



PROCEEDINGS
TRANSFORMATION
in a changing climate

International Conference in Oslo 19 - 21 June 2013

2013

University of Oslo
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Conference webpage:
WWW.ISS.UIO.NO/TRANSFORMATION

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The first “transformation in a changing climate” conference: Introduction and reflections

INTRODUCTION

What is the relationship between personal, cultural, political, institutional, and systems transformations, and how can these contribute to changes that are both ethical and sustainable? This question was one of the motivations for organizing the conference on “Transformation in a changing climate”, which took place from 19-21 June, 2013 at the University of Oslo, Norway. The conference was organized by the Department of Sociology and Human Geography at the University of Oslo, in collaboration with CICERO, the Stockholm Resilience Centre and the International Social Science Council, and co-sponsored by the Intergovernmental Panel on Climate Change (IPCC). The event brought together close to 300 participants from more than 40 countries from a wide range of disciplines and perspectives, including science, government, business, civil society and the arts to discuss the concept of transformation as a response to climate change.

THE CHALLENGES OF CLIMATE CHANGE AND TRANSFORMATION

Climate change is considered by many to be the greatest challenge to humanity. The IPCC Assessment Reports conclude that in the absence of significant responses, climate change can lead to unprecedented social and ecological impacts. Climate change responses include both measures to reduce greenhouse gas emissions and adapt to changes that are projected to occur in the next decades. It is, however, becoming clear that business-as-usual scenarios will not be sufficient to meet the complex challenges posed by climate change. The concept of transformation is increasingly used to describe the types of responses that are considered necessary. Transformation can be defined as physical and/or qualitative changes in form, structure, or meaning-making. It can also be understood as a psycho-social process involving the unleashing of human potential to commit, care and effect change for a better life.

Transformation to a low-carbon, well-adapted global society presents both opportunities and risks. For some, it is associated with a green economy, opportunities for innovation and increased levels of well-being. For others, it suggests a contraction of freedom that can result in chaos and disruption. Still others see it as the agenda of powerful interests seeking to take advantage of multiple crises. Transformation is thus not a neutral process, and there are diverse values and interests at stake. There are many theories, frameworks and approaches that provide insights on transformation. The literature generally points to the need for transformation at the systems level, which is dependent upon changes at multiple, interlinked levels of human-environmental interactions, facilitated by factors such as reflection, deliberation, innovation, learning, and leadership. In the face of climate change these diverse approaches can be integrated in ways that generate equitable, ethical and sustainable responses.

CONFERENCE ON TRANSFORMATION IN A CHANGING CLIMATE

The Transformation 2013 conference emphasized diverse aspects of transformation, including a variety of themes. These included transformations related to economics; politics; technical responses and infrastructure; urban areas; community-based strategies; learning and leadership; social-ecological systems; values, norms and worldviews; science and research; communication; and the arts. In addition to the thematic focus, the conference welcomed cross-cutting contributions that explored the linkages between different scales and dimensions of transformation. The following questions represent some of those explored during the conference:

- What do we actually mean by transformation, what does it entail and how does it differ from our understanding of processes of change and transition?
- What types of transformation are considered necessary? Is it possible to innovate rapidly enough, and with sufficient intelligence, to transform systems along pathways towards global justice, gender equity, and long-term social and ecological resilience?
- Can this be done in a participatory and deliberative manner?

- What factors facilitate transformation in theory and in practice, across different systems, sectors, and domains?
- What types of capacities and competencies need to be developed to initiate and facilitate transformations that are both ethical and sustainable?
- Where are the gaps in the current knowledge base? What lessons can be drawn from diverse fields of research to inform strategies and actions for deliberate, ethical and sustainable transformations at the rate and scale called for by scientific understandings of climate change?
- How does science itself need to change, and how can new approaches to global change research contribute to transformation of both theory and practice?

The format of the conference included both conventional and unconventional features. Each part of the program was carefully tailored to the conference objectives, particularly the need for transdisciplinary dialogue across and beyond academic disciplines. The diverse format included short plenary talks, panel discussions, “fish-bowl” dialogues, and “speed papers”, which allowed for deeper conversations around participants’ areas of expertise. Unconference formats enabled vibrant conversations and ensured maximum exposure to different perspectives, allowing for innovative ideas and new collaborations to emerge. As one example, an open space event called “Taking a Stand” allowed conference participants to create the agenda, identifying questions and ideas that were not included in the formal conference program. Group discussions sparked new ideas and initiatives for research and collaboration related to transformation. The unconventional format was essential to opening up dialogues, discussions, and debates that got to the heart of transformation, asking what it would really take to catalyze transformations at the personal, cultural, organizational and systems levels. These conversations also focused on the beliefs, assumptions, habits and loyalties that hinder transformations, and how such impediments might be overcome.

Art played an important role in the conference, bringing creativity and imagination into every aspect of the program. Powerful talks and images by Amy Balkin (USA), Tone Kristin Bjordam (Norway), Amy Franceschini from Future Farmers (USA) and Eva Bakkeslett (conference curator) drew attention to the importance of art in communicating and exposing alternative, creative and transformative responses to climate change. Illustrations and films were used to represent different dimensions of transformation processes, targeting different audiences and interests. These included the short film “Extreme Choices,” directed and edited by Clive Ardagh and the animation “Extremes in Climate Change” by 18-year old William Blofeld. Graphical recordings of all plenary talks were done by Karina Mullen; by translating the presentations and discussions into colorful drawings, the key themes and ideas were made visible. A public lecture on “The Reimagination of Carbon” was held by Paul Hawken, the author of “The Ecology of Commerce” and “Blessed Unrest”, providing the audience with new perspectives on transformation to a low carbon society. The perspectives of young people were emphasized throughout the conference, both in plenary sessions and as part of an active audience. Climate change, poverty, social inequality, struggles for democracy, and high youth unemployment are just some of the concerns facing young people around the world, and these issues underscore the importance of engaging youth in transformation processes.

The conference welcome reception took place at the Oslo City Hall on the afternoon of Tuesday, June 18th. The conference dinner on Thursday, June 20th began with a fjord boat trip to Bygdøy, followed by an aperitif at the Fram Museum, which houses the ship used for Fridtjof Nansen’s polar expeditions. The dinner itself was held at the Kon-Tiki Museum, where conference participants were met by Mr. Thor Heyerdahl Jr., who talked about his father’s adventures and scientific achievements. During the dinner the participants were seated around the legendary balsa raft Kon-Tiki that Thor Heyerdahl used when he and his crew crossed the Pacific Ocean in 1947. The dinner venues emphasized the themes of exploration, which was as important to the 20th century as transformation is to the 21st century.

Social media served as an important means for disseminating the conversations to a wider audience. All plenary events of the conference were streamed live and video streams are available at the conference web site (www.iss.uio.no/transformation). The Facebook page for the conference had followers from around the world and people were active on Twitter.

CONFERENCE PAPER CONTRIBUTIONS AND PROCEEDINGS

Prior to the conference, a call for abstracts was announced through international research networks and 150 papers were accepted for the conference. It was not possible to publish all of the papers, for lack of space and because some were committed for publication in research journals and anthologies. We have nonetheless selected some examples of

papers on different themes and aspects of transformation. Although these papers do not represent the full spectrum of research presented at the conference, they do reflect the diverse nature of the field. The diversity of approaches, reflected in the conference abstracts, attest to the need for integrated research on transformations to sustainability.

Some of these papers address larger questions related to the who, what, why and how of transformation processes, and others present case studies of transformation in practice. The papers include a combination of theoretical, empirical and philosophical approaches to transformation. They demonstrate the breadth of the field and the importance of bringing together different perspectives. It should be noted that the articles included in the proceedings have not been through a peer review process.

CONFERENCE ACHIEVEMENTS AND OUTCOMES

The Transformation 2013 conference has had several outcomes. First and foremost, the conference catalyzed the formation of a community of knowledge and practice around the theme of transformation. This community is unique because it includes diverse perspectives and links different fields and institutions. With its many ties into different international policy and research processes, this community has the potential to inform future agendas on the issue of transformation. Building on the Transformation 2013 conference, several institutions and countries are interested in hosting future transformation conferences, and the Stockholm Resilience Centre plan to host the next Transformation conference in 2015. We look forward to fostering this unique network and catalyzing collaboration on transformation in a changing climate.

The conference also contributed to an increased understanding of the many dimensions of transformation, including what is possible, what it takes to get there, how different sectors and institutions can participate and what is an individual's sphere of influence to generate systems change. Another important outcome of the conference will be academic publications that contribute to an enhanced theoretical, empirical and practical basis for understanding deliberate transformations in response to climate change.

We would like to end with some words of appreciation. First, we thank the scientific board for the conference for diverse feedback and for playing different roles during the conference. We also thank the main conference funders for making the event a reality: the Norwegian Ministry of Foreign Affairs, the Norwegian Environment Agency, the Ministry of the Environment and the Norwegian Research Council. Lastly, we would like to thank those from around the world who participated in the Transformation 2013 conference in Oslo, 19-21 June, 2013, including student volunteers. You were the conference, with all your knowledge, experience, skills, enthusiasm, openness and friendliness.

Enjoy reading the interesting speeches and articles that follows in this Transformation 2013 proceedings.

With regards,

The Conference Organizing Committee

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Conference opening speech

Inga Bostad, Pro-Rector at the University of Oslo

Dear all,

I am extremely happy to welcome you all to the University of Oslo and this conference: Transformation in a Changing Climate. The conference is co-organized by the University of Oslo, the Stockholm Resilience Centre and International Social Science Council. It is likely to be the first in a series of conferences addressing this theme to take place around the world.

This room now counts approximately 250 people. You represent almost 50 countries. In other words; the perfect picture of how a conference on climate change should be met – with dialogue and discussion across national borders or regional organizations – and across of academic divides.

Universities are obvious participants and facilitators for dialogue concerning the grand challenges of our time. It is, in fact, an important part of our social responsibility. The University of Oslo is certainly no exception.

Meeting the challenge of a changing climate, and all its implications, is a multifaceted task. We need to be innovative in our approach, and we need to think beautifully and act dutifully as the Norwegian ecophilosopher Arne Næss said. 2013 is the University of Oslo's Year of Innovation, and innovation will be a key theme today – hopefully an innovation that consists of an ethical reflection.

We want to raise awareness to the role universities have in driving innovation forward. Without innovative solutions, we will not be successful in meeting the future and a changing climate. To reach an understanding of what transformation in a global era actually implies, interdisciplinary and transdisciplinary research collaborations are critical.

Therefore, I am happy to see representatives of many disciplines in this room. The social sciences and humanities are disciplines with enormous contributions to make towards understanding change processes, including how we can deliberately change in a fair and ethical manner. The role of the arts is also emphasized in this conference. Art is not just as a source of entertainment or means of communication, but also a way to visualize and experience transformation processes in new ways – and some days ago I had the opportunity to engage in a public dialogue with the world known writer and philosopher Jostein Gaarder, to talk about his last book, *Anna*, a modern Fairy tales about climate change.

While we are participants in a public dialogue, universities also need to put their money where their mouth is. At the University of Oslo, we have our Green UiO Initiative, which together with the organizers at the Institute of Sociology and Human Geography has made this conference as “green” as possible. I wish to thank both the organizers and Green UiO for a job well done!

I am certain you will have motivating, challenging and inspiring days here in Oslo. The conference is driven mainly by dialogue and discussion, and less by presentation, something which is not less demanding; real dialogue is about listening carefully and being willing to meet other people's argument even if we do not sympathize with them in the first place. A dialogue wide enough for the uncomfortable dilemmas.

Arne Næss once told me: If you ask me what kind of philosophical attitude I was inspired by, I immediately think about Diogenes, who dressed in a barrel, and walked around with a lantern in the middle of the day, searching for wise people. Diogenes, said Arne, was a role model for me – and made me aware of my own life and that prioritizing values was the inner core of mankind.

In other words; we the need to think far ahead when dealing with our global challenges. If we have a long term vision, for example two or three generations ahead, our work today could be about what kind of world we leave behind. What kind of world do our grandchildren and our great grandchildren receive from us?

Here, to shed light on today's topic from the view of the Norwegian authorities is our Minister of the Environment, Bård Vegar Solhjell.

Good luck with the conference! I hope you have awarding discussions!

Conference welcome speech

Bård Vegar Solhjell, Minister of the Environment

Ladies and gentlemen!

I am very pleased with this opportunity to introduce this conference on transformation in a changing climate.

I come from a small community on the west coast of Norway, surrounded by deep fjords, steep mountains and magnificent glaciers.

We are used to rough weather. But increasingly people in my region fear that when they send off their kids on the school bus in the morning, they are also putting them at greater risk, as the frequency of avalanches is increasing year by year. The features of landscape are also changing and changing fast. While the glaciers were hanging majestic and blue only a decade ago, what is left now is the grey rock bed.

So what do these changes do with the people in this region - their perception, identity and sense of place? Natural science is fundamental to understand climate change. But, climate research must be able to capture the processes of change that go beyond nature and into the understanding of how society and people conceives, react and respond to climate change. I should add that I'm trained as a political scientist myself, and often in my daily work as a Minister I feel the lack of this broader approach in research. I welcome this conference that speaks directly to this issue and hope it will make a valuable contribution in building comprehensive understanding of climate change processes.

Climate changes are affecting everyday life, business and politics, and interact with other social and economic processes of change that transform our society. The climate challenge gives shape to new ideas and policies from health care, transport and energy to the visual arts and literature. However, regrettably often too slow. Because the lack of ability to fully grasp and welcome change, and understand what is actually coming. My guess, and I gather many in this audience would agree, no other single issue will dominate and give colour to the story of the 21st century.

The question that remains is whether this will be the story of overwhelming change brought on by global warming and mass extinction of species and ecosystems. Or, if our grandchildren will live in a world where global warming has had only modest impact, and where society is transformed through a fresh and bold low-carbon way of life. It's a question foremost to be answered through political willingness to act. But we also need research in order to understand our options. What do we leave behind and what would we be faced with by choosing the different pathways?

In 1958, NGU, Norway's geological surveys institute, declared in a formal letter to the Ministry of Foreign Affairs: "The possibility to find oil, coal or sulphur on the continental shelf offshore Norway could be neglected". 11 years later, in 1969, Norway stepped into the oil-age, with the Ocean Viking rig striking oil at Ekofisk.

The story of oil in Norway proves that belief in changing the future is not naive, change happens. But when people try to predict the future, they tend to rely on experience, the truth of today, often ignoring even the most obvious facts when we look back in hindsight.

Celebrating 100 years of the right for women to vote in Norway earlier this month, today's place for women in society is taken for granted, for obvious reasons.

When people looked forward into the future in 1913, they would never ever guess much of what dominates the lives of modern human, it be mobile phones, commercial air flight or women's rights to decide their own destiny.

In the 1850s, when horse taxis dominated the streets of London, an artist made a drawing on how he expected future transport to be. He drew an enormous carriage with 100 horses. Bigger, faster and with more horse power. But he wasn't able to imagine something completely different, such as for example cars. This is now about climate change, and we look to the future with great concern.

More than 80 percent of the greenhouse gases that can be allowed to be released into the atmosphere under the 450-scenario, have already been released. Annual emissions of all greenhouse gases combined compares to roughly 50 billion tons of CO₂, according to the United Nations Environmental Programme. Last week the IEA presented another report, stating that we are on course for 4-5 degrees global warming. That will create living conditions unknown to mankind. The good news is that global warming was created by man, and therefore can be solved by humans.

I grew up under the threat of nuclear war between the USA and the Soviet Union. My children grow up under the threat of global warming. As it turned out, there was no nuclear war, the Iron curtain is history and the Soviet Union does no longer exist. Enemies are now allied.

This shows us that everything is possible in the history of mankind. If someone had told us in 1979 that the Berlin Wall would be gone in ten years, we would not have believed it.

We can't predict the future, but we can contribute to shaping it. As human beings of the 21st century, we have a lot of knowledge about the impact of fossil fuels on climate change.

Even if Norway is a small country, we can take on our fair share of the effort

- Norway has pledged to cut emissions 30 percent, compared to the level of domestic emissions in 1990
- Conditioned by a sufficiently ambitious global agreement, this target will be stepped up to 40 percent
- We aim to be a low-carbon society mid century
- And stay committed to several international initiatives, on clean energy, carbon-capture technologies, fighting deforestation and addressing the short lived climate forcers.

Halting climate change and achieving a green transition is the greatest challenge of our time, but it is doable. The Ozone-shield was threatened, so through international negotiations and local action, we fixed the problem. And I have not met with one person that complains, and wants to have back the refrigerators and spray cans of yesterday.

Low emission society is not boring and hard and difficult, as many tend to believe. On the contrary, it will be better for all of us.

The right future will provide

- better public transport,
- cleaner air,
- less pollution,
- improved economy,
- more efficient use of resources
- and eventually a much safer and more prosperous future.

There will be more cars with no emissions and less noise. We will plan our cities better, with shorter distance between our houses, our working places, schools and kindergartens. In a truly resilient economy, based on sustainable technologies and solutions.

Maybe our children will shake their heads when we tell them about the cities of our childhood, the pollution, the noise and traffic jams.

Let me end where I started - back home. I want the glaciers to remain, I want the parents to be confident that when they send their children to school they will return safe. I still want to go skiing in the places I always have. We can do a lot to make the future a safer place by deep and swift cuts in greenhouse gas emissions. But I also realise that we have come to a point of no return, where the processes of climate change will affect risk and livelihoods of millions of people.

My hope for this conference is that it widens our understanding of a changing climate, and that collectively, researchers from different disciplines contribute to build a shared understanding of climate change and transformative processes. And at the same time help us to understand how we face the consequences of an already changing climate.

With that I wish you all the best for the days to come. Thank you.

Program at a glance

TUESDAY 18 JUNE

	Venue: Sophus Lies Auditorium
12:00	<p>OSLO EXTREME DIALOGUE ON CLIMATE EXTREMES - BUILDING A BRIDGE TO THE FUTURE</p> <p>Moderator: Nisha Pillai</p> <p>Venue: Sophus Lies Auditorium</p> <p>Participants: Ravid Goldschmidt, Musician, Hang player, Spain; Ole Petter Ottersen, Rector, University of Oslo, Norway; Arvinn Gadgil, State Secretary, Ministry of Foreign Affairs, Norway; Nnimmo Bassey, Friends of the Earth International and Environmental Rights Action, Nigeria; Mehjabeen Abidi-Habib, Government College University Lahore, Pakistan; Madeleen Helmer, Red Cross, the Netherlands; Idar Kreutzer, Finance Norway, Norway; Cathrine Moestue, Moestue Consulting, Norway; Susanne Moser, Susanne Moser Research & Consulting, USA; and Haavard Stensvand, County Governor of Sogn og Fjordane, Norway.</p>
15:00	
16:00	Conference Reception, Oslo Town Hall
17:30	Welcome note by Mayor Fabian Stang, City of Oslo and Dean Fanny Duckert, Faculty of Social Sciences at the University of Oslo

WEDNESDAY 19 JUNE

WHAT IS TRANSFORMATION?

	Venue (9:00-15:30): Georg Sverdrups Hus					
09:00	OPENING , Pro-Rector Inga Bostad, University of Oslo					
09:05	WELCOME SPEECH , Minister of the Environment, Bård Vegar Solhjell					
09:15	FRAMING TALK , Karen O'Brien, University of Oslo					
09:30	REALITY CHECK: A Climate for Transformation , Cecilie Mauritzen, CICERO					
09:45	MUSIC : Tommy Tokyo					
10:00	PERSPECTIVES ON TRANSFORMATION: "Reconnecting to the Biosphere" Carl Folke, Stockholm Resilience Centre; "Speed, Scope and Depth": What Counts as a Socio-Technical Transformation? Frans Berkhout, IVM					
10:45	Break					
11:15	PAPER PRESENTATIONS: PART I					
	Social-Ecological Transformations (I)	Transformational Adaptation (I)	Urban Transformations (I)	Creating Low Carbon Societies (I)	Communicating for a Change (I)	Towards a New Science of Transformation (I)
12:00	Break					
12:15	PAPER PRESENTATIONS: PART II					
	Social Ecological Transformations (II)	Transformational Adaptation (II)	Urban Transformations (II)	Creating Low Carbon Societies (II)	Cultural Transformation	Towards a New Science of Transformation (II)
13:00	Lunch					
14:00	DEEP CONVERSATIONS					
	Adaptation & Transformation Featuring Mark Pelling, Neil Adger, Paty Romero Lankao, Marianne Karlsen and participants	The Story of Climate Change Featuring Joe Smith, Katie Mach, Nina Witoszek, Amy Franceschini and participants	Transformative Leadership Featuring Lisen Schultz, Susanne Moser, Anne Caspari, Ioan Fazey and participants	The Economics of Transformation Featuring David Manuel-Navarrete, Atle Midtun, John Thompson, Steffen Kalbekken and participants	Transforming Development Featuring Coleen Vogel, Rohan D'Souza, David Tabara, Myanna Lahsen and participants	
15:00	Break					
15:30	PLENARY DISCUSSION: How Do We Transform the Future? Moderators: Karen O'Brien, University of Oslo and Ioan Fazey, University of Dundee Speakers: Nnimmo Bassey, Mark Howden, Riel Miller, Geoff Fitch					
16:30	Break					
	Venue (17:00-18:00): Sophus Lies Auditorium					
17:00	PUBLIC LECTURE: "The Reimagination of Carbon" Paul Hawken, environmentalist, entrepreneur, and author					
18:00	Break					
18:30	OPTIONAL ART EVENT: NEW AGRARIAN MYTHOLOGY - Agrarian folklore, rituals, and celebrations as related to the pressing issue of climate change.					
19:30	Flatbread Society/ Bakehouse Bjørvika.					

THURSDAY 20 JUNE

HOW DO WE DO TRANSFORMATION IN PRACTICE?

Venue (09:00-12:30): Georg Sverdrups Hus					
09:00	FRAMING TALK , Per Olsson, Stockholm Resilience Centre				
09:15	PERSPECTIVES: "Social Innovation and Sustainability: Understanding the Social Dynamics of Transformation" Frances Westley, University of Waterloo "Grass Root Innovations" Anil Gupta, Indian Institute of Management				
10:00	ART PERSPECTIVE ON TRANSFORMATION: "Critical Transitions", Tone Bjordam				
10:15	Break				
10:45	PAPER PRESENTATIONS: PART I				
	Approaching Modernity: Business and Economy (I)	Transforming Development (I)	Community Transformations (I)	Politics and Governance (I)	Creating Low-Carbon Societies (III)
11:30	Break				
11:45	PAPER PRESENTATIONS: PART II				
	Approaching Modernity: Business and Economy (II)	Transforming Development (II)	Community Transformations (II)	Politics and Governance (II)	New Approaches to Education and Learning
12:30	Lunch				
Venue (13:30-14:30): Venue Idrettsbygningen					
13:30	TAKING A STAND ON TRANSFORMATION: An Open Space Event Faciliator: Bill Aall				
14:40	Break				
Venue: Georg Sverdrups Hus					
15:00	PLENARY DISCUSSION: What is the role of innovation in global sustainability transformations? Moderators: Per Olsson, Stockholm Resilience Centre and Frances Westley, University of Waterloo Speakers: John Thompson, Eva Bakkeslett, John Thackara, Anil Gupta				
16:00 16:30	"Transformation Where The Rubber Hits The Road: The Story Of Climate Change Adaptation In Durban, South Africa" Debra Roberts, eThekweni Municipality, South Africa				
18:00	CONFERENCE DINNER Departure to Bygdøy with boat from Aker Brygge, touring the fjord, visit the Fram Museum Dinner at the Kon-Tiki Museum				

FRIDAY 21 JUNE

HOW DO WE MAKE TRANSFORMATION JUST, DELIBERATIVE AND EQUITABLE?

Venue: Georg Sverdrups Hus					
09:00	FRAMING TALK, Asun St. Clair, CICERO				
09:15	PLENARY DIALOGUE: How to Transform an Oil-Based Society into a Sustainable Society? Moderator: Marius Holm, Zero og Asun St. Clair, CICERO Kick-off perspectives by Paul Hawken, Helge Ryggvik, Lan Marie Berg, Cecilie Mauritzen and Stein B. Jensen				
10:15	Break				
10:45	PAPER PRESENTATIONS: PART I				
	Politics and Governance (III)	New Narratives (I)	Community Transformations (III)	Power, Politics and Interests	Transforming Agriculture
11:30	Break				
11:45	PAPER PRESENTATIONS: PART II				
	Politics and Governance (IV)	New Narratives (II)	People on the Move	A Changing Climate for Youth	Trim Tabs for Transformation
12:30	Lunch				
13:30	VOICES OF THE FUTURE: Taking on the Challenges Ahead (Featuring Bronwyn Hayward on “Democracy and Citizenship”, and Joe Smith on “Taking Care of Things”, along with a medley of youth perspectives)				
14:20	ART PERSPECTIVE ON TRANSFORMATION: Public Smog, Amy Balkin				
14:45	PLENARY DISCUSSION: What Could a Transformed World Look Like, and What Would It Take To Get There? Moderator: Asun St. Clair, CICERO Speakers: Jean Russell, Des Gasper, Susanne Moser, Gunhild Stordalen				
15:45	“Taking Social Transformation Seriously” Heide Hackmann, International Social Science Council “The Next Steps” Karen O’Brien, University of Oslo				
16:00	MIDSUMMER TOAST - TO A SUSTAINABLE FUTURE				
16:30	End of conference				

SATURDAY 22 JUNE

09:00	WORKSHOP ON TRANSFORMATIVE LEADERSHIP
17:30	

Committees



Transformation in a Changing Climate
was an FEE certified green event.

SCIENTIFIC COMMITTEE:

Neil Adger, University of Exeter, UK

Eva Bakkeslett, Artist and Cultivator, Surrey, UK

Jon Barnett, University of Melbourne, Australia

Frans Berkhout, Institute for Environmental Studies, VU University, the Netherlands

Barrett Brown, Integral Sustainability Center Amsterdam, the Netherlands

Rohan D'Souza, Jawaharlal Nehru University, India

Ioan Fazey, University of Dundee, UK

Chris Field, Stanford University, USA and the Co-Chair of WG II of the IPCC

Carl Folke, Stockholm Resilience Centre, Sweden

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Responding to climate change: The three spheres of transformation

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INTRODUCTION

More and more individuals and organizations recognize that business-as-usual is an insufficient response to today's climate challenges. As a result, the concept of transformation is moving to the forefront of debates about responses to climate change (WBGU, 2011; O'Brien, 2012; Park et al., 2012). Nonetheless, there are some very different conversations taking place around transformation. Transformation can be defined as physical and/or qualitative changes in form, structure, or meaning-making, or as "the altering of fundamental attributes of a system (including value systems; regulatory, legislative, or bureaucratic regimes; financial institutions; and technological or biological systems)" (IPCC, 2012: 564). It can also be understood as a psycho-social process involving the unleashing of human potential to commit, care and effect change for a better life, or an internal shift that results in long-lasting changes in the way that one experiences and relates to oneself, others, and the world (Sharma, 2007; Schlitz et al., 2010). Folke et al. (2010) note that transformations can be deliberate or forced, depending on the level of transformability of the system. Transformability is defined by Westley et al. (2011: 763) as "the capacity to create untried beginnings from which to evolve a fundamentally new way of living when existing ecological, economic, and social conditions make the current system untenable."

Within the context of climate change, transformation is a complex process that entails changes at the personal, cultural, organizational, institutional and systems levels. It is not always clear what exactly needs to be transformed and why, how, in whose interest, and what the consequences will be. The idea of transformation can be perceived as instrumental by some and threatening by others, leading to trade-offs or conflicts that can result in real or perceived winners and losers at different scales. For example, a transformation of energy systems that involves the development of biofuels has been criticized for contributing to land grabbing and food insecurity (Harvey and Pilgrim, 2011). Strategies to reduce deforestation, such as through REDD+, can be seen as detrimental to indigenous communities and local interests (Sunderland, 2011; Beymer-Farris and Bassett, 2012). Geoengineering as a response to climate change has also raised numerous social, environmental and ethical concerns (Gardiner, 2011). Not surprisingly, many of the transformations that are currently proposed in response to climate change are poorly understood, frequently contested and often resisted.

In this paper, we discuss four approaches to transformation that are currently visible in the climate change literature. We then synthesize these approaches by presenting a simple framework that focuses on three interacting "spheres" of transformation. The three spheres, referred to as the practical, political, and personal spheres, can be used as a tool for understanding how, why and where transformations toward sustainability may take place. We consider where the four approaches fit into this framework, paying particular attention to how the relationships among the spheres together influence outcomes for sustainability.

RESEARCH ON TRANSFORMATION

Although transformation is widely talked about, there are many partial, fragmented, and even contradictory understandings of how such changes come about. Transformation means different things to different people or groups, including within the community of researchers, policy makers, practitioners and citizens working on issues of climate change and global sustainability. A result is that multiple conversations are taking place around the notion of transformation, each with different approaches, focal points, goals and objectives. Below, we discuss four broad literatures that address transformation in a changing climate. There are many similarities and overlaps among these literatures, but they can nonetheless be considered discrete approaches to transformation within the context of climate change.

Transformational adaptation

Humans have been transforming the Earth for millennia, but it is only over the past centuries that the impacts have become visible at a global scale (Turner et al., 1990; Steffen et al., 2011). Climate change, in combination with other environmental changes, is now contributing to transformational changes in the Earth system, including changes in ice cover, sea level, ecosystems, species distributions, and extreme events (IPCC, 2007; 2012). While adaptation is recognized as an important response to climate change, it is becoming clear that in some places it may be necessary to pursue transformational adaptation. Transformational adaptation goes beyond incremental approaches to climate change impacts, and may include changes in form or structure through novel, large-scale actions. It may be taken in anticipation of, or in response to observed or expected impacts, it may involve coordinated or uncoordinated actions, and it may be deliberate or inadvertent (Nelson et al., 2007; Marshall et al., 2012; Park et al., 2012). Kates et al. (2012) describe three types of transformational adaptations; those adopted at a larger scale or intensity; those that are novel to a particular region or system; and those that transform places or involve a shift in location. Although transformational adaptations are most often technological or behavioral, it is recognized that there are legal, social and institutional barriers linked to values, ingrained behaviors, and self-identities (Kates et al., 2012).

Attention to transformational adaptation is warranted in a world experiencing complex processes of change, and where climate change mitigation is not occurring at a rate that will avoid serious impacts for some. Kates et al. (2012: 5) contend that “transformational adaptations will be required in future years in some places and by some systems, given local vulnerabilities and in the face of such possible driving forces as relatively severe climate change and other stresses.” Explicit to this is the idea that impacts are forthcoming regardless of human responses. Implicit is the possibility that humans cannot or will not change systems and structures that contribute to climate change, social vulnerability, and disaster risk, and thus will be forced to adapt to the consequences of climate change in a transformational manner.

Transformations to sustainability

There are diverse literature on transitions and transformations to sustainability, most of which include development pathways that stabilize emissions of greenhouse gases (Raskin, 2001; Calvin et al., 2009; WBGU, 2011; Westley et al., 2011). The literature on transformative pathways typically focus on trajectories of emissions, changing risks, cost-benefit analyses, transitions in energy systems and land-use patterns, carbon capture, technological choices, and policy approaches (Calvin et al., 2009; Thomson et al., 2011). Given the large number of potential transformation pathways, the choice of which to follow will ultimately involve weighing characteristics and considering tradeoffs with other priorities. More generally, research on sustainability transitions focus on purposeful and deep structural changes in energy, transport, agriculture and other systems (Geels, 2011). This includes societal innovations and changes in governance, including transition management as a new mode of governance to influence long-term societal change (Loorbach, 2007). Most research on transitions is based on systems thinking and complexity science, which emphasize learning processes, adaptive management, innovation and experimentation across multiple levels, such as landscapes, regimes and niches. While non-linearity is a recognized characteristic of transitions, the process itself is considered to be long-term and gradual, often occurring over generations due to lock-in mechanisms (Geels, 2011). Importantly, there is no single cause or driver of such transitions, but rather it is seen as the result of multiple processes interacting across scales. For example, niche alternatives alone are unlikely to transform regimes, which include the deep structures that account for the stability of existing socio-technical systems (Smith, 2010; Geels, 2011).

The importance of including ecosystems and biodiversity in discussions of global sustainability is emphasized in the literature on transformations to ecosystem stewardship (Chapin et al., 2009; 2010). Drawing on many of the concepts and ideas from the study of resilience, such as adaptive cycles, fast and slow variables, feedbacks, and bringing in notions of governance and innovation (Gunderson and Holling, 2002; Walker and Salt, 2007), this literature focuses on the notion of desirable transformations, i.e., the goal of sustaining the desirable features of the current world for future generations (see Chapin et al., 2009). It recognizes that cultural, economic and governance institutions all play an important role in preventing or enabling transformation (Westley et al., 2011). While there is some overlap with the literature on socio-technical transitions to sustainability, this field of research draws attention to a fundamental need to “reconnect with the biosphere” (Folke et al., 2011). It includes recognition of the role of human agency and capacity for learning, as well as the importance of institutional entrepreneurs who often operate within shadow networks (Westley et al., 2011).

Transforming behaviors

The transformation of human behavior is considered to be an essential part of transitions and transformations to global sustainability. There is a growing literature discussing the individual and cultural dimensions of climate change, including the psychological barriers to responding (Gifford, 2011; Swim et al., 2011). Cognitive psychology shows that people have multiple strategies for dealing with the reality of climate change (Kahan, 2012), whereas cognitive anthropology puts these within the context of human belief networks to consider the cognitive prerequisites for mobilizing the subjective individual potential for collective action (Antal and Hukkinen, 2010). Social psychology emphasizes the important role that cultural values play in shaping collective responses (Crompton, 2011), and sociology draws attention to how climate change is sustained through the social construction of denial, and through the cultural management of emotions (Norgaard, 2011). A number of authors attribute climate change to nothing less than a crisis of consciousness (Speth, 2008; Rifkin, 2010).

The role of human agency in transformation processes has gained considerable attention through a wide range of literatures. Research on values, worldviews, beliefs, self-efficacy and ecological citizenship focus on the potential of individuals and groups to become agents of change (O'Brien and Wolf, 2010; Hedlund-de Witt, 2012). A more recent body of research, discussed by Rowson (2011), emphasizes 'neurological reflexivity', which includes self-awareness that is capable of shaping the social and biological conditions that underpin actions. Reflexivity involves an understanding of the underlying beliefs, assumptions and other factors or drivers associated with an activity or experience, which results in the power to influence or change it (Siegel, 2007). Such an approach differs from 'nudging' sustainable behaviors, which "changes the environment in such a way that people change their behavior, but it doesn't change people at any deeper level in terms of attitudes, values, motivations etc." (Rowson, 2011: 16). Nonetheless, a focus on "attitude, behavior and choice" has been criticized for ignoring the underlying systems of provision, and the extent to which options and possibilities are structured by institutions and governments (Shove, 2010).

Social transformations

There is a wide recognition that the types of transformations necessary to avoid dangerous climate change involve more than new technologies, better management, improved policies or behavioral changes. They also call for transforming the political, economic, and social structures that maintain the systems associated with increasing risk and vulnerability intact. Manuel-Navarrete (2010), for example, calls for challenging sociopolitical structures and the realist agenda of global environmental governance and regimes, and draws attention not only to the need to address power relations, but also to humanist ideals of emancipation, which emphasize intentional human agency and creative power. Swyngedouw (2010) critiques the non-political and non-partisan nature of environmental populism and its implicit acceptance of the inevitability of capitalism and a market economy as the only organizational structure of the social and economic order. Absent from this is a "politics of the possible" and a naming of different socio-environmental futures that may introduce difference, conflict, and struggle (Swyngedouw, 2010).

In discussing transformation as a type of adaptation, Pelling (2010) describes a central challenge for systems analysis: placing the system itself as the object of observation. He notes that the resilience of a system is often maintained by focusing on the proximate causes of undesirable outcomes, rather than the root causes of vulnerability that lie in the social, cultural, economic and political spheres. From within the system, these causes can appear naturalized, or "part of the way the world is" (Pelling, 2010: 86). When vulnerability is attributed to local issues, such as unsafe buildings or inappropriate land use, adaptation will be seen as technical problem that can be addressed through improved housing standards, land use changes, and other managerial strategies. However, Pelling (2010: 97) stresses that "if vulnerability is framed as an outcome of wider social processes shaping how people see themselves and others, their relationship with the environment and role in political processes, then adaptation becomes a much broader problem. It is here that transformation becomes relevant."

THREE SPHERES OF TRANSFORMATION

Transformation is becoming an important concept in discussions and debates on how to address complex global environmental problems. The diverse conceptual and theoretical frameworks discussed above can guide research, policy and practice, and contribute to deeper understandings of transformation within the context of climate change. However, there is also recognition that a more comprehensive approach to transformation is needed: "a regime shift cannot occur without changing worldviews, institutions, *and* technologies together, as an integrated system" (Beddoe

et al., 2009: 2484). Yet still there is no comprehensive understanding of how deliberate transformations towards sustainable outcomes come about.

In this section, we synthesize and integrate the conversations on transformation discussed above by conceptualizing transformation as a process that takes place across three embedded and interacting spheres. These three spheres, referred to in shorthand as the practical, political and personal spheres of transformation, are implicitly or explicitly alluded to in each of the conversations on transformation, but with little attention to the interactions and interrelations. By viewing the spheres together, it is possible to see the breadth and depth of transformations, as well as the multiple entry points for sustainability outcomes.

The three spheres of transformation are drawn from the work of Sharma (2007) and illustrated in Figure 1. The practical sphere represents both behaviors and technical solutions to climate change. These include behavioral changes, social and technological innovations, and institutional and managerial reforms. The political sphere includes the social and ecological systems and structures that create the conditions for transformations in the practical sphere. The personal sphere includes individual and collective beliefs, values and worldviews that shape the ways that the systems and structures (i.e., the political sphere) are viewed, and influence what types of solutions (e.g., the practical sphere) are considered “possible”. While the spheres come across on paper as flat, two-dimensional circles, they are embedded within one another, with the practical sphere at the center, surrounded by the political and personal spheres. The ordering of the three spheres is significant; the practical sphere is at the core, where the targets or goals are located; the political sphere represents the enabling/disabling conditions; and the personal sphere captures individual and collective “views” of systems and solutions. Transformations within any one sphere can facilitate changes in the others, although some interventions are more powerful and effective than others (see Sharma, 2007).

The practical sphere

We first focus on the practical sphere that represents the core of transformation; this is where outcomes have an observable and measurable influence on climate policy goals such as mitigation, adaptation, or sustainable development. Not surprisingly, this is where most attention is currently focused; it is within this practical sphere where “technical” responses to climate change take place, including changes in management practices, the introduction of new technologies, and socio-technical and cultural innovations. It also includes changes in strategies, practices and behaviors. Transformative pathways towards emissions stabilization are typically focused on this sphere, and this includes many climate policies aimed at cost-effective emissions reductions through changes in the energy technologies or through carbon capture and storage (Thomson et al., 2011). Most adaptations to climate change also take place in the practical sphere.

The practical sphere can be considered the “outcome” sphere, where the numbers, parameters, and indicators are most often measured (e.g. the Human Development Index, the Red List of Endangered Species, ecological footprints, etc.). However, as Meadows (2009) notes, attention to parameters and numbers is one of the least effective leverage points for systems change, as many such changes push the system in the wrong direction. Indeed, without addressing the larger systems and structures, practical solutions may create unexpected outcomes and new problems. The line between business-as-usual and transformation is

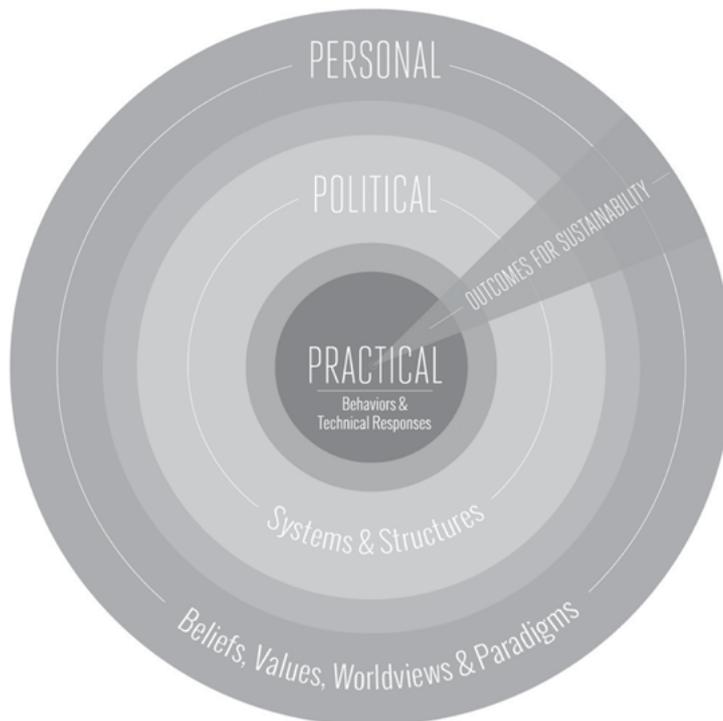


Figure 1: The three spheres of transformation (after Sharma, 2007).

easily blurred within this sphere. For example, although electric cars may replace petrol cars, mobility systems are not necessarily transformed (see Urry, 2011). Frantzeskaki et al. (2012) discuss the inherent tensions between ambitions for radical transformations and the practical need for specificity, implementation, compromise and incremental steps. More often, the responses that emerge in this sphere are influenced by transformations in the larger political, economic, and cultural systems and structures associated with the political sphere.

The political sphere

The next sphere is the political sphere, which represents the systems and structures that define the constraints and possibilities under which practical transformations take place. The political sphere includes economic, political, legal, social and cultural systems; it is here where politics and power influence the rules of the game, where social movements, collective action campaigns, lobbying, electoral politics, and revolutions respond to them, and where threatened interests resist or quash pressures to change. It is in this sphere where both problems and solutions are identified, defined and delimited, and where conflicts of interest must be resolved (Forsyth, 2003). Research on socio-technical transitions and social practices often focus on this sphere to understand how and why transformations at the practical levels occur or do not occur, and draw attention to the importance of political sphere for facilitating or enabling responses that promote sustainability (e.g., Geels, 2002; Shove, 2010; Frantzeskaki et al., 2012).

Importantly, the political sphere also involves the management of “natural” systems, such as ecosystems, the climate system, water systems, and so on. Earlier in history, transformations in these “natural” systems were considered to be outside of the realm of human agency (Hulme, 2008). However, in an era where human activities now rival global geophysical processes in transforming the environment, the direction, rate and scale of the transformations to these systems has become a matter of collective choice, and hence must be addressed within the realm of politics (Steffen et al., 2011). The dominant systems and structures have been established by societies through time and often reflect past and present beliefs, values and worldviews.

The personal sphere

Outermost is the personal sphere; it is here where the transformation of individual and collective beliefs, values and worldviews occur. Changes in this sphere can lead to different “action logics”, or ways of understanding and interacting with the world (Torbert et al., 2004). Discourses and paradigms emerge from the personal sphere, and influence the framing of issues, the questions that are asked or not asked, and the solutions that are prioritized in the political and practical spheres. Changes in the personal sphere often result in “seeing” systems and structures in new ways, e.g., with different boundaries and different factors considered as “endogenous” and “exogenous”. For example, while ethnocentric worldviews may prioritize systems and structures that help a particular group adapt to climate change, worldcentric worldviews are more likely to place attention on actions that benefit all humans and species, with an emphasis on both mitigation and adaptation. Changes to beliefs, values, and worldviews can influence the types of actions and strategies considered possible in the practical sphere.

Transformations in the personal sphere are considered to have more powerful consequences than in other spheres; paradigms can be considered the sources of systems, and beliefs and assumptions can influence the quality of connections with larger groups (Torbert et al., 2004; Meadows, 2009). Yet while there are considerable discussions about the need to change values, beliefs and worldviews as a response to climate change, transformations in this sphere cannot be forced. Although indoctrination has been used in the past to influence beliefs and worldviews, ethical arguments suggest the most legitimate transformations in the personal sphere may come through transformative education or through voluntary changes by individuals or groups who are interested in expanding their own “spheres of influence” (Schlitz et al., 2010; O’Brien, 2013).

TRANSFORMATIONS AND OUTCOMES FOR SUSTAINABILITY

The “three spheres” framework described above and illustrated in Figure 1 can be used to situate diverse approaches to transformation in response to climate change. Each of the four approaches discussed earlier fall within one, two or three of these spheres. The transformational adaptation literature focuses on the practical sphere, while recognizing that changes in the political sphere are necessary to facilitate changes of the scope and scale required. It also draws attention to the personal sphere, for example noting that factors such as place attachment and occupational identity may be potential barriers to transformational adaptation (Marshall et al., 2012). The transformations to sustainability

literature operates within both the political and practical spheres, exploring how the larger landscape for technological innovation and change creates conditions for innovation and industrial transformation. The transformations to ecosystem stewardship approach draws attention to all three spheres, emphasizing the importance of a worldview that sees social and ecological systems as interrelated or coupled.

Research on behavioral transformations is aimed at understanding and enabling changes in the practical sphere, where outcomes can be observed and measured (e.g., reduced meat consumption, increased use of public transportation, lower carbon footprints, etc.). The social practices literature emphasizes the links between behaviors and the political sphere, arguing that behaviors such as showering or driving a car to work are not about personal choice, but rather about the social systems and cultural practices that have collectively emerged (Shove and Walker, 2010). The social transformations literature places an emphasis on the political sphere, drawing attention to the crisis of capitalism and the challenges of institutionalizing new paradigms (Carson, 2012; Pelling et al., 2012).

Most of the literature on transformation acknowledges multiple spheres, but seldom recognizes the important interactions among the three spheres. The three spheres framework can contribute to a better understanding of the dynamics of transformation processes. It can also be used to identify leverage points in support of non-linear transformations. The notion of leverage points or “trim tabs” for systems change has been discussed by Fuller (2008), Meadows (2009), Senge (1990) and many others working with systems thinking. Systems thinking itself is considered to be a powerful leverage points for social transformation (Senge, 1990; Naberhous et al., 2011). Potential intervention points for transformation may be found within each of the spheres, but it is the interactions across the spheres where the greatest potential for generating non-linear transformation lies. Without attention to the outer circle, there is often an assumption that a particular sustainability solution is suitable for everyone, and value conflicts are likely to result. Without attention to the inner circle, attention may be focused on abstract ideals and goals, without producing practical, actionable outcomes. Importantly, without attention to the middle circle, large-scale transformations are unlikely to take place at the rate and scale called for in response to issues such as climate change. Systemic changes are critical to achieving outcomes consistent with global sustainability.

Goals are particularly important, as they define the purpose or function of the system and influence material and information flows, feedbacks, and self-organizing behaviors (Meadows, 2009). According to Meadows (2009), resistance to systemic change can be attributed to the bounded rationality of actors within a system, each with a different goal and metrics of success (e.g., national security, economic growth, resilience, sustainability). When it comes to the types, rates and scales of transformations that are called for in response to global challenges, it is clear that there are conflicting goals and visions for the future. Not every transformation is equally ethical, equitable or sustainable, and the normative dimension to transformation cannot be ignored (Meadowcroft, 2009).

CONCLUSION

Climate change calls for new understandings of transformation – understandings that in some cases may challenge fundamental beliefs and assumptions about the way that change comes about or is created. This paper reviewed some of the literature on transformation and presented a framework for understanding how, where, and why transformations to sustainability take place. The three spheres framework shows that realizing outcomes for sustainability in the “practical” inner sphere calls for the transformation of systems and structures in the central “political” sphere, which are often driven by individual and collective transformations in the “personal” outer sphere. This suggests a need for transformations from both the “outside-in” and the ‘inside-out’ (O’Brien, 2013). As Pelling (2010: 88) notes, “perhaps the most profound act of transformation facing humanity as it comes to live with climate change requires a cultural shift from seeing adaptation as managing the environment ‘out there’ to learning how to reorganize social and socio-ecological relationships, procedures and underlying values ‘in here’.” As a result, identifying the links between practical, political and personal transformations may be important for achieving ethical and equitable outcomes for sustainability at the rate and scale that are called for in response to climate change.

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Triggering transformation: Managing resilience or invoking real change?

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INTRODUCTION

Societies respond to pressure to change mostly through incremental steps, which focus on maintaining the current system or accepting gradual partial change. However, this may be increasingly inadequate - given the multiple dynamic pressures under current and future global change - and there is a need to develop more robust understandings of how change can be managed and what promotes positive transformative action. This would ideally contribute to achieving the goals of development, disaster risk reduction and adaptation simultaneously. Much of the focus has however been dedicated to changes that are far from revolutionary, and less attention has been paid to the issue of scale and the evaluation of the nature of that change and its long-term implications. Given the dissatisfaction with incremental reactive change, what mechanisms and opportunities exist for deeper transformative change, and how can this level of change be evaluated?

This paper will use Handmer's and Dovers' (2007, 2009) three-staged typology to investigate and understand those factors that bring about transformation. It also explores through different examples how transformation could be characterised and evaluated. We argue that not all transformation is necessarily positive and welcome, and that greater focus needs to be placed on understanding the drivers which enable long-term positive transformation, and which inhibit maladaptation. We also highlight the complexities around the issue of scale and the normative elements embedded in attempts to evaluate change. Our interest lies also in identifying spaces in policy processes where negative transformational change could be reversed and commitment to non-sustainable agendas could be reduced.

The paper is organised as follows: The second section reviews briefly common definitions of transformation as qualitative change and explores how different authors have recently contributed to this effort. The third section discusses different framings of policy problems and introduces a modified typology (Handmer and Dovers, 2007, 2009), which is used to illuminate different dimensions of problem types and management responses. The fourth section discusses in more detail what these different responses and framings mean in terms of identifying and understanding the nature of transformative change. The last section summarises the arguments and proposes critical areas of further research.

DEFINING TRANSFORMATION

Change has always intrigued humans not the least given the past history of vanishing and collapsing societies where decisions and particular pathways have led to differing outcomes (Diamond, 2005; Burch, 2009). The recent discourse on large-scale potentially catastrophic global changes has made the issue of change management even more acute. In this discussion, transformation has been proposed both as an acute need in the face of large-scale changes at the global level and as the preferred management response (Pelling, 2011; O'Brien, 2012). The concept of transformation is frequently used and widely applied across diverse fields such as mathematics, genetics, leadership, organisational change, education, and theatre. Over time particular characteristics have formed to distinguish and explain transformation from the perspective of qualitative change (Table 1). Most of these definitions see transformation as an act or process, which demands significant change. This change, as the Farlex Free Dictionary (2013) notes, is "usually for the better". Transformative change in other words should lead to a positive change, which is "profound and radical" at heart (Business Dictionary, 2013). After transformation, the system should be significantly different with "little or no resemblance with the past configuration or structure" (Business Dictionary, 2013). Transformation then requires a significant shift from status quo; such change in other words becomes a potential indicator for the evaluation whether or not transformation has taken place.

Table 1. Definitions of transformation.

‘Transformation’ as qualitative change	
The Free Dictionary by Farlex	<ol style="list-style-type: none"> 1. <ol style="list-style-type: none"> a. “The act or an instance of transforming”. b. “The state of being transformed”. 2. “A marked change, as in appearance or character, usually for the better”.
Dictionary.com	<ol style="list-style-type: none"> 3. “change in form, appearance, nature, or character”. 4. “Theatre. a seemingly miraculous change in the appearance of scenery or actors in view of the audience”.
Oxford Dictionaries	<ol style="list-style-type: none"> 1. “a marked change in form, nature, or appearance”
Merriam-Webster	<ol style="list-style-type: none"> 1. “an act, process, or instance of transforming or being transformed” 2. “false hair worn especially by a woman to replace or supplement natural hair”
Business Dictionary	<p>“In an organizational context, a process of profound and radical change that orients an organization in a new direction and takes it to an entirely different level of effectiveness...transformation implies a basic change of character and little or no resemblance with the past configuration or structure”.</p>
Macmillan Dictionary	<p>“a change into someone or something completely different, or the process by which this happens”</p>
Wordsmyth Thesaurus	<p>“a significant change in the form, structure, character, or nature of something or someone”</p>

While most definitions agree with the need for “significant change”, some of these refer to the different nature and durability of such change. For example, Merriam-Webster’s (2013) second definition describes transformation as “false hair worn especially by a woman to replace or supplement natural hair” while another describes transformation as “a seemingly miraculous change in the appearance of scenery or actors” (Dictionary.com, 2013). Transformation in other words can appear to have taken place without changing the actual underlying system. This raises an important qualitative aspect of change and its evaluation: how do we know when transformation is “real”? Where can the line be drawn between appearance and rhetoric and actual transformation?

Several disciplines have investigated transformation in the context of global environmental change including risk management, climate change adaptation, sustainable development, emergency management, and disaster risk reduction. The definition and characteristics of transformation have inspired scholarly thinking in recent years in particular in the context of climate change adaptation (Table 2). For example, Kates et al. (2012) refer to “transformational adaptation”, which emphasizes the novelty, intensity, and scale in its attempt to differentiate between transformational and incremental change. Transformational adaptation can be taken by multiple actors at multiple scales over multiple time periods. O’Brien (2012: 670) notes that despite the increasing interest in transformation research, the concept still remains fairly vaguely defined specifically given that it can mean “different things to different people or groups, and it is not always clear what exactly needs to be transformed and why, whose interest these transformations serve, and what will be the consequences”. This poses obvious problems regarding attempts to set and identify such elements as boundaries, scale, and the evaluation of transformation.

Nelson et al. (2007) similarly observe that there is rarely a good understanding of the difference between incremental adjustments and transformation leading to obvious difficulty in evaluating “transformative” change. Park et al. (2012)

also note the interdependency between incremental and transformative change. In transition and resilience theory, transformation is conceptualized as a necessary step once the system becomes unviable in its current structure. In this view, transformation is not necessarily a choice but rather the last phase before or during system collapse. O’Brien (2012) however considers transformation through an anticipatory perspective in which transformation is a deliberative choice that intends to change the system into a new state before such collapse takes place. Similar to the dictionary definitions is the characteristic of distinct change, which is manifested by a new state of the system.

Table 2. Definitions related to transformation in the literature.

Aspects of ‘Transformation’ in the literature	
Kates et al. (2012: 7156)	<p>Transformational Adaptation= 1) Adopted at a much larger scale or intensity, 2) Truly new to a particular region or resource system, 3) Transform places and shift locations.</p> <p>Nature: both reactive and anticipatory, can be collective, individual, organisational, both autonomous and planned; spin-offs from other actions, incremental or rapid</p>
Nelson et al. (2007: 397)	<p>Transformation= “A fundamental alteration of the nature of a system once the current ecological, social, or economic conditions become untenable or are undesirable”</p> <p>No distinct boundary between incremental adjustments and transformation</p>
O’Brien (2012)	<p>Deliberate Transformation= Multi-definitional concept depending on one’s values and worldview; associated with changes in meaning-making processes, calls for new critical approaches and challenges paradigms</p>
O’Neill and Handmer (2012)	<p>Transformative Adaptation= distinct deliberate changes in practices, learning through monitoring and re-evaluation</p>
Park et al. (2012: 199)	<p>Transformation= “a discrete process that fundamentally (but not necessarily irreversibly) results in change in the biophysical, social, or economic components of a system from one form, function or location (state) to another, thereby enhancing the capacity for desired values to be achieved given perceived or real changes in the present or future environment”</p>
Pelling (2011: 84)	<p>Adaptation as Transformation= fundamental shifts in power and representation of interests and values</p>
Preston et al. (2013: 1025)	<p>Adaptive Transformation= A fundamental alteration of “actors’ perspectives on sustainability, societal objectives and how they can be achieved”</p> <p>Main issue whether transformation is optional and voluntary or obligatory and externally mandated</p>

Park et al. (2012) also describe transformation as a fundamental deliberate change but one that can be reversed if needed. The main aim or attribute of transformation therefore is to enable actors to follow their “desired values to be achieved” within the current or future context (Park et al., 2012: 199). The difference between incremental and transformational change lies in the “extent of change” and represent in essence a spectrum of different strategies that can be undertaken in response to change (Park et al., 2012: 199). In the question of scale, Park et al. (2012: 199) note that transformation has the potential to take place at “any level, from the individual through to the collective, industry or region” while acknowledging that simultaneous transformative processes can occur independently within a complex system.

O’Neill and Handmer (2012) likewise propose that transformative adaptation will become a necessity in the future for example within fire management where the events will most likely be outside of the range of previous experience. The authors propose that central for any transformative practice is to challenge the existing norms and practices and to identify “unacceptable risk” (O’Neill and Handmer, 2012: 5) in order to facilitate discussions about the need to change

routines and practices. Given the pulsed nature of change processes (Moench, 2009), continuous learning and re-evaluation become key factors for transformative planning as events reveal inefficiencies and injustices in the current structures and operations.

Such continuous learning and re-evaluation could be achieved through ‘adaptive transformation’ that includes actor-specific understandings of, for example, the meaning of sustainability (Preston et al., 2013: 1025). Adaptive transformation enables actors to embrace alternative ways of action despite the commitments to particular pathways. In other words, adaptive transformation changes the perceived feasibility of particular options hence enabling a broader acknowledgement what in fact is a ‘good’ path of action. The important point is whether the transformation process is conducted on voluntary bases or whether transformative change becomes the only alternative driven by external pressures (Preston et al., 2013).

The majority of the proposed definitions and existing assumptions regarding transformation centre on the characteristic of a ‘fundamental’ shift that questions and challenges values and routine practices (Handmer and Dovers, 2007, 2009; Pelling, 2011; O’Neill and Handmer, 2012) and changes prior perspectives employed to rationalise over decisions and pathways (Poutiatine, 2009; O’Brien, 2012; Preston et al., 2013). Change is perceived more often than not as something inherently positive and achievable. As Preston et al. (2013) note, climate change adaptation literature for example suggests such concepts as ‘no-regret’ and ‘win-win’ in order to prove that changes in practices and policies can result in positive outcomes even under uncertainty.

Most of the cited definitions and conceptualisations do not however address explicitly the issue of scale and the durability of transformative actions. The basic expectation seems to be that the end state or the new state can be known and planning and policy responses can be undertaken. Yet, information regarding the future is generally highly limited. In addition, responses to change are varied and differ also based on current management practices and principles in use, and not all change is necessarily positive (Handmer and Dovers, 2009). The extent that changes can be made, and their consequences, are dependent on current norms, practices and previous commitments to vulnerability management (Preston et al., 2013). The next section introduces a typology that delineates different types of policy problems we commonly face and the different types of management responses undertaken.

MANAGING CHANGE

Several typologies demonstrate the types of problems and types of change management processes commonly in use. Handmer and Dovers (2007, 2009) propose three different types of problems and dimensions of resilience and practices, which describe the general societal attitude or perception of dealing with risks and hazards (Table 3). Institutions do not necessarily only choose or display one type but frequently use a combination of types across different sectors and different decisions. While the typology is obviously a simplification of multiple dimensions and processes, it provides a useful way of understanding which aspects of change management are transformative and where it might not necessarily be beneficial to pursue transformative actions. Ideally, a combination of these different types of resilience provides the most robust response as in some instances incremental change is enough whereas in other cases benefits are greater through transformational change.

Types of problems

Problems are framed and classified in order to decide on the extent and scale of the problem, attribute responsibility, and to select pathways and practices to address the problem. Handmer and Dovers (2007, 2013) distinguish between routine, non-routine and complex problems, which describe different framings given to particular issues. Routine issues or problems are something most agencies, institutions and individuals face every day, which can be addressed fairly quickly. In routine cases, the extent of uncertainty is relatively well-known, there is less need to introduce drastic changes to the existing tested practices, and the responsibility attribution is more or less clear. In non-routine cases, risks and events are still often within experience but stretch the boundaries of known and tested practices. These can have a profound way of introducing new uncertainty dimensions but due to their rarity, the push for significant changes in the current management practices does not necessarily take place.

Within the context of environmental change however the kind of change and policy problems in today’s society can best be described as complex (Handmer and Dovers, 2007: 95-96). Complex unbounded problems are most often outside of previous experience, have high uncertainties, involve multiple scales, and have high levels of unpredictability. Attribution

of responsibility is more diffuse as complex problems call for whole-of-society responses where the system depends on effective responses across multiple scales and sectors. This in itself calls for transformative and new ways of managing change where experience cannot be harnessed for the simple reason that it does not yet exist. Yet, societies regularly manage change, mainly to maintain or increase their functioning in the face of adverse events and impacts.

Management responses

Handmer and Dovers (2009) identify three different management response types that societies adopt. Type I resilience describes rather rigid management structures, which resist change through the denial of the existing risk and intends to keep the system functioning as business-as-usual. The focus lies on maintaining system stability with all costs. The denial of risk legitimises strong focus on routine practices and incremental change. The knowledge and science used to inform the decision-making process is conventional and relies on commonly deployed methods and leaves little space for innovation. It provides in other words more evidence for favouring incremental change as it cements the existing approaches in use. Uncertainties in the operational environment are well understood and can be calculated according to one’s needs. Broader changes are resisted in particular due to significant costs in changing the system. While this approach does not challenge the existing practices or lead to change, it however provides stability and certainty in operational sense, and hence can be preferred in particular situations. Type I makes sure the existing power structures are kept intact and exerts significant control even over how information regarding particular hazards is managed. The sustainability of the system can be called into question as it often leaves it too late to consider anticipatory planned transformation leading the system into a state of collapse, and hence forced transformation or eventual destruction.

Table 3. Problem type and management response typology (adapted from Handmer and Dovers, 2009: 198-199, and Handmer and Dovers, 2007: 92-95).

Typology		
Routine + Type I: Resilience and Maintenance	Non-routine + Type II: Change at the margins	Complex + Type III: Openness and Adaptability
Science: <i>Applied science where most conventional methods are suitable to deliver results</i>	Science: <i>Professional consultancy where specialised expertise is more valued and seen necessary</i>	Science: <i>Post-normal science where multidisciplinary approaches and innovation are necessary due to problem complexity</i>
Uncertainty: <i>The extent of uncertainty is known and quantifiable</i>	Uncertainty: <i>The extent of uncertainty is fairly well known and understood but less quantifiable</i>	Uncertainty: <i>The extent of uncertainty is often not known and cannot be quantified; multiple dimensions of simultaneous uncertainty</i>
Sustainability: <i>1) Implications: Not sustainable, possible collapse 2) Approach: Denial of need to change</i>	Sustainability: <i>1) Implications: Awareness of unsustainability of current system, minimal scale of change 2) Approach: Treat symptoms</i>	Sustainability: <i>1) Implications: Ability to manage change and uncertainty, major change, chance of maladaptive decision 2) Approach: Treat causes</i>
Elements: <i>1) Positive: Maintaining status quo, stability and certainty 2) Negative: Lack of flexibility, narrow options, inability to adjust</i>	Elements: <i>1) Positive: Incremental change, awareness of the problem 2) Negative: Showcases change but changing only ‘details’, not systems</i>	Elements: <i>1) Positive: Flexibility, adaptability and undertakes major changes 2) Negative: Can lead to wrong decisions, reduces optimal capacity for current and near future</i>
Typical arguments: <i>1) Denial 2) Appeals to ignorance 3) Costs a major issue</i>	Typical arguments: <i>1) Problem may exist 2) Delaying tactics (e.g. enquiries) 3) Minor changes</i>	Typical arguments: <i>1) Change essential 2) Change because of uncertainty 3) Longer-term view</i>
Approach to hazard: <i>1) Anticipatory planning for obvious threats 2) Resources devoted to maintain the status quo</i>	Approach to hazard: <i>1) Less anticipatory planning 2) Minor changes in hazard adjustments</i>	Approach to hazard: <i>1) Maximum flexibility to accommodate unexpected threats</i>

Power structure: 1) Existing power structures	Power structure: 1) Existing power structures but may include new issues e.g. environment	Power structure: 1) Major changes in power structures
Emphasis: 1) Individual sovereignty 2) Professional hazard management 3) Control of public information and agenda	Emphasis: 1) Use of right rhetoric 2) Slight shift in responsibility for hazard management towards individuals 3) Control of agenda with some participatory mechanisms	Emphasis: 1) Humanity and biosphere 2) Hazard management for all 3) Participatory information systems

Type II describes management systems where the need for change is acknowledged but this awareness does not necessitate large-scale transformations. The knowledge and science utilised is heavily focused on professional expertise and consultancy where particular expert areas and niches exert significant control over what kind of knowledge is used and needed. Uncertainty is still fairly well understood but at times cannot be quantified. The system focuses on managing risks and might attempt to consider innovative new approaches that are not part of the current practice as part of a range of solutions. However, the main focus lies in treating the symptoms rather than actual causes of problems. Common to this type is the use of enquiries to provide more detailed information about the nature, scale, and extent of problems but these lead often to incremental changes rather than large-scale system transformations. The use of the rhetoric of change is common; this however only displays possible transformation as “false hair” (Merriam-Webster, 2013): an awareness for change gives an appearance of change but little is done to enact the necessary changes for a deeper transformative change. Power structures are retained with possible additions and the focus expands to the role of individual actors in enacting such change.

Type III resilience describes management systems where the need for change is acknowledged and transformation of practices and systems becomes an option. The needed knowledge and science is multidisciplinary and attempts to draw information across sectors in a holistic manner. The extent of uncertainty often cannot be known, is outside of previous experience, involves multiple scales and have high levels of unpredictability. The rationale is that transformative change can actually increase system flexibility and hence keep opportunities open under uncertain conditions. However, if taken hastily, it has the potential to result in maladaptive decisions, in particular if the scale of change is too broad and rapid for the system to function adequately. Type III includes also changes in power structures and strongly advocates participatory mechanisms in order to expand the responsibility and subsequent opportunities in decision-making and in the choice of options. Uncertainty is not viewed as negatively as in Type I and II since in Type III uncertainty becomes a major rationale for undertaking and implementing change. This particular approach would stress whole-of-society and system change, and be best paired with complex problem approaches.

Of the three different problem types and management responses, such global issues as climate change clearly fall within the complex and Type III resilience category. While Type III might appear enticing given its focus on flexibility, acknowledgment of uncertainty, and shifts in power structures, Handmer and Dovers (2009) caution that transformative change is not always positive. For example, large-scale rapid changes increase system instability and have the potential to produce irreversible choices, which lead to suboptimal pathways and inflexibility (Handmer and Dovers, 2009). Such changes include for example substituting diverse income sources for a single source of livelihood, which is vulnerable to a range of external pressures, or changing legislations at a rapid pace where system uncertainty creates an operational vacuum and cripples system functions.

This section has demonstrated how different framings, management and problem types determine often the kind of space available for transformative action. These issues relate to multiple factors such as the tolerance for uncertainty and its role in managing change, the kind of science and knowledge perceived as useful and necessary, the flexibility and sustainability of chosen options and pathways, and the scale, extent and speed of preferred change. And yet, evaluating any *need for* and *scale of* change is highly subjective and determined by a range of factors, both at smaller individual and broader institutional scales (Adger et al., 2009; O’Brien, 2012; Preston et al., 2013). Next, we discuss the relevance of several issues that have been so far raised regarding transformation and its characteristics, and examine what the different problems types and management practices mean in the context of continuous change.

DISCUSSION

The previous sections have pointed out several ways of thinking how societies manage change and how transformation is currently understood and defined. However, while the literature and definitions all signal particular features that should or could be found around transformation and related change management practices, none specifically note or investigate further the issue of scale. This is problematic regarding the evaluation and understanding of the process of transformation. If transformation takes place across multiple scales, through multiple actors at multiple times (O'Brien, 2012), on what grounds can we differentiate between appropriate transformative management responses? And how do these processes guarantee that the change is for the better and actually reduces vulnerability in particular for neglected segments of society?

For example, in the field of climate change adaptation, there is still disagreement on how an adaptation baseline can be determined (Burton, 2009), or robust indicators to measure 'vulnerability' (Klein, 2009) or even 'resilience'. The discourse on transformation is likely to face similar challenges as any attempt at evaluation and understanding particular characteristics of change processes will demand also evidence of what is actually being measured. The process of constructing meaningful indicators itself is imbued with difficulties given the multiple perspectives and normative preferences underlying any process of defining boundaries (Hansson, 1996; O'Brien, 2009), but these are necessary steps if one wishes to enable "transformation" to take place. Here we list several classifications for scale and triggers that might provide an interesting framing to look at transformative actions and processes.

Hansson (1996) provides a useful illustration of such multiplicity when it comes to framing and understanding policy issues, which he terms as 'decision horizons'. Nuclear energy debates provide a good example of different decision horizons. Here four common decision horizons are at play, which describe the sources for policy conflict and controversy among the actors (Hansson, 1996). The first decision horizon demarcates the issue in terms of *disposal and location*: safe disposal of radioactive waste, which relates to questions over the technique and method of disposal, and possibly decisions over disposal locations. Policy- and decision-makers often favor such narrow decision horizons as it is clear what the issue is about and there is less room for transformative changes. The second decision horizon focuses on *energy production* and the currently acceptable ways to produce energy given the present system. The third horizon relates to *energy systems* as part of the broader system, and focuses on the question how in general we should be producing energy. The fourth horizon focuses on *societal organization*: how we should organize our society. Environmental activists often favour broader horizons (e.g. energy production systems, lifestyle and sustainability questions). While all of these horizons are equally valid policy stances, the difficulty comes when actors assume to be operating within the same scale (Hansson, 1996).

The question for transformation and managing change is to first locate the discourse on a particular scale in order to make it feasible and understandable as to what is being changed. Scale enables a deeper exploration of the rate and extent of change, and hence is crucial for any evaluation effort. When determining the scale of needed change, one must carefully examine and make explicit the actual perception-scale (decision horizon) from which the issue is approached in the first place (Hansson, 1996). This has certain relevance also to the suggested typology as one needs to understand the level and scale of the issue and its subsequent consideration within the realms of the typology, including the acknowledgement that an issue can have several decision horizons attached to it. Scale essentially relates to issues of time and space. For example, one could differentiate between system transformation as "large scale changes in surrounding systems", geographical transformation as "complete change of the environment" and individual transformation as "deeper shifts in existing values and perceptions". If transformation is really about challenging existing practices and beliefs, perhaps it should be identified and defined in terms of the difficulties in implementing significantly different systems or the number, range, and scale of different obstacles in introducing new routines for example in emergency management (Handmer and Dovers, 2007; O'Neill and Handmer, 2012).

The probable push factors for transformation will most likely continue to be event-dependent and associated with complex problems. However, such factors do not necessarily include natural extreme events, but may also draw on political events such as when new governments enact large-scale re-structuring of departments. Such political factors transform systems not necessarily because the outcomes of res-structuring are economically, socially or culturally more efficient and suitable but merely because of setting their stamp on the structure itself. Such a transformation of institutional structures often has multiple unintended side effects such as operational vacuum, system and operational instability, and loss of organisational objectives among actors. Furthermore, not all systems can transform and become viable in a new state. Hence, the discussion on limits to adaptation demonstrates that particular systems will not

survive and flourish once those limits are reached. This calls for clearer identification of both limits and transformative potential within the systems.

Perhaps transformation should be understood as an internalisation of deliberate change for the better, which ensures a better fit if simultaneously the external structures are also changed to accommodate new ways of thinking. Such ‘fit’ between external and internal spheres is paramount in transformational change. For example, fragile states remain fragile and do not suddenly transform into effective states given that the organisational objectives of good governance and transparency are not internalised by the very people who could or should be the drivers of change (London School of Economics, 2011). Transformation will remain only as an appearance of change if the structures are ‘transformed’ and changed, but the actors within the systems remain in their previous ways of thinking and do not adopt new ways of practice.

CONCLUSION

This paper has investigated the different conceptualisations and definitions of transformation, and the common problem types and management responses that societies use to manage change. It first explored what transformation is and how it has been defined, and illustrated the many similar and different nuances found in the literature. It then used Handmer and Dovers’ (2007, 2009) typology in examining the nature and scope of common problem types and associated management responses, and suggested several ways transformation could take place through the use of a mix of management responses. The following discussion focused on raising some questions as to the nature of transformation and possible challenges it faces as a management response. The literature and definitions discussed in this paper also point to the problematic aspect of scale in the discourse around transformation. Scale remains elusive and vague and there is little agreement at what level, scale, speed, and extent transformation should be pursued. Our typology has demonstrated that complex problems demand vastly different approaches than what routine and non-routine problems pose to the way we manage our societies. However, while complex unbounded problems call for new ways and practices that are distinctively different from the status quo, well-planned and facilitated transformation calls also careful consideration of what exactly needs to be changed and how. Too rapid and drastic change can lead to instability and confusion as to who for example is responsible for new routines, practices, and their implementation.

While the idea of transformation is now becoming increasingly pertinent, it is unclear where the boundaries of transformation lie in terms of its scale(s) and subsequent evaluation of the nature of the change and its durability. Clearly not all outcomes are positive and different actors will always carry differing perceptions as to what “good” or “positive” outcome entails. However, more focused and comprehensive identification of boundaries, evaluation and scale will enable the transformation discourse to set itself aside as a distinct area of inquiry. While transformation literature might not qualify as of yet as a new science, the discourse is an important one due to its ability to bring together multiple issues, systems, and disciplines, and challenge the existing paradigms, assumptions, and norms.

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Distilling the characteristics of transformational change in a changing climate

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BACKGROUND AND RATIONALE

“Coping with past problems often creates dysfunctional systems. To meet coming challenges requires transformations of world views, institutions, approaches, and methods.” - (Folke et al., 2011: 721)

The past two decades have seen a rapid growth in projects, programs and policies that link climate change adaptation and development. The consequent mainstreaming of climate change recognizes the close inter-relationships between climate change and development issues, and the need to avoid creating parallel institutions and practices that deal with climate and development issues in isolation (Huq and Reid, 2004; Kok et al., 2008). To a large extent, these have drawn upon existing development approaches, applying a ‘climate change lens’ to issues such as water resources management (OECD, 2009).

These development-driven approaches to adaptation apply the climate change problem to existing conditions and development processes. More recently however, analysts have been grappling with the potential limits of conventional approaches. In adaptation, this has included assessing the biophysical and societal limits to adapting to climate change impacts, reflected in the growth of approaches to address ‘loss and damage’ where impacts exceed adaptive capacity (Peterson, 2009; Adger et al., 2009; Warner and Zakieldeen, 2012). This has also been prompted by acknowledgement that current international actions and commitments are insufficient to prevent dangerous levels of climate change and that without radical emissions reductions, we are unlikely to avoid dangerous levels of climate change (Anderson and Bows, 2008; UNEP, 2011). As a result, we increasingly need to consider adaptation approaches more appropriate for global temperature rises of 4 degrees Celsius or more (Stafford-Smith et al., 2011; World Bank, 2012).

As a result, researchers and practitioners alike are increasingly asking whether meeting the twin mitigation and adaptation challenge needs more than simply doing more of the same or incremental adjustment of existing approaches (Kates et al., 2012). As a consequence, there is growing interest in how to understand and create more transformational changes required for addressing climate change challenges (Pelling, 2010; O’Brien, 2012; Park et al., 2012; O’Brien et al., 2012; Kates et al., 2012; Tanner and Horn-Phathanothai, 2014). While transformation can describe an unintended change, it generally implies a deliberate attempt to engineer the changes required to achieve a desired goal, such as enhancing resilience or avoiding dangerous interference in the atmospheric system (Nelson et al., 2007). Kates et al. (2012: 1) suggest three classes of adaptations described as transformational: ‘Those that are adopted at a much larger scale or intensity, those that are truly new to a particular region or resource system, and those that transform places and shift locations’. Park et al. (2012: 119) define transformation in the context of environmental change as:

“a discrete process that fundamentally (but not necessarily irreversibly) results in change in the biophysical, social, or economic components of a system from one form, function or location (state) to another, thereby enhancing the capacity for desired values to be achieved given perceived or real changes in the present or future environment.”

This paper employed a literature review of peer-reviewed articles on transformation from a range of disciplinary areas. Supplementary interviews were carried out with ten experts on climate change and development, asking them to reflect on what they regarded as, transformational change and to provide supporting examples. We use quotes from these interviewees throughout the text, thereby demonstrating the importance of multiple voices and collective visions of transformational change. Interview quotes are shown in the text in italics, while secondary source quotes are shown in

plain text. Interview quotes are not individually attributed, but the set of interviewees is shown in the acknowledgments. Results were presented and modified as a result of a brainstorming session with climate change professionals from the Department for International Development (DFID) and presentation at the *Transformation in a Changing Climate* Conference in Oslo, 2013.

This paper responds to a critique touched on by almost every interviewee - the current elasticity in how the word transformation is used in the context of climate change and development. This reflected the shift in lexicon from adaptation to resilience and now to transformation, dynamism in terminology that often lacks empirical grounding. The word is therefore entering policy lexicon with little substance to guide implementation. In addition, transformation is generally being employed to signify a positive change without acknowledging possible negative transformations. Transformation in human systems could also entail tradeoffs with ecosystems and services they provide. Finally, without greater attention to the characteristics of transformational change, there is a danger of it being co-opted,

“...to avoid thinking about things more radically; it’s a convenient word like resilience or sustainability and has moved from an initial more radical meaning to one that is likely to be co-opted into existing systems which want to avoid transformation”

These points of critique provide the rationale for this paper. By collating the reflections of experts and key findings from academic papers, we attempt to create the foundations of a more robust conceptual grounding for transformational change in the context of climate adaptation and development. The following section outlines the common characteristics distilled from the literature and interviews in order to stimulate conceptual and practice-based thinking and approaches in this area.

CHARACTERISTICS OF TRANSFORMATIONAL CHANGE

Radical change, innovation and experimentation

Transformation is commonly interpreted as radical change requiring innovation and testing of new approaches. This entails the generation/use of new knowledge and a markedly different way of doing things.

The results from both secondary and primary research suggest that radical change and innovation is at the core of the notion of transformation. Francis et al. (2003: 19) discuss this from a business management perspective: ‘...it is almost inconceivable that a firm can achieve a radical transformation through the building up of ‘normal’ or incremental capabilities...Instead it may be necessary to destroy, at least in part, the existing approach to business as well as the capabilities that underpin this-to enable transformation to occur’. Biggs et al. (2010:3) argue that ‘...wave of innovation is needed if modern society is to transform its current ecosystem-management institutions to meet the environmental challenges of the 21st century’. Tonn (2006) describes the IPCC as a transformational initiative because it develops new and innovative approaches that could be applied in a variety of contexts and not just for the specific purpose of climate change research itself. Pelling (2010: 10) highlights the need for innovation for adaptation and distinguishes between two forms of risk management “...that strengthen stability in the status quo... and those that champion innovation with the potential for change...”.

A number of experts interviewed echoed this idea of radical innovation that breaks with the status quo. One cited the example of disaster risk management (DRM) in Bangladesh and said that radical innovation was evident in the country’s shift from an approach to DRM that operated in silos to one that was better integrated across Government departments. Another interviewee gave the example of the shift in thinking on treatments for malnutrition from field hospitals to an approach that stressed building a community’s innate ability to treat the problem. This shift was a result of the actions of the very people who championed field hospitals earlier but began to see that they were not a long term solution. Another expert noted that rather than a new idea in an older, larger structure, transformation is actually about a new ‘form’- *‘I think a lot of us agree that it is about time to revolutionize or fundamentally change the shape of how things are thought and done.’* Explaining the reason for this belief in the urgent need for transformation through radical innovation, they added,

“I do not believe in the ability of incremental change to lead us through the kinds of solutions that are needed, the only way to accomplish necessary solutions to the climate is to fundamentally revise this structure and the form of relationships between actors, spaces and knowledge.”

This reflects the instinct of many that transformation is a ‘completely different’ way of doing and thinking. For one expert, the need for radical innovation sprung from a realization that where there is a high degree of vulnerability, high exposure and the nature of shocks is ever changing; this requires ‘*a more fundamental rethink about what we’re doing and the word transformation helps to convey the fact that we need to do something quite substantially different*’. The respondent discusses the rapid increase in the capacity of the Paris health system to deal with heat waves as an example of transformation and outlines how radical innovations in the training of health workers, in urban planning and hospital infrastructure has transformed the city’s resilience (see example in Box 1).

Box 1: Transformation in the Paris health system

As the heat wave of 2003 had a high human and financial impact on the city of Paris, the administration recognised the need to transform the health system in order to deal with emergencies of this nature better. The city invested substantial funds to equip the health system in a short span of time, they invested in risk registers across the city, recalibrated their approach to urban planning, provided special training to health workers, upgraded hospital facilities, developed response plans and protocols, invested in better early warning and developed improved risk communication methods.

This is considered transformational because:

- It contested institutionalised positions on risk management.
- There were radical innovations in the training of health workers, in urban planning and hospital infrastructure etc.
- It greatly reduced the vulnerability of the city to similar events.

Further Information: Fouillet et al. (2008); O’Brien et al. (2012)

Crucially, new knowledge is not essential for transformation but how knowledge was mobilized is what is critical. One interviewee noted the work of an NGO that builds sand dams in parts of Kenya as transformational (see Box 2); the technology for building sand dams existed for centuries but it was the employment of this knowledge in specific contexts that needed them most, using a process that ensured community buy-in that made this transformational. Similarly, the example of participatory games that simulate real world situations in order to improve decision making in the face of climate change was regarded by one interviewee as transformational not because new scientific knowledge on climate change dynamics was being generated, but because this was a new process of sharing perspectives of those involved in a decision making chain-from scientists to farmers, so that existing knowledge is made use of effectively (see box 3). Such games also encourage experimentation, which breeds innovation:

“...they’re also inspired to explore the range of what is possible and they can do so in a safe environment because they know that they can try and fail and the only consequence is that they won’t win the game as opposed to the real world where trying and failing may mean that you’re fired or that people die.”

Addressing power imbalances

Addressing power relations and helping individuals to be ‘empowered’ lies at the core of an intervention becoming ‘transformational’. Success involves recognising the social and political processes underpinning vulnerabilities, building inclusive forms of governance, redistributing benefits and more equal access to resources.

Kapoor (2007: 478) argues that social transformation entails engagements with issues of power at two levels: changes in the social structure and changes in individual ‘values, capabilities and choices’. Alterations in consciousness such as this at the individual level are vital to bringing about wider social transformation. Similarly, transformative education is an approach that aims at extending the ability to critically reflect on their world to students in disempowering contexts (Bivens et al., 2009). Transformative education aims to transform by sensitising students of oppressive power structures that curtail expression such as forced marriage, caste and gender discrimination (ibid).

Bahadur and Tanner (forthcoming 2014) argue for the use of concepts of transformational in resilience building initiatives as a means of bringing issues of power and politics into the potentially value-free frameworks of resilience drawn from socio-ecological systems thinking. Pelling (2010: 10) argues that for risk management to be transformative, it must be a tool for ‘...opening dialogue and contributing to wider, inclusive forms of governance’. Shifting the balance of

political and cultural power in society are therefore vital: ‘...transitional adaptation is concerned with those actions that seek to exercise or claim rights existing within a regime, but that may not be routinely honoured...transformational adaptation describes those actions that can result in the overturning of established rights systems and the imposition of new regimes’ (Pelling, 2010: 85).

A number of experts echoed this sentiment:

“For me transformation is a change in the way power operates. It means that there is a transition from one structured basis of power to another. It also means that those that have been disadvantaged have their disadvantage reduced or overcome completely.”

This is illustrated by sand dams being built by an NGO in water deficient regions of Kenya (see example in Box 2), seen as transformational because they corrected local level imbalanced power dynamics in the context of gender as women no longer had to travel far to collect water and could participate more fully in a range of socio-economic activities around the village with substantially improved their social position.

Box 2: Sand dams for transformed communities

Sand dams are helping alleviate the suffering of people living in water scarce regions in Kenya. ‘During the dry periods pastoralists and agro pastoralists get water for themselves and livestock by scooping into the sand beds of the dry streams at upstream sides of ledges cutting across the channel. Water in such sites is usually clean for drinking but quite finite and quickly gets depleted. Sand dams are an artificial enhancement of this traditional practice that puts extra water into these sand beds to recharge and store water for use. A concrete wall is constructed across the channel at specific sites to trap and hold back the sand during flooding; this creates an additional sub surface water bank for harvesting,’ (Practical Action, *Undated*).

This is considered transformational because:

- It radically increases the income and wellbeing of local populations.
- It employed technology and know-how that existed innovatively, in specific contexts that needed them most, using a process that ensured community buy in.
- They address local level imbalances in power relations by giving individuals and communities greater control over water resources management and they were built in manner that ensures community buy-in.
- They demonstrate how transformational change does not have to be large scale.

Further Information: Practical Action, *Undated publication*. <http://practicalaction.org/sand-dams>

The views of another expert were also underpinned by the emphasis on challenging power relations, arguing that transformative initiatives are those that are designed to deliver outcomes that enhance/contribute to equity. Transformative initiatives support processes of social cohesion, include people who were once excluded and allow marginalized people more equal access to resources. Participatory games (see Box 3) also recalibrated power relations so that experts and non-experts were on an equal footing and shared a horizontal relationship. By bringing different stakeholders (who have traditionally held very different amounts of power) together, the games explore links and compatibility between different knowledge systems.

Box 3: Participatory games for transformational learning engagement with climate risk

As adaptation to climate change involves dynamic elements that are not easy to grasp using conventional approaches, a communication was needed to convey the existence of systemic complexity. Participatory games were designed to better understand feedbacks, non-linearities, trade-offs and unanticipated side effects inherent in risk management decisions.

This is considered transformational because:

- It was a highly innovative process to ensure sharing perspectives of those involved in a decision making chain- from scientists to farmers.
- The games encourage experimentation and simulate the complexities of real operational environments.
- The games recalibrated power relations so that experts and non-experts were equal.
- It catalyzed processes of reflection and engagement.
- As polycentric deliberative space, it encouraged collaboration and competition.
- It entailed leaders acknowledging that the status quo needed changing.

Further information: Suarez, P. and Macklin, C. (2011)

Similarly, eliciting diverse points of view and divergent discourses to those that are institutionalized was also brought up by an expert, who discussed a transformational initiative by the Baring Foundation which worked with a variety of organizations to explain to them how climate change may be relevant to their work/brief (see Box 4). In this context, the interviewee argued that transformational change is delivered by contesting the entrenched discourse, *‘...in this case, this was a discourse which argued that climate change is not a problem which impacts diverse sectors and this was the job of purely environmental NGOs such as Green Peace and Friends of the Earth’*

Critical reflection, beliefs and values

Transformation entails being aware of and challenging inherited ways of thinking, assumptions and biases, as well as recognising and negotiating power structures. This involves developing alternatives to entrenched and institutionalised positions, reflecting critically on one’s own patterns of behaviour and addressing moral trade-offs in change processes.

Boyd and Myers (1988: 13) argue that transformation, at the individual level, takes place when a person starts to become conscious of ‘...how we feel about the way we are perceiving, thinking or acting or about our habits of doing so’. Transformation entails an ongoing process of critical reflection, challenging culturally assimilated frames of reference or ‘inherited modes of being’ (Mezirow, 1997; Biggs et al., 2010). ‘Transformative learning is when the individual becomes a more autonomous thinker by learning to negotiate his or her own values, meanings, and purposes rather than to uncritically act on those of others,’ (Mezirow, 1997: 11). Some see the transformative element of such reflection as empowerment and the ability to recognise and challenge structures of injustice (Bivens et al., 2009; Mills, 2010). Pelling (2010: 9) echoes this, using the term ‘conscientization’ to describe ‘...learning that can enable the marginalized to perceive social, political, and economic contradictions, develop a critical awareness, and challenge oppressive elements of reality’.

One interviewee echoed the need for a critically reflective mode of thinking for transformation, framed as ‘double loop’ learning (Argyris, 1977) that challenges underlying assumptions rather than ‘single loop’ learning associated maintaining status quo. The participatory games example (see Box 3) were particularly good at getting people to engage in, reflect on, and own the process of constructing knowledge:

“...people tend to be distracted, to get bored and tend to not own the ideas that are put forward, whereas since we started using participatory games, it’s very easy to tell that people who participate in these activities, themselves construct the knowledge, own the ideas and seek dialogue with others to try and find new and better solutions.”

One expert extended this point of view by talking of the importance of reflection in an initiative by the Baring Foundation which worked with a variety of organizations to explain to them how climate change may be relevant to their work (see Box 4). Initially the organizations that they reached out to were clear about their work not having any engagement with climate change but as their outreach continued, they reflected on their work and started to see climate change links.

Box 4: Transforming voluntary organizations to engage with climate change

The Baring Foundation launched an initiative to support non-environmental voluntary organizations to explore how the impacts of climate change will affect their primary charitable purpose. As a result, the levels of understanding on climate change increased dramatically and organizations succeeded in seeing how climate change impacts their work.

This is considered transformational because:

- It contested the entrenched discourse which said that climate change is the remit of environmental NGOs.
- It spurred a process of reflection. Initially the organizations were clear about their work not having any engagement with climate change but as the outreach continued, they reflected on their work and started to see how climate change impacts it.
- It looked at the organizational cultures/priorities of individual NGOs to frame the knowledge appropriately.
- It attracted substantial engagement from diverse organizations through keeping a space for sustained collaboration open.

Further information: Smerdon, M. (2009)

Critical reflection is also associated with the notion of altering beliefs and values. One expert noted that ‘values, ethics and morality’ need to be considered as transformational processes, citing the need for critical reflection on moral trade-offs and choices rather than the often ‘mechanistic’ approach to disasters and development. Another expert made a similar point about tackling chronic poverty and vulnerability as more than just a lack of resources but instead is linked to ‘ socio-structural’ factors and with ‘cultural values’ which are transformed through sensitization and reflection. One interesting reflection was that transformation need not be thought of in terms of large structural changes (such as that thought of by macro-economists) but *‘it might actually be more helpful if we think of it in multiple different ways which can be around belief patterns and values.’*

Effective leadership

There is a need for leadership that can perceive the need for transformation and communicate this effectively. Leaders can challenge the status quo, provide alternate visions of what is possible, take advantage of policy windows and manage conflicts that may emerge during transformational processes.

Leadership, and in some cases key individuals, can play a central role in transformation (Olsson et al., 2004). A business approach to transformation has argued that while ‘managers’ may want to maintain the status quo, transformation requires ‘leaders’ who see a need for change and then carry this change through (Kotter, 1995; Francis et al., 2003). For Kapoor (2007: 48), social transformation is brought about by ‘...conscious and visionary individuals who are potential agents, and often the initiators, of radical change’. Both Biggs et al. (2010) and Smith and Stirling (2010: 7) argue that socio- technical transitions should initially be led by ‘visionary forerunners’ who are able to convey the vision of change back to the current management regime. In doing so, they need to influence the regime’s behavior through building networks to affect new management structures and manage conflicts that may result from new arrangements, thereby consolidating transformation of management regimes.

Multiple interviewees noted the need for ‘policy entrepreneurs’ to *‘...to question what is going on at the moment and say that there’s something wrong with this status quo. That, I think, is a key element of leadership in transformation’*. The sand dams example in water scarce regions of Kenya (see Box 2) used outside stimulus (an NGO) to break the status quo, illustrating how: *‘Transformational change is delivered through a catalyst - a political actor/agent which has ascribed to itself the moral duty of trying to change society and help the poor. In most cultures either people are fearful of starting that or can’t gather sufficient people to make that work.’* Similarly, in the participatory games example (see Box 3), leadership was about recognizing and acknowledging the inadequacy of the status quo with regards to

inadequate utilization of climate information by those who needed it most: “...there’s knowledge that resides among the scientists and could be used for helping farmers and fishermen; while certain organizations had that knowledge, they were not able to make meaningful decisions...”.

A number of experts interviewed highlighted the functions that leaders need to perform in order to affect change. One noted that: ‘You need people who are very good at collecting and gathering information, at networking and building bridges with different kinds of people and who are able to convince other people of the validity of the idea.’ This idea of collating existing knowledge and bringing people together to develop shared learning was touched on by multiple interviewees, in contrast to the idea of inventing brand new ideas or visions. One gave the example of ‘At Risk’ (Blaikie et al., 1994), the seminal work on disasters that marked a change in how issues of vulnerability and risk are perceived, which relied on the authors capturing ideas in circulation and presenting them effectively.

Finally, one expert raised the importance of shadow networks in the context of organizational transformation, where ad hoc associations between key people in an organization can be critical for achieving substantive change (Olsson et al., 2006; Pelling et al., 2008; Boyd and Osbahr, 2010). These messy processes between the informal and formal sphere (Shaw, 1997) can hasten the pace of innovation and change, especially in public sector organizations, where the formal procedures of breaking with established process can be time-consuming and politically difficult.

Collective vision and future orientation

A collective vision for change is crucial in transformation, developed in advance but often through trial periods and experimentation. Preparing strategies in advance enables them to take advantage of crises as opportunities for their uptake. Transformational initiatives are therefore oriented around long term visions of the future.

Kotter (1995) places significant emphasis on the need for, and communication of, a collective vision for successful transformation: ‘In every successful transformation effort that I have seen, the guiding coalition develops a picture of the future that is relatively easy to communicate and appeals to customers, stockholders, and employees.’ Francis et al. (2003: 20) highlight the importance of a clear forward-looking transformational strategy, although this may be tentative and requiring experiments. Such visions for positive change in the long term have also been stressed by ecosystems approaches to transformation (Olsson et al., 2004; Biggs et al., 2010). Carpenter and Folke (2006: 314) discuss the importance of sensitizing populations to the importance of ecosystem services through ‘... integrated information in the form of visions for positive change in the approaches of society toward ecosystem services’. They also note that while crises create opportunities for a reorganization of relationships between humans and the environment, ‘...vision must be well formed by the time the crisis arises, because the opportunity for change might be short-lived,’ (ibid: 314).

One interviewed expert was emphatic that without a vision you just get changes but with vision these changes become transformational, ‘...if you ask what is it that is different about transformation- it’s the vision. Leadership, is about marshalling ideas and a clarity of vision.’ The notion of a diversity of voices combining to form effective visions was voiced by several interviewed experts: ‘I think effective leadership is not only about someone who has a vision but someone who can develop a vision based on a number of different voices.’ Another expert noted that ‘its not necessarily about developing a new vision but about allowing different visions to surface and compete’.

Closely associated with the need for a vision is the notion of being ‘future oriented’. Tonn’s (2003) analysis of the Intergovernmental Panel on Climate Change (IPCC) as a transformative initiative is hinged on the IPCC’s 100 year analysis horizon. This promotes future-orientation in its audiences, such that ‘regularly and frequently, viewers, listeners, and readers are challenged to extend their perception of time, from hundreds to thousands to tens of thousands and now to hundreds of thousands of years. Expanding our perceptual horizon of the past can only help to revolutionize our abilities and desires to consider the future,’ (Tonn, 2003: 616, our emphasis).

Moments of opportunity and policy windows

Without the ability to open or recognize policy windows, the aggregation of the other components of transformation may not be employed usefully to affect change. Understanding the sources of stimulus of policy windows is critical to processes of transformation.

A number of interviewed experts highlighted the importance of opening policy windows. ‘Policy windows are exceptional, fleeting periods of time when there is a greater likelihood of initiating policy change than usual. They arise when the normal policy environment is disrupted’ (Michaels et al., 2006: 984). One expert highlighted that one can have a lot of key ingredients of transformation but unless there is a window of opportunity none of it would matter. The Stern Review in the UK provides a good example; in linking climate change directly with broader economic issues, the report paved the way for a wider discussion of climate change and development issues (Stern, 2006).

One interviewee’s reflections included a discussion of the transformation in how risk and vulnerability are perceived. They noted that this change was only possible because there were major disaster events where the hazard wasn’t that big but the impact was enormous. This proved that vulnerability was not only a function of bio-physical factors but was also socially determined and shared broad/tangible linkages with levels of development. Michaels et al. (2006) also discuss the role of disasters as focusing events for transformational when they talk about Hurricane Hazel that killed 81 people in Ontario, Canada. The hurricane led to substantive changes in floodplain management, land use regulations and flood damage control protocols.

Extending this point, citing the example of a transformation in the Paris health system (see Box 1) one interviewee noted that making substantive shifts happen hinges on a deep understanding of the sources of stimulus for such change: ‘*Certainly in the case of Paris it was a fairly shocking impact that led to spaces for transformation to be opened up*’. There should also be a broad interpretation of the idea of policy windows:

‘I think you can have particular events that change national psyche and create new landscapes of belief and new landscapes of the way the electorate might wish to act, new calls for action: I think that is part of the policy window and policy spaces.’

Nevertheless, there are numerous examples where disaster events have opened policy windows that are not taken up (Pelling, 2010). One challenge is to understand how these policy spaces open up without disasters taking place. Having policy spaces in isolation is not useful - you needed effective leadership to take advantage of these:

“You may have prized opened a policy space where there is broad appreciation that change needs to happen but at the same time you need a leader who is working towards a vision of that change- for me that would be the most important.”

CONCLUDING COMMENTS

Similar to our previous review of characteristics of resilience (Bahadur et al., 2013), the analysis of these characteristics is not designed as a definitive list but as a starting point for reflection and the foundations of a more robust conceptual grounding for transformational change in the context of climate adaptation and development. As one expert interviewee noted:

‘I do think that conceptual clarity on what transformation is, what it implies, what it requires, how do you recognize it can help us find solutions because it feels like we’re in a swamp, conceptually and procedurally and even technically.’

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Transition management as an approach to deal with climate change

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INTRODUCTION AND BACKGROUND

Climate change mitigation and adaptation is undoubtedly a highly debated topic in science and policy. As pointed out by Crutzen (2002) the impact of human actions on the earth systems has become equivalent to a geological force, climate change being a major result thereof. When Rockström et al. (2009) point to the fact that human actions have already crossed a number of thresholds now endangering essential building blocks to secure a safe operating space for humanity on earth, climate change is at the very forefront of development debates. In consequence there is widespread agreement and sense of urgency that emissions need to be drastically reduced. Also, adaptation to anticipated impacts has to occur in order to reduce or avoid negative effects, which might result e.g. from more frequent and intense natural hazards. But, not only after the rather limited success of the very recent international climate summit in Poland in fall 2013, effective mitigation and adaptation efforts appear to be lacking.

As with other global challenges, such as biodiversity loss, tackling climate change can be described as a wicked or persistent problem. It is characterized by a high degree of complexity and uncertainty; it persists over long time and involves a diverse range of actors with their respective interests and roles. Levin et al. (2007) emphasize that climate change challenges even go beyond other policy problems, thus calling them “super-wicked”. They point out that (1) time is running out to implement especially effective mitigation actions, as the natural environment cannot be negotiated with, (2) centralized governance is lacking and coordination across various scales is required, (3) actors aiming to end the problem are also its cause, and (4) decision makers and the public disregard even clear evidence on harmful consequences and instead focus on short term actions.

Facing the severe consequences of inaction as well as the “super-wicked” nature of the challenge, several authors (e.g. Stern, 2007; IPCC, 2011) have stressed the need for approaches that enable transitions, shifting from currently dominant harmful regimes towards more sustainable forms. These transitions imply processes of radical change towards new systems or system configurations carried out by multiple actors over long time spans (usually 40-50 years) and encompass multiple changes in societal systems (Rotmans and Loorbach, 2009). Or, as Rotmans et al. (2001: 16) put it, transitions are “a set of connected changes, which reinforce each other but take place in several different areas, such as technology, the economy, institutions, behavior, culture, ecology and belief systems”.

Research on transitions has gained momentum in the past decade (Farla et al., 2012; Markard et al., 2012) driven by a relatively small range of authors (e.g. Berkhout et al., 2004; Geels and Schot, 2007; Rotmans and Loorbach, 2009; Geels, 2012; Markard et al., 2012; Smith, 2013). By studying and examining completed past transitions, insights for current and future transitions are gained (Markard et al., 2012). One of the overarching goals of these research papers is to develop a practical analytical approach to understand radical changes that take account of the complexity of socio-technical systems and its mechanisms of system innovation. Therefore transition research links a broad range of theories such as innovation studies, history, and ecology with sociology, political and governance studies as well as psychology (Wittmayer et al., 2013).

Markard et al. (2012) in more detail distinguish four theoretical strands comprising transition studies: technological innovation systems (e.g. Jacobsson and Bergek, 2011), the multi-level perspective (MLP) on socio-technical transitions

(e.g. Geels and Schot, 2007), strategic niche management (Kemp et al., 1998) and transition management (e.g. Rotmans et al., 2001; Loorbach, 2007).

“The first two aim at analyzing and describing transitions as processes of radical and structural change focusing on transition dynamics. The latter two are rather prescriptive and focus on issues of agency and how actors (can) influence transformation processes, yet including insights on transition dynamics, too” - (Rauschmayer et al., 2013: 5).

Although approaches have different foci, the following analytical concepts are prevalent in the understanding of transition theory and management (Grin et al., 2010): (1) the multi-phase concept, (2) the multi-level concept and (3) the multi-pattern concept.

1. The *multi-phase* concept describes the temporal dynamics of transitions, which include a sequence of fast and slow phases: the pre-development phase where the status quo system dominates, but non-visible changes in the background take place; the take-off phase, where the process of structural changes is gaining momentum; the acceleration phase, where structural changes become visible and the stabilization phase, where a new regime is established.

2. The *multi-level* concept views transition dynamics according to different functional scale levels, i.e. micro (niche), meso (regime) and macro (landscape) level. The landscape level comprises relatively slow and autonomous developments such as globalization, changes in political arenas and global agreements such as the Kyoto protocol. Regimes refer to the dominant structures, norms, and practices shared by groups of actors. At this scale, much resistance to transformative change and innovation exists, as existing regime actors want to maintain the status quo. At the niche level, short-term development takes place and new initiatives, techniques or forms of management are created.

3. The *multi-pattern* concept refers to combinations or sequences of mechanisms underlying the dynamics of a changing regime. Mechanisms are e.g. adaptation, emergence, empowerment and transformation. A transition pathway consists of a pattern plus a starting and end-point.

As transitions per se can have either negative or positive outcomes, transition researchers and managers stress the need to give sustainability transitions a direction by defining them as “long-term, multi-dimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption” Markard et al. (2012: 956). Linking the analytical to the prescriptive dimension, it becomes obvious that steering transitions is not a straight-forward endeavor. Building on the analytical concepts above, transition management offers a governance approach, which tries to adjust, adapt and influence system developments (Grin et al., 2010) in the direction of sustainability. Thus, rather than managing transitions in the classical sense of steering, transition management is about experimenting, searching and learning (Rotmans, 2005). It is

“a multilevel model of governance which shapes processes of co-evolution using visions, transition experiments and cycles of learning and adaptation. Transition management helps societies to transform themselves in a gradual, reflexive way through guided processes of variation and selection, the outcomes of which are stepping stones for further change. It shows that societies can break free from existing practices and technologies, by engaging in co-evolutionary steering” - (Kemp et al., 2007: 78).

In Europe, especially the Netherlands and UK are frontrunners in transition research and transition management. Further, the approach is currently applied in Australia (e.g. Melbourne's Transition to a Water Sensitive City, Ferguson et al., 2012) and Japan (e.g. within the FutureCity Initiative, especially in urban planning of disaster-hit municipalities, www.futurecity.rro.go.jp/en/). Although transition theory in general and transition management in particular have been proposed as very promising attempts to tackle climate mitigation and adaptation related transitions (e.g. Schneidewind and Scheck, 2011), systematic exploration and applications remain limited. For example, research on climate change and transitions emphasizes strongly on the scale of sectoral transitions (e.g. in the energy sector; Schneidewind and Scheck, 2011; Geels, 2012) and to a lesser extent on individuals (e.g. InContext project, www.incontext-fp7.eu). Also, literature is heavily biased towards climate mitigation rather than climate adaptation (the study by Tompkins et al., 2010 being the exception).

RESEARCH APPROACH

The paper aims to contribute to the debate on climate change governance by critically looking at transition theory and management, their application as an analytical framework and as a practical approach. Viewed from the perspective of transition researchers, it provides a climate focus on transition literature by extracting and condensing currently dispersed mitigation and adaptation topics. It therefore presents an explorative overview of the literature on transition management and transition theory related to the field of climate change research. The authors focus on exploring the potential contributions of transition theory in general and management in particular to deal with climate change mitigation and adaptation at the level of a) theory, b) analytical understanding and c) practical application. The following research questions are addressed:

1. Which limits and potentials of transition theory and more specifically, its components related to complex adaptive systems and governance theory can be revealed from looking at the topic of climate change?
2. Which key insights in analyses of climate change challenges does a research approach based on transition theory and transition management allow for?
3. How does transition management deal with climate change in practice? Can conclusions already be drawn for future mitigation and adaptation efforts using this approach?

The research questions are addressed through an explorative literature review. To find theoretical and practical examples for the application of the transition approach, a targeted search has been conducted using ISI Web of Knowledge and Google Scholar to look for key words (or combinations thereof) like transition management/theory/research/approach and climate mitigation/adaptation/change. Based on that, around 40 articles have been reviewed that provide an overview and cover different angles of how the conceptual framework and management approach have been used.

Articles were then analyzed in three focused steps, which also provide the structure for the following chapters: First, potentials and limits of transition theory are addressed with a focus on governance theory and complex adaptive systems, as these two strands of research have had a strong influence on developing transition theory (Loorbach, 2010). Second, to specifically gain broad insights on question (2), analyses from literature were selected covering different perspectives drawing out a multitude of linkages between transition theories and management in relation to climate change mitigation and adaptation. Thus, this paper presents applications such as research efforts that take a meta-perspective on climate adaptation (Tompkins et al., 2010), a sectoral perspective on mitigation (Geels, 2012) and a focus on a specific mitigation strategy (Bailey and Wilson, 2009). Third, practical examples of the transition management framework in climate change related fields are analyzed, encompassing relatively long on-going transition processes, which have been examined by researchers from different disciplines (e.g. Dutch Energy Sector), as well as newer applications like the MUSIC project (Roorda et al., 2012).

POTENTIALS AND LIMITS OF TRANSITION THEORY

As there is widespread agreement – at least in the scientific community – that climate change is happening and requires urgent action, the development of governance approaches to deal with mitigation and adaptation to climate change is seen as a contested and highly complex task. For example, interests of decision makers diverge largely when it comes to the definition of precise goals, committing to strategies and pathways to reach those goals and measures to implement and monitor the strategies (Bailey and Wilson, 2009). Within this current system, practices of international negotiations and domestic activities have not yet led to a transition including a drastic decrease of greenhouse gas emissions (Levin et al., 2007). Thus, even critical scholars of transition theory have acknowledged, “there is no doubt that the idea of a societal transition is appealing, at least for anyone convinced that there are serious problems with current practices” (Meadowcroft, 2009: 326; see also Duineveld et al., 2009). In the following we focus on the contributions of transition management to two interrelated challenges with regard to governance approaches to systems transformations: First with regard to understanding complex systems and their development and second with regard to possibilities to influence their transitions by means of governance approaches.

Complex adaptive systems

When it comes to understanding climate change in its nature as a “super-wicked” problem, there is a need to examine human-environmental systems and their dynamic, non-linear developments, involving a high degree of complexity, uncertainty, ambiguity and knowledge-gaps. These non-linear dynamics of the Earth’s climate imply e.g. that abrupt as well as gradual changes take place, that parameters of the human-environmental system are highly interlinked and that future trends are hard, if not impossible, to predict. Thus, changing the systems’ parameters might lead to unintended consequences and requires mechanisms to deal with uncertainties and steer away from harmful regimes.

Looking at human-environment systems as complex adaptive systems is one approach that builds on insights from research on non-linear dynamic systems and got applied mostly in the natural and computational sciences. However, it is gaining increasing attention in the social sciences, as researchers try to understand the dynamics of social systems with concepts like emergence, self-organization, co-evolution and basins of attraction (Lansing, 2003). Transition researchers see potential for transition theory to contribute to a deepened understanding of complex adaptive systems and their governance. Loorbach (2007) as a proponent of transition management argues that it provides a coherent and integrated perspective and encompassing approaches to persistent problems such as climate change, as opposed to a fragmented debate e.g. around specific regulations and policies separated from each other. Important characteristics of a system are its context, that the system is open and co-evolves with its “outside” environment, and that the outside environment itself changes and influences the system, which in turn responds by adapting in a non-linear way. These characteristics already indicate that systems, such as socio-technical systems, contain a certain amount of complexity and require that their actors and institutional structures have a certain degree of adaptive capacity to deal with systems dynamics. Loorbach thus argues that informing transition theory with a complex adaptive systems perspective and vice versa can have potential to capture societal complexity “such as heterogeneous agents and artefacts, dualism of structure, emergence, surprise and uncertainty” (2007: 64).

However, transition theory currently has several shortcomings, which need to be addressed in order to harvest this potential. Considering the complex web of interactions of a system with its outside boundaries, a critical issue before starting a complex system analysis is to be able to demarcate the system, i.e. identify system-specific, internal and external developments. Some authors (Meadowcroft, 2009; Grin et al., 2010) emphasize that the definition of a system is not a trivial task, as it is an outcome of strategic choices based on normative rather than objective criteria. The demarcation of the system is also closely related to its envisaged transition. Even though defining an evolutionary end point of a transition is not the chosen approach, examining the scope of possible alternative regimes is critical to define the character of a transition process (Bailey and Wilson, 2009).

The implications of these difficulties for climate change transitions can be exemplified by the definition of the energy system and its desired transitions.

“Here, the necessary transition could be characterized as: a) movement from a fossil fuel based (or dominated) energy system to a non-fossil fuel based (or dominated) energy system; or b) a shift from a carbon emitting energy system to a carbon neutral (or low carbon) energy system; or c) a transition from a non-renewable energy system to a renewable energy system. Other alternatives are also possible, for example, d) a movement from an insecure (vulnerable) energy system to a secure (robust) energy system. And e) a change from centralized energy provision to a decentralized energy system. And these different transitions would imply different development trajectories, a different mix of energy technologies in the emergent system and a different orientation for policy intervention.” - (Meadowcroft, 2009: 327).

It becomes clear that depending on the very focus of the transition, there are multiple different systems that can get investigated. Further research, e.g. building on this example from the energy sector, is needed to enhance the debate on system demarcations and their implications in the field of climate change adaptation and mitigation research. Research needs to increase knowledge on the biophysical as well as social characteristics of the system. Hence, it should cross disciplinary boundaries to e.g. critically examine definitions of necessary transitions for mitigating and adapting to climate change for various actors and (across and between) scales or to explore alternatives and potential consequences of changing internal system dynamics to arrive at an envisaged regime.

Governance theory

Applying a systems perspective to climate change issues, and identifying triggers to foster regime shifts has also been done by researchers outside the transition field (e.g. May et al., 2008; Rockström et al., 2009). According to Loorbach

(2007), the innovativeness of the transition approach lies in its explicit integration with ideas from sociology and governance studies. Thus, additional to the structural perspective, transition theory also provides an actor-centered, socio-political governance framework, which claims to provide the inclusive character needed to tackle persistent problems such as climate change. Although it is called management, the crucial insight from complexity theory – that controlling complex systems is impossible – has shaped this framework, as it aims not to manage the system (command-and-control), but to influence its change into a certain direction (Rotmans, 2005).

“Transition management facilitates a range of processes and points them in the same direction with a combination of network steering and self-steering. As such, transition management can be considered as a specific form of multi-level governance” (Rotmans, 2005: 39). It shares some characteristics with the schools of incrementalism (Lindblom, 1979) and adaptive governance (e.g. Pahl-Wostl, 2007), such as a focus on uncertainty, learning by doing and doing by learning, and several possible solutions (Van der Brugge and van Raak, 2007). It expands these governance approaches through the emphasis on radical and structural (irreversible) change, which implies the implementation of a portfolio of (high-risk) experiments, and the not only adaptive, but also anticipating long-term focus. Its distinguishing features are that transition management provides a long-term, normative perspective on sustainability. A steering framework has been developed, which captures the complexity of governance with the analytical insights from the systems perspective. The commonly used multi-level, multi-phase and multi-pattern concepts thereby provide a useful frame for analyzing governance processes (Rotmans, 2005). Elements of this framework are “actor-network interaction, of different levels of scale, of different social domains with specific characteristics, of the plurality of actor perspectives and the new instruments, practices and approaches that emerge within the field of steering and government” (Loorbach, 2007: 72).

These governance components of transition management appear promising and have attracted debates around transition politics (e.g. Shove and Walker, 2007; Duineveld et al., 2009). Criticism includes that the actors’ capacities to understand system dynamics is limited, as actors are part of the system itself, which inevitably shapes e.g. visions for the future. Bailey and Wilson (2009: 2330) for example point out that “transitional directions never leave the realm of the possible defined by transitional corridors (...)”. This constraint is usually referred to as “path dependency” or “lock-in” effects.” Duineveld et al. (2009) also pick up on the prescriptive character of the approach, emphasizing that processes are represented unrealistically mechanical; leaving the misconception that process analysis can yield definite and direct policy strategies. Power and strategic behavior also remains a discussed issue (Shove and Walker, 2007; Meadowcraft, 2009), as transition processes (e.g. the selection of participants) are never neutral and cannot be steered by objective criteria. Related to the challenges of demarcating the system and defining the desired transition (see energy sector example above), Shove and Walker (2007: 765) point to an additional governance challenge: What or who defines the desired transition as more socially benign? “For whom would the new regime be more benign, by whose measure and across what space and scale?”

Explorations above reveal the conceptual potentials and limitations of transition management to address questions of climate change mitigation and adaptation. At the same time they highlight severe challenges for governing climate change. For example, lock-ins into current regimes are created by powerful actors, vulnerabilities to climate change differ greatly among actors and scales, and unintended consequence of mitigation and adaptation measures might even occur on experimental level. Although not specifically related to climate adaptation and mitigation, ongoing and consequently pursued iterative efforts between enhancing transition theory and management have already addressed several points of critique. For example, reflections on power relationships between actors lead to a more careful selection of participants in the transition management process or exploration of new participatory tools for envisioning long-term transitions. Also, research increasingly addresses political aspects, such as the role of coalitions between governmental and non-governmental actors to achieve sustainability transitions (Hess, 2013).

EXPLORING THEORETICAL ANALYSES TO UNDERSTAND TRANSITIONS

Several studies (e.g. Kemp et al., 2007; Pahl-Wostl, 2007; Bailey and Wilson, 2009; Tompkins et al., 2010; Geels, 2012; Nevens and Roorda, 2014) have used analytical concepts developed by transition researchers as pointed out above to explore either on-going or historical shifts relating to climate change. They aimed to see if patterns of transition theory apply to these shifts and to gain insights into the process. The following paragraphs focus on three recent studies from the field of climate change related transition research, which represent different ways of linking climate mitigation and adaptation efforts with transition theory: climate adaption in the UK, transitions in the transport sector and the carbon economy.

In a meta-study on UK climate adaptation, Tompkins et al. (2010) aim to answer the question whether a series of observed adaptation actions can be viewed as evidence for a societal transition to a well-adapting society. They use the multi-level framework and explore niche activities, how their resulting new technologies link to existing technologies and finally how they flip the regime so that new technologies are widely used. Based on an 8 month survey in six different sectors in the UK, they found niche activities to be accumulating. Although motivations for adaptation actions remain diffuse and capturing deliberate as well as unintentional adaptation actions remains challenging, the study suggests that niche activities start to link with existing activities and thus are becoming mainstream. This might indicate a starting adaptation transition towards a society “where institutions and technologies allow for changing circumstances” (Tompkins et al., 2010: 633). However, a more widespread, deeper transition might also require adjustments of the current top-down risk-based adaptation strategy that is applied in the UK.

Geels (2012) provides a more detailed view on transition processes in socio-technical systems and examines transitions in the transport sector with a focus on car mobility from a multi-level perspective. He analyses niche developments and the emergence of a variety of green innovations (e.g. public transport initiatives, diffusion of ICT). Although it cannot be said which of the new technologies will eventually establish themselves and become mainstream and although niche activities are yet too scattered and small-scale, he discusses that slowly pressure arise bottom-up, from niche to regime level. These are complemented by pressures from a landscape scale, such as discussions about climate change and resulting policy actions. Thus, he concludes that despite factors strongly stabilizing current mobility patterns (e.g. cultural preferences, macro-economic developments), cracks in the regime appear, which might indicate that the current regime is in an early phase of a transition.

The study by Bailey and Wilson (2009) situates and analyses carbon economy as one possible form of transition response and explores why it has succeeded over other possible transition pathways, such as more eco-centric forms of behavior. With their focus on underlying ideologies, they start out by describing the possible range of what they call transition corridors, with approaches to reform current economics to include costs of climate change, to those who reject contemporary capitalism in favor of alternative modes of societal organization. Their findings suggest that

“reproduction and reinforcement of neoliberal and ecological modernization rhetoric largely shapes current transitional corridors. Even if a major transitional rupture was possible (e.g. dramatic relocalisation), it is unlikely that the new transitional trajectory would completely leave the path dependencies and transitional corridors established by the currently predominant neoliberal ideology.” - (Bailey and Wilson, 2009: 2335)

Thus, they discuss that even if a transition towards a low carbon society happens via carbon economy, the range of pathways used to achieve this transition remains strongly limited to strategies underpinned by powerful and dominant ideologies.

All three studies show that a deepened understanding of the specific examined system can be gained by framing it in transition terms. The studies by Tompkins et al. (2010) and Geels (2012) indicate that the conceptual framework is suitable for assessing the current phase or level of a transition, which in consequence might allow for more targeted policy measures and have implications on strategic developments. However, both also emphasize the remaining high uncertainty about potential outcomes. Thus, it is essential to combine this forward looking research with retrospective studies like Bailey and Wilson (2009), which provides insights into the characteristics of attractive transition pathways.

EXPLORING PRACTICAL APPLICATIONS OF TRANSITION MANAGEMENT

Moving from the more analytical perspective to the normative and prescriptive approach, Loorbach and Rotmans point out that

“the very idea behind transition management is to create a societal movement through new coalitions, partnerships and networks around arenas that allow for building up continuous pressure on the political and market arena to safeguard the long-term orientation and goals of the transition process.” - Loorbach and Rotmans (2010: 239)

As has already been described above, climate change presents a manifold challenge to societies, which leaves multiple potential entry points for transition processes to contribute to this idea. The long-term perspective needed

to mitigate and adapt to climate change requires a re-orientation, which goes beyond the current short-term thinking of most market and government actors. Actors from the international to local level increasingly recognize the need to collaboratively engage in climate actions and transition processes have gained support from governmental as well as non-governmental actors.

Often, the formulated aim of transition management processes is not to tackle climate change per se. Rather, climate change is mentioned either explicitly as one problem and slowly changing variable on the landscape scale that needs to be integrated to reach the goal of a sustainable society (e.g. Geels and Schot, 2007). Or, a mitigating and well adapted society is only implicitly defined as (one of the) overarching goals and, thus, aims of the transition process are formulated on other scales, like in the energy sector) (Foxon et al., 2010; Tompkins et al., 2010). The MUSIC project (Roorda et al., 2012) provides an exceptional case, as it hosts a transition management process, where mitigation is one of the key objectives already mentioned in the title “Mitigation actions to reduce CO₂ emissions in Urban Areas and the creation of Solutions for Innovative Cities”. This project aims at transitions to sustainable urban planning in the cities of Aberdeen, Gent, Ludwigsburg, Montreuil and Rotterdam with the specific goal to reduce carbon emissions to 50 percent by 2030.

The extensive documentation and analysis of transition management in the Dutch energy sector provides ample room for the discussion of benefits and caveats of this approach (Kemp et al., 2007; Kern and Howlett, 2009). It is a specifically interesting example of combining mitigation efforts with transition approaches, as the Dutch national government embraced the concept of transitions already in its white paper “A willing world” in 2000 (Kemp et al., 2007) and committed to transition management initiatives in its Fourth Dutch National Environmental Policy in 2001 (Kern and Howlett, 2009), at a stage, when transition management just started. Thus, this transition management process can be seen as a pioneering achievement at relatively large scale, where stakes are high and wide and critical discussions are bound to occur. Since 2000, broad public and political awareness for the need to achieve an energy transition increased significantly, also because local climate pollution and an increase in extreme weather events became apparent (Kemp et al., 2007). The Fourth Dutch National Environmental Policy Plan acknowledges that system innovations are needed to solve climate change problems and that the energy system aims to cut its emissions by 2030 to 40-60 percent of its 1990 levels (VROM, 2001). Actors involved in the transition management processes, developed 28 official transition pathways that suited a portfolio approach. That means that a variety of options are being explored in order to achieve the vision of 2050, where energy should be clean, secure and affordable. Actors in the transition management process – which were criticized as being too narrowly selected and dominated by supporters of the current regime - created transition platforms and networks, a task force, and an interdepartmental directorate for policy coordination (Kemp et al., 2007). On the one hand, it is remarkable that these coalitions seem to be so resilient, that they already outlived several government changes. However, arriving at decisions for certain policy and market instruments and implementing them is a critical next step that has to be taken in order to actually see biophysical outputs of the transition management process. Kemp et al.(2007) conclude that the transition management process is not fully following the proposed model, especially due to the characteristics of the participating actors and the strong technology focus at the expense of social factors (Kern and Howlett, 2009). It supports, however, a form of reflexive governance, which aids the orientation of sectoral policies and innovations towards the vision of a sustainable energy future.

Kern and Howlett (2009) analyze the orientation of Dutch energy policies more closely to see if they are coherent, if policy tools are consistent and if goals and means in the policy mix are congruent. Their paper results from the notion that energy policy changes outside the transition management process seem to override transition efforts. Additionally, transition arenas and consequently transition experiments are dominated by market interests represented by major companies and public officials. They show with the example of trade-offs between short-term goals of economic efficiency and long-term sustainability that current transition management policies and instruments are neither coherent, nor consistent or congruent. They argue that these characteristics of policy mixes need to receive more explicit attention, as neglecting their importance might lead to adverse effects or unanticipated outcomes, which generally “frustrate initial transition management efforts, aims and expectations” (Kern and Howlett, 2009: 403).

What these analyses of transition management in practice confirm is the claim that transition management is an appealing approach, which is able to create a momentum for various actors to reflect on current practices at a system level and to engage in the development of ambitious visions. However, when it comes to the development and implementation of concrete measures, considering the occurred problems and hindering factors is essential for the further improvement of the transition management framework. Also in practice, the need has been stressed by the

cited authors to put increasing focus on the subjects of transitions, i.e. regime as well as non-regime actors. While e.g. the design of the MUSIC project seems promising for including a diverse field of stakeholders and providing space for the input of frontrunners, experience from the Dutch energy transition shows that a transition process might easily become dominated by regime actors, which limits the scope of potential innovations.

FINDINGS AND CONCLUSIONS

Although the transition theory literature revealed current shortcomings and areas for improvement, using transition theory to frame climate change and related governance issues is an intriguing approach. The complex adaptive systems perspective provides potential for analyzing climate change problems (“super wicked problems”) and pathways to mitigate and adapt to anticipated impacts. As Geels and Schot (2007: 417) put it, climate change currently has the role of a landscape pressure, which might act disruptive and might trigger “a sequence of transition paths in transport and energy regimes” if particular niche-innovations have been developed at that point.

Discussions around the normative dimensions of transitions towards sustainability also apply in the realm of climate change. These include the need and difficulties to explicitly designate the examined system, how the aim of a transition towards mitigation and adaptation to climate change is defined, by whom, and what that would actually mean. Several authors thus stress the importance of flexibility to be able to react and adapt to iterative reflections on visions, goals and the process itself (Loorbach, 2007; Shove and Walker, 2007).

A research approach based on transition theory and transition management provides a deepened understanding of the current phase or level of a transition. Thus, studies found it potentially useful to inform better policy-making and preparations of long-term strategies. The combination of forward looking research with retrospective studies can be seen as an especially useful way to explore attractive transition pathways and deal with uncertainties.

As has been pointed out e.g. by Loorbach and Rotmans (2010), the transition field is currently focused on a few sectors (energy, water, urban planning), with strong regional foci and transition management processes in the early phase. One of the core themes of transition management is to increase theoretical and practical understanding how phases after the predevelopment phase (i.e. where experiments on niche level happen) might be managed. The examined literature is in line with that state of the art. For example, in the practical application criticism arose that the dominant Dutch energy regime (with its actors and policies) prevails transition efforts to upscale niche-level innovations and move into the take-off and break through phases (Loorbach, 2007; Kern and Howlett, 2009). Also, we did not find studies mentioning any impacts of transition management processes e.g. on reduced carbon emissions. Apart from most transition processes still being in the earlier phases, an explanation for this is that the complex relationships between transitions and their biophysical outcomes pose significant methodological challenges on researchers evaluating the effects of transitions on climate change mitigation. So far, documentation of project outcomes has focused on institutional and technological change rather than addressing the issue of (potential) biophysical results (such as in the Dutch energy transition). Thus, literature on climate change and transitions is currently focused on the potential of transition approaches and transition pathways rather than already achieved mitigation and adaptation effects.

However, we found that the documentation of transition management as well as transition research reveals a high degree of critical self-reflexivity by practitioners and researchers engaging in this field, which shows their high awareness of the strengths and weaknesses of the approach and a willingness to further expand and improve it. Hence, we conclude in line with Grin et al., who state that

“We still cannot answer unequivocally the question whether transition management really works. And it might take another decade before we can answer this question. But the potential and positive effects of the transition management approach are clear and encouraging, which is also reflected in the rapidly expanding practice of transition policies, research and projects.” - (Grin et al., 2010: 201)

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When is change change? What can we learn regarding societal transformation in the face of climate change from the previous work of local authorities on promoting sustainable development?

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INTRODUCTION

The idea of ‘transformation’ – in the sense that the world needs radical changes – has always been central in the environmental discourse - and has also been strongly linked to that of promoting the goal of a sustainable development (Lafferty and Langhelle, 1998). Since the presentation of the Brundtland report in 1987 and the introduction of the goal of a sustainable development there has been an astonishing world-wide activity at the local level of governance on promoting sustainable development (Lafferty and Eckerberg, 1998; Lafferty, 2001). Astonishing, because most policy makers and academics seem to agree that solving the global challenges outlined in the Brundtland report – such as avoiding climate change, protecting biodiversity and increasing global justice – is first and foremost a quest for the international and national level of governance. Some – among others economist scholars – even argue that local government should stay out of this quest, because involving local authorities could lead to sub-optimal policy solutions. Thus, finding examples of ‘transformative change’ towards sustainable development facilitated – so to say, against all odds – by local authorities should be of high relevance to the upcoming debate on societal transformation in the face of climate change. One might expect that local initiatives aiming at creating radical changes would have to overcome even more obstacles than those of national initiatives, thus also having to be more of a ‘transformative’ nature in order to have any chance of succeeding.

We may identify three main modes of action for local authorities in the work on promoting a sustainable development (Aall et al., 2007): *First*, as implementers of national policies on sustainable development, and *secondly* as ‘test sites’ for national authorities to develop new innovative sustainable development policies. Both of these modes apply to local authorities as *policy structures* for national policymaking. However, an additional *third* mode of action has also evolved, namely that of becoming a *policy actor*. In this third mode, local authorities act more or less independent of (in some situations even in conflict with) national authorities. There are relevant examples of ‘transformative’ initiatives within all of these three modes, but perhaps more so within the second and third mode. Resting on insights from a number of Norwegian research projects from the last 25 years on the role of local authorities in promoting sustainable development, we will in this article discuss what to learn from these examples regarding the problems and prospects of creating societal transformation in the face of climate change.

SOME THEORETICAL REFLECTIONS ON TRANSFORMATION AND RELATED CONCEPTS

The concept of *transformation* is attaining a growing interest in the climate change literature (O’Brien and Wolf, 2010; O’Brien et al., 2012). What is really meant by transformation in the context of the climate change discourse is however still rather unclear.

Looking up the word ‘transformation’ in different encyclopaedias you may be able to find at least 50 different meanings of the concept – applied within many different contexts ranging from mathematics via chemistry and medicine and to humanities and social science contexts. A generic definition that seems to cover the use of the concept within most humanities and social science contexts is as follows (one of six generic definitions presented at <http://en.wiktionary.org/wiki/transformation>): A marked change in appearance or character, especially one for the better. Thus, the core

characteristic of the concept seems to be a concept that describes (a) *change* which (b) might be *to the better* and (c) might imply a *more profound change* than other concepts of change.

The idea that we need ‘radical changes to the better’ in order to address emerging environmental problems is not new in the environmental discourse, and other concepts than ‘transformation’ have been used to capture this idea. The perhaps most well-known example of this can be found within the discourse on the strong critique of economic growth as a superior goal for the development of nations, initiated in the early 1970s by contributions from scholars like Meadows and colleagues (1972). Alternatives to the prevailing model presented in this discourse were (among others) the steady state economy (Daly, 1968) and the bio-economy (Georgescu-Roegen, 1971). More recent discourses picking up on the same ideas on ‘radical change for the better’ is the discourse on *sustainable development* (Høyer, 1997; Lafferty and Langhelle, 1998) – including that of *rebound effects* (Saunders, 2000) and on *degrowth* (Schneider et al., 2010) – and the discourse on *social-ecological systems* and *resilience* (Berkes et al., 2003; Walker et al., 2004).

The so far dominating strategy in the sustainable development discourse has been that of ‘eco-efficiency’, coined in 1992 by the Business Council for Sustainable Development (WBCSD, 1992), and endorsed later the same year at the UN Conference on Environment and Development in Rio de Janeiro (UNCED). The strategy of eco-efficiency entails more being produced with less input; the intention being that the production of economically valuable goods and services cause as little ecological impact as possible. It originates from a more general idea of how society could be changed in order to solve environmental problems: the reform-oriented school of ecological modernization which emerged in Europe during the early 1980s (Spaargaren et al., 2000). A basic assumption of ecological modernization is the idea of environmental re-adaptation of economic growth and industrial development, as echoed by the aforementioned notion of producing more with less. The debate on eco-efficiency and ecological modernization has focused on the marginal environmental efficiency of industrial production measured e.g. in the form of energy per unit of production or per price unit – later extended to that of measuring the energy use (or other measures of environmental pressure) per unit of Gross domestic product (GDP). However, the final output has been subject to less attention; that is, whether applying a strategy of eco-efficiency or ecological modernization has actually reduced the environmental pressure in society as a whole, or just literally moved the pressure to other regions or related economic activities, often referred to as rebound effects (Hertwich, 2005).

The *rebound effect* has been presented as a possible explanation why major success is still lacking in trying to curve down the energy use in rich industrialised countries; a task which is crucial for achieving the goal of a sustainable development (Høyer, 1997). Basically the rebound effect refers to behavioural or other systemic responses to the implementation of new technologies or other measures to save energy use (Saunders, 2000). According to Hertwich (2005) the environmental benefits of any environmental policy measures can under certain conditions be less than anticipated (rebound effect) or even negative (backfire effect). Thus, Hertwich (2005) underlines the importance of getting a clear understanding of the rebound effects. Several authors have tried to sum up the controversies relating to rebound effects of energy policies. Some tend to conclude that the rebound effects are limited and therefore of minor importance (e.g. Greening et al., 2000). Others conclude that rebound effects are at least of some importance, but they need not result in energy efficiency policies becoming substantially ineffective (Sorrell et al., 2007). Others again state that the rebound effects are significant and challenge the belief that improving the efficiency of energy use will lead to a substantial reduction in energy use (Herring, 2004; Santarius, 2012; Saunders, 2013). These seemingly contradictory conclusions could stem from applying different definitions of what is meant by rebound effects and the application of different system boundaries in rebound analysis, ranging from direct, via indirect to economy wide (or macro) rebound effects (Sorrell et al., 2007).

When rebound effects are omitted, the eco-efficiency approach turns sustainable development into something compatible with the prevailing notion of economic growth – the increase in the amount of the goods and services produced by an economy over time – as the ultimate societal goal and indicator of societal progress. This view of societal change has deep theoretical roots, and can be linked back to Leslie White’s (1949) social evolutionism postulating that the degree of societal progress, or cultural development, is indicated by production (P), which is the product of the amount of energy harnessed (E) multiplied by the technology (T) used to put that energy to work. Yet, not all theorists adhere to the sustainability and desirability of this kind of societal change or development. In his seminal work, *The Great Transformation*, Karl Polanyi (1944) analysed the move from other kinds of economies (household, reciprocal, redistributive) to the market economy, concluding that the conversion of land and labour into commodities implied destructive changes to human nature (a switch toward more utility maximising mind sets, a turn of people into

labourers, depriving them control over their lives) as well as the environment, resulting in a system undermining its own existence. Some three decades later, the much-referred-to volume *The Limits to Growth* (Meadows et al., 1972) presented an analysis showing that if the exponential growth characterizing the contemporary global society were left to continue, it would likely lead to an overshooting of planetary physical limits, a situation which sooner or later would induce a ‘contraction’ whereby resource use and emissions would decline. Such a contraction could either be managed by human society, or come in the form of a collapse enforced by nature or the market. The authors argued for an urgent planned reduction of human activities’ physical impact on the earth, and continue to do so today (Meadows et al., 2004; Randers, 2012). One of their messages is that while economic growth in the past has contributed to the improvement of material living standards and human well-being, it will cease to do so when planetary limits are overshoot.

The debate on the relationship between economic growth and sustainable development has recently been further developed under the heading of *degrowth* (Schneider et al., 2010). In these works it is argued that degrowth should not be treated as a negative event affecting the present global economy – thus being met with strategies to boost the economy back onto the growth track – but instead treated as a strategy for economic development in rich industrialized countries in order to reach two goals: To achieve a more just distribution of economic welfare between rich and poor countries, and to substantially reduce environmental pressure from consumption in rich industrial countries. A core idea in the degrowth discourse is to shift the focus of environment policymaking in two ways: From focusing most of all on production to include that of consumption to a much higher degree; and from focusing most of all on increasing resource efficiency to including that of reducing (in physical terms) the end-use volume of consumption for selected products and services (Saunders, 2013).

In the literature on *social-ecological systems* and *resilience*, system transformation has been described as a process creating a fundamentally new social-ecological system – a process which is induced when certain ecological or social thresholds are crossed (Berkes et al., 2003). Because of the many feedbacks in complex systems, locating the thresholds prior to the occurrence of transformation can be difficult (Berkes et al., 2003). An important further distinction has been made between: “transformation as a directed, desirable process and transformation associated with the effects of inadvertently crossing thresholds” (Nelson et al., 2007: 402). The former may be perceived as “a planned, deliberate process, whereas the latter is an uncontrolled process, which results from insufficient system resilience. One would expect that inadvertent transformation is more likely to lead to undesirable system states with low productivity and less human well-being” (Nelson et al., 2007: 402-403). The past is ripe with examples of presumably inadvertent societal transformations and civilization demises, many of which have been linked to factors such as the overexploitation of local resources, rapid population growth or failure to adapt to relatively abrupt climatic changes (Tainter, 1988; Diamond, 2005). Several authors have warned that unless societies deliberately transform in the face of climate change, climate change will, in combination with other pressures on society, impose transformations that are likely to imply large negative societal consequences (O’Brien, 2012; Ehrlich and Ehrlich, 2013).

A briefing note issued from the Learning Hub on the concept of *transformation* at the UK Institute of Development Studies sums up the rationale for moving from what they describe as a traditional approach of incremental change to a new transformation approach in the climate change debate in the following manner:

“There is growing debate on the need for transformational approaches to tackle the challenges facing development in the face of climate change. If current incremental approaches to preventing dangerous climate change and adapting to the change we are already locked into are insufficient, then more radical approaches may be required.”

- (Bahadur and Tanner, 2012: 1)

A similar view can be found in some of the recent works of the Intergovernmental Panel on Climate Change (IPCC). In the introduction to the Special Report “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation” the following is stated (IPCC, 2012: 1): “Some strategies for effectively managing risks and adapting to climate change involve adjustments to current activities. Others require transformation or fundamental change”. The same report defines transformation as: “The altering of fundamental attributes of a system (including value systems; regulatory, legislative, or bureaucratic regimes; financial institutions; and technological or biological systems)” (IPCC, 2012: 4).

The related theoretical discourses mentioned above include debates about a number of dimensions of change; among these are questions of incremental versus abrupt change, forced versus deliberate change and finally, different forms

of expansion versus contraction. They also touch upon issues of human well-being and economic, environmental and social justice. Although the visions of how societal transformation in the face of climate change will come about vary, it is possible to discern two main trends: One trend views the necessary transition as basically an eco-smart prolongation of the current processes of modernization and globalization. According to this view, we can use the same human ingenuity that brought us into the climate crisis to get us out of it. Basically, the most important change humanity needs to put in place is to redirect a sufficient amount of human ingenuity from the extraction of fossil fuel to the invention of new technologies that create abundant, cheap and green-house gas (GHG) emission free energy. The other trend sees the problem of GHG emissions as symptoms of a deeper problem connected to the role of economic growth and also as more intimately connected to the old (pre-climate) environmental problems. One characteristic of much of this literature is that it remains at an abstract conceptual level, and often lacks a thorough grounding in locally-based situations and experiences. We argue that policies aimed at inducing societal transformation toward a climate-friendly and resilient society may be enhanced by also drawing upon lessons from local level perspectives – and below we will present some relevant experiences gained from more than two decades of local initiatives on promoting a sustainable development.

EXAMPLES OF LOCAL INITIATIVES ON PROMOTING A SUSTAINABLE DEVELOPMENT

Local environmental governance in Norway experienced what Rothstein (1992) denotes as a formative period during the late 1980s and early 1990s (Aall, 2000). Christensen (1996) applied the term ‘formative period’ in order to describe the emergence of Nordic environmental political institutions at the national level during the late 1960s and early 1970s. During this period existing political institutions became dysfunctional in the handling of environmental crises and emergencies. However, according to Christensen, although the Nordic countries experienced a formative period, the formative moment did not materialise. No radical shifts in policy making occurred. Despite numerous initiatives during this period of time – several of them quite radical – the institutionalisation of environmental politics and policy in the Nordic countries largely followed existing norms for public management. Thus, any ‘transformative change’ was never to materialise. A similar process occurred 20 years later at the local level of government. In this period of time local government proved to be dysfunctional with regard to handling environmental crises and emergencies like increasing pollution problems relating to waste and sewage treatment, the algal bloom in the North Sea, and radioactive pollution in parts of Norway due to the Chernobyl disaster. And similar to what took place a decade before at the national level, the formative period never transformed into a formative moment (Naustdalslid, 1994). Still, there are interesting examples of ‘transformative changes’ taking place in some municipalities and in some sectors (Aall, 2000). Below we will present three examples which can be of relevance to the debate on social transformation in the face of climate change (Aall, 2012):

- Mode 1 Implementers of national policies: The government initiated reform “Environment in the Municipalities” (MIK)
- Mode 2 ‘Test sites’ for national authorities: A government initiated local project on sustainable consumption
- Mode 3 Policy actor: Local authorities as international players in environmental policy

The examples have been chosen to cover each of the three main modes of local policy for promoting a sustainable development identified in the introduction.

The government initiated reform “Environment in the Municipalities” (MIK)

In 1988, the high profile programme ‘Environment in the Municipalities’ (abbreviated “MIK” in Norwegian) was introduced by the Ministry of Environment (MoE) in cooperation with the Norwegian Association of Local and Regional Authorities (KS). Two-hundred-and-twenty out of a total of 435 municipalities applied for participation, and 91 were accepted. The programme was designed to test different administrative and political organisation models and to promote local planning on environmental and natural resource management. MoE financed the appointment of a municipal environmental officer in each of the participating municipalities. The MIK programme was followed in 1991 by a Government White paper on local environmental policy, resulting in a corresponding reform offering all municipalities earmarked funding of an environmental officer (for municipalities with less than 3.000 inhabitants the offer was limited to a half-time position). By 1992 almost 100 percent of the municipalities had chosen to take part in this arrangement. However, in 1997 the arrangement with earmarked funding ended, and the equivalent sum of money was included in the basic government funding of local authorities – resulting in a quick drop in the share of municipalities with an environmental officer. In 2008 only approximately 40 percent of the municipalities had 0,5 or more person-years designated to work specifically with environmental policy (Aall, 2008). In 2013 this share is probably even lower.

In analysing the outcome of the MIK-reform, Jon Naustdalslid formulated a hypothesis suggesting that local authorities will primarily relate to local environmental problems (for example pollution of a local watercourse from municipal sewage) as opposed to global problems like climate change. According to Naustdalslid the assessment of the MIK reform – which to a large extent rests on analysis of national surveys – has corroborated this hypothesis. He observes that “local management bodies in the first place hardly can function as activators in the work with more superior, global environmental problems . . . the municipalities give priority to issues which lead to visible local gains” (Naustdalslid, 1994: 22-23). And he continues “if one wants the municipalities to give priority to global environmental issues, there is a need for more profound national co-ordination of local environmental policy”. He further claims that “[such] an environmental-political U-turn presupposes changes in people’s values and priorities” (Naustdalslid, 1994: 25). Still, in-depth case studies of front runner municipalities indicate that municipalities *can* give priority to working with global environmental problems if local actors are able to clarify how the global and the local levels are interconnected, in both nature and society, thus transforming the global into a local problem (Hägerstrand, 1991; Corell, 2003; Kates et al., 2003; Aall et al., 2007). To accomplish this there is a need to develop effective and communicative concepts and metaphors (Aall, 2001). One example of such, which has proven to trigger local action towards global environmental problems – in particular that of contributing effectively in mitigating GHG emissions – is the local application of the term ‘ecological footprint’; a term which for the case of Norway have been used by among others the cities of Oslo and Stavanger (Aall and Norland, 2005). This term was co-originated by William Rees and Mathis Wackernagel of the University of British Columbia in the 1990s (Rees and Wackernagel, 1996). The fundamental thesis underlying the concept of the ecological footprint is that Earth’s land area is finite, whereas the number of humans is increasing, as is land use. All human functions – and resource use – require land use, primarily biologically productive land. Ecological footprinting pinpoints the need for a ‘cradle-to-grave’ focus on both production and consumption, and the global consequences of everyday local behavior. Unlike commonly used analytical tools – such as cost-benefit analysis or life-cycle analysis – the footprint also incorporates the concept of global justice, a long-term perspective, and the aspect of volume. The latter concerns increased attention to consumption and related environmental impacts. Thus, by applying ecological footprinting, local consumption is put in perspective of long term global availability of natural resources and recipient potential as well as the issue of global justice (Aall and Norland, 2005). In both cities ecological footprinting has been included as one out of many indicators presented in the annual environmental report produced by the administration for the municipal council. The city of Stavanger has in addition made a web based tool for calculating your personal ecological footprint (cf. <http://vfp1.vestforsk.no/miljokalk/>).

Local authorities as ‘test sites’ for policy development: The case of sustainable consumption

At the first meetings in the United Nations Conference on Sustainable Development (UNCSD) – the body set up by the United Nation to monitor the follow-up of United Nations plan on promoting a sustainable development (Agenda 21) and the UNCED conference in 1992-- the former Norwegian minister of environment, Mr Torbjørn Berntsen, suggested putting *sustainable consumption* on the international political agenda, and he said that Norway was willing to take a lead on this. His invitation was accepted and thus the first international conference on sustainable consumption, with top-level political participants, came to be staged in Oslo in 1994 (the Oslo conference). Just before this conference the Norwegian Labour government had introduced its long-term economic programme for the period 1994-97, which among other things included a goal of doubling the volume of consumption per inhabitant up to the year 2030. During the opening session of the Oslo conference Mr Berntsen made a statement which quickly secured the conference considerable attention in the media (the newspaper “Aftenposten”, 19 January 1994): “One thing is crystal clear: The goal of doubling the volume of consumption in Norway by the year 2030 is absurd. If India were to emulate us, the world would collapse. We Norwegians must realise that there is no room for further growth in prosperity. The problem is that, regardless of how environmentally friendly Norwegian industry becomes and how environmentally correct our products become, any growth in the Northern Hemisphere will have a negative impact on the global distribution policy.” What is radical in Mr Bentsen’s statement is that he emphasises that making production processes more efficient and changing the patterns of consumption is not sufficient for attaining a sustainable development; rich industrialised countries must also reduce their volume of consumption. After the conference, the opposition parties in the Norwegian parliament strongly criticised Mr Berntsen’s statement, and the Norwegian Prime Minister at that time, who happened to be Gro Harlem Brundtland, had to dissociate from Mr Berntsen’s statement and calm down the criticism by vindicating that the government had no plans what so ever of eradicating the goal of doubling the volume of consumption per inhabitant up to the year 2030.

As an integral part of Norway's effort to the UNCSO to take a lead on putting sustainable consumption on the international agenda, the MoE in 1996 initiated the project Sustainable Local Communities (SLC) involving seven pilot municipalities and lasting from 1996 to 1999. The goals of this effort were (1) to bring out municipal perspectives on the concept of sustainable consumption, (2) in order to serve as input for transforming national policies on this topic, (3) which in turn could serve as input to the international process on defining the content of a policy on sustainable consumption (Aall, 2001). A large number of concrete policy initiatives were developed, some of which were also implemented, whereas others were put on rest due to hindrances which arose during the implementation stage. In a study of the project (Aall, 2001), local informants from the municipal administration admit that they in most cases had deliberately focused on non-controversial and "positive" aspects in working with sustainable consumption (like searching for win-win solutions by choosing eco-labelled products), thus enabling them to 'sell' the project and the concepts of sustainable consumption. However, a number of the informants emphasise the necessity of something they describe as the need for a *quantum leap* in environmental policy making at both the local and national level, expressing the hope that the time is soon ripe for bringing up also the controversial aspects of sustainable development. Thus, quite a few of the sub-projects were dealing with the issue of energy and how to reduce consumption of energy, not only shifting to more climate friendly energy sources; and some of the sub-projects were focusing on the issue of sustainable mobility – including that of *reducing* mobility – hence taking up one of the most controversial aspects of sustainable development as well as climate policy-making (Høyer and Aall, 2005).

In short, what came out of the SLC project was much relevant output regarding the first goal, but very little regarding the two other goals (Aall, 2001). At least two lessons can be drawn from the SLC project which are relevant to the discourse on societal transformation in the face of climate change: Creating cooperation between 'radical elements' within national government and 'radical local authorities' in order to carry out local development projects can bring forward new and 'transformative' policy initiatives. However, without at the same time ensuring that the lessons learned from such initiatives are channelled into (and followed up in) national level policy making, the chances are high that such initiatives will run into serious obstacles – and hence sooner or later 'dry out'.

Local authorities as players in international environmental policy processes

When analysing the nature of climate policy, academics tend to start at the 'top' where the international climate negotiations take place. A common analysis is that international agreements are "taken home to be implemented, or ignored, by national governments, with consequent local level obligations" (Bulkeley and Betsill, 2003: 16). This constitutes a traditional hierarchical view of how policy-making is conducted. However, within the domain of environmental policy we find that the role of local government can differentiate. Local authorities take independent policy initiatives and send political signals to both the national and the supranational level, and they 'interfere' in policy areas that normally fall under the responsibility of government bodies (Lindseth, 2006; Aall et al., 2007)

The perhaps most prominent example of what we might denote 'think locally – act globally' is the role that local authorities have played in the international processes related specifically to the goal of a sustainable development, even though local authorities were not assigned any role of importance neither in the Brundtland report itself nor in the first drafts of Agenda 21 (Aall, 2000). Representatives from local governments, and particularly staff at the International Council of Local Environmental Initiatives (ICLEI), played a decisive role in the inclusion of a separate chapter on the role of local authorities in Agenda 21 (chapter 28 which outlines Local Agenda 21). At first, there were no plans for such a chapter, but representatives of local authorities world-wide played an active role in the run-up to the UNCED conference in 1992 and managed to persuade their state representatives to include a separate chapter outlining the role of local authorities in fulfilling the goals set out in Agenda 21. As it turned out in the assessments 10 and 20 years after UNCED, very little progress have been made when it comes to establishing progressive and effective *national* Agenda 21 processes and plans; whereas there are many examples internationally of both progressive and (at least to some extent) effective *local* Agenda 21 processes and plans (Lafferty and Eckerberg, 1998; Lafferty, 2001).

Of particular interest in the context of this article is the parallel story of how representatives of local authorities world-wide have taken very actively part in the processes surrounding the international climate negotiations (Lindseth, 2006). Two international organisations – both established in 1990 – have been instrumental in this process: Cities for Climate Protection (CCP) and the Climate Alliance. CCP has been working systematically on a lobbyist basis towards the international climate negotiations, urging for more ambitious climate policy goals at both the national and international level and arguing that local government should be recognised as a formal partner in the international climate agreement negotiations (Aall, 2000). The Climate Alliance has introduced into the climate policy agenda the radical idea of linking

GHG mitigation efforts in rich developed countries with economic support to indigenous people and the preservation of the rain forests in developing countries (Lindseth, 2006) – an idea that was successfully picked up by the Norwegian government and presented at the international climate negotiations in Bali in 2007. Since 2007 Norway has allocated 3 billion NOK annually for the preservation of foreign rain forests.

The two organisations described above are interesting in three ways for the discourse on societal transformation in the face of climate change. First because the networks were established long before any kind of national climate policy on involving the local level of government were formulated in most of the countries with member municipalities. Secondly because an important part of the work of these two networks has been directed towards making national and international climate policy commitments more ambitious. And thirdly because the members of these two networks have contributed with developing innovative local policy measures for mitigating climate change (Lindseth, 2006).

MAIN LESSONS LEARNED OF RELEVANCE TO THE DISCOURSE ON SOCIETAL TRANSFORMATION IN THE FACE OF CLIMATE CHANGE

The main lesson to be learned from the examples presented here is that local government can play a decisive role in mitigating *global* environmental problems – thus also in adapting to and mitigating climate change. This potential can be realized by making use of the following four mechanisms in climate policy-making.

A *first-order* mechanism is to make use of the role that local authorities have in most industrialized countries as implementers of national policies (Naustdalslid, 1994). However, in order to fulfill such a role there needs to be a national climate policy in place that adds up to this. Thus, if the national climate policies first and foremost are geared into generic policy measures (like national taxes) and foreign policy measures (like buying international climate quotas and financing the preservation of foreign rainforests), there is little room for local authorities as implementers. On the other hand, if the national climate policies encompass regulation, e.g. by means of land-use planning, there is an obvious need for local authorities to take active part in climate policy-making.

A *second-order* mechanism is to appreciate the important role local government can play in climate policy by translating the abstract and global phenomenon of climate change into a concrete and local context, and thereby clarifying choice options of concrete policy measures on adapting to and mitigating climate change. To accomplish this there is a need to develop new concepts and metaphors (Aall, 2000). Governments should pay more attention and allocate more resources to this in their national climate policies, which in turn implies that the government has to make room for local implementation of climate policies (cf. point above).

A *third-order* mechanism is that of systematically inviting local authorities to take part as ‘test-sites’ for the development of new and innovative policy approaches and policy measures. This is often done in many countries. However, without at the same time ensuring that the lessons learned from such ‘test-site’ projects are channelled back into national climate policies, the local initiatives will in most cases ‘dry out’. Alternatively, if local actors manage to uphold their local work, there is the danger that these ‘test-site’ and ‘front-runner’ municipalities may distract attention from otherwise generally low-ambitious national policies (Bulkeley, 2000), and serve as an excuse for inaction at both the local and national level of governance (Aall et al., 2007).

A *fourth-order* mechanism is to include systematically and formally representatives of local authorities in the international climate negotiations. The examples presented above indicate that the inclusion of representatives of local government in international environmental negotiations may on the one hand lead to an increase in the ratio of ‘radical inputs’ into these negotiations, thus strengthening the ‘transformative nature’ of the environmental treaties (Lindseth, 2006). On the other hand, establishing a clear and direct link between the international and local level of governance in these matters may also inspire and give support to local policy processes towards becoming more ‘transformative’ (Aall, 2000).

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Institutional transformation in a devolved governance system: Possibilities and limits

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A CASE OF INSTITUTIONAL TRANSFORMATION

Changing climate creates challenges for governance and the institutional rules that have previously served efforts to incrementally adapt to the climate variability already experienced. Projected climate changes, outside the range of changes experienced to date—and especially at the extremes (IPCC, 2012)—will put pressure on the coping capacity of existing institutions. It may be necessary to consider transformational change from the current state (Kates et al., 2012). Theories of transformational change in a climate change context are lighter on *how* change is achieved, than they are on *what* change is needed to enable institutions to anticipate and address more extreme climate effects, like rising sea levels, increased coastal storm frequency and flooding over long timeframes.

Recent theoretical work has attempted to differentiate transformational adaptation: adaptations adopted at a large scale or intensity; those that are new to a location or system; and those that change the location of activities (Kates et al., 2012) and to distinguish transformational adaptations from incremental ones, while recognizing that both incremental and transformative changes sit on a continuum of responses to climate change (Howden et al., 2010). Other studies suggested that, rather than focusing on the intensity, scale and location of transformation, an adaptive governance framing has particular value in informing the design of policy options to address multiple interacting drivers of decision-making in practice (Nelson et al., 2008; Rickards and Howden, 2012). To take this a step further, others have identified a lack of attention to institutional design that is flexible, anticipatory and fit for a changing future (Dovers and Hezri, 2010; Lawrence et al., 2013b), and thus enabling specific transformations at various scales and locations (as defined by Kates et al., 2012) to take place. The institutions that are responsible for managing climate risk may themselves need to transform. The roles of transformational change in governance and institutions to support adaptation to climate change are our focus. The adaptations that are examined here are based on a regime developed to anticipate environmental change underpinned by the precautionary principle, and sustainability and resilience thinking. But are they fit for purpose and what are their limits?

We begin our case study of transformational institutional change in New Zealand with the reform of the resource management regime in the early 1990s. We then fast-forward to the present to see if the regime's framework can address the climate challenges envisaged, given the framework's path-dependent legacy. We identify necessary conditions that can prepare the space for more flexible adaptive decision-making, by either significantly modifying or augmenting the current statutory regime.

New Zealand's governance structures have enabled rapid and transformational change in the past. A unicameral system of government, powers devolved to regional and local (district) levels of government and easy access enjoyed by the electorate to politicians at all levels, have been pivotal in enabling rapid, and in many cases transformational, changes on a number of notable issues. Culturally, New Zealand sees itself as a nation of innovation and leadership in social, economic and environmental reform, such as women's voting rights, anti-nuclear policy, and the Treaty of Waitangi grievance-settlement process for New Zealand's indigenous population. Thus, the conditions for transformational change within society are expressed through a fearless ability to 'have a go' and try something new. Radical legislative change requires far fewer minds to be changed than in many other jurisdictions, and legislation can be drafted, the public can make its input and new laws can be enacted within a relatively short period of time. Often new laws are triggered by crises and underpinned by rising community concern, which can gather momentum very quickly in a country of just over four million people. As a result, quite dramatic swings in ideology and experimentation with new policy approaches have occurred. Some have had beneficial outcomes, while some have left a legacy of unintended

consequences (e.g., Mumford, 2011; Canterbury Earthquakes Royal Commission, 2012, Royal Commission on the Pike River Coal Mine Tragedy, 2012).

Two decades ago New Zealand undertook a transformational experiment by reforming its natural resource management laws and setting up a regime for integrated land, air and water management following principles of sustainability—the Resource Management Act 1991 (RMA)—underpinned by the ‘precautionary principle’. Examination of this transformation, and the reasons behind it, is instructive for assessing New Zealand’s ability to address changing climate risk. The RMA experience also contains insights that could have wider resonance for whether specific transformational adaptations can be sustained and supported by New Zealand’s institutional framework. In the RMA, resource management was devolved to regional and local governments, while the central government retained the ability to promulgate national policy instruments, thus setting up a three-tiered regime. The RMA changes were driven by an ideological shift in governance perspective, hastened by a national governance and financial crisis that was due to a legacy of strong centrally driven ‘think big’ policy ideology, implemented by an attempt by central government to ‘choose winners’ (e.g., in land development or hydropower schemes), often without sufficient recognition of local constraints and opportunities.

The RMA regime swung environmental governance in the opposite direction, allowing markets to operate freely but within environmental bottom-lines spelled out in sections 5 to 7 of the Act. The transformation was profound, with a vision of sustainability embodied in the statute’s purpose of “sustainable management.” However, two decades on there are questions about the degree to which the RMA regime has operated successfully, and to what extent the now established practices will be able to cope with the dynamics added to environmental governance issues by the impacts of climate change.

Through a fine-grained analysis of practices of decision-making at the three levels of government in New Zealand—central, regional and local—we sought to understand the practices aimed at sustainable management and whether the RMA remains fit for the dynamically changing effects of climate change. The analysis was based on three workshops with 95 participants and in-depth semi-structured interviews with 36 practitioners and seven decision-makers. These participants operate at local and central government in areas with responsibility for the effects of climate change, flood management, hazards and emergency management, and for infrastructure asset planning and implementation. Participating councils were recruited from different parts of New Zealand affected by coastal changes or flooding (Wellington, Otago, Auckland and Hawkes Bay). The interview and workshop materials along with associated reports, planning documents and court decisions were thematically analyzed (Flick, 2002; Braun and Clarke, 2006) to identify common, dominant and unique themes on current professional practice, governance and the adequacy of institutional frameworks to address the effects of climate change. A particular focus was the ability to deal with coastal and river erosion and inundation, which is projected to be increasingly damaging and more frequent as a result of rising sea level and the increased frequency and intensity of heavy rainfall events (IPCC, 2012; IPCC, 2013).

THE REGIME CHARACTERISTICS

The governance regime reflects the socio-cultural context of New Zealand at the time of the RMA enactment 20 years ago and changes in the political economy that have taken place since. The RMA is an environmental statute aiming “to minimise environmental effects to promote good environmental outcomes” (Hansard, 1989: 14165–14186), with efficiency, integration and role definition at its heart. Importantly, the regime set up an expectation of central government engagement through National Policy Statements (NPS) and National Environmental Standards (NES), providing consistent overarching directions while supporting the devolution of functions to the lower levels of government. This devolution was achieved through enabling legislation that integrated functions between regional and territorial local governments (regional and district councils), yet retained separate statutory and electoral responsibilities at the three levels of government. This devolution and simultaneous integration across levels of government was a transformation in governance and institutional arrangements. The degree to which subsequent practice has been transformed, and to what extent the regime allows for specific transformational adaptations (e.g., flexible land-uses and managed retreat) is a critical question for the consideration of climate change effects.

The hallmark of the shift in focus to integrated environmental management (land, water and air), was driven by a normative set of ecological principles embodied in Section 5 of the RMA based on ‘sustainable development’ and the ‘precautionary principle’. These were translated into a strategic framework based on sustainable management of natural

and physical resources, and operationalized through provisions at national, regional and district levels addressing the allocation of resources and their use (Bosselmann and Grinlinton, 2002).

A multi-layered and integrated regime was set up. Consideration of future generations and uncertainty were explicit parts of the strategic framework, leading the way for consideration of future effects, unknown at the time. The framework comprises several components that influence practice—the statutory mandate, the tools and the processes that operate within it (see Figure 1). These in turn are influenced by the professional disciplinary approaches used to implement the mandate, the capability of personnel and the resourcing of councils, and the political drivers, property interests and cognitive barriers affecting the decision-makers.

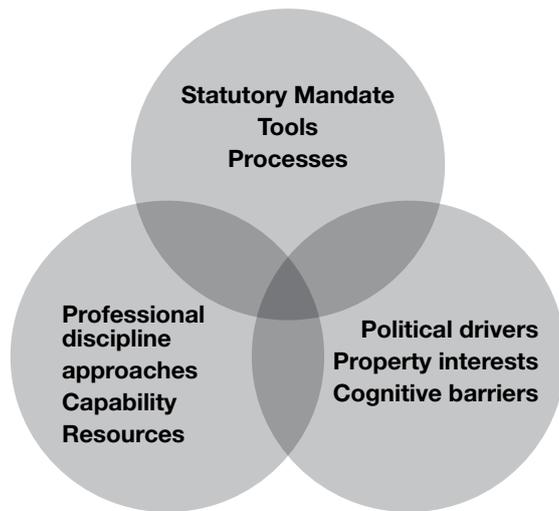


Figure 1: Drivers of practice.

Control under the RMA is designed to be exercised through a hierarchy of mandatory and optional instruments at all levels of government: primary statutory requirements and principles (mandatory); promulgation of NPS and NES (optional); adherence to any NPS or NES that is issued (mandatory); regional policy statements, plans and rules (optional); regional coastal plans (mandatory at the regional level); and district plans and rules (mandatory at the district and city levels). Plans must be reviewed at least every 10 years and a plan change can be requested by any person or initiated by the council at any time.

The operation of the RMA framework raises three important questions. First, can periodic plan reviews with incremental adjustments be considered adaptive practice, or can such reviews even enable adaptive practice? While reviews provide space for change in the control mechanisms, in reality many measures—like hazard lines, seawalls or flood levees—set up path dependencies by limiting the degree to which adaptations can take place at a later time and narrowing the range of future adaptive choices. This is especially the case for land uses and activities that have longer capital turnover periods, and that are constrained by the expectations of private property owners and by the dominant structural protection measures used, which instill a sense of safety in those ‘protected’ by them (Tobin, 1995).

A second question is whether the implementation of effective adaptation relies upon all instruments at all levels of government being mandatory or in place. The hierarchical regime set out in the RMA was envisaged as providing the supporting architecture for sustainable management of natural and physical resources. In particular, government saw its role as one of providing certainty for third parties who could be affected by spill-over effects from private land-use, especially where those other parties had inadequate information regarding hazards. Balancing flexibility and certainty was explicitly considered as the RMA was being developed (Ministry for the Environment, 1988: 19). Government agreed that it had “a role in hazard mitigation through information provision, policy direction, disaster relief and management where appropriate” (Ministry for the Environment, 1988: 20). It is notable that climate change is recognized in the primary statutory requirements in the RMA (section 7 requires that decisions “have particular regard to the effects of climate change”), but no NPS or NES has been issued that would provide binding guidance on how this provision is to be given effect. General guidance on climate change issued to date has been non-binding and outside the statutory framework.

A third question concerns the balance of roles and responsibilities. At the time of the change, local government was viewed as having both strengths and weaknesses in resource management. For example, their technical capabilities were questioned, but decision-making located close to affected communities was valued. Thus devolution needed to be accompanied by capability for higher levels of government to express regional and national priorities in a decision-making role and as a participant. There was much debate about the particular roles ministers should assume and the integration of that role with responsibilities of regional and territorial local governments. This arose from concern about previous governments' interventionist policies. It was thought that regional government should provide integrative mechanisms and that local territorial authorities should undertake functions within that regional framework.

In a generic sense, the RMA has been described as a framework law for a control system reflecting a hierarchical planning structure at national, regional and local levels with consistency between the levels (Carlman, 2005). However, Carlman observes that balancing interests is limited in such a regime by what can be measured now or with certainty. Relating this to climate change effects, future impacts cannot be measured now. While the likely types of impacts and vulnerable locations is known, councils have found it difficult to translate proxies for climate change effects, such as a range of sea levels or flood scenarios, into flexible rules when regulating land-use activities (Lawrence et al., 2013a; Lawrence et al., 2013b). This challenge becomes particularly significant where rules infringes on private property rights at the local government level, where decisions on climate change effects have been devolved and where individual voices have most weight.

Some regimes elsewhere have developed triggers for change in responses or suggested and designed pathway approaches for managing climate changes (Kwadijk et al., 2010; Reeder and Ranger, 2010; Stafford Smith et al., 2011; Haasnoot et al., 2013). However, none has been translated yet into a legal regime for spatial effects of a changing climate. Those that have been implemented have been for large infrastructure projects relying upon governance arrangements with operational mandates over publically owned engineering management of water systems, like in the Netherlands and the United Kingdom, or are private decisions made by individual business owners in a rural setting like in Australia (e.g., Park et al., 2012). Such arrangements rely upon a degree of autonomy and control over jurisdiction or property, rather than on a command-and-control regime (Pahl-Wostl, 2009) exercised in the public interest by representative governments affecting private property interests spatially under public law such as the RMA (Berry and Vella, 2010). The latter type of decision-making is more complex to administer, especially when addressing an issue like changing climate risk, which is perceived as contested and a distant threat (Spence et al., 2012).

THE PRACTICE

The outcomes observed in our research show that the practice has struggled to address the factors that could set the stage for consideration of future climate changes. These factors include spatial and temporal uncertainty, increased exposure to climate-related risk and dynamic risk. The practice has become dominated by the disciplines operating within the framework—planning, engineering and law—which often operate in parallel, rather than in an integrated manner. Under the RMA and other associated legislation that was partially reformed during the 1990s,¹ planners and engineers continued to operate using spatially driven instruments of practice, but always subject to legal principles and frameworks that required 'evidence'. The inherent need for certainty that the often adversarial legal processes generate created spatial and temporal compression, focused on the short-term and static instruments of practice and driven by a need for certainty.

Analytical tools are based on measurable effects, such as probabilities of known and quantified risks and associated cost-benefit analyses, which often ignore changing and dynamic characteristics and more fundamental uncertainties of climate change or discount future costs and benefits, making the range of possible futures invisible to decision-makers.

Similarly, when defined as lines on maps coastal and flood hazard zones fix land uses for the duration of a plan. Thus, once they are established, land-use activities become significantly path-dependent through the expectations of land users, exacerbated by regional councils' reluctance to initiate changes to existing uses, even though they have the required power (section 9[3] RMA). Settlements and infrastructure are built up behind levees in low-lying floodplains and in coastal areas. In essence incremental change, which has sought to control land use by progressively adjusting hazard-zone lines based on risk, sets rules that are unlikely to protect land users from damaging climate change effects.

¹ *The Local Government Act, the Soil Conservation and Rivers Control Act, The Land Drainage Act and the Building Act and Building Code.*

There are gaps in the use of the available instruments. The absence of NPS has hampered local government consideration of climate risks by leaving ambiguity about central government support. This has left local government to “design its own wheel,” which the practitioners and the decision-makers described as an “inefficient use of their limited resources,” resulting in “no consistent practice across councils”.

A vacuum in policy direction from the center of government has enabled strong local political drivers to dominate. This has been influenced by the tensions between the statutory responsibilities of local governments tasked with minimizing long-term risks in the wider community interest and individual private property interests. The system has become mired in community tensions between public and private interests and short- and long-term costs and benefits. Cognitive barriers, including the effect of psychological distance (Leiserowitz, 2005; Milfont, 2010; Spence et al., 2012) and perceptions of contest about climate change (Kunreuther and Weber, 2012), work to exacerbate such tensions.

Such experiences are noted in Australia (Handmer, 2008; McDonald, 2011) and the United States (Moser and Ekstrom, 2012), but they are more surprising in New Zealand, given that the RMA was designed on sustainability principles with future generations in mind, unlike in other jurisdictions. Yet, innovations of flexible approaches that could reduce path-dependent decisions have been slow to emerge. Table 1 details the success factors from innovators identified in our study. Notably, consideration of climate change effects has only emerged when leadership and capabilities have persisted over more than 10 years.

Table 1. Success factors contributing to consideration of changing climate risk.

Success factors	Council practice: Tasman and Kapiti Coast districts; Hawke’s Bay region
Council approach	Hazards assessment; Graduated development of controls
Strategic approach	A decade-long process; Comprehensive development strategy
Professional focus	Continuity of staff; Expertise and information available; Monitoring
Integrated functions	Highly integrated, with corroborative ‘evidence’ across functions
Community	Ongoing community engagement at critical stages
Political fortitude	Consistency maintained over long timeframes; Political commitment driven off high staff capability
Judicial integrity	Two councils have tested their policies and plan rules in Environment Court successfully; one yet to be tested

THE ADEQUACY OF CURRENT PRACTICE

The practices and their success, shown in Table 1, have emerged despite weaknesses in implementing the integrative mechanisms between the levels of government that were envisaged by the designers of the RMA. The NPS were meant to be the main instruments for providing “a useful mechanism for co-ordination of policies on a nationwide basis in order to achieve the purposes of the Act” (Randerson et al., 1990: 26). Concerns that central government could enact ad hoc interventions were to be addressed by an arms-length and public consultation process during the preparation of an NPS. NPS were to be expressed in general, rather than directive terms, consistent with the RMA’s purpose. They would be subject to judicial review. Lower levels of government were required to give effect to them.

This finely balanced system attended to the roles of the different levels of government. However, the practice has been somewhat mixed. Central government has been reluctant to use their NPS mandate, leaving local government to reflect local interests. This has created a consistency void for matters requiring higher-level support for their efficient implementation, importantly in the case of climate change, where decisions today require a long-term perspective. The arms-length relationship between central and local government set up by the RMA and associated local government legislation has not been conducive to integrated planning practice on long-term issues between the levels of government. A 2005 review of the RMA practice (Klein, 2005) noted that a lack of legal certainty, substantial

plan divergence and loopholes in legal protection were disadvantages of the lack of comprehensive binding national standards and statements. The review also identified a capability deficit at councils and inadequate coordination architecture.

Almost a decade later, our study has confirmed that coordination architecture remains significantly missing in the operation of the RMA. This is evidenced through the underuse of the NPS instrument for climate change effects, the lack of a national assessment of climate risk or any regional coordination of such an assessment, and the lack of an environment that allows innovation and use of new tools for addressing changing climate risk. This is in part a statutory design issue relating to devolution of powers, and in part a disciplinary practice issue, with councils reluctant to adopt transformational adaptive practices that affect existing uses that might constrain development for uncertain future effects.

Development of flexible adaptive practices that leave options open for future generations has been slow to emerge. It is necessary that centrally driven NPSs and comprehensive regional risk and vulnerability information and rules be given effect in district plans, enabling councils to better exercise precautionary practice more flexibly than at present. However, even if this developed, practices would still rely upon a legal process that is based on certainty of outcome which generates path-dependency. This leads us to the conclusion that institutional arrangements outside the current statutory regime or a redesign of aspects of the statutory regime may provide the key to more transformational consideration of climate change risks unimpeded by certainty constraints.

SUFFICIENCY

Van Buuren et al. (2013) examined the ability of institutional frameworks for spatial planning to address uncertainty, contentiousness, multiplicity and complexity of climate change. They have called for adaptive approaches that embody learning, experimentation, dialogue and flexibility. Our case study questions the ability of the RMA to embody such characteristics. At the margins councils have been learning from each other and utilizing progressive hazards zones based on risk at the coast, some of which integrate climate change effects. They have been experimenting inside (Tasman District Council, 2011; Kapiti Coast District Council, 2012,) and outside (Greater Wellington Regional Council and Wellington City Council) the regulatory framework for coastal erosion and flooding risk. Some councils have experimented with framing the climate change problem in different visual formats to avoid using probability statements which evoke 'safety'. Some have undertaken new dialogue approaches with communities, for example, using an 'open day' format with interactive flood maps and discussion sessions with flood-affected communities (Lawrence et al., 2013b). These approaches have shown that those having experience with flooding are more likely to engage with a wider range of adaptation options than those without exposure to flooding (Lawrence and Quade, 2011; Evans et al., 2012). Nevertheless, the challenge is to find governance and institutional arrangements that enable experimentation to translate consideration of changing risk into durable yet flexible instruments that can be applied in practice. The Local Government (Auckland Council) Act 2009 transformed the governance framework for the Auckland region by amalgamating seven district and city councils and the regional council to provide greater efficiency and leverage for New Zealand's economic growth. This has enabled a high-level non-statutory spatial plan that charts future directions for development and highlights environmental risks, including climate-related ones to be developed and implemented through statutory plans, using policies and rules. While this hierarchy of instruments has given leadership on directions and served a useful focus for dialogue between the levels of government and the community, flexible landuse provisions have yet to emerge.

Experimentation occurring in Wellington, the capital city and seat of government, has emerged from the International Council for Local Environmental Initiatives (ICLEI) legacy which started local government consideration of climate change in New Zealand in 2003. The initial focus was reduction of greenhouse-gas emissions by councils' business activities, e.g. vehicle fleet. This has evolved into a Climate Change Action Plan that addresses both mitigation and adaptation actions within a city resilience framework (Wellington City Council, 2013). This enlarged focus has been possible because of political willingness, leadership from successive mayors and dedicated council capability on climate change. The attention has been on strategic actions outside the legislative arena and on working with communities to understand their values as a precursor to developing adaptation options for consideration. The integration of mitigation with adaptation strategies has enabled both mitigation and adaptation activities to be leveraged, as was demonstrated in a survey of how Wellington regional residents consider sea-level rise information (Evans et al., 2012).

Even though sustainability, future generations and the avoidance and minimization of natural hazard risk sit at the center of the RMA framework and the framework enables councils to override private interests in the wider public interest, the processes and practices have not delivered outcomes that reflect these principles. Urban settlements have continued to be concentrated in coastal and low-lying flood-prone areas. The multi-layered governance architecture is embodied in law, but not all parts of it are in place. This has resulted in local government expressing concern that it is stranded in its exposure to private interests. This could be viewed as a direct consequence of the permissive enabling design of the statute and the light-handed implementation of the regulatory framework, which have both been embedded as norms in New Zealand legal and regulatory practice over the last two decades.

The consequences of such regulatory practice have been starkly exposed in three ‘catastrophic’ policy and implementation failures that have economy-wide implications: changes to the health and safety framework resulted in mine safety failures with 29 deaths (Royal Commission on the Pike River Coal Mine Tragedy, 2012); changes to building regulations resulted in leaky buildings and billions of dollars of ongoing public and private costs (Mumford, 2011); and inadequate consideration of ground conditions in local government planning resulted in widespread liquefaction damage the Canterbury earthquakes in 2010 and 2011 (Canterbury Earthquakes Royal Commission, 2012). The role of central government policies was a factor in these failures. Health and safety practice and governance, earthquakes standards and consideration of natural hazard risk are being strengthened. However, there are other signs (New Zealand Government, 2013) that the RMA planning framework could be changed to an even greater permissiveness, upsetting the finely balanced roles in multi-layered governance architecture and public protections. This suggests that lessons have not been learned from these crisis situations.

The Netherlands, by contrast, has strong public safety norms driving their institutional designs for flood-risk management and now climate change effects (van Buuren et al., 2013). Safety as a bottom line has influenced the statutory framework (prescriptive reporting, standards and their regular review) and the governance arrangements (special purpose Delta Commission) and resulted in a highly engineered yet adaptable system within the engineering constraints. This cultural difference is born of the immediacy of the threat to a large proportion of Dutch territory.

In New Zealand, the cognitive feedback from major damaging natural disasters and crises occurs in some localities and not others, with differing frequencies: relatively often in the case of floods, and less so with major earthquakes. The impact of the Canterbury earthquakes has been so large (estimated at NZ\$40 billion in addition to the loss of 185 lives) that it has triggered institutional change, including direct central government intervention over-riding local government in managing earthquake recovery through a special-purpose organization (Canterbury Emergency Recovery Authority). Neither floods, with frequent but with largely local effects, nor catastrophes with wide national effects as well as large local effects, have influenced change in cultural norms that could trigger durable transformational adaptation. The institutional changes at a government level have been particular to the event or focused on recovery and reconstruction. For example, the Bill to strengthen asset planning for exposed infrastructure has limited the new statutory asset planning requirements (30-year planning horizon) to ‘natural disasters’ only. It appears this response follows the pattern observed by Carlman (2005) of single-purpose legislative responses, in this case liquefaction effects of earthquakes on infrastructure being dealt with *ex post*. Consideration of the wider learning from disasters for the type of risks associated with a dynamic and changing climate appears to have been missed. This also leaves the consideration of dynamic risks, like changing climate, within a framework that has not proven to be truly flexible or adaptive.

TRANSITION TO TRANSFORMATION

As the intensity and frequency of climate-related events increase and slow-onset changes combine with them (like rising groundwater following sea-level rise and surface water flooding following intense rainfall events), spatial and temporal assessments of vulnerability will be essential to differentiate the priority areas for attention. But what can trigger such assessments of risk?

The lesson to be learned from the RMA transformational change is that practice culture did not materially change in tune with the purpose of the RMA, judging from the rules and the outcomes on the ground. It could be concluded that even regular and costly flood events and major earthquakes with large damage costs may not be sufficient to change the dominant practice cultures. However, those events have changed the risk-response culture in the insurance industry arising from an increase in risk exposure globally (Kreft, 2011). Insurance companies are responding to the pressure from the reinsurance industry and premiums have almost doubled for home owners in a shift to a capped-risk regime.

Meanwhile the central government is reviewing the governance, pricing, institutional design and roles of the actors under the Earthquake Commission Act 1993, in terms of lessons learned from the Canterbury Earthquakes. However, the extent to which this will cover projected risks associated with a changing climate remains to be seen.

Some necessary conditions were identified through our research for a transition to be made that would enable the RMA to function in an adaptive manner across changing risk conditions, or for more transformational change to occur. The challenge identified by our research participants was to enable flexibility as change occurs, while creating some certainty for private property interests over time. This is an area for further research attention with affected communities.

Ways of communicating the changing nature of climate risk and its damage consequences was viewed as a precursor to a change in practice, because current communication practices are entrenching risk by suggesting that the risk is static and by mischaracterizing the extremes. It was seen also as necessary for central government to respond in a more supportive manner nationally, so that spatial and temporal identification of vulnerable activities at a national level could be undertaken, for better understanding of the levels of risk and their location, so that central government can decide the nature of its role in climate change adaptation.

Overcoming community resistance to rules that affect property interests and values requires translating risk and vulnerability into a certainty framework. The type of mechanisms suggested include establishing go/no-go spatial areas, employing triggers or time-conditions on land-use consents, and allowing purchase and lease-back options for councils that would signal a change of plan at a point in the future. Provision of alternative development sites was also considered necessary so that existing land owners can make their own choices. Such actions were all suggested as possible ways to temper future landowner expectations and aid a transition to an adaptive transformation in institutional practice.

Councils plan and maintain public assets on which communities rely. Management and funding of 'stranded' public assets will be necessary for a transition, as in the cases of stormwater, waste, and water-supply systems that will eventually become unusable in areas subject to sea-level rise, rising groundwater and flood inundation. Design of adaptive systems was considered a priority. Some already instituted examples include assuring hydraulic neutrality in new subdivision sites and engineering secondary flow paths instead of enlarging stormwater pipes.

Dislocation brings costs and a scale of impact not envisaged by current funding mechanisms. New funding mechanisms to manage public and private transition costs based on proportionality and responsibility of each party will need to be designed for staged responses to impacts affecting communities. Similarly, new governance arrangements will inevitably be needed to support transition to new regimes over time. Sudden events spawn new governance arrangements. Learning from them provides opportunities to inform what might be required and when to address climate change effects.

In sum, the delivery of transformational institutional and practice change to enable climate changes to be addressed by governments will require transition mechanisms that rebalance the linkages and dependencies between the three levels of government so that feedback and learning can occur more quickly based on trust, to avoid the lurches in central government intervention that are singlepurpose or that trammel accountabilities to the public, as have been experienced in responses to recent crises.

CONCLUSION

A transformational institutional change was undertaken in New Zealand two decades ago to provide a regime for resource management that could anticipate risk. On many counts the practice under it has failed to deliver. The contributory factors that have driven incremental change since the transformation of the statutory framework have been discussed in this paper. Underpinning them all have been the workings of human cognition and their behavioral consequences. Attempts by governments to change the relationships between the statutory players has brought public opprobrium, while local government continues to experiment in the absence of clear support at the central government level or the ability to learn from the consequences of climate and non-climate events. Strong institutional norms have reinforced business-as-usual through the institutional structures and processes of organizations and technical disciplinary practices. As the governance changes rehearsed in Auckland gather momentum in other regions, new scale may hold the key for the innovative experiments being carried out by individual councils to gather speed and legitimacy, backed by new willingness for transformation in communities. On such a trajectory, other levels of government can be expected to also join in on the changes underway.

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Post Carbon Pathways: Removing Roadblocks and Driving Transformational Change

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INTRODUCTION

As the probability and risks of runaway climate change continue to grow, so too does the urgency of a swift transition to a just and resilient post-carbon future. The *Post Carbon Pathways* project aims to help meet this challenge by strengthening understanding of i) key elements of the most promising and innovative large-scale de-carbonization strategies; and ii) the most effective ways of overcoming barriers to the rapid implementation of these strategies.

The project has been informed by the view that, while increased public understanding of the necessity of swift reductions in greenhouse gases is crucial, the transformational changes required to drive large-scale de-carbonization also depend on broad recognition that alternative, more desirable futures and pathways are indeed possible.

The first phase of the *Post Carbon Pathways* project involved a critical overview of eighteen of the most ambitious large-scale post-carbon economy transition strategies, from both government and non-government sources (Wiseman, 2012). Table 1 provides a summary of the targets, costings and assumptions about social change informing each of these strategies. The second phase of the project has focused on learning about the challenges involved in the swift implementation of post-carbon economy transition strategies. This analysis has been informed by interviews with leading policy makers and researchers working in the field of post-carbon economy transitions (see Table 2).

This paper provides an overview of the following three key findings arising from this research project.

1. The probability and risks of global warming of four degrees or more are rapidly increasing. This is, however, an argument for visionary leadership and decisive action - not political paralysis and buck-passing.
2. The technological and economic roadmaps to avoid catastrophic global warming are now widely understood.
3. The biggest barriers to a swift transition to a post carbon future are political not technological.

The paper concludes with a brief discussion of political scenarios and pathways which might plausibly trigger the transformational changes required to overcome these political obstacles by driving a swift transition to just and sustainable post carbon future.

Table 1. Post carbon economy transition strategies: Summary of targets, costings and theories of social and political change.

Strategy (Non-government authored)	Energy and emissions targets	Approximate cost of transition policies	Theory of social and political change
German Advisory Council on Global Change: World in Transition	Decarbonize global energy system by 2050	Additional net investment of between US\$200 and \$1000 billion p.a. by 2030	Knowledge-based, shared visions of desirable future; strong and effective change agents and champions; social and economic 'shocks'; proactive state; supportive global governance structures.
Lester R. Brown and Earth Policy Institute: World on the Edge	Cut global CO ₂ emissions by 80% by 2020 (on 2006 levels)	Net cost US \$200 billion p.a.	Three social change models: 'Pearl Harbour': Dramatic event leads to fundamental change 'Berlin Wall': Social tipping point reached after gradual change in thinking and attitudes 'Sandwich': Grassroots movement strongly supported by political leadership
Al Gore, Our Choice	Rapid reduction to 350ppm atmospheric CO ₂ concentration	Does not include detailed costings	Visionary leadership combined with broad community mobilization. Need to hold self-interested corporations to account and ensure higher standards in media.
Paul Gilding and Jurgen Randers: One Degree War Plan	Cut global GHG emissions to zero over 15 years; negative emissions for rest of century	Carbon tax expected to generate US\$2,500 billion p.a. by year 5 to spend on transition	One or more critical ecological, economic or social tipping point events leading to shift in public support for action required.
Mark Z. Jacobson and Mark A. Delucchi: Powering a Green Planet	Switch global energy system to 100% renewable energy (wind, water, solar) by 2030	Approx. US \$100 trillion over 20 years to construct global renewable energy systems. BAU will cost approx.US\$10 trillion (not including mounting social costs)	Strong political and policy leadership and regulation to overcome path dependencies and avoid dominance of industry preferred technologies.
WWF International: The Energy Report	Peak and decline global GHG emissions within five years, reduce by 80% by 2050 (on 1990 levels); 100% renewable energy by 2050	Total cost of approx €1 trillion p.a. Investment expected to have paid itself off by around 2040 at latest	Human ingenuity, technological innovation and behavior change as key drivers of transition.
Centre for Alternative Technology UK: Zero Carbon Britain 2030	Reduce net UK GHG emissions to zero by 2030	Approx. £50 billion p.a. required for initial investment program	Importance of sudden, unexpected events as political tipping points in driving dramatic political shifts. Importance of behavior change plus promotion of wider societal dialogue on values, structures and processes that have led to overconsumption, climate change and resource depletion.
ClimateWorks Australia: Low Carbon Growth Plan for Australia	Reduce Australian GHG emissions by 25% by 2020	AU\$1.8 billion per year. Strong emphasis on net savings to business.	Build support from key industry sectors as a basis for achieving and maintaining broader social and political support.
Beyond Zero Emissions: Zero Carbon Australia Stationary Energy Plan	Reduce net Australian GHG emissions to zero by 2020; 100% of stationary energy from renewables by 2020	AU\$37 billion p.a. for ten-year period, or approx 3% of Australian GDP. Net present costs over longer time period (2010–40) roughly equivalent to BAU (not including transport savings).	Clarify debate on technical feasibility of 100% renewable energy in Australia to enable social and political changes to occur. Need for decisive leadership from government, business, academia and wider community to implement the plan.

Strategy or plan (Government authored)	Energy and emissions targets	Approximate cost of transition policies	Theory of social and political change
European Commission: Low Carbon Roadmap 2050	Reduce EU GHG emissions by 20% by 2020 and 80–95% by 2050 (on 1990 levels)	Approx. €270 billion p.a. over 40 years (approx 1.5% of EU GDP p.a. above 2009 investment levels). Savings between €175–320 billion p.a. (not incl. savings on social costs)	Political and social change drivers not covered in detail Notes importance of policy innovation, public education and behavior change.
Government of the United Kingdom: Carbon Plan	Reduce UK GHG emissions by 34% by 2020 and 80% by 2050 (on 1990 levels)	Total net present cost over lifetime of policies in past carbon budget periods approx £9 billion. Average cost approx 0.4% of UK GDP p.a. in period 2008–22 and 0.6% of UK GDP per year over 2023–27	Importance of UK Government, industry and citizens ‘pulling in the same direction’ in order to achieve low carbon transition.
Government of South Korea: Green Growth Strategy	Reduce Korean GHG emissions by 30% below projected 2020 levels (equivalent to 4% reduction on 2005 levels)	Total investment announced as part of Five-Year Plan (2009–13) US\$83.6 billion	Emphasis on education and raising public awareness about need for lifestyle change needed to support green growth.
Government of Peoples Republic of China: 12th Five-Year Plan & Climate Change White Paper	Reduce Chinese CO ₂ emissions per unit of GDP ⁹ by 40–45% by 2020 (on 2005 levels)	Total investment (public and private) in ‘new energy’ of approx RMB5 trillion (US\$760 billion) over next 10 years	Assumption of strong, ongoing role for co-ordinated government planning and intervention, consistent with overall Chinese economic and political governance arrangements.
Government of India: National Action Plan & Low Carbon Growth Report	Reduce India’s emissions intensity of GDP by 20–25% by 2020 (on 2005 levels)	Does not include detailed costings	Notes need for final report to include discussion of ways of overcoming barriers to policy implementation and adoption by communities, business and governments.
Government of Australia: Clean Energy Future	Reduce Australian GHG emissions by 5% by 2020 and 80% by 2050 (on 2000 levels)	Carbon price and related measures to raise approx AUD\$25.5 billion in the period 2011–15. Further \$3.9 billion public funds to augment.	Carbon price as central driver of change. Strong emphasis on limited impact of policy measures on Australian economy and lifestyles.
Government of Germany: Energy Concept	Reduce German GHG emissions by 40% by 2020 and at least 80% by 2050 (on 1990 levels)	Additional investment €20 billion p.a., offset by energy cost savings	Importance of public understanding and support for transition. Emphasizes importance of accessible information, transparent decision making and opportunities for public dialogue.
Government of Denmark: Our Future Energy	100% renewable energy in all Danish energy supply by 2050	Cost to 2020 approx DKK 5.6 billion (US\$952 million). Immediate net costs of < 0.25% GDP in 2020. Average additional costs to Danish households approx DKK 1,700 (US\$289) in 2020	Assumes strong ongoing role for government in encouraging innovation and community education.
Government of California: Scoping Plan & Clean Energy Future Plan	Reduce GHG emissions to 1990 levels by 2020 and 80% of 1990 levels by 2050; 33% of electricity from renewable energy by 2020	Ongoing costs approx US\$36 million p.a. Benefits by 2020 (compared to BAU) include increases in economic production of US\$33 billion and overall gross state product of US\$7 billion	Active public participation essential. Emphasis on role for market forces and growing environmental awareness to shift individual choices and attitudes. Targeted public outreach, marketing and education programs.

Table 2. Transition policy makers, researchers and activists interviewed for Post Carbon Pathways Research Project.

Name	Position and affiliation
Kevin Anderson	Deputy Director, Tyndall Centre for Climate Change Research and Professor of Energy and Climate Change, University of Manchester
Lester Brown	President, Earth Policy Institute and author, 'Plan B' and 'World on the Edge'
Jenny Clad	Former Executive Director, The Climate Project
Kevin Curtis	Chief Program and Advocacy Officer, The Climate Reality Project
Mark Delucchi	Research Scientist, Institute for Transportation Studies, UC Davis and co-author, 'Powering a Green Planet'
Jean-Philippe Denruyter	Manager, Global Renewable Energy Policy, WWF International and co-author, 'The Energy Report'
Ian Dunlop	Member, Club of Rome, Chair, Safe Climate Australia and Deputy Convenor, Australian Association for the Study of Peak Oil
Ottmar Edenhofer	Deputy Director and Chief Economist, Potsdam Institute for Climate Impact Research and co-Chair, IPCC Working Group III
Adrian Gault	Chief Economist, UK Committee on Climate Change
Paul Gilding	Author, 'The Great Disruption' and co-author, 'One Degree War Plan'
James Goldstene	Former CEO, California Air Resource Board
Peter Harper	Head of Research and Innovation, Centre for Alternative Technology, Wales and co-author, 'Zero Carbon Britain 2030'
Mark Jacobson	Director of Atmosphere and Energy, Stanford University and co-author, 'Powering a Green Planet'
Alex Kazaglis	Senior Policy Analyst, UK Committee on Climate Change
Amory Lovins	Chairman and Chief Scientist, Rocky Mountain Institute and author of 'Reinventing Fire'
Roy Neel	Former chief of staff to Vice President Al Gore and Adjunct Professor, Vanderbilt University
Mark Ogge	Co-founder, Zero Carbon Australia 2020 project
Jørgen Randers	Professor of Climate Strategy, Norwegian Business School, co-author of 'Limits to Growth', 'One Degree War Plan' and '2052'
John Schellnhuber	Director, Potsdam Institute for Climate Impact Research and Chair, German Advisory Council on Global Change
Anna Skarbek	Executive Director, ClimateWorks Australia

1. The probability and risks of global warming of four degrees or more are rapidly increasing

“We are running out of both time and options because we are not being honest about what has to be done. The solutions exist, but unless you are honest about the problem, they will never be adopted.”

- Ian Dunlop, Club of Rome, Safe Climate Australia (Wiseman, 2012)

The most up to date and robust scientific evidence continues to confirm that the gateway to a world in which there is a reasonable chance of preventing catastrophic climate change is rapidly closing. This conclusion is, however, an argument for visionary leadership and decisive, emergency speed action – not political paralysis, buck passing and despair.

Recent analysis of emissions pathways consistent with a reasonable probability of preventing runaway, catastrophic climate change remain consistent with the assessment published by Rogelj et al in *Nature Climate Change* in 2011. “We find that in the set of scenarios with a ‘likely’ (greater than 66 per cent) chance of staying below 2°C, emissions peak between 2010 and 2020 and fall to a median level of 44 Gigatonnes of CO₂ equivalent [GtCO₂e] in 2020.” Between 2020 and 2050 a rapid decline to close to zero emissions combined with carbon sequestration would then be needed in order to achieve the goal of returning atmospheric CO₂e to 350 ppm or below.

A quick glance at the goals of the government authored strategies summarized in Table 1 highlights the size of the ongoing gap between targets consistent with the climate science physics and the ‘real-politic’ of the commitments currently being made in even the most ambitious strategies. This conclusion is also consistent with recent systematic analyses of national emission reduction pledges (United Nations Environment Program, 2012)

While a number of the strategies developed by non-government auspices and authors include targets more closely aligned with the required speed and scale of emissions reductions, the challenge of achieving political support for the rapid implementation of these policies remains formidable.

The overall state of play, as of November 2012 was concisely summarized in the World Bank report, “Turn Down The Heat: Why a 4C Warmer World Must Be Avoided” which concluded that “even with the current mitigation commitments and pledges fully implemented there is roughly a 20 per cent likelihood of exceeding 4°C by 2100. If they are not met warming of 4°C could occur as early as the 2060s.”

A full and frank assessment of the social and ecological consequences of global warming beyond 4 degrees has significant potential to create a deep sense of despair, fuelled by the belief that it is already ‘too late’ for the action required to prevent catastrophic climate change. However, as Lester Brown, Director of the Earth Policy Institute and author of *World on the Edge* usefully reminds us:

“When we use the term ‘Is it too late,’ we have to say, ‘Is it too late for what?’ The question is can we get carbon emissions coming down soon enough to avert the worst consequences of climate change? We’re not going to avert all of them. We’re already experiencing them. The question is, can we keep climate change from spiraling out of control? I don’t know the answer to that question but we certainly have to try.”

And, as Kevin Anderson, Deputy Director of the Tyndall Centre for Climate Change Research, also notes, a robust assessment of the scale and speed of action now required is an argument for decisive and determined action rather than resignation and despair.

“This is not message of futility but a wake up call of where our rose tinted spectacles have brought us. Real hope, if it is to arise at all, will do so from a bare assessment of the scale of the challenge we now face. I take the view that 2°C is better than 2.5°C, 2.5°C is better than 3°C, 3°C is better than 3.5°C and so forth...and we know that the lower the temperature, the lower is the carbon budget that we have available to play with.”

But failing on 2°C is no reason to give up on mitigation, making hay whilst the sun shines and resigning to an impact and adaptation future. We need to do everything we can to get emissions out of our system as quickly as possible so that we can have the rise in temperature as low as is possible.

2. The technological and economic roadmaps to avoid catastrophic global warming are now widely understood

The overall suite of technological and policy priorities needed to achieve a just and sustainable post carbon future is now widely understood: rapid replacement of fossil fuels by renewable energy; rapid reduction in energy consumption (through improved efficiency and reduced demand); significant reduction of emissions from agricultural activity and the drawdown and sequestration of carbon into sustainable carbon sinks. Table 3 provides an overview of technological and policy priorities common to many of the strategies reviewed.

Table 3. Technological and policy priorities for achieving a rapid transition to a post carbon economy, informed by Post Carbon Pathways review of transition strategies.

Goal	Technological and policy priorities
Rapid replacement of fossil fuels by renewable energy	<ul style="list-style-type: none"> • Robust carbon price at level required to drive rapid shift from fossil fuels to renewables • Complementary taxation, subsidy and regulatory policies driving rapid electrification and swift phase out of fossil fuel energy in all industry sectors. Key initial priorities include transport (e.g. cars, aviation and shipping) and fossil fuel-intensive industries (e.g. aluminium, cement, iron and plastics). • Tax incentives, low interest loans, loan guarantees, feed in tariffs, public sector investment and community based initiatives driving innovation and deployment of renewable energy sources including: <ul style="list-style-type: none"> o solar: concentrated and photovoltaic o wind: on-and off-shore o wave and tidal o hydroelectricity o geothermal: directly to heat buildings and at high temperatures for electricity generation o bioenergy: traditional biomass; sustainable residues and waste; sustainable energy crops; and sustainable algae o use of spare wind, water and solar energy to produce electrolytic hydrogen o liquefied hydrogen combustion for aircraft. • Designing and building interconnected 'smart' grids and other network infrastructure required for replacement of fossil fuels by renewable energy sources • Strengthening investment and innovation in decentralised renewable energy supply systems
Rapid improvements in energy efficiency and reductions in energy consumption	<ul style="list-style-type: none"> • Zero waste economy and 'cradle to cradle' product design systems • Energy efficient buildings and planning <ul style="list-style-type: none"> o retrofit existing buildings to maximise energy efficiency o zero emissions standards for new buildings o maximise insulation o wide rollout of passive solar, combined heat and power and decentralised heating and cooling systems o improve efficiency of all heating, cooling, lighting and appliances o integrated land use, housing and transportation planning to reduce distances travelled and facilitate the shift to energy efficient transport • Energy efficient industry <ul style="list-style-type: none"> o investment in resource and energy efficient industrial processes and equipment o reduce impact of energy intensive industries (e.g. aluminium, cement, iron, plastics) o upgrade inefficient electric motors, lighting and heating systems o recycle heat energy from electricity generation through co-generation o reduce fugitive methane emissions from mining o improve recycling and abatement technologies for non-CO2 emissions. • Energy efficient transport <ul style="list-style-type: none"> o set and achieve higher vehicle fuel economy standards o reduce carbon intensity of transportation fuels o reduce distances travelled through urban planning, traffic congestion taxes, and increased use of video conferencing etc. o replace fossil fuel cars with electric and plug-in hybrid vehicles o improve access to electric vehicle charging stations o encourage shift from private cars to public transport, high-speed rail, bicycles and walking o expand use of second-generation biofuels (e.g. algal biodiesel and lingo-cellulosic ethanol) o hydrogen (from renewable electricity) to be used for some shipping o significantly reduce airline travel
Significantly reduce greenhouse emissions from agricultural activity	<ul style="list-style-type: none"> • Reduce livestock production and consumption; More efficient use of on-farm energy and fuel increase local food production and distribution • Energy efficient transport • Reduce livestock production and consumption; More efficient use of on-farm energy and fuel • Increase local food production and distribution • Reduce cropland soil emissions: reduce tillage; improve fertiliser and nutrient management; restore degraded farmland • Improve pasture and grassland management: optimise grazing intensity; expand planting of deep-rooted perennial grasses; • Improve fire management • Reduce livestock emissions: active livestock feeding; anti-methanogenic treatments; improve manure management • Bio-gasification of organic manure; capture or burning of agricultural methane
Drawdown and sequestration of carbon into sustainable carbon sinks	<ul style="list-style-type: none"> • Cropland carbon sequestration • End and reverse deforestation • Improve forest management (weed and pest control)

3. *The biggest barriers to a swift transition to a post carbon future are political not technological*

“Meeting 100 per cent of global energy demands through renewable energy is technically and economically feasible. The main problems are political and social.” - Professor Mark Jacobson, co-author, Powering a Green Planet

While significant technological challenges remain there is increasingly widespread recognition that, as Rogelj et al noted in January 2013, “despite all of the uncertainty in the geophysical, social and technological aspects, our analysis indicates that the dominant factor affecting the likelihood and costs of achieving the 2C objective is politics.”

Key political ‘roadblocks’ preventing rapid implementation of post carbon economy transition strategies include the following:

- Denial of the necessity and urgency of action
- Power of fossil fuel industry and its allies
- Political paralysis, short termism and ‘moral corruption’
- The dominant economic paradigm of unconstrained and unsustainable consumption
- Technological, social and economic path dependencies and lock ins
- Financial and governance constraints

The researchers and policy makers interviewed for the *Post Carbon Pathways* project highlighted six priority actions which need to be taken in order to remove the key political roadblocks.

Overcoming climate science denial and deepening understanding of the necessity and urgency of action

“It’s crucial to make climate change as real to people as possible in their everyday ordinary lives. It’s not this theoretical thing that will happen in the future; it’s happening now. The emissions have gone up now, the climate’s changing, the impacts are happening. Severe weather is probably the best example of that impact and the way to make the connections.” - Kevin Curtis, CEO, Climate Reality

Clear and effective communication of the most robust scientific evidence of climate change trends, causes and risks remains the essential foundation for overcoming climate change denial and strengthening understanding of the necessity and urgency of action. Evidence of the ways in which climate change is increasing the frequency and severity of extreme weather events will be particularly important in enabling individuals to ‘join the dots’ between personal experience and broader climate change trends and patterns.

The evaluation and interpretation of climate science messages is however profoundly influenced by pre-existing value frameworks and political perspectives. The core messages of climate science therefore need to be augmented by action to expose and overcome climate denial disinformation campaigns and by framing and communicating strategies in ways which reach and appeal to a variety of audiences.

For some audiences an ethical concern about the consequences of catastrophic climate change for the most vulnerable people and species now and in the future will be a sufficient motive for action. For others recognition of more immediate and personal risks to their own families and communities will be crucial. Others again may be most influenced by imagining and understanding the potential social and economic opportunities and co-benefits of a healthy and sustainable post carbon future.

And, as Ian Dunlop reminds us, the task here extends well beyond refuting the more delusional assertions of the flat earth school of climate denial.

“Denial is interesting, politically and corporately, because the moment you accept that you have a problem, and the seriousness of it, then you have to do something about it. For example, corporate directors have a fiduciary responsibility to objectively assess the critical risks to which their companies are exposed, and take action to ensure these risks are adequately managed. But if they acknowledge climate change as a serious risk, they are bound to act, which requires a radical redirection of Australian business away from our addiction to high-carbon coal and gas.”

Overcoming the power and influence of the fossil fuel industry and its allies

“The biggest barriers to solving the climate crisis are the vested interests of big oil and big coal and the influence they have. They put a lot of money in political campaigns and now there are no limits on what they can put in so they’re just buying everything in sight.” - Lester Brown, Director of the Earth Policy Institute

Exposing and countering the lobbying and disinformation tactics being employed by the fossil fuel lobby and its allies in the media and finance industries is clearly an essential priority. However as Mark Ogge, from *Beyond Zero Emissions* also notes, the reduction of greenhouse gases at the necessary scale and speed cannot be achieved without a swift end to the mining of fossil fuels.

“We actually have to beat the fossil fuel lobby. It has to be more painful for our electoral representatives to ignore us than it is for them to ignore the fossil fuel industry. That’s the basic equation. Until you reach that point, we don’t win.”

The most effective strategies for overcoming the influence of the fossil fuel lobby and ending the mining of fossil fuels include ceasing public subsidization of fossil fuel industries; a concerted campaign to encourage private sector disinvestment in fossil fuel corporations; a sufficiently robust carbon price; and legislation and regulation driving a rapid shift in investment from fossil fuels to renewables.

Equitable structural adjustment programs for communities and households affected by the phase out of fossil fuel industries and employment will also be vital, both for ethical reasons and to maintain community and electoral support for the implementation of tough political decisions.

Overcoming political paralysis and strengthening the determination of communities, governments and businesses to take decisive action

Courageous moral leadership – at multiple levels and in many sectors – is an essential precondition for rapid implementation of post carbon economy transition strategies. In addition to the corrosive influence of denial campaigns and the lobbying of vested interests other obstacles standing in the way of decisive climate change leadership include competing and more immediate economic and political demands, the pressure not to be seen to be politically naïve or unrealistic; and the sense that the transformational change required is simply not possible.

As Alex Kazaglis from the UK Climate Change Commission notes, climate protection and de-carbonization legislative targets with progress reviewed by independent monitoring agencies provide one important mechanism for maintaining clear priorities and focus.

“One of the lessons from the UK is that having a Climate Change Act which sets things out in law, where there’s [legal] implications for government if they don’t continue on the track that’s set out in that Act, and an independent watchdog overseeing progress...those things help to bind the politics to the long-term targets...so when other factors come up, it doesn’t completely knock it off course.”

The imagination and communication of ‘parallel narratives’ visualizing a desirable post carbon future combined with ‘living laboratories’ demonstrating what life in such an alternative future might be like can also provide a valuable foundation for sustaining the belief that transformational change is indeed socially and politically feasible. In addition, as Mark Jacobsen reminds us, “showing that it can be done is crucial because people are often afraid to change or don’t know what it takes to change. So the more avenues they see their neighbors doing it, the more likely they are to do it.”

Developing an economic paradigm focused on wellbeing and resilience rather than unsustainable consumption of energy and resources

The question about the extent to which we can achieve a sufficiently rapid reduction in green house gases without a significant shift in rates of economic growth was the issue on which there were the greatest differences. Some, such as Amory Lovins argue that the main focus should be on reconsidering the way we use and produce energy. Others such as Kevin Anderson take the view that...

“For the relatively developed, wealthy countries, I don’t think there’s any option for our first move other than to reduce our consumption. I’m not saying that because I think that’s an easy thing to do politically or that it’s something that I might agree with for another set of reasons. I’m simply saying we cannot get off the emissions curve fast enough through technology. We have to change what it is we consume.”

Overcoming technological and social path dependencies and driving social, economic and technological innovation

“It is vital to integrate all the energy-using sectors and all the four kinds of innovation: in technology, policy, design and strategy. The sum of the parts is a lot smaller than what you actually get, and there are some deeply disruptive business opportunities that emerge only when you look at that whole picture.” - Amory Lovins, Rocky Mountain Institute

The crucial role of individual and organizational change agents, social entrepreneurs and demonstration projects in challenging path dependent thinking and in imagining and communicating disruptive ideas and technologies is now widely understood.

However many researchers and policy makers also note the importance of a strong emphasis on the importance of a proactive role for government in setting long policy directions and in mobilizing the investment required to drive the rapid, scaled up commercialization and deployment of game changing social and technological innovations.

John Schellnhuber, reflecting on the speed with which renewable energy is replacing fossil fuels in Germany offered the following observation.

“Public will, individual psychology, and technological innovation come together to create tremendous innovation dynamics....tremendous substitution dynamics. In a few years renewable energy has already overtaken, at least in installed capacity, the nuclear power industry in Germany. So this is ‘proof of concept’.... that yes we can create big transitions.”

Strengthening the financial and governance capabilities needed to drive swift implementation of large scale de-carbonization

The cost estimates of the post carbon economy strategies summarized in Table 1 are consistent with the more recent conclusions of the *2012 Climate Tracker Update*: “The cost of staying below 2°C can be less than 1% of global GDP, when investments are spread overtime. Coordinated early action (ie, starting now, well before 2020) will deliver the least cost way of staying below 2°C. The longer the delay, the higher the cost and the bigger the technological challenges.”

Strategies for mobilizing the required investment funds will need to include a robust carbon tax, a ‘Tobin tax’ on international financial transactions as well as resources arising from the end of subsidies and tax concessions to fossil fuel industries.

An equitable strategy for redistributing the financial burdens and costs of the transition policies will need to include global, national and regional structural adjustment assistance to support workers and communities shift away from fossil fuel based employment as well as the embedding of renewable energy and climate change resilience investment resources in all international aid and development programs.

The achievement of global commitments to an internationally verifiable de-carbonization road map; a shared approach to carbon pricing and a strengthened role for international governance institutions such as the International Energy Agency and International Renewable Energy Agency remain important goals. However the urgency of the timetable for emissions reductions and the lack of any likelihood of progress towards binding global treaties in the next few years means that the main focus will need to be on alliances and collaborations between nation states, sub-national regions, provinces and cities.

There will also be an important and increasing role for local government and local community organizations in exploring and implementing innovative post carbon economy transition solutions and in extending of opportunities for citizen participation, including legislative obligation for governments to provide citizens with opportunities to participate in informed debate.

Finally it will be important to continue to strengthen the labor market skills and policy making capabilities through capacity building and training programs in renewable technology and energy efficiency and through transformation and transition studies as core discipline and program in all universities and research institutes.

Alex Kazaglis from the UK Climate Commission particularly highlights the importance of getting implementation right.

“It’s an all too common story. You speak to people who’ve tried to install solar panels on their roof and they tell you how difficult it was and the guy that they dealt with didn’t seem to know all the different options and had his own agenda. So, there’s a whole raft of issues there that are very difficult to overcome and I think they’re not the glamorous part of the policy. Once you’ve announced the policy, the implementation side gets forgotten a little bit. Whereas, actually, in terms of success, it’s critical.”

IMAGINE 2030: HOW THE TRANSITION TO A JUST AND SUSTAINABLE POST CARBON FUTURE WAS ACHIEVED

In the end however the most challenging question remains: How might the transition to just and resilient post carbon future actually occur? What theory of social and political change could plausibly deliver this transformation at sufficient speed and scale? We therefore asked each of the people we spoke with to provide a brief response to the following question.

Imagine it is 2030...Imagine we now live in a world in which the transition to a just and resilient post carbon society has occurred so there is now real hope that catastrophic climate change will be avoided. How did this happen?

Jenny Clad, from Al Gore’s Climate Project tells a story of evidence and education.

“Little by little, every year, the evidence, the increased education of the public, of the politicians, the work from businesses. All of this inch-by-inch is going to have the effect of making the deniers and those who profess to do nothing and put more money into drilling oil, digging out coal, more and more marginalised.”

Amory Lovins, CEO of the Rocky Mountain Institute focuses on the transformational power of creativity and innovation.

“As we look back on this now... one wonders what all the fuss was about. We used to think that catastrophic climate change was a big problem because we supposed that it had to be solved by difficult treaties between national governments. But that assumed - quite wrongly - that the solutions would be costly and painful rather than attractive and profitable, for the simple reason - now so blindingly obvious in hindsight - that it was so much cheaper to save the fuel than to buy it in the first place, let alone burn it. So as the economic logic gradually overcame the dogma that it must not have been cost-effective to save energy or we’d have done it already, we really unleashed the dynamism of individual choice and corporate and social innovation....”

The third scenario highlighted by former Climate Reality Project Co-ordinator, Kevin Curtis is all about courageous political leadership....

“How we got there is a collection of acts of leadership by leaders who emerged to seize the moment. Who just said ‘no we cannot let our climate be so fundamentally changed. We can’t afford what that’s going to do. It’ll be consumers demanding new products, it’ll be companies providing new products, it’ll be the media. It’ll be people from all walks of life demonstrating true leadership, taking on the status quo, taking on a sense of negativism and ‘it’s too late-ness’. It won’t be coordinated, it won’t be controlled, it will just happen and it will happen if all of us in the next five years – get the word out.”

For Club of Rome member and Chair of Safe Climate Australia, Ian Dunlop.

“The trigger is going to be some sort of natural disaster that wakes people up. Before long the community will wake up to what is occurring and demand action along the lines that.... ‘We have been looking at the problem for 30 years and done virtually nothing. Now we have to really start moving. The pressure will then come on the business and political worlds for real action. It will require different leadership from anything we’ve seen before as we will have to move to a war-footing....”

John Schellnhuber, Director of the Potsdam Institute for Climate Impacts Research and Climate Adviser to German Chancellor Angela Merkel draws together all these threads of evidence, innovation and leadership in the following way.

“One [driver] is, very sadly, that...disasters will happen. Hurricane Katrina changed a lot in America.”

The second thing is leadership. What Merkel did with the German experiment [driving a rapid shift from nuclear and fossil fuel energy to renewables] is happening because Merkel had the guts really to say she was wrong. This type of leadership will be necessary, maybe in China, maybe in the United States, maybe in Australia even...

The third thing is social innovation. For example I just went to a region in Germany where people say “We want to have energy supply completely done on a communitarian basis. We the citizens will buy the power plants. We will buy the networks and the grids. We will do it.”

CONCLUSION

The rapidly approaching ‘perfect storm’ of climatic and ecological tipping points, deeply entrenched inequalities of power and resources and the remarkable capacity for human beings to demonstrate short sightedness and self delusion provides strong ammunition for those who regard the goal of avoiding runaway climate change as an impossibility. An honest assessment of the size and scale of the political obstacles standing in the way of an adequate and timely response to the climate crisis is certainly an essential guard against wishful thinking.

However while his role in formulating and driving the neo-liberal economic agenda makes his advice deeply ironic, Milton Friedman also provides us with a valuable reminder of the powerful role alternative visions of the future can play in driving transformational change, particularly at moments of economic, social and ecological crisis.

“Only a crisis—actual or perceived—produces real change. When the crisis occurs, the actions that are taken depend on the ideas that are lying around. That, I believe, is our basic function: to develop alternatives to existing policies, to keep them alive and available until the politically impossible becomes politically inevitable” - (Klein, 2007)

Our hope therefore is that the ideas, experience and insights brought together in the *Post Carbon Pathways* project and report can make a useful contribution to well informed and decisive action at the point at which the transformation to a just and resilient post carbon future makes the leap from political impossibility to political inevitability.

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A low-energy transformation will demand a disembodiment of the growth imperative

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INTRODUCTION

From a climate change and energy savings perspective, the theories and policies of the past 40 years have failed. The rich countries of the world have managed to do no better than to slow growth in energy use over this period. Despite international and national goal setting; the establishment of carbon markets; the deployment of fiscal instruments such as taxes and fees; the investment in research on and diffusion of efficient technologies - the effects on energy consumption and carbon emissions have been marginal. It is high time to acknowledge that minimizing the severity of climate change will not be achieved without a deep transformation in the ways we produce and consume energy. This poses not only a huge political challenge but also challenges to existing theories on the relationship between carbon, energy and development. And while efforts to replace fossil fuel based production with renewable energies, projections from the International Energy Agency imply that the renewable transition will not happen fast enough to take a significant dent out of global carbon emissions over the coming decades (Wilhite, 2012). This makes the absolute reduction of energy consumption more urgent than ever.

For much of its history, the politics and policies of mainstream energy conservation have relied on markets and technology development to deliver savings. Critiques of this framework from the non-economic social sciences began as early as the 1980s (see Wilhite et al., 2000 for a summary) and have increased in recent decades in light of the need for absolute reductions of fossil-based energy consumption. These critiques have been counterbalanced by the expanding influence of the Friedman doctrine in both national economic and energy policy: the proposition that an unfettered market will omnisciently orchestrate the realization of economic and societal goals (Klein, 2007). Friedman's view has persevered despite ample evidence that the environment continues to degrade and global social imbalances remain. It has also persevered theoretical critiques from a number of holds, including Marxists, ecological economists and economic anthropologists, such as Polanyi (2001), who argued that the 'free market' has probably never existed in any society, and in fact that the functioning of markets has depended on State-generated legal frameworks and the strict regulation of institutions such as private property, national currencies, legal contracts and credit markets. In the world of energy, State regulation and intervention were swept aside in the late 1980s. Both the theories and policies relating to energy use and conservation became saturated with free market principles and assumptions about sovereign, economic rational consumers. In the past two decades, one country after another has deregulated or privatized its energy sector. As a result, the goal of energy savings has been replaced with the goal of market and technical efficiency, confusing the means with the ends (Wilhite and Norgard, 2004).

Another tenet in the Friedman doctrine that is deeply embedded in national and energy politics is the growth imperative: economies must expand in order to survive and to thrive. Schnaiberg (2005) refers to this as "the treadmill of production", of ever more and ever faster. As Wilhite and Hansen (2012) write, the dynamic tendencies of capitalism represent one of its greatest strengths, but are also the cause of fundamental tensions and dilemmas. Without growth, the capitalist economy stagnates or recesses. The consequence is that companies lose profits, workers lose wages and/or jobs, and politicians lose elections. Any commercial enterprise operating in a capitalist, free market is obliged to grow in order to secure profit generation. If not, it has no chance of surviving in a competitive market or of producing dividends for shareholders (Ingham, 2008). This is why capitalism is said to have an embedded 'growth imperative' and why it has historically fostered many fixes for expansion in order to sustain growth (Harvey, 2006), be they geographic expansion (colonialism, international trade, transnational corporatism) or temporal expansion (credit-based production and consumption). The economic growth imperative, so deeply embedded in every facet of life in OECD countries, associates more with better in virtually every arena of energy production and consumption.

EMBODIED GROWTH

Lived lives in arenas premiering growth has led to the embodiment of growth-habits. This is largely neglected in the theories and policies of energy savings. Energy research has directed most of its attention to mental states, beliefs, cognitive processes and rational choice. Brains are regarded as the sole change agents and incentives for change appeal to deductive reasoning, economic utility maximization and motivational information. Jean Lave argued that this cognitive focus has distanced theory from experience and divided ‘the mind from the world’ (1993:8). Bodies remember and this memory is highly influential in all kinds of practices, including energy using practices in household and transportation.

Anthropologist Marel Mauss (1934) wrote that embodiment can result from one of two distinct but related forms for learning: from exposure through lived experience to the practices and movements of others sharing the same socio-cultural context (what Mauss refers to as enculturation); and from purposive training, such as in training for a sport or learning a craft. Mauss proposed that repetition of actions in either a cultural space such as a home, or through training, creates dispositions for the ways we accomplish similar acts in the future. Enculturation and training both result in bodies that ‘intend’ certain situations (Crossley, 2007:83). These embodied intentions are at the core of Mauss’ concept of ‘habitus’, picked up on and elaborated by Pierre Bourdieu in his theory of social practice (1977). Bourdieu refined the notion of *habitus* to mean a domain of dispositions for action, created and perpetuated through repeated performance of a practice in a given social-cultural space. These dispositions influence, or predispose future performance of the same practice. Thus the *habitus* engages with the “presence of the past” (1977: 304) in forming and embodying knowledge. Anthropologist Sherry Ortner equated a theory of embodiment with a “theory of history” (2006: 192).

Bernard Lahire (2003: 335) has critiqued Bourdieu’s notion of habitus and dispositions are ‘nothing more than a grammar or a logic of current actions, of systems of action, of current interactions, etc.’ asserting that more weight should be given to the role of beliefs, attitudes and other elements of external reality in the production of actions. This opens for the notion of mental habits or better, of a dissolution of the mind/body dichotomy altogether and replacing it with a distinction between experiential knowledge and reflexive knowledge, to both of which mind and body, as well as both history and personal biographies contribute. Both of these forms for knowledge are important to consumption choices, but far more attention has been given to the latter, leading to energy savings policies dominated by assumptions of rational consumers who respond to deductive information in the form of prices, paybacks on energy investments based on saved energy over time, as well as rational appeals to do something in the home in order to save the planet. Little attention has been given to experiential knowledge and a theory of change that acknowledges practical learning.

A theory of experiential knowledge is essential to understanding everyday consumption practices. In a recent paper with coauthor Gregoire Wallenborn (Wilhite and Wallenborn, 2013) we articulate the ways that personal and culturally mediated experience embodies both knowledge and meanings and how this in turn affects the ways we perform energy-consuming acts involving how we travel, determine indoor comfort, clean our living spaces (cool and heat) and acquire and prepare food. We explore how objects involved in these practices contribute to dispositions for future performances. A more robust theoretical framework would expand from an emphasis on cognitive information (on issues as conflicting as gas prices, climate change, and home improvement) to include knowledge embedded through the performance of routine household tasks.

THE EMBODIMENT OF GROWTH

People who live their lives in capitalist or quasi-capitalist political-economic systems have embodied high energy habits. Equally problematic from a transformation perspective is the habituation to growth itself in virtually every domain of life. Better lives are associated with income growth and material growth in the types, numbers and sizes of things that give pleasure, provide comfort and deliver convenience, such as houses, cars, televisions, and air conditioners. Robbins (2005) refers to this as the culture of capitalism. This culture encompasses politicians, marketing specialists, advertisers, corporate public relations specialists, journalists and families, ‘all of whom conform to a vision of the world designed to maximize production and consumption of goods’ (Robbins, 2005: 14). Robbins relates how this culture developed from the beginning of the 20th century in the USA and Europe, departing significantly from a culture of moderation, thrift and frugality that characterized the 19th century, when having too many things and splurging on consumption were frowned upon. In the 19th century, home interiors were sparsely decorated, there were few household furnishings and only a few appliances to aid housework. It was common for people to make their own clothes and to have gardens or access to their own farm products (in 1870, 53 percent of the USA population lived and worked on farms). The culture

premiering frugality and durability in the 19th century was transformed in the 20th century into a capitalist growth culture, encouraged by government policy, commercial actors and advertisers.

While there were significant junctures in Western economies in the 20th century, including discontinuities, reversals and setbacks, these junctures have at most only temporarily derailed the upward spiraling consumption. The culture of growth has infiltrated notions of the good life. At the level of home and household, dwelling sizes have steadily increased, as have numbers and sizes of rooms (bathrooms, bedrooms, kitchens and so on), furnishings and household appliances. There has been an increasing demand for greater convenience in the form of the delegation of physical work to technologies and the demand for speeding up the performance of tasks, as well as for an increase in indoor thermal comfort in the form of more mechanical heat in the winter and mechanical cooling (air conditioning) in the summer (Shove, 2003). Energy provides the heat and/or refrigerated air for bigger houses, provides power for the increasing numbers and uses of appliances as well as for accelerating transport practices in the expanding geography of everyday lives. To site an example in the domain of transport, Urry (2009), citing Buchanan (2002: 131), writes that in 1800 people in the USA travelled 50 meters a day. Schafer and Victor (2000: 171) estimate that in 2000, the average American travelled 50 km a day. They project that the movement of the global population will expand from 23 billion kilometers daily in 2000 to 106 billion km by 2050.

DISEMBODYING GROWTH

After a several generations of lived experience in this growth culture, ‘dispositions’ have formed for a treadmill of expansive consumption practices, whether they be measured in terms of money, goods or resource inputs. From a sustainability perspective, the habits of growth have been largely ignored and will be difficult to break and reform. Efforts to unlock and reform growth habits will have to aim at both the politics and practices of growth. To begin at the top, it is difficult to imagine how a low energy transformation can be achieved unless the growth and size of the economy are dimensioned to sustain a robust ecology and resource base. This will constitute a radical departure from business as usual and involve if not a revolution, revolutionary new thinking on the role of government and markets in producing and reproducing the capacity for good lives. There is an increasing crescendo of critique and analysis of the growth imperative from a climate/environmental point of view (see for example Pugh et al., 2000; Jackson, 2009; Patel, 2009). The recent report of World watch institute (2013) authored by an impressive set of academic contributors, states decisively that a significant reduction in the environmental impact of economy will not be possible within the economic growth paradigm. Taking this into national political economies will be difficult given the recent economic recession and the nature of national political debates today, which are mainly concerned with ‘restarting’ economic growth and the more immediate (an important) issues of increasing commercial competitiveness and providing jobs. Whether and when a paradigmatic change in the national politics of growth happens is highly uncertain. In the meantime, we must continue to work for change from the inside and from below on stimulating low energy practices. The market alone will not do it.

We need governments that are willing to impose tougher national laws and regulations that restrict and reduce spaces for energy growth, such as favoring public transportation infrastructures over roads, closing of city centers to cars, regulating the size of new homes, penalizing high volume energy use and so on. These types of regulations will enable the formation of new, less energy intensive habits and begin a habituation to no-growth. At the same time we must expand the spaces for experimentation with low-energy practices through public supported demonstrations and support for community level initiatives aiming at low energy living.

REGULATORY ENABLING OF NO-GROWTH HABITS

Transport is a good example of consumption that is strongly dependent on infrastructure and technologies. A transformative policy must aim at vastly increasing the pace of the building out of train, metro, bus and biking infrastructures. In countries (and cities) that are making significant investments in public transportation, there is near uniformly high public acceptance and documentation on the ameliorating effects in terms of congestion and pollution. Norway is unfortunately not a good example of a long term approach to enabling public transport. Train capacity and the geographical reach of the train network are vastly underdeveloped and existing train tracks in dire need of repair and upgrade. The tramway system in Oslo is degraded and the entire fleet of tramcars virtually unserviceable. At the same time, study after study shows that Oslo residents will bike more if the shabby system of bicycle paths is upgraded and expanded. The first plan for the development of a bicycle network in Oslo was prepared in 1977 and was intended to be completed in 1985. In 2013, very little has been done to operationalize this now 35 year old plan.

I give attention to bicycling infrastructure because of its multiple advantages in lowering energy use for transportation, reducing traffic (both automobile and public transport), reducing pollution and improving fitness and health. Many European cities have experienced a surge in bicycling after the building of safe and convenient infrastructures. Copenhagen and Amsterdam have extensive bicycle networks. Over 40 percent of commuting within Copenhagen is by bicycle. Stockholm has 750 km of bike paths, and Gothenborg 450 km. Paris, which is approximately the same size as Oslo, has built 600 km of bike paths over the past 10 years. Lisbon is a typical example of a place where pessimists predicted that investments in a bicycle infrastructure would be a waste of money and urban space. In fact, in the first half-year after its completion in 2010, there were very few people bicycling. However, as people began to experiment with and experience the use of bicycles for training, commuting and other tasks, the numbers of people bicycling has increased rapidly (Wilhite and Wallenborn, 2013). In Oklahoma City, where the car and car culture reigns supreme, a successful program for the building of bicycle infrastructure was driven by a fitness campaign initiated by the city government (Sahakian and Wilhite, in press). These infrastructure developments have induced changes in urban lifestyles, enabling the local population to become less dependent on cars.

A similar massive effort needs to be directed at buildings and building energy use. The majority of building energy goes to heating and cooling, both of which are linked to building size. In the residential sector, dwelling sizes in OECD countries have been expanding steadily over the past 30 years. In Norway, homes have doubled in size since 1990. Policies need to aim at reducing dwelling sizes, though this is paradoxical and difficult in an economy that encourages growth. As I have argued in several articles, this growth in dwelling size is one reason behind the explosive expansion in the energy used to run air conditioning in places with warm climates. In many parts of the world, it is getting more difficult to find buildings designed to stay cool without an air conditioner. A transformative policy would aim at retaining or recapturing building structures and materials that can be cooled naturally in hot and humid climates (Wilhite, 2009).

ENABLING EXPERIMENTATION WITH LOW-ENERGY LIVING

A second set of disembodying policy levers would stimulate the creation of spaces for experimentation with, or demonstration of low-energy practices. Publicly supported demonstrations, used extensively in the USA in the 1970s and 1980s in the wake of the oil shocks, were largely abandoned in the wave of free-market energy ideology from the 1990s. In Davis, California great strides were made in home weatherization after demonstration homes were set up in neighborhoods. People were able to experience first-hand how life in a low energy house in their community was comfortable and to talk to their neighbors about the specific costs and benefits of insulation, new windows and weatherstripping. Demonstrations provide the opportunity for people to learn through exposure and experimentation, which as we have seen are important to unlocking and changing habits.

Another form for consumption that is benefiting from experimentation is collaborative consumption. In a recent monograph entitled *Together: the Rituals, Pleasures and Politics of Cooperation*, Richard Sennett (2012) argues that in contradiction to post-modern portrayals of social life as the cumulative actions of selfish individuals, cooperation and collaboration are fundamental to societal interaction. There is growing interest in collaboration, in part stimulated by internet based networks that specialize in non-market exchanges such as exchanges of used goods, sharing of housing, car sharing and other creative forms of exchange (Attali and Wilhite, 2001; Levine, 2009; Botsman and Rogers, 2011). The most ambitious form for collaborative consumption involves community visioning and planning of alternative forms for practices that are less environmentally intrusive and in some cases aim at no growth or low growth microeconomies. May (1994, quoted in Scott-Cato and Hillier, 2010: 880) characterizes these community efforts as micropolitical, defined this way: "It is a concept best understood as engaging in a practice that, while within the social network of practices and thus not transgressing that network, occupies a place that disrupts dominant practices by showing creative possibilities within these practices." The idea is to enable experimentation, differentiation and the emergence of new social forms. Berressem (2009: 64) writes that this process involves a 'healthy destabilization of habits' and thus provides an opportunity for the formation of new habits.

One such micropolitical movement calls itself the 'Transition Movement' (originally called Transition Towns). It is one of the most robust examples of bottom up, community driven change. It began in a community in England in 2006 and has rapidly spread across the world. In 2009, there were 134 communities officially registered as members of the Transition Movement (Scott-Cato and Hillier, 2010). Hopkins (2013: 45) expresses the rationale behind the movement this way: "If we wait for the governments, it'll be too little, too late. If we act as individuals, it'll be too little. But if we act as

communities, it might just be enough, just in time”. In order to be eligible to join the movement, a new community must commit to adherence with certain principles involving both participatory planning and an aim to be less environmentally intrusive. Implicit to the movement is an alternative political economic framing that is ‘non-capitalist’, yet incorporates a positive vision rather than one of denial or simplicity (Hopkins, 2007).

These transition communities constitute islands of practice in which the participants live, experience and build up new habits for the performance of energy related practices. In this process, the culture of growth is questioned, disembodied through experimentation with new practices, and eventually replaced with a culture grounded in low-energy habits. These and other bottom-up community efforts have been criticized for being politically naïve and elitist (Cato, 2009). Nonetheless, I claim that they constitute a source of knowledge and inspiration for alternatives to the growth culture and deserve public support and encouragement.

CONCLUSIONS

In the rich, high carbon producing countries of the world, the social body is saturated with the culture of growth, and the individuals who live out their lives in this culture have embodied knowledge and habits that accord with it. This needs to be acknowledged in research on low-energy transformations and acknowledged in policy at all levels from international to national to local. To stretch the body metaphor of this paper to the limit, it is unlikely that the ecological and social threats constituted by growth economics will be arrested by a revolutionary guillotine aimed at cutting off its head. We urgently need to disembody growth through anti-Friedman public initiatives and investments in low energy structures and infrastructures, as well as support for bottom-up experimentation with low energy practices.

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Homo consumens, needless consumption and sources of transformation

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INTRODUCTION

A climate-friendly transformation in affluent Western societies, such as Norway, requires a transformation of the patterns of consumption. What inhibits transformation is not consumption, per se, since we all need to consume, but the overall needless, unsustainable, unfair, excessive, lavishly, conspicuous (over)consumption. Even an increase of consumption of green products may contribute to worsening of the crisis, if we are not critically aware of what enters into the production of these products. More electric cars will certainly help reducing emission of pollutants, but we need to take into account the resources gone into building the car and how it relates to issues of poverty and the environment. Needless consumption are consumption of products that consumers want but do not need. It is, of course, difficult to say what people want and need, but if we do not address the issue, we may ignore key aspects of what inhibits climate-friendly transformation. We will in this paper look at two aspects: how needless consumption is embedded (embodied) in a culture of consumer-addiction and what the sources of transformation are that can break with the addictive consumer-patterns.

NORWAY AS A CASE IN POINT

Norway is one of the most affluent countries in the world. Norwegians have the means necessary to provide an example to the world how we can live more climate-friendly at the same time as we contribute to the elimination of poverty, international solidarity, and the greening of the world economy. Norway's wealth is largely acquired by oil and gas, so that Norwegians have a huge debt to pay to Gaia and those who suffer in the world. Politicians do not take measures beyond what they believe the majority of their constituents would do. And in spite of efforts here and there, fundamental transformation is not taking place in Norway, which is partly due to a culture of consumer-addiction to needless consumption.¹

We need bold political leadership, but that is a scarcity. After the financial crisis (fall 2008), the financial minister from the Socialist Left party, perceived by many as the "green party" in Norway, went out in national media to encourage people to keep on shopping as before, if not more. She said: "*Psychology has everything to say for how hard this [the financial crisis] will hit us*". To set an example herself, she said: "*After I have been out shopping, I take another round on Karl Johan [main shopping street in Oslo] with a new shopping bag, only to show that there is circulation in the economy!*"² This creates a situation the biologist and anthropologist Gregory Bateson (1972) called a *double-bind*, with two conflicting messages conveyed at the same time: to solve the economic crisis, you should shop more; to solve the ecological crisis, you should shop less. This shows in many ways how we have become dependent on systems of consumption that are dependent on our dependencies. If we stop shopping, the systems will collapse. In other words, *the consumer-society produces consumer-addicts trapped in a culture of consumer-addiction. We have evolved from homo sapiens to homo consumens!*

1. Overconsumption of energy and food, with its needless waste, fuels and feeds the crises of energy and food. Every year Norwegians throw over 300 000 tons kg of food, i.e. over 50 kg per each person. Many international students, who come to Norway from countries like Spain, Italy, Portugal that are hard hit by the financial crisis, are shocked by this and partake in what is known as "dumpster diving", i.e. living out of what others throw away. A direct-action by students in my ecophilosophy class put the issue to the forefront, and spurred a national debate, see <http://www.nrk.no/nyheter/distrikt/ostafjells/telemark/1.7387122>.

2. "Kristin Halvorsen advarer mot shoppe-stopp", *Verdens Gang*, 25.11. 2008; authors own translation.

HOMO CONSUMENS

Homo consumens is the consuming specie that is defined by the commodities it consumes: *I consume, therefore I am*. It is an object of consumption: objectified as a commodity or commodified as an object. It lives with no self, in the existential sense, no consciousness, no inner will or spirit – a *spissborger (philistine)*, to use a phrase by the existentialist philosopher Kierkegaard. *Homo consumens* has become *comfortably numb*. The emptiness inside is sought filled with more consumption, at least for a while, before falling deeper into the existential crisis of despair and meaninglessness. The psychotherapist and sociologist Erich Fromm speaks of *homo consumens*:

“Twentieth-century industrialism has created this new psychological type, homo consumens, primarily for economic reasons, i.e., the need for mass consumption, which is stimulated and manipulated by advertising...man has transformed himself into a homo consumens. He is voracious, passive, and tries to compensate for his inner emptiness by continuous and ever-increasing consumption...he appears to be active, “thrilled”, yet deep down he is anxious, lonely, depressed, and bored.” - (Fromm, 1984: 92-93, my emphasis)

A precursor to Fromm is the economist and sociologist Thorstein Veblen (1899), who argued that the newly rich had accumulated so much wealth and leisure time that they are no longer concerned about meeting physical needs, but rather consume *to be seen*. He calls this for *conspicuous consumption*, consumption for displaying ones economic power and wealth. It is as much a psychological as a sociological phenomenon, which he furthermore links to what he calls *pecuniary culture*, a culture where all value is defined in terms of money value. The consumer-society fills the spiritual void in the life of *homo consumens* with the promise of soul in what is consumed. The TV and the computers have become altars of consumption and the shopping malls are the cathedrals, with names like Source, Oasis, Lagoon, Paradise, Hercules, indicating places where people will find their spiritual needs. The gold credit card is the new golden calf and the yearly sales the new communion.

Homo consumens thrives well in Norway, but studies show that even though the standard of living has skyrocketed, the quality of life in Norway has been rather constant since the early 1970s (Stoknes, 2011). In other words, people are getting richer and have more material wealth, but they are not getting happier. The Norwegian philosopher Arne Næss writes: *It is not what you have that makes you happy, but how you feel – you may have everything, but feel poor, or you may be poor and feel rich!* (Næss and Haukeland, 2009). We measure wealth in terms of *Gross National Product (GNP)*, what we consume (buy and sell), but is it a good indicator of how we feel? In Bhutan they introduced a new measurement of wealth, *Gross National Happiness (GNH)*, to measure not simply what you have but how you feel. A consumer-society like Norway is rich in terms of GNP, but poorer when it comes to GNH. The so-called *rich* countries would not introduce GNH, since if it focuses more on what makes us happy is not in what we consume, the economic system could easily collapse. Consumer-society is *dissatisfaction guaranteed!*

CLIMATE CRISIS AS AN EXISTENTIAL CRISIS

The Norwegian sociologist Gudmund Hernes states in *Hot Topic—Cold Comfort: Climate Change and Attitude Change* that mindsets and behavior do change through extreme events, but not always:

“Global warming and climate change has become a hot topic. Yet the fact that the various threats to the planet, even through major events, have not had a greater impact on the public mindset is sobering and slight consolation. Indeed, it is cold comfort. The events and disasters that have happened have been bad – yet they may not have been bad enough.” - (Hernes, 2012: 142)

In other words, it is not for certain that fear of a major threat makes us change our ways. Hence, we need to explore other sources of transformation. One way to do so is by seeing the climate crisis as an existential crisis of the self. This can bring the issue closer to home for people. We are well aware that climate change may threaten the very existence of life as we know it. It is a crisis that will threaten human existence and civilization, but this is too abstract for most people, especially in a country like Norway where things do not seem at all that bad for most people – yet. Still, there is a crisis of the self, i.e. how to find meaning and happiness in life. Freedom of choice is important to us, but if we are not self-aware, we may live as a prisoner of ignorance under the illusion that we choose freely. Our nihilistic age – where all meaning is flattened – does not help. Nietzsche thought this would be liberating, since we then can create our own meaning, an important tenet in *post-modernity* where individuals seek to realize themselves by themselves. Kierkegaard,

however, did not believe we would be able to come to ourselves and live meaningful lives without some defining relation to some outer power. We are not able, like a *superman*, to pull ourselves together on our own. Attempting to do so will only lead to feelings of guilt, inadequateness, self-denial, alienation and despair. We need help!

In Norway, there is a phrase from Henrik Ibsen's *Peer Gynt*, that illustrates some of the situation: *å være seg selv nok* ("to have enough with oneself"). The consumer-society has clearly narcissistic traits. Narcissus was punished by the gods to fall in love with his own self-image, because of his arrogance, which eventually killed him. *Peer Gynt* lived most of his life lavishly with arrogant disregard for anything or anyone, just following his own lusts and desires. He meets the troll *Bøygen*, who is a Norwegian expression of the voice that lures us to *go outside* whatever causes resistance and to take the easiest road. Ibsen used the word *egoist* to describe *Peer* (as a *bergtroll*). An *egoist* is one that is fixated on his or her own. The *ego* and the *self* are not the same. *Peer Gynt* has great success as an egoist, not unlike Norwegians today, but it leaves him with a void inside and an emptiness that makes him long home to himself and where he came from. He is confronted by not having a self, having not made a true choice. He seeks proof that he has done so, but must give up. He then comes to Solveig, the woman he met heart-to-heart in his youth, but whom he could not hold on to. She greets him with joy, warmth and love. He asks her: *Please tell me, when was I ever a true self*. She answers: *In my faith, in my hope and in my love*. In this loving relationship to Solveig, *Peer* had found himself and through that peace of heart and mind. This is a recurring Kierkegaardian theme: we become our selves in the defining relation to some higher power.

That we depend on some outer power is counter to most everything in our secular age. Charles Taylor (2008), in his study on secularism, argues that people in the rich, Western countries have lost their belief in some external authority that can guide their lives. "God is dead!" wrote Nietzsche, killed by weapons of reason and science. Dreyfus and Kelly (2011) argue convincingly that the problem is not seeing or being sensitive to what is calling us in the moment in order to find meaning. Alastair McIntosh asks in *Hell and High Water*, an excellent book on the climate crisis: *[Do we] hear the cry of the Earth to its own sweet child in time?* (2008: 250). But the egoist only hears the voice of *Bøygen*, calling it to take the easy road in life. The more we obey *Bøygen*, the more we remain in the ego and fall further away from our selves as transformative powers in our lives. What makes the situation worse for *homo consumens*, is that it lacks the self-awareness to break with *Bøygen*. Trapped in a culture of consumer-addiction, it only sees itself through what it consumes.

THE CULTURE OF CONSUMER-ADDICTION

What does it mean to be trapped in a culture of consumer-addiction? The BBC documentary from 2002 titled *The Century of the Self*, made by Adam Curtis, gives a great view of the *culture of consumer-addiction*. It portrays Edward Bernays (1891-1995), a nephew of Sigmund Freud, who used Freud's ideas to help business manipulate consumers. In his book, *Propaganda* (1928), he writes:

"The conscious and intelligent manipulation of the organized habits and opinions of the masses is an important element in democratic society. Those who manipulate this unseen mechanism of society constitute an invisible government, which is the true ruling power of our country." - (Bernays, 1928)

Bernays was a master of propaganda, a skill he called *the engineering of consent*. This skill helps businesses make the masses believe what they want them to believe. He worked in automobile industry, electrical industry, tobacco industry, and more. He did not convey information through commercials, but rather, he used public relations (PR), research and news media. He would use a third-party as legitimizers. For example, he could send a survey to 1500 doctors and ask what brand they were smoking. Perhaps he got only 10 responses, where 6 said they were smoking Lucky Strike, which he then could manipulate into following news: "Most doctors smoke Lucky Strike!" PR was not only about selling a product, as advertisers do, but to sell a whole mindset of aspirations. A slogan Bernays used was *tie-up, tie-in*, which for him meant seeing things in a systemic way. For example, you can have a great unleashing of a new cigarette on Freedom day, saying that smoking cigarettes is like *lighting torches of freedom*, at the same time there is an interview by a doctor who questions whether smoking is damaging health, a new commercial is run on prime-time TV that evening, combined with new cigarette stands in the city. Bernays thought it was quite legitimate to pacify and manipulate the masses of the society to numbed consumers. It will then keep them in check.

Today's business follows the pioneering work of Bernays, also playing on the language of addiction. A Norwegian commercial for milk, a few years ago, had the following slogan: *Got to have it! Just got to have it!*, and the national newspaper *Verdens Gang* used once the following slogan in its commercials: *Not a day without!* The principle of *tie-up*, *tie-in* is today modified by having consumers first buy a product and then form various dependencies to the company. An example is printers. You can get a printer fairly cheap, but when you have been *tied-in*, you are soon *tied-up* having to buy expensive print cartridge in unforeseeable future. Much aid to poorer countries are like that; a country can give a poor farmer a tractor, but then the farmer soon needs to buy gasoline, parts and service to the tractor from the same country that gave the tractor, i.e. *tied-in* and *tied up*.

Many today follow Bernays work on manipulating the consumer, some are more explicit than others. At the SXSW conference in 2012, a VP in Digital and Content at SutherlandGold, made a presentation under the following title: *How to get consumers addicted to your content?* The synopsis of her talk is as follows:

*"[The talk] takes brands and marketers on a deep dive into the behavioral neuropsychology that drives audiences to try and become addicted to a brand's content, and helps them translate that knowledge into a scalable program that drives specific business objectives using consumer-centric content"*³

One blogger⁴ that followed the event outlines three steps to create consumer-addiction: 1) *don't publish information; fuel aspirations*, 2) *market your manifesto, so to transcend the utility of the brand* and 3) *double-down on content experiences, give the consumers more of what they want*. An experienced commentator on the blog made a revealing comment: *Brands need to be more than what they want for their customers, they need to become something worth joining for true 'addiction'*. Consumer-addicts buy under the promise of becoming complete, fulfilled, happy, and realized, but the culture of consumer-addiction drives on aspirations that point to the dissatisfaction of the present.

Zygmunt Bauman (2011) describes the consumer-society through his concepts of *liquid modernity* and *collateral damage*, i.e. the damage to marginal groups which is accepted, even justified, by referring to some higher objective. Consumer-society produces *collateral causalities*, the consumer-addicts that fall out and become disposed. These are then the human and environmental externalities, an acceptable downside of the system. Instead of people in communities commit to each other, the consumer-society consists of *swarms*, which are people who swarm, like bugs over a dead road-kill, around the next product (prey) – the new ipad! Consumerism threatens humanity, says Bauman, on two critically important areas: 1) the treatment of relationships as partnerships without duties or obligations, which breaks down the trust necessary for building bonds between people in communities and 2) the sustainability of the planet, which he is quite pessimistic about. Unless we behave and consume differently, humanity and the planet are getting deeper into trouble.

Homo consumens is not passively participating in the consumer-culture. Even though it is passive at a deeper level, it actively embodies a *consumption habitus* that reproduces the consumer patterns of behaviors, aspirations and tastes. Following the sociologist Pierre Bourdieu, who talked about *habitus* as the embodied organizing principle that surfaces in everyday practice, we speak of a *consumption habitus* as embodiment and individuation of certain social and cultural dispositions to the world, e.g. seeing the world through a shopping window. Such dispositions are, for example, discontent, dissatisfaction, distraction, aspiration, despair, frustration, low self-esteem, general confusion, lack of clarity, not being present, busy-ness, and normalization. One example: dissatisfaction. The same day a new *ipad* is out, there are rumors of another that will be much better. The *fine line* is for business to make the consumer aspire for the new, but not so unsatisfied that they will go over to a competitor.

Processes and structures for consumer-addiction are all part of what we can call a *Transformation Prevention System* (TPS). One part of TPS is structural, found for example in the infrastructures necessary for transformation; if you want to turn your house into solar-heated house, the infrastructure of the electrical company may stop you. Another part of TPS is the process of normalization in consumer-culture, e.g. what is *in* and what is *out*. And if you deviate from the norm, you will get explicit and implicit reactions, such as mechanisms of exclusion (punishment, discipline) and inclusion (rewards, confirmation).

3. http://schedule.sxsw.com/2012/events/event_IAP13140

4. <http://ericaswallow.com/2012/04/11/addictive-content/>

According to Nakken (1996), the addict cannot break the addiction process alone (1996: 77). He or she needs help from the outside. Similarly, the process of coming to oneself is a downward spiral of hopelessness, despair, fear and loneliness through the stages, until all illusions burst, perhaps through confrontations by an external event, confronting family or friends – the addict may open the door of transformation. Bruce (2008) says that what drives addictions is the dislocation of the addict from psychosocial integration. Addictions tear people apart from not only who they are, but from friends, family, community, and in ways that break social and spiritual bonds. He goes on to say:

“In general, free-market society seems to be generating ever-more-effective substitutes for psychosocial integration to fill the needs of people that it dislocates. These newer substitutes may soon replace the drugs as the most important objects of addiction...[we need] to reshape society with enough force and imagination to enable people to find social integration and meaning in everyday life. Then great numbers of them would not need to fill their inner void with addictions.” - (Bruce, 2008: 168)

In other words, it is largely a social and political task to deal with addictions. It is not the responsibility of the addict alone, but instead the consumer systems may define the consumer-addicts and negative externalities as acceptable (collateral) casualties.

SOURCES OF TRANSFORMATION

Fromm (1984) argues that *“a new approach to the problem of freedom is necessary, only with the transformation of homo consumens into a productive, active person will man experience freedom in true independence and not in unlimited choice of commodities”* (1984: 97). Fromm presents a three-fold solution to the problem: 1) a change in habits of consumption, the transformation of *homo consumens* into the productive, active man (in Spinoza’s sense), 2) the creation of a new spiritual attitude, that of humanism (in both theistic and nontheistic forms) and 3) a renaissance of truly democratic methods. (p. 97). Spinoza’s concept of *freedom* is linked to his concept of *ratio*, which is a deeper reason within that connects us to something greater expressed in a kind of *active-ness* where the whole of our being is participating in the doing, guided by active affects (positive feelings) such as love, friendship, hope. To be merely active or busy is a kind passivity that is led by passive affects (negative feelings), says Spinoza. Ratio is the consciousness that empowers the transformation from passive to active affects, and thereby guides us to our self, to freedom and to deep joy. That is a deep source of transformation to greater freedom, and it can be interpreted as spiritually based.

The therapist Nakken (1996) points to four relations that are critically important in order to break with addictive patterns: 1) family and friends, 2) a higher spiritual power, 3) the self and 4) community. The Alcoholics Anonymous (AA)⁵, who has had great success over decades helping people break with their addictions, speak of twelve steps in the transformative process. These steps show the existential and spiritual need of some external power (God) that has the power to make the addict be born anew. This echoes what the English Quaker Martin Smith (2010) outlines as lessons from the work with addiction to climate change. First, Smith argues, we should recognize and counter the tendency in society to belittle and *fence in* the change required. By looking at the high number of relapse among addicts, Smith finds it analogously to the climate debate that working to only *fence in* the reduction of greenhouse gases can ignore the steps needed for lasting transformations. Smith says we need to speak more about *“a new and sustainable way of living”*, not only about the climate change. The second lesson is to *actively counter the undermining effect of low self- and social-efficacy*, i.e. the belief that nothing can be done. Bandura (1997) argues that low self-efficacy undermines high enough ambitions and goals for change, so that people, when confronted with setbacks, give up earlier than they would if they had higher self- and social-efficacy. In order to build self-efficacy, Smith suggests then using the well-tried method of *step-by-step mastery*; which helps the addict cover large distances with one step at a time. The third lesson is that *change is better achieved in association with others rather than going it alone*. Addicts who are formed in groups are more successful in making lasting changes than those who are not. Smith mentions here Alcoholics Anonymous (AA) and the Transition Initiative movement as positive examples of forming such local groups that can spur both individual and social change. The final lesson is openness to a spiritual force of transformation, which is a lesson addicts around the world have experienced. Smith sees this not only as a basis for coming out of addictions but into a sustainable, climate-friendly future.

5. The Twelve-step program from AA was initially introduced in the 1930s when its initiator Dr. Bob quit drinking and together with Bill W. established the guiding principles known as the twelve steps.

Another therapist Bruce (2008) speaks of the missing, magical piece of the puzzle of breaking with addiction, which he sees is determined by social actions:

“World society will change at a gallop when its world view changes, but its world view will not change until a galvanizing alternative philosophy appears, together with images, ceremonies, music and metaphysics that can give it life in human hearts and minds.” - (Bruce, 2008: 392)

Such magical pieces we find appearing in the Transition Town or Transition Initiative movement that emphasize the link between inner and outer transformation. Transformation surely may take place through outer intervention, using the legal and health systems, playing on punishment and reward incentives, but we also need the inner transformation of natural inclination to produce lasting effects. We need both sources, just as we need not only to focus on the fear that the threat of climate crisis can set in people, but on the love of the kind of future we deeply wish to fight for.

You may act based on what you fear, for example if you get a diagnosis that say that you will die if you do not change your ways, you may change, but you may not (as Hernes showed above). If the fear of climate change shall cause people in Norway to react quickly, it is way too late to do something and human existence and civilization may be threatened, as the Gaia-scientist James Lovelock (2006) warns. Many people today are like the passengers aboard of Titanic who sat in the bar with waters up to their knees, nipping wine, telling others to calm down, since the boat cannot sink. It is like Henrik Ibsen wrote in the *Vildanden* (Wild Duck): *Deprive the average human being of his life-lie, and you rob him of his happiness*. Fear is a force of repulsion, a negative source of transformation, and it is only effective if it is perceived in a way that leads to a change of action, but what we fear is something we seek to avoid. The force of love is quite different.

Love is a *force of attraction*, which is a positive force that people would rather seek. An example is *being in love*. Love colors everything you see. To love Gaia in all its expressions, require of us to be more present and attentive to Gaia, so that we would care for it as we do with our loved ones.

To grapple with consumer-addictions in the society, I started collaboration with a therapeutic community in Telemark that rehabilitates former drug-addicts into the society.⁶ I wanted to learn more about the sources of transformation out of addiction among these former addicts and what could be done to help them in the transformation. In return, I was asked to take the former drug-addicts on trips in nature doing different exercises to explore how the outer and inner nature co-exist. I found in this that discoveries of outer nature (relations) is a way to discover our inner nature (self). Love of nature is love of self. Experiences from this work reinforce the lessons from people working with addictions. Both fear and love are actual sources of transformation, but love is clearly the strongest source: the love of life and the love of someone. Still, lasting transformation out of addiction is not a sole individual pursuit. It is strengthened by committing to social relations and community. Transformation requires choices by the individual, but these choices cannot be taken in a vacuum. They are empowered by community and through the loving relation to someone or something. There is so much to learn about climate-friendly transformation by people who work with breaking patterns of addictions.

PLACE-BASED TRANSFORMATION

Gandhi once said: *Be the change that you seek*, in which I have added *...wherever you are!* (Haukeland, 2011) We are always placed somewhere, but what we do there is not always *in-place*, rather *out-of-place*. We need to be more sensitive to what the Norwegian architect Nordberg-Schultz called *genius loci*, the spirit of place, and to do so wherever we are. Coming to our self must entail coming to what McIntosh (2008) calls *communities of place*, which are *glocal* in scope. There are fortunately many people who engage in being the change where they are, for example through movements like Stop Shopping! and Voluntary Simplicity, under a similar slogan to that of Arne Naess: *Rich life, simple means!* (Næss and Haukeland, 2009).

One promising example of *glocal* work is the Transition Initiatives movement⁷, founded by Rob Hopkins and evolved from the small town of Totnes in England to several thousands of communities across the globe. It is a grassroots

6. I am thankful to all the employees and users of Samtun in Telemark over the past years that I have collaborated with, and to Aasta Kravik and Lina Væthe, who has taught me much about how the Therapeutic Community deals with various aspects of transformations out of addictions.

7. See www.transitionnetwork.org, www.transitionculture.org.

movement directed to doing something joyful, social and constructive to deal with climate change and to make communities resilient for the changes that are coming. This unleashed an enormous amount of creativity, putting the frustration of politicians not doing enough into concrete actions for themselves and their neighbors. The movement started by reconnecting to simple things like the production of one's own food. Based on permaculture principles, local people start to grow their own food in community gardens. They work to green their communities, by for example bicycle repair, composting, buying local, transitioning the house into an energy passive house, sharing excess things, mindful consumption. This follows some critically important lessons from our discussion on breaking with consumer-addiction, by emphasizing social change. It takes a whole community to break the individual patterns of addiction.

It is interesting also to note that the Transition Initiatives movement use, similar to AA, 12 steps in order for a community transformation to take place: 1) *Form a core group*; 2) *Awareness raising*; 3) *Lay the foundations*; 4) *Organise a "Great Unleashing"*; 5) *Form interest groups*; 6) *Use Open Space*; 7) *Become Visible*; 8) *Reskilling*; 9) *Link to Local Government*; 10) *Honour the elders*; 11) *Let it go where it wants to go*; and 12) *Energy descent plan* (Hopkins, 2008: 148). In other words, there is a need for communities themselves to break with unecological patterns of consumption. In Norway, the two main Transition Initiatives are *Bærekraftige liv på Landås* (Bergen) and *Omstilling Sagene* (Oslo). At Telemark Research Institute, we collaborate with these initiatives to see how the movement can spread to both rural and urban communities in Norway. We find that these initiatives have the potential to develop into a broader sustainable, place-based community development and values-creation (Haukeland and Brandtzæg, 2009; Haukeland et al., 2010).

However promising the Transition Initiatives movement is, it needs, according to Alastair McIntosh (2008), a spiritual basis for building communities of place. The initiatives need what he calls the *cycle of belonging*, which he describes as 1) a sense of place (grounding), 2) that gives rise to a sense of identity (ego/head), 3) which carries with it a sense of values (soul/heart) 4) that generate a sense of responsibility (action/hand) (McIntosh, 2008: 235). Furthermore, it requires a re-connection to the indigenous in place, which links future work to the way of being in the past that has proven sustainable. This presupposes not only a re-connection to place-based culture, but to nature in place, which to a large extent can be understood as a spiritual rooting (Haukeland, 2010). It opens up for a renewed understanding how to interact and participate in the natural cycles of place, rejuvenated through the stories of place, that may re-enchanted our understanding of how nature calls on us to act and to treat our fellow creatures as neighbors, as part of the same community of place (Harding, 2005; Abram, 2010).

CONCLUSION

This paper has put focus on an area that hinders the affluent countries in the West to make the necessary transformations into a sustainable, climate-friendly future: *consumer-addiction to needless consumption*. We who live in such countries, like Norway, are all complicit in it. Consumer-addiction fuels the climate crisis and the status quo in the gap between rich and poor in the world, and we need to explore both what it is and the sources of transformation out of it. The climate crisis is seen as an existential crisis of the self, which helps us bring the broad, and sometimes abstract, discussion of climate change home to ourselves. We need to break with our own addictive consumer tendencies in order for us to be critically aware how what we consume contributes to climate change. There are consumer systems that seek to prevent people from becoming self-aware as a critical consumer. The paper shows how embedded (embodied) these systems are, but it also shows, drawing on lessons from people working with other forms of addictions, how to break with our own addictive tendencies. Love and fellowship are important sources of transformation, both for the individual and for communities. The paper has shown furthermore how people are breaking with their patterns of consumer-addictions, as in the transition initiatives, drawing on the spirit of love to life, place, community, fellow-humans and nature. This is a hopeful movement of people drawing on deeper sources of inner and outer transformation, which will help us not only overcome the crisis of climate and self, but to do so in a way that is joyful, meaningful and climate-friendly.

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Climate change undermines the livable climate in large areas of the world: A key transformation issue for human living and working conditions of most people on the planet

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CLIMATE CONDITIONS AND CLIMATE CHANGE

Climate change will involve higher temperatures (IPCC, 2013) and higher absolute humidity (due to increased evaporation from warmer sea surfaces; Wright et al., 2010) during major parts of each year in much of the densely populated world. The modeling of future climate will not be discussed in detail here, but the accumulating evidence of global and local climate change becomes more and more convincing (Stordalen et al., 2013). Stronger and longer hot seasons is one feature of the change and another is shifting rainfall patterns causing local droughts and floods in already hot areas (IPCC, 2013). These changes will have particular importance for population health in areas of the world that have high population density. The hot parts of the world already have heat exposures higher than what is physiologically safe and comfortable during many days, weeks or months each year (Hyatt et al., 2010).

Air temperature and humidity, rainfall, wind and solar heat radiation are components of climate conditions that can affect health and well-being if physiological limits are exceeded. A wide range of clinical health effects have been identified (Mc Michael et al., 1996; Kjellstrom and McMichael, 2013) and the need for *Transformation* to human development that protects the climate is well established (Stordalen et al., 2013). A greater variability of weather and climate conditions, as well as ecological change and sea-level rise, create additional risks for human communities.

The climate related risks can only be controlled in the long term if *Sustainability* is the foundation for the *Transformation* trends (e.g. Lundgren and Kjellstrom, 2013). *Sustainable development* brings in the inter-generational concepts (WCED, 1987) and climate change highlights the need for assessment of future long-term social and population health impacts of current and past green-house gas emissions (IPCC, 2013).

THE MEDICAL SCIENCE FOUNDATION FOR IMPACTS ON COMMUNITIES

The core body temperature of all humans is close to 37 °C and when ambient temperatures are higher the body relies totally on sweat evaporation to maintain a safe core temperature (Parsons, 2003). When ambient air has high relative humidity this evaporation is reduced or even stops, which means that hot humid conditions create particular health risks. If the core temperature goes above 39 °C clinical effects of *heat stroke* are likely (Bouchama and Knochel, 2002). At 41 °C and beyond heat induced deaths occur. Another health risk is dehydration, which develops when sweating is profuse and the lost liquid is not replaced in a timely manner (Parsons, 2003).

Dehydration and high core temperature both cause *heat exhaustion*, which reduces the persons' ability to carry out daily tasks. People involved in physically demanding work have a particular risk of "over-heating" as the muscle work creates large amounts of "waste heat" inside the body. Only 20 percent of the energy used in muscles is actually transferred to the external work intended. The remaining energy becomes "waste heat" (Parsons, 2003). In order to cope, working people have to slow down (Kjellstrom et al., 2009a; Dunne et al., 2013), which reduces labor productivity. Heat stress also affects mental activities and intellectual work output (Hancock et al., 2007).

The broader issue of clinical health impacts of climate conditions has been reviewed by a number of reports (e.g. Costello et al., 2009) and a recent graphic presentation of the health impacts indicate a wide range of potential health effects of climate (Kjellstrom and McMichael, 2013). We will not repeat the listing of effects here, but it is important to note that the impacts of heat on working people has unfortunately been very limited visibility in the global reviews.

TRANSFORMATION PATHWAYS TOWARDS PREVENTION

The concept of Transformation involves the need to make significant changes in the global resource utilization and energy production, which would bring us towards sustainable systems that protect the living and working environment for all people (Stordalen et al., 2013). This requires new thinking about climate change and how human populations transform to a sustainable, equitable, healthy and happy global society. Thus, the issue of safe and healthy climate is a key topic to discuss. Heating of local living and working spaces is a major energy consumer in countries with cold seasons, and cooling systems are becoming a greater and greater burden on the electricity systems of many hot countries. Finding ways to reduce the energy requirement for heating and cooling is of great importance. The energy sources need to be renewable in order to create a sustainable low carbon emission society (Lundgren and Kjellstrom, 2013).

The Transformation process has several components of relevance to the protection of the climate, and these are highlighted below. In order to develop the necessary evidence for new policy and actions, cooperation between academia, enterprise, governments and global agencies is needed integrating the different transformation issues (Stordalen et al., 2013).

TRANSFORMATION OF VALUES, NORMS AND WORLDVIEWS

It has been well established, repeatedly, that mortality rates in relation to ambient temperatures have a U-shaped relationship with minimum mortality rate (Relative Risk, RR = 0.95) in the range 15 – 27 °C (Curreiro et al., 2012). In the colder temperature range down to – 10 °C (a range of approximately 30 °C) and beyond there was a steady increase of daily mortality rates up to RR = 1.1-1.3. At the hot end the increasing mortality tends to go up more sharply and within a range of approximately 10 °C the increase was from an RR of 0.95 to an RR of 1.05 – 1.1. These relative risks basically present how much higher the risk of mortality due to heat exposure is at hot or cold temperatures than the risks at the “safest temperatures”. Cities in the South of the USA showed stronger impacts at the cold end and less impact at the hot end than cities in the North of the USA. Studies in other countries have shown similar results for daily mortality (Honda et al., 2013). Similar health impact patterns have been shown for hospital admissions, hospital emergency presentations and ambulance calls in relation to daily temperatures (e.g. Hansen et al., 2008; Knowlton et al., 2009). Thus, ambient cold or hot temperatures are important health hazards.

No large scale studies of other aspects of temperature related morbidity or reduced well-being have been published. One reason is that the health service outcomes are usually analyzed from computerized large scale databases with clinical data, while data on non-clinical effects are not so easily available for epidemiological analysis. Numerous anthropological and other qualitative reports are available describing the negative aspects on human daily lives caused by extreme heat (Hollowell, 2010), but these effects have not been analyzed quantitatively on a large scale. When ambient temperatures exceed 37 °C and humidity is high over-heating is an important health risk even for people at rest (Sherwood et al., 2010).

The impacts of heat exposure on work capacity has been studied to a limited degree in real work situations, and numerous laboratory studies of people from different backgrounds have provided further evidence (Parsons, 2003). The conceptual graph in Figure 1 highlights the risks at both the cold and hot ends of the thermal spectrum. The rapid drop of work capacity at the hot end, as the heat exposure levels increase, follows the recommendations of the international standard for occupational heat exposure impact prevention (ISO, 1989).

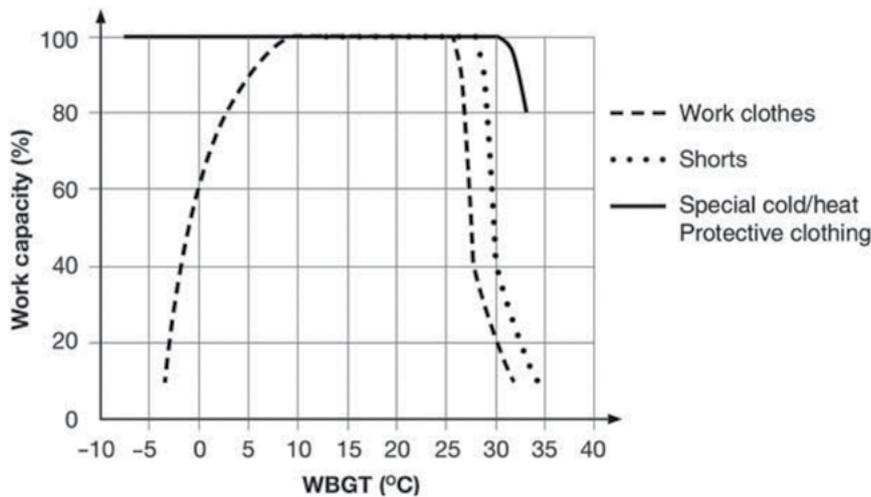


Figure 1. Conceptual graphic showing the work capacity loss due to cold and hot work environments, taking clothing into account (Kjellstrom et al., 2009b).

Figure 1 shows that available evidence and interpretations into guidelines for thermal work environments project very large work capacity losses at both cold and hot ends if just standard work clothes are worn. At the hot end, using very light clothing (shorts) makes work possible in slightly hotter environments, but at the cold end the problems remain. Special protective clothing can make a major difference at the cold end, but it is more difficult to create sufficient protection against the temperatures at the hot end (Parsons, 2003).

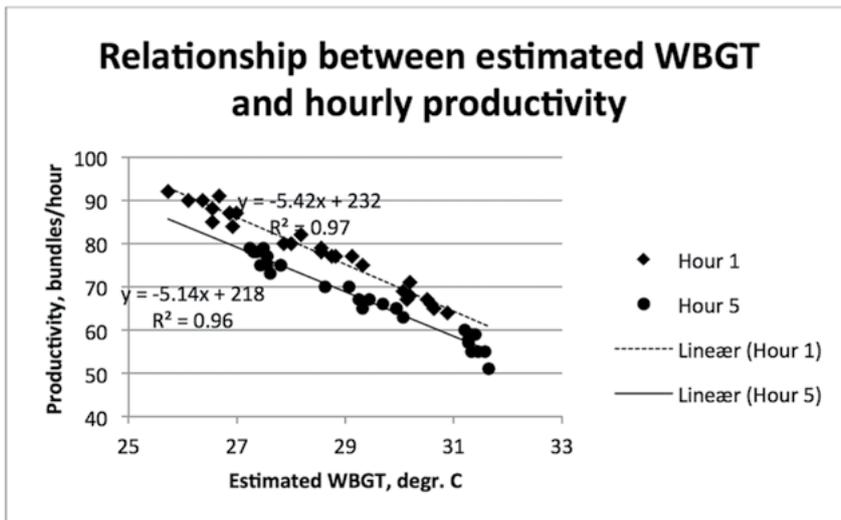


Figure 2. Reduction of hourly productivity (rice bundle numbers collected) by farm workers in West Bengal, India, as a function of ambient heat exposure levels (Sahu et al., 2013).

In order to show the type of actual study data that underpins Figure 1, Figure 2 shows the results of a recent study (Sahu et al., 2013). Within a 5°C range of hotter workplaces the work capacity loss is 1/3 of the starting value. There are only two other studies published that quantify work capacity loss in real life work situation (at metabolic rates of approximately 200 and 300W) (studies of tobacco workers in India and studies of gold mining workers in South Africa). The productivity loss relationships to heat exposure levels are close to the more detailed data by Sahu et al. (2013) (Figure 2).

An important difference between the clinical and non-clinical impacts is the size of the change of the health impact. In the studies by Curreiro et al. (2012) and Honda et al., (2013) an increase of 10 °C at the hot end increased mortality rate by 10-15 percent over the background of approximately 1 percent/year (or a daily mortality of 27/million). This increase represents a daily mortality impact of heat stress in the population at 2.7 – 4.1 per million (Table 1), or at a 5°C increase

a mortality increase half of this. The graphic in Figure 2 can be interpreted as a work capacity loss in the working population of 1/3. This means that 333,000 per million are affected on a daily level when heat goes up 5° C beyond the minimum impact range. Not every day of a year goes to such high heat levels, so the comparison in has been adjusted for the hot days, which in tropical countries may be 4 months per year (1/3 of the year), while in temperate countries a “heat wave” only lasts for a few days.

Table 1. The increase of health and well-being impacts due to a 5° C increase of ambient environment at the hot end of the Livable Thermal Environment spectrum in tropical countries.

Health variable	End-point outcome	Rate in the heat exposed population
Mortality (daily)	Death	1.4 – 2.0 per million persons
Work capacity loss (daily)	30 percent loss of work capacity	111,000 per million persons (6,000 + times greater than the mortality risk)

Transformation question 1.
Should we pay more attention to the impacts of the thermal environment on daily life and well-being, and stop focusing exclusively on mortality and morbidity recorded in health service computer systems?

Transformation question 2.
Is an increase of mortality or health service morbidity affecting less than 1 percent of the population to be considered more important than health effects on daily life that cause up to 30 percent function loss in a much larger proportion of the population?

TRANSFORMATION OF RESEARCH AND TECHNOLOGY

Precious little research effort is spent on quantifying the conditions of a safe and healthy climate and the distribution of the upper and lower limits of healthy thermal exposures at population levels. Different communities living in different thermal conditions have adapted to the local conditions via clothing, building design and seasonal or diurnal behaviors. As the saying goes: “only mad dogs and Englishmen go outside in India in the middle of a hot day”. There are some limited differences in reactions to heat via sweat function, as documented in a recent study, but overall the physiology of all human populations is the same with significant inter-individual variations. Some people are more heat sensitive than others. However, the scientific evidence needed to model the impacts of a changing climate at population level is not yet sufficient (Kjellstrom et al., 2013).

Measurement and analysis variables for cold and heat exposure. The fact that physiologically not only temperature, but also humidity, air movement (wind speed) and heat/cold radiation, influence the human reaction to, and negative effects of, thermal extremes is often ignored. Future reports should include as back-up material an agreed selection of measured or calculated thermal stress indexes (more than 40 indexes have been published) (Epstein and Moran, 2006), in order to make comparisons between different studies possible.

Measurement and analysis variables for health and well-being impacts of thermal exposures. Much of the research to date has focused on clinical health outcomes recorded as ICD-numbers in health service records. This obscures the impact analysis as negative health impacts that do not bring the victim to a health service agency will not be recorded. Methods need to be developed, tested and assessed, so that an international agreement can be reached on ways to quantify the extent that a safe and healthy climate has been, and will be, undermined by climate change.

Health impact assessments based on population distributions. There is a major distinction between analysis of thermal impacts at individual level, local community level, or global distribution level. All impact analysis is important for development of prevention methods whether it is clothing, architecture, heating or cooling technologies, or behavioral approaches. However, discussions about climate change impacts that consider the global dimension need to consider where the changes in climate occur and how many people are likely to be exposed and affected. Only limited analysis is available, and the commonly seen statement that “the Arctic area will experience the greatest climate change” (IPCC, 2013) overlooks the fact that very few people live in the Arctic area. A few million people live there, while in the hot tropical areas more than 4,000 million people live and work.

Globalization impact on distribution of production. An increasing proportion of consumer products sold and used in high income countries are produced in low and middle income countries (for instance clothes, shoes, toys, etc). Millions of low income people get jobs via this process, but the working conditions need to be scrutinized, so that health and economic risks do not occur. Factories making these products in tropical and subtropical countries seldom (if ever) have efficient cooling systems during the long hot seasons, creating unhealthy and unproductive indoor working conditions. Enterprises could test different approaches to air conditioning using electricity produced by solar panels on the factory roof.

Development of technology for heating and cooling. This is another issue motivating research and technical assessments in order to provide locally suitable approaches to shaping a Livable Climate. Local community traditional knowledge on solutions needs to be identified and assessed, and finding renewable source for the energy required is another key challenge. A lot of technology development work is going on, but usually the scientists working on this topic are not directly collaborating with the health, physiology and ergonomics scientists who can define the needs of a Livable Climate. Heating can sometimes be achieved with renewable biomass (wood) as an energy source, while cooling primarily depends on electricity supply. The potential for using local photo-voltaic cells or other solar energy based methods for cooling systems has not yet been fully explored (Lundgren and Kjellstrom, 2013).

Quantifying the limits of “adaptation” – when “mitigation” is necessary. One of the research areas, which still is underdeveloped, is the estimation of the approaches to achieve a Livable Climate via “adaptation” to climate change. If the ambient atmosphere becomes so hot 24 hours a day that human life and daily activities in that location becomes impossible, even when using available “adaptation” methods, then that part of the world is made uninhabitable. If “mitigation” at global level reduces the degree of climate change so that “adaptation” methods at local level become sufficient, then global “mitigation” is the preferred solution, at least for that part of the world.

Transformation question 3.
Is the lack of research and international agreements on heat estimation variables, which health impacts to include, and prevention technologies an impediment to progress on climate change prevention?

TRANSFORMATION OF ECONOMIC ANALYSIS

Another issue in need of Transformation thinking is the economic costing of different aspects of climate change. Until 2012 analysis of economic impacts did not take a Livable Climate into account in a clear manner. The first report that took impacts on daily life and work into account was the Climate Vulnerability Monitor 2012 (DARA, 2012), which used estimates of lost working hours due to increased heat at population level, and estimates of GDP per person (in USD PPP), to calculate the cost of this component of climate change in different parts of the world. The results were astounding more than 50 percent of the total global economic cost of climate change was estimated to be due to labor productivity loss already in 2030 (Table 2). So far, no detailed analysis to validate or refute these important economic calculations has been published.

Table 2. Economic impacts of climate change. Currency = billions of USD PPP; GHG = greenhouse gases (source, DARA 2012).

Impact component	Total global net cost; in brackets, percent of total climate		Net cost in 2030 in specific country types		
	2010	2030	Developing, low GHG emitters	Developing, high GHG emitters	Developed
Total climate change costs	609 (100%)	4345 (100%)	1730 (100%)	2292 (100%)	179 (100%)
Labor Productivity loss due to increased workplace heat	311 (51%)	2436 (56%)	1035 (60%)	1364 (60%)	48 (27%)
Clinical Health impacts costs	23 (3.7%)	106 (2.4%)	84 (4.9%)	21 (0.9%)	0.002 (0.001%)

Transformation question 4.

What are the consequences, for developing well founded climate change policies, of the lack of a more detailed economic analysis of the costs of climate change that brings parts of the world beyond a safe and healthy climate?

TRANSFORMATION OF CLIMATE RESILIENCE POLICY AND PROGRAMS

To make the global community able to effectively deal with the challenges from climate change, there is a need for a Transformation towards *unleashing human potential to commit, care and effect change for a better life*. The first step is to accept that the undermining of a Livable Thermal Environment is a major problem for the human species. This has not yet occurred. The IPCC report in 2007 pays little attention to it, and follow-up global assessments of climate change impacts on health and economic development totally ignore the issue (e.g. Costello et al., 2009; World Bank, 2012).

The concepts developed above and the additional quantitative research and analysis can lay the foundation for future assessments. The policy development has to link a variety of scientific, technical and economic disciplines. These include:

1. Meteorology/climatology/physics laying the foundation for the likely future climate conditions
2. Local climate modeling/physics/urban design to establish the additional exposures due to Urban Heat Island effect
3. Physiology/ergonomics to establish the local Livable Thermal Environment limits
4. Architecture/building design creating solutions to the indoor thermal environmental needs
5. Energy assessment/engineering identifying solutions to providing energy efficient heating and cooling of residences and indoor workplaces
6. Sustainability analysis/environmental science analyzing sources of needed energy supply to ensure sustainability
7. Epidemiology/health impact assessment analyzing health and well-being risks at population level and modeling future impacts based on different alternative scenarios
8. Social sciences analyzing the broader social impacts on communities
9. Economics estimating the potential costs of the impacts based on different scenarios
10. Policy analysis developing strategies for achieving preventive policy development and implementation at national and international level

Transformation question 5.

How can these inter-disciplinary inputs into policy development be established in the most effective way? can initiatives from informal groups influence government and global agencies?

NEED FOR COOPERATION BETWEEN ACADEMIA, ENTERPRISE, GOVERNMENTS AND GLOBAL AGENCIES

In order to make progress on the Transformation required to create and maintain a Livable Climate based on Sustainability principles, academic institutions and individuals need to urgently fill the gaps in the current evidence so that decision-makers and the community at large obtain a clearer picture of the challenges we face (Stordalen et al., 2013). Enterprises need to join forces with academia in these efforts in a way that does not undermine the objectivity of research and analysis. One particular role for enterprise may be to test and assess new solutions to current sustainability problems.

Government agencies need to be aware of the climate challenges and the principles of sustainable solutions, in order to be prepared to develop guidance and regulations that support a healthy and equitable social and economic development. In addition, the global agencies, such as UN, UNDP, WHO, WMO, ILO, etc, need to integrate the principles of moving towards a Livable Climate into their meetings, reports and recommendations.

SUMMARY OF CONCLUSIONS

A safe and healthy climate is a requirement for healthy and productive communities around the world.

Substantial parts of the world already are affected during major time periods each year by thermal conditions outside the limits of a safe and healthy climate.

The projections for future temperatures, humidity and precipitation indicate that the hot parts of the world will be even hotter, and a large proportion of the global population will be challenged by the further undermining of a safe and healthy climate by the trends of local climate change.

This will create major direct health risks to the local populations, and it will counteract the efforts to reduce poverty as the high heat exposures will affect work capacity in many common occupations in a negative way.

Sustainable solutions to reduce these impacts via “adaptation” need to be urgently developed, and these challenges also imply that climate change mitigation has even greater importance than what has been considered until now.

To meet and resolve these challenges to a healthy, productive and equitable society will require cooperative efforts between various parts of academia, different enterprise sectors, many government institutions and global agencies.

A common mindset and strategy for dealing with these issues to protect global population health is needed so that the fruitless competition between health agendas can be avoided.

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Learning about transformational design in Pakistan's Climate Compatible Development Space

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INTRODUCTION

*Can we innovate rapidly enough, and with sufficient intelligence, to transform systems along pathways towards global justice, gender equity, and long-term social and ecological resilience? Can we do this in a participative manner, without resorting to fear, force or folly?*¹

Over the past two decades there has been considerable experimentation worldwide in approaches to public and cross-sector innovation. This includes an important strand of work designed to address what have come to be known as 'wicked' or 'messy' issues (Rittel and Webber, 1973; Verweij and Thompson, 2006). These are issues of public value that are too complex, uncertain and interconnected to be addressed by a single organization – or by the public sector – alone (SLIM, 2004). Frequently such issues are also contested, both in how they are framed and in what solutions might be most appropriate. Climate compatible development (CCD) (Mitchell and Maxwell, 2010), are wicked issues par excellence (APSC, 2007); some now even refer to them as 'super wicked' (Levin et al., 2009; 2012).

This blossoming of experimentation has led to a diversity of approaches to tackling wicked issues. Influenced by a diversity of traditions including complex adaptive systems theory, organizational research, second order cybernetics, group dynamics, design thinking and transdisciplinarity, this has spawned a rich mix of innovation practices that variously fall under the rubric of change labs, design labs, learning systems, innovation platforms, innovation systems, upstream innovation and so on (e.g. Wilson and Willis, 2004; Bunker and Alban, 2006; World Bank, 2006; Kimble, 2009; Bason, 2010; Blackmore, 2010; Westley et al., 2012). While such practices do not yet figure prominently in approaches to climate compatible development, there are nevertheless a number of promising developments in this area (e.g. Hinkel et al., 2010; Ison et al., 2011; Blackmore and Ison, 2012).

Looking across these different approaches, a number of core design issues stand out. First, many of these approaches value difference and diversity by seeking to bring together *unlikely alliances* of individuals from different organisations, sectors or levels of governance; these alliances are often referred to as systemic, in that they seek to reflect in microcosm the 'wider system' under consideration (Attwood et al., 2003; Weisbord and Janoff, 2007). Second, these approaches often draw on a *rigorous and holistic design framework or process* as a means by which to transform actors' understandings, relationships, intentions and actions and to explore concerted ways forward (e.g. SLIM, 2004; Kahane, 2012). Third, this process is often set with a *carefully bounded or 'holding' space*, so that the innovation team or community experiences enough protection and safety, but also enough pressure and friction, to engage in the innovation process (Heifetz and Laurie, 1997; Attwood et al., 2003). This holding space may include the political positioning of the initiative, the psycho-social conditions of the work and the physical locations of meetings; very often all three of these need to be considered.

Given that these innovation practices remain in their infancy in the CCD field, it is vital that there is contextualized evaluation of their potential contribution and that learning about and through such practices is enabled, shared and amplified. In this paper we describe the early stages of a CCD process recently initiated in Pakistan that draws on some of the above principles and approaches. In particular we explore some of the entailments of working with unlikely alliances, holistic design practice and holding frameworks to progress CCD within the social, political and ecological conditions of a state which is both remarkably resilient as well as multiply 'fragile'. Narratives that we seek to draw out in this account include the significance of 'start conditions' as well as the intrapersonal, interpersonal and

1. From the invitation to the conference *Transformation in a Changing Climate*, 19-21 June, 2013, webpage: <http://www.uio.no/transformation/about>

political dynamics of diversity, design practice and the strengthening of institutional spaces for holding. We conclude by reflecting on some of the challenges of facilitating CCD pathways in so-called ‘difficult environments’ (Hamza et al., 2012).

THE CONTEXT FOR OUR STORY – WORKING IN THE ‘HARD COUNTRY’

We begin this paper by devoting some attention to the start conditions of our work (Chapman, 2002; Ison et al., 2011). We do this in the recognition that to be effective, CCD work needs to be highly contextualized and that in narrating this work, including sharing it in an academic context, the ways in which we build bridges between generalized theory and principle and contextualized practice are therefore critical. And as practitioners informed by systems thinking, start conditions take on additional meaning. We therefore seek to introduce our work by positioning it both within the current ‘state’ of Pakistan and in the context of how our work was commissioned and contracted – both key aspects of start conditions.

Pakistan has been described as a ‘hard country’; moreover one in which climate change already wreaks havoc through extreme climate events including glacial shifts, floods, droughts and sea storms (Harmeling, 2012). These threats ‘coexist with moribund dysfunctional state institutions, perpetually mired in challenges of governance, transparency, accountability and universally failing to protect, secure or serve the common citizen’ (Isa, 2012). Lieven argues that Pakistan will survive terrorism and chaos but climate change may be its undoing (Lieven, 2011). The ‘hard country’ description refers to the resilience of its people to recover from frequent shocks in the social, political and ecological realms, beginning with the socio-political trauma at Partition with India in 1947 and continuing through to the latest social-ecological catastrophes of the floods of 2010 and 2011.

Pakistan frequently arouses hostility and disdain in the west, where it is too easily couched in banal generalities based on comparisons with approximated western political and economic institutions. Yet this ‘intellectual shoddiness has far-reaching consequences in the real world, easily creating a dehumanizing discourse about the country’ (Mishra, 2011) and how it, like India, has for decades ‘mocked its obituaries which have been written obsessively by the west’ (ibid.). In this melee of crisis and response, Pakistan is a country that can appear to have lost its narrative about itself and its identity.

Yet digging below the surface reveals that Pakistan is a country marked by fusions of people and nature, a meeting place of western and eastern tectonic plates, along the line that separates Indian and Irano-European flora and fauna. “Pakistan stands at the cusp of practically everything — of geography, economics, ethnicity, tradition, culture and politics” (Isa, 2012). Its people too are a slow blending of traditions that create a diversity of cultural fusion reaching across time: Alexander the Great, the symbol of Western civilization, conquered along the Indus but not beyond this natural line of demarcation, creating an Indo-Greek Gandharan civilization that is unique (500 BC to 10 AD). Resilience scholarship informs us that such infused diversity is the stuff of redundancy that accentuates resilient responses from within a system (Folke, 2006).

Coming to the present moment, Pakistan is notable for the richness, diversity and vibrancy of its social development and ecological conservation institutions, which extend into realms outside the government sector yet with a tendency to be separated into distinct realms of intellectual legacy and methodological approaches of science and social science. In both realms, considerable leadership capital has been cultivated and in understanding this capital we have found amongst them Sufis, Machiavellian politicians and dedicated scientists.

As an example of how its legacies influence context, community-based work in Pakistan is founded on a four decadal tradition of social mobilization, service delivery and institution building for the poor in common currency with NGOs in Pakistan. The icons of this approach are recognizable in the work of the Orangi Pilot Project in Karachi, the nationwide Rural Support Network and the Pakistan Poverty Alleviation Fund, the predominant institutions for the uplift of the poor. The founding principles and tested approaches of this work rely on the contributions of Dr Akhtar Hameed Khan, who was Pakistan’s pioneer of development for the poor after the separation of Bangladesh and Pakistan in the 1970s (Khan, 2010). The philosophical and ethical roots of this work as well as its methodologies go back to the Gandhian movements of self-help and non-violence by the underprivileged (Hasan, 2001).

But the confusions arise when post-colonial public institutions that govern this social-ecological diversity put into motion agendas that can be described as manipulation – not adaptation (Thomsen et al., 2012) - in which the system is controlled for outcomes that serve the narrow interests of a sub-set of the system, instead of the whole system. As international development aid suffers donor fatigue, climate finance poses a new opportunity for government ministries to access international grant assistance after a period of lean aid years (Mohammed, 2012). Yet, the government Ministry for Climate Change (the Ministry) is in a state of existential crisis, with low influence in federal governance and a paucity of expertise and funds. (After the completion of this writing, the Ministry was turned into the Climate Change Division under the Cabinet Secretariat, subsequent to a new government decision to reduce the number of Ministers and Ministry portfolios). For example, as we reveal in our story below, while there was an initial appetite for translating its climate change policy into actionable programmes that allowed our project to be commissioned, the Ministry soon lost interest in the indigenous responses for innovative practices and learning systems that were being developed, and switched its interest to the preparation of tools for attracting international finance.

HOW OUR LEADERSHIP STORY STARTED

In February 2012 a commissioned project, through a consortium including the two authors of this paper, was contracted to develop Pakistan’s first actionable and nationally-appropriate work programme in the wake of Pakistan’s recently ratified climate change policy (Government of Pakistan, 2012).

Reflecting the challenges of the call and particularly its emphasis on a process for building stakeholding in a prioritised work programme, our proposal placed process planning (linked to stakeholder dialogue) centre stage, drawing on a ‘whole system’ approach to building stakeholding in CCD issues and pathways. The theory of change underpinning our whole system approach was strongly influenced by systems thinking and practice (Ison, 2010; Ison et al., 2011) and highlighted the importance of emergent, action-based learning processes (Collins and Ison, 2010), set within a framework characterised by adaptive management (Jiggins and Rölling, 2000; Allen and Stankey, 2009; Biggs et al., 2011) and an appreciation of the coupled nature of social ecological systems (RCEP, 2010). This process-sensitive approach was in turn closely linked to our framing of CCD as a goal which starts *in the present* and is complemented by preparation for potential future shocks and stresses, rather than vice versa.

In reflecting on starting conditions, the circumstances of our leadership collaboration are also noteworthy, and we have come to recognize this initial collaboration between the project leaders itself as an ‘unlikely alliance’. Thus we came together for the first time within this project not only from diverse cultural and gendered backgrounds, but also with different experiences of working with and championing government, civil society and business sector interests, and of working at the intersections between these. Initially an important commonality was our understanding that this was a moment of power and opportunity. Recognizing the space that had opened up, we saw that we could do a combination of three things: act as visionaries, as change agents or merely as ‘good consultants’. For us, this meant that while as ‘good consultants’ we should ‘deliver’ what was agreed in our contract, as ‘change agents’ we wished to do this in a manner that began to build the capacity for shaping effective CCD pathways and as ‘visionaries’ felt compelled to approach this work with a view to potentially committing to a process which might take 10 or more years to properly embed itself. However, given the time constraints of the project, progressive divergence of our personal and cultural understandings of these roles created significant obstacles.

A SYSTEMIC DESIGN APPROACH BASED AROUND UNLIKELY ALLIANCES

So, what did we actually do? As indicated in the introduction, there is a diversity of systemic design practices that could be applied to addressing CCD as a wicked issue and the approach we took in Pakistan is best described from a number of angles. From one perspective, our approach can be understood as a *blueprint or plan* for transformational learning and innovation, such as that set out in the project initiation document (Colvin et al., 2012) – a more generic example is shown in Figure 1.

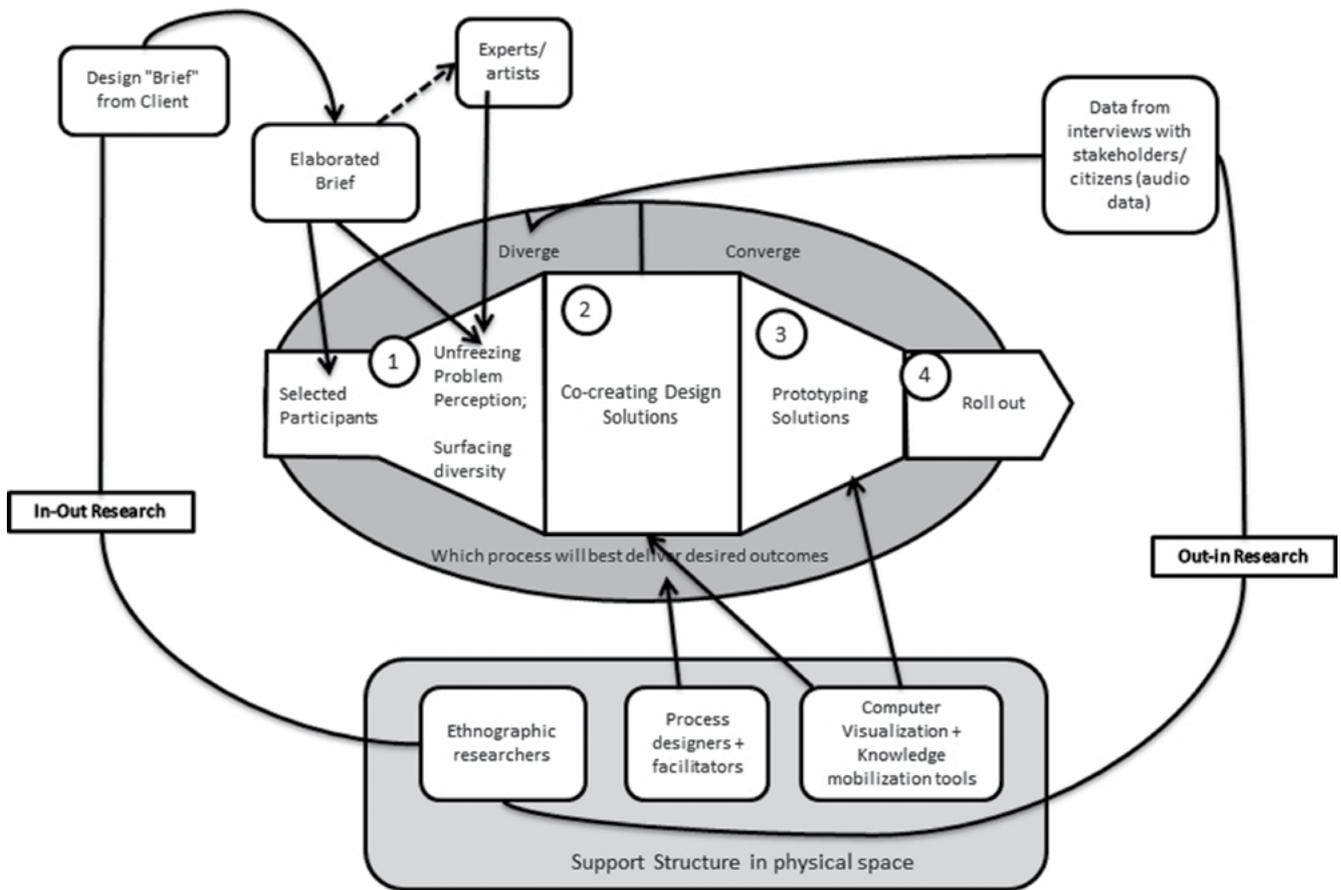


Figure 1. The innovation platform as a transformational design approach. The diagram shows the adaptation platform developing through a series of four stages, with supporting activities inputting to this (Source: Westley et al., 2012).

A second and complementary perspective is to understand our design practice as *praxis* – that is, as a set of plans and actions informed and shaped by an underlying theory of change and set of design principles. While these were initially articulated only among the leadership team, they subsequently evolved and deepened as they came to be more widely shared and re-worked with key stakeholders (Table 1). From a third perspective, and one that underpins systemic praxis, we understand design for transformational innovation as an ongoing and *emergent process* which, while drawing on an initial praxis and plan, is also shaped by continuous cycles of action learning and adaptation. Indeed some would argue that design in this sense can only ever be understood in retrospect – that is, on reflection (Ison et al., 2007). This would imply that design practice is best shared through narrating the unfolding story of what we actually did – of our action and learning – as documented in recent detailed accounts (Colvin et al., 2012a, b, c). In this paper we can do no more than highlight key moments and turns in this design story, as set out below.

Working with leadership capital

During the early weeks of this project we sought to engage with three key groups: our client, the Ministry as the primary beneficiary, and a cross-section of innovators, leaders and climate change champions occupying pivotal positions in civil society, NGOs, business, government and academia. (In selecting this mix of individuals we chose not only to engage those explicitly identified with climate change work, but also those in a range of leadership and innovation positions, and for whom we expected climate change already to be impacting their primary areas of professional concern).

Table 1. Design principles for innovative project development, agreed with climate change champions, leaders and innovators in the project design team.

1. Design for climate compatible development (CCD). CCD sets out the vision of what we want to achieve and helps us to ensure that we pursue pathways that take us in the direction both of low carbon and of climate resilient development.
2. Projects should be designed with the most vulnerable in mind ('focus on pro-poor, gender sensitive adaptation') – both vulnerable communities and vulnerable ecosystems (since these mediate both climate impacts and climate resilience) – and involve the most vulnerable in the design process.
3. Projects should be 'doable'. That is, are we ready, willing and able to pursue this project, starting with who we are and what we have (gathering additional resources along the way).
4. Climate compatible development involves innovation. Be bold! We need to be prepared to create innovative pathways of climate compatible development - where we 'do not know what we do not know'.
5. Project proposals should be developed and implemented through innovative, ' unlikely governance alliances '. Roles of NGOs, CBOs, private sector, universities and district, provincial and federal government all need to be considered.
6. These alliances should link multiple scales of governance , to ensure that different perspectives are utilised and that implementation, including taking to scale, can be expedited. These will vary from project to project.
7. Project proposals should reflect the principles of collective and iterative learning – building on previous experience, and designed for ongoing learning (in the form of adaptive management cycles).

This engagement enabled us to test for stakeholding in CCD-related innovation as well as explore understandings of CCD as a process, and as an initial cycle of action research revealed a contradictory mindset within our client (at times collaborative, adaptive and learning-based but more often reverting to a more conventional style either of wanting to control; or expecting to 'hand over' to the experts); weak stakeholding on the part of the Ministry; but a strong interest in opening up opportunities for innovative CCD across the broader range of stakeholders interviewed.

Building new institutional capital for CCD innovation through convening an innovation platform of unlikely alliances

In a second rapid cycle of action research and adaptive management, we therefore convened a series of 'unlikely stakeholder meetings' in order to test for – and potentially build - new institutional capital for CCD innovation, based around what could be described as an innovation platform (as illustrated in Figure 1). Drawing on social learning practices that enable exploration of actors' understandings, relationships, intentions and actions as a means of shaping concerted project development, we first convened a workshop for six design team leaders and then building on this, a larger workshop for five theme-based design teams, each consisting of 5-6 individuals from a mix of institutional backgrounds (Figure 2).

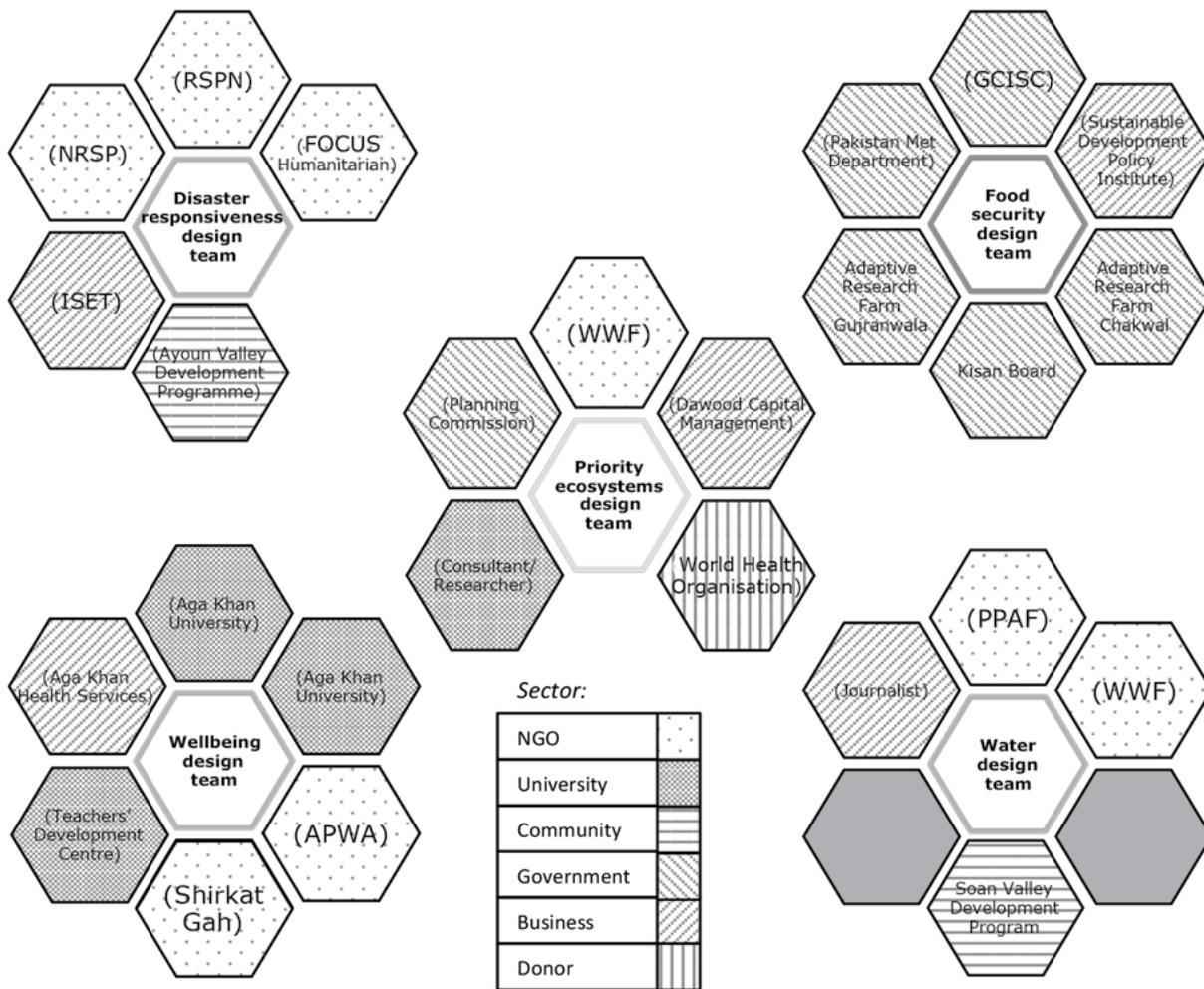


Figure 2. Figure illustrating the composition of the five design teams within the innovation platform.

Each design team then worked up 2 - 3 proposals for CCD projects that could be presented to the Ministry and other government ministries for feedback and thereafter to a range of funding bodies. While some of the proposals presented by the design teams were genuinely co-created (step 2, Figure 1), many built on ideas either on the drawing table, ready for implementation, or ready for upscaling, while at the same time broadening the stakeholding in these ideas and sharpening design thinking. Our client was involved in and lent their enthusiastic support to both workshops and the Ministry gave the opening address at (and their official endorsement to) the second.

Emerging tensions within the project, leading to a premature and unanticipated ending of the first innovation cycle

Design teams left this second workshop in a state of enthusiasm and over the following weeks refined their project proposals as agreed. At the same time (and approximately half way through this 8-month project) tensions began to emerge, which within the space of a further four months would lead to the collapse of what in retrospect we describe as the first innovation cycle.

These tensions were brought out into the open as anxieties emerged within the Ministry around the nature of the unlikely alliances that were emerging and the participatory dynamics of the innovation process; in particular the Ministry had no recent experience of working with civil society. The Ministry therefore convened a meeting of its advisory panel on climate change to help it reflect both on the process and on the diverse portfolio of project proposals, spanning a range of sectors and scales, that was proposed (Table 2). However the advisory panel had little experience of the process, leading to a polarized debate reflecting both enthusiasm and caution in roughly equal measure.

In what was to prove a decisive move, the client chose to take the side of caution and the Ministry began to shift its priorities away from unlocking adaptation projects from existing work in Pakistan and towards a new priority - the preparation of tools for accessing international finance. Linked with this, our consortium partner found it increasingly difficult to maintain commitment to the intensely participatory process of innovation platform development – reflecting concerns about reputation and company image in the federal field.

Table 2. A set of project proposals that could together constitute a coordinated programme of Climate Compatible Development pathfinding for Pakistan (Source: Colvin et al., 2012b).

Budget (\$m)	Project Title	Scale and National Appropriateness
100	Ecosystems 1: Ecosystems Climate Fund	National with Local Implementation
90	Water 1: Diverting Flood Water from River Indus	National with Local Impact and Downscaling Potential
26	Ecosystems 2: Economic Opportunities through Reducing Carbon Footprints in Vulnerable Ecosystems	Replicating Best Practices to National Level
25	Disaster Preparedness 1: Establishing and Strengthening Early Warning Systems	National
20	Disaster Preparedness 2: Community-based Disaster Risk Management (3-5 Years)	National with Pilot Phase Targeting Each Province and FATA and AJK
12	Urban 1: Industrial Waste Water Recycling Programme	Municipal Pathfinder
10	Disaster Preparedness 3: Multi-Hazard Risk Assessment at National Level	National
10	Ecosystems 3: Climate Compatible Development for Priority Ecosystems	National
5	Urban 2: Small Scale Urban Power Production	Municipal Pathfinder
3	Water 2: Reducing Vulnerability of Human Settlements in Mountain Areas	Local Focus with National Watershed Management Implications
1.5	Water 3: Live Sharing of Third Generation Interventions in Soon Valley	Local with Significant Ambitions for National/Regional Upscaling
1	Wellbeing 1: Women-led Community-based Food Production	Local Focus: Two Cities in Sindh (Karachi and Hyderabad)
1	Food Security 1: Climate Compatible Restoration of Rangelands	National Focusing on 3 Provinces (Balochistan, KPK and Punjab)
0.8	Food Security 2: Transmitting Agro-climatic Information to Farmers	Provincial Testing in Punjab with Local Communities
0.15	Wellbeing 2: Mobilizing Women to Raise Water Quality	Local Pathfinding in Sindh (to Villages)
0.1	Urban 3: Climate Sensitive Waste Management (1 year)	Replication from Lahore to Small Cities in Punjab
?	Wellbeing 3: Enhancing Community Resilience through Holistic Early Child Development	Local Community Groups Influence Provincial (Resources) and National (Policy) Scales

Thus, during our first cycle of learning about facilitating the enactment of a climate change policy, the politics of a design practice founded on diversity and unlikely alliance building became apparent at both intra-personal and inter-organizational levels. While the creativity and energy released through unlikely alliance building within the innovation platform itself was highly productive, in other parts of the system, notably within the client, the Ministry and the more long standing and conventional alliance of the advisory panel to which they both belonged, the ‘wobble’ it created was too great. For us as reflective practitioners, the resonance between this amplifying wobble and the dynamics of diversity that we had noted first within our own leadership team-working – an unpredictable and at times ‘weird’ mix of generative creativity and polarizing discomfort – was also striking.

During the final months of the project, we worked with the client and the Ministry to agree a re-balancing of priorities, but were unable to reach a mutually acceptable approach within the timescales available, resulting in the client withdrawing the remaining funding in December 2012.

LEARNING ABOUT INSTITUTIONAL HOLDING SPACES WHILE TRANSITIONING TO A SECOND CYCLE OF SYSTEMIC INNOVATION

Subsequent to the interruption of project financing, we have entered what we hope will become a second cycle of systemic innovation. The dynamics of the early stages of this second cycle are very different to those of the first and comprise a period of measured reflection coupled with the negotiation of a new holding space for the innovation platform.

A key theme of our reflection on the first cycle of innovation – and one that is particularly relevant to transition periods that are the hallmarks of complex processes – concerns the constitution of holding spaces (the third element of the design framework that we set out in our introduction). Highlighted as a key consideration in shaping effective systemic dialogue by a range of practitioner-authors, which can be manifested both politically, psycho-socially and physically (Heifetz and Laurie, 1997; Attwood et al., 2003; Kahane, 2012), the importance of holding spaces has been particularly foregrounded for us as we have reflected on the limitations inherent in the nature of the institutional space that held the first cycle.

It has become clear to us that while holding the space of the innovation platform required a mix of conducive physical settings and strong social learning facilitation within and between the platform meetings themselves, these in turn were also ‘held’ (i) financially and politically by the client and the Ministry; (ii) through the psychological trust invested by the client and the Ministry in the leadership team on the basis of our combined reputation, expertise and presence; and (iii) through a wider set of interactions involving not only those organisations represented within the innovation platform but also others who weren’t, including the climate change advisory panel. Figure 3 is an early attempt at visualizing this mix of holding spaces and forces (at least, of elements (i) and (ii)) in a dynamic manner.

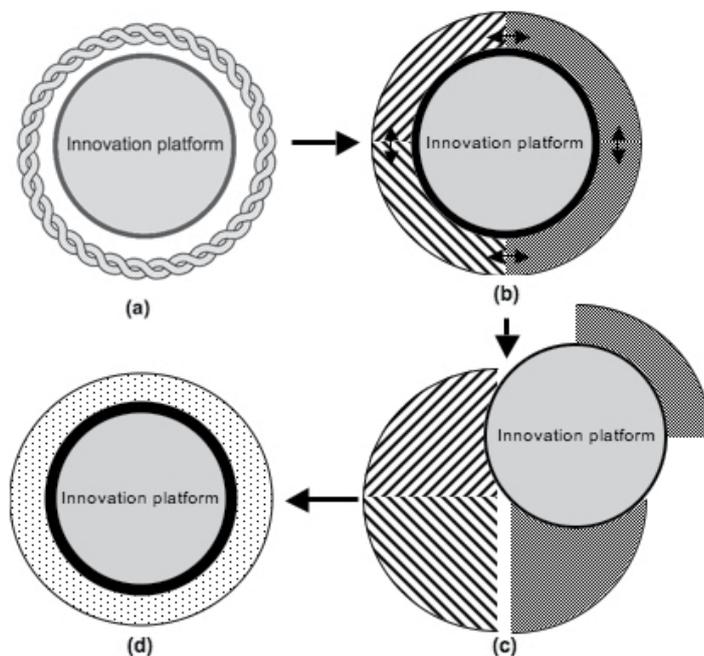


Figure 3. An attempt to visualize holding spaces in dynamic flux. (a) Early in the innovation cycle the emerging innovation platform is held by a braided and interdependent combination of psycho-social trust in the leadership team and financial-political investment by the client; (b) mid-way through the innovation cycle the developing innovation platform is more strongly held both by the leadership team (dark shading), the client (diagonal shading bottom left to top right) and the Ministry (diagonal shading top left to bottom right), however tensions are also apparent (two-way arrows); (c) towards the end of the innovation cycle, there is insufficient tensile strength to further support the energy and initiative being released from the innovation platform; (d) in continuing dynamic flux, the platform moves into a second innovation cycle, developing new interdependencies with PPAF (light shading) who offer a new holding space.

A significant realization for the leadership team has been of the need to build more resilient ‘tensile strength’ to link the institutions that are responsible for creating and holding the space of the innovation platform, as this unlikely space of values, worldviews and solutions and the inspiration, energy and potentially concerted action that it can release could provide an important key to finding adaptive and contextually appropriate solutions for CCD.

Fortuitously, the enduring energy and inspiration of the innovation platform that emerged during the first cycle remains an important asset in seeking a way forward. In particular, one key participant in a leadership position within the innovation platform took a deep interest in the work and has consequently invited the design team to relocate to a platform to be sponsored by the Pakistan Poverty Alleviation Fund (PPAF) – an NGO with a unique and powerful position within Pakistan’s development landscape. As one of the largest sources of pro-poor spending in the country, PPAF is the lead agency for poverty reduction in Pakistan and reaches around 416,000 community organizations, having given out over 5 million microloans with an average of \$200 per loan.

As a result, a second cycle of learning has begun which entails moving beyond the institutional arrangements of the initial start conditions. Realizing that the Ministry is not the appropriate first hosting place for this type of work has also thus required changing funding support from those committed to assisting government to those interested in civil society innovation as means of deep and broad societal influence and learning. As process design leaders, we are thus now learning to shape a tensile holding space which might provide enough protected space yet also give enough fuel for the courage needed to support the institutional diversity and collaboration that we had seeded in the first cycle.

CONCLUDING REFLECTIONS - MEETING THE CHALLENGES OF TRANSFORMATION

In this paper we have sought to narrate and illustrate an approach to transformational design that is both inherently context-specific, yet also sensitive to linking generalized theory and principle with contextualized practice in meeting the collective challenge to act at a systems level. Here we offer some concluding reflections which we hope may hold value beyond the specific context of Pakistan, and particularly in other ‘difficult environments’ (Hamza et al., 2012), for fellow practitioners and others who are seeking transformative socio-institutional pathways for CCD while also mitigating the pitfalls of fear, force or folly (see introductory quote).

Appreciating extant social capitals within a system

This approach assumes that the designer is able to recognize, map, locate and involve existing social capital within their system of interest, and to shape and mobilise a unique palate comprising people, ideas, resources and institutions that will need to come to the fore in transformation plans. This is a departure from more conventional approaches that call for capacity building to ‘progress’ a system along known pathways towards prescribed development goals. Instead, borrowing from social ecological systems research, we consider that within a given system or society, certain social capitals are already inherent as a function of its history and endurance. The transformational designer is thus required to have the vocabulary to locate these capitals and to shape processes to foreground and enhance capitals such as thought-leadership, institutional excellence, traditional world-views and knowledge, and mechanisms to resolve conflicts and polarities.

Enabling unlikely alliances

Some of the most insidious walls of separation that hinder interdisciplinary thinking and pathfinding are conceptual frameworks that underlie sectoral work but are for the most part used unconsciously by managers and decision makers. The touchstone for convening and building unlikely alliances across a system is a compelling design language that builds bridges across conceptual divides in a way that is similar to the work of peace-building in conflict situations. The shocks and stresses of climate variability and change are helping to forge such a language, as these threaten both social and ecological realms in easily recognizable forms. Once brought together through common understanding and with unifying design principles, unlikely alliances are marked by their generative energies that begin to open up concerted CCD pathways with motivation, vision and outputs.

Creating holding spaces for transformative design

‘When the elephant moves many branches will be disturbed’. This is an apt metaphor used by one of our collaborators to recognize the perturbations created as systemic re-design work begins. Transformation of systems for climate compatible development and adaptation is a participatory design process that needs what we call a ‘holding space’ or a convening cauldron, and which is housed in an institutional setting that is sufficiently aligned, tensile and powerful to sustain the alternative visions and generative work arising from transformative design. Most institutions are bounded

by disciplinary and philosophical specializations, and underlying intents, that are not system-wide but instead more narrowly focused on missions of system sub-sets. Not only is an appropriate institutional holding space an important enabler, but also the relationship and intents of the design facilitators should mirror some of the same qualities identified, including alignment of intent, tensile interpersonal relations and the power of intermediation (Kilelu et al., 2011).

Transformational design as work beyond fear

Transformational work requires a designed process with catalytic facilitators in place; it does not happen fast enough when left to its own dynamics as evident in the slow response to the challenges of climate change. Transformational designers are positioned in a leadership role of a particular nature that requires experimentation and fast cycles of learning. As such they must command an art which is well grounded in experiential practice, and such individuals are typically accomplished and well-respected in their peer-group and society. Yet, accomplishment often breeds the need to maintain standards of intellectual poise and excellence that can themselves weaken the mind-set for experimentation and fast learning cycles. Our experience of undertaking this transformational work in Pakistan has highlighted for us that transformational design is for those who, having achieved certain accomplishments in our life journey, reach a point where we must choose to move beyond the call for further accomplishment into a realm where professional stakes are high, there is the risk of public faltering (and folly) and the danger of losing professional repute arises from failure. Given the high levels of uncertainty, transformational design work is risky and can often feel unsafe for professional repute; and yet it is work from an inner space where thresholds of fear are crossed and the privilege of particular types of leadership comes to the fore (Torbert, 1991; Heifetz, 1994).

Experience from Pakistan offers insight into the qualities for ‘sufficient intelligence’ (see introductory quote) that are required to transform pathways towards social and ecological resilience in ethical and participatory ways. This is the extent of the learning we have to offer so far, as the outcomes and scales of transformation that will ensue remain in the realm of the uncertain. In this hard country, the challenge then is provide an opportunity for its own innovators to shape adaptive responses into climate compatible development pathways, yet there are obstacles that must be faced in order to find the design, holding space and alliances that would enable a system-wide response.

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Linkages between sustainable adaptation and transformation: Exploring humanitarian approaches for disaster risk reduction and climate change adaptation

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INTRODUCTION

In this paper, we explore four principles for sustainable adaptation pathways and how they could be achieved through humanitarian responses. Climate change is likely to result in more extreme events such as droughts, floods and cyclones (Christensen et al., 2007; Shongwe et al., 2011), necessitating humanitarian interventions alongside a host of other actions to prepare populations for disaster, increase their resilience and reduce suffering. Humanitarian interventions will continue to constitute a main response to disasters relating to climate change, and there is growing awareness both among scientific and practitioner communities of the need to relate these distinct fields (O'Brien et al., 2008; Red Cross, 2009; DFID, 2011). However, humanitarian responses and climate change adaptation have largely remained separate policy spheres (Agrawal and Perrin, 2009). In order for humanitarian responses to avoid undermining longer term adaptation by indirectly contributing to the perpetuation of longer term vulnerability processes, new thinking around the links between short-term responses to emergencies defined by acute needs and longer-term transformations inherent in sustainable adaptation is required.

The very definition of humanitarianism - providing emergency assistance to save lives and alleviate suffering during and in the aftermath of emergencies¹ - strikes to the core of efforts to reduce vulnerability in terms of the potential to be adversely affected by climate stressors. However, the focus is largely on short term emergency and distress relief, in particular food aid (Macrae, 2002). In contrast, climate change adaptation has a broader and longer term focus. It comprises actions and adjustments to practices and systems to moderate negative consequences and take advantage of any opportunities due to actual or expected climate change (IPCC, 2007). Disaster risk reduction - which focuses

1. "Humanitarian aid is assistance designed to save lives, alleviate suffering and maintain and protect human dignity during and in the aftermath of emergencies (...) it includes disaster prevention and preparedness; the provision of shelter, food, water and sanitation, health services and other items of assistance for the benefit of affected people and to facilitate the return to normal lives and livelihoods; measures to promote and protect the safety, welfare and dignity of civilians and those no longer taking part in hostilities and rehabilitation, reconstruction and transition assistance while the emergency situation persists." (Source: OECD; http://www.oecd.org/document/19/0,3746,en_21571361_39494699_39503763_1_1_1_1,00.html)

on preventing disasters and building community resilience by anticipating events and addressing risk factors² - is increasingly seen as a way of bridging this gap³. Yet, shorter term humanitarian interventions in the immediate aftermath of a disaster are important for re-establishing livelihoods, hence having clear implications for efforts over the longer-term to reduce vulnerability and improve resilience.

This paper forms a conceptual and methodological discussion of how humanitarian policy and practice may contribute to longer term adaptation to climate change. We develop sustainable adaptation as an analytical framework, linking this to understandings of transformation. We then exemplify how we will use this framework in practice, using case studies of climate change adaptation and humanitarian approaches in Africa and Asia.

CHALLENGES IN LINKING HUMANITARIAN POLICY AND PRACTICE AND LONGER TERM VULNERABILITY REDUCTION

In recent years, our understanding of the nature of disasters, vulnerability, and what constitutes adaptation has evolved and broadened. A long tradition of literature documents that so called “natural disasters” are in fact created by a range of social processes (O’Keefe et al., 1976; Wisner et al., 2004). The climate change problem has brought new relevance and attention to these insights. In particular, climate change as a driver of emergencies and humanitarian situations un.masks deeply embedded processes and structures that generate vulnerability. There has been a growing recognition in the climate change literature that vulnerability is driven by multiple stressors, that is, people are vulnerable to climate change due to a range of other environmental and social changes facing them at the same time (O’Brien and Leichenko, 2000; Reid and Vogel, 2006).

Vulnerability is seen as the contextual conditions of social and ecological systems that contribute to negative outcomes from interacting changes (O’Brien et al., 2007). There is increasing understanding that in addition to adjusting to particular climate changes, there must be concurrent efforts to reduce vulnerability, which often entail addressing deeply embedded social differences or political and economic conditions that favor elites (Eriksen and Lind, 2009). This implies that providing relief to those affected by climatic events does not address the root causes of vulnerability since it may not directly address why people are unable to cope, nor the social and environmental processes and structures creating their vulnerability (Chambers, 1989; Eriksen and Silva, 2009). Although humanitarian assistance is not necessarily designed to address longer-term vulnerability, it is crucial to address the potential synergies between immediate actions to reduce human suffering in disasters and the longer-term actions that are required to reduce vulnerability and prevent crises from recurring. There is a danger that humanitarian actors are being left to pick up the pieces of development failures that have generated vulnerability, but this need not be the case.

These insights raise the challenges of linking short term measures with longer term building of resilience and also making sure that humanitarian measures successfully address the causes of vulnerability. As agencies and governments shape their humanitarian policies, there is an urgent need to identify the potentials and limits for different types of humanitarian interventions to address these two challenges. In particular, there is a need for evidence-based interventions on which agencies and governments can shape their humanitarian policies, operations and decision-making.

These challenges highlight a number of practical, institutional and political issues. The first is how to understand and address multiple stressors and drivers of vulnerability in interventions. Multiple stressors that drive the vulnerability context often lead to unexpected and unintended consequences of development interventions (Fergusson, 1994; O’Brien et al., 2009). Conflicts, political and economic change, migration and droughts may interact in mutually reinforcing ways, for example (O’Brien and Leichenko, 2000; Kolmannskog, 2008; Eriksen and Lind, 2009; Eriksen and Silva, 2009).

Considerable understanding exists regarding complex humanitarian disasters; however, in order to reduce vulnerability in the long term, humanitarian operations must be able to access information and utilize understanding that can be

2. Disaster risk reduction is defined as “the conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.” (UNISDR, 2009)

3. As evident by the forthcoming Intergovernmental Panel on Climate Change (IPCC), Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.

operationalised in their decision-making. This will require adjustments not only in specific activities, but deeper changes in the ways in which humanitarian organizations and policymakers conceptualize poverty, vulnerability, and sustainable development (Nyborg, 2011).

The second issue is how institutions involved in humanitarian responses are connected, including governments, NGOs, UN agencies, private-sector actors, and local formal and informal institutions (Næss, 2008). There is interdependence as well as conflicting interests between these institutions, and negotiations and power relations between them determine which voices and problem understandings are heard, and how humanitarian actions are targeted. A particular concern is the way in which the voices of the vulnerable are represented in this institutional and political landscape. Decision making under uncertainty and unpredictability, with highly differentiated and sometimes unintended negative effects on various groups, demands decision-making processes that are inclusive rather than top-down in nature (Funtowicz and Ravetz, 1993; Eriksen et al., 2011). A third issue is: in order to ensure that interventions effectively address the vulnerability context of different groups and in particular enhance their capacity to respond to change and control their own circumstances, there is a need to empower the vulnerable, democratize the decision making process, and increase transparency. Such policy making empowers local knowledge regarding the social and physical aspects of disasters, highlights conflicting interests and makes value judgments explicit in policy decisions. The risk literature similarly emphasizes need for community participation in disaster prevention, response and strategies (Pelling and High, 2005; van Aalst et al., 2008) but often lacks clarity in presenting participation as a process of negotiation, resistance and struggle embedded in complex historical, cultural, social, economic and political contexts.

This paper represents part of preliminary efforts by “Courting Catastrophe: Humanitarian Policy and Practice in a Changing Climate”, a project funded by the Research Council of Norway. The overriding project objective is to critically examine the scope and practical ways in which humanitarian responses may contribute to adaptation to climate change. Specifically, this paper forms a conceptual and methodological discussion, focusing on two sub-objectives: first to identify how we can enhance understanding of the long term implications of humanitarian interventions for efforts to build sustainable adaptation to climate change; and second, how we can identify lessons from current interventions and policy approaches, in particular regarding discrete humanitarian policy approaches that empower the voices of the vulnerable in decision making and address long term vulnerability. This examination is set in the context of emerging understandings of transformation as a fundamental societal response to climate change. Transformation adds a new and deeper dimension to such responses, where adaptation is not only about reducing vulnerability but proactively choosing what future we want. Hence our value systems and social and political processes at local, national and international level that determine who effectively participates in problem understanding, what constitutes a desirable future, and how we respond to and manage climate change in order to achieve such a future. Such insights form a crucial starting point for achieving a third project objective; that is, develop guidelines for how humanitarian interventions can better contribute to climate change adaptation in terms of use of information about complex climate and vulnerability contexts in operational decisions.

This conceptual and methodological exploration is particularly important because the project itself represents a collaborative effort by research and humanitarian actors to engage in action-oriented knowledge production, a much called for but relatively unusual approach in the climate change adaptation field. In order to study the linkages between sustainable adaptation, humanitarian responses and disaster risk reduction, it is important to understand their conceptual underpinning and implications for how adaptation is understood in practice. In the next section, we examine the definitions of key concepts linking sustainable adaptation and disaster risk reduction. We then outline how the potential contribution of humanitarian approaches to sustainable adaptation can be investigated in practice, using Nepal, Pakistan and Ethiopia as examples. We argue that it is central to shed light on values and conflicting interests in order to achieve more sustainable adaptation pathways in terms of both reducing emissions and our influence on the climate system and addressing the social, political and cultural causes of vulnerability.

KEY CONCEPTS AND DEFINITIONS: IDENTIFYING COMMOND GROUND AND DIVERGENCES

In this section, we discuss how sustainable adaptation links with transformation, and how conceptualisations of disaster risk reduction and humanitarian assistance may determine the potential for how these approaches may address such adaptation.

Sustainable adaptation and transformation

The main theoretical and methodological challenge that this paper addresses is to place academic understanding regarding adaptation needs in a framework of practical actions. We use principles of sustainable adaptation as a way of bridging the academic and practical and to identify how lessons from research as well as from practical humanitarian interventions can be examined together. *Sustainable adaptation* is defined as “adaptation that contributes to socially and environmentally sustainable development pathways, including both social justice and environmental integrity” (Eriksen et al., 2011: 8). Strengths and weaknesses in current approaches, policies and interventions can be assessed according to the four normative principles of sustainable adaptation:

1. Recognize the context for vulnerability, including multiple stressors;
2. Acknowledge that differing values and interests affect adaptation outcomes;
3. Integrate local knowledge into adaptation responses; and
4. Consider potential feedbacks between local and global processes.

Adaptation can be seen as a process rather than an outcome, in response to actual climatic events as well as predicted future climatic changes (Huq and Reid, 2004; Leary et al., 2008). In addition to climate-related practices, adjustments and policy interventions, adaptation is also viewed as the daily decisions and social relations through which individuals strive to secure a decent life in changing social and environmental contexts, whether or not the climate change contribution to these changing contexts can be distinguished (Adger, 2003; Eriksen et al., 2005; Osbahr et al., 2010). Sustainable adaptation hence builds on a conceptualization of adaptation as a process taking place in the form of interaction between actions, decisions, relations, negotiations and structures across several scales (in contrast with viewing adaptation as a single policy, project or action).

Similarly, current development pathways are the outcome of past and present decisions and actions. These pathways are based on particular development goals linked to a worldview of unending physical growth, maximizing growth of the market economy, and unlimited use of resource and energy throughput, where any resource limitations (such as fertilizer) are met by increased use of fossil fuels (Beddoe et al., 2009). This development is leading us into the ‘anthropocene’, where human activities alter environmental processes at a systemic level, threatening our global socio-ecological system (Steffen et al., 2011; Westley et al., 2011). In line with this thinking, sustainable adaptation is a process (rather than being a particular outcome or isolated action) to manage multiple stressors and transform from current pathways - that reproduce fossil fuel driven economic growth generating both inequity and high emissions (Wilkinson and Pickett, 2013) - towards more sustainable development pathways.

There is increasing recognition that adaptation cannot be seen merely as a techno-managerial challenge involving incremental adjustment to technologies, regulations, policies and practices in order to sustain current ways of living with change. There are three key aspects to the linkage between sustainable adaptation and transformation: First, the idea of sustainability as a criterion for adaptation raises the issue of transformative change. The need for more sustainable development pathways implies that fundamental shifts in societal systems are required (Beddoe et al., 2009; Westley et al., 2011; Kates et al., 2012; O’Brien and Sygna, 2013). This may be in the form of transformation: “the transformation of energy and agricultural systems, financial systems, governance regimes, development paradigms, power and gender relations, production and consumption patterns, lifestyles, knowledge production systems, or values and world-views” (O’Brien, 2012: 671). Critical here is the need for deliberate transformation, that is, to consciously take actions to influence future change towards more sustainable pathways.

Second, values and worldviews are central to development pathways and therefore a fundamental part of transformation. In particular, O’Brien and Sygna (2013) argue that in addition to a practical (actions) sphere, transformation has a political sphere and a personal (worldview, values) sphere. Some policy interventions may focus on adjustments in technology, management systems, and governance and represent a practical sphere of transformation. These may alter emissions and the impacts of climate change; however, social and political systems are not necessarily changed. When applying the second and third principle of sustainable adaptation (acknowledge that differing values and interests affect adaptation outcomes; and integrate local knowledge into adaptation responses) to assess humanitarian approaches, a deep understanding of fundamental changes in values and in political systems is therefore required.

Third, and related, conflicts between different (or predominance of particular) values and worldviews shape development pathways and transformation. Current development pathways are the outcome of past and current decisions by a few actors, based on covert development goals, worldviews or understandings that are often unquestioned. For example, modernization is often an implicit development goal or paradigm that drives decisions (Eriksen and Marin, forthcoming). There are particular values and interests behind any decision, including deliberate attempts at achieving common societal sustainability goals or transformation (Shove, 2007; Manuel-Navarrete, 2010). Eriksen and Marin (forthcoming) suggest that a sustainable development pathway is a set of relations and processes creating a trajectory of change through more overt and explicit development goals and negotiations between them. This acknowledges that decisions are made by diverse actors (not just policy makers) and the values and decisions that they lead to are negotiated through power relations between these actors. The result in terms of development outcomes (well-being, equity, poverty, environmental integrity, emissions) may vary and may be ‘negative’ at some points in time and for some groups because negotiation between different interests and goals and the interaction between actions, practices and decisions does not always give neat, predictable results (Eriksen and Marin, forthcoming; Eriksen and Selboe, 2013).

The term deliberate transformation therefore refers to the extent to which development goals and differing interests of many actors are negotiated and acknowledged, not whether one single actor may have a deliberate action to reach his or her own individual goal or interest (Eriksen and Marin, forthcoming). A major question is nevertheless how and to what extent acknowledged common goals are agreed upon and reached in a practical context, where even deliberate transformation may have unintended outcomes. As such, sustainable adaptation is a pathway of interactions and negotiations between multiple goals rather than well-planned actions and institutions geared towards a common sustainability goal (Eriksen and Marin, forthcoming).

Humanitarian approaches in the context of disaster risk reduction

The three points above imply that how different actors define and understand key adaptation and development concepts, and divergence between them, is important for whether or not sustainable adaptation is promoted as part of humanitarian policy and practice. Many disaster risk reduction measures could directly contribute to better adaptation. Of particular relevance to values is the extent to which local livelihoods, and diversity of values and objectives are prioritized in humanitarian actions. For example, which assets, livelihoods or developments are thought of as valuable and protected in the face of disaster and for whom? Does disaster or humanitarian actions alter values of the people involved?

The question of what constitutes disaster becomes important. Disasters are defined by the IPCC as;

“...severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.” - (IPCC, 2012: 5)

UNISDR (2009: 9-10) defines disaster risk as “the potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period”.

The concept of disaster risk shifts the viewpoint from disasters as events randomly affecting places, to that of negative potential conditions continuously affecting all areas. Disaster risk encompasses several different types of potential losses - in lives, livelihoods and financial and other assets - and is often difficult to quantify. How it is assessed and mapped reflects the values of those assessing it – and has important implications for the types of measures that are put in place, and to what extent local.

The definition of disaster risk reflects the concept of disasters as the outcome of continuously present conditions of risk. Addressing such conditions could potentially contribute to sustainable adaptation, depending on the extent to which it addresses the four principles in ways that combine personal and political with practical spheres of transformation. Disaster risk reduction is defined by UNISDR as;

“...the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.” - (UNISDR, 2009: 10-11)

Disaster risk reduction is therefore a process that could form part of adaptation. It has a focus on measures, strategies and policies, whereas adaptation includes a wider spectrum of actions, including those of individuals. In terms of linking with transformation, the strong focus of disaster risk management on using administrative directives, organizations, and operational skills implies a bias towards practical, rather than personal or political change, although this need not be the case.

The fact that disaster risk reduction is often implemented through humanitarian actors means, however, that the way humanitarian actions are defined may limit the scope of its adaptation component. Humanitarian aid is defined by OECD as;

“...assistance designed to save lives, alleviate suffering and maintain and protect human dignity during and in the aftermath of emergencies (...) it includes disaster prevention and preparedness; the provision of shelter, food, water and sanitation, health services and other items of assistance for the benefit of affected people and to facilitate the return to normal lives and livelihoods; measures to promote and protect the safety, welfare and dignity of civilians and those no longer taking part in hostilities and rehabilitation, reconstruction and transition assistance while the emergency situation persists.” - (OECD, 2011)

OCHA (2003: 14) defines humanitarian operations as “operations conducted to relieve human suffering, especially in circumstances where responsible authorities in the area are unable or unwilling to provide adequate service support to civilian populations”. A Relief Web (2008: 29) definition expands that humanitarian actions are “assistance, protection and advocacy actions undertaken on an impartial basis in response to human needs resulting from complex political emergencies and natural hazards”. These definitions appear to focus on actions by non-governmental organizations, and on particular emergencies (rather than vulnerability conditions over time), although ‘human suffering’ could be interpreted as longer term vulnerability.

These definitions do not suggest an active changing of development pathways or transformation, indeed, advocacy and actions are supposed to be impartial, reflecting the fact that humanitarian actors must strive to be apolitical. The principle of neutrality, for example, implies that humanitarian assistance must be provided without engaging in hostilities or taking sides in controversies of a political, religious or ideological nature. Sustained humanitarian access to the affected population is ensured when the receipt of humanitarian assistance is not conditional upon the allegiance to or support to parties involved in a conflict but is a right independent of military and political action. This sensible precondition also means that humanitarian operations take place within the system rather than altering the system.

Nevertheless, since humanitarian operations form part of a system and part of social change, the extent to which they contribute to sustainable adaptation, through practical, personal and political transformation, may depend on the values that they enact through their decisions and actions. For example, if their focus is on food security, the actions can be quite wide and potentially involve both political and personal transformation since food security is as much about access to food as producing more food. The 1996 World Food Summit held under the auspices of the Food and Agriculture Organization of the United Nations defined food security as the state achieved such that “all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 2003: 28). Ingram et al. (2010) argue that central tenets of food security are the notion of access and sustainability.

METHODOLOGICAL IMPLICATIONS

Identifying how humanitarian approaches in the context of disaster risk reduction may contribute to sustainable adaptation in practice demand empirical investigation of past experiences. We here outline how such investigation may be carried out, building on the conceptual discussion above. We suggest that case studies of past operations, the values they enact in terms of development, empowerment and vulnerability reduction, and the extent to which they have been able to contribute to political, personal and practical transformation (leading to sustainable adaptation processes) in practice, forms a focus of analysis. In the current project, cases in six countries (Ethiopia, Kenya, Zambia, Nepal, Pakistan and Bangladesh) are compared in order to reveal potentials for enhanced interventions as well as current limits to addressing sustainable adaptation in different contexts. The case study countries have been selected in order to compare across African and Asian contexts – two regions that have been targets of at times massive humanitarian interventions in connection with climate related disasters and which are considered vulnerable to climate

change (IPCC, 2007). In some of these countries, disaster risk management has been promoted as a potential climate change adaptation pathway. In some other case studies, such as the Nepal case, humanitarian work has focused on responding to slow onset disasters such as drought as well as chronic food insecurity. Hence, the range of cases allows in depth examination of particular themes, such as interaction between conflict, migration and climate vulnerability, as well as how responses to mega-disasters and recurrent disasters differ in institutional organization and linkages to local development realities.

The four principles of sustainable adaptation can be applied in analyzing past approaches. In specific, the extent to which deeper political and personal transformation, in addition to practical sphere transformation, within efforts relevant to these principles is an important focus of analysis.

A focus of the study is local social innovations as part of disaster risk reduction, humanitarian responses and climate change adaptation and their interactions with interventions. Hence, data both on policy and village level are required. Key informant interviews can target beneficiaries of humanitarian assistance as well as with personnel carrying out relevant programs and interventions in order to identify the extent to which past and ongoing humanitarian interventions address these normative principles. Limits and potentials to supporting sustainable adaptation through humanitarian approaches can be hypothesized to be closely linked to institutional dynamics and varying objectives and vested interests of different government, humanitarian, aid and local formal and informal institutions, i.e. limits to the types of actions that humanitarian actors (NGO, government, UN, private sector) can engage in within the current institutional and political frameworks. Key informant interviews can target these actors for analysis of institutional frameworks, as well as the space for policy dialogue and advocacy.

The limits and potentials can also be hypothesized to be closely linked to how different actors understand short term emergencies and their relation to causes of vulnerability. Interviews can therefore usefully focus on how understanding and information regarding complex vulnerability contexts, such as those created by climate stress, food insecurity, migration and resettlement, and conflict, is taken on board by various actors in humanitarian interventions and reflected in their use of tools such as vulnerability and capacity assessments (Braman et al., 2010; IFRC, 2010; Cannon and Kerbyshire, 2011).

Intersectionality can be used as a tool to study how vulnerability and local responses to climate related disasters are differentiated between groups. This approach can help explain how social differentiations are driven through various interacting relations and processes, including those related to gender, age, livelihood systems (pastoral and agro-pastoral), ethnicity, social class, in addition to processes of exclusion and inclusion (vulnerable groups) and the relations between people and intervening institutions (social interface analysis) (Nightingale, 2011). Going beyond describing social differentiation in terms of poverty and generic socio-economic factors is particularly important since relations are an understudied aspect in the climate change adaptation literature (Lambrou and Piana, 2006; Terry, 2009). These can be analyzed at individual or household level, selecting one or more villages as appropriate in each case study country. Useful methods include: participant observation (meetings, local community); interviews (open/semi-structured); focus group discussions (with villagers and local policy level); and key informant interviews with people representing different socioeconomic and interest groups (may include poor, rich, men, women, different livelihood groups/sector).

While humanitarian organizations enter the field when disasters have already happened, they could work proactively if they play a role in policy dialogues or manage to empower vulnerable groups. However, conflicts of interests between different groups in society, such as local actors, policy makers, NGOs, humanitarian actors, international organizations, and the government, can limit efforts in adaptation to perennial drought and in empowerment of vulnerable groups. Policy analysis pays particular attention to: first, which are the narratives behind and from where/whom do they come; and second, who is driving policies – how are discourses shaped (embracing different concepts and how this leads to particular practices/interventions)? Focusing on government and humanitarian organizations at different levels, discourse analysis is used in looking for key concepts and how vulnerability is assessed in policy documents, in key informants' efforts to advocate for specific programs as apparent in interviews as well as passive participation in meetings.

In each case country, the examination can follow at least one practical intervention or program by a humanitarian partner in order to study both how operations currently contribute to the principles of sustainable adaptation, as well as the feasibility (or limits) of the activities suggested by study findings. In addition, policy dialogue can be strengthened through dialogue workshops at country level, testing the relevance of findings to practical applicability.

Below, we exemplify how these methods can be applied in three case study countries, Ethiopia, Nepal and Pakistan, selected to demonstrate different humanitarian contexts and approaches.

Ethiopia

The humanitarian crisis in the Ethiopian lowlands bordering Somalia (2011-2012) has once again drawn international attention to problems of vulnerability and people's lack of options and opportunities to cope with recurring drought. Responses centered on emergency feeding in camps as well as wider food distributions are regarded as inadequate by governments, donors and humanitarian actors alike. Currently, the Productive Safety Net Program (PSNP) is the main program through which aid is distributed in Ethiopia. Although the PSNP has a 'food for work' component that mainly focuses on environmental rehabilitation in order to make local communities less vulnerable to environmental degradation, PSNP interventions hardly address adaptation to climate change. Agriculture is the main sector the PSNP and other government policy measures aim at when trying to tackle households' vulnerability to humanitarian disasters and little attention is paid to the importance of livestock. Since the start of development and humanitarian interventions, pastoralist households have been resettled and engaged in irrigated agriculture within those interventions. However, the question whether forced resettlement and a shift away from (extensive) livestock production towards irrigated agriculture is a sustainable measure in the long term in view of climate change, remains unanswered. The specific objectives for the Ethiopian case study are:

1. Provide insights into how humanitarian programming can contribute to longer-term responses that support adaptation to perennial droughts;
2. Assess the relative importance of livestock in supporting stronger livelihoods and adaptation and, hence, provide needed alternatives to current approaches which center on resettlement and the delivery of relief to newly sedentarised groups;
3. Analyze the role of humanitarian organizations in policy dialogues and empowerment of vulnerable groups;
4. Analyze the role of conflict in limiting such efforts.

Nepal

In Nepal, policy and decision makers often attribute chronic food insecurity in remote areas to climate change, low production levels and high food prices. Recommended actions often include distribution of improved seed varieties, construction of irrigation systems and building of roads to access markets. The short term response by the government of Nepal through the Nepal Food Corporation, NFC, has been to subsidize food prices (mostly rice) in remote areas and for the World Food Programme to implement 'food for work' and 'food for assets' projects where people get food (mostly rice) when they construct irrigation systems or roads or when they plant marketable crops.

However, there is increasing criticism that governments and humanitarian organizations mainly focus on technocratic approaches to adapt to climate change (food aid, seed aid, irrigation systems etc.), with less focus on fighting poverty in terms of enhancing social equity, economic and political rights. Indeed, policy documents seldom consider the capability of a person to access quality food as related to different livelihood strategies and the way they are affected by power relations at the local, regional, national and international level (Nyborg et al., 2008; Nagoda and Eriksen, forthcoming). Such social and political dynamics implies that the causes for food insecurity go beyond technical food production issues and must also be found in much more complex social, cultural and political processes (O'Brien et al., 2008; Eriksen and Silva, 2009; Nagoda and Eriksen, forthcoming).

Food security is used in the study as an entry point to investigate differences in climate change and development discourses, comparing how food security is conceived by key documents, policy makers as well as by local villagers. The goal of the study is to investigate how national policies and development discourses shape climate change interventions and development and how climate change form part of or justify particular types of humanitarian aid interventions. The specific objectives for the Nepalese case study are:

1. Investigate national politics, development and adaptation discourses and how relations between institutions shape food aid and climate change interventions.
2. Understand mechanisms by which political interests related to adaptation influence the potential and constraints for sustainable adaptation.

3. Investigate local perceptions about local vulnerabilities and external aid and how these perceptions differ within villagers (related to the caste, class and gender) and why?
4. Investigate who get advantages of external help (Climate change adaptation projects/food aid) and who do not and why.

Pakistan

Having experienced several devastating disasters over the last 8 years, Pakistan gives a unique opportunity to learn about several key issues. Following the earthquake in 2005, the government of Pakistan developed an Earthquake Rehabilitation Authority (ERRA), National Disaster Risk Management Strategy, and initiated work on provincial, district and community preparedness plans. When the flood hit in 2010, 2011 and 2012, requiring massive levels of humanitarian aid, efforts towards the development of the DRM plans were stepped up with the help of the international community. Building on our on-going research in Pakistan, on the implications of the conflict and flood on local livelihoods, we explore both the content and the institutional context of how disaster risk management plans can, in practice, contribute to adaptation to climate change. The specific objectives for the Pakistan case study are to identify:

1. The ways in which different types of disasters impacted local communities.
2. The degree to which communities, government and aid agencies were able to respond to these crises, and take steps to reduce the impacts of future crises.
3. The extent to which they address the broader social, economic, political and environmental issues necessary in coping with the diverse and unpredictable insecurities resulting from longer-term climate changes in the region.

Table 1 outlines key research questions and methodological features that may highlight some of the different contexts and approaches by different actors in the humanitarian/development interface in the three countries. The suggested methods for comparing the three case studies are included here to illustrate how the link between sustainable adaptation and transformation can be studied in practice; the actual case study investigations are currently at various stages of development and completion as part of the ‘Courting Catastrophe’ project.

Table 1. Investigating the potential of humanitarian approaches to contribute to sustainable adaptation.

	Ethiopia	Nepal	Pakistan
Particular features of the case	Extensive humanitarian crisis (drought) Food aid and food for work, centered on environmental rehabilitation Settling of pastoralist households within such programs	Chronic food insecurity, often linked to climate change by policy makers Poverty, high social inequality and political instability Food aid and food for work, centered on environmental rehabilitation	Climate change as flood/drought in the North and South in the context of political conflict
Research questions investigated	a) How do actors see different climate change issues – climate change, vulnerability, disaster, adaptation, humanitarian response across scales? b) What informed the approaches of different policy documents and practices? c) Which humanitarian interventions have been implemented by different actors addressing climate change adaptation/climate risk/resilience/food security? d) And how – focusing on a specific intervention? (Inclusion/exclusion, the principles of sustainable adaptation) e) Which social innovations exist and what are the drivers of vulnerability? f) Which intersectionality, power relations, negotiations and conflict exist between different actors?	a) How is vulnerability, climate change and food security perceived by different actors at national and local level? b) How are adaptive capacity and vulnerability influenced by local social or political structures (e.g. caste system, local administration), and by external interventions (e.g. development interventions such as food aid distribution)? c) How is climate change adaptation used in development discourses to push for “old recipes” to combat poverty? d) How are policies and interventions implemented on the ground the product of political bargaining between conflicting interests of different governmental (e.g. ministries), bilateral (e.g. national aid agencies), and multilateral organizations (e.g. the World Bank, WFP)?	a) How has climate change in form of floods affected the north and south of Pakistan differently? b) How have responses differed in the North and South in terms of short and long-term adaptation? c) How do different actors define and interpret climate change, DRR and risk and risk management in each case? What types of responses are defined as DRR? By whom? d) What is the relationship between DRR and longer-term development? f) Have local adaptations/ideas influenced DRR activities/approaches by different humanitarian actors? g) To what extent are adaptation activities focusing on technocratic adaptations, social vulnerability, or both?
Key documents	Local policy documents Humanitarian agency documents Government: Climate Resilient Green Economy Strategy (federal) Productive Safety Net Programme and the Household Asset Building Program Donors: Climate Smart Initiative (World Bank)	Humanitarian agency documents at local and national/international level, e.g. NAPA (National Adaptation Plan of Actions) and LAPA (Local Adaptation Plan) Government food security and agriculture strategy documents e.g. ADS (Agricultural Development Strategy) Donors strategy documents such as World Food Program’s country program	Government and private organizations policies NDMA etc). Post-earthquake disaster policies Disaster Risk Reduction Policy Climate change strategy and policy.
Sites of local investigation	2-3 sites within Ethiopia of varying agriculture/pastoralism and types of intervention.	4 villages in Humla, displaying varying levels of food insecurity.	2 sites in north and south: Dera Ghazi Khan in Southern Punjab/Sindh (flood/drought) and Swat/Charsadda (political conflict)

CONCLUSIONS

The discussion has raised three key aspects to the linkage between sustainable adaptation and transformation: First, the idea of sustainability as a criterion for adaptation highlights the issue of transformative change. Second, values and worldviews are central to development pathways and therefore a fundamental part of transformation. Third, and related, conflicts between different (or predominance of particular) values and worldviews shape development pathways and transformation. Transformation can consist of practical, political and personal transformation, where the latter is closely linked to the issue of values. Political transformation also suggests that there may be conflicts of interest rooted in values or development paradigms that frame how adaptation takes place. In order to create a process consistent with the four principles of sustainable adaptation (which necessitates fundamental change rather than development as usual), transformation within all three spheres are required.

Traditional humanitarian approaches may at best contribute to practical transformation, though some would argue that they could also perpetuate 'development as usual' and hence undermine transformation. Disaster risk reduction as an approach has a broader perspective on vulnerability reduction, and may contribute to sustainable adaptation processes. However, in order to investigate how such contributions can take place in practice, it is necessary to identify the values and narratives used by different actors within disaster risk reduction, including villagers and their social innovations.

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Environmental disasters and agrarian transformations: Frictions, articulations, and challenges

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INTRODUCTION

The first decade of the twenty first century has been called “the decade of disasters” (Provost, 2011). Hurricane Katrina, the Earthquake in Haiti, the Tsunami of South Asia, and the Earthquake in Japan, are but some of the nearly 7,000 events reported from 2000 to 2010 (IEG- WB, 2011). Among these disasters, floods are increasingly becoming catastrophic events. From 2001 to 2010 there were 4,022 instances of flood-induced disasters reported, which represents 44.5 percent of the total number of disasters occurring in that decade. Over the same period, floods affected 1,065,359,000 people representing almost 40 percent of the total number of individuals affected by all natural disasters (Red Cross, 2011). Despite the numerous effects of these catastrophes on different people and environments, flood-induced disasters have been particularly severe in rural areas. Floods and other extreme climate events have been the cause of “disaster-related food insecurity” on a global scale (IFAD, 2011).

Poor farmers are among the most affected because of the vulnerability of both their livelihoods and their economic basis in agriculture. This fact is particularly alarming if we take into account that 75 percent of the world’s poor live in the countryside (IFPRI, 2009). The International Food Policy Research Institute estimates that climate change-related extreme events will result in yield declines and price increases for the most important food crops. In addition, it is expected that by 2050, calorie availability levels in the developing world will be lower than they were in 2000 (IFPRI, 2009). If the pace of climate change keeps increasing, the occurrence of disasters will increase as well. It is projected that an increase of 3 or 4 degrees will generate catastrophic floods on 4,500 square kilometers of agricultural land in the Nile Delta alone. This extreme event will necessarily cause the migration of thousands of poor farmers, thus threatening food security and rural livelihoods (IFAD, 2011). In 2010, there were many rural areas affected by flood-induced disasters, occurring worldwide. Thailand experienced the “worst flooding in almost half a century,” which caused severe damages in 30 provinces in the rural northeast of that country. Fields and crops were also destroyed in central Vietnam and the northern Philippines (Palatino, 2010). In Pakistan roughly 17 million acres of agricultural land were submerged, and almost 100,000 farm animals perished (Waraich, 2010). In Latin America, countries such as Brazil, Venezuela, Bolivia, Peru, Mexico, and Colombia were also severely affected by flood-induced disasters.

This paper provides a reflection on the transformations of agrarian societies and landscapes within the context of increasing environmental disasters and accelerating climate change. The idea of transformation, as it is considered here, entails two different but interrelated dimensions. First, contemporary rural societies not only face longstanding problems such as the concentration of private property, the commoditization of land, and the expansion of industrial agriculture, but they are also facing profound transformations brought about by the escalating impact of floods, hurricanes, and other environmental disasters associated with the acceleration of climate change. The articulation of these social, political, economic, and environmental transformations presents complex challenges to the ways in which both the academic and policy sectors have understood rural societies to date. Second, these new articulations call forth new theoretical and political approaches that set the foundation for an environmentally and socially sound transformation in the countryside. Drawing on a case study of flood-induced disasters in Colombia, this paper will propose that such transformations can be facilitated by the consideration of three issues: a) the theoretical and political problematization of the concept of ‘adaptation to climate change’; b) a dialogue between disasters and agro-economic development policies; and c) the critical incorporation of local agrarian and environmental histories into the policy agendas of climate change and rural development. This paper has three parts. Drawing on sociological perspectives on agrarian change, the first part explores the possible connections between agrarian transformations and climate-induced environmental disasters. The second part explains these connections in the case of flood-induced disasters in Colombia. The third part provides some concluding remarks focusing on potential paths for sound transformations in agrarian landscapes and societies in light of accelerating climate change.

AGRARIAN TRANSFORMATIONS AND THE ENVIRONMENT

In order to better understand how environmental disasters are having a prominent role in the transformation of rural societies and landscapes, it is important to explore the place of the environment in the intellectual debates on agrarian change. Broadly speaking, sociological and political economic approaches to agrarian change have focused on the ways in which capitalism restructures the countryside. From this perspective, early interpretations of agrarian change have considered the environment in terms of the *impacts* of capitalist social relations on rural landscapes. In the 19th century, Marx pointed out that by concentrating people in urban areas, capitalist production disrupts the circulation of matter between humans and the soil. As a consequence of this, soil fertility is threatened. Marx concludes that “all progress of capitalist agriculture is a progress in the art, not only of robbing the labourer, but of robbing the soil” (1967: 475). The disruption of metabolic processes under capitalism inspired contemporary environmental sociologists such as J.B. Foster (1999) to develop the idea of the “metabolic rift” to conceptualize the socio-ecological contradictions of global capitalism. Despite its shortcomings (see for instance Schneider and McMichael, 2010), the concept of “metabolic rift” has also opened important avenues to understanding the relationship between the environment and agrarian capitalism -beyond the soil fertility debate (see for instance Wittman, 2009; Moore, 2011). It is not the aim of this paper to further develop these debates, but to highlight that the environment has regrettably occupied a subordinated place in the debates about the development of agrarian capitalism. As Mann (1990: 4) pointed out, “the nature of capitalist development is integrally related to the development of capitalists’ ability to control and subordinate –to civilize- nature”.

In 1899, Karl Kautsky (1988) provided another perspective on the subordinate character of nature in the development of agrarian capitalism. For Kautsky, peasants are more susceptible to the unpredictable changes of the market than they are to the weather. From Kautsky’s perspective, agrarian technologies such as irrigation systems, ditches, and smoking fires help mitigate the effects of wet summers, droughts, and spring frost respectively. Peasants, however, have no means “of arresting a collapse in prices, or of selling an unsaleable corn” (1988: 16). These forms of controlling nature convey the idea of an economic system that tames the vagaries of weather by way of technological interventions in the landscape. In the 1970s, however, Mann and Dickinson (1978) put forward a thesis arguing that nature is far from being a passive factor in agricultural production. Rather, nature can be an obstacle for the capitalist trend to take over agrarian economies. This is particularly evident in the disparity between production time and labor time. That is, there is a moment in agriculture in which little or no labor is needed because crops are in the process of maturing. This discourages capital development, as it reproduces more successfully when production time is reduced, and when the difference between labor time and production time is minimal (Mann and Dickinson, 1978)¹. It is widely known today, however, that agricultural technologies have rapidly developed a number of methods to overcome what Mann and Dickson understood as barriers to capitalism. The genetic modification of seeds, among other biotechnologies, has thus reduced the production time in agriculture (see Kloppenburg, 1988). It is also well known that the development of agricultural technologies such as pesticides, fertilizers, and irrigation systems, has had an alarming impact on the environment (Weis, 2007; Perfecto et al, 2009).

The idea of nature as subordinate to society, therefore, has occupied an important place in the study of the environmental dimension of agrarian change. But what happens when nature, in general, and weather variations, in particular, play an active, even disruptive, role in society? Environmental disasters have been largely ignored in the political economic and sociological analysis of agrarian change. The situations described at the beginning of this paper, however, account for the need for particular approaches to the ways in which environmental disasters are reconfiguring social, political, and economic relations in rural areas. Nevertheless, it is fair to note that the main critiques of the behaviorist tradition of disasters arose out of geographical and anthropological research in peasant societies. Broadly defined, the behaviorist tradition in disasters and hazards studies directed its attention towards understanding questions such as why people persist in occupying hazardous areas? Why are people sometimes reluctant to evacuate hazardous areas? What factors influence people’s decisions regarding the adoption of some adjustments to their everyday practices, and the rejection of others? (Baunann and Sims, 1974). By addressing these questions, researchers would be able to identify the most appropriate adjustments to attain a “good adaptation” (Burton et al., 1978). This adaptation must guarantee a stable, self-regulated, and homeostatic relationship between people and the environment (Russell, 1970). As the behaviorist tradition was highly policy-oriented, researchers devoted part of their efforts to understanding how to foster rational, conscious, and systematic human behavior in the process of adaptation to flood plains and risk areas (see for instance White, 1945).

1. For a criticism of the Mann-Dickinson thesis see Henderson 1999.

In the 1970s, scholars doing research in rural areas of the developing world were highly critical of the behaviorist tradition. At this time, thousands of rural families in Africa were facing the devastating effects of the Sahelian droughts. In this context, authors such as Ben Wisner, Phil O’Keefe, and Michael Watts questioned the very naturalness of “natural” disasters, as they observed that the catastrophes brought about by the Sahelian droughts in rural Africa were closely intertwined with the spread of the unequal forces of agrarian capitalism. According to O’Keefe et al (1976), the increasing rate of disasters cannot be understood as an outcome of the increase of biophysical events. Rather, “the explanation for the increasing number of disasters must be sought in an explanation of the growing vulnerability of the population to extreme physical events” (1976: 566). In turn, this social vulnerability, according to these authors, was directly connected with conditions of underdevelopment, population growth, and the unequal access to resources. Therefore, it is misleading to label as “natural” a type of environmental event whose causes are more political and economic than biophysical. At the end of the 1970s, anthropologist William Torry (1979) gave continuity to the critical views that O’Keefe et al had initiated a few years back. Torry also questioned the naturalness of natural disasters, and added that by concentrating on homeostasis, equilibrium, and self-regulation, behaviorists were completely inattentive to the dynamics of coping failures and maladjustments. Furthermore, Torry observed that behaviorists explained disaster losses in terms of costs and figures, thus glossing over cases in which disasters did not cause significant economic and death tolls. A few years later, Watts (1983) fiercely attacked the behaviorist tradition for a lack of theoretical content that helps to explain social change and organization in a more comprehensive way. According to Watts, the behaviorist tradition sees human beings as organisms devoid of any social character. Society, in turn, is regarded as any other biological population. This “neo-Darwinian” perspective, as Watts calls it, fails to consider maladaptation and dysfunction (as Torry had already observed), and therefore makes it impossible to consider broader historical, economic, and political dynamics. Equally important, Watts observed that the behaviorist tradition regarded nature and society as separate units, thus making it difficult to consider the forces and relations of production as crucial aspects to the understanding of human adaptation. In sum, what these authors argued was that the behaviorist tradition, besides reinforcing a geophysicalist explanation of disasters, and by uncritically deploying biological metaphors from the “natural” sciences, ignores the role of economic, social, and political forces in the production of disasters (Hewitt, 1983).

Why is this brief genealogy important for understanding the situation described at the beginning of this paper? On the one hand, the increasing occurrence of environmental disasters is being framed as a problem associated with global climate change (see for instance Gillis, 2011 and Rice, 2012), which helps depoliticize disasters in very problematic ways, and obscures the role of politic and economic forces in the production of these disasters. On the other hand, the idea of “adaptation,” coupled with “mitigation,” is gaining currency in climate change policy discourses as one of the most viable strategies for survival (Nelson et al., 2009; Thornton and Manasfi, 2010). This demonstrates that the idea of environmental disasters as “natural” phenomena, together with the biological concept of “adaptation,” are on the stage again despite the critical opinion of the 1980s. As Peet et al. (2011: 9) observe, most of the current work on adaptation to climate change “is a recycling of an older sort of cultural ecology –systems theory dressed up as new institutionalism- in which there is much talk of adaptive capacity, resiliency and flexibility of local social systems, but almost no serious account of political economy and the operations of power”. In the case of rural environments, disasters have not only affected the materiality of the agrarian economies, but they have also penetrated the discourses of rural development and environmental governance. Therefore, the discourse of “adaptation to climate change” in the context of environmental disasters is becoming a powerful strategy to rebuild and shape agrarian social and economic relations. In this regard, it is important to explore how the occurrence of environmental disasters is connected with the transformation of rural economic and political relations. This endeavor requires a broader perspective of the relationship between the environment and the dynamics of agrarian change. This perspective must go beyond nature as subdued by society, and consider nature instead as an active agent participating in social transformations. This is not intended to revive an environmental determinism, or to re-naturalize environmental disasters. Rather, by acknowledging the active role of nature in social transformation, this perspective will highlight the mutual constituency of nature and society. In the next section, I will analyze the relationship between environmental disasters and agrarian transformation in the case of flood-induced disasters in Colombia.

FLOOD-INDUCED DISASTERS AND AGRARIAN POLITICS IN COLOMBIA

In 2010, Colombia experienced the “worst tragedy in its history” (CNN, 2011). Catastrophic floods associated with the La Niña phenomenon affected 93 percent of the national territory in one way or another. More than 400,000 households lost crops and farm animals, and there were about 200,000 reported instances of damage to rural lands. In addition,

roughly 200,000 families were displaced from the countryside. The Colombian government publicly contended that this phenomenon was a manifestation of global climate change (CNN, 2011). Furthermore, as the abrupt increase in precipitation rates was a direct consequence of the “La Niña” phenomenon, the problem of flooding in Colombia was officially conceived of as a “natural disaster” (Delcas, 2011; Otis, 2011). Even though Colombia has long been a flood-prone country, the 2010 floods exacerbated the capacity of the state to respond to this catastrophe. As a consequence, the recently elected president Juan Manuel Santos was obliged to restructure his government plan, and subsequently new institutions, alliances, and programs were created. This process of state restructuring was framed within a government plan called National Plan of Adaptation to Climate Change, which seeks to “reduce the risk and socio-economic impacts associated with climate change and variability” (DNP, 2012: 3). As a part of this plan, a new institution was created: The Adaptation Fund. This institution was created to be in charge of the “reconstruction” and “reactivation” of the areas affected by “La Niña” phenomenon. These forms of reconstruction and reactivation have been thus far mainly limited to infrastructure projects in devastated areas. Since its creation, the Adaptation Fund has sponsored the reconstruction of roads, bridges, public school, hospitals, and –more recently- the construction of houses for people left homeless in the aftermath of the 2010 floods.

The southern part of the Department of Atlántico, in Northern Colombia, was one of the most seriously affected areas in 2010. Towns and villages were completely covered by water, and hundreds of rural families were forced to migrate to neighboring areas after losing their crops, animals, and land. Due to the magnitude of this situation, the Adaptation Fund focused a great part of its resources and efforts on this particular area. The aim was to reactivate the agricultural economy of this part of the country, and reconstruct the infrastructure affected by floods. In 1983, Hewitt argued that post-disaster scenarios usually constitute perfect opportunities for states and other organizations to bring about different types of reforms that previously may have been rejected by local populations (1983: 137). In the case of Southern Atlántico, post-disaster policies are not only creating undesirable situations, but they have also been “recycling” old projects that proved to be unsuccessful in the past. In what follows, I will analyze two important transformations that the Adaptation Fund’s post-disaster reconstruction project is currently implementing in Southern Atlántico: the creation of risk zones, and the reactivation of agrarian economies. Even though these projects are still in their initial stage, they involve important transformations that will have serious implications for agrarian relations. The information about this project has been taken ethnographically from the municipality of Manatí, Southern Atlántico, during different field trips beginning in June 2012 and extending through the present.

Risk zones and the dilemmas of subtle dispossession

Even though many rivers, lakes, and wetlands overflowed in 2010 as a consequence of heavy rains, the catastrophic floods in Southern Atlántico were exacerbated by the collapse of an artificial canal built in the 19th century and restored in the 1950s. People from Manatí recall that by 2010, the canal was already highly deteriorated and loaded with tons of sediment. As one person said:

“We all in this area knew that this catastrophe was going to happen before long. We cautioned government officials but they never took our words seriously. For years, we have asked governors to repair the canal, but they just dismissed our claims. Now that the catastrophe has finally occurred is that they [governors] are saying that it is necessary to invest money in the reconstruction of the canal” - (Manatí, March 15, 2013)

In sum, as a woman said, “this catastrophe was a death foretold .” As people in the area are aware that the 2010 floods were caused not only by heavy rains, but also by the irresponsibility of local and regional governors, people are aware of the unnaturalness of this so called “natural disaster.” Based on this awareness, there is a generalized opposition to the creation of risk zones in Manatí. Adaptation Fund’s post-disaster recovery projects such as housing and the reconstruction of aqueduct and sewer systems require a previous definition of what the risk zones are. Ideally, no one is allowed to live in risk zones, and therefore no recovery and reconstruction project is supposed to be carried out in those zones. Many families in Manatí were informed overnight that their households are located in a risk zone, and that they will be resettled in a new housing project. A peasant man argued that:

“The government wants us to move out and live in the houses they are building for the victims of the catastrophe, but I do not want to leave my place. In my house I have enough space to grow subsistence crops, chickens, pigs, and other animals. The new houses are small and are located in a place that is very unattractive to all of us. I do not fully understand why we have to leave our place, and I do not understand either why our neighborhood is a risk

zone. The 2010 catastrophe occurred because the government dismissed our warnings regarding the deterioration of the canal. There is nothing natural about that. So if we are living in a risk zone, does it mean that the government will never repair the canal and therefore our neighborhood is likely to be flooded again?" - (Manatí, March 19, 2013)

Some peasants see the resettlement project as a subtle form of dispossession. I interviewed a government official participating in the resettlement housing project, and she said that:

"We are not intending to force people to leave their homes. We are only showing them that it is very inconvenient to live in a risk area. Ultimately, they are entitled to remain living at the place where they are at the moment. But if they choose to do so, they won't be included in any post-disaster recovery project. And if another catastrophe occurs in the future, the government won't provide any help to them either" - (Barranquilla, April 27th, 2013)

Therefore, some families are trapped in a dilemma. They do not wish to leave their houses, but at the same time they do not want to feel unprotected if another catastrophe comes in the future. People feel that by creating risk zones, the Adaptation Fund is forcing them to leave not only their houses, but also their crops and animals. This is seen as nothing other than a form of dispossession that uses no violence or physical means, but that fosters to a sense of uncertainty and hopelessness to persuade people to resettle against their own will. Unlike other forms of dispossession, the establishment of risk zones is not intended to displace people in order to take away their land, and use it for other purposes. In fact, the resettlement project has been created to foster the wellbeing of affected people. As the mentioned peasant pointed out, the risk to this area is far from being a natural risk. In fact, the definition of which areas are risk zones, and which are not, has been a highly arbitrary decision. The Adaptation Fund never conducted a systematic study of risk zones in this area. The designation of risk zones was left up to the local Mayor, who was required to send a letter to the Adaptation Fund indicating what the risk zones are. In the case of Manatí, a government official made the decision without any previous field study. Furthermore, the resettlement project only considers the households located in urban areas. Thus, farms and rural households located in risk zones are not being made a part of any resettlement project. As almost every family who owns land in the countryside actually lives in the urban area, they will be partially benefited from the resettlement project. If another flood occurs in the future, their urban settlement will be safe, but their rural lands will be flooded again.

Remaking agrarian economies

In September 2012, Juan Camilo Restrepo, the Minister of Agriculture and Rural Development, publicly presented an agricultural recovery plan for the Southern Atlántico region. According to the Minister, this plan aims at making Southern Atlántico an export-oriented agricultural area (Minagricultura, 2012). The Minister's statement is not only a response to the catastrophic event of 2010 that devastated rural economies, but it also resonates with the recently signed US-Colombia trade agreement, in which agricultural products play a fundamental role. The plan includes a series of agricultural projects among which the recovery of irrigation districts occupies an important place. What the Minister never mentions is that a similar agro-economic project was developed in the same region almost fifty years ago, and that this project resulted in the reproduction of rural poverty and social inequality. In the 1950s, Colombia became part a beneficiary of a US aid policy which intended to "bring" development to "undeveloped" countries. International institutions offered loans, technical support, and agricultural input to fuel an economic model based on the exploitation of agriculture (Escobar, 1989; Sandilands, 1990; Alacevich, 2007). In this context, Southern Atlántico was identified as one of the regions with the necessary conditions to implement an agricultural scheme. Among these conditions, the fertility of its soil seemed to be a significant advantage. Agricultural projects started in this region in the 1970s, and were accompanied with a land reform program intended to allocate land to poor peasants. Southern Atlántico was mostly covered by wetlands, and therefore fishing was the main activity supporting rural livelihoods. Agricultural engineering was applied to drain wetlands and transform them into arable land. As this transformation took place, fishermen soon became farmers willing to exploit the newly created lands. At the beginning this agrarian transformation there was an increase in agricultural productivity. However, in the 1980s this prosperity started to fade. A peasant leader in Manatí explained this crisis in the following terms:

"This area was completely transformed. Agricultural production was very successful -cotton and tomatoes being the main commercial crops. We received a lot of technical and financial support from the government. People from Israel came here to teach us how to make agriculture more productive. But in the 1980s, the state started to cut credits and without credits it was difficult to keep producing. Then all the state-sponsored technical assistance was gone as well. Drainage canals were filled up with sediment due to the lack of maintenance. As agriculture declined, domestic

economies came into crisis. Then the state offered us credits but not for agriculture, but for cattle ranching. Ever since then, we adopted cattle ranching as the main economic activity, and agriculture became a subsistence activity, not a profitable one. But when the 2010 flood came, it wiped out our domestic crops and the few cows we had. We have nothing today.” - (Manatí, May 8, 2013)

The post-disaster agricultural recovery plan presented by the Minister is not without problems. First, this plan is intended to be part of the broader strategy of adaptation to climate change, but the plan does not seem to comply with this aim. What we can see is that the agricultural plan is more about adapting to a profit-driven production system than to a changing climate. When globally informed discourses of adaptation to climate change approach the local level in Southern Atlántico, these discourses evaporate and the language of markets, profits, progress, and agro-economic development take their place. This lack of coherence has given way to a number of contradictions. For instance, the majority of the arable lands that will be used to develop the post-disaster agriculture recovery plan in Manatí are located in risk zones, which are supposed to be devoid of any human occupation. Second, the creation of irrigation districts in an area where the same type of project fell apart some decades ago, should involve a more detailed analysis before its implementation. The idea of recovering agrarian economies in Southern Atlántico is still bound by a technocratic logic, and therefore does not consider the social and economic conditions under which the irrigation districts are supposed to operate. After more than two years, many peasant families in Manatí are still unable to recover their crops because they lack the economic resources necessary to start working the land. Furthermore, the agricultural plan includes the allocation of six cows to every peasant family in Manatí, but cattle ranching has proven to be an unprofitable activity since its adoption in the 1980s. In sum, the agricultural recovery plan does not consider the historical failure of agricultural technologies and development in Southern Atlántico. Without addressing the social and economic problems that peasants have been facing for years, this plan will solve short-term needs, but it is unlikely to contribute to the structural transformation of the region. Moreover, it is still difficult to discern how people will adapt to climate change through an economic project which is exclusively oriented to economic profit motivations.

CONCLUSIONS

In Southern Atlántico, flood-induced disasters have played an important role in the geographical, sociopolitical, and economic configuration of the region. By materially devastating the area, floods created the conditions for the flow of projects, programs, institutions, and external actors seeking to remake agrarian landscapes and the social life of peasants in the area in the name of adaptation to climate change. Furthermore, the 2010 floods reconfigured the geographies of everyday life by setting the stage for the political production of risk zones. A subtle peasant dispossession associated with the spatiality of risk –and in the name of welfare- is becoming an important means to achieve the goals of the National Plan of Adaptation to Climate Change. Therefore, the 2010 floods are today a critical element to understanding the agrarian transformation of Colombia. What we saw in the case of Southern Atlántico is that adaptation to climate change policies and discourses are closely connected with political and economic transformations in very complicated ways. It is still difficult, however, to determine what the effects of the plans led by the Adaptation Fund will be. But it can be said with certainty is that these plans are already fostering important changes in the ways in which people think about their domestic economies, territories, and everyday life.

I want to finish this paper by suggesting three key transformations that, from my perspective, would help to understand post-disaster recovery plans in rural areas in a more complex way:

- a. There must be a more diversified dialogue between post-disaster and agro-economic development policies. The Southern Atlántico case shows that economic recovery is fundamentally equated with profit-oriented production. This is not to say that profits are unimportant in the reconstruction of agrarian economies. But in the aftermath of disasters, the reconstruction of domestic economies must also involve practices of food sovereignty, access to land and resources, and the reconstruction of domestic social relations and economies.
- b. Even though disasters may completely destroy a place, it does not mean that they wipe out the history of this place as well. The Southern Atlántico case accounts for a set of recovery policies that fully ignore the environmental and agrarian history of this region. By acknowledging this history, post-disaster recovery plans may learn important lessons from past experiences.

- c. The idea of adaptation to climate change must be theoretically and politically problematized. In the case of Southern Atlántico, the idea of adaptation seems to be very vague and subject to multiple meanings. It is not fully clear what are the aims of adaptation. Adaptation to what? The very idea of adaptation to climate change is very abstract, and it is not easily lend itself to use as an ultimate goal of public policy. The Adaptation Fund, as a result of this vagueness, is sponsoring an agro-economic reconstruction project to be carried out in areas that are at the same time designated as risk zones.

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Transformation and barriers in the context of multiple stressors: Understandings from two rural sites in the Eastern Cape, South Africa

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INTRODUCTION

The world is becoming increasingly complex and uncertain as our planet undergoes escalating levels of environmental change (e.g. Rockström et al., 2009), including climate change, and as globalisation links countries and economic systems in multifarious and often unpredictable ways (Faber et al., 2003; Schröter, 2009). Such change is a prime factor exacerbating vulnerability, particularly for poor, natural-resource dependent people who often do not have the capabilities and assets to cope with unanticipated events, especially when these arrive simultaneously with other stresses they face on a daily basis (Adger and Vincent, 2005).

In southern Africa, people in areas where environmental and social conditions are marginal, will face unprecedented challenges as the region becomes hotter and drier. Southern Africa is expected to warm faster than the global average and to suffer more frequent, intense, and prolonged droughts as well as, ironically, more severe and frequent floods (Christensen et al., 2007). Deleterious impacts are already being felt, with these considered likely to increase over the next decades. Climate change is stressing, and will further stress, rain-fed agriculture, pastoralism, and other activities at the core of rural livelihoods in the region, and is undermining a host of ecosystem services that contribute to social welfare (World Bank, 2010).

The inevitability of this change means that policies and actions need to be put in place to protect vulnerable people, and new practices need to be developed and implemented. This process requires recognition, understanding and the means to overcome the various impediments that may block people's ability to respond to change and threats and to take-up new livelihood directions, as well as new forms of learning and capacity for adopting such practices. Consequently, the notion of transformation has emerged as a critical and growing area of research. Understanding how society and ecosystems simultaneously interact and respond to new and exacerbated drivers, stresses and forms of change, and the barriers that may hinder responses is essential for promoting sustainability in a changing world.

South African and Eastern Cape context: rural livelihoods, vulnerability, stressors and change

Stressors in poor rural communities in South Africa include short term shocks such as climate extremes, death and illness in the household, job loss and violence and crime that often arise as a consequence of longer term 'background' change, which, we argue, is fundamentally altering local social-ecological systems and rural ways of life (Reid and Vogel, 2006). Examples of these background changes include the systemic effects of HIV/AIDS on household structure and assets (Marks, 2002; Loevinsohn and Gillespie, 2003; Piot et al., 2007), land and resource degradation, urbanisation, deagrarianisation, increased reliance on social grants, and changes in demographics and values (Shackleton et al., 2010), all set against a long history of inequality, discrimination and under-development which continues to have impacts today. For many of these changes, no clear trajectories are evident, with short term stressors often working in synchrony with longer term change to negatively influence livelihoods, through creating feedback loops that potentially lead to increasing vulnerability and food insecurity (Misselhorn, 2005; Shackleton and Shackleton, 2012).

Particular combinations of immediate stressors and longer term change may have livelihood impacts that manifest in different ways in different contexts (historical, geographical, biophysical, socio-economic and political) and for different social groups (poorer versus better off; women versus men). This heterogeneity is rarely sufficiently explored, and, thus, the conditions that hamper vulnerable groups from being able to adapt or transform may be obscured and these groups further marginalized. Indeed, the failure to question underlying processes of development and change is neglectful of the very processes that shape inequities, vulnerability and adaptive capacity.

We contend that the legacy of deprivation and neglect in South Africa’s rural communal areas, combined with more recent changes that decrease flexibility, diversification and local agency as well as exposure to increased risk, may lock some households and communities into situations that prevent innovation and response. Such situations are often viewed as being ‘stuck’ or in a trap (Folke et al., 2009), and it is in these contexts that the possibility of transformation becomes crucial. Moreover, based on new climate science observations, it has been argued that in many contexts transformation will be required (Kates et al., 2012; Marshall et al., 2012), and perhaps nowhere more so than in Southern Africa. In some places and systems the vulnerabilities and risks are likely to be so severe that they can only be reduced by major reorganisation or locational change (Kates et al., 2012). Transformation can, thus, be thought to involve a fundamental change in a system’s (or parts of a system’s) structure or function (Walker and Salt, 2012), which is essential when people face multiple and intractable barriers.

Aim and approach to this paper

In this paper, we draw on findings from several sub-studies and a parallel social learning process over three years in two sites in the Eastern Cape of South Africa, namely Gatyana and Lesseyton (Figure 1). The overall project, funded by the IDRC, sought to explore how climate change, together with several other livelihood stressors including HIV/AIDS, affects vulnerability, food security, livelihood strategies and choices, adaptive capacity and coping, adaptive and transformational responses amongst different types of households. We use both quantitative and qualitative findings to evaluate whether some households, through a combination of shocks and longer term changes, may be trapped in a situation that prevents them from responding to current and future vulnerabilities. The observed changes in and of themselves, combined with other shocks, could be thought of as barriers to actively navigated transformation (Chapin et al., 2009) to a more positive state. In particular, we try to understand how historical processes, national policies and changing local dynamics might affect people’s motivation and capacity to adjust their practices and activities. We also think about social differentiation and consider whether some factors, changes and conditions act as impediments for some people and not others. Not all individuals have the same capacity to transform (Adger et al., 2009; Marshall et al., 2012), hence there is a social justice dimension embedded in thinking about transformation.

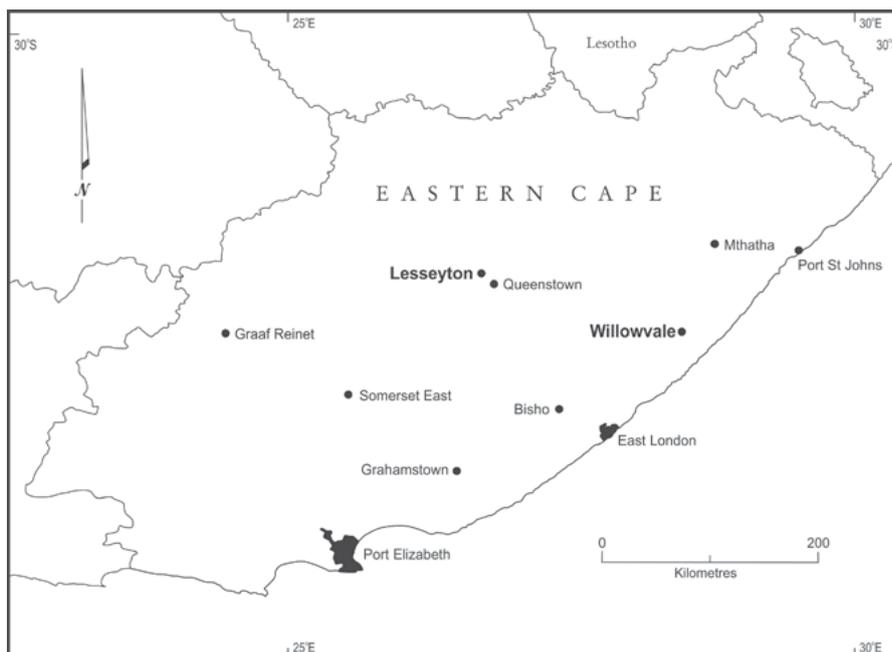


Figure 1. Location of study sites (Lesseyton and Willowvale) in the Eastern Cape, South Africa.

CONCEPTS AND THEORETICAL CONTEXT

Transformation, like many concepts, has multiple definitions and meanings depending on the disciplinary context. In social-ecological systems theory it is generally defined as “the fundamental alteration of the nature of a system once the current ecological, social or economic conditions become untenable or undesirable” (Walker et al., 2004). From this perspective, transformation is thus both similar to and different from adaptation. In contrast to adaptation that keeps a system in the same state, transformation is conceptualized as being required when human-environmental systems or components of these are over-whelmed or trapped and a complete shift is required (Kates et al., 2012). Transformation also suggests conversion to a better or more beneficial state (Chapin, 2009) and is, consequently, a normative and deliberative notion. The normative nature of transformation can lead to ethical concerns related to what constitutes a more beneficial state, for whom, at what scale and who determines this.

There are numerous types of impediments to transformation, including barriers, limits (e.g. Moser and Ekstrom, 2010) and various types of traps (e.g. Carpenter and Brock, 2008; Folke et al., 2009). We argue that the distinctions between all of these concepts become blurred when faced with the variety and complexity of conditions influencing livelihoods and their development, particularly given the lack of clarity regarding future development directions and pathways and the normative nature of transformation. Consequently, it is important to be able to recognize where historical, social, cognitive, informational, biophysical, economic and political factors acting together may pose barriers and limits to what is possible for local people (Orlove, 2009), and where these may result in traps. It is this that we explore in this paper.

FACTORS INHIBITING TRANSFORMATION IN THE RURAL EASTERN CAPE

Our research has revealed several types of interlinked, often mutually reinforcing, shocks, stressors and longer term changes in the rural Eastern Cape that together could act as impediments to transformation, both now and in the future. However, some of the factors and changes also have positive dimensions that need to be considered and weighed against negative aspects. This complex mix of factors influencing transformation is evident in a number of key areas that are described with supporting evidence below.

Legacy of apartheid and path dependence

While apartheid ended two decades ago, inequality and poverty in South Africa have worsened (Bhorat and Kanbur, 2005; Adato et al., 2006; Özler, 2007). The present state reflects the legacy of the Bantustan system, with former ‘homelands’ in rural areas remaining under-developed in comparison with former ‘white’ South African areas and cities (Bank and Minkley, 2005). The residual effects of poor education, poor service delivery, lack of land tenure rights, the undermining of agriculture and self-sufficiency, and the creation of a labor pool can still be seen and continue to impact on people’s livelihood options today. Moreover, national transformation has yet to trickle down to the rural communal areas (see quote, Box 1). Consequently, the communal areas of the Eastern Cape continue to represent some of the poorest and most vulnerable regions in the country.

These lingering effects of apartheid form an entrenched barrier to transformation, and new policies, for example, that aim to put traditional authority structures back into power have the potential to reinforce the ‘separateness’ of these areas, disempower some groups (e.g. women) and heighten social differentiation (Claassens, 2013). Furthermore, education is one of the most important assets to extract households out of poverty (May, 2006), but seems to be in a trap of its own in the rural Eastern Cape. Adato et al. (2006) argue that “the legacy of apartheid is an economy in which social exclusion and poverty continue to interact in a mutually self-sustaining fashion” and is likely to persist well into the future. This characteristic of complex social-ecological systems is referred to as path dependence (Chapin et al., 2009), and we believe it is one of the fundamental issues to be addressed to support transformation in the rural Eastern Cape.

Box 1. Past, present and future problems as discussed by Grade 11 learners in Lesseyton and Gatyana.

Past Problems: no electricity, not educated, low income, poor transport, forced marriage, no rights

Present Problems: not enough water, unemployment, health problems, crime (murder, rape, livestock theft), unhealthy environment (litter, animals), substance abuse, lack of information, distance, poor roads, teenage pregnancy, inadequate school and recreational facilities, no electricity, farming less, people are judgmental, lack of information (e.g. for bursaries), ineffective education, teachers don't come to school, corruption in school, corruption in municipality, government failing to deliver, no consequences to crime

Future Problems: The same problems as present, but some worse

"The so-called freedom is for the educated people. As for the uneducated, it has brought them nothing".

New trajectories: Changing livelihood portfolios

Livelihoods in the Eastern Cape rural communal areas are on new trajectories. We have observed trends where there has been a narrowing of livelihood activities and the use of local safety nets as well as greater reliance on social welfare (Figure 2). Together these trends could decrease resilience amongst households and hamper ability to adapt and transform. Below we focus on three different components of livelihoods in which we see substantial changes. The first is an increase in the availability and dependency on state grants. The second and third, remittances and cultivation respectively, were formally a crucial part of rural Eastern Cape livelihoods, but have undergone a long period of decline.

Social grants: window of opportunity or a barrier to transformation?

In an effort to alleviate poverty and redistribute wealth, post-1994, old age pensions in South Africa were equalized and social grants were extended to include a child support grant (Hagen-Zanker et al., 2011). While the pension amount is significant and reflects the minimum wage, the child grants are small. These changes have increased the availability of state support to the poorest South Africans. Some 15.2 million people receive grants.

Grants are critical in contributing to food security, children's education and reducing the negative impacts of HIV/AIDS (Hagen-Zanker et al., 2011; Ndlovu, 2012). But they also now form, on average, more than half of household income (Figure 2), and can result in the diversion of benefits from the intended beneficiaries; something acknowledged by interviewees in this study. This dependence on grants (Box 2), however, cannot be separated from the apartheid history of the country and its disempowering effects on poor people's self-determination and self-sufficiency, as well as the marginalisation of the areas in which they live.

Box 2. Illustrative quotes on the contribution of social grants to livelihoods (Clarke, 2012).

"I worry about how I will survive if the government stops the old age grant".

"There are six people living in this house. Me, my two daughters, my brother and grandchildren. We live on the pension that I get".

"I cannot afford to build a decent dwelling for my family due to financial constraints. And to raise children on a social grant is very hard for me. It was better when my husband was alive".

Several authors have suggested that grants can provide a 'window of opportunity'. Hagen-Zanker et al. (2011) found that pensions can help adults within the pensioner's household seek employment by providing the resources for job-hunting. Other research has shown the child grants have increased the likelihood of mothers participating the in labor market (Eyal and Woolard, 2011). Other positive aspects of grants have been to reduce risky livelihood activities such as transactional sex, contribute to health care, and support other livelihood activities. But grants as 'windows of opportunity' seem to be limited in our study areas to those who are competitive in the job market, especially those with education (Ndlovo, 2012).

Given the complex and multidimensional contexts in our study areas, there are no straight forward answers regarding the impacts of social welfare and how it is affecting future trajectories. The notion of a ‘cycle of dependency’, described by Kofinas and Chapin (2009) as a situation where individuals, households and even communities move away from traditional livelihood practices into systems with disincentives for self-sufficiency, is too simplistic. While dependencies on external support could increase vulnerabilities to change through depressing innovation and productive activity and narrowing the livelihood portfolio, these negative results may be outweighed by the importance of these grants in providing a safety net, especially for the most vulnerable (women, orphans, the elderly and infirm, and those with low levels of education and opportunity). However, this relief is often temporary as grants are lost when the pensioner passes away or the child grows up. Moreover, our results suggest that, given stressors such as HIV/AIDS, these grants are able to do little more than keep people within the status quo, ameliorating and preventing them from falling deeper into poverty. Other commentators have also recognized that the grant system alone is unable to change rural people’s lives (e.g. Bank and Minkley, 2005), and argue that the South African government’s social security system is not designed to lift a significant proportion of individuals out of poverty. For such a result to occur, social grants would likely need to co-exist with other complementary transformations such as in education (Ndlovu, 2012), and/or reductions in the effects of HIV/AIDS, or take a different form. Consequently, the role of social grants in facilitating transformation, rather than merely helping people cope or acting as a disincentive, needs further investigation (Clarke, 2012; Stadler, 2012).

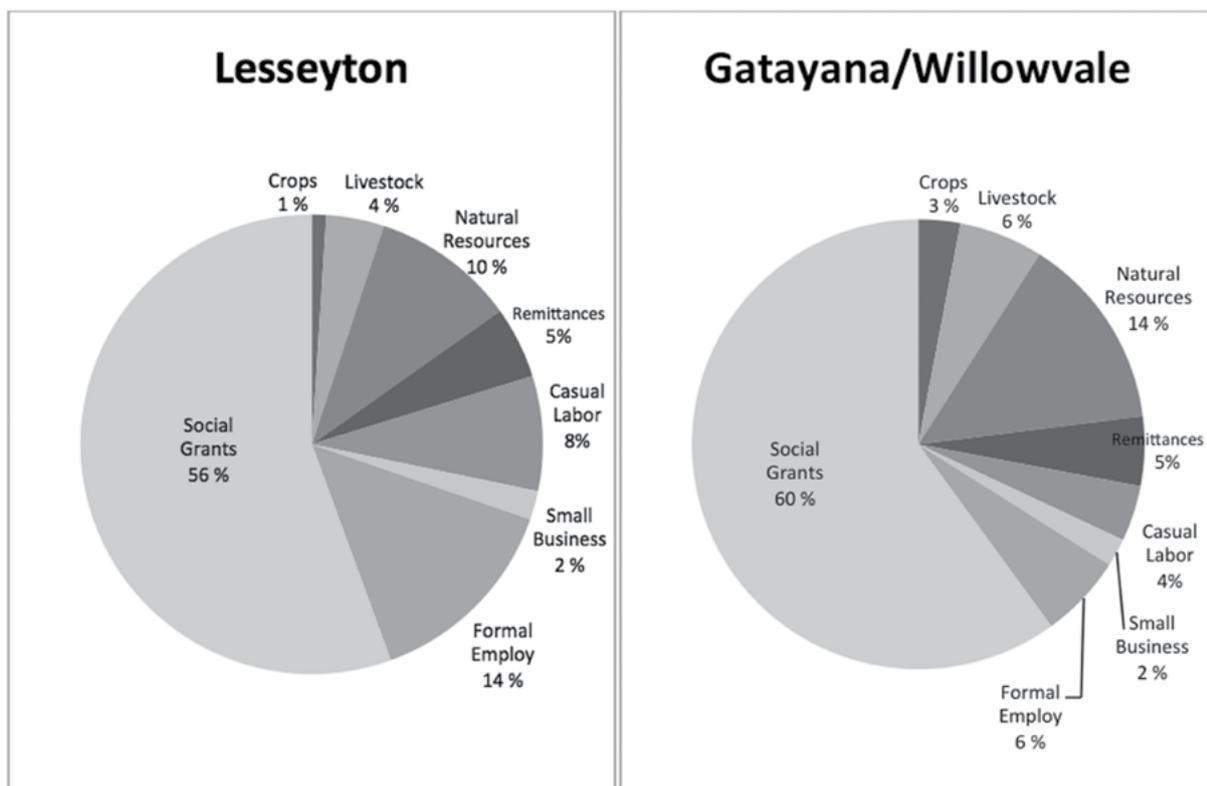


Figure 2. Average income shares from different livelihood sources across all households (340) in Lesseyton and Gatayana.

Unemployment, declining remittances and less cash

Remittances have decreased with declining employment opportunities nationally in several sectors and in the cities, especially for the less connected and educated rural poor (Bhorat and Kanbar, 2005). Further factors include ‘de-industrialisation’ including in some of the smaller towns in the Eastern Cape (Bank and Minkey, 2005) and the process of more permanent relocation to urban areas, which leaves little money to send home (Hebinck and van Averbek, 2007). The impacts of HIV/AIDS on the productive age classes of the population has also reduced remittances as ill people return home for care or to die (Bank and Minkley, 2005). Remittances now only form some 5 percent of total household income sources in our study areas (Figure 2), whereas they used to be one of the main sources of cash income (including for farm investment) for rural households (Hebinck and van Averbek, 2007). Bank and Minkley (2005) argue that “...the rates and real value of rural remittances have been declining steadily since the 1980s”, and then

go on to suggest that “the main dynamic in the post-apartheid era is that rural labor – once so eagerly desired – has become a burden to the state and an irrelevance to capital”. The decline in remittances has had the effect of squeezing the cash obtained from grants and can also be linked to the decline in agriculture, possibly further trapping people.

Field abandonment and decline in livestock

Another clear trend is a decrease in agricultural activities. Field abandonment and a decline in arable farming for both cash and subsistence purposes has been happening over several decades and could be viewed as a social-ecological transformation in itself (Hebinck, 2007; Shackleton et al., 2013; Box 3). Results from our study sites show that cultivation forms, on average, only between 1 percent and 3 percent of total household income in the peri-urban (Lesseyton) and rural site (Willowvale) respectively (Figure 2).

Box 3. Landscape change in Willowvale (Source: Shackleton et al., 2013).

GIS analysis of the Willowvale landscape over the past 50 years (1961 – 2009) has shown:

- Reduction in field cover from 12.5 % to 2.7 %
- Increase in abandoned field cover from 1.5 % to 6.9 %
- Reduction in grassland of 22.5 %
- Increase in woodland from 13.9 % to 28.8 %
- Increase in forests by 5 %
- Also an increased abandonment of home gardens, but less than fields

It has been argued that this move away from agriculture started in the 1940s (or even earlier as discussed by Hebinck and van Averbek, 2007) with the concentration and relocation of people into the Bantustans, and a deliberative process of ‘depeasantisation’ expedited through the creation of ‘labor pools’ to supply the mining industry and the marginalisation of black farmers, while white farmers were heavily subsidised (Fay, 2003; Hebinck and Van Averbek, 2007). At the same time, the policy of so called ‘Betterment’ that villagized people and zoned land for particular uses, served to separate and distance households from their fields and contribute further to their disuse (Fay, 2003; De Klerk, 2007; Hebinck and Van Averbek, 2007). However, some farming still continued, facilitated by income from jobs in the mines, which could mainly be sent home because accommodation (in hostels) and transport were provided by the mining companies (Hebinck and Van Averbek, 2007).

The greatest levels of field abandonment occurred in recent years, with Shackleton et al. (2013) finding that most past farmers interviewed in Willowvale had stopped farming, on average, about 18.5 years ago coinciding with the democratic transition and the increase in social welfare (Aliber and Hart, 2009), as well as changes in the recruiting system for mine workers (Hebinck and Van Averbek, 2007). Other drivers and reasons given for the decline in agriculture include: poor access to markets; exhausted soils; unpredictable weather; lack of labor; poverty and lack of access to credit; infrastructure decline especially fencing and roads; destruction of crops by cattle and wild animals related to both the former and to the loss of child labor for herding; a decline in farming knowledge; and institutional factors that prevent the emergence of a land rental market (Andrew and Fox, 2004; Hebinck and van Averbek, 2007). Livestock production has also declined (attributed locally to disease) although to a lesser extent than arable farming, and lack of cattle for draught has been mentioned as another reason for the decline in cropping (Andrew and Fox, 2004; Timmermans, 2004; De Klerk, 2007). Hebinck (2007) and Andrew and Fox (2004) argue that these trends have led to a disconnect between people and the land and the loss of a farming identity, with prospects for the future suggesting that the youth are unlikely to be interested in farming (Shackleton et al., 2013).

Given these declines in agriculture, an important question is whether this trajectory is narrowing options and placing people in a state of greater vulnerability, including blocking positive transformation in relation to future food security. On the one hand, many households in our study sites have large amounts of unused farmland, suggesting that it is not in their interests to undertake agriculture. But, on the other, the current high reliance on purchased food was perceived by the majority of vulnerable people sampled to be detrimental due to an increased need for scarce cash resources (Figure 3), and could become a more serious problem as food prices rise with the impacts of climate change (Schmidhuber and Tubiello, 2007). The decline in the perceived value of farming and homestead gardening also results

in the potential loss of a set of other related benefits. These include communal ethics relating to farming, and other social and cultural benefits (Andrew and Fox, 2004), reinforced ownership and entitlement rights (Timmermans, 2004), the supplementation towards incomes and food security, and provision of a safety net (Hendriks, 2003; Aliber and Hart, 2009; Hebinck and Lent, 2007).

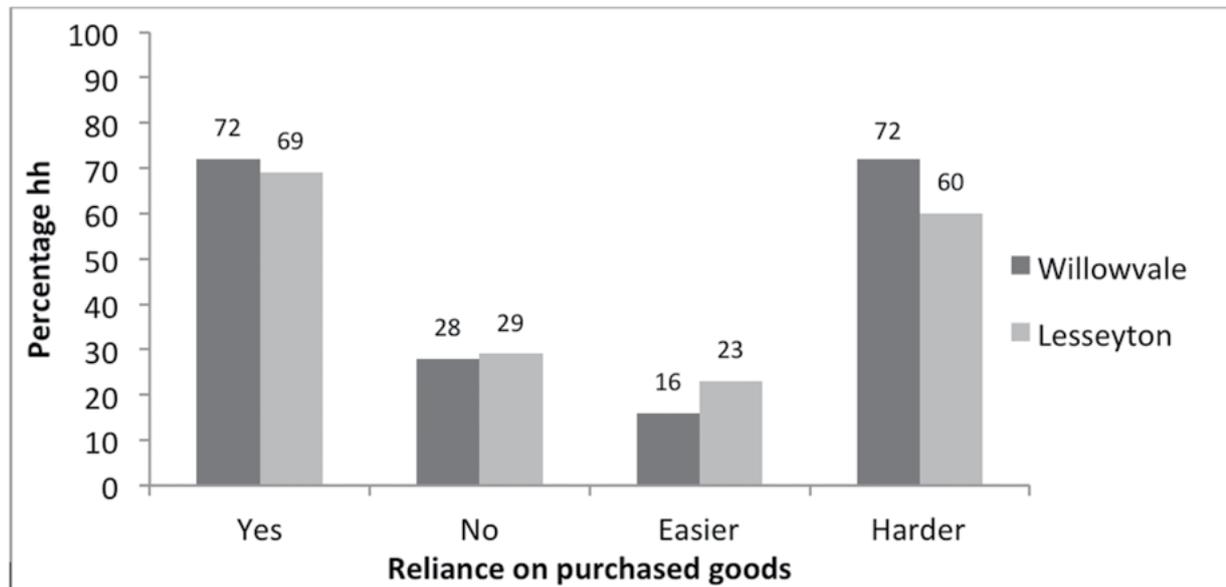


Figure 3. Reliance on purchased rather than collected natural resources and cultivated food amongst vulnerable households in Willowvale and Lesseyton and perceptions of the impacts of this (Questions: do you rely more on purchased goods now than in the past; has this made your life harder or easier?) (Source: Clarke, 2012).

Long term, insidious and asset eroding impacts of HIV/AIDS

With South Africa having one of the highest HIV/AIDS prevalence rates in the world, this disease has had major negative impacts on households and communities across the country; a situation that was further exacerbated by the government’s lack of action and slow roll out of antiretroviral drugs. In our study sites there are few households that have not been impacted in some way by HIV/AIDS (Table 1).

Table 1. HIV/Aids experiences and presence of proxy indicators by site*.

		Lesseyton (N = 170)	Willowvale (N=170)
Type of impact	Non affected %	42.4	34.7
	Chronic illness and receiving free care %	45.9	47.6
	Illness-related death in previous 10 years %	18.2	22.9
	Presence of de facto orphans %	24.1	17.6

*Percentages do not total 100 as households may have multiple experiences

Box 4. Illustrative quotes suggesting the long-term impacts of HIV/AIDS.

“In the past, the people were healthy and fit and working. Funerals were not an everyday thing as it is the case now. Every weekend there is a funeral, it has become the norm. HIV/AIDS is rife.”

“Sickness is worse now. There was no HIV and no asthma.”

Impacted households have higher and more specific dietary needs, and face the dual pressure of less productivity and income coupled with increasing health-related expenses, often resulting in a downward spiral of increasing stress and food insecurity and the erosion of assets as these are sold to pay for healthcare. At the household and community level, the deaths of adults equate to a loss of labor and skills, an upset of knowledge transfer systems, loss of professionals

and a rise in orphans. Home-based care also diverts household labor from economically or agriculturally productive activities (Weigers et al., 2006).

The effects of HIV/AIDS tend to be longer lasting and more severe than other causes of mortality. Because so many families are affected, traditional coping strategies (such as support from relatives) have been eroded (Misselhorn, 2005; Shackleton, 2006), which can affect responses to other shocks. With the significantly higher death rates of prime-aged adults, the number of orphans has grown (Misselhorn, 2005). These orphans are most often either taken in by relatives, usually grandparents, adding to the strain on household resources, or they form their own child-headed households, where they frequently experience a lack of supervision, stunted growth and poor socialisation (Barnett and Whiteside, 2002). Many of these orphans have dropped out of school and so the effects will last for the rest of their lifetime, if not generations. In the absence of adult caregivers (a major concern in the communities we worked; Figure 4), these children are particularly vulnerable to exploitation, abuse and HIV infection themselves. Many authors have made reference to the 'vicious circle' of HIV/AIDS and poverty, which can operate in mutually re-enforcing cycles, as HIV/AIDS depletes multiple forms of capital, whilst a lack of capital diminishes capacity to recover from other shocks and increases vulnerability to HIV/AIDS (Gillespie et al., 2001; Piot et al., 2007). So HIV/AIDS can create a trap, possibly putting households in the position where the income they obtain from social grants merely helps keep them from falling into deeper poverty.

Changing perspectives and values

Interviews with different actors in the two communities, including youth, the elderly and mixed groups, suggested that the rural areas of the Eastern Cape are undergoing a process of social and cultural change as new values, goals and ambitions take root. As the above sections suggest, the youth do not appear to have a strong interest in systems of local production and prefer the idea of working in formal employment. This has also been observed by other authors with respect to food gardening in urban areas of the Eastern Cape (e.g. Møller, 2005; Aliber and Hart, 2009). Moreover, adult members of the communities felt that the younger generation have lost respect for traditional ways of life and the authority of their elders and are flaunting discipline and family and community values, rules and norms (Clarke, 2012; Stadler, 2012). A key concern that emerged in our social learning meetings in both sites related to the future of the youth (Figure 4). A lack of parental care and discipline, partially linked to HIV/AIDS, were mentioned repeatedly as major factors contributing to community vulnerability. At the same time, interviews with the youth suggested that they feel misunderstood and neglected. All groups, however, commented on the serious problems of substance abuse, truancy, crime and teenage pregnancy amongst the younger generation and saw this as a barrier to development (Box 1).

These trends, together with the general perception amongst the youth of a hopeless future, their own general lack of empowerment and poor adult role models, are in line with findings of youth in marginalized communities elsewhere in the country (Campbell and MacPhail, 2002), and emphasize the need to incorporate youth in community development and adaptation planning. Reflecting the modernisation that is happening, discussions with youth groups in both sites indicated a desire for a strong emphasis on education, schooling and knowledge (Box 1), whereas these themes were largely absent from discussions with elderly groups. Knowledge and agency are important to counter-act the negative behaviors arising from not being able to imagine a bright, hopeful future (Campbell and MacPhail, 2002).

Social problems: Crime and other maladaptive behavior

Crime and the disincentives it creates

South Africa's incidences of criminal activity are one of the highest in the World (Bhorat and Kanbur, 2005), and linked to income inequality. Amongst men, women and youth in the two study sites, crime repeatedly surfaced as a major factor contributing to vulnerability, preventing productive activity including farming and small business establishment, and leading to mistrust and conflict in the community (Box 1; Figure 4; Box 5). The Lesseyton youth group mentioned how the theft of communal taps was affecting water security, and women in Willowvale cited how it has become unsafe for them to walk far distances to collect natural resources. Women and girls, in particular, are vulnerable to rape and violence (Stadler, 2012).

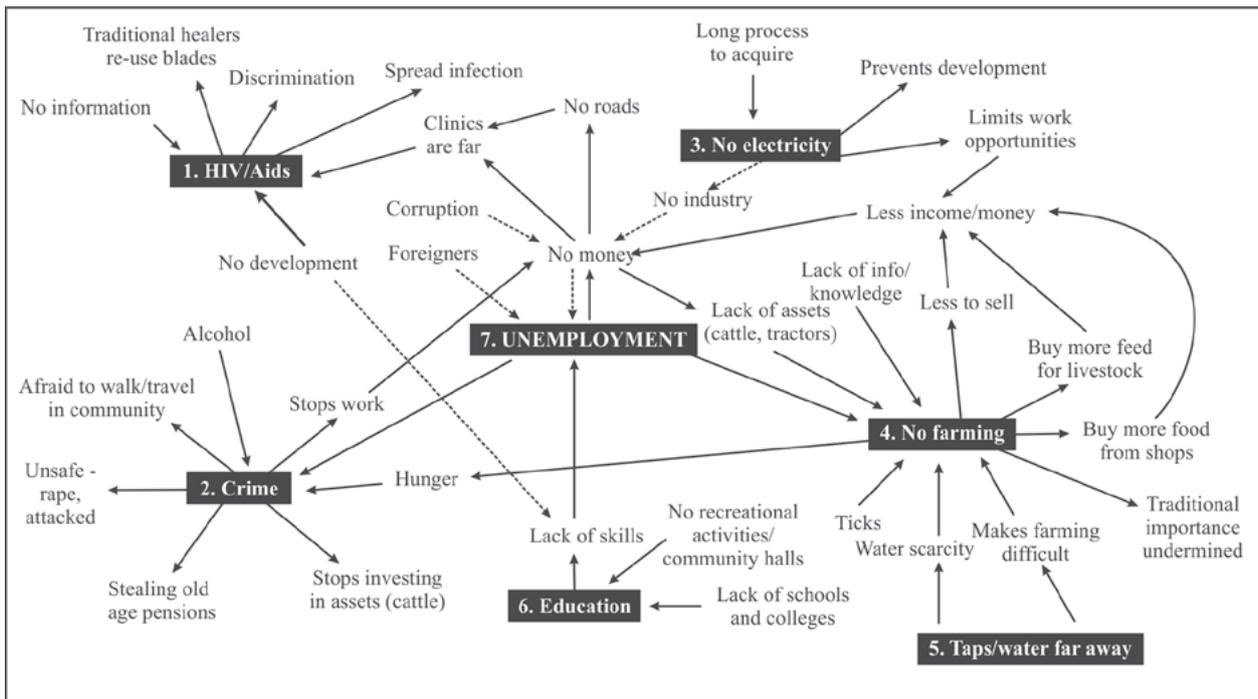


Figure 4. Participatory mental map of local stressors done by men in Gatyana illustrating the complex linkages between these.

Crime was linked to a host of problems, including: unemployment, poverty, a failing education system and school drop-outs, lack of parental care and discipline amongst the youth, and alcohol abuse, amongst others. The absence of a parent/parents within a household can impact emotionally on a child, and may increase the likelihood of children (primarily boys) becoming involved in crime (Coovadia et al., 2009). In both sites, crime was described as an inhibiting factor preventing people from investing in assets, notably cattle, fences and other farming equipment, for fear that these would be stolen. Theft was also shown to be one of the main constraints to farming in a study by Perret (2002). In addition, the youth in both sites associated crime with the lack of recreational activities, peer pressure and social media. The youth believed that there were no real consequences for crimes committed and therefore people had no fear of repercussions.

Crime was often described in terms of cyclic knock-on effects (Figure 4): crime leading to limited livelihood options, in turn driving people to substance abuse and other desperate crimes. The effects crime has on a community’s social capital and livelihood options, not to mention the health and well-being of the individual members affected, quite clearly indicates how crime can be viewed as a persistent barrier to action and transformation.

Corruption (outside and within the community) and nepotism were also mentioned as important factors affecting access to services, jobs and assets, as well as impacting on community development. Bhoart and Kanbur (2005) argue that there is a fair degree of policy inertia in terms of dealing with crime and this is evident in some of the narratives obtained from the life histories (Box 5). Crime and corruption thus form barriers to agriculture, innovation, motivation and livelihood improvement.

Box 5. Illustrative quotes regarding the impacts of crime (Source: Clarke, 2012).

“We got a phone call on a Saturday at about 12 midnight to say Grandma was being attacked by thugs. They stabbed her 4 times. Grandma stayed with a 14 year old girl. They ran away with the girl. We searched for the girl and when we arrived we found the girl dead; they had raped her and broke her neck. We are disappointed in the police in the way the case was handled. They were imprisoned for only two months and were released. In fact the case was dismissed. Justice had failed us.”

“Crime is rife. I cannot leave my chickens in the fowl run. When it is bed time, I fetch the chickens and they sleep with us in the house”.

“It was a quiet place when I first arrived here but now things have changed. There was no crime here and no murders”.

Substance abuse

Alcohol abuse was also mentioned in several discussions as a key factor that kept people in poverty (Box 1; Figure 4). About a quarter of all households purchased alcohol every month, although this was higher in male headed households (approximately 36 percent), and lower in female headed households (approximately 4 percent). It has been estimated that about one in four men and one in 10 women in South Africa experience symptoms of alcohol-related problems (Parry, 2005). Passing time in the taverns was also mentioned as a serious problem amongst young men that prevented them from getting involved in productive and healthy activities. Alcohol is recognized as a major risk factor for risk-taking sexual behavior in South Africa, with HIV intervention strategies which focus on responsible drinking showing positive results in reducing the risk of infection (Kalichman et al., 2008). Alcohol abuse also increases a person’s vulnerability if they experience social marginalisation and discrimination as a result of their addiction (London, 2009).

Erosion of social capital

Seeking assistance from family and friends was one of the most common responses to shocks in our sites (Clarke, 2012). However, there was also evidence that drawing on others for assistance is not as easy as it was in the past (Box 6). Adato et al. (2006) argue that the erosion of social capital amongst black South Africans started with the social exclusion policies of the apartheid government. However, this loss of social capital seems to have accelerated in recent years. In both our study sites, community members in various discussions (Figure 4) mentioned how crime and corruption were undermining community trust, and how HIV/AIDS was putting a strain on social networks. Generally, family members may assist in preventing destitution, but usually can’t do much more because they also lack resources (Adato et al., 2006; Box 6). A general decline in social capital (both cognitive and structural) was identified in our study sites (Stadler, 2012), although women headed households had higher social capital measures. This situation is not unique to the Eastern Cape. Hebinck and Bourdillon (2001) also observed a decline in kinship ties in rural areas of Zimbabwe, while Adato et al. (2006) found that one third of the households they had surveyed in KwaZulu-Natal reported problems of conflict and distrust between families. Linked to the phenomenon of declining cultivation has also been a disappearance of communal labor sharing work parties and after feasts, which were essential to plough and plant large areas (De Klerk, 2007; Shackleton et al., 2013).

Box 6. Illustrative quotes related to social networks (Clarke, 2012).

“People in the community are unreliable. You cannot count on them”.

“People only care for themselves. If someone assists you with anything, they expect you to pay back. They do not give for free”.

“I seek help from my sisters. The community does not help. They gossip about other peoples’ problems so I do not bother asking them for help”.

CONCLUSIONS

Our study has revealed multiple interacting stressors and changes that impede households in the communal areas of the Eastern Cape, in particular female headed households, HIV impacted households and those with low levels of education, from escaping their current state of poverty and vulnerability. The various stressors identified, combined with the highly polarized legacy of the country, effectively limit local people’s ability to take action to better their situation and respond to new or future shocks and stressors. This is supported by work by Adato et al., (2006) who argue that large numbers of South Africans are trapped in poverty without a pathway to upward mobility. Similarly, Bank and Minkley (2005) view households in the rural Eastern Cape as being caught-up in a process of ‘involution’ in which:

“economic marginalisation and disconnection inhibit social change because they lock people into a system of shared poverty, where the poor reinvent communitarian traditions of mutual dependence and risk-spreading in an effort to protect themselves from the effects of deepening poverty”.

These authors further go on to identify the rural Eastern Cape as a “case of the entrenchment of a livelihood system which has failed to either stabilize or transform itself into a new pattern under changing conditions”. Such arguments are reiterated in the work of Cundill and Fabricius (2008). They show how the Eastern Cape’s history, together with more recent experiences of poverty and mobility, has resulted in a situation characterized by high vulnerability, low

institutional capacity and the reduced production of, particularly, provisioning ecosystem services through agriculture. They contend that this represents a trap and that transformability must be at the focus of discussions about future trajectories in the region.

The multiplicity of factors interacting at an immediate level in the study communities, together with the mixture of economic and social drivers, highlight the importance of understanding local perspectives of multiple stressors to plan for effective transformation. Like Levine et al. (2012) we recognize that there is no neat distinction between risk, shock, stressors, vulnerability, barriers and responses, because in the real world they can be one and the same. As our results have shown, a stressor can be an impediment (e.g HIV/AIDS), just as can a maladaptive response (e.g. crime) or an unintended consequence of a transformation (e.g. dependencies on social grants and changes in agriculture). Moreover, research from our study sites shows that overcoming barriers that result from multiple stressors and change are likely to require multiple transformations. Addressing the traps identified with simple, single transformations may perpetuate, or even exacerbate, these. For example, Ndlovu (2012) found that the potentially transformative policy of initiating social grants for large segments of the poor population has led to reduced labor supply in productive activities. But, results also suggest that this negative effect could be overcome with improved education. Conditions at our study site suggest that addressing problems related to HIV/AIDS, crime and other social welfare issues may also be pre-requisites for transformative change, as will tackling basic structural issues related to continued neglect.

Within the complexity of traps and changes at our study sites, we argue that, while some of the changes observed could be thought of as transformations, their future trajectories remain unclear and their desirability ambiguous given the uncertainty of the future. Within this context, introducing specific, as opposed to enabling, transformations could become risky. For example, despite the decline of cultivation, and the problems associated with this trend, we believe that to introduce policies that seek to re-establish agrarian livelihoods in these rural areas will need careful consideration and specific targeting (to those still interested in farming) so as to prevent such an approach becoming counterproductive. Rather, if an enabling environment can be created, where people are educated, healthy, live in communities with minimal crime, and have the rights to self-determination, then they will be in a better position to consider the pros and cons of alternative livelihood options, including agriculture, themselves. Such an approach also helps to avoid the normative nature of specific pathways.

Overall, we agree that to transform these rural communal areas requires:

“More detailed analysis and understanding of the social, political and economic forces that have deepened and entrenched poverty in rural areas over the past decade. We need to know how existing inequalities are being maintained and reproduced. It is not enough to assume that the removal of ‘obstacles’ and the introduction of localized incentive packages will be enough to re-orientate an entire region with a long and deep history of poverty and under-development”. - (Bank and Minkley, 2005)

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How to disappear completely: Migratory farm workers, climate change adaptation and state intervention in Turkey

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INTRODUCTION

While it is widely accepted that the political economy of uneven capitalist development creates and maintains vulnerability to environmental change (Wisner et al., 2004), the role of the state in creating and maintaining the vulnerability of particular groups is relatively under-investigated. Therefore a gap is observed in the vulnerability literature as regards the specific ways in which neoliberal state interventions produce or exacerbate vulnerability and constrain adaptive capacity (see Fieldman, 2011). This study critically explores state-led vulnerability reduction interventions through a case study of migratory farm workers in a labor-intensive agricultural setting in the lower Seyhan plain located in the eastern Mediterranean region of Turkey. In doing so, it demonstrates that climate change adaptation policy and social policy in Turkey comprises biopolitical interventions that serve to maintain the vulnerability of migratory farm workers (hereafter MFW)¹ at a controllable and governable scale rather than removing its root causes. In order to establish this argument, first we briefly introduce the concept of biopolitics and establish its links with climate change. After this, we present the relation between migratory agricultural wage labor and climate change before moving on to a case study on MFW vulnerability and adaptation policy in the lower Seyhan plain in the following sections of the article. The case study is then followed by a discussion on shortcomings of designating adaptation as biopolitics. In conclusion, we argue that a collective transformation, rather than individual adjustments will contribute to a better understanding of adaptation and vulnerability and set these two concepts apart from biopolitical interventions on populations.

BIOPOLITICS AND CLIMATE CHANGE: AN EMERGING FIELD

In his advanced introduction to biopolitics, Thomas Lemke (2011: 33) suggests that biopolitics represents a “constellation in which the modern human and natural sciences and the concepts of normality inform political action and determine the goal of politics.” This constellation of human and natural sciences inform and lead the policy makers to make life as the referent object of politics in circumstances where human and nature interactions are inevitably bold. While biopolitics is most often associated with the works of Foucault (2007; 2008), Agamben (1998) and Hardt and Negri (2000), its roots can be traced back to earlier 20th century to the works of Rudolf Kjellen (Lemke, 2011: 9). However despite diverse and often conflicting views (*ibid.*) on its intellectual breadth, biopolitics is increasingly used across many disciplines to explain issues ranging from outbreak of epidemic diseases (Braun, 2007) to proliferation of GMOs (Andrée, 2002), from colonial patterns of migration (Bastos, 2008) to ecosystem security in boreal forests (Baldwin, 2013). While it is not our intention to compare different uses of biopolitics as demonstrated most concretely by the prolific theoreticians of biopolitics, we find it important to say that the rest of this article benefits from a Foucauldian understanding of this concept. As such, what makes Foucauldian biopolitics distinct is its separation of pre-modern forms of power from modern ones as regards their focus on *making lives* instead of *taking lives* by moving the focus from sovereign power over territory to biopower. We will see that this is an important attribute of the adaptation policy since climate change is increasingly voiced over population’s vulnerability rather than physical vulnerabilities of the ground conditions (O’Brien et al., 2007).

1. While migratory farm worker is the frequently used term for the people engaged in seasonal agricultural wage labor, this social group is also named as seasonal agricultural worker in the Turkish context which refers to domestic seasonal migration of communities from 11 cities predominantly located in southeast Turkey to 19 cities across the country with deficiency in agricultural labor supply (Development Workshop, 2012). While no official statistics exist on the number of MFW, government sources put the total figure at 300.000 (FES, 2012). A recent needs assessment of MFW in Turkey estimates the magnitude of migratory agricultural labor supply being in the scale of millions including children and elderly (Şimşek, 2012).

Biopower, which is the essence of biopolitics, differs from previous forms of power with its ability to *make live* or to disallow it to the point of death, *let die* (Foucault, 2003). *Making live* happens through normalization of society by a) keeping individuals under surveillance, training them and in case of insubordination punishing them, b) making populations live by insuring them from threats and c) controlling lives by managing and regulating populations (Coleman and Grove, 2009). Therefore biopolitics is often understood as myriad of processes through which states are making lives by analyzing processes of life and consequently governing individuals and populations by “practices of correction, exclusion, normalization, disciplining, therapeutics and optimization” (Lemke, 2010: 430). Through such interventions, state’s authority over population is consolidated as individuals are saved from themselves and what surrounds them. Since biopolitics do not exist in a vacuum without a security apparatus to maintain and regulate its actions, it also becomes the realm in which security concerns over life, production of life and reproduction of *status quo* flourish (Dillon and Lobo-Guerrero, 2008).

What matters for Foucauldian biopolitics is the life of populations as a cohort of biological individuals. Such a vision of populations justifies state’s use of top-down policies to enforce individual life-enhancing initiatives. Therefore populations, which fail to adapt or maladapt to changing conditions, threaten not only themselves but also the biopolitical foundations of global governance since their suffering might produce economic dislocation and social upheaval (Reid, 2010: 396). Biopolitical interventions, hence, must create adaptable individuals who neither threaten the existing economic nor political orders. These interventions can be understood as a “reorganization or restructuring of government techniques, shifting the regulatory competence of the state onto responsible and rational individuals” (Lemke, 2001: 202). According to this formulation, lives of individuals are given an entrepreneurial form, which is empowered, through development (such as the infamous magic wand of *capacity building*) to maximize their self-interests and be adaptable subjects. In other words:

“[I]n line with neoliberal logic, environmental discourse concerned with ameliorating climate change has increasingly focused upon the individual as an agent of self-monitoring, to both facilitate government agendas at a distance, and to “self-fashion” in the mode of the autonomous subject, securing [itself] against external risks.” - (Potter, 2009)

Along the same lines, those who are exposed to risks are often blamed for their exposure even if their exposure derives from circumstances beyond their control (Casper and Moore, 2009). Therefore while *invisible* segments of society are blamed or even victimized for exposure to changes beyond their control, certain risks beyond the control of those populations provide an opportunity for the state to intervene. Such intervention often takes the form of state simplification to improve legibility of populations. Scott’s (1998) influential work has shown how states use simplification to reach certain types of knowledge and have control over populations and territories.

Investigation of climate change from the lens of biopolitics entails a focus on securitization, risk and management of contingency. Most recently, Oels (2013) has shown that a shift of focus from management of possibility to management of contingency is observed in the way climate change risk is handled. This is essentially achieved by means of building self-reliant, resilient populations so that “the controlled insertion of bodies into the machinery of production” (Foucault, 1998: 141) remains undisturbed while the welfare state vanishes. Oels (2013) suggests that the rationality behind risk management through contingency is to mobilize and empower people (particularly the most vulnerable segments) to adapt to radical contingency. As we will further elaborate in the following sections, it is this understanding of adaptation as the management of contingency that becomes dominant when state deals with MFW.

Migratory farm workers and adaptation

The burgeoning literature on migration and climate change has not sufficiently engaged with issues related to migratory farm workers (i.e. mobile and seasonal forms of agricultural wage labor). MFW are arguably among the most vulnerable groups to climatic changes. Since variation of climatic conditions across years, unexpected weather shocks and more predictable life-cycle changes cause fluctuations in the supply of and effective demand for agricultural labor over time (Rogaly and Coppard, 2003), livelihoods of MFW are directly (manifested mostly as income loss and public health concerns) and indirectly (manifested as future uncertainties in available work) affected by these changes. On the top of this, availability of year-round economic activity as well as their health and well being are shaped by local conditions of those regions where MFW temporally move to work. Recent studies on migrant agricultural wage labor conclude that this group comprises a transient and invisible population as underinsured or uninsured workers in a vocation surrounded by occupational and environmental hazards (Burke et al., 2012; Winkelmann et al., 2013).

Yet there are only few studies available on the labor-environment nexus investigating MFW. Although several studies cover various aspects of migration and environmental change, only very few of them have examined MFW in relation to environmental change (see Perloff et al., 1998). Moreover, majority of research remains within a rather bounded set of disciplines, most frequently found in research lines such as rural sociology, public health, occupational health and safety and agricultural economics. Despite the evidence provided by some recent studies (Ellis, 2003; Rafique, 2003; Vasquez-Leon, 2009), which attempt to build this link, there still exists a considerable lacuna as regards the vulnerabilities of this group. It is with this rationale that the following sections provide a critical insight on state intervention on MFW at the intersection of social policies and adaptation policies.

METHODOLOGY

We have conducted an in-depth case study (Yin, 2003) on the state intervention and MFW in Karataş province of Adana located at the southern tip of lower Seyhan river basin Turkey (see Figure 1). The region was selected since it is the largest migrant seasonal labor destination in Turkey, with tens of thousands of MFW arriving to supply wage labor every year between early February and late October. Moreover this region was targeted for pilot adaptation studies by the Ministry of Environment and Urbanization due to the severity of anticipated impacts (see Fujihara et al., 2008 and Şen et al., 2011).

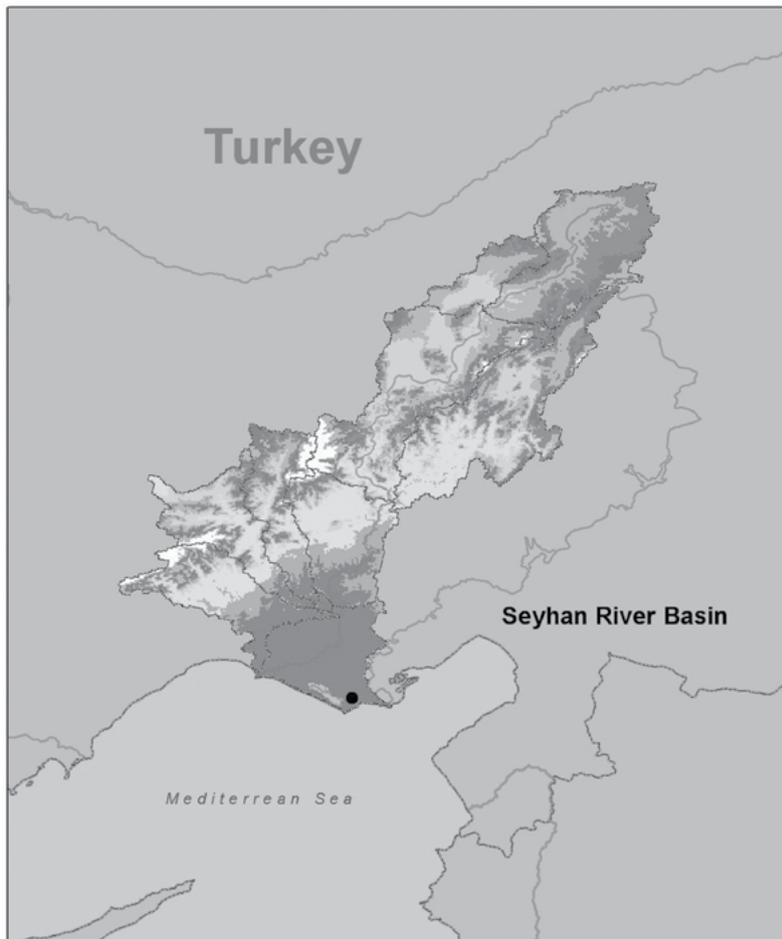
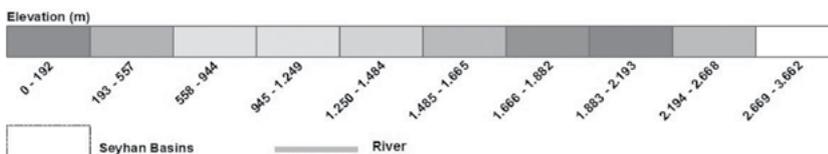


Figure 1. Map of Seyhan River Basin (Courtesy of Hannes Etter, UNU-EHS).



Source: GADM Vers. 2; CIGAR-CSI

Fieldwork involved two months of direct observation, 30 semi-structured interviews and many more informal encounters with MFW, intermediaries and landowners between February-April 2011. Interviewees were reached through snowball sampling with the help of key informants such as the president of the association of agricultural intermediaries, the head of Tropical Diseases Research and Application Center at Çukurova University, the president of Chamber of Agricultural Engineers and a social worker involved in schooling of MFW children in the region. Direct observation consisted in having lunchtime and after work talks with MFW, spending time with them in their encampments and moving around with the president of association of agricultural intermediaries.

DISAPPEARING VOICES, REAPPEARING VULNERABILITIES: MIGRATORY FARM WORKERS IN THE LOWER SEYHAN PLAIN

In a warm and humid day of early spring when one moves across the wide open lower Seyhan plain, s/he can witness the change of landscape over the course of a few weeks with the arrival of MFW spreading around the plain sporadically. Once the winter is over and the agricultural season begins, Karataş gradually receives tens of thousands of Kurdish and Arab migrant workers virtually all coming from eastern and southeastern provinces of Turkey. These communities are the source of manual labor for the labor-intensive agriculture in Karataş. With their arrival, white stripes of low greenhouses setup for watermelon, tomato, pepper, eggplant and similar vegetable production start to dominate the landscape. This change of landscape visually depicts the beginning of a new calendar by February. MFW will work here until May to finish their work in early grown vegetables and move elsewhere (often towards central and northern Anatolia for sugar beet, onion or hazelnut harvest) to continue working more or less until the end of October in planting, hoeing, irrigating and harvesting of various crops while some return to Karataş later in the year for cotton harvest.

Structural vulnerability of MFW in Turkey can possibly be explained in two parts: First by the harsh nature of labor-intensive agricultural wage labor itself and second by the ethnic division of labor, unequal power relations, dispossession and disruption of livelihoods which has historically progressed in Turkey parallel with the following factors. A transformation in agricultural class lines from “feudal landlord” to “capitalist farmer” and from “sharecropper” to “wage worker” has been occurring in Turkey since the 1950’s. This shift was further accelerated by the introduction and promotion of modern agricultural tools through US Marshall Plan, initially aiming at investing the relatively well-off North American capital outside the USA in the name of development aid and thus avoids problems of over-accumulation (see also Wood, 1986). Marshall Plan had a decisive role in agriculture in Turkey by changing the form of accumulation from trade capital to productive capital and thus gave Turkey an agricultural role in a new world system (Tören, 2007). This agricultural role was nonetheless favoring large landholdings over small peasantry, which was the dominant mode of production back in the day.

Seyhan plain is one of the first regions in Turkey where climate change impacts on agriculture was analyzed and presented within Turkey’s national climate change reports. Moreover it was the geographical focus of the first community-based adaptation project that UNDP Turkey implemented between 2008-2011. Results from global circulation models downscaling for the region estimate 2-3.5°C increases in surface air temperatures accompanied by 25 percent reduction in winter precipitation by 2070 (Fujihara, 2008) while other regional climate model (Şen et al., 2011) projections point at a 6-7°C increase by the end of the century. It is inevitable that such changes would have impacts on labor-intensive agricultural production and MFW livelihoods in the region.

Indeed, in the face of changing socio-economic and climatic conditions, landowners in the region already state that they are in favor of moving to capital-intensive crops and expensive modern greenhouse technologies, which will require less labor. As one of the respondents suggested “*[I]f advanced technologies would become cheaper, worker hassle will also diminish. Producers will be happy.*” (Interview #19, male, agricultural engineer). Yet today easy access to cheap labor is still an issue. After acknowledging that climate change is still perceived as a distant threat, a senior official from the Chamber of Agricultural commented as follows:

*“The third biggest problem of production here [after input and climate] is the shortage of labor. Producers cannot find workers because of increasing education levels and social opportunities. [...] Yet as long as there is product to harvest, there will be workers coming here. **They will adapt.** The impact of [climatic] changes will become more evident as delay in payments and loss of money for the workers” - (Interview #21, male, senior official from Chamber of Agricultural Engineers).*

While these words put the need for them bluntly, MFW are hardly considered to be a factor in future scenarios of the region. Both state institutions and local stakeholders only seem to consider MFW as a social group whose labor circulation should be secured under uncertain conditions by all means. In order to ensure this, state interventions attempt to guarantee that settlement, transportation and working conditions are reformed to ensure that their circulation continues without raising demands for better wages, treatment as equal citizens and fair working conditions. State authorities and landowners opt for improving temporary encampments rather than establishing prefabricated settlement zones and convenience facilities.

Notwithstanding the visibility of thousands of workers in the field who move across spaces, producing information related to MFW in the region is considered as “a delicate issue” and “no one wants to have a headache” (Interview #1, female, rural development expert). It is a delicate issue not only because MFW arguably comprise the poorest segment of society but also because ethnic segregation marks the basis of their vulnerability. Vulnerability of MFW towards climatic and economic shocks is therefore:

“[...] Much worse than any other social group to begin with. Although I did not directly observe any influence of climate or drought on their wages, I have seen in many instances that they were not paid when the prices for cotton or watermelon were low in the markets. As you know this is an informal economy. They depend on the mercy of the landowner. Yet [...] when a climatic or price shock happens, it affects everyone in this informal system, from top to bottom” - (Interview #1, female, rural development expert).

Yet potential disruptions to the current mode of production are underway. In responding to these disruptions posed by i) socio-economic shocks due to fluctuations in global agricultural markets and ii) unexpected extreme weather events; two recent policy measures mark a change in the way the Turkish state handles MFW vulnerability. These two policies can be categorized as adaptation policy and social policy respectively.

First of these policies, National Climate Change Action Plan (NCCAP) defines the vulnerabilities of various sectors in Turkey and sets priorities and responsibilities for adaptation. Seasonal agricultural workers are defined among the most vulnerable groups to climate change especially with regards to public health impacts of climate change on vulnerable populations (MOEU, 2011). While this is the case, no specific actions are defined to reduce this vulnerability. Instead, MFW were included in a pilot public health study within the scope of aforementioned UNDP-led project.

Issued by the Ministry of Labor and Social Security (MLSS) in 2010 to improve the living and working conditions of these communities, the second policy, which is at the focus of our attention is titled as “National Strategy and Action Plan for Improving Work and Social Lives of Seasonal Migratory Workers” (METIP). Aim of this social policy intervention, on the other hand, is defined as “meeting the long-term qualified labor demand of the country through registering seasonal agricultural workers and improving their living and working conditions especially those of children” (MLSS, 2010). As we will further explore in the coming section, it is our contention that while adaptation policy mainly renders MFW vulnerability solely as a public health issue, METIP seems to aim at stabilizing the good circulation of labor and securitizing its presence. In what follows, we explain how this happens by critically reflecting on the content and practice of those two key policies by building on information from the field.

“THEY WILL ADAPT”: ADAPTATION AS BIOPOLITICS

Rendering MFW as adaptable and governable subjects

Our first finding indicates that instead of dealing with the root causes of vulnerability, state intervention comprises a biopolitical response in two distinctive ways: first, by attempting to create ‘adaptable MFW subjects’ who will individually assume the responsibility to deal with risks related to possible future economic and climatic changes; and second, by attempting to create controlled circulation of MFW governed through securitizing their presence with technologies of control of their movement. As such, the state opts for “hard” interventions that facilitate agricultural intensification and “soft” measures that contribute to individualized risk management of their condition (as manifested by labor circulation) by MFW.

Through METIP, 24.3 million USD was disbursed in 2010, 15.1 million USD in 2011 and 11.6 million USD in 2012 by the state, targeting at improving the living and working conditions of MFW. Most of this money was spent on infrastructure projects such as “hard adaptation” interventions aiming at intensifying agriculture, fixing irrigation ditches in the region as well as improving ground conditions of MFW settlement zones, i.e. through provision of water wells and electricity on the condition that utility costs will be borne by workers themselves (Personal communication with a provincial public officer, 28.02.2011). “Soft adaptation” interventions, on the other hand, work through capacity-building trainings for MFW and is utilized by the state to implement a particular vision of those communities as subjects adaptable to economic, environmental and political changes as well as able-bodies providing a circulation of cheap and agile labor force. Thus in both adaptation interventions and social policy domains, MFW are considered both as *risk* (security-wise) and *at risk* (agricultural labor supply-wise) and decisions are taken on their behalf by the government on how and what they should adapt.

Policy interventions arguably reduce structural vulnerabilities of MFW into a self-help personal hygiene problem, which shows a dire contrast with the need for answers to structural problems of social exclusion, inequality and historically constructed power relations, which contribute to public health risks. Outcome of a recent public health risk assessment graphically describes some of those interventions:

“The project aimed to reach 3600 of the 12000 people who have migrated from east and southeast Anatolia as seasonal agricultural workers and settled in tents and sheds in the towns of Tuzla and Yunusoğlu in the district of Karataş, and around canals near the Seyhan river in the town of Yumurtalık, to diagnose and treat transmitted diseases and determine the vectors (such as insects and animals). [...] Aside from transmitted diseases, access to clean water and education are also critical problems in the area. [...] Within the project scope, hygiene products, toothbrushes, toothpastes, shoes, t-shirts and blankets were distributed. Training on sanitation and hygiene was given.” - (UNDP, 2010)

As Şener (2010: 27) notes, risk management frameworks promoted by states in the neoliberal era tend to produce *responsible poor citizens* who should be competent in self-management of chronic conditions. MFW, in the formulation above, are identified as the resilient subjects who are able to take care of their own. Such a resilient subject:

“[i]s adaptive in that it is capable of making those adjustments to itself which enable it to survive the hazards encountered in its exposure to the world. In this sense the resilient subject is a subject, which must permanently struggle to accommodate itself to the world. Not a political subject, which can conceive of changing the world, its structure and conditions of possibility, with a view to securing itself from the world. But a subject which accepts the disastrousness of the world it lives in as a condition for partaking of that world and which accepts the necessity of the injunction to change itself [...]” - (Reid, 2012: 74)

Ensuring invisibility and maintaining the circulation

While public health interventions present one side of the coin, we argue that state’s control over MFW encampments as *non-places* (Auge, 1995), serve as the other side of the coin. These are the encampments in which *good circulation* of labor is maintained without creating the possibility of a long-term settlement, yet providing prospects for a temporary (albeit controlled) return in the future. Such settlements provide a temporary space for MFW, who need to leave as soon as their work finish for other agricultural fields to continue their migration and contribute to the production of surplus without causing much hassle neither to the landowner nor to the provincial government. While official discourse focuses on vulnerability reduction in agriculture, MFW still remain absent from the picture.

“The acts of the state through ministerial decree and action plans involve nothing of a sort of registering and regulating MFW as formal workers with social security and dignity of work. This is cheating. You can not just get away by claiming to improve the working conditions” - (Interview #1, female, rural development expert).

Precarious presence of MFW in the field ensures the continuation of accumulation of agricultural surplus and acts as a buffer for labor-intensive agriculture against deteriorating environmental conditions by keeping labor costs low. Policies, which allow this good circulation creating agricultural surplus, also make it possible to prevent bad circulation through partial improvement of physical conditions and ensuring surveillance to maintain a good body of agricultural labor reserve. We can find evidence of such treatment in NCCAP’s portrayal of MFW as well as and the insistence of METIP on ensuring non-permanence of encampments. A recent publication of UNDP on pilot adaptation projects in

the region depicts a photo of migratory farmworkers with the caption “*Tropical diseases are important especially for the health of people living in tent villages in the basin*” (UNDP, 2012: 40) and proposes the following as a policy priority:

“*To conduct studies on the prevention of [permanent] migration, and identification and control of social problems.*”
- (UNDP, 2012: 39)

There are two serious problems with both statements above. First, describing migratory farmworkers simply as “people living in tent villages in the basin” strips the issue of all its historical, political and economic relevance and simply turns it into an issue of some people randomly happening to live in *tent villages* on their own will. Second, while public health interventions, aiming at improving living and working conditions of communities facing climate risks are important, it raises questions on why the prevention of permanent migration to the region is among policy priorities. Instead of a structural transformation, which will formalize the work arrangements and provide protective social measures (i.e. social security, housing, representation in decision-making on MFW matters), local actors (both state officials and landowners) prefer patch-wise interventions whose sole proponent is the state itself. It can be argued that this is due to the emphasis of biopolitics on “infinite substitutability of one thing for another in the circulation or intercourse of living things made available by the advance of the calculability of circulation as such” (Dillon and Lobo-Guerrero, 2008: 281). As long as circulation of MFW can be calculated and regulated, there are infinite chances for substitution of new groups of those who are hit by the anticipated impacts of socio-economic and environmental shocks with new MFW. Thus, a structural transformation, which will challenge *status quo*, is neither desired nor required by those who have the power to decide.

DISCUSSION

Adapting to contingency: Governing invisible communities

By using a biopolitical lens, Reid (2012: 71) suggest that the “exposure to threats is a constitutive process in the development of living systems, and thus the problem for them is never simply how to secure themselves but how to adapt to them”. Thus in a similar fashion, we argue that particular state policies redressed as biopolitics adapts populations to observed changes rather than removing the root causes of vulnerability in order to safeguard the profitability of agricultural economy. This process makes Turkey’s MFW into invisible subjects through two mechanisms seen in both policies mentioned above. First mechanism operates through rendering MFW adaptable to any environmental/economic shock by the nature of their mobility. Second mechanism, however, works through extending initiatives such as public health interventions in the name of vulnerability reduction without properly addressing the structural shortcomings of informal employment without access to social security. This implies a shift in state’s vision on vulnerability reduction from territory to population with adaptation being its means of application. As Aradau and Blanke (2010) observe while sovereignty acts upon a territory and disciplines a particular space, biopolitics focuses on temporality and handles the conditions as separate incidents on their own. In a similar vein, adaptive state interventions in Seyhan region work to handle vulnerabilities separately and without an eye for a collective transformation of these conditions.

Our belief is that the invisibility of MFW before the state policies serve both ways: i) it helps the marginalized community to be relatively outside of the radar of the state thus saves itself from coercive force; while it also ii) helps the state to underplay a whole series of issues that it is obliged to provide such as health care, dignified living and working conditions, social security, social integration, equal citizenship etc. Contingencies (i.e in our case, manifested as extreme weather events) provide the platforms where this invisibility can no longer be maintained since skewed nature of relations appear. Therefore while making the MFW community visible due to sudden and intense suffering they are exposed to (mostly in cases of flood or hail), contingencies also makes it impossible for the state to stay indifferent since the production system is disrupted. So this junction state intervenes in order to adapt the population to contingencies to maintain the *status quo* rather than reconfiguring the physical and social terrain on which they work.

Reasons behind biopolitical responses to a changing climate

While a shift in migration patterns under changing environmental and socio-economic conditions may seem intuitive, such a shift is connected to broader class dynamics and accumulation opportunities. A highly complex set of factors shape the relation between environmental change and migration behavior. As Warner et al. (2010: 697) observe, “environmental change does not undermine human security in isolation of broader factors such as poverty, state support

to communities, access to economic opportunities, effectiveness of decision-making processes, and the extent of social cohesion within and surrounding vulnerable groups.”

This is most evident in the case of MFW with regards to two key aspects. First of all, similar to most smallholder farmers in the developing world and all the landless elsewhere, MFW are marginalized in power and decision-making. Toulmin (2011), in the context of smallholder vulnerability, discuss that this is a consequence of large numbers of people, weak and costly organization and consequent very limited political power. Historical analysis suggest that MFW in Turkey are incompletely dispossessed, which means that although a significant portion is landless or own small landholdings which is not enough to subsist, they are not detached from the rural social relations leaving them with the only survival opportunity to organize in unions as free laborers (Toprak, 1997).

Understanding adaptation as biopolitics, on the other hand, helps to reinforce practices through which circulation is organized. It helps to eliminate its dangers and provides clear divisions between good and bad circulations by maximizing good circulation and hindering bad circulation (Aradau and Blanke, 2010). Therefore by providing reactive responses to changing environmental conditions, adaptive interventions of the state help to regulate the circulation of MFW. As such state allows circulations to take place, controls them and ensures that right things are always in movement (Foucault, 2007: 65).

Foucault identifies circulation as the space in which biopolitics operate. This circulation has to be monitored and regulated (Dillon and Lobo-Guerrero, 2008: 268). Hence while good circulation (i.e. Mobility of cheap labor) is securitized and protected in Seyhan plain, bad circulation (i.e. Uncontrolled movement of laborers due to socio-environmental risks they are exposed to, health problems they may be exposed to due to environmental conditions) is regulated and adverse impacts are prevented. In this regard adaptation policy embodied in NCCAP provides a clear and legitimate terrain to intervene in protecting the labor-intensive political economy. Hence it is our contention that social policy interventions like METIP on ameliorating the living and working conditions of MFW provide a safe ground on which circulation can be maintained. As Felli and Castree (2012:1) observe, considering migration (or circulation in this case) as adaptation contributes to a mindset producing ‘adaptable’ human subjects, which these authors identify as “people able to respond tactically to anthropogenic alterations of the biophysical world while becoming ever more the subjects of capitalist market relations”. Similar criticisms are also voiced over global adaptation responses, which promote heavily monitored and managed temporary and circular migration schemes instead of open border policies.

Biopolitics, as Dillon and Lobo-Guerrero (2008) argue, does not manifest itself as a condition of possibility of freedom while securing the existence of populations. Rather it is interested in regulating the behavior of those very populations as far as adaptation and transformation are concerned. The two policy responses mentioned above are failing to address the root causes of the vulnerability of MFWs since they are designated as biopolitical approaches from the scratch. This is arguably due to the fact that these policy measures tend to favor adaptation of the populations rather than addressing the socio-economic conditions, which create vulnerability in the first place. Thomsen et al. (2012) name such measures as *manipulation* since these measures shift the adaptation debate from “how we should behave” to “how life should be”. Henceforth, similar biopolitical practices shape the capacities for adaptation and change, when fitness of the populations is in question (Dillon and Lobo-Guerrero, 2008: 271).

Therefore it is no surprise that piece-meal adaptation, which does not challenge the status quo in agricultural production, can serve to maintain an existing power constellation. Such a vision observes that adaptation is increasingly being “used to reconstitute a growth driven development agenda without stopping to consider whether these approaches are appropriate in addressing either the challenges of climate change or the needs and aspirations of local communities.” (Ireland and McKinnon, 2013). Creating adaptable human subjects, who can improve their conditions through use of charitable interventions, operationalizes this vision.

On top of these charitable visions, it can also be argued that a biopolitical vision of adaptation shifts the focus of attention from territory to populations. Enforcing the ‘hard’ adaptation in agriculture follows the territorial logic of sovereign power of the state to maximize surplus and to ensure profitability of the agricultural territory. ‘Soft’ adaptation options, as redressed biopolitics on the other hand, do little more than amelioration of MFW settlements, disciplining of able bodies to take care of their own and ensure good circulation. Adaptation measures such as sporadic public health interventions cannot act as vulnerability reduction policies. Instead of transforming, they adjust to future changes by

reproducing power structures. Yet if adaptation is to be effective and serve the needs of most vulnerable communities, it should be envisioned as a deliberate transformation rather than adjustment of the ground conditions (O'Brien, 2012; Rickards and Howden, 2012).

CONCLUSIONS

A long tradition of state-led, top-down development in Turkey keeps adaptation hostage to its ambitions while downplaying the conditions of vulnerable groups. Similar to the case in malaria eradication, state officials “not only shrink society to a thin abstraction of itself, they also alienate the very population and communities they seek to educate and govern” (Evered and Evered, 2012: 322). A key argument of this article is that while the state mobilizes, contests and negotiates the environment-labor nexus in the context of adaptation, its interventions also aim at making vulnerable groups legible, simplified, homogeneous and thus governable. Biopolitics, in this sense, emerges as the modality of governance through which political economy of the society goes unharmed from anticipated changes. This, we argue, is achieved through regulating circulation of cheap agricultural labor in the lower Seyhan region.

While it is hard to discern anything related to aspirations, needs and demands of MFW in the adaptive interventions in Seyhan region, it is even harder to claim that state acts to include them at any step of policy-making. Recent critiques of existing adaptive responses claim that existing conceptualizations of adaptation are aimed at accommodating change, rather than contesting it (Pelling, 2011; O'Brien, 2012). Such critiques lead to a conclusion that “current systems and paradigms are accepted and in some cases modified, but rarely critically questioned or challenged” (O'Brien, 2012: 669). This unquestioning of the dominant paradigms fits well with the case of MFW and points at a need for a transformative change in the way MFW vulnerability is handled.

In this piece, we presented MFW in Turkey as a key vulnerable population whose lives are being rendered governable through biopolitics redressed as social and adaptation policies. In order for farms to become sustainable workplaces, MFW need to have access to decent employment and living conditions, and participate in decisions that affect their lives and workplaces, such as adaptive interventions in agriculture (Hurst et al., 2007). As Grove (forthcoming) eloquently observes the challenge in this is establishing an “affirmative biopolitics of adaptation”, one which provides “a politics of life organized around security *from* rather than *for* neoliberal order.” This will doubtlessly require a consideration of MFW as a key component of the agro-ecological landscape and give them a voice in transforming the very causes of their vulnerability. Unless conditions, places and ideas valued and aspired by MFW are included in policies targeting vulnerability, chances for a transformation to improve their conditions stand slim.

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Transformations in land use in the southwest coastal zone of Bangladesh: Resilience and reversibility under environmental change

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INTRODUCTION

The political economy of land use change in the tropics and the conflicting land uses of agriculture, forests, pasture and aquaculture represent radical and deliberate transformations. These land use transformations are central in driving macro-economic development in such regions (e.g. Lambin et al., 2003). Shrimp aquaculture, for example, has transformed land uses within delta and coastal environments. Significant short-term economic returns have been achieved but they are coupled to trade-offs, negative externalities and significant conflicts over the inception, propagation and functioning of such systems (e.g. Lebel et al., 2002; Hall, 2003; Rahman et al., 2006).

Much of the current literature on transformations argues that they can potentially be steered and managed for sustainable futures with widely shared values and benefits (Kates et al., 2012). Yet, Nelson et al. (2007) argued that many transformations are likely to be imposed, unforeseen, and represent significant disruption to societies and environments. While the Kates et al. (2012) perspective of steering society through positive transformations is an appealing normative view on future transformations, it is important to learn the lessons from the radical changes that continue to be implemented in environments and economies throughout the world. There is a need to highlight how and why these transformations fail to realise sustainable solutions even with stated and real intentions to harmonise human well-being with environmental sustainability. Learning lessons from such deliberate transformations with inadvertent negative outcomes are critical for the future.

The southwest coastal zone of Bangladesh, in common with these global trends, has undergone transformations in land use over the past 50 years. In the 1960s, government interventions driven by food security concerns protected the seasonally flooded floodplain through the creation of embankments (or polders as they are locally known, from the Dutch term). Later, driven by global markets and local malfunctioning of the polder system, local interests converted some of these polders to shrimp aquaculture by allowing saltwater to enter. Government policy subsequently supported conversion as a way to generate foreign export which had wide reaching implications for agricultural productivity and the sustainability of the socio-ecological system. More recently, interventions take a at more sustainable, ecosystem driven approaches, with varying degrees of success.

This paper examines these land use changes from the perspective of socio-ecological systems to provide insights on transformations, and their resilience and reversibility under climate and policy change. The application of socio-ecological systems theory illuminates reasons why transformations occur, why some persist when others are unsuccessful, and why transformations may not produce the planned benefits. We demonstrate that land use transformations involve deliberate action to maximise economic returns from one part of the system, and that such specialisation and reduction in diversity amplifies the difference between winners and losers, exacerbating inequality and other outcomes that are detrimental to social cohesion and the long-term viability of the system. Hence, significant efforts to transform natural processes for poverty alleviation goals have only had marginal impacts.

Furthermore, we argue, that such transformations have inadvertently imposed risks and insecurity, as not only have they failed to increase aggregate well-being, but have locked systems into this regime of unequal returns and persistent

insecurity. We show that there is potential significant hysteresis in such transformations. In other words, there is no way back when physical environments are transformed, by polders and shrimp aquaculture, to systems that are more sustainable. Therefore, past transformations become a barrier to successful transformation in the future, and they create a situation that is maladaptive under environmental and social change.

Socio-ecological systems function in a non-linear manner, exist at different scales and in different states. In the context of this research, we define socio-ecological systems at a landscape scale representing an area of homogeneous land use and associated livelihoods and ecosystem services. A transformation occurs when, as a response to external perturbations, systems move into a different state with radically different characteristics. The new state may be more or less desirable under various criteria, and more or less stable. Therefore, the resilience of a system is defined by its ability to survive perturbations without radically changing its characteristics. Resilience is a function of four initial starting parameters: the amount of change a system can absorb before it crosses a threshold into a new state, how difficult it is to change the system, how close a system already is to the threshold, and the influences working on the system from other scales (Walker et al., 2004).

The remainder of the paper is divided into five parts. First, the paper describes the land use transformations that have taken place and explains the characteristics in the context of socio-ecological systems. The paper then discusses why the transformations in the environmental realm have not lead to equivalent transformations in the social realm. Finally, the paper discusses reversibility and the role of deliberate transformations in preventing socio-ecological systems from continuing to evolve under change. The paper concludes with implications for humans' ability to drive successful transformations in the future.

HISTORY OF LAND USE TRANSFORMATIONS ON THE FLOOD PLAIN

This section provides a brief history of the land use transformations that have taken place in the southwest coastal zone of Bangladesh, the relative resilience of each of the systems and the drivers of change. While conversion of mangrove to saltwater shrimp aquaculture is the dominant narrative of land use conversion on tropical coasts, there are intermediate steps in the case of the southwest coastal zone of Bangladesh. Forest clearing for agricultural production and settlement, followed by enclosure of agricultural land within flood protection infrastructure preceded the introduction of shrimp aquaculture. While this paper describes these land use types as a sequence, each land use type also exists contemporaneously with important exchange and trade-offs of ecosystem services occurring between them. While most of the land area has been protected from flooding, wetlands still experience seasonal inundation and conversion to flood plain and many people still inhabit areas along riverbanks unprotected by infrastructure.

SUB-TROPICAL MANGROVE FORESTS

The southwest coastal zone of Bangladesh is part of the Ganges Tidal floodplain and was originally forested with mangrove species. While deforestation and settlement of the area started in the Mughal period (1526-1756), British rule accelerated this deforestation between 1765 and the mid-1800s as the forest resources were required for railway and ship construction. Landlords installed by the British to collect taxes (Zamindars) encouraged deforestation to increase cultivation and taxes collected (Roy et al., 2012). In the latter part of the nineteenth century, the British began to recognise the economic value of the resources in the Sundarban and brought the remaining forest area under state ownership (Roy et al., 2012). While earlier ordinances regarding the forest aimed to maximise abstraction of natural resources, later policy focused on the sustainable management of the forest, with some consideration of community management (Roy, 2009).

The Sundarban forest protected area represents the majority of the remaining forest systems and the ecosystem services it provides help to sustain a range of livelihoods. The Sundarban forest provides livelihood to wood cutters, fishermen, honey and wax collectors, shell collectors, timber traders and workers, workers of fish drying industries to name a few. It is estimated that the forest ecosystem provides direct employment for 500 to 600 people in Bangladesh. According to a baseline study in the impact zone of the Sundarban, a zone of 20 kilometres surrounding the border of the Sundarban, a fifth of households are dependent on Sundarban resources (Islam, 2010). The Sundarban forest supports many ecosystem processes including water purification, sediment trapping, shore stabilisation, assimilation of pollutants (Barua et al., 2010), and coastal protection from storm surges (Barbier, 2006). Furthermore, the ecosystem

processes the forest supports are important to other socio-ecological systems in the coastal zone. For example, the majority of the supply of shrimp larvae for culture is collected from the Sundarban forest (Islam, 2010) and the forest provides nursery grounds for offshore fisheries.

However, while the Sundarbans are a forest reserve where law prescribes the sustainable extraction of resources, the forest is degrading. There are two main reasons: the huge population that depends on the forest for its livelihoods and a lack of alternative livelihoods for those officially excluded from extraction, and the poor capacity of the Bangladesh Forest Department to implement measures (Roy et al., 2012). Therefore, while the level of risk involved in resource collection informally restricts illegal resource extraction (e.g. tigers, physical punishment from forest officials), the remaining tracts of forest are under extreme pressure. As a result, they are less able to support the livelihoods and industries dependent on them. Therefore, the transformation from forest to an agricultural system, has not lead to a transformation of social systems away from dependence on the forest ecosystem and services. Instead, it has lead to increasing pressure on a system that is decreasing in both extent and quality of its services (Roy and Gow, 2013).

SEASONALLY FLOODED AGRICULTURE

Cultivation of rice followed deforestation, and it was specifically adapted to the seasonal flooding that took place in the region. Since the land was inundated for several months of the year, low yield and flood tolerant crops were cultivated. Dry season paddy was traditionally grown only on lower ground near low land and permanent water bodies where soil moisture persisted. Farmers faced the stress of unseasonal onset of floods, or floods of excessive depth. Furthermore, the area experienced coastal flooding, which floods the area with silt-laden saline water.

However, the benefit of this system is that seasonal flooding allows for co-existence of inland fisheries on the floodplain alongside seasonal agriculture. In Bangladesh, fish is second only to rice as a source of food and represents 80 per cent of the total animal protein consumed in the country (BBS, 2005). Fishing in the floodplain is a livelihood option available for all members of the population to supplement their incomes (Allison and Ellis, 2001) and most residents are farmer-fishers carrying out different activities at different times of the year (Béné and Friend, 2011). The property rights system changes with the season from open access wetlands to privately owned agricultural land. This allows for the more even distribution of the benefits of ecosystem services between the landed and landless parts of the population.

Flood hydrology plays an important role in maintaining the life cycle of inland fish that inhabit rivers and floodplains. Many species of white fish migrate between rivers, where they find shelter during the dry winter seasons, and floodplains, where they spawn and feed during the summer monsoon. The inundation of the floodplain provides the spawning grounds, nursery areas and the major feeding opportunities. Therefore, this transformed system allows cultivation of rice combined with fishing, and so could be considered more desirable than forests alone in terms of the benefits provided.

However, the system is also less stable. Inhabitants of the flood plain rely on the mangrove forest to meet shortfalls in income and to support livelihoods. River erosion can remove huge tracts of land both rapidly during storms and gradually, leading to a loss of income and a loss of property. Floods can come early or late, too quickly, stay too long or water levels can raise too high destroying harvests and livelihoods (Paul, 1997). Every few years the area experiences tidal surges and saline water enters the area. The local population has very little ability to adapt and must accept the good with the bad. Yet, while the local population has very little adaptive capacity since it has very little ability to prevent these changes from occurring, the resilience of the system is high, and returns rapidly to the original state after disturbance. Furthermore, negative can lead to positive benefits. Unusual floods, while destroying wet season crops, lead improve harvests in subsequent seasons due to the retained soil moisture (Paul, 1997).

Decisively, however, agriculture under this system had the potential for improvements in both extent and productivity (Brammer, 1983). Therefore, plans were put in place to remove some of the uncertainty in the system to enable increases in the extent and productivity of agriculture. These improvements were driven by food security concerns during the 1960s (Islam, 2006), took place through large engineering solutions and lead to a transformation to a different kind of agricultural system, that prioritises one form of production (agriculture) over another (inland fisheries) This new socio-ecological system, demonstrates very different characteristics and lead to a new set of problems for the population.

POLDERED AGRICULTURE

The Coastal Embankment Project was implemented to increase both area under cultivation and the productivity of areas already cultivated. It would do this by protecting the coastal area from tidal flooding and saline intrusion, and providing water for irrigation allowing dry season crops and high yield variety crops (Brammer, 1983). Work began in 1958 under the East Pakistan Water and Power Development Authority (EPWAPDA) and continued after independence in 1971 under the Bangladesh Water Development Board. The embankments promised to protect 1.4 million ha, including 1 million ha of cultivable land with funding (mainly under loan agreements) from the governments of Canada and the Netherlands, and the World Bank (BWDB, 2012).

The interventions increased the scale of agriculture, although no monitoring and evaluation was carried out to assess the success of the interventions. Between 1969 and 2010 the productivity of rice agriculture in the southwest coastal zone increased two to five times (Hossain and Dearing, 2013) and the production of high yield varieties have more than tripled since the 1980s (Hossain and Dearing, 2013). The polders have allowed multi-cropping in northern areas of the southwest coastal zone during the monsoon season and helped to increase dry season crop coverage in areas traditionally plagued by salinity (Khanom and Salehin, 2012). These increases in productivity lead to improved opportunities for landless agricultural labourers and sharecroppers and an associated increase in income (Nandy, 2011).

However, the rates of return on large-scale projects were not as high as expected (Brammer, 1990) and the CEP was virtually abandoned after independence in 1971. Later schemes focused on construction polders of further inland from eroding banks and maintenance (Talukder et al., 1992). Levels of wellbeing in this region are lower than the national average. There are two potential explanations of why the gains made in agricultural productivity have not translated into equivalent gains in the social realm. The first relates to the inequitable distribution of the benefits of increases in productivity and the extraction of surplus value. The second relates sub-optimal functioning of flood protection infrastructure because of poor management and maintenance and disruption of underlying ecosystem processes.

While increases in agricultural productivity should lead to decreases in poverty through a reduction in the price of food, and increased income in the farm sector (DFID, 2004) this is not always observed. The majority of the rural population in Bangladesh is landless, and while agricultural labour contributes to a diverse livelihood portfolio, off-farm activities may dominate the income of the landless. Furthermore, mechanisation and exploiting niche markets has driven growth in agricultural production meaning that little employment has been generated for the rural poor (Toufique and Turton, 2002). Poor people lacking assets are required to enter into social relationships in order to gain access to natural resources. The conditions of these relationships, for example through sharecropping, play a role in preventing the poor from accumulating surplus and graduating out of poverty.

However, even increases in agricultural productivity could not be sustained (Islam, 2006). By the 1990s, the modification of the natural functioning of rivers and their interaction with the floodplain had led to tidal sediment deposition outside of the polders and drainage congestion within the polders (Islam, 2006). This began to reverse any gains in agricultural productivity and reduce the functioning of the system to a point where even human inhabitation of the area became difficult (Islam, 2006). Causes were exogenous as well as endogenous. Endogenous factors included the poor management and maintenance of the polders. Proper maintenance and management comes at a high financial cost and requires significant institutional resources (Boyce, 1990). Exogenous factors included the construction of the Farakka barrage across the Ganges River in India that reduced flows and thus increased siltation (BWDB, 2012).

The poldered agricultural system removed the elasticity of the system; it does not easily recover from perturbations because of the inertia and obstructions created by engineering interventions. Furthermore, the system is continually attempting to return to its previous state; in order to maintain the current state huge institutional and financial resources must be constantly applied (Boyce, 1990). The lack of capacity to manage these interventions leads to a sub-optimal situation where the new state is nonviable but the physical infrastructure prevents the system returning to its previous parameters.

The poldered agricultural system put the system at a much higher risk of switching to a new state. The ability to regulate flood levels was not only attractive for agriculture, but for shrimp aquaculture too; floods lead to a loss of stock by overtopping the edge of shrimp aquaculture ponds. Water logging problems brought the agricultural system further towards the boundaries of a new basin of attraction. An external push factor may have been increasing levels of salinity on the coast, a result of reduced freshwater flow from upstream, decreasing the productivity of agriculture.

BRACKISH SHRIMP AQUACULTURE

Around the same time as the environment was becoming amenable to shrimp aquaculture, the demand for shrimp for the international market increased. Shrimp aquaculture that had been carried out on a small and traditional scale in the very southwest zone, expanded mainly through the agency of local entrepreneurs. Powerful business groups, both local and from outside the area, started shrimp cultivation outside polders and came to know about potential markets abroad. Changes in government policies made shrimp business highly lucrative and in the 1990s, shrimp took over as the biggest export earner of Bangladesh (Alauddin and Hamid, 1998). Shrimp aquaculture reverses the original purpose of the polder: instead of preventing saltwater from entering the poldered area, users intentionally allow brackish water to enter (Rafiqul Islam, 2006).

The introduction of shrimp aquaculture for export markets has been shown to represent significant challenges to local institutions, patterns of ownership and the moral economy of social norms and obligations that govern a community (e.g. Lebel et al., 2002; Veuthey and Gerber, 2012). In the case of Bangladesh, the presence of outside investors leads to a breakdown of the moral economy that supports both the poorest in society while ensuring the sustainable use of resources. The manner of exploitation of natural resources in the area is similar to that of the roving bandits (cf. Berkes, 2010) in coastal fisheries; an external investor can extract to maximize profit because they have no incentive to preserve environmental sustainability in the area. The resulting situation is almost impossible to reverse. Saltwater penetrates the soil and creates a situation of increase salinity that prevents or reduces crop productivity and degrades the structure of the soil leading to excessive erosion.

However, despite the decimation of both the social and environmental components of the system, positive feedbacks make shrimp aquaculture a relatively stable socio-ecological system. Once saltwater had been introduced by shrimp farmers, productive agriculture becomes difficult in adjacent areas forcing farmers in peripheral areas to also take up shrimp farming. Cyclones also further reinforce this system, as they bring saltwater into the poldered area when they breach embankments. Sea level rise and continued flow reductions from India lead to increased salinity in the system, making it unlikely to switch back to an earlier state.

However, at some point the system will cease to provide any benefits, as salinity levels increase beyond the tolerance of brackish water shrimp, and then beyond the threshold of other more salt-tolerant species such as crabs. The social system transformed into a new, almost non-existent and definitely weaker state with introduction of shrimp. The displacement of agricultural livelihoods and related social bonds leaves very little adaptive capacity in the system.

TRANSFORMATIONS IN CONTEXT OF CHANGE

The sequence of land use transformations has reduced the heterogeneity of ecosystem services in the area and has increasingly concentrated the benefits of the transformation into an increasingly smaller group of stakeholders. This has meant that the system moves further into a rigidity trap (c.f. Carpenter and Brock, 2008) leaving very few other options in terms of livelihoods on which the local population can depend (Deb, 1998). The southwest coastal zone of Bangladesh is an area extremely vulnerable to the impacts of global environmental change. The transformations to poldered agriculture and shrimp aquaculture happened when the environment was considered, in the long term, static. These systems are likely to be maladaptive, or at the very least insufficient, to meet the challenges of a changing climate and social system. Furthermore, diversity in livelihood options which has been curtailed by these transformations will become more crucial as the impacts of climate change are experienced.

Polders were constructed to keep out tidal floods, but not cyclones. The destruction of polders by cyclones has hampered successive cyclone protection projects. Resources must be redirected for emergency restoration of embankments, siphoning money away from their improvement (BWDB, 2012). This has implications for the ability of polders to enable high yield agriculture as the frequency of cyclone events increases (Hossain and Dearing, 2013). Brackish shrimp aquaculture is maladaptive under climate change for two reasons. Firstly, levels of salinity are already increasing because of sea level rise and reduced freshwater flow from upstream making certain areas almost uninhabitable. A system that brings saltwater further inland is highly undesirable in this context. Secondly, government priorities are moving back towards food security and self-sufficiency; saltwater shrimp has had negative and irreversible consequences on the agricultural productivity of the land.

Humans drive transformations despite constantly evolving perceptions and understanding. A government, donor or academic may propose a transformation that at a certain moment in time is the most appropriate. However, worldviews,

as well as the state of the art in scientific knowledge or social understanding, are not static. A fair, just and appropriate intervention may be perceived as inappropriate in a short space of time. This can be both due to hindsight, where time reveals the long-term implications of a project, and a result of changing attitudes, behaviours and priorities in society. Therefore, even a successful transformation may be considered undesirable to successive groups, even if it was successful in achieving its goal. An old transformation may no longer fit its purpose under new priorities, it may not be considered a positive transformation under a changed environmental or social context.

In the case of the polders, recent projects reflect the increased prioritization of integrated approaches, rehabilitation of degraded environments and more of a concern for the ecological, environmental and social impact of polder projects. The government is in the process of implementing the Integrated Coastal Zone Management Program, developed as part of a Coastal Development strategy. Pro-poor growth, environmental management and building equity are central to its goals. Would polderisation still be considered the most appropriate option for Bangladesh in a world where co-managing poverty reduction and environmental conservation are important priorities?

This question is relevant as risk management and climate change adaptation moves away from hard infrastructural interventions, to more behavioural adaptations and ecologically harmonious changes and traditional practices. One criticism of panel studies on climate change adaptation is that they assume that the social situation remains the same throughout a period of predicted changes in the climate, precipitation, water resources etc. However, the composition of populations, wealth status, priorities, health outcomes and fertility behaviour all change over time with implications, in this case, for the adequacy of interventions made in the past.

Transformations will always lead to a decrease in wellbeing for certain groups and can never be made in the presence of perfect information. In the case of polders, the positive gains in agriculture created negative trade-offs with other ecosystem services (Ipe, 1995; Tallis et al., 2008). Flood control interventions have had negative impacts on inland fisheries through disruption to fish migration routes and life cycles (WARPO, 2001). The loss of subsistence fisheries is an important factor compelling landless labourers and small farmers to leave rural areas in search of work in the cities (Rahman and Minkin, 2003). The prioritisation of agriculture over fisheries reflects the underlying power structures, the lack of voice for the poorest and the influence of large landowners (Toufique, 2002). Strong engineering lobby groups drove decisions to construct the polders when other groups had doubts as to their efficacy, value for money and the understanding of the functioning of the river system (Brammer, 1990). How can we guarantee that powerful groups will not continue to drive transformations at the detriment of the marginalised?

Development and adaptation to climate is forced to take into account the legacy of past transformations. Farmers in the southwest coastal zone of Bangladesh are trying to do just that, breaching polders to allow monsoon water to drain out, driven by a loss of income from water logging. This action reconnects the flood plain with the river, and allows tidal water to enter into the poldered area. Water at high tide deposits sediment within the low-lying areas of the polders and erodes sediment from riverbed as the water recedes. As a 'semi-natural' (Rezaie et al., 2013) process, it represents a partial and temporary reversal to a former state. When applied successfully, after three or four years of flooding poldered areas, land surface can be raised by several feet and the width of the river increased by two or three times (Rezaie and Navera, 2013). Local populations initiated tidal river management and self-organised to form committees that managed the process (Rezaie et al., 2013). While they lacked the coordination to maximise results, on seeing positive results, the government took up tidal river management as a way of restoring the functioning of polders.

However, the implementation of this process reveals that the social barriers that exist to any reversal or change in a socio-ecological system. While the local and affected population acknowledge that tidal river management is an effective solution, they often oppose schemes or stop them midway. Flooding of the polder means a loss of income for the farmers for extended periods. In order to work well, all polders connected to a particularly river system should be flooded sequentially, moving in an upstream direction; therefore large populations must agree to be affected. Although the government offers compensation, the majority of people do not receive it or it does not reach all the affected stakeholders (Rezaie et al., 2013). Therefore, in reversing transformations or re-transforming an environment the social system may show more resilience and inertia as the ecological system.

Other transformations may be irreversible. Landowners are attempting to reverse the transformation from agriculture to shrimp production driven by the financial risks involved in shrimp aquaculture, the renewed prioritisation of food security at the household and national level, increases in occurrence of shrimp viruses and recognition of the long-

term negative impact of saltwater on soil structure. The presence of salt modifies the structure of the soil, increasing erosion and reducing the productivity of agriculture. Deliberate, repeated flushing of the soil with freshwater would speed the process of decontaminating the soil, but such an intervention are unrealistic on a large scale. In this case too, the reversal is only partially successful, at least in the lifetime of a farmer and also involves conflicts between the interests of farmers and the interests of shrimp aquaculture investors. With the continued rise in salinity in this region, a reduction in salinity and return to productive agriculture begins to look increasingly unlikely.

CONCLUSION

While some transformations may be exogenous and brought about by processes of global environmental change, humans are particularly effective at radically transforming their own environment. The transformation in coastal Bangladesh that changed the system irreversibly was the protection of the floodplain from saltwater flooding. This paved the way for the huge expansion of brackish shrimp aquaculture which further deepened the stability of the system. Not only is it very difficult for the system to return to a previous state, but it is difficult for the system to evolve effectively with changing environmental and social conditions.

The paper has elaborated the nature of land use transformations in the southwest coastal zone of Bangladesh. We have discussed the characteristics of each system in terms of the socio-ecological systems paradigm and highlighted the implications of implementing transformations in a changing climate and changing society. Transformations have been driven by outside interests for the macro-scale objectives of food security and generation of foreign currency. They have not been pro-poor, leading to a concentration of benefits of ecosystem services into the hands of the most powerful groups – landowners in the case of polderisation and to outside interests and local elites in the case of shrimp aquaculture. In this second case, the benefits accrued to actors outside of the area. If the adaptive capacity lies within the population, the adaptive capacity of the system is perverse because actors with no stake in the area drive systems into less favourable, states.

Such trade-offs have been justified by their positive impact on the economy. However, in both cases the positive benefits will eventually cease because of the unsustainable nature of large-scale transformations to the functioning of the natural system. That is to say, the modification of the ecosystem will eventually be self-destructive. It remains to be seen with the economic gains were worth the irreversible trade-off in ecosystem functioning and productivity. The recent priorities of the Bangladeshi government towards environmentally sensitive interventions and improvements would suggest that the economic gains have not been realised in a sustainable manner.

Any future interventions must incorporate the existing polders and infrastructure: there is very little opportunity for reversing the land use transformation. In this case, as the socio-ecological system was transformed into different land uses, the systems lost their transformability and their flexibility. This has important implications as the environment begins to alter around these systems as a result of climate change. This research shows that sustaining land use transformations and the accompanying benefits is extremely difficult, especially in a context of weak institutional and financial capacity. Any future adaptation to climate change must deal with the legacy of past transformations in the environment and avoid making the same mistakes for future generations.

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Exploring transformation for resilient Australian landscapes and communities

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INTRODUCTION

Many rural communities in Australia face an uncertain future. Interwoven dynamics around the declining viability of traditional industries, unfavorable demographic changes, loss of services and a succession of extreme and sometimes catastrophic climatic events has challenged the very existence of some smaller rural communities. These dynamics have coincided with a return to more centralized policy and decision-making, driven by distant political agendas, often imposing significant and abrupt changes to property and resource access rights.

These socio-political dynamics are playing out against a backdrop of a diminishing capacity of natural ecosystems and resources to supply the goods and services required to support many rural industries. Terrestrial, aquatic and marine ecosystems in many regions show conspicuous signs of degradation, the cumulative legacy of past and current practices and decision-making. Despite more than two decades of significant investment in natural resource management (NRM) and the wide spread adoption of more sustainable land management practices in recent times, the major NRM issues remain stubbornly resistant to change. The specter of a shifting climate and amplified climatic extremes, where changes in precipitation, temperature and the frequency and magnitude of climate shocks severely stress natural and agricultural production systems finely tuned to their current climatic envelopes, further compounds the already significant challenges faced by tightly coupled rural social-ecological systems. Recent climate information suggests these changes will be acute in many of Australia's most productive agricultural landscapes and our most biodiverse regions (CSIRO, 2010).

PLANNING FOR CHANGE

In combination these factors create a relentless and seemingly intractable syndrome of decline and many communities are now being forced to confront major questions about their future. There is an emerging sense of the need to be proactive at the local scale, to act before being acted upon. Communities and governments alike are exploring alternative approaches for planning and managing that are able to cope with uncertain and volatile futures (e.g. Australian Public Service Commission, 2007). In this context a new model for planning and managing rural landscapes is beginning to emerge. This model, based on concepts drawn from resilience thinking, adaptive governance and management and social learning (cf. Folke et al., 2005; Lebel et al., 2006; Brown, 2008) seeks to better integrate social, ecological and economic dynamics through development of systemic-thinking to understand and influence complex interactions at different scales. Around 20 of Australia's 56 Natural Resource Management Regions are using a resilience/adaptive management model for planning and implementation. As other regions go through their planning over the next few years it is likely that many more will adopt at least some key aspects of this type of planning. The first applications of this emerging model have been encouraging, leading to significant changes in the way professional and community based natural resource managers think about and organize interventions in natural resource management. As yet, however, the approach has not adequately addressed the need for the deeper, more profound transformational change in the structure and function of social-ecological systems required to tackle the most entrenched problems.

Recent social and institutional processes and a series of major natural disasters in Australia have created a window of opportunity to explore deeper change processes. In this paper we report on our efforts to assist communities and their support organisations that have indicated an interest in transformation as an option for tackling intractable

NRM problems. We describe a prototype of a conceptual framework for guiding intentional transformative action that has emerged from a trans-disciplinary, participatory action research process involving communities in south eastern and far northern Australia. Ultimately the framework is intended to support communities that want to move beyond the incremental adaptation that occurs within existing ‘business-as-usual’ paradigms for managing social-ecological systems to more radical shifts towards sustainable future trajectories. We then report on two linked case studies in south-eastern Australia where aspects of the transformative framework have been developed and applied. Evaluation of the vastly differing outcomes observed in the case studies (we deem one case study to have resulted in transformation of a key NRM organisation into a catalyst for socio-ecological change, and the other to have failed) has led to refinement of the framework that is now being applied to a further case study in far north Queensland.

FRAMING TRANSFORMATION

The context for our research is regional place based social-ecological systems (SES), where socio-economic and ecological dynamics are tightly coupled, and co-evolving, and where changes in feedbacks and combinations of fast and slow variables operating within and between scales cause non-linear dynamics that drive changes that can be both unexpected and difficult to manage or reverse (Biggs et al., 2010). As already described many regional areas in Australia are struggling with these dynamics and at least some regions are actively exploring how to undertake processes that lead to transformation. An underlying motivation for our research is that we think it is likely that many regions will miss opportunities for beneficial, proactive transformation in the absence of strategically targeted processes for engaging key actors, building their transformative capacity and using that capacity to identify and implement transformative actions. We define transformative action as intentional action taken by people within the focal system to instigate and navigate their way through significant change processes, and transformative capacity as the capacity to plan and execute this intentional action.

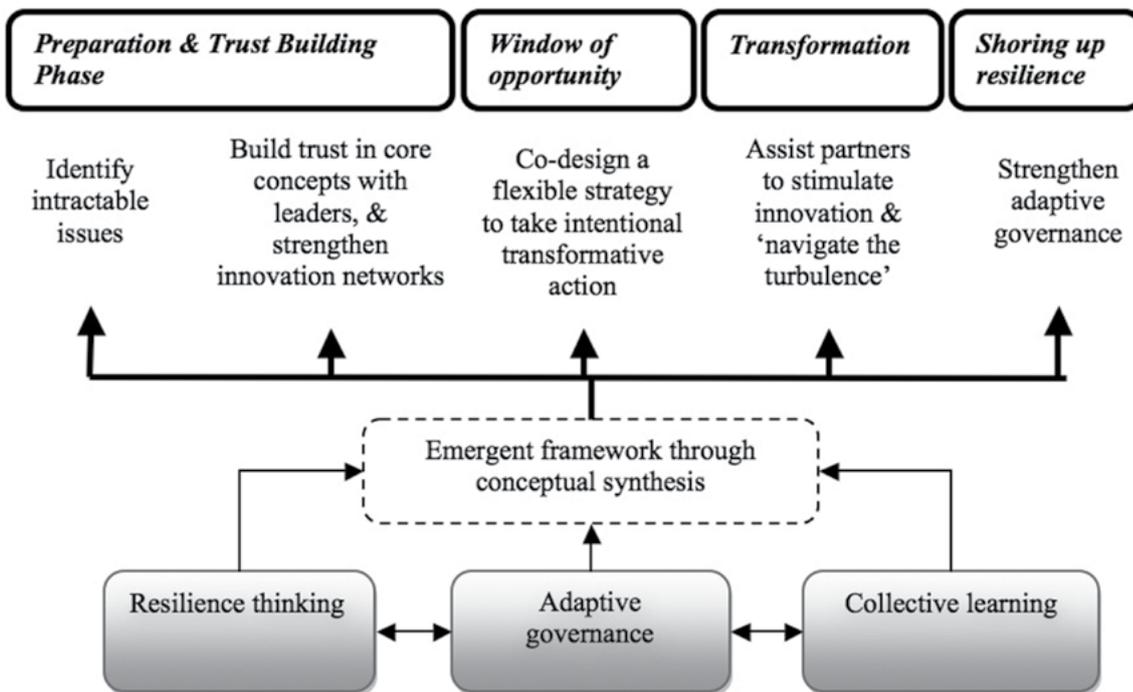


Figure 1. A framework to support intentional transformative action in the Murray Catchment case study (Adapted from Olsson et al., 2006).

Our initial framing of transformation processes has been heavily influenced by Olsson et al. (2006), which identifies the critical role of governance, leadership, networks and learning in transformational change, as well as proposing a phased approach to the transformation process. Our research attempted to explicitly expand on the approach outlined by Olsson et al. (2006) by melding together this broad phased approach with specific concepts drawn from resilience thinking, adaptive governance and social learning; three inter-related concepts that each bring elements we postulate

are potent ingredients for taking transformative action. The broad phases identified by Olsson et al. (2006) and specific ‘elements’ drawn from resilience thinking, adaptive governance and social learning form the basic structure of the framework.

The framework is supported by an evolving toolkit designed to build capacity for intentional transformative action. It consists of heuristics, practice guides and processes designed to support activities within a planning process, from exploratory discussion, to skills transfer, to stakeholder engagement.

A TRANSFORMABILITY CAPACITIES HEURISTIC

By drawing on our evolving experience in this project, and further reading of the literature, we have built on the framework to support intentional transformation (Figure 1), to develop a transformational governance capacities heuristic (Figure 2) that can support three kinds of processes: (i) assessment of capacities for taking intentional transformative action, (ii) design of capacity building efforts, and (iii) design of deliberate processes to bring about intentional transformation. It speaks particularly to the ‘Transformation’ phase of the framework (Figure 1), of course. The heuristic draws on Brown’s (2008) collective learning model as well as an adaptive governance assessment framework (Griffith et al., 2009) modified for this project.

The core of the portrait of transformation this heuristic offers is five processes:

Envisioning Futures: exploring possibilities using multiple knowledges.

Deepening Insight: into safe operating spaces, tipping points, and leverage points.

Radical Design: for both change processes, and their goals.

Nurturing Innovation: leveraging any of the five capitals.

Radical Self-organisation: decentered and emergent (e.g. market behaviour), or fundamentally ‘political’ and deliberative.

These processes can each be read as markers of basic capacities for intentional transformation, and specifically as expressions of capacity for transformational governance. We don’t envisage ‘capacity for intentional transformation’ as either universal or stable. We expect capacities to fluctuate, and we expect that exactly which capacities are helpful or needed will vary from context to context. We offer these five as likely to be useful, and notionally, as capable of being stitched together as a model for a process design (as per the linking arrow in Figure 2).

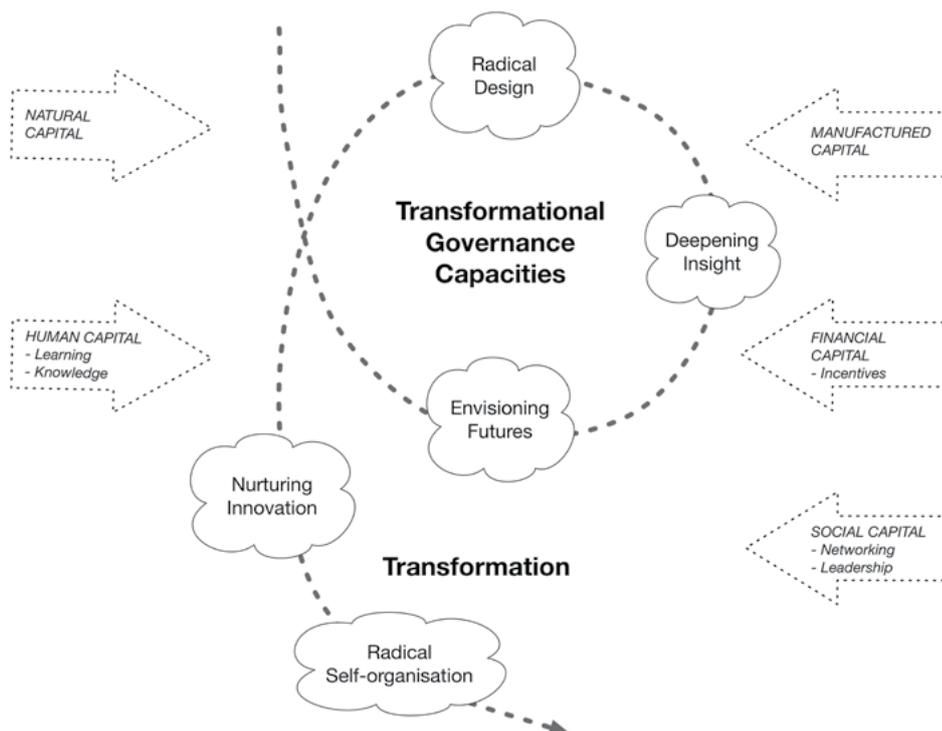


Figure 2. Capacities for transformational governance: a diagnostic and design heuristic.

Apart from the invitation to heed these five capacities, other key cues that this heuristic offers practitioners and researchers are as follows.

1. The processes in cloud shaped bubbles are key activities that efforts to bring about intentional transformation of socio-ecological systems are likely to involve. We prefer clouds to circles or rectangles, for example, to signal the fuzziness of separation into phases (actual change processes involve many non-linearities), and the ambiguity of mapping actual activities precisely to one or other of the processes: skillful action may be doing many things at once (see Walkerden, 2009, for a discussion of these points).
2. Because we want to emphasise the importance of testing the fit of the analytical tools we have developed to practitioners' contexts,
 - (i) we have emphasized that what we are laying out here is an heuristic - a way of approaching cases that may be helpful, and
 - (ii) we have placed the five capitals around the boundaries of the diagram to underline how access to different kinds of resource shapes the character of transformative action (for better or worse).
[We do not use the capitals framework because we support applying an economic calculus across the board; it is simply a familiar, inclusive, way of talking about the kinds of resources people rely on as they pursue their objectives.]
3. Underneath the relevant capitals, we have listed five key stimulants, developed by starting from the key influences on transformation identified by Olsson et al. (2006), and drawing on further literature (Griffith et al., 2012). These stimulants of transformative action can be both designed into change processes and used in assessment processes to help gauge capacity for intentional transformation. The stimulants are:
Learning: critical reflection to challenge assumptions, norms and frames, particularly;
Knowledge: knowledge transfer, creative reuse, and reframing;
Networking: widening dialogue, fostering alignment;
Leadership: that fosters radical innovation; and
Incentives: applied near thresholds to prevent or assist change.

The kinds of questions we expect users of this heuristic to ask include:

- Which of envisioning futures, deepening insight, radical design, nurturing innovation and radical self-organisation do we think a group, network or community is well-placed to undertake?
- Where areas of weakness are obvious, how might their capacities to undertake these actions be built?
- What is the state of the capitals that people draw on to support transformation? What opportunities, and threats or risks, does the state and dynamics of the capitals imply?
- Which, if any, of knowledge, learning, networking, leadership and (tipping point) incentives are, or could be brought into play as, stimulants of transformation?

We have used this heuristic as a lens through which to view our case studies.

DEVELOPING AND TESTING TRANSFORMATION CONCEPTS THROUGH CASE STUDIES

In 2008 the research team was invited to work with the Murray Catchment Management Authority (MCMA), a regional statutory authority responsible for the development and delivery of community based natural resource management (NRM) programs. The invitation to work with the MCMA arose following a number of institutional and natural events including historically significant droughts, flooding and government policy decisions that cumulatively meant both the MCMA and local communities in the region were actively seeking alternative approaches to governing, planning and implementing NRM programs. There was recognition by many community and organisational leaders that major change was required if local communities were to remain viable in the face of the series of significant events. At the request of the MCMA, the research team was invited to work at the sub-regional scale with a Local Government Area, the Wakool Shire, that was commencing a community based strategic planning process. Lessons learnt in this setting could then

be translated up to the regional scale where the MCMA was soon to embark on a regional scale strategic planning process. This nested case study design represented a striking opportunity to explore transformation at different scales within the one region, in the spirit of Anderies et al. (2006).

The participatory research design centered around a staged ‘learning-by-doing’ process involving co-design of process by the key organisations at each scale (Griffith et al., 2010). Leveraging the phased approach adopted from Olsson et al. (2006) and the emerging transformation framework, the research team worked closely with key individuals at different levels within the relevant organisations to explore various aspects of the organizations’ and communities’ capacity to undertake transformational change. This included assessment of adaptive governance capacity, analysis of the major biophysical and social issues confronting regional communities, exploring innovative and potentially catalytic projects, and transferring concepts and skills with potential to help with transformational change.

From the outset the researchers used a pro forma to make notes on key events including meetings, workshops and discussions with champions. Provision was made for factual description and reflection in relation to study aims and objectives. For key meetings and workshops, notes were provided to participants for correction and as a record of the event. The evaluation includes eleven semi-structured interviews undertaken in May and June 2012 and a re-analysis of earlier interviews from 2009 and 2010. MCMA documents including internal papers were also drawn on for evaluation (For a more detailed account of the research process see Mitchell, 2013, and Mitchell and others, forthcoming).

THE CASE STUDY REGION

The Murray Catchment region, in the state of New South Wales (NSW), as it was for the study period, covered an area of 35,170 square kilometers north of the Murray River from its origin in the Australian Alps to near the junction of the Murray and Murrumbidgee Rivers. It is part of the Murray-Darling Basin (MDB), Australia’s largest and best known river system which extends across four States and the Australian Capital Territory. The landscape, land use and settlement pattern varies as the Murray River progresses west and rainfall declines. The largest settlement is Albury with a population of approximately 51,000 people. The region has suffered a series of severe shocks (policy driven changes to resource access, major droughts, flooding) and changes in critical slow variables including on-going structural adjustment in important industries, detrimental demographic changes, degradation of some resources and loss of biodiversity.

Climate change is likely to influence the dynamics of most of these issues and in doing so exacerbate the challenges faced by these communities. Rural land use is predominantly grazing, cropping, irrigation, forestry and horticulture. Major NRM issues over the past 20 years have been the health of the Murray River, the condition of its riparian environments, salinity and water allocation policies. These issues and the way in which governments have responded have created tensions both within and beyond the regional scale.



Figure 3. Wakool Local Government Area, in the Murray Catchment Management Authority area.

Wakool Shire (Figure 3) was chosen for several reasons. The Wakool Shire Council had recently emerged from its own governance crisis and a new progressive General Manager had been appointed a year earlier. The region was experiencing a long severe drought that had started in 2002. Federal Government exceptional circumstances provisions were in place, livestock production and cropping were at record lows, particularly rice production, and the regional economy had contracted. Populations in the small towns of Wakool Shire were declining with impacts on community life. The Murray River and its associated River Redgum floodplain ecosystems were also showing signs of stress, and public sentiment in large urban populations in Australia was shifting in relation to the long standing tension between irrigated agriculture and the health of the Murray River. This was being expressed in changes to River Red Gum forest policy and in proposed changes to irrigation water allocations as part of the Murray-Darling Basin Plan. The Wakool Shire was significantly affected by all of these conditions and it appeared as though transformational change would be forced on the communities within the Shire (Hyder Consulting, 2010; Ryan and Mitchell, 2011). The Red Gum forest logging industry had been compelled to significantly reduce its operations and negotiate compensation arrangements, as a result of the conversion of state forest title to national park title. At the same time, a group of irrigators in the Shire were in negotiations with the Federal Government to sell their water allocations as part of the Government's water buy-back scheme and retire their irrigation district after 74 years.

Applying the adaptive cycle (a heuristic used in resilience thinking - Walker and Salt, 2006) the social-ecological systems of the Wakool Shire were brittle and potentially entering a back loop where innovation and reorganization of social capital are required. The need for capacity to either deal with the imposed transformation or instigate and steer their way through a community driven transition seemed obvious.

CASE FOR CHANGE

The focal organisations in both cases, Wakool Shire at the local scale, and MCMA at the regional scale, had been charged with developing strategic plans that addressed the communities' concerns and provided a basis for future investment of public funds. The combination of deepening institutional, socio-economic and biophysical crises and the prospect of the approaching planning processes provided the trigger for the focal organisations and their respective communities to contemplate if a business-as-usual approach to planning would deliver the change they knew was required.

Key Wakool Shire leaders saw the process of developing their new Community Strategic Plan as an opportunity to address the series of deepening crises that had beset the Shire over the preceding 5 years. The MCMA had been through a potentially serious governance crisis in the previous year. They had performed poorly in a number of key areas in an audit by the Natural Resources Commission (NRC), an independent commission providing advice to Government with advice on natural resource management and the performance of Catchment Management Authorities (CMAs) in relation to state wide targets and standards, in late 2008. This Audit covered how the NSW Standard for Quality Natural Resource Management was being used to promote adaptive management, and to implement their strategic plan, the Catchment Action Plan (CAP). A new leadership team of Chair, new Board members and General Manager had been appointed. The new leadership team was keen to address the deficiencies raised in the Audit and were committed to performance improvement. The requirement to develop a new Catchment Action Plan provided an important vehicle for change, particularly the requirements imposed by the NRC for the new CAP to be whole-of-community and whole-of-government.

For these organisations, the window of opportunity identified by Olsson et al. (2006) as critical in the move towards more transformational change was beginning to open. The respective planning process would be a vehicle for changes to move through this window of opportunity.

KEY FINDINGS

Evaluation of the case studies and the change processes embarked upon by the focal organisations using their respective planning processes as vehicles have provided key insights into the challenges of undertaking deliberate transformation.

In the case of Wakool Shire, the change process put in place with guidance from the researchers, failed to enhance the organisation or community capacity for transformation. Although a number of factors contributed, Mitchell et al.

(forthcoming) identified the failure to adequately address some of the key ‘stimulants’ of substantive change identified in the transformational governance heuristic (Figure 2). Specifically, leadership and supporting networks to underpin major phases (Figure 2) were poorly developed through the process and the transformation journey stalled before innovations likely to catalyse system change could be fully developed and nurtured. The failure to build these necessary capacities hampered each phase.

In contrast evaluation of the MCMA’s progress demonstrates that significant changes have taken place in the MCMA over the term of the study. Capacity building and innovations led by MCMA in the areas of governance and NRM planning have changed the culture of the organisation and as a result its standing with regional communities and peer organisations. They have also put in place a number of processes to support and nurture innovation, networks and learning. MCMA leaders orchestrated four phases of change which are shown in Figure 4. The approach is similar to Olsson et al. (2006) in some respects but more iterative.

Of particular note, the MCMA was able to develop and enhance capacities around transformative leadership, and these have made a fundamental contribution to the successful change process. These leaders and the skills they developed have made a significant contribution to their own change process, to this research, and to future practice models of NRM more generally.

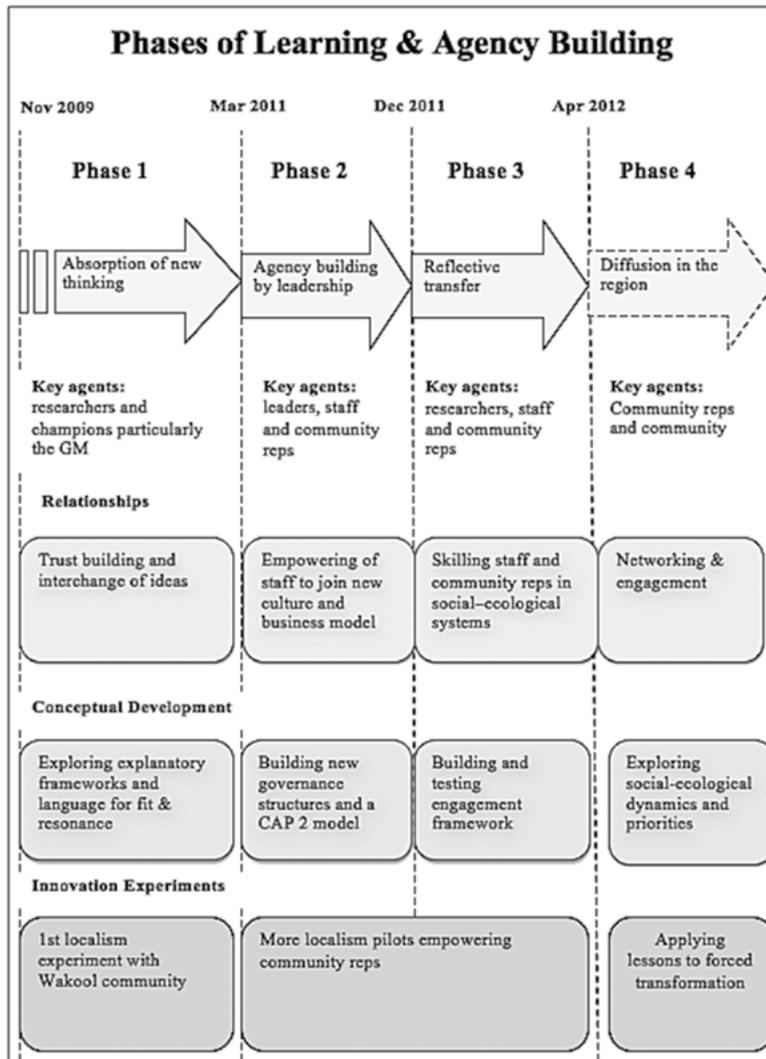


Figure 4. Four phases of learning and agency building orchestrated by MCMA as part of its change strategy.

Nonetheless, there is still a lack of radical innovation with respect to intractable NRM problems. It is too soon to tell whether transformative action at the organisational level initiated by the MCMA, and its implications for regional processes, will result in bigger changes towards sustainability such as transformations in land use or land management practices, or in a transition of any of the landscape scale social-ecological systems, or the whole regional system. As yet, the rural communities have not demonstrated they are willing to intentionally transform whole social-ecological systems or parts of those systems. Moreover, the new paradigm of NRM now being practised and expanded by MCMA is under threat from a top down transformation of NRM arrangements in NSW at the state scale. The NSW government is establishing new regional authorities across the state with new regional boundaries, which will absorb the MCMA.

The case studies confirm the relevance of the five key stimulants of transformative action explored in this study. Much has been learned about the practical application of those stimulants. Critical reflection to support learning, innovation networks, knowledge reframing and repackaging, and tipping point incentives have all been applied by MCMA in novel ways which provide new insights for future applications with other case study partners. It is likely that the required capacities are context specific and further testing is required to assess how well the transformation framework (Figure 1) performs under differing settings. For now we postulate that a combination of the phased approach outlined by Olsson et al. (2006), and modified for application here, and the transformation framework developed through this research are broadly robust for guiding transformative action. In contrast, the 'stimulants' identified here are likely to be far more context sensitive, and consequently, so to are the tools and heuristics we deployed attempting to build the capacity of our regional and local research partners to apply those stimulants.

Further work is required to develop diagnostics that could be deployed in the early phases of transformative processes to better identify which stimulants (from the set we have identified or a wider set) may be most critical for moving from business-as-usual to more transformative processes. We are exploring this in further trials of the evolving Framework in Far-North Queensland.

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Historical case studies from Oceania: How to account for the benefits and losses of transformation

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INTRODUCTION

Historical analogies of environmental change and stress are a well-established method of examining vulnerability to the impacts of climate change (Ford et al., 2010). In our view historical analogies of social transformations can similarly illuminate what factors are conducive to transformation. In this paper we draw on diverse historical examples, ranging from the environmental transformation of New Zealand from predominately woodlands into farmlands, to the social transformation of Australian indigenous cultures following European colonization, and political transformation in contemporary Vanuatu. These examples illustrate how both incidental and purposeful transformations can be instigated by small groups of committed individuals working in formal or informal networks, but can also be imposed by outside experts who instituted widespread changes under notions of progress and improvement without local support or consent. Such transformations involved widespread changes to indigenous governance regimes, agricultural systems, production and consumption patterns, lifestyles, values and worldviews, and inevitably involved both beneficial and negative outcomes for local peoples. Such case studies provide an opportunity to assess the processes that shape both vulnerability and resilience, and the circumstances under which transformational change occurs, as well as the potential dangers of irreversible changes.

In this paper we outline how historical case studies can be used to extend and inform discussions of deliberative transformation for the purpose of adapting to climate change. These historical examples of social transformation in Oceania demonstrate that social transformation is often not a linear process or singular event and frequently involves on-going changes over decades or generations; hence, transformational change is often incremental. This paper starts with an overview of current thinking about transformation and where we see the linkages and shortcomings of these approaches. Following this overview of transformation, we explore how historical analogies have been used to inform climate change adaptation scholarship. Lastly we discuss our historical case studies and demonstrate the ways in which social transformation frequently involves adaptations over longer time frames to address manifest injustices.

SOCIAL TRANSFORMATION: CURRENT THINKING

Scholars are increasingly advocating transformation as the “solution” to global environmental change, distinct from or coupled with mitigation and adaptation (O’Brien, 2012). Definitions of transformation vary and mean different things to different people (Pelling, 2011; O’Brien, 2012, 2013a). Some define it as large-scale changes to the form, structures, and values of social-ecological systems (Park et al., 2012). Others consider it a psycho-social process that involves engendering human beings to commit to changing their behavior to produce a better life for all (O’Brien et al., 2013b). For some, the concept of transformation suggests new opportunities for technological, economic and social innovation such as the creation of green economies, the development of renewable materials, and low-carbon lifestyles. For others, it suggests constraints to freedom, trade-offs and conflicts between different groups, and the creation of real or imagined winners and losers. For the purpose of this paper, transformation is understood to be a process of altering the fundamental attributes of a system, including institutions, structures, regulatory systems, financial regimes, as well as lifestyles, practices, attitudes, policies, and power relations (Hackmann and St Clair, 2012: 16; Field et al., 2011).

Transformation implies an irreversible regime change to achieve a specific goal or outcome. Pelling suggests that such a change involves a fundamental shift in the way a society or institution is organized, which goes beyond the incremental changes always at work within societies, as well as the existing deliberate adaptations to climate change (Pelling, 2011).

In order to engender purposeful transformation, existing social values and patterns need to be questioned and many may need to be reconfigured (Castles, 2010). O'Brien et al. (2013b), for instance, argues that social transformation within the education system will require both external changes (to structures such as institutions, curriculum, and the creation of incentives) and internal changes (to personal values and behaviors). The authors advocate experimental processes within the education system that encourages people to release their underlying assumptions and question their beliefs. Such a process, which they term transformative learning, would require 'unconventional and daring' approaches that allow for the development or evolution of existing systems into new forms and involve radical 'interior shifts in consciousness among diverse actors involved in education and capacity building' (O'Brien et al., 2013b: 10). Yet questions remain about the purpose, form, function, and outcomes of transformation. These questions do not only relate to the question of how societal transformation can be facilitated but also the extent to which issues of ensuring inclusivity, and ways of bringing together duties, obligations, and responsibilities to the poor, marginalized, and future generations, and how social justice is ensured in transformational change.

In order to understand the full complexities of social transformation we argue that it is necessary to consider the ways in which change emerges and operates in societies. Here the work of historians and social scientists can further our understandings of the ways in which processes of environmental change, including but not limited to climate, interact with and relate to the multitude of other processes at work in societies across scales (both temporal and spatial). In particular work is needed to analyse global environmental change through the lens of social and cultural histories. This could, Hackmann and St. Clair (2012) suggest, involve an examination of the historical drivers that have contributed to high carbon lifestyles and economic models, or track the influence of neoliberal thought on governance and institutional arrangements. We would go further and argue historical antecedents of transformation in human societies offer important insights for understanding processes of social change, because the social and ecological contours we encounter today are frequently the result of complex historical processes and trajectories. Accordingly we argue that planned adaptation, representing deliberative responses across scales (from local to global), needs to consider historical contexts and experiences in the design, implementation and evaluation of adaptive and transformative actions. In particular the abilities of indigenous societies to adapt to climate change are often conditional on the political and socio-economic environment, all of which is underpinned by the historical legacies of colonialism (Cameron, 2012; Veland et al., 2013). For indigenous peoples colonial issues continue to set the backdrop for new encounters, as our case studies of Vanuatu and Australia will later demonstrate, including their experiences of and responses to global environmental change.

HISTORICAL EXAMPLES OF TRANSFORMATION

The majority of change occurs in small incremental steps and accumulates over time. Transformation however represents a discontinuity wherein ordered structures and existing social values are replaced by something new and different. This raises questions such as in what instances does such abrupt or disruptive change occur, what is the form and function of such change, and does it create winners and losers? In this section we use four historical studies from Oceania to examine the form, function and outcomes of transformation, and argue that transformation is not a simple or straight-forward process that can be implemented quickly or with full awareness of the long-term outcomes of change. Our case studies highlight the difficulty of identifying a definite tipping point or threshold at which transformation occurs. Indeed it is often only in hindsight that we can evaluate if and how something was transformative (a new idea, technology, legislation, practice). Even in instances where contemporaries recognize that a transformation is taking place (such as universal adult suffrage or the end of colonial rule), the predicted social or system-wide outcomes of this change often do not eventuate or occur in expected ways.

ENVIRONMENTAL TRANSFORMATION: GRASSLANDS IN NEW ZEALAND

Our first case study comes from the southern reaches of Oceania and focuses on the process of environmental transformation that occurred in the nineteenth century as part of the British colonization of the islands that now constitute the modern nation-state of New Zealand. New Zealand has long attracted the attention of international geographers and historians, and has been depicted as some kind of ecological and social laboratory for transformational change (Pawson and Brooking, 2002). In 1941 British geographer Kenneth Cumberland pronounced the ecological transformation of New Zealand from temperate forests to grasslands over the previous century as most 'profound. What in Europe took twenty centuries, and in North America four has been accomplished in New Zealand within a single century – in little more than one full lifetime' (Cumberland, 1941: 529). Canadian geographer Andrew Hill Clark

(Clark, 1949) described it as a ‘revolutionary change’, while historian Alfred Crosby devoted an entire chapter in his *Ecological Imperialism* to the social and ecological transformation of the colony into a ‘Neo-Britain’ (Crosby, 1986). New Zealand historian James Belich noted in *Paradise Reforged* that it was the speed, rather than the length of New Zealand history that makes both remarkable and traumatic (Belich, 2001).

When Europeans first began to migrate to New Zealand in the early nineteenth century they encountered mountainous landscapes with extensive forests, and a temperate climate, and a large indigenous (Māori) population (Brooking and Pawson, 2011). The majority of the Māori population (estimated at 100 000 pre-contact) lived in the northern half of the North Island, which possessed a warmer climate more suited to Māori horticultural techniques most notably kumara (sweet potato) cultivation. The eastern sides of both islands were dry and dominated by tussock grasslands. These landscapes were undeniably culturally produced, with early Māori using fire to hunt and clear forest; over a relatively short time frame (AD 1300-1450) virtually all the forests of the eastern South Island were removed and replaced by tussocks (Anderson, 2002). The western areas of both islands, in contrast, were wet and covered in dense temperate rainforests. Throughout New Zealand wetlands were covered low-lying coastal regions and were of considerable importance for Māori as food-gathering sites (Brooking and Pawson, 2011).

The grassland transformation was not a simple or straightforward process, but rather emerged from the convergence of colonial discourses, government policies, experimentation, and economic activities. For instance the first European settlers in New Zealand initially cleared forest at a relatively slow pace and favored the South Island’s indigenous tussock grasslands. In the early years of colonization, in particular, Pākehā (Māori term used to describe people of European descent living in New Zealand) were dependent of Māori hospitality and environmental knowledge to enable them to survive. In an effort to engender colonial progress, government used various means to force settlers to remodel their environments. For instance early landholders were required by law to make practical improvements to the land (such as clearing forest and building fences). The introduction of exotic species (both flora and fauna) was similarly supported by government legislation, and in some cases, government funding. In 1846, for instance, the government passed the Duties and Customs Ordinance to encourage the introduction of exotic animals and plants by exempting them from duties. From the 1860s onwards the government largely delegated responsibility for the introduction of exotic flora and fauna to acclimatization societies, which were set up by Acts of Parliament and supported by government funds. These societies were essentially self-regulating government agencies, with minimal government oversight, and were responsible for the release and protection of introduced species (McDowall, 1994). Acclimatization, dubbed the ‘seeding of empire’ by Brooking and Pawson, was reinforced by scientific theories most notably the work of Charles Darwin (Brooking and Pawson, 2011: 32). Darwin himself suggested in *The Origin of Species* that ‘if all the animals and plants of Great Britain were set free in New Zealand, a multitude of British forms would in the course of time become thoroughly naturalized there, and would exterminate many of the natives’ (Darwin, 1902: 483). Darwinism was seen to justify the pathway of British colonization and was embraced with particular fervor in New Zealand. Government employee J. F. Armstrong wrote in 1871, for example:

“The indigenous Flora seems to have arrived at a period of its existence, when it no longer has the strength to maintain its own against the invading races; indeed, every person who has attempted the cultivation of native plants knows how difficult it is ... on account of their weakness of constitution.” - (Armstrong, 1871: 285)

In hindsight, weakness of constitution had little to do with it, just as the social and political dislocation, impoverishment, and territorial destruction of Māori iwi (tribes) cannot be attributed to any innate inferiority. Rather, New Zealand’s indigenous social and ecological systems were subject to the increasing might of colonial improvement and overwritten by the ever-increasing numbers of Pākehā migrants, government regulations, and globalizing economies.

Indeed, as McAloon has argued previously, ‘[n]othing about the transformation of New Zealand’s grasslands was inevitable’ (McAloon, 2011: 94). Land clearance was often intermittent, dependent on the state of the economy and the availability of both people and financial incentives. In this way the environmental transformation of New Zealand to grasslands was part of the much broader worldwide economic transformation, with ‘the revolutionary effects of capital ... simultaneously reshaping landscapes and economies in various parts of the globe’ (Robbins, 1994). McAloon puts forward the argument that colonial pastoralism ‘was both the vehicle and the product of capitalist globalisation’, with emergent commodity markets essentially driving on the whole transformative agenda of nineteenth century British colonialism. Essentially New Zealand’s grasslands were converted into commodities (wool, meat, butter, and cheese), commodities were sold abroad, and those finances in turn financed further land clearance and pastoral expansion.

This trend intensified in the 1880s-1890s with the arrival of refrigeration which allowed New Zealand's dairy and meat products to be shipped to Europe. The money made from refrigeration allowed much of the central North Island, newly confiscated from its Māori owners, to be converted into grasslands. And by the end of the nineteenth century, Beattie observes, New Zealand began to function as one 'giant imperial farm, supplying raw materials and food to Australian, British and other markets' (Beattie, 2004: 3).

This grassland transformation had a number of long-term social, economic and ecological outcomes. The first was the displacement of the indigenous Māori, who were considered to not 'improve' or 'use' the environments. Although New Zealand, unlike Australia and many areas of North America, did have a treaty that supposedly protected Māori rights, popular scientific notions of wastelands and Social Darwinism nevertheless informed the widespread appropriation of Māori land by financial, legal and military means. Once appropriated the majority of Māori land was converted to grasslands or, if the land was found to be profoundly unsuited to agriculture, declared conservation areas. In both social and environmental terms, this transformation involved the intangible losses of forests, wetlands, tussock grasslands, and flora and fauna, which underpinned Māori livelihoods, and cultural practices (Pawson and Brooking, 2002). In some areas this loss of resources was absolute; in others resources could be obtained from elsewhere. Māori households and iwi (tribes) survived and adapted to changing circumstances, but continue to face considerable socio-economic disadvantage, in part because of the long term impacts of dispossession, economic marginalization, and social discrimination. The second notable outcome was environmental degradation, including soil erosion and loss of nutrients from the soil, flooding problems, depleted aquifers and contaminated freshwater supplies, as well as mass extinctions. Mass extinctions of endemic flora and fauna were a direct consequence of the destruction of ecosystems and the introduction of exotic species; since the mid-1800s nineteen endemic bird species and countless other fauna have come extinct. The third outcome was the creation of the New Zealand economy, which was and still is largely is an economy almost entirely focused on production of low value-added pastoral commodities such as wool, dairy products, and frozen meat for export to international markets. However since the 1970s, when Britain joined the European Union and restricted New Zealand agricultural products, New Zealanders have begun to realize that their pastoral 'totalitarianism' is not enough to sustain their high standards of living or ensure environmental integrity (Brooking and Pawson, 2011).

The New Zealand case study raises questions about timescales and outcomes of transformative change. How can we actually determine if a contemporary action, policy, or practice is truly "transformative" if the consequences of that change are uncertain? And how do we evaluate the consequences or outcomes which determine the extent to which a strategy is "transformative", to whom in particular, and whether the outcomes are actually positive or negative? Since 1840 colonial and later national governments, farmers, and scientists firmly believed that the conversion of forests to grasslands was both a positive and necessary transformation. As late as the 1970 New Zealand agricultural scientists and governments were proclaiming the need for more extensive and productive grasslands (Levy, 1970). Indeed it is only comparative recently in the 1970s and 1980s (at around about the time Māori land rights came onto the political agenda) that New Zealanders began to realize that perhaps this grassland transformation came with huge social, cultural and environmental costs.

AUSTRALIA: THE ECOLOGICAL CONSEQUENCES OF SOCIAL TRANSFORMATION

The New Zealand example can be seen as reflective of the wider process of European colonization. The process of colonization itself can be seen as a kind of transformation (or a suite of transformations) involving irreversible regime changes, fundamental alterations to (and sometimes complete destruction of) indigenous societies, economies, lifestyles, social structures and cosmologies, and ecosystems, as non-indigenous groups sought to "civilize" and "remake" colonial spaces in the image of the metropole. While the previous case study examined the landscape transformation, our next case study explores the social transformation of Australian Aboriginal societies in the twentieth century through government resettlement programs. The Australian example highlights that transformation, even if motivated by the best of intentions and the best science of the day, can result in coercive and discriminatory policies and negative outcomes.

In the century that followed the commencement of British colonization of Australia in 1788, various attempts were made to establish harmonious cross-cultural relations between Europeans and Aborigine people. However ultimately these relationships were characterized by conflict over resources, government sponsored violence against Aboriginal

groups, and indigenous dispossession (Kidd, 1997; Parsons 2012). The colonization of Queensland, in particular, is widely regarded by historians as the embodiment of ‘the objectives and inherent implications of colonisation’ (Moses, 2000: 102-103). The Queensland Government entertained a general, implicit policy to aid and encourage violence against Aboriginal people. The Native Police, for instance, was charged with the protection of colonists’ lives and property and empowered to use violence against Aboriginal people to punish or prevent resistance (Finnane and Richards, 2004; Finnane and Richards, 2010). The end result was indiscriminate massacring of entire Aboriginal clans by police and individual settlers in what newspaper reporters proclaimed as a ‘war of extermination ... waged against the blacks’ over a fifty year period (*The Brisbane Courier*, 1877: 2; *Cooktown Courier*, 1877). However from the 1870s onwards missionaries in Queensland began to advocate the establishment of Aboriginal missions as a method to protect Aboriginal people from white violence and exploitation, and as a means to civilize and Christianize them (Chesterman and Galligan, 1997: 36).

In 1897 the Queensland Parliament introduced the *Aboriginals Protection and Restriction of the Sale of Opium Act*. Informed by humanitarian ideals, the purpose of the legislation was declared to be: ‘to make provision for the better protection and care of the Aboriginal and Half-caste inhabitants of the colony’ by the establishment of Aboriginal reserves throughout Queensland wherein Aboriginal people would be separated from whites and learn to live sedentary and civilized lives.¹ Under the Aboriginals Protection Act and its various amendments thousands of Aboriginal families were removed to Queensland government-run reserves and church-run missions under the dual banners of racial segregation and protection from 1897 until the late 1960s (Parsons, 2009). This process, a form of state-sponsored social transformation on a grand scale, involved white police officers ‘capturing’ Aboriginal people and forcibly removing them to institutions far removed from their traditional lands. Unmarried women and their children were often separated from their families and placed in separate dormitory institutions in an effort to train them to be domestic servants (for girls) and farmer laborers (for boys). By the 1930s more than half the Queensland Aboriginal population were housed in such institutions whose operations echoed those of nineteenth century reformatories and workhouses (Kidd, 1997; Haebich, 2000). Within these institutions, white officials sought to remake Aboriginal people to make them to accord to white norms of dress, diet, housing, hygiene, and lifestyles. Where and how Aboriginal people chose to live (on reserves or pastoral stations), what they could eat (government issued rations typically consisting of only three items white flour, sugar and black tea, and occasionally a small allocation of meat), who they could marry (only Aboriginal or “colored” people authorized by the government), where and when they worked (in white households or farms), and how much they got paid (all of which was paid to the government) was all controlled by Queensland government officials. Aboriginal people resisted and challenged government control in various ways, including escaping from reserves and returning to their traditional lands, and sought to maintain their distinct cultures and practices within institutions.

The policy of Aboriginal removal and segregation continued to operate in various forms in Queensland until the 1970s. The end result of these policies and practices adopted in Queensland, which was used as a model for other Australian states as well as the South African government, was social transformation in that they resulted in a regime change for Aboriginal culture from countless nomadic hunter-gather societies living spread out throughout the state to a collective of Aboriginal (or Murri) groups living predominately in concentrated urban areas of southern Queensland. This settlement pattern is reflective of the massive social change that occurred as a result of the removal-reserve policy. Similarly the widespread and endemic poverty, an adult mortality rate of 10 to 12 times higher than for non-Indigenous Australians, deeply traumatized communities, health statistics at third world standards, and incarceration rates 15 times higher than the national average, are all reflective of the impacts of structural violence, segregation and chronic poverty that was engendered through the Queensland removal-reserve system (Ring and Brown, 2002; Anderson et al., 2006). While the aim of this particular social transformation was informed and shaped by the current scientific knowledge, which considered that Aboriginal people a ‘dying race’ who needed protection, the long-term outcomes were profoundly negative and involved considerable social costs (McGregor, 1997; Parsons, 2009). A situation paralleled throughout Australia, with the various state and territory governments adopting variations of the Queensland model (Haebich, 2000).

Transformation can cause unintended or unexpected consequences. The removal of Aboriginal peoples from their traditional lands, for instance, combined with the expansion of white agricultural activities, caused widespread environmental changes across the Australian continent most notably to fire regimes (Rose, 1996; Griffiths, 2009). Over millennia in Australia, Aboriginal people used fire to confine and restrict wild fires (Pyne, 2006; Bowman et al., 2012). In Northern Australia, for instance, the region’s tropical savannas are naturally prone to burn every dry season and the most effective way of preventing fire is fire itself. Aboriginal people used patch burning and fire breaks during the early dry

season (when the weather is cooler and fuel loads are smaller) as a method to prevent larger uncontrollable wildfires in the later part of the dry season (when the weather is hotter, drier and the fuel loads larger). The resulting mosaic of burnt and unburnt grasses, Sharp and Whittaker (2003) observe, served to limit the extent of higher-intensity fire lit later in the year. However these indigenous land management practices were abruptly interrupted in the nineteenth and throughout much of the twentieth century as Aboriginal people were moved (voluntarily or forcibly) into centralized communities (towns, missions and government-run reserves) (Russell-Smith et al., 2009). Without people on the land to manage it, the newly emptied landscape began to experience a destructive pattern of frequent large fires, which were often started in more settled areas of the lowlands. This new fire pattern negatively affected local ecosystems and cultural heritage sites such as rock art, and resulted in greater greenhouse gas emissions than earlier fire patterns (Russell-Smith et al., 2009). Large destructive wild fires, for instance, are now a common feature of the Australian hazard landscape, particularly in Australia's south-east, in part because Aboriginal people were removed from their lands and their traditional fire management practices were no longer systematically applied to the Australian terrestrial landscapes (Soeterboek, 2008; Griffiths, 2009; Bowman et al., 2012).

UNDERSTANDING TRANSFORMATIONAL CHANGE

The previous case studies have demonstrated how often system transformations occur through incremental change over long periods of time. While some of these changes have been somewhat rapid, it should be noted that evaluation of 'transformative' change is still however unclear although particular tipping points and triggers can be identified. Female suffrage is for example one of the most frequently cited historical examples of positive deliberative social transformation in the modern era (O'Brien et al., 2012). However this example has not been studied much in depth in its relationship to transformative processes and the context within which it occurred. Closer scrutiny of female suffrage in the New Zealand context reveals a more complicated and multi-contingent process. In 1893 New Zealand Parliament granted women over the age of 21 years the right to vote in parliamentary elections, the first nation-state to give women voting rights (Page, 1993). This action, the culmination of decades of peaceful campaigning by New Zealand suffragists (Muller, 1869; Hansard, 1893; Women's suffrage petition, 1893; McDonald, 1993) and more than a century of agitation by feminist writers and activists in Europe and North America (Wollstonecraft, 1792), did not herald widespread social or political changes within New Zealand society (such as women taking an increased role in "public" life or paid employment). The changes the decision brought were gradual rather than radical. While New Zealand women gained the right to vote in 1893, they did not gain the right to stand for parliament until 1919, and the first female Member of Parliament was not elected until 1933. It took another 50 years (until the mid-1980s) for the number of female Members of Parliament to reach double figures, and even now the New Zealand Parliament continues to be predominately male domain (Page, 1993; Brookes, et al., 2003).

The New Zealand example parallels the experiences of other English-speaking nations (McDonald, 1993). Female suffrage simply did not "transform" societies in the ways in which the current discourse of transformation implies, no rapid large-scale changes to the dominant social, political, and economic structures, practices or values occurred. Rather the legislative changes that granted women the ability to vote in democratic elections typically resulted in minor changes that over time slowly accumulated into broader change and highlights that meaningful transformation may not always be an abrupt process. Transformation in this instance was not a linear process or singular event but part of a broader, slower paced but nevertheless set of positive social and political changes.

Nelson et al. (2007) argues that transformation can arise from transitions (incremental adaptations) with subsequent claims on the existing system resulting in modification of a sub-system. This process can be seen in contemporary Vanuatu, and highlights the ways in which transformation is frequently not rapid. In 1980 the small island state of Vanuatu achieved independence from joint French and British colonial rule and embarked on the process of "decolonizing" and transforming the way Vanuatu was governed. Since 1906 Vanuatu had been administered by the British-French Condominium, this historic agreement established a system of colonial governance whereby both British and French laws and institutions operated within the colony, which resulted in laws, police forces, courts, prisons, currencies, and health and education systems being duplicated. Miles (1998) observes that essentially three westernized governance structures functioned within colonial Vanuatu (the British, the French, and the joint government) in addition to the countless number of existing indigenous governance structures that continued to operate within the 100 plus indigenous language groups of Vanuatu. Following independence Vanuatu's multiple governance structures were formally consolidated into single system of rule. Like with other newly independent 'post-colonial' nations, it was assumed

that this political transformation (from a multiple to single system of government) would be a relatively straightforward process that could be completed within a decade. Yet, as Miles (1998) observes, this transformation of separate islands, hundreds of different tribal groups and three distinct colonial governance structures into a coherent unified nation-state is still an on-going process. Perceptions of if and when this political transformation will actually be achieved vary widely. From this perspective, Vanuatu's achievement of the status of a sovereign nation (through legislation) can be seen as the start or tipping point for a much longer and slow process of transforming the governance systems of Vanuatu and creating a sense of national unity amongst culturally distinct and geographically dispersed social groups.

In Vanuatu, like other post-colonial states, social and political transformations manifest themselves through incremental change rather than rapid large scale alteration (Ashcroft, 2001). As Basil Davidson observes in the context of Africa, the legacy of colonial control for newly independent governments 'was not a prosperous colonial business, but in many ways, a profound colonial crisis' (Davidson, 1994: 209). The post-independence leaders of Vanuatu have embraced the challenge of creating a unified nation-state, yet this task requires both structural and social changes. In this instance political transformation is not simply about creating a new governance structure but also about developing the capacities of local people to act with decision-makers within ni-Vanuatu institutions thereby removing the need for outside (western) experts to be employed. While the obvious "tipping point" or "trigger" for this transformation was the legal and structural changes that took place in 1980 when independence was achieved, the actual long-term transformation of the new state is still in the making.

CONCLUSION

In this paper we have argued that transformations are often the result of long-term incremental changes in social, political and environmental sub-systems. Our case studies highlight how multiple triggers and tipping points can enable and shape processes of change and can result in unexpected outcomes. An important question relates to on what basis we can evaluate the success of a transformation. In regards to adaptation actions, Pelling argues that the 'context, history and the viewpoint of those at risk are arguably the most significant features in judging the legitimacy and determining whose security is being prioritized and at what cost through adaptation' (Pelling, 2010). Should we apply similar criteria to evaluate transformations? If so, an evaluation of the political, economic and ecological transformations that accompanied the project of European empire-building may reveal them as profoundly negative or maladaptive. Indeed the colonial histories of Australia and New Zealand are described by Robin and Griffiths (2004) as 'giant experiments in ecological crisis and management, sometimes a horrifying concentration of environmental damage and cultural loss, and sometimes a heartening parable of hope and learning' (Robin and Griffiths, 2004: 443). In both countries British colonial expansion assumed the dominance of British culture over not only indigenous cultures, but also indigenous ecosystems, and created path-dependent societies vulnerable to socio-economic and environmental shocks and disruptions. Yet as the on-going political transformations in Vanuatu and New Zealand attest, transformation can be both meaningful and just when built on transitions over time that seek to address the root causes of vulnerability (poverty, social marginalization, lack of political freedom, gender inequity).

Historical analogies allow us to reflect on the past and provide important insights into what kinds of forces and processes enable people to make positive transformations within their own societies. From the examples we provided in this paper, perhaps the most crucial indicator for evaluating the "success" of a transformation is whether the changes enhance cohesion and resilience within a given socio-ecological system or create marginalization and vulnerability, and whether this transformation leads towards other transformations. In the end the process of evaluating the success of any transformation is actor-specific and involves comparative assessments of social and environmental justice. Therefore, it would be reasonable to assert that the true judgment of transformative actions will always lie with those whose lives are being transformed.

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The state of our world, the state of our worldview(s): The Integrative Worldview Framework as a tool for reflexive communicative action and transformation

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INTRODUCTION

While global environmental protection has been on the international political agenda since the 1972 United Nations Conference on the Human Environment, efforts have not been effective in altering the fundamental trajectories of human-induced environmental degradation (Biermann et al., 2012). As many now recognize, the failure to alter their course is largely due to widespread disagreement and gridlock in the global debate on contemporary sustainability challenges such as climate change (Hulme, 2009; Nisbet, 2009; Victor, 2011). It is therefore becoming increasingly clear that the lack of agreement and the often intensely polarized perspectives this lack is based on, is itself a major, if not *the* major obstacle to forging robust, effective solutions and building a secure, sustainable, and flourishing ‘planetary civilization’ in the twenty-first century. As Hulme (2009) has argued, differences in *worldview* and culture often underlie the ubiquity of such diverging and polarized perspectives in stakeholder negotiations and public opinion, thereby hampering the communicative action¹ and cooperation that is so urgently needed. For example, several voices have pointed out how intractable political conflicts in the U.S. are the result of ‘culture wars,’ or clashes in worldviews. Moreover, it has also been asserted that diverging worldviews are at play in international conflict (see e.g. Koltko-Rivera, 2004).

However, since our planetary issues are increasingly interconnected and multi-faceted, transnational, transcultural, and transdisciplinary cooperation are absolute necessities; these issues are simply far too complex to be solved from one or two perspectives, disciplines, methodologies, or modes of rationality (Held, 2006; Hedlund, 2010; Benedikter and Molz, 2011). While the divergence in perspectives and cultures clearly leads to misunderstanding, conflict, and inertia, some voices have also emphasized the *value* of such diversity for addressing our pressing, global issues (UNESCO, 2002; Calicott, 2011). Precisely because of the diverse range of solutions, strategies, and perspectives that different cultural worldviews tend to bring forth, cultural diversity can be seen as having the potential to enhance our overall capacity for (cultural) adaptation and transformation (see also O’ Brien, 2009).

Thus, overall there appears to be a growing recognition of the critically important phenomenon of *worldviews* in the urgently needed transformation to sustainable societies (Hulme, 2009; O’Brien, 2009; Esbjörn-Hargens, 2010; O’ Brien et al., 2010). More specifically, some authors argue (see e.g. Esbjörn-Hargens and Zimmerman, 2009) that some degree of mutual understanding and synergy between divergent worldviews is essential to fostering sustainable climate solutions. We thus argue that basic insight into, and awareness of, worldview-dynamics can prove useful in fostering such mutual understanding, as well as leveraging and aligning diverse cultural potentials, generating constructive communication, and ultimately shared action to transform social structures and institutions in service of climate change adaptation and mitigation. In our view, it is precisely through an empathic understanding of other worldviews and their ways of relating to issues such as climate change that we can expect to craft strategic communications and make progress in galvanizing a larger part of the population in this important deliberation regarding our shared well-being, and the future of our planet. The aim of this article is therefore to summarize insight into the predominant worldviews in the West, and demonstrate how such insight can be applied to communication for climate solutions.

1. *Communicative action* can be understood here, following Habermas (1987b) as communication based on deliberation and dialogue oriented toward the establishment of greater mutual understanding.

We begin, in section 2, by discussing the notion of worldview and clarifying the philosophical foundations of our understanding and usage of this concept, as well as of our research approach in general. In section 3, we introduce the *Integrative Worldview Framework* (IWF), an interdisciplinary framework that synthesizes research from a number of fields, notably developmental-structural psychology and sociology. In section 4, we translate the basic understandings of the IWF to issues of multi-stakeholder communication, intending to demonstrate how this framework holds the potential to illuminate key barriers to mutual agreement and collective action, and enact strategic potentials and opportunities towards sustainable climate solutions. We show how this framework has the potential to serve as 1) a heuristic for cultural and psychological self-reflexivity; 2) an analytical tool for understanding worldview-dynamics in society; and 3) a scaffolding for effective climate communications and transformative solutions. Finally, we close with a reflective discussion on the IWF and offer suggestions for further research.

DEFINITION OF KEY-TERMS AND PHILOSOPHICAL FOUNDATIONS

In earlier research worldviews have been defined as the “inescapable, overarching systems of meaning and meaning-making that to a substantial extent inform how humans interpret, enact, and co-create reality” (Hedlund-de Witt, 2012; Hedlund-de Witt, 2013b). Further specified, they are complex constellations of epistemic capacities, ontological presuppositions, and ethical and aesthetic values that converge to dynamically organize a synthetic apprehension of the world. This definition highlights the power of worldviews in generating causal effects, which therefore impact the manifestation of actual events, and emphasizes their complex, interdependent relationship with the events that they bring forth.² Simultaneously, this definition emphasizes that worldviews are not a patchwork of loosely related phenomena but a coherent pattern or *system* that integrates seemingly isolated ideas into a common holistic structure (see also Inglehart and Welzel, 2005).

The notion of worldview highlights the relativity of our perception and understanding of reality, by emphasizing that there are multiple ways of looking at the world. To be sure, the concept conveys, in our eyes, a (critical) realist commitment to a world ‘out there,’ which is to some extent independent of, and thus not completely subject to, our human constructions (Bhaskar, 2008 (1975); Hedlund-de Witt, 2014, in press-b). This comes to expression in the word itself, which emphasizes *view* equally to *world*, and integrates them into a larger whole. As we are employing it, the concept thus reflects a philosophical perspective or *research worldview* (Creswell and Plano Clark, 2011), aiming to integrate the most important insights of both realism—emphasizing a *world* that can in principle be objectively investigated by a researcher external to its object of study—and social constructivism—emphasizing our *view* as human construction and product of historical, political, and cultural contingencies.

Our understanding here has been informed by contemporary philosophies that position themselves as alternatives to both naive realism (or positivism) and social constructivism, building on some of their most important insights, while simultaneously aiming to transcend their widely perceived shortcomings. These philosophies, most notably, include Critical Realism and Integral Theory (see e.g. Esbjörn-Hargens and Wilber, 2006; Bhaskar, 2008 (1975)). In effect, our notion of worldview reflects what we see as an emergent ontological and epistemological position that honors not only the creative agency of the human subject, but also the reality and even agency of objects in the world (Bhaskar, 2008 (1975); Hedlund-de Witt, 2014, in press-b). As such, we see this understanding of the notion of worldview as reflective of an emergent intellectual formation that has yet to achieve widespread appeal within the academy and public sphere, but is very much apropos in relation to our contemporary planetary demands and life conditions.

We tend to maintain a generally dialectical, developmental view of culture and society. However, this position contrasts in important ways with the notion of development in its modernist connotations—that is, of a uni-linear, triumphalist developmental progression from ‘primitive’ levels of social evolution towards the ‘civilized’ status represented by the modern West.³ Rather, we argue for a more complex, dialectical, open-ended, and unpredictable process of

2. However, this is not to suggest that reality itself is fundamentally contingent on worldviews and their epistemic-hermeneutic functions; in our view, aspects of reality (e.g., generative mechanisms, structures) exist as such largely independent of, and anterior to, interpretation and construal via worldviews.

3. Such an approach has, in our eyes rightfully, been deconstructed by (notably postmodern) philosophers, anthropologists, and sociologists alike, mainly because of its Eurocentric, neocolonial, and derogatory implications, and its commitment to an oversimplified ontological parsimony that is out of step with the complexities and messiness of the empirical evidence (MARSHALL, G. (1998). *Oxford Dictionary of Sociology*, Oxford, Oxford University Press, FERGUSON, J. (2002). *Development*. In: BARNARD, A. and J., S. (eds.) *Encyclopedia of social and cultural anthropology*. London: Routledge).

change. In this understanding, development is de-coupled from the notion of ‘progress’ (i.e. one can also speak of negative developments), while some form of *qualitative* or structural change can nonetheless be observed. Thus, in a developmental movement two or more qualitatively different stages can always be systematically distinguished (Van Haaften, 1997). Moreover, new stages do not randomly arise, but they evolve out of and are in some sense ‘produced’ by the antecedent stage (particularly its shortcomings and absences). In the words of Van Haaften, the later stages “depend on the earlier ones in the sense that the prior stages are necessary (though of course, not sufficient) conditions for the coming about of the later ones. It is in this sense that several stages can be identified as causally and conceptually connected parts of a single developmental sequence” (1997: 18).

In our understanding, a primary aim of worldview-analysis and research is to enhance reflexivity and generate insight into worldviews, as well as support mutual and empathic understanding between them, thereby aspiring to serve dialogue, cooperation, integration, and ultimately social-ecological transformation. In a similar fashion, several pioneering worldview-theorists have argued that the concept of worldview is of crucial importance for areas such as conflict resolution and peace psychology (Koltko-Rivera, 2004, see also Van Egmond and De Vries, 2011, Johnson et al., 2011). Clearly, we are speaking here of a *potential* of a certain definition and enactment of the concept of worldview, rather than of a universal or pre-ordained meaning. The IWF, which we will now turn to, builds on the aforementioned understanding of worldviews, and aspires to enact this potential for deeper understanding, cooperation, and integration across worldview boundaries.

THE INTEGRATIVE WORLDVIEW FRAMEWORK: TOWARDS AN INTEGRAL ECOLOGY OF WORLDVIEWS

In this section we aim to provide an overview of the predominant worldviews in (but not limited to) the West, by introducing the *Integrative Worldview Framework* (see Hedlund-de Witt, 2012; Hedlund-de Witt, 2013a; Hedlund-de Witt and Hedlund-de Witt, 2014, in press). The IWF is an interdisciplinary framework that synthesizes research from a number of fields, notably developmental-structural psychology and sociology. The framework operationalizes the worldview-concept into five interrelated aspects (see table 1), and delineates between at least four major ideal-typical worldviews in the contemporary West: a *traditional*, *modern*, *postmodern*, and *integrative* worldview (see table 2). This framework, in its current form, is to be understood primarily as a *heuristic* that can be used for generating understanding, reflexive inquiry, and communicative action.

In including each of these major worldview structures—traditional, modern, postmodern, and integrative—the IWF can be understood to disclose a kind of *integral ecology of worldviews*, illuminating how different psycho-cultural worldviews exist in complex, dynamic interrelationship with a plurality of other worldviews (as well as with biophysical, political, economic, and institutional dimensions of reality). This understanding of an ecology of worldviews points toward the empathic disposition in one’s relating to other worldviews that we deem to be essential. A basic premise of the IWF is therefore that every worldview is ‘partially right,’ has intrinsic value, and can make important contributions to the larger interrelated (ecological) whole (Wilber, 2000). Similarly, the IWF posits that no worldview is intrinsically ‘better’ than another; rather, worldviews should be seen as deep structures that can come to expression in more and less healthy—and more and less ecologically sustainable—ways. This means, as several authors have pointed out, that every worldview at least has *the potential* for ecological expressions (see e.g. Esbjörn-Hargens and Zimmerman, 2009). By being aware of this potential of each worldview—its healthy values and enduring truths—we can, in our understanding of and communication with other worldviews, orient towards supporting these potentials, rather than activating their less optimal expressions.

Table 1. The five aspects of the Integrative Worldview Framework (Hedlund-de Witt, 2012).

<p>Working definition of worldview</p> <p>Worldviews are inescapable, overarching systems of meaning and meaning-making that to a substantial extent inform how humans interpret, enact, and co-create reality; they are complex constellations of epistemic capacities, ontological presuppositions, and ethical and aesthetic values that converge to dynamically organize a synthetic apprehension of the world.</p> <p>The five aspects of worldviews, including exemplary questions and concerns for each of them</p> <ol style="list-style-type: none"> <p>1. Ontology: A perspective on the nature of reality, often enriched with a cosmogony.</p> <p><i>What is the nature of reality? What is nature? How did the universe come about? If there is such thing as the divine—what or who is it, and how is it related to the universe?</i></p> <p>2. Epistemology: A perspective on how knowledge of reality can become about.</p> <p><i>How can we know what is real? How can we gain knowledge of ourselves and the world? What is valid knowledge, and what is not?</i></p> <p>3. Axiology: A perspective on what a ‘good life’ is, in terms of morals and quality of life, ethical and aesthetic values.</p> <p><i>What is a good life? What kind of life has quality and gives fulfillment? What are our most cherished ethical and aesthetic values? What is life all about?</i></p> <p>4. Anthropology: A perspective on who the human being is and what his role and position is in the universe.</p> <p><i>Who or what is a human being? What is the nature of the human being?</i></p> <p><i>What is his role and purpose in existence?</i></p> <p>5. Societal vision: A perspective on how society should be organized and how societal problems and issues should be addressed.</p> <p><i>How should we organize our society? How should we address societal problems and issues?</i></p>
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Empirical research and theory in both sociology and developmental psychology appear to posit at least three worldview structures which are understood to be predominant in the West: a traditional, modern, and postmodern worldview (e.g., Hedlund-de Witt et al., 2014). For example, the World Values Survey—the largest existing worldwide, cross-cultural, longitudinal data set on cultural beliefs, values, and worldviews—demonstrates substantial value differences between traditional, modern (industrial), and postmodern (post-industrial) societies. The social science climate researcher O’Brien (2009) articulates these differences as follows:

“Traditional worldviews may, for example, place a greater emphasis on the set of values associated with conservation, which include tradition, security, and conformity. Modern worldviews may place emphasis on values associated with self-enhancement, such as power, achievement, and hedonism. Values linked to openness to change, such as stimulation and self-direction, may bridge both modern and postmodern worldviews. Finally a postmodern worldview may emphasize values that focus on self-transcendence, such as universalism and benevolence.” - (pp. 168-169)

Such differences in worldview also come to expression in distinct epistemological patterns, which the World Values Survey found to be characterized by a move from religious authority to secular authority (that is, a secularization of authority) in the process of modernization, to an internalized authority (or an emancipation from authority) in the process of postmodernization (Inglehart, 1997; Inglehart and Welzel, 2005). As Charles Taylor argues in his seminal work *Sources of the Self* (1989), our contemporary cultural landscape is characterized by a profound tension between an Enlightenment-inspired, instrumental, disengaged, objectified understanding of reality (modern worldview), and a Post-Romantic, expressive cultural current that sees nature as inner source (postmodern worldview). Next to that, he refers to a traditional or theistic worldview:

“the lines of battle are multiple and bewildering . . . I have been sketching a schematic map which may reduce some of the confusion. The map distributes the moral sources into three large domains: the original theistic grounding for these standards [traditional worldview]; a second one that centres on a naturalism of disengaged reason, which in our days takes scientific forms [modern worldview]; and a third family of views which finds its sources in Romantic expressivism or in one of the modernist successor visions [postmodern worldview].” - (pp. 495-496)

While these terms are used to refer to a variety of different and sometimes divergent phenomena in an assortment of distinct contexts, we make use of the terms *traditional*, *modern*, and *postmodern* for a number of reasons. First, these terms are broad, widely used constructs that capture the general thrust of the historical-developmental trajectory of cultural epochs and worldviews in the West, as described by numerous philosophers of Western thought, historians, and social scientists (see e.g. Bhaskar, 2008 (1975); Taylor, 1989; Habermas, 1976; Habermas, 1987a; Tarnas, 1991; Wilber, 1995; Inglehart, 1997; Giddens, 2009; Hartwig, 2011). Thus, they appear to be apt terms to be deployed for conceptualizing the deep structures of worldviews in a wide-ranging manner, generically linking the individual and collective, as well as integrating multiple, domain-specific theories. Moreover, because these terms appear to be fairly common, they seem to have widespread cultural caché, and be graspable in a relatively intuitive manner. However, needless to say, understanding worldviews in terms of such a high-level framework is necessarily based in a sweeping generalization of the complexities and ambiguities of reality. Nevertheless, in our eyes, such simplification is justified by its heuristic value: offering a kind of generalized orienting framework that can *ideal-typically* structure research and analysis and generate testable hypotheses.

In addition to the traditional, modern, and postmodern worldviews, the IWF includes a fourth, somewhat hypothetical, emergent worldview structure. This post-postmodern or *integrative* worldview appears to be primarily characterized by its attempt to integrate many of the enduring elements of the earlier worldviews, notably spirituality with rationality⁴ (see e.g. Wilber, 2001; Esbjörn-Hargens and Wilber, 2006; Laszlo, 2006; Wilber, 2007; Esbjörn-Hargens and Zimmerman, 2009; Benedikter and Molz, 2011; Hedlund-de Witt, 2011; Van Egmond and De Vries, 2011; Hedlund-de Witt, 2014, in press-a).

4. In the words of Benedikter and Molz (2011:9) “the current constellation in the European-Western hemisphere is witnessing a significant increase in ‘spiritually’ informed paradigms that claim to be at the same time ‘rational’. Though these paradigms sometimes deploy ambiguous concepts of ‘spirituality’ and ‘rationality’, have very diverse features, are not infrequently opposed to each other and are of varying quality, their common core aspiration can be said to be, in the majority of cases, integrative, inclusive and integral. These terms imply an attempt to reconcile spirituality and rationality, transcendence and secularism, as well as ‘realism’ and ‘nominalism’, with the goal of building a more balanced worldview at the heart of Western civilization than the ones we have had so far, which have by and large been biased either towards secular nominalism on the one hand, or religious transcendentalism on the other.”

Table 2. The IWF ideal-typically constructs traditional, modern, postmodern, and integrative worldviews, using the five worldview-aspects as coding scheme (Hedlund-de Witt, 2013a; Hedlund-de Witt and Hedlund-de Witt, 2014).

	Traditional worldview	Modern worldview	Postmodern worldview	Integrative worldview
Ontology	<p>Religious/metaphysical monism. Reality as singular, transcendent</p> <p>Universe as purposively constructed whole. God-created universe <i>ex nihilo</i></p> <p>Transcendent God is separate from profane world; dualism</p> <p>Nature as embodiment of meaningful, imposed order (e.g. God's creation)</p>	<p>Secular materialism. Reality as singular, immanent</p> <p>Mechanistic universe brought about by random selection</p> <p>Material reality devoid of meaning, intentionality, consciousness; dualism, disenchantment</p> <p>Nature as instrumental, devoid of intrinsic meaning and purpose. Resource for exploitation</p>	<p>Post-materialism. Reality as pluralistic, perspectival, constructed</p> <p>Cosmogony as cultural construct?</p> <p>Reality as discontinuous and fragmented; anti-essentialism</p> <p>Nature as constructed through a plurality of cultural values, meanings, and interests</p>	<p>Integralism? Reality as multiplistic, transcendent <i>and</i> immanent</p> <p>Universe as evolving and creative manifestation of Source/Spirit</p> <p>Extrinsic and intrinsic reality co-arising and interdependent; unity in diversity</p> <p>Nature as constructed <i>and</i> intrinsically valuable. Frequently seen as divine force that humanity is part and expression of</p>
Epistemology	<p>Naïve realism; emphasis on concrete-literal interpretations of religious doctrine (literalism, dogmatism)</p> <p>Religious authority (scripture, divine revelation, tradition)</p> <p>A-methodological</p> <p>Substantive rationality</p>	<p>(Post-)positivism; emphasis on reality as objectively knowable, (empiricism, reductionism, scientism)</p> <p>Secular authority (science, the state)</p> <p>Quantitative methods; methodological monism</p> <p>Procedural rationality</p>	<p>Social constructivism; emphasis on reality as constructed, perspectival (pluralism, relativism)</p> <p>Internalization of authority (e.g. moral, emotional, intuitive, artistic knowing)</p> <p>Qualitative methods; methodological pluralism</p> <p>Skeptical rationality</p>	<p>Neo -or critical realism, pragmatism; emphasis on reality as knowable through integration</p> <p>Triangulation of authority (scientific, spiritual/religious/philosophical, and subjective knowing)</p> <p>Mixed methods; integrative pluralism</p> <p>Synthetic rationality</p>
Axiology	<p>Traditional values (e.g. security, tradition, conformity, obedience, humility)</p> <p>Emphasis on community, family</p> <p>Pre-conventional morality</p>	<p>Rational-secular, materialist values (e.g. power, achievement, hedonism, stimulation)</p> <p>Emphasis on independent individuality</p> <p>Conventional morality</p>	<p>Self-expression, postmaterialist values (e.g. openness to change, self-direction)</p> <p>Emphasis on unique individuality</p> <p>Postconventional morality</p>	<p>Self-expression / self-transcendence values (e.g. universalism, benevolence)?</p> <p>Emphasis on embedded, relational individuality</p> <p>Universal morality</p>
Anthropology	<p>Humanity in managerial stewardship role vis-à-vis nature</p> <p>Prime purposes determined by larger order and social roles. Human being as sinful/fallen from grace. Dependent on religious/metaphysical authorities for salvation</p> <p>Ethno-centric identity</p>	<p>Humanity in promethean control over nature</p> <p>Prime purposes of a material, hedonistic nature. Human being as self-optimizing, independent being. <i>Homo economicus</i></p> <p>Socio-centric identity</p>	<p>Humanity in cautious relationship to nature</p> <p>Prime purposes are found within, intrinsic. Human being as self-expressing, unique individual</p> <p>World-centric identity</p>	<p>Humanity in unity and transformational synergy with nature</p> <p>Prime purposes found within, serving the larger whole ('service through self-actualization'). Human being as evolutionary co-creator, with a vast—though generally unrealized—potential</p> <p>Planetcentric identity</p>
Societal vision/ socio-technical imaginary	<p>Traditional societies, emphasis on (subsistence) farming</p> <p>Traditional and religious authorities and values are looked at for solutions to societal and environmental problems</p>	<p>Industrial societies, emphasis on industry and commercial industrial agriculture</p> <p>Technological optimism: science and technology will solve societal and environmental problems</p>	<p>Post-industrial societies, emphasis on service economy and creative industries</p> <p>Scepticism, idealism: emancipation of marginalized voices through 'deconstruction' of power dynamics will solve problems</p>	<p>Increasing emphasis on services, creative industries, and sustainable entrepreneurship?</p> <p>Integrative vision: emancipation of the masses through consciousness growth and a synthesis of interests and perspectives will solve problems</p>

In table 2 we tentatively depict these four major worldview-structures as described by prominent thinkers and researchers, according to the structure and aspects of the IWF. This depiction is of an *ideal-typical* nature, aimed at providing a very general and broad overview of the primary assumptions, themes, and concerns of each of these worldviews, as well as provisionally suggesting the larger developmental trajectory that they seem to display. Moreover, whereas the depiction of traditional, modern, and postmodern worldviews is grounded in more empirical research, the depiction of the integrative worldview is based on a limited data pool and is therefore currently still somewhat hypothetical and speculative.

Lastly, it is important to underscore that these worldviews are *deep structures* or underlying dynamical patterns that vary in terms of their culturally and individually relative *surface* contents or expressions (Wilber, 2000, drawing on Noam Chomsky). For example, a traditional ontology will be expressed through different surface contents depending on whether that worldview is situated within a Christian or Hindu religious-cultural context, but will share certain underlying commonalities.⁵ Furthermore, it is crucial to bear in mind that these worldviews are fundamentally *not* conceptualized as rigid characterizations of people, but rather refer to general homologies of perspective. Human beings are highly complex singularities that cannot be exhaustively described through any theoretical framework. Additionally, in our view, individuals do not simply hold one worldview in a monolithic manner, but rather tend to probabilistically inhabit a predominant worldview, while expressing elements of other worldviews depending on a variety of contextual variables. The accurate and ethical usage of this worldview framework depends on such a nuanced understanding.

It is also important to point out that although value priorities and orientations may shift with changing worldviews, most values and perspectives associated with earlier worldviews do not necessarily disappear: they simply decrease in exclusive priority as they become integrated as structural sub-components of later worldviews, which transcend and include certain aspects of them, while jettisoning other elements (Wilber, 2000). For example, certain traditional and modern values remain within postmodern worldviews, but they may be considered to be a lower priority and visible only in some contexts and situations (O' Brien, 2009). Wilber (2000) elucidates this phenomenon by distinguishing between what he calls *enduring* and *transitional* structures. Enduring structures are the elements of a worldview that, upon their evolutionary emergence, persist in the developmental process, despite being subsumed and synthesized by a later worldview. Conversely, transitional structures are the worldview-elements that are phase-specific and thus are largely negated and replaced by later, subsequent structures in the developmental trajectory of emergent worldviews.⁶ As we will discuss in the section below, this technical distinction turns out to be of practical importance for generating empathic and effective communications that can resonate with multiple worldview audiences simultaneously. Having discussed the general contours of the IWF, we will turn to address the application of this model to communications in service of building solutions to our pressing ecological and social challenges.

APPLYING THE IWF FOR REFLEXIVE COMMUNICATIVE ACTION

In this section we will demonstrate the practical value of the IWF, by applying it to climate communications. In this context, the IWF serves three major purposes. First, the IWF can serve greater self-reflexivity vis-à-vis policy-makers and communicators' own worldviews. Such self-reflexivity appears to be essential for effective climate communications. Secondly, we argue that the IWF can serve as an analytical tool to foster greater understanding of worldview-dynamics at play in sustainability-debates and issues, as well as in societal dynamics at large. An understanding of the worldviews operating amongst stakeholders or segments of the population is essential in order to generate effective policies and communications. Third, the IWF can serve as a kind of scaffolding for the process of crafting effective communications by tailoring them to resonate with specific worldviews. We now discuss each of these three major functions of the IWF in relation to aiding 'reflexive communicative action' for sustainable solutions—communications in service of mutual understanding that are both self-reflexive and keenly attuned to the worldview-dynamics in different audiences and/or society at large.

The IWF as heuristic for cultural and psychological self-reflexivity

As several authors have argued, greater self-reflexivity is an essential prerequisite for crafting effective communications in service of solutions to complex eco-social challenges such as climate change. Such self-reflexivity, in our view, can be conceptualized as consisting of two major dimensions: the cultural and psychological.

5. For example, Inglehart and Welzel (2005) observe that the cultural traditions that historically shaped a society show a lasting imprint on, and thus interact with, the developmental process of value change, rather than being immune to change or being completely overtaken by it.

Cultural self-reflexivity has to do with the critical examination of the collective, cultural, or intersubjective elements of the worldview that one is embedded in. In this context, it has been argued that the lack of reflection on the dominant framings around global environmental issues such as climate change have been problematic for communication strategies (Nisbet, 2009; De Boer et al., 2010; O' Brien et al., 2010). For example, Shellenberger and Nordhaus (2004) accuse the American environmental movement of “failing to question their most basic assumptions about the problem and the solution” (p. 7)— notably the assumption that the problem should be framed as ‘environmental.’ According to these authors, ‘the environment’ is a category that reinforces the idea that the environment is a ‘separate thing’ that humans are set apart from and superior to. Framing the problem as ‘environmental’ also may tend to reinforce a proclivity to understand it as a ‘special interest’ issue, rather than one that is potentially relevant for everyone’s basic safety, security, and (economic) well-being—that is, an issue that is relevant to basic concerns of everyone.⁷ Thus, as these authors illustrate, all too often environmental communications appear to reflect a lack of self-reflexivity—that is, they succumb to an unconsciousness vis-à-vis the positionality of the communicator(s) own worldview and niche within the larger ecology of worldviews, thereby inadvertently rendering one’s own worldview paradigmatic for everyone else and projecting it onto the world.

The problematic nature of such an unreflexive approach reveals itself in practice when, for example, environmental groups concerned with climate change highlight the perilous plight of the polar bear as the clarion call for action. In our view, such a narrative is likely to be appealing mostly to the limited segment of the public sphere that inhabits a postmodern worldview, since the postmodern worldview is, for example, partly constituted by a worldcentric self-understanding (in the *anthropology* aspect) that includes and therefore tends to care for non-human species such as polar bears on a global scale and is thus more likely to be compelled by the (worldcentric) environmental values that such a communication seems to presuppose. Employing such a strategy may tend to significantly delimit the potential for climate communications to achieve widespread impact and even generate negative associations for certain population segments that may alienate them from further engagement with these issues (e.g., ‘Why are those environmentalists so worried about polar bears, when I and so many others are unemployed and struggling to make ends meet?!’). As several authors (e.g., Shellenberger and Nordhaus, 2004; Nisbet, 2009) contend, insufficient cultural self-reflexivity appears to be widespread within the contemporary context of climate communications and may be an important mechanism contributing to the lack of large-scale behavioral change and the various gridlock dynamics that tend to dominate stakeholder negotiations.

Therefore, decision-making and communication processes may benefit from making worldviews more transparent and promoting systematic reflection on them—that is, engaging in a process of cultural self-reflexivity. Such cultural self-reflexivity may contribute to the use of a more comprehensive repertoire of methods and tools, and may enable policy-makers to avoid locking in on non-reflected frames (see also De Boer et al., 2010). For that reason, we suggest that communicators, strategists, and policy-makers seeking to foster climate solutions engage in a reflective inquiry with an eye for self-assessment of their own predominant worldview-structure. One way this can be done is by investigating, reflecting on, and dialoguing about one’s answers to the exemplary worldview-questions in table 1, and/or by reading through the aspects of each worldview as denoted in table 2, noting patterns of resonance or dissonance between the structural descriptors and one’s own felt sense of one’s predominant assumptions and values.

In addition to its cultural variant, greater *psychological self-reflexivity*, that is self-reflexivity on a more personal and emotional level, is essential, as Moser (2007b) argues:

“Maybe the first insight is for communicators themselves to acknowledge their own emotional responses to environmental degradation and society’s responses. Many choose to work on climate change because of deep passions and emotional, identity- and value-driven motivations, and thus are likely to experience strong emotional reactions (p. 72)”.

7. O'Brien et al. (2010) also question the accurateness and usefulness of framing climate change as an environmental problem, thereby giving rise to “a climate system that is separate and external to human activities,” resulting in a managerial discourse that points to “institutional and policy failures as the ultimate cause of the problem, and technocratic interventions as the solution”.

Such reflexivity is highly beneficial, as “unacknowledged feelings among communicators can lead to the impulsive, frustrated, or at least unskillful use of threat and guilt appeals which are unpredictable at best and counterproductive at worst” (Moser, 2007b). For example, it seems likely that environmental communications appealing predominantly to the psychology of fear (e.g. apocalyptic predictions or scenarios, however realistic they may be) reflect, in part, a projection of the communicators own psychodynamic issues and fears, in the absence of sufficient psychological self-reflexivity, and may in fact be counterproductive (Moser, 2007a).

Such unacknowledged feelings and judgments may also pertain to whole worldview-structures. Take, for example, the frequent, wholesale postmodern environmental disdain for the modern worldview’s proclivity towards corporate enterprise and instrumental reason. Becoming aware of and reflecting on such feelings and judgments is a crucial step toward generating authentic empathy, mutual understanding, and effective communications with other worldview-audiences. The process of working through such judgments (or blockages) in relation to various worldviews is a crucial form of *intrapsychic integration* vis-à-vis the worldviews operant within oneself (Hedlund, 2008). If a communicator cannot take the perspective of a worldview that is different from their own predominant one, this is a sign that they need to cultivate a greater capacity for mutual understanding—that is, the capacity to inhabit and empathetically resonate with divergent worldviews. This capacity, as several authors argue, is a necessary pre-requisite for engaging communications that foster coordination, bridge divisions, synthesize positions, and synergistically align perspectives towards common goals and win-win solutions (Brown and Riedy, 2006; Esbjörn-Hargens and Zimmerman, 2009; Brown, 2012). However, in order to engage other worldview-audiences from such a place of authentically wanting to understand and resonate with (rather than change) them, one will need to ‘bracket’ one’s own positions (or practice “epoché” as the phenomenologists call it; see e.g. Moustakas, 1994) and be open to being changed. It is precisely this openness that potentially allows the outcome of the encounter to become participatory and mutually transformative. In short, such psychological self-reflexivity and integration will generally support one to communicate in a more ‘whole,’ empathic, and therefore effective way, engaging people more deeply and personally (see also Moser, 2007a).

The IWF as analytical tool for understanding worldview-dynamics in society

Next to greater self-reflexivity, the IWF can also serve as an analytical tool to foster greater understanding of the worldview-dynamics at play in climate and sustainability-debates, as well as in society at large. An understanding of the worldviews operating in particular target segments of the public sphere appears to be essential in order to generate effective policies and communications. As many studies suggest, research into the values and views of specific populations is therefore necessary for generating effective interventions (see e.g. McKenzie-Mohr and Smith, 2008; Steg and Vlek, 2009). However, in our view, an overarching meta-framework like the IWF, which synthesizes a large body of existing research across multiple disciplines, may effectively disclose the general contours of the values and views of the primary sub-culture populations in the West, potentially augmenting the need for conducting further research in some contexts. Moreover, in contexts in which knowledge of specific inflections and nuances of particular worldviews and their dynamics is needed, the IWF can function as a scaffolding for further research, providing a backdrop that can guide researchers in more effectively mapping a highly complex social landscape.

We will now briefly illustrate how this framework may facilitate better understanding of contemporary sustainability policies, and debates. Take for example the complex debate around biotechnology and its potential merits and risks in terms of sustainable development (Hedlund-de Witt et al., forthcoming). Several studies suggest that the different positions and opinions that the larger public holds towards biotechnology can be understood in terms of larger cultural patterns or worldviews. For example, in a European-wide study using the data of the 1996 Eurobarometer survey on biotechnology, two different patterns of resistance against biotechnology were found, which the authors characterized as a ‘traditional’ and a ‘modern’ skepticism. Their data showed that these different groups of skeptics were not only characterized by certain demographics (age, education level, residence), but also by their political, religious, and value orientations. As the authors argued, “modern biotechnology is commonly confronted by both a ‘pre’-industrial critique of intervention in ‘nature’s order’, as well as a ‘post’-industrial critique of the potential risks involved with the new technology” (2002: 192). While the traditionalists appeared to be critical on a more principled, a priori basis, the moderns tended to demonstrate a more pragmatic orientation, emphasizing that intervention in nature is not reprehensible per se, but that it is instead dependable on conditions and circumstances, such as potential risks, perceived benefits, and the regulations in place. Moreover, the results also showed that while moderns tended to trust NGO’s such as environmental and consumer organizations, traditionalists were less sure whom to trust, generally placing a higher degree of trust in the medical profession, and in some Catholic countries in religious organizations. Moderns also

displayed a much higher level of active participation in the biotechnology discourse, generally pleading for regulation of the industry, labeling of genetically modified food, and public consultation (Nielsen et al., 2002).

However, from the perspective of the IWF these two different forms of skepticism would be more accurately understood as ideal-typical traditional and *postmodern*. This not only aligns better with some of their own framings (e.g., the ‘modern’ group is characterized by “postmaterial values,” and tends to articulate a “post-industrial” critique with respect to biotechnology) but also in virtually every other aspect this group aligns better with an ideal-typical postmodern worldview—from their emphasis on uncertainty, systemic impacts and unpredictability, their trust in non-governmental and societal organizations, their politically left-wing inclination, their emphasis on the marginalization of certain interests, to their distrust of corporations to adequately take care of societal interests and needs. It appears that because these authors studied ‘resistance’ against biotechnology rather than the different positions with respect to biotechnology (thereby seemingly making the acceptance of biotechnology the implicit norm), the ideal-typically *modern* position in fact tends to be overlooked.

This example thereby underscores and illustrates how the IWF can support heuristic understanding of the larger currents and patterns in certain complex sustainability-debates. That is, while individuals with a traditional worldview may be skeptical of industrial biotechnology because technological intervention in nature is seen as a-priori unacceptable—since there tends to be a belief in a natural, God-created order that humans should not interfere in (‘Mankind has no right to play God!’)—individuals with a more ideal-typically postmodern worldview may be skeptical because of the risks and uncertainties that are hard to oversee as nature is conceptualized as a complexly interrelated, somewhat fragile, set of systems (Nielsen et al., 2002; see also Thompson et al., 1990). In contrast, individuals with a more *modern* worldview may exhibit more trust in science and technology and less problems with interfering in nature, frequently displaying a technological optimism or ‘techno-trust’ that assumes that environmental problems and other risks will be solved or managed through the further development of science and technology (see also Koppejan and Asveld, 2011). Thus, as this analysis shows, the IWF can illuminate the deeper assumptions, values, and concern at play in such highly complex debates, in which clearly much more is at stake than an argument over the scientific facts (Sarewitz, 2004; see also Hansen, 2012).

The IWF as scaffolding for effective climate communications and solutions

As we hope is becoming increasingly clear, the IWF can also function as a kind of general scaffolding to support the crafting of effective climate communications. As communication research has contended, in order to be effective, messages need to resonate with the worldviews—that is, the assumptions, values, and visions—of the audiences that they aim to convince or inspire (Moser and Dilling, 2007; McKenzie-Mohr and Smith, 2008; Nisbet, 2009).

Next to the importance of resonating with the audience’s worldviews and values, many researchers have emphasized the importance of communicating positive and *empowering* values and aspirations (Moser and Dilling, 2007). In this context, it has been argued that many communication strategies around environmental issues are problematic, because they aim at increasing the sense of urgency through fear, guilt, or shame appeals (which, according to the majority of studies, tends to be counterproductive except for under specific circumstances; see Moser, 2007a), or because they tend to be overly technical, dry, or scientific (Leiserowitz, 2007, Lappé, 2011). Futerra (2005, 2009) therefore speaks of the need to articulate a compelling *vision*, as communications about sustainable development need to be associated with the positive aspirations, values, and worldviews of the target audience—just as traditional marketing does. Other authors have also argued that communicators need to tap into culturally resonant, positive, empowering values and personal aspirations, and “envision a future worth fighting for” (Shellenberger and Nordhaus, 2004; Moser, 2007a; Moser and Dilling, 2007; McKenzie-Mohr and Smith, 2008; Lappé, 2011). Thus, communications appear to be more successful when they are *vision- and value-driven* rather than problem-centered, precisely because it is through (positive) values that approaches can connect to what motivates people and what is important to them (Schösler and Hedlund-de Witt, 2012). Developing an inspiring vision for the future that appeals to multiple worldview-structures therefore demands a detailed exploration of the different values and views that are the motivational drivers behind the solutions, policies, or strategies that one is trying to advocate. Such an exploration has the extra advantage of inviting strategists and policy-makers to examine their strategies and solutions with more critical awareness and from a multiplicity of perspectives rather than merely their own, possibly facilitating greater *policy-reflexivity* (see e.g. PBL, 2004, Huitema et al., 2011). As we have described above, the IWF can serve this reflexive process, as well as may generate a greater understanding of what drives other worldview-groups.

Communicators thus need to investigate and reflect on what is valued and what is experienced to be inspiring by multiple worldview-audiences. Generally, it is important to tailor communications so as to resonate with and appeal to the *enduring* elements of the different worldviews, thereby as much as possible averting the alienation of later worldviews. For example, when one appeals to the more universal, religious or spiritual core of a traditional worldview rather than to their more dogmatic, ethnocentric, and authoritarian expressions, this is likely to be more respected and potentially even well-received by modern and postmodern worldview audiences, while a more authoritarian and ethnocentric religious dogmatism will tend not to engender such a response. Conversely, when reason and science are invoked as important yet partial modes of knowing that can be complemented by faith and religiosity, rather than panaceas that eradicate the need for faith, individuals inhabiting a traditional worldview will likely be more receptive to such communications (see also Habermas, 2010). Generally speaking, while the transitional aspects of a worldview tend to give rise to conflict and polarization with other worldviews, the enduring aspects tend to be more compatible with the content and preferences of other worldview-structures. It is also preferable to craft messages that start with (and prioritize) an appeal to (the enduring aspects of) the earlier worldviews, as these elements will be largely maintained in subsequent development and can thus be relatively easily resonated with by the later worldview-audiences, while the converse is not true (that is, the enduring aspects of the later worldviews may not resonate for the earlier worldviews). Moreover, in a Maslowian manner, when earlier worldview-audiences feel assured that their fundamental needs and values are addressed, they are more likely to be open to other values and needs.

To illustrate the strategy of crafting communications that appeal simultaneously to the enduring elements of multiple worldviews, consider the following hypothetical example of a campaign for the advancement of renewable energy and efficiency technologies. One could begin the framing of their communicative strategy by emphasizing the values of increased homeland security and personal safety, as a result of greater energy independence and less reliance on foreign oil from politically unstable regions. Such a strategy then draws on traditional values, which, in their enduring form, tend to have widespread appeal (i.e., everybody generally can resonate with the need for safety and security). Additionally, the notion of energy independence often resonates with the traditional worldview's proclivity to express ethnocentric values through identification on the level of the nation-state and a primary concern for one's own national interests and autonomy (see e.g. Beck and Cowan, 1996; Cook-Greuter, 2000; Cook-Greuter, 2002). Such traditionalist forms of nationalism are often amenable to the idea of domestic ownership and control over energy production. One could then build on these traditional values and integrate key modernist values, by highlighting the potential economic advantages, such as an increased competitive advantage, innovation, job-creation, profit, and overall economic growth—all as results of investments in renewable energy. Furthermore, one could emphasize the benefits in relation to climate change such as biodiversity, the environment, global solidarity, and social justice, which tend to be more valued by more postmodern audiences. Lastly, for certain niche audiences, it might be skillful to underscore the ways in which such an initiative may serve the transformation of humanity's relationship to the environment and contribute the emergence of a flourishing 'planetary society,' thereby resonating with the emerging integrative worldview. See Figure 2 for an example of such a tailored communications-strategy.

When policies, strategies, and communications are crafted to effectively resonate with the intrinsic motivational flows of each worldview, meeting them *where they are*, rather than implicitly demanding that they identify with various assumptions and values associated with a different worldview, one is practicing effective structural *translation*, or assimilation, to borrow the term used by Piaget (Piaget and Inhelder, 2000 [1969]). Assimilation is the practice of effectively *translating* a (new or higher-order) communicative input or message into language that resonates with, and is appropriate for, the intended audience's 'native' worldview in its already-existing structure. Simply put, it means crafting a communication (or, for that matter, developing a strategy, campaign, or policy proposal) in such a way that it resonates and aligns with the audience's core view on the world. In contrast, structural accommodation consists of attempting to use the communicative act as a practice augmenting the internal structural configuration of the receiver(s) worldview. In effect, this amounts to an attempt to *transform* the worldview of the receiving audience. Due to the complex ethical as well as pragmatic questions associated with this strategy, we will not discuss this further here, thus focusing on strategies of translation.⁸ In general, we suggest communicators employ a strategy of translation (rather

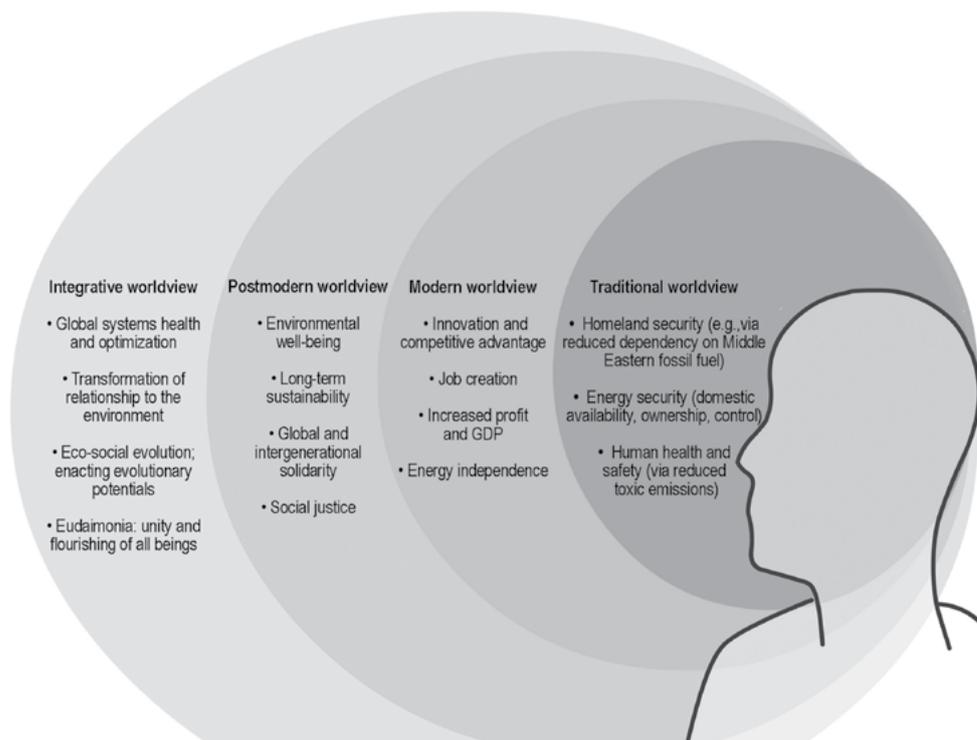
8. According to Brown and Riedy (2006), "transformative communications face a major obstacle: people change their worldview rarely, and there is no clear understanding of how to catalyze that change. Harvard developmental psychologist, Robert Kegan, points out in *The Evolving Self* (1982) that it takes approximately five years to change a worldview if the right conditions are present. Jane Loevinger, pioneer in understanding ego development (which is central to one's worldview), states that "Ego development is growth and there is no way to force it. One can only try to open doors."

than transformation), as we argue that individuals have the right to *be where they are* in terms of their predominant worldview, and should be respected and honored as such. Through translation, communicators can work with their audience’s extant views and values, creating supportive conditions for expressing the enduring potentials and values of their current worldview.

We also argue that strategies, initiatives, and communications should be developed and framed in a way that, as much as possible, *synergizes* the different worldview- and value-orientations, rather than focusing on the views and values of one group and opposing or omitting the rest. For example, Shellenberger and Nordhaus (2004) propose a way of addressing ‘environmental’ issues—which can be understood as a predominantly, though not exclusively, postmodern concern—that synergizes them with core values of the larger public, such as traditional family values, or modern technological innovation and competition values (see also Dilling and Farhar, 2007). In a similar vein, framing-theorists have explored multiple frames—e.g. social progress, economic development and competitiveness, morality and ethics, public accountability and governance—that can be used to synergize the interests and aims of the communicators with those of the larger public (Nisbet, 2009; De Boer et al., 2010). Precisely because most environmental issues are complex and multifaceted, their proposed solutions tend to be viable for syntheses that appeal to multiple value-orientations or worldview-audiences.⁹

Having discussed some salient ways in which the IWF can support reflexive communication in service of climate solutions, we will now turn to our concluding reflections.

Figure 1. An example of framing communications for renewable energy initiatives to multiple worldviews.



9. The following example illustrates how a sustainability initiative can appeal to multiple worldviews and can thus be communicated in a synergistic fashion. In studying the emerging values and views of the organic and Slow Food movements—the forerunners of the transition to a more sustainable, plant-centered, organic/local diet—it was found that individuals associated with these movements tend to be inspired by a pluriform value-palette, which appears to be potentially compelling to multiple subcultures and worldview-audiences (Schösler and Hedlund-de Witt, A., 2012). This value-palette ranged from more ‘traditional’ values (such as an emphasis on and appreciation for family-owned farms; local livelihoods; traditional production methods; simple, seasonal, artisanal foods according to ‘grandmother recipes’; strong social ties between producer and consumer), to ‘modern’ values (flourishing economies; pleasure of taste; high quality foods; great variety; experimentation and innovation; health and nutrition), to ‘postmodern’ values (environmental well-being; animal welfare; pure, natural foods and mindful eating; food choices as expression of one’s individuality; vitality and holistic health). These various value sets can all potentially be highlighted in a synergistic communication strategy, foregrounding and backgrounding certain of them depending on the particular audience.

DISCUSSION AND CONCLUSION

As stated in the introduction, the aim of this article is to summarize insight into the predominant worldviews in the West, and demonstrate how such insight can be applied to communication for climate solutions. However, while we feel that the IWF holds the potential to empower individuals and organizations to work with the crucial but oft-overlooked interior realities of worldviews and their complex interrelations more effectively, the IWF is explicitly intended as a provisional, *orienting heuristic* that can advance our investigation and understanding of worldviews and their dynamics, rather than as a rigid or reified model with which to categorize and label people, stakeholders, or organizations. Indeed, the real-world empirical terrain of our contemporary social landscape is highly complex and messy, and is not readily disclosed in a comprehensive manner by any conceptual framework. Rather than aiming to fully describe, explain, or predict this complexity, the IWF aspires to highlight its most salient patterns— helping one to *navigate* it. As the saying goes, ‘the map is not the territory.’ Moreover, although we emphasize (an understanding of) worldviews as a critically important element in any sustainability or climate change policy, strategy, and communication, we are aware that other dimensions of reality—behavioral, political, institutional, socio-economic, et cetera—deserve equal consideration.

To be sure, further research into the IWF is needed, both with respect to the framework itself as well as with respect to its concrete application in various contexts. Empirical investigation and validation of the different worldview-aspects (e.g. ontology, epistemology, axiology) and their interrelationships are needed, since the extent to which the various aspects of each worldview tend to ‘hang together’ or correlate within individuals or stakeholder groups remains to be empirically explored in a more robust manner. Furthermore, the development of a rigorous psychometric assessment or scale that can obtain high degrees of validity and reliability is crucial for the theoretical development of the IWF and is currently under construction (for the first steps in developing a psychometric, see Hedlund-de Witt, 2012; Hedlund-de Witt et al., 2014, in press). In addition, there are many domains of research that the IWF could fruitfully be applied in as an orienting heuristic. For example, the framework could be applied to explore the scientific, public, and policy debates around climate change, using the IWF as a heuristic for analyzing and understanding the various voices and positions in these debates with a greater degree of nuance and depth (Hedlund-de Witt, Forthcoming). Such research projects will likely expose areas in the IWF that are in need of further theoretical development, leading to its refinement, augmenting the framework in an iterative manner, and demonstrating how and in which contexts it can be best applied.

Despite the aforementioned complexities and the arduous work of successfully applying the IWF within the real world context of disagreement and gridlock, we hope that the framework, as outlined in this article, might contribute to fostering greater self-reflexivity among policy-makers and communicators, greater understanding of the intricate dynamics within and between worldviews, and constructive communication and cooperation across various worldview-perspectives in service of climate solutions.

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'Practicing' narratives: Exploring the meaning and materiality of climate change

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INTRODUCTION

As we move deeper into the Anthropocene, frustrations and anxieties over our apparent inaction in the face of a warming world are mounting. Despite several decades of effort, successes in curbing greenhouse gases in the atmosphere have been patchy and insufficient in averting a global rise in temperature, let alone the broader transformation of our socio-technical systems towards a more resilient, low- or non-carbon society that many have called for (cf. O'Brien, 2011). Studies explaining the political, social, and technical reasons for our delay have been joined in recent years by a body of work that has sought to unravel the mystery of our inaction using social and psychological paradigms. This work has identified many "barriers", including our individual and collective feelings of psychological distance, apathy or disconnect from the effects of climate change (Moser and Dilling, 2007; Rees, 2010; Scannell and Grouzet, 2010; Akerlof et al., 2012); the inability of our moral and ethical frameworks to deal with it (Markowitz and Shariff, 2012); and all the ways that we reconstruct climate change information to support pre-existing cultural or political beliefs (Hulme, 2009; Kahan et al., 2012; Weintrobe, 2013). The findings of this work suggest that for many, climate change has failed to acquire any real significance or meaning; it remains instead an abstract concept, unrelated to our daily lives, menacing and yet impossible to grasp (cf. Jasanoff, 2010).

While this work has yielded important insights, it is still yet unclear how the exploration of our meaning-making endeavors might contribute to a societal transformation in the face of a warming climate. In this paper, we suggest that narrative analysis adds an important dimension to an ongoing discussion of climate change that has thus far mostly focused on the "facts" of climate change, with relatively little discussion of how these facts are actually imbued with meaning that may or may not resonate across communities and societies (cf. Smith, 1998; Wynne et al., 2007; Jasanoff, 2010). To help make a connection to concrete action, we link narrative concepts with work in social practice to understand the relationship between meaning and material, and explore the utility of such an approach in effecting a transformation to a low-carbon, resilient society.

We begin by briefly defining narrative and reviewing the major applications of narrative to climate change research and practice, including its discursive, communicative and dialogical forms. We outline both the contributions and inadequacies of these applications, in particular highlighting the need to connect climate change narratives to the material, cultural and institutional contexts from and for which they are created. We broadly introduce the body of work on social practice as a means to accomplish this, and conclude with some thoughts on how the integration of these two theoretical approaches may contribute to better engagement for a transformation towards low-carbon societies.

THE USE OF NARRATIVE IN CLIMATE CHANGE RESEARCH AND PRACTICE

From its origins in literature and history, applications of narrative theory have flourished throughout the humanities and social sciences over the last few decades (Czarniawska, 2004). Barbara Czarniawska (2004) explains this enthusiastic "turn" toward narrative as a response to the failure of rational models of behavior to take either the plurality or situatedness of human experience into account (cf. Schütz, 1973; Meuter, 2011). Following the post-modern tradition, this turn toward narrative continues a movement away from singular accounts of truth and rational scientific approaches that propose a single way of looking at reality, or what Jerome Bruner (1991) termed the "logico-scientific" form of cognition. In its place, a narrative understanding allows for a multiplicity of "truths" or accounts of reality, each with its own unique position in space and time, wrought from our interactions with each other and with the material world

(Lyotard, 1979; Fisher, 1984; Bruner, 1991; Squire, 2008). The specific uses and applications of narrative now vary, with narrative defined in a multitude of ways ranging from the literary (i.e. the structural form of narratives), to the experiential (i.e. as the very foundation from which we construct and experience the world) to the discursive (i.e. as the broad currents of thought and idea associated with particular events, issues or periods of history).

Though recent, the entry of narrative into climate change research and practice has already begun to follow many possible pathways that if followed, could yield interesting and important insights. However, as we will argue, those that follow a more instrumentalist approach to narrative are unlikely to result in either widespread or meaningful engagement with climate change on the part of citizens and communities. In the sections below, we explore the predominant approaches to narrative in climate change research and practice thus far, highlighting both their benefits as well as some of their limitations.

USING NARRATIVES TO COMMUNICATE CLIMATE CHANGE

First, narrative has increasingly been interpreted as a means of packaging or delivering climate change information in the hopes that the intended audience will understand and connect to it. This use of narrative as a particular mode or structure of communication is predicated on the notion that people communicate their experiences through story, most often with some temporal ordering of events, characters and outcomes. Applications of this approach to climate change have increased in number in recent years, with many suggesting the use of narrative as a more appropriate means of communicating the facts and urgency of climate change to a diverse audience. Instead of providing people with information that is highly abstract, large in scale, and irrelevant to everyday experience, the logic goes that narratives may instead be used to present information in a way that ties complex climate issues to personal experiences and concerns (Kearney, 1994; Leiserowitz, 2006; Moser, 2007).

Climate change communication strategies that draw on the fundamental narrative structure that underlies human cognition may capture the emotional and value-derived aspects of knowledge and experience, rendering them more effective in relating climate change to existing knowledge and worldviews (Kearney, 1994; Whitmarsh, 2008). As a result, some have suggested the need to reconceptualize major publications on climate change (e.g. the IPCC reports) in a narrative form that connects the information to the reader's experience (Lejano et al., 2012). Indeed, several communications around climate change are beginning to assume a more narrative form in an attempt to more clearly present the possible futures under different scenarios (e.g. Arnell, 2013;)¹. Recent work on landscape visualisation and climate change is moving in the same direction, suggesting that the use of such visualisations may be extended to the use of narratives that connect climate change issues to familiar places and experiences of landscapes and streetscapes (Dockerty et al., 2006; Sheppard, 2012).

Though this approach to narrative has yielded insights into how we frame or communicate certain risks, ideas and issues, one problem is that it is often based explicitly or implicitly on what have been described as information-deficit or ABC models of behavior change (Shove, 2010). Such models, which generally presume that providing more information (in this case, packaged in more persuasive narrative forms) will lead more or less directly to change behavior. Work in areas such as health promotion (Green and Kreuter, 2005; Savelson et al., 2005), energy efficiency (e.g. Stern, 1986, 1992; Wilhite, et al, 2000; Owens and Driffill, 2008), community-based social marketing (Mackenzie-Mohr and Smith, 1999), and the general determinants of behavior change (Stern, 2000; Kollmus and Agyeman, 2002; Jackson, 2005) have shown that such models are limited in their ability to induce actual behavior change. An example in climate change literature is that of popular film representations of climate change futures, which have moved beyond the documentary style of *An Inconvenient Truth* or *The 11th Hour* to depict fictional dystopic climate change futures, such as those in *Waterworld* (1995) and *The Day After Tomorrow* (2004). Studies of such films' narratives have found that while they have provoked emotional reactions and/or feelings of agency in audience members, the long-term behavioral effects of having viewed such films are minimal (Leiserowitz, 2004; Lowe et al., 2006; Howell, 2011).

Nevertheless, the use of narrative to communicate climate change information can still present an important means of generating awareness, public discussion and debate on climate change issues (Leiserowitz, 2004). Callison's (2010) work with evangelical Christians interested in environmental stewardship, for example, shows that culturally dominant science-based framings of the problem are of limited interest to such groups, while ethics-based approaches to

¹. An important subset of this approach to narrative has been the study of narrative structures and typologies found in media accounts of climate change impacts, politics and policies, e.g., Boykoff & Boykoff, 2007; Jones, 2010; Mayer, 2011; McComas & Shanahan, 1999; Young, 2013.

climate change have much greater resonance. The rise of a new literary genre dubbed “cli-fi”, or climate fiction is also worth noting, which explores various aspects of climate change, either explicitly or implicitly as a background to the development of more personal narratives (e.g. Lynas, 2008; Weart, 2008; Oreskes and Conway, 2013). Popular authors who have recently begun to write along such themes include Barbara Kingsolver (*Flight Behaviour*, 2013), Ian McEwan (*Solar*, 2010) and Nathaniel Rich (*Odds Against Tomorrow*, 2013). As these authors attempt to grapple with the meaning of possible climate futures, the artistic forms of communication around climate change they produce may arguably prompt others to do the same, improving understanding through the sharing of experience and perspective (cf. Rorty, 2007).

CLIMATE NARRATIVES AS BROAD DISCOURSES

A second approach to narrative in climate work is to map out the development and impact of modern climate discourses within scientific or political spheres. For example, Sorlin (2009) traces the development of climate change narratives in the early days of Swedish polar research, demonstrating the contingency of current climate change narratives on the advances of particular fields and the embeddedness of history in current climate change rhetoric. Hamblyn (2009) similarly reviews key moments in the development of climate change over time that have rendered the narratives of *risk* and *risk reduction* central to the issue, showing that the vision of a warming world as the result of and beyond the control of human actions can be traced to events as early as the discovery of the greenhouse effect in the late 19th century. At a broader scale, the implications of our overarching metanarratives of climate change, including those of *risk* or *danger*, *fear* and *uncertainty*, have been explored by several authors (e.g. Fleming, 2006; Hulme, 2008). For example, Hulme explains that a narrative of fear of climate has manifested itself in different forms over time, beginning with the environmental determinism and associated fear of “abnormal” climates of the early Greeks. This view of “climate as pathology” has also been noted in colonial perceptions of the morally corrupting force of tropical climates (for a powerful literary example of this view, see Conrad, 1990/1899). Hulme also notes a second sub-narrative of “climate as judgment”, evidenced in the belief in weather as the domain of divine and satanic forces at various times in history. Poor weather has often been viewed as punishment for sin, a view that, like pathology, has extended into the present (Glacken, 1976; von Storch and Stehr, 2006; Hulme, 2008).

Such work has also shown that the dominant narratives of climate change that emphasize themes of *scientific expertise*, *complexity and uncertainty*, and *limitation* do not necessarily resonate with, have relevance for, or compel change across a broad proportion of society. These narratives have emerged from particular ways of viewing the world, and act to legitimize particular courses of action while excluding others (e.g. Wynne et al., 2007). In her treatment of international climate negotiations, for example, Liverman (2009) notes that each of the three broad narratives that have emerged at this scale – “dangerous climate change”, “common but differentiated responsibility”, and “market as solution” – have tended to “obscure the historical geographies of anthropogenic climate change and have fostered solutions that are often unequal and somewhat ineffective in reducing the risks” (2009: 280). The case has also been made that a metanarrative of climate change as an insurmountable crisis has produced both controversy and apathy. Such narratives often presuppose the failure of our attempts to avoid climate change and marry us to our fate of a catastrophic and dystopian future, creating in us a sense of anxiety, if not anger or outright denial (Moser, 2007). In work examining the activities of the IPCC and some of their critics, Shaw and Robinson furthermore note the degree to which specific narratives of the interaction between science and society play a significant role in determining not only the purpose and meaning of the findings of the IPCC, but also significantly constrain the ways in which the IPCC process itself should be understood (Shaw and Robinson, 2004).

This discursive approach to narrative offers clear opportunities to better understand the climate problem (and its characterisation as such). The exploration of changing narratives place these understandings of and responses to climate change into context and reveal the ways in which their meaning has changed over time and space. In doing so, these approaches have revealed the culturally, geographically and historically situated nature of our narratives, dispelling the notion of a fixed or inherently truthful account of climate, or appropriate response to it. Instead, it has shown that many of our narratives around climate change are not new, but have manifested in different ways over time. The identification of narrative threads in modern climate change discourse furthermore facilitates the identification of both overarching metanarratives present in national or international discussions of climate policy, or more locally situated narratives of human responsibility or potentiality. By tracing the development of particular narratives over longer periods of time, the overarching rationale for a particular way of thinking or acting on climate change and the discrepancies between competing “truths” can be revealed. Such work also points to the need to think explicitly about how different narratives can intersect and be adjudicated, perhaps as important for addressing climate change as addressing scientific uncertainty about the potential future of the climate system, or the costs and impacts of human responses.

SHARING NARRATIVES FOR DECISION MAKING AND CIVIC ENGAGEMENT

Thirdly, narratives have been used in climate change efforts as a part of a relatively new set of engagement tools and methods around climate change that solicit and share different narratives of the various dimensions of climate change. Such an approach replaces a unidirectional model of providing information with one that favors mutual sharing of experience and knowledge. More than about identifying existing narratives, then, such an approach is about how we might create dialogue-based processes that present the opportunity of developing new narratives. More than about seeking the “right” narrative that will best engage or move a specific audience to action, sharing existing narratives can be a foundation from which to explore the various meanings of climate change as they arise and what they offer as a focal point for discussions about possible futures.

In this way, the use of narrative is less as an object of interest to be understood or conveyed, than a process through which multiple narratives may be shared. Discussions become a “collective meaning-making” exercise that use narrative, storytelling, metaphor and imagery to tie everyday understandings and experiences with decision-making. Sharing these narratives may form the basis for understanding diverse experiences and values, creating fruitful means of citizen engagement in climate change, and ultimately new approaches to climate change problem solving. This represents a shift from “persuasive communication” approaches, intended to change behavior in predetermined ways, to an “emergent dialogue” approach, which aims to create a forum for dialogue that is open to different and unpredictable outcomes. The goal is not to persuade but to create dialogue processes that are informed by the best available understanding of the science, but which allow the participants to make up their own mind about desirable choices and courses of action. This approach parallels work in Dialogical Processes that view participants as emotional as well as rational and draw on their experience as “embodied, feeling and narrativizing subjects” (Bendor et al., 2012: 73; see also Tanenbaum et al., 2013). It also builds on participatory integrated assessment approaches that are based on a procedural approach to sustainability (Robinson et al., 2011).

Approaches in climate change research that have called for such a use of narrative include the work of Hulme (2009), who explores narrative as a means of accessing the collective meanings underlying climate change that, if harnessed, could provide the key to effective action. In contrast to typical narratives of risk or danger, Hulme presents four climate “myths” that draw on four human penchants for environmental protection, social justice, fear of uncertainty and mastery of nature. In using climate change as a mirror in which we may examine our own fears and longings, he suggests, we may actually transform it from a material catastrophe to socially constructed opportunity and ultimately reconfigure the “myth” of climate change from one of limits and impossibilities to one of opportunity. Drawing on the anthropological tradition, Cruickshank’s (2001, 2005) explorations of the intersection of scientific narratives of glacier change with the oral histories and myths of the Yukon elders shows that while both explain changes in glacier extent over time, personal narratives provide a means of relating human histories in very concrete ways to the non-human elements of a changing landscape, to be told and re-told while taking on constantly changing forms (Cruickshank, 2005).

Practical applications of this approach are also occurring through efforts to engage citizens in conversation about sustainability and climate change issues. To take a local example, in its goal to become the “Greenest City” by the year 2020, the City of Vancouver has supported a number of dialogical exercises that engage the public by opening up spaces to share experiences and meanings around a particular issue through storytelling or other cultural fora (e.g. City of Vancouver, 2012; Greenest City Conversations, 2013). These are the beginnings of processes intended to engage citizens in exploring possible worlds through different dialogical processes and channels of engagement that have different “affordances” in terms of the kinds of narrative that are possible (see Bendor et al., 2012; Maggs, 2012; Tanenbaum et al., 2013). A single pre-determined solution is not assumed; instead, multiple narratives are drawn upon to form a new, co-created narrative that explores issues of interest to the participants in the process. Such processes can span the range from purposive-instrumental engagements intended to give rise to some form of agreement or consensus on specific decisions or policy choices, to open-ended dialogical processes aimed more at exploring questions of identity and social meaning (Bendor et al., 2012). Consistent with Rorty’s view, sharing stories may not always be tied to decision making around specific issues, but can allow for understanding and empathy to develop, which may in turn facilitate the process of decision making around contentious or complex issues.

EXPLORING MATERIALITY THROUGH SOCIAL PRACTICE

The review of the three approaches to narrative discernable in climate change work to date reveals the various approaches to incorporating a narrative lens in climate change research and practice. But what do they offer in terms of contributing to changes in the systems of resource use that contribute to climate warming in the first place, especially

given the concerns about persuasive approaches described above? Here it may be useful to explore how narrativity plays out in material human practice. Such material dimensions of narrative are usually only touched upon in most applications of narrative. While we are a part of a physical world made up of institutions and infrastructures, each with its own aspects of change and stability, tradition and innovation, path dependency and emergence, common uses of narrative tend to explore expressions of individual or collective meaning, or the symbolic and largely immaterial aspects of a constructed reality. This leads us to ask: how might narratives relate, if at all, to the material world?

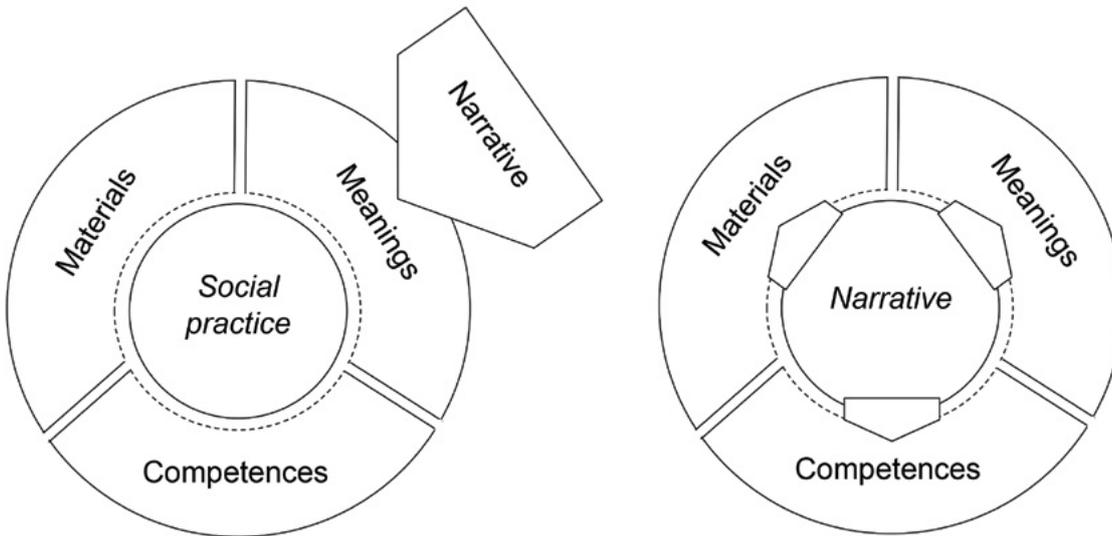
To begin to answer this question, we first look to work that conceptualizes narratives as stories lived in practice, fundamentally linked to our lived experience as temporally- and spatially bounded beings (Bruner, 2004; Ricoeur, 1991). Such an understanding draws in part from the phenomenological concept of narrative as the means through which we live out our lives, necessarily immersed, or grounded in the physical world and bound by our physical bodies (Heidegger 1927; MacIntyre, 1981; Bruner, 1991, 2004; Clandinin and Connelly, 2000). In this understanding, language and ideas constitute an expression of bodily experience, moulding life into a meaningful whole through dynamic interaction with the world (Heidegger 1927; Bruner 1991; cf. Merleau-Ponty 1945). At the collective level, narratives furthermore contain both “normative and performative” dimensions, where “master” narratives in policy or society not only describe a situation but “assert how it should be” (Wynne et al., 2007: 75). In either the individual or the community, then, narratives are intimately linked with materiality and context, both derived from and formative of our interactions with the world.

To further explore this connection, it is also useful to draw on emerging work on *social practice*, a body of work without a unifying theory but with a shared sense of the emergent relationships between meaningful and material, structure and agency. Reckwitz (2002) broadly defines social practices as the collections of objects, technologies, skills, knowledges, institutions, rules and meanings that constitute society, which are negotiated and reinvented over time. Social practices are seen as *carried* by individual body/minds through routinized performances that embody non-cognitive aspects of life, shaped by the structures and expectations of a particular society in time (Reckwitz, 2002; Schatzki, 2002). As such, “experience is best understood not as an outcome of events and intentional actions, but as an ongoing process or flow in which habits and routines are continually challenged and transformed” (Shove et al., 2012: 5). In this way, social practice contradicts the conventional habit of assuming that a combination of sufficient knowledge, appropriate beliefs or attitudes, and desires will result in individual behavior that is sustainable, leading to the critiques noted above of the information deficit and ABC approaches to behavior change (Shove, 2010; Hargreaves, 2011). Behaviors are instead embedded in a richer cultural and social context of institutions, infrastructures and broad societal trends. The focus is shifted away from individuals toward relationships, with emphasis on performance and the role of institutional and infrastructural contexts.

Different social practice theorists have sought to characterize the ways that practices “hang together”, breaking down their components in slightly different ways. Among these, the simplest is Shove and Pantzar’s (2005) model of *meanings, competences and materials*, or the dynamic relationship between our values, images and icons; the “things” and technologies that make up our physical world; and the skills and knowledge that we require for their use. Inherent in such a model is the view of practices as both “entities” as well as “performances”, or the bodily routines and behaviors that we act out in daily life (Reckwitz, 2002; Schatzki, 2002). However, the focus is less on individual behavior as cognitively chosen through processes of instrumental rationality, than on these dynamic systems of relationships, inter-woven with cultural and social meanings and value. Meanings form one part of practices, while needs and desires form an outcome and not a driver of action.

This body of theory forms a basis from which to make some broad comparisons between social practice and narrative theories (particularly the discursive and dialogical approaches explored above), as well as explore the possibilities their deliberate convergence offers to climate change research and practice. First, the exploration and sharing of narratives can provide an opportunity for reflexivity and the analysis of existing or ideal practices in the achievement of sustainability efforts. Approaches to narrative rooted in narrative analysis or inquiry may therefore be useful for exploring the “meanings” dimension of practices, more clearly revealing the tacit, symbolic and meaning-laden dimensions of practices, both in individuals and in interaction with others. This is especially relevant given the danger inherent in social practice work of going too far towards the idea of humans as “passive carriers” of practice and ignoring the “dynamic, normative or evaluative reaction to practice” one might have (Sayer, 2013: 336). Sayer explains this risk as falling into a “blandness” in the way we represent life, “as when, for example, a funeral is reduced to the performance of ritual, and grief is edited out as if it were insignificant” (2013: 336). Eliciting personal and/or organisational narratives thus offers a way of highlighting the inherent normativity of social practices, as well as important elements of agency,

subjectivity and power that remain despite acknowledging the co-emergence of meaning and action (cf. Spaargaren, 2011). By exploring narratives at individual, community and institutional scales, the ways we understand, desire and value certain ways of doing things, and how these ways of doing are given priority over others can be revealed (cf. Reckwitz, 2002; Warde, 2013). This integration of narrative and social practice theory can perhaps be conceptualized as an extension of the *meanings* component to social practice through the use of narrative methodology (Figure 1a).



a. Narrative methodology is used to provide access to the “meanings” dimension of social practices

b. Narratives conceptualised as acted out as social practices

Figure 1. Representations of two possible integrations of narrative and social theories.

Secondly, as alluded to above, the addition of a social practice lends specifically material and social dimensions to narrative, allowing it to be embedded more firmly within particular routines, material contexts and socio-cultural meanings. As noted by Squire, narratives cannot be seen as fully “determining” the material world; they instead remain vaguely attached to it and can often even operate “outside social functionality” (2012: 53). As such, while narratives can reveal how meaning is attached to particular issues or events, it remains difficult to determine within the confines of narrative theory how meanings are associated with our actions, routines or behaviors. Social practice theories may help to do so by situating narratives within relevant social and material systems and exploring, for example, how one’s personal narrative of energy use or climate change plays out through certain practices with more or less energy intensity; where and how these narratives are acted out, and using which specific technologies or infrastructures. Taking this approach, bundles of social practices that are relevant to climate change can be explored in the sense of “performances” (vs. “entities”) that realize certain narratives about the world. In essence, this combined approach allows us to explore how personal, institutional and/or cultural narratives are *acted out* as social practices (Figure 1b). In this way, we can be seen as the carriers of social practices but use these practices to tell a story as we move through time and space, woven out of action and experience in a temporal sequence and performed as habitual activities and routines.

Taking the inverse, deeply entrenched cultural narratives may also be seen as the “sediments” of practices (Czarniawska, 2004: 45), following approaches that consider all social life as enacted narrative, as life as lived out as story. If, as posited by Ricoeur (1991), all action is in the quest of fulfilling a narrative, it is impossible to understand the purpose or intention of an action without considering the broader story into which it fits, including its setting, characters and purpose (cf. McIntyre, 1984; Schutz, 1973; Mattingly, 1998). Considered this way, climate change can be understood in Hulme’s terms as a story told, or the convergence of our perceptions, ideas, experiences and fears in myth and the ways such myths reinforce or are reinforced by ways of being in the world. Social practices in turn can be explored in relationship to the overarching metanarratives to which we either contribute or which we contend. Practices as “entities” can be captured as the stories (or narratives) that sketch out the way we think, feel and interact with the meaning-laden environments of our daily life.

INTEGRATING NARRATIVE AND SOCIAL PRACTICE FOR TRANSFORMATION TOWARDS LOW-CARBON SOCIETIES

The two sections above reviewed the basic concepts of narrative and social practice theories, and the ways in which they have been applied to the issue of climate change. We suggested the use of social practice as a means of getting to the materiality of narrative, and explored possible ways of their integration. But how might narratives and social practices be explicitly linked to public understanding and engagement in the context of climate change? What role might a combined narrative-social practice approach play in contributing to changing the flows and patterns of life in which we are embedded?

First, change in social practices has been identified as occurring in a few ways. A change in any of the basic elements of a social practice – materials, competences or meanings – may result in a change in the nature of the practice (Gram-Hanssen, 2011). For example, new practices might emerge through changes in the material environment (e.g. the introduction of satellite communications networks), technologies (e.g. the introduction of tablets), or meanings (e.g. the valuation of in-time global communication). Where practices can be thought of as in competition for the attention of practitioners, the adoption of one practice necessarily pushes others aside; by extension, old practices fade away when practitioners can no longer be recruited.

Of interest to climate change scholars, however, is not simply how practices change but how sustainable practices become established and diffuse (Shove and Spurling, 2013). Shove and Spurling suggest that those wishing to reduce energy consumption are tasked with “imagining and realising versions of normal life that fit within the envelope of sustainability and that are resilient, adaptable and fair” (2013: 26). While many practices are sustained without awareness or reflection, Gram-Hanssen (2011) and Schatzki (2013) both discuss how practices often change through a change in knowledge or engagement, which in turn prompt conscious reflection about the routines in which they participate, as well as the conscious decision to adopt new habits. This may occur when practices are challenged, for example by a steep rise in energy prices.

However, the exploration and sharing of narratives around climate and energy may provide an intentional space for reflection, particularly through deliberative processes that are linked to social practices. Where the a dialogical approach to narrative is used for the deliberate creation of new, collectively-defined climate change “myths” and perhaps initiatives, the social practice dimension may conversely help to visualize, either literally or figuratively, how these might look, work or feel. Similar kinds of work have begun in online fora or “Change labs”, where the potential role of idea sharing and communications technologies through fostering innovations are explored in the hopes of creating conditions for the “successful integration of different perspectives and knowledge sets, facilitating breakthroughs in complex problem domains” (Westley et al., 2011: 776; see also Bendor et al., 2012).

Secondly, the combined exploration of narratives and social practices also allows for a process in which the end goal of sustainability efforts can be continuously debated and revisited as goals change and new information comes into play. In such an approach, climate change may no longer be the key issue, but instead one of many concerns relevant to the maintenance of conditions amenable to the flourishing of human and other life. As a procedural phenomenon, “sustainability” in turn becomes an emergent property of a system whose purpose is to ensure the continued well-being of its components (Robinson, 2004, 2008; Ehrenfeld 2008, 2012; see Miller, 2012). This necessarily involves the development of participatory (and perhaps narrative) processes of community engagement that allow participants to explore and express their views about preferred futures, based on some understanding of the ecological, social and economic consequences of different choices (Robinson et al., 2011). These understandings include those derived from climate models and observations of real and potential impacts, but are linked to local, meaningful scales (cf. Jasanoff, 2010). Bringing together multiple perspectives and experiences may allow for the development of common understanding and resilience through sharing of stories. The emphasis on imaginative possibility and the inclusion of others’ stories may furthermore allow for a re-emphasis on understanding rather than controlling.

CONCLUSION

In this paper, we presented an overview of how narrative has thus far been applied to the issue of climate change, and how the insights derived from such an application might be even further extended through the integration with a social practice lens. As a discursive tool, the study of narratives offer a way of exploring individual feelings, perceptions and experiences around climate change, as well as the broader assumptions around facts and values

embedded in the metanarratives that make up the societal level. The examination of our collective narratives can lead to the understanding of their embedded assumptions and prompt a deeper look into the way these are performed, or acted out through the systems of practice that serve and are served by them. While communicative models of narrative help to reveal the kinds of climate narratives that have resonance or meaning for particular societies or cultures, the sharing of narratives as a means of engagement around climate change presents an opportunity for emotive, imaginative or contextual elements to come to the fore of discussions around possible or desired futures, capturing the unique and dynamic experiences of individuals within a community, or communities within a society, and offering the potential for exploration of new forms of engagement with climate change.

It is our contention that this third approach to narrative in particular may be helpful for contextualising climate change in terms of the overall desire for a liveable world, allowing the question of what this looks like and how we can achieve it to be continually asked in the full richness of multiple framings and worlds, and that can then connect, in no doubt unpredictable ways, with policy and individual action. What such approaches require, however is the addition of a pragmatic lens such as social practice to help ground our narratives within the material flows and social conditions in which our stories and lives are situated. This includes material constraints and conditions (e.g. energy systems, building technologies, transportation options, etc.), as well as norms, values, and institutions. In turn, the use of narrative approaches in social practice studies may provide an opportunity to reflect upon and perhaps intentionally redirect the more discursive, normative and subjective aspects of our daily habits and routines. As we attempt to shift our communities and societies towards a low-carbon future, an exploration of social practices as narratives can furthermore help to situate practices within the broader climate change and other myths in our society, and what we want them to “say”. How our daily practices reinforce or challenge such myths is a topic of importance for any plans or policies that aim to engage citizens in efforts to reduce our impact on the climate.

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Mindfulness, well-being and sustainability

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INTRODUCTION

Earth's ecosystems are under considerable pressure. 60 percent of the ecosystems examined in the Millennium Ecosystem Assessment (MA, 2005: 1) were degraded or used unsustainably. Rapidly growing demands for resources has resulted in a substantial and largely irreversible loss in the diversity of life on Earth.

Climate change has, according to MA, not been the main contributor to this state. It has so far had low or moderate impact in most ecosystems (MA, 2005: 16). It is human-driven habitat change, overexploitation and pollution that have been drivers with the greatest impact. However, the impact from climate change is now rapidly increasing in all ecosystems. Ecosystems will have to cope with a warming world on top of their weakened resilience, while also the other drivers continue increasing in intensity.

The climate challenge could perhaps in theory be solved technically, with new renewables, energy efficiency in buildings, low emission transport, etc. But, the pace and scale of introduction of such solutions is not in sight. In addition, even if the climate challenge would be solved, we would need to handle the other drivers. Underlying all drivers is resource consumption, and this consumption will increase as up to three billion more middle-class consumers will emerge the next 20 years compared with 1.8 billion today (McKinsey, 2011).

Humans consume to provide for basic needs and necessities such as food, water and shelter, as well as to fulfill sensuous desires and wants. While *needs* can be seen as a relatively inflexible part of people's consumption since people need a minimum to survive, *wants* are more adaptable as they are shaped by the common perception of what is considered important, 'normal' or valuable in a culture (Max-Neef, 1991; Tay and Diener, 2011). Obviously, what billions of consumers consider valuable have great impacts on the demand for resources. If humans embrace experiences that depend on consumption, it will be more difficult to reduce the drivers to ecosystem degradation than if we emphasize e.g. human development, solidarity and environmental sustainability.

Can humans become more orientated towards the latter type of goals? In this paper we discuss "mindfulness" as one possible contributor. Mindfulness is a mental training technique that promotes awareness and a more mindful way of living. It is subject to an increasing number of scientific studies, and we believe the reported effects on individuals, such as increased well-being, empathy and awareness of one's true values could be helpful.

WHAT IS MINDFULNESS?

Mindfulness is a term that may be regarded in several ways; as a mental training technique that one engages in for a period of the day, or as a way of being in daily life. Kabat-Zinn (1994: 4) defines it as "paying attention in a particular way: on purpose, in the present moment, and nonjudgementally". Bishop et al. (2004) maintain that, when being mindful "thoughts and feelings are observed as events in the mind, without over-identifying with them and without reacting to them in an automatic, habitual pattern of reactivity." Hence, one does not attempt to change thoughts and feelings, but the reactions and relations to them (Shapiro et al., 2006). According to Chambers et al. (2009) mindfulness meditation allows "the individual to more consciously choose those thoughts, emotions, and sensations they will identify with, rather than habitually reacting to them."

Mindfulness can be trained by mindfulness meditation. For example, one pays attention to one's breath, body, feelings, thoughts, surrounding or context. Whether experiences that arise are pleasant or unpleasant, one simply pays attention to one's experiences, moment to moment. A cousin technique is loving-kindness meditation which aims more directly to evoke positive emotions. It is used to increase feelings of warmth and caring for self and others (Fredrickson, 2009). The technique involves focusing respectively on oneself, people one likes and dislikes as well as strangers, and dwelling on and cultivating an attitude of acceptance, well-wishing and compassion in relation to them. In the end one extends this attitude towards all beings (Hofmann et al., 2011). One of the effects of loving-kindness meditation may also be that one becomes more mindful (Fredrickson et al., 2008).

These practices have received increasing attention in professional and private arenas the last years. According to Kabat-Zinn (Boyce, 2010), it is moving into areas beyond medicine, healthcare, psychology and neuroscience, to programs on childbirth and parenting, education, business, athletics and professional sports, the legal profession, criminal justice, even politics (see also e.g. Riskin, 2002; Weick and Sutcliffe, 2007; Gelles, 2012; Wickelgren, 2012). Meditation is now one of the world's most widely practiced, enduring, and researched psychological disciplines (Deurr, 2004; cited in Walsh and Shapiro, 2006).

MINDFULNESS, WELL-BEING, VALUES, EMPATHY AND SUSTAINABILITY

There is a lot of research indicating that mindfulness has positive effects on well-being and empathy and can promote awareness of one's true values. We now discuss how this may lead to more sustainable behavior.

Subjective well-being

Well-being is likely to positively impact how we view and approach sustainable behavior. For instance, stress, depression or physical pain makes it harder to take into account other problems. Caring for the environment will seem a 'surplus phenomenon' if more basic needs is not fulfilled.

Research suggest that mindfulness improves on a range of well-being and health related conditions like chronic pain, stress, anxiety, depression, immune function, satisfaction with life, etc. (Brown et al., 2007; Chambers et al., 2009). Magnetic resonance imaging of meditators' brains suggest changes in regions important for e.g. sensory, cognitive and emotional processing, learning and perspective taking (Lazar et al., 2005; Hölzel et al., 2011). Regulatory functions of these practices may have long-term impacts on the brain and behavior (Lutz et al., 2008). Meditation has been pointed out as one of the more effective ways of achieving happiness (Layard, 2005). A recent review concludes that there is a "...clear convergence of findings from correlational studies, clinical intervention studies, and laboratory-based, experimental studies of mindfulness - all of which suggest... that training in mindfulness may bring about positive psychological effects" (Keng et al., 2011). Research has also documented positive effects of loving-kindness meditation on well-being (Fredrickson et al., 2008; Hofmann et al., 2011).

Mindfulness meditation may be beneficial for happiness and well-being for several reasons. First, mindfulness meditation might lead to less unhappiness by increasing the ability to be engaged "here and now", in the present moment. Having a wandering mind is found to be correlated with less happiness, even when thinking about emotionally neutral topics. It is suggested that mind wandering is a cause, and not only the consequence, of unhappiness (Killingsworth and Gilbert, 2010). Second, mindfulness has been related to increased compassion and empathy, which in turn might lead to better social relations. A study of loving-kindness meditation found that the participants received more social support, compared to the waitlist control group, and had more positive relations with others (Fredrickson et al., 2008). Having supportive relations with friends and family is one of the most important factors for a happy life (Layard, 2005). Third, mindfulness might improve well-being by contributing to clarification of values, facilitating behaviours that are consistent with the values. Personal well-being is best served by following "authentic" goals, i.e. goals that are inherently meaningful, and rooted in one's core values (Lyubomirsky, 2007). In one study, values clarification partially mediated the relationship between increased mindfulness and decreased psychological distress (Carmody et al., 2009, cited in Keng et al. 2011). Fourth, mindfulness meditation is an activity that seems to avoid the "hedonic treadmill." Happiness is found to be only moderately associated with external circumstances, i.e. income, work etc. (Layard, 2005; Lyubomirsky, 2007). People soon get accustomed to a given level of material welfare. This is called the "hedonic treadmill effect" (Seligman, 2007). An interesting feature of mindful attention and loving-kindness meditation is that these mental training techniques seem to be able to undo this effect (Fredrickson et al., 2008).

Studies suggest that happiness is correlated with several forms of sustainable behavior (Brown and Kasser, 2005; Corral-Verdugo et al., 2011). And, prosocial behaviour is found to increase subjective well-being, which in turn may encourage more prosocial behaviour (Dunn et al., 2008 and Aknin et al., 2011, cited in Markowitz and Shariff, 2012).

Empathy and values

Environmental problems like climate change are challenging for our perceptual, cognitive and affective information-processing system because they are so abstract, probabilistic and intangible (Gifford, 2011; Markowitz and Shariff, 2012). Framing these issues in moral terms may be more engaging. Jamieson (1992) argues that when seen as ethical problems, environmental problems “become problems for all of us to address, both as political actors and as everyday moral agents.” One way to strengthen the recognition of climate change as a moral imperative could be to expand group identity by “increasing identification with and empathy for future generations and people living in other places” (DLC, 2009; Markowitz and Shariff, 2012). According to Decety (2011) empathy is often associated with prosocial behavior and is an important enabler for altruism:

“Empathy is not restricted to kin, nor does it have to be prompted by the actual perception of distress signal or emotion contagion. Rather, it can be extended to strangers and even members of different species and generated from cognitive processing, like imagination and conscious rationalization.” - (Decety, 2011)

Compassion, according to Jazaieri et al (2012), is suggested to be a predictor of psychological health and well-being while also promoting altruistic behavior and generosity. According to Walsh and Shapiro (2006): “Meditative disciplines particularly value and cultivate transpersonal states in which the sense of identity extends beyond (trans) the individual person or personality to encompass wider aspects of humankind, life.” Mindfulness is shown to increase empathy and compassion (Shapiro et al., 1998) and a felt connection to other people and the world around them (Tipsord, 2009). For instance, Kemeny et al (2012) ran an 8-week meditation/emotion training intervention on healthy teachers that were assigned to either a treatment-group or a wait-list group. They found increased positive states of mind and positive behavior, increased prosocial responses like compassion, and that negative affect was significantly reduced. Similar results are found in other studies (Block-Lerner et al, 2007; Jazaieri, 2012) supporting the idea that compassion can be taught and learned. Studies showing that inducing empathy may be a valuable way to create more environmentally friendly attitudes and concerns support the above arguments (e.g. Berenguer, 2007, Schultz, 2000, Pahl and Bauer, 2013).

Family, friends and the rest of society will often influence our values. Advertisers also influence while trying to persuade us that a purchase would be beneficial for achieving a more happy life. They creatively promote “perceived obsolescence” and infuse buying with feelings like self-worth, freedom, adventure, and success (Clark, 1989; Dauvergne, 2010). This conditioning makes it difficult to evaluate what exactly is valuable to us, and we may instead be “pushed and pulled by what we believe ... is most important, but fail to reflect upon whether it is truly important in the context of our own lives” (Shapiro et al., 2006). Several studies suggest that people with self-enhancing, materialistic values and goals directed towards achievement, money, power, status and image, also are more negative towards the environment, are more likely to use natural resources unsustainably and less likely to be involved in environmental friendly behaviors (Crompton and Kasser, 2009). Given the strong emphasis on consumption in society, it is difficult not to be influenced. However, mindfulness could serve as a counterweight. Shapiro et al. (2006) argue that mindfulness may clarify one’s values. It may help us to reflect more objectively so that we may “rediscover and choose values that may be truer for us.” And, it can help us to become more aware of thought processes and less receptive to persuasion by others (Rosenberg, 2004). As an example, Brown et al. (2009) argue, in line with the discussions in this paper, that the high level of focus on wealth and consumption in society may contribute to people feeling discrepancies between what they have financially and what they want, fostering reductions in subjective well-being. Using three different samples completing self-report measures, they found that higher mindfulness was associated with smaller financial desire discrepancy and greater subjective well-being, and that smaller desire discrepancy was related to higher well-being. In a quasi-experimental study they also trained participants in mindfulness, and found that to the extent training increased mindfulness, discrepancies decreased and subjective well-being increased.

Sustainable behavior

In much of our daily life our actions are not the products of conscious choice (Bargh and Chartrand, 1999). This may create undesirable effects, for instance related to health and well-being (Marteau et al., 2012). People interpret the world according to their own set of ‘lenses’, so that “objects and events are rarely seen impartially, as they truly are, but rather through the filters of self-centered thought and prior conditioning, thereby running the risk of furnishing

superficial, incomplete, or distorted pictures of reality” (Brown et al., 2007). Rosenberg (2004) argues that also much of our consuming behavior is automatic and comes more from unconscious choice than from careful deliberation. However, increased awareness is said to enable transformation of cognitive and emotional habits (Lutz et al., 2008). Wenk-Sormaz (2005) found less habitual responding in an experimental setting with meditation. Thus, mindfulness may foster awareness and the ability of a non-habitual mode of being that is more flexible and more objectively informed (Brown et al., 2007).

Mindfulness has also been related to increased self-control (Friese et al., 2012) which might be helpful when one is exposed to choices between sustainable and tempting unsustainable behaviors (Clark, 1989). In the context of physical health-related activities Chatzisarantis and Hagger (2007) found mindfulness to facilitate translation of intentions into actions. Since mindfulness enhances understanding of true values, people act more in line with them so that intentions become better predictors of behavior (Glomb et al., 2011). Thus, to the extent mindfulness practices promote proenvironmental values, compassion and self-control, such mental training could possibly also facilitate translation of environmental related intentions into more sustainable behavior. Amel et al. (2009) regressed a green scale variable constructed from self-reported sustainable behavior on “acting with awareness”, a variable related to mindfulness which they thought would be most relevant to sustainable behavior. They found that acting with awareness was correlated with sustainable behavior, and suggested that low mindfulness was incompatible with sustainable behavior.¹ Brown and Kasser (2005) studied the relation of mindfulness, intrinsic value orientation and “voluntary simplicity” life styles to subjective well-being and ecologically responsible behavior. They found that happier people lived more sustainably and that mindfulness and intrinsic values were associated with higher well-being and ecologic behavior. The results also showed that people living by voluntary simplicity were more likely to endorse intrinsic values which supported well-being and ecologic behavior, suggesting that cultivation of intrinsic values may be related to this kind of simpler lifestyles. The researchers propose that “a mindful consideration of one’s inner states and behavior along with a set of values oriented more towards intrinsic than extrinsic aims appear to simultaneously benefit both individual and ecological well-being.”

CHALLENGES AND POTENTIALS

Meditation alone will not by itself solve the environmental crisis. Structural barriers like lack of bicycle lanes and public transport are but two examples from the area of transportation that hinders an otherwise sustainable-intended person from behaving according to ideals. In addition, mindfulness may not necessarily be easy to instigate and sustain over time. There are forces, represented by advertising, prevailing norms etc. that contribute to people choosing material wealth and other sources of perceived well-being over mental training. The positive consequences may be slow to emerge, and one often has to accept some initial frustration. Increased awareness may also bring access to suppressed feelings which are not always pleasant (Yalom, 1980).

Another pitfall is for the practitioner to become too much focused on the self, which might lead to narcissism and political passivity (Hedlund de-Witt, 2011). On the other hand, according to Brown et al. (2007): “mindfulness is not a form of escape that results in passivity or disconnection from life; rather, it is thought to bring one into closer contact with life by helping to circumvent the self-generated accounts about life that act to pull one away from it.” Still, little is known about the consequences of mindfulness meditation for political activity and whether it leads to passivity or not. There are many things we do not know in this field of inquiry, especially when it comes to effects related to sustainability. In general, there is a lack of experimental evidence, as most studies are correlational (with the exception of consequences of mindfulness for well-being, where many experiments have been done). In experiments, long-term consequences in terms of environmental behavior, political activity and lifestyle have not been explored. Both quantitative and qualitative research is called for.

The “double dividend” that mindfulness might both increase well-being and be better for the environment has the potential of making discussions of sustainable policies more attractive and engaging. As an example, information on climate change framed around the issues of public health, rather than around risks to the environment, might inspire more hope (Markowitz and Shariff, 2012; Myers et al., 2012). Feelings of hope and efficacy are strongly correlated with

1. They also investigated “observing sensations”, another variable related to mindfulness they thought could be relevant as the variable encloses attention to sensory connection with the world outside of ourselves. The regression found no significant relation, but the authors argued it was more than likely this was due to problematic measurement issues.

willingness to support climate change policies (Lorenzoni et al., 2007, cited in Myers et al. 2012: 1107). Given these mental training techniques are taken up by a significant number of people, some of the positive effects may all the same be salient in the general population. If the positive effects prove large enough this could be promoted as a public policy, not only because of sustainability issues, but also due to the effects on well-being and prosocial behavior.

CONCLUSION

Ecosystems are under pressure, and excessive consumption is a major cause. Consumption will increase with three billion more middle-class consumers the next 20 years. If billions of people across the world hold materialistic values, where perceived well-being is dependent on consumption it will be hard to achieve sustainability. If well-being is achieved through means less dependent on consumption it would be easier. In this paper we have highlighted that the contribution of mindfulness to well-being is substantiated by a wealth of research. Well-being achieved this way may in turn relate to a more sustainable way of living. Research also implies that mindfulness can contribute to increased empathy and value clarification which again may be related to environmentally friendly and sustainable behaviour. Promoting mindfulness and loving-kindness meditation in schools, workplaces and elsewhere could be construed as a policy of “double dividend” in that it could contribute both to more sustainable ways of life and to greater well-being. However, there is much we do not know, and there is a particularly strong need for more research.

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Climate change in Andean cosmivision: An indigenous perspective on the transformative power of worldview

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INTRODUCTION

The challenge of climate change to present societies is urgent. Scientific analyses are clear: in order to contain global warming and steer toward a more stable climate, we must drastically reduce our dependence on fossil fuels, requiring that we restructure our societies and individual lives. Moreover, postponing such action only a few years into the future will mean that greenhouse gas cuts will have to be so dramatic that they are hard to imagine possible (Figure 1). We know that rapidly rising temperatures are likely to produce dire outcomes for the Earth's biological diversity (Thomas et al., 2004; Gottfried et al., 2012), including food production (Vermeulen et al., 2012). Yet despite increasing knowledge about climate change and its current and projected impacts on ecosystems and livelihoods, we do little to change our current behaviors. Global greenhouse gas emissions continue to increase (Figure 1), and we continue to conduct our lives and structure our societies with only minor adjustments made towards carbon cuts.

In recent years, there has been an emergent realization that even scaling up or incrementally increasing current efforts to adapt to and mitigate climate change, for example through changes in infrastructure, regulatory frameworks and carbon cuts, are unlikely to suffice, and that more fundamental changes will be needed (IPCC, 2012). The need and prospects for such transformations are envisioned in different ways, but may imply substantial changes within technological, governmental and value systems (IPCC, 2012). It has been noted that if not deliberately induced, considerable societal transformation is likely to occur by force as climatic and concomitant environmental changes progress (Beddoe et al., 2009). Since such forced transformation could entail considerable risks to environmental and human well-being, humanity should grasp the chance and employ its capacity to engage in deliberate transformation, creating alternative pathways for society and steering away from calamitous future scenarios (O'Brien, 2012).

But, if we currently only scarcely have addressed climate change by implementing minor adjustments, how can a large scale deliberate societal transformation to meet the climate challenge take place? Searching for answers to this question should be of key importance for researchers seeking relevance to a global society standing before one of its greatest challenges. It is probably a question to which a single answer will not suffice. Given the plurality and diversity of humanity we will have to seek answers from multi- and transdisciplinary perspectives, and be open to listening and learning from the insights and experiences emanating from multiple points of view.

Some researchers have brought attention to the potential roles played by values and worldviews in shaping ideas about appropriate adaptation (O'Brien, 2009) and mitigation (Ford, 2011). This is in accord with several research traditions, among them ethnoecology (Conklin, 1962; Nazarea, 1999) and cognitive anthropology (D'Andrade, 1995), both of which theorize that human perceptions of and behaviors in relation to the environment are influenced by cultural knowledge systems and worldviews.

The present paper explores the prospects of transformative change emanating from one particular worldview, Andean cosmivision. The paper is based on a case study that explores how Kichwa elders in Northern Ecuador perceive and explain climate change (Skarbø et al., 2012). Here we find that elders have clear conceptions of climatic change as well as its causes and consequences. The perspectives put forth herein may provide fresh insights relevant to our search for broader understanding of the underlying causes of our altered climate, as well as new solutions for addressing current

and future change. The paper is structured as follows. We begin by introducing the study area and methods, and then review perceptions of human-environment relationships in Andean cosmivision. Following, we report local observations of recent climate change and the consequences of these changes for agriculture. We then relate local explanations for disrupted climatic patterns as well as proposals for addressing these problems. In the final sections we discuss the transformative power of worldview and reflect on the prospects of climate stabilization through reconnection with the living environment.

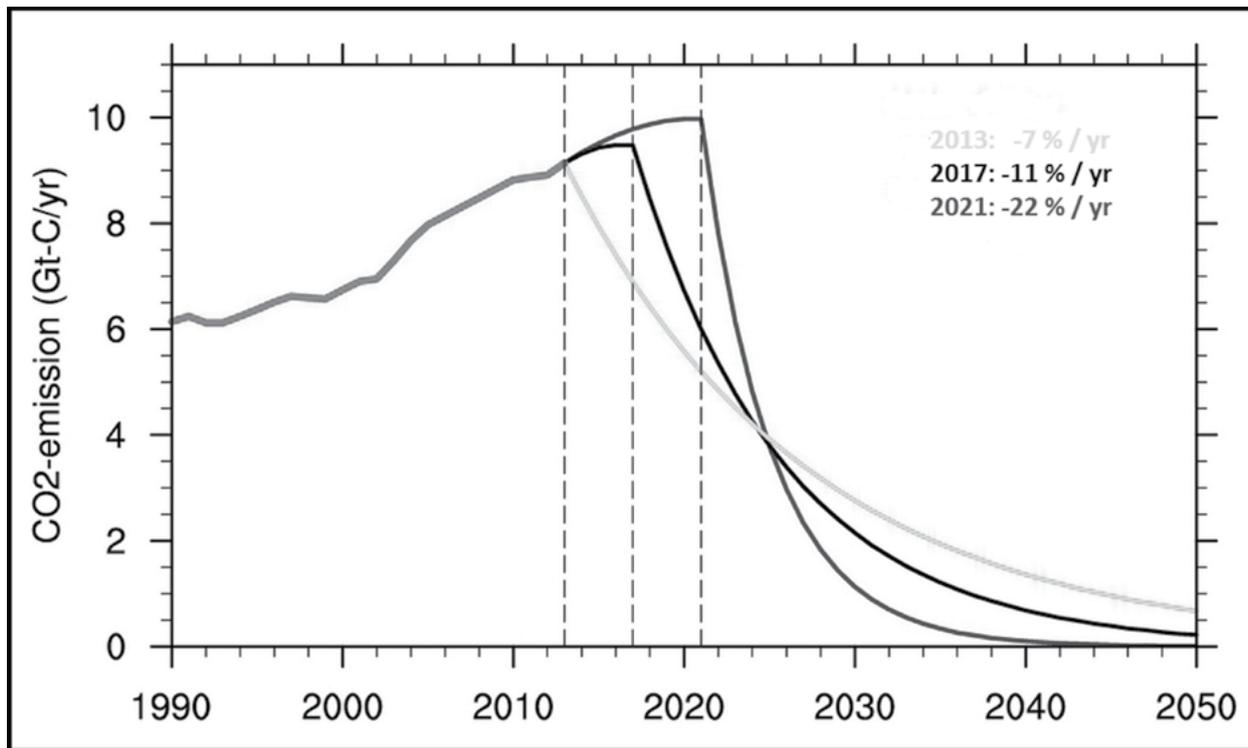


Figure 1. Global CO₂ emissions over time and yearly emission cuts needed in order to avoid global warming above 2°C with different starting points. The figure shows that postponing emission cuts a few years into the future implies drastic increases in the proportions of yearly cuts necessary. Figure developed by Helge Drange at the Bjerknes Centre for Climate Research, based on an updated version of analyses in Meinshausen et al. (2009). Reproduced with permission.

STUDY AREA AND METHODS

Cotacachi County (*cantón*) is located in the highlands of northern Ecuador, some 80 kilometers north of the country’s capital, Quito. Cotacachi is also the name of both the town housing the county’s administrative seat and the dormant volcano that dominates the local landscape (4939m). Agricultural lands span the mountain’s broad eastern slopes, which stretch from the base of the Inter-Andean valley (2400m) where the town of Cotacachi is located up to a height of 3300m (Zapata-Rios et al., 2006). These slopes harbor 43 rural communities, with a combined population of 15878 (UNORCAC, 2007). Most rural inhabitants identify as Kichwa (locally common terms are *indígenas* [Sp.] and *runakuna* [Ki.]), whereas the majority of Cotacachi’s urban population identifies as mestizo. Although over 70 per cent of the rural working population is employed off-farm, primarily in the neighboring cities of Otavalo, Ibarra and Quito, agriculture continues to be important as slightly more than 84 per cent of the population owns and cultivates land, aiding livelihoods by supplementing inadequate income and seasonal unemployment (UNORCAC, 2007). While farmers with larger landholdings typically produce crops for sale in local and regional markets, the majority have only small plots (less than 1 hectare) where they grow food for household consumption. Crop diversity is exceptionally high (Skarbø, 2012). Maize and beans are among the most commonly grown crops at lower altitudes, whereas higher up tubers, grains and fava beans predominate. Given that only 43 per cent of farm households have access to irrigation water, over half depend on rainfall for the growth and maturation of their crops (UNORCAC, 2007). Beyond and because of its millennia-old basis for subsistence in the area, agriculture also plays an important symbolic and material role in the constitution of culture and identity for Cotacachi’s populace (Rhoades, 2006a).

This paper primarily draws on information collected through participant observation, workshops and semi-structured interviews conducted by the authors in a 12-month period spanning 2009 and 2010. During this time, author one and two lived with an indigenous family in the community of Turucu in Cotacachi's lowlands, where they participated in a variety of agricultural and ritual activities. Additionally, the authors held five workshops involving 200 participants that examined local perceptions of and explanations for changes in weather and agriculture, and conducted over 100 semi-structured interviews on a variety of topics related to climate and agriculture with both men and women farmers between 20 and 90 years of age across 11 communities. Interviews and workshops were conducted in a combination of Kichwa and Spanish, and most were audio-recorded. All transcription and translation was conducted by the authors. Finally, our perspectives also build on long-term experience in the region, in the case of authors one and two from multiple periods of field work during the past decade, and in the case of author three from lifelong residence in Cotacachi.

HUMAN-ENVIRONMENT RELATIONSHIPS IN ANDEAN COSMOVISION

Like elsewhere in the Andean region (Apffel-Marglin and PRATEC, 1998; Estermann, 1998; Gonzales, 1999), the cosmivision of Cotacachi's *runakuna* is a worldview in which nature is endowed with life and sentience, and humans are tied to the beings of their environment in an interdependent manner. The wind is not mere moving air, the rain more than water which falls from clouds. They are Mother Wind (*Wayra mama*) and Mother Rain (*Tamya mama*), powerful beings with life, sentience, gender and will. Mother Water (*Yaku mama*), Mother Cloud (*Fuyu mama*), Father Hurricane (*Akapana tayta*), Father Sun (*Inti tayta*), Mother Soil (*Allpa mama*), Mother Grain (*Granu mama*) and Mother Fruit (*Frutu mama*) inhabit the landscape; they all play different roles in regulating the world's workings and are linked to one another as well as to humans through relationships of mutual dependence. Local mountains also belong to the collective of beings endowed with life (VanderMolen et al., 2011). Mt. Cotacachi, known locally as Mother Cotacachi (*Mama Cotacachi* or *Kutakachi*)¹, is married to Father Imbabura (*Tayta Imbabura*), a majestic mountain across the valley. Together they are considered to be guardians of the region, a responsibility delegated by the divine *Achi tayta*. *Achi tayta*, also called *Hawa pacha tayta*, and *Pacha mama* are the two most important divine beings in Cotacachi's Kichwa cosmivision. *Achi tayta* might be best translated to the English term God; he is the supreme male divine being. *Pacha mama*, on the other hand, is the supreme female divine being that also constitutes the biophysical world. In English, the most approximate translation might be Mother Earth, yet *pacha* is a term signifying both space and time, making it more complex. Other important divinities have emerged from Catholicism. When colonial authorities introduced Catholicism a syncretism formed, and since then Jesus, the Virgin Mary, and a number of Saints have gained local significance. Finally, human ancestors also carry importance and can influence the course of events in the present, playing a particular role in mediating communication between human, natural and divine beings.

The agricultural plot, the *chakra*, is one site where all beings interact. Agriculture has constituted the primary source of nourishment for Cotacachi's rural population for millennia, and in order to secure harvests, humans have depended upon the collaboration of natural, divine and ancestral beings. According to elders' beliefs, humans must therefore respect and maintain communication with these beings as they labor the earth, and nurture their relationships to them through ritual and everyday life. In the past, people gave prayers and offerings (*ofrendas*) atop sacred sites (*tolas*) to keep these beings happy and content, to remind them how revered they are among humans, to call them to come or to ask them to withdraw. During colonial times, some sacred sites became locations for churches, and people began to perform masses (*misas*) for these beings, as well as certain ritual celebrations in the names of saints. Today, the local ritual and agricultural calendars overlap such that many saints' days coincide with key events in the agricultural cycle. For example, ceremonies expressing gratitude to *Pacha mama* for ripened harvests are conducted during Easter (*kari paskwa* [Ki. mens' Easter]) and around the days of Saint John, Saint Peter and Saint Lucy, close to the June solstice (*San Juan* [Sp. Saint John] or *inti raymi* [Ki. Sun festival]). On All Souls' Day (*Finados*), the relationships to ancestral beings are nurtured through the ceremonial sharing of food (*wakcha karay*) at local cemeteries.

In times past, ceremonies were also carried out when it became apparent that an imbalance had occurred in the environment, such as when rains remained absent, or stream and spring flows waned. When rains were absent, people called for Mother Rain by gathering groups of children in circles, where they would lift their arms and call in prayer towards the sky: "dear *Achi tayta*, forgive us, and give us water" (Rosa Bonilla). Elders explain that after several days of calling, clouds would fill the sky and the rains would return. When stream and spring flows declined, it was thought that Mother Water had fallen asleep or that she had been frightened and fled to another place. Lack of proper reverence

1. Also called Snow-capped Mountain [Urku rasu], Snow-capped Woman [Warmi rasu] or Mountain Mother [Urku mama].

shown towards Mother Water was responsible for her sleep, and sudden loud noise or earthquake was responsible for her fright. In the case of sleep, Mother Water would flow again if people returned to visit the spring and show her respect. However, if Mother Water had fled from fright, it was necessary to call a *yachak* (shaman) to perform a ceremony to cleanse the site, clear her from fright and call her back.

Yet rituals alone do not suffice. According to local beliefs, communication and interaction between humans and nature's beings should take place throughout daily life. This entails both listening and talking. For example, when a river fills and rumbles down the mountain, the noise that precedes the water is Mother Water loudly warning trespassers to stay clear of her path. If people choose not to listen and remain too close, she cannot be blamed if they are caught by her force and taken downstream. Or, when Mother Rain begins falling lightly, it is her way of telling people to run and collect drying clothes and grains from the patio before heavier rains set in. At the same time, people must speak back; for example, by asking permission before entering springs, mountains and other sacred places in the landscape. When Rosa Ramos's grandmother Petrona Gualsaqui would enter a field to sow, she first asked *Pacha mama* for permission, saying "listen, I will leave you in charge of some grains for you to return next year multiplied", and with that she would begin sowing. Similarly, she would converse with the mountains, saying "Father Imbabura, I am leaving you in charge of these grains for you to return to me new grains with a good production, protecting them from all plagues. Please give me water, for here I am sowing". Those who still believe in the importance of this communication explain that in order for there to be a good production, one has to sow with the heart, having faith that *Pacha mama* listens, and imagining how the seeds will grow.

PERSPECTIVES ON CLIMATE CHANGE

Perceptions of climate change

Cotacachi's rural residents note several recent trends of change in local weather patterns (Skarbø et al., 2012). First, they point to increasing irregularity in seasonality, particularly in regard to precipitation. They explain that in recent years the rains have been delayed, and that when they do set in it is often with extraordinary force, leaving fields waterlogged at odd times of the year. They further report increasing temperatures, greater incidence of crop pests, loss of Mt. Cotacachi's glaciers and snow-cap, and increasing water scarcity linked in part to decreased glacial runoff and lack of rain.

Where data are available, farmers' observations match scientific analyses of climatic records. Detailed analyses of local precipitation data are lacking, but analyses of temperature data from the Ecuadorian highlands (Ontaneda, 2007) and the greater Andean region (Vuille et al., 2008) show clear trends of warming since the first records were kept during the 1940-1960s. Data from across the Andes show an average increase of 0.1 °C/decade during the last six decades of the 20th century, with accelerated warming after 1974 at a rate of 0.3 °C/decade (Vuille and Bradley, 2000). As a result of this and other changes in climate, tropical Andean glaciers have declined (Vuille et al., 2008). These glaciers act as important buffers to variation in seasonal precipitation as runoff supplies surrounding areas with water during dry seasons (Bradley et al., 2006). The glacier on Mt. Cotacachi disappeared towards the end of the 20th century, producing a marked decline in many local waterways (Rhoades et al., 2006). Finally, farmers' observations of increased pest problems is not an unlikely consequence of warming temperatures as altitudinal distribution and reproduction rates often are tied to temperature regimes (Dangles et al., 2008; Diffenbaugh et al., 2008).

Consequences for agriculture

"And so they said, my grandparents, that one day you will lose the whole glacier, and with the glacier the grain production will be lost too. And now I see that this belief has turned reality, because my grandparents said so, and exactly the same is happening." - Francisca Chavez

Climatic changes affect local agricultural conditions in multiple ways. In Cotacachi, the cultivation of different crop complexes occurs year round in accordance with distinct seasonal climatic and precipitation patterns for which the unpredictability experienced in recent years has disrupted the agricultural calendar and complicated production. For example, increased water scarcity and prolonged dry spells desiccate plants and weaken developing seedlings, while occasional uncharacteristically excessive rains lead to the rotting of maturing maize and beans, increase the loss of potatoes to late blight, produce erosion, and leave fields water logged and difficult to access. Finally, increased pest problems, both in-field and post-harvest, lead to the loss of stored grains and seed. This again poses challenges to

food security and jeopardizes the maintenance of household seed stocks. It should be mentioned that farmers are not passive to the altered climatic and hydrological conditions; they experiment moving planting and harvest dates, swapping crops between seasons, and expanding the cultivation of heat-adapted crops to new altitudinal zones (Skarbø, 2013). However, whether such experiments and adaptations will lead to sustained food production in the coming years is yet to be seen.

Causes of climate change

While people in Cotacachi offer numerous and varied explanations for recent climate change, here we focus on one explanation most highlighted by elders who retain firm grounding in the local Kichwa cosmivision. What they see as the ultimate cause of climate change is a profound shift in people's beliefs; a transformation of their worldview and concurrent changes in their attitudes and behavior.

“Nowadays nobody believes in Pacha mama. Now we are like dogs without owners. We do what we please. Oh, to tell these things to the young – who will believe? Earlier one believed, but not anymore. If it rains, it rains, if the sun shines, it shines.” - Azucena Lita

What Lita refers to is that people no longer see the connections in nature, no longer appreciate their elders' beliefs about the workings of climate, and no longer consider their own role in maintaining fundamental human-environmental relationships. Among the developments that elders cite as having distanced people from the cosmivision are formal schooling, migration, and new religious movements.

The current educational system was introduced into Cotacachi's rural population during the past two generations when primary schools were opened within certain communities and the indigenous population was given the opportunity to enroll in urban secondary schools. Local schools offer different explanations for how the world works, alongside which elders' beliefs sometimes become of lesser value in the eyes of Cotacachi's youth. Further, Cotacachi belongs to a region of Ecuador that experiences exceptionally high rates of internationalization; not only are radio, television and internet highly prevalent, scores of tourists from across the world visit the area every year, and many locals engage in labor migration, both within and beyond national borders. This results in intense exposure to different cultures, often leading youths to distance themselves from Kichwa cultural roots and beliefs.

“The young no longer value. When they go to other countries, they come back with another culture. They forget when we try to remind them, they no longer show interest, they no longer care. We have reached the degree when they return with piercings, even in the nose. The boys, like girls, wear earrings. And their clothing changes too, instead of coming with white pants and sandals [traditional male clothing], they come with hanging pants, like skirts. You can no longer differentiate if they are indigenous, if they are mestizos, if they are black, or if they have turned puendos [mix of indigenous and mestizo], one no longer knows. When these young people grow up, they no longer think like their parents.” - Rosa Bonilla

Another influential force is a surge of evangelicalism and other religious movements that have gained popularity in Cotacachi's communities during the past few years. According to interviewees, these religious groups tend to be unaccepting of local beliefs: “We have forgotten all of those beliefs [of the cosmivision]. It is because there are many religions – they become Mormons, Jehova's Witnesses, and this way they say that the beliefs of our people are no good anymore” (Hermelinda Sanchez). Summarized in the words of Azucena Lita, “before we were more united, now we are dispersed, here and there”. There is no longer one shared way of viewing the world. Different processes have led people to abandon their ancestors' beliefs and adopt new worldviews and knowledge systems. The elders who remain faithful to old teachings are offended by the young who tell them that they are crazy, that their beliefs are all lies, and that they are stuck in old times while modernity has arrived.

Societal and infrastructural changes are believed to further the distance between people and the environment. Agriculture continues to be important for household food security, but most households now engage in off farm work as well. According to elders, this shift away from agriculture as the primary source of food and livelihood creation causes the young to lose interest in cultivating the earth with as much dedication as earlier generations. Elders further relate that in times past they carried water from rivers and springs, whereas now it is delivered to their homes via tubes, causing people to forget the source and the fact that water is part of the environment. Two generations ago, the common

housing unit in Cotacachi's communities was the *choza*, a hut made from natural fibers with a dirt floor. When homes built from cement and bricks began to appear, it was a welcome change for many, but caused sadness for others. Rosa Ramos remembers that her grandmother Petrona sat down and wept when she saw the first cement structure appear in her community. She perceived it to be an insult to *Pachamama* and a danger to future food security: "My poor *Pachamama*, my poor fields", she sighed. When Rosa asked her what was wrong, she explained that cement structures hurt *Pachamama*, and that one day when the house would be old and abandoned, the soil underneath it would be sick and unable to produce well. The *choza*, on the other hand, was a structure that could be readily dismantled, and the ground underneath was highly fertile since people typically raised guinea pigs inside on the open floor. For her, this architectural shift was a step in the wrong direction, preventing people from being able to grow food to the full extent in the future, and damaging the earth.

Thus, through the convergence of several societal processes, people in Cotacachi have changed the way they view the world and relate to their environment. Only elders still adhere to the frames of reference and understanding set by the Andean cosmivision. For them, it is no surprise that harvest levels have dropped and that patterns of rain and sun are in disarray. These are the expected outcomes of people's abandonment of beliefs, their loss of comprehension of their interdependence with nature's beings, and their subsequent lack of respect, dedication to and cultivation of life-sustaining relationships. For, as noted above, when Mother Water is abandoned, she falls asleep and her flow declines. When Father Sun, Mother Rain, Mother Wind and Mother Cloud are no longer called upon and revered, they become angered or bored, and cease to adhere to normal patterns. Increased pest attacks are interpreted as signs of punishment on the part of *Achi tayta* and *Pacha mama*. As long as people do not react and repent, the pests persist.

A proposed way forward

Elders not only provide a causal explanation for climate change, they also suggest a solution, a pathway for environmental balance to be restored. What they call for is a revival of beliefs, and of the practices that follow; rituals and offerings, and devotion and dedication to the environment in everyday life, and especially in the practice of agriculture. For some elders, a revival in beliefs could be initiated by the current parental generation, which they perceive to have failed in passing on the local knowledge system to their children:

"In reality now we say that we are parents, mothers of our children. But we are not, because we are not teaching them. Earlier our parents taught us our culture, our beliefs. And who in reality are the parents of our children? It is our Hawapacha taitiku and our mother is Pacha mama. But as we are not teaching our children the beliefs, it is as if they were without parents." - Zoila Tuquerez

For others, local non-governmental organizations could play a potentially instrumental role in reviving beliefs and practices. In fact, a process of cultural revitalization is already underway in Cotacachi, linked to the increasing political power of Kichwa *runakuna* since the election of Ecuador's first indigenous mayor in Cotacachi in 1996 (Rhoades, 2006b). In particular, the local second-tier indigenous organization *Unión de Organizaciones Campesinas e Indígenas de Cotacachi* (UNORCAC) has taken increased action to revive rituals and accentuate the public celebration of traditional festivities and ceremonies. According to some elders, however, this is not enough, and a greater revitalization needs to take place in order for beliefs to be restored, and with them, a healthy environment.

The school system is another suggested venue for revitalizing beliefs. There are already local programs to foster environmental awareness in Cotacachi's community schools, focusing on stewarding vulnerable natural resources such as water and trees. Although this is welcomed, some caution against over-emphasizing a mechanistic view of nature, and emphasize the need to go beyond physical explanations of environmental connections. "The environmentalists say that one should not cut down trees because they filter the air, they give purity to the air, nothing more. But they only reach so far, they do not arrive at the depth of it, that there must be contact and communication" (Woman from Cotacachi, originally cited in Skarbø et al., 2012). From this perspective, environmental health and balance is not likely to be achieved through action based on a view of nature as merely a provider of ecosystem services. Instead there is a need for a deeper respect for nature's beings that rests in the firm belief that these are alive and sentient. Only when relationships to these beings are nurtured through communication and respect will there be harmony and peace among human, natural, divine and ancestral beings.

THE TRANSFORMATIVE POWER OF WORLDVIEW

At one level, there is perhaps surprising similarity between Cotacachi's elders' and scientific explanations of climate change: both link recent changes in climatic trends to changes in people's behaviors. According to the two perspectives, both human action and non-action create disturbances in the climatic system, producing changes in precipitation, wind and temperature patterns, as well as glaciation and hydrology. Yet, while scientific explanations usually stop there (rising greenhouse gas emissions being the ultimate cause), the explanation from Cotacachi's elders goes deeper. Elders link the observed changes in human behavior to an underlying change in worldview – a shift in people's ways of understanding human-environment interaction. This shift, incurred by a host of concurring societal processes including education, migration and the introduction of new religions, has induced changes in the way people conceive of and behave towards their environment within the span of only a few generations. People not only have changed their mentality, they have also changed emotionally and spiritually, resulting in a shift in the way that they *relate* to the environment. No longer aware of their strong interdependence with nature's beings, members of new generations fail to pay respect, perform rituals, and work and move in the local landscape with care. Understanding of changes and variations in environmental conditions has gone from being a matter linked to personal action to something externally driven, beyond immediate relevance and certainly beyond the control of local individual and collective action. Nature's beings have gone from the status of living and sentient to mere physical objects and systems deprived of life. This change of status has bereft them of the respect and devotion that kept them healthy and happy, functioning so as to keep the Earth a tranquil and harmonious place.

While the explanations and solutions recounted above are framed in a culture and geography that may seem distant to many readers, the lessons put forth by Cotacachi's elders offer relevant input to the ongoing debate on the need for societal transformation as humanity faces human-induced climate change. Above all, the observations and explanations of climate change proposed by Cotacachi's elders highlight the transformative power of worldview. They suggest that changes in worldview have resulted in changes in behavior, and suggest that a return to former beliefs can restore crucial human-environment relationships and stabilize weather patterns. Even if their beliefs regarding the world's workings may seem foreign, we may seek enlightenment by engaging in a little thought experiment. Suppose all of humanity adopted the core beliefs held by Cotacachi's elders and began to conceive of plants, animals, mountains, wind, water and clouds as living, sentient beings, mutually bound to humans through ties not only of material, but also spiritual and moral dimensions, and directly responsive to human action and communication. Would we then act differently toward our surroundings and the world? Would we be more likely to reduce our ecological footprints, collectively inducing climate systems to stabilize? Even if such an adoption of foreign beliefs and perspectives may seem elusive and far from attainable given the presently widespread mechanistic understanding of the world, the potentially highly efficient abating effect this move would have for the dangerous and urgent threat of climate change should call for us to reflect on our interdependent relationships to the environment.

THE PROSPECTS OF RECONNECTION

The main message from Cotacachi's elders is that the climate is altered because people have lost their connection to it and the greater environment. Might we be able to take up their challenge, to change the way we relate to the world around us and reconnect with a living environment?

Of course, as human beings living on Earth, we remain completely dependent upon our environment. Even if today many of us live further removed from direct daily dependence on climatic conditions than our ancestors did, we are as fundamentally dependent on natural systems for our survival as human beings always have been. The prime example here might be our daily nourishment; our food is derived from the biological and biophysical systems upon the earth and in aquatic bodies, the functioning of which rely on climatic conditions. Realizing this dependence might be one step toward reconnection. Cotacachi's elders further remind us that human-environment relationships are not one-way, but are mutual and dialectic. What matters, however, is not only how we *reason* about the rain and sun and our interdependence with their cycles; in order to restore a climate conducive to harmonious life, we must fundamentally change the way we perceive the world, the way we conceive of its workings and the way we *relate* to its constituents emotionally and spiritually. Only then are we likely to be able to achieve a true transformation in our behaviors, which is the only way the climate might be brought back on track.

One might argue that worldviews are deep-held structures and that a change therein will take more time than we have left to control our carbon emissions, and that other paths must be sought. Yet considering the large differences in the

perspectives, beliefs and opinions of older and younger members of the same families, and the stark changes that people observe among the youth that migrate and return, the case of Cotacachi suggests that worldviews may in fact be rather rapidly reshaped.

As researchers, we have a challenge in contributing to the possibilities of reconnecting across the stark divide separating nature and humanity, constructed from within the western worldview. The pathways toward achieving such a reconsideration of our place and role in the world might be manifold. People who still cultivate close relationships to their natural surroundings in different parts of the world, such as Northwestern North America (Turner and Clifton, 2009) and Tibet (Byg and Salick, 2009), also emphasize the importance of keeping connected, and offer their own integrated ways of viewing the world. Relevant intellectual journeys initiated by western scientists include the recent appearance of the constructal law in physics, encompassing a new definition of life, and the development of environmental ethics exemplified by deep ecology. Constructal law complements the two basic laws of thermodynamics, and presents a view of life that unites both physical and biological entities. It considers a system to be alive if it flows: “The constructal law is a definition of life in the broadest possible sense: to be alive, a system must be able to flow and to morph in time so that its currents flow more and more easily. Live are the water streams in the river basins and the streams of animal mass flowing on the landscape, which are better known as animal locomotion and migration. Live are the animate and the inanimate systems that flow, move, and change configuration.” (Bejan and Lorente, 2011: 210-211). This definition of life, derived via work on the cooling of electronic systems (Bejan, 1997), is in fact very much in agreement with an understanding of earth systems such as wind and water as living beings. Deep ecology, on the other hand, is an ecological philosophy, or ecosophy, developed with influences from the fields of ecology and philosophy. From a deep ecology perspective organisms are considered “knots in the biospherical net or field of intrinsic relations” (Næss, 1973: 95). This perspective rejects anthropocentrism and recognizes biospherical egalitarianism: that every lifeform carries intrinsic value, leading to “a deep-seated respect, or even veneration, for ways and forms of life” (Næss, 1973: 95). Deep ecology combines science with spiritual dimensions, and argues that an ecology which fights pollution and resource depletion only to protect the health and affluence of human beings is shallow and insufficient. It is illuminating that the conclusions of such long academic odysseys resonate so soundly with the time-tested lessons explained by elders rooted in the cosmovision of the Ecuadorian Andes. The insights these elders share may offer inspiration and guidance toward constructing paths of understanding and connection that nurture, and not destroy, our life-sustaining Earth system.

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Readiness and persuasion in transformative learning for sustainable responses to climate change

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“Climate change is the greatest market failure the world has ever seen . . . an effective global response. . . [requires] action to . . . inform, educate and persuade individuals about what they can do to respond to climate change.”
- Nicholas Stern, *The Economics of Climate Change*

Sustainable responses to the threats from climate change require people to change many aspects of what they do in their daily lives, to use energy more efficiently, for example. Policy makers focus a different kind of energy on devising better ways to get people to change their behaviors, directing attention toward the triggers and levers, roadblocks and pathways to positive change. Some behavioral change policies entail government actions that change the conditions in which behaviors occur, with a belief that the new conditions will encourage or discourage certain behaviors. Reality is complex, however, and people’s responses to policy initiatives are often unpredictable. Moreover, it can be hard to determine the reasons for observed changes in order to gain insights into policy improvement.

Individuals also have thresholds for tolerating what they consider to be government intrusions in their lives. It is not necessary for present purposes to know precisely what these thresholds are, or how they are dispersed in a society, or to what extent they inform important policy decisions. The consequence of both unpredictable choice and limited appetite for direct government intervention is interest in instruments of persuasion. Persuasion works on the reasons people use to decide on their behaviors. Accordingly, policy interest increasingly focuses on the use of social marketing, used alone or in combination with other policy initiatives, such as incentives, regulations or community-based activities, to help people learn about and adopt new behaviors.

Regardless of the particular details of an initiative, efforts to persuade underlie all social marketing. Much of the evidence about such persuasion targets attitude changes with respect to a single belief or object. A recent collection of environmental case studies examines behavior-change strategies related to reducing junk mail or the use of plastic bags, using natural yard-care methods, increasing recycling and making sustainable seafood choices, among others (McKenzie-Mohr et al., 2012). Yet, the sustainability objective directs our attention to whole-person changes such that *all* subsequent behaviors, in whatever conditions, are more sustainability focused. Unlike persuading new behaviors in a single domain, such as more efficient home heating or bicycle-share systems, persuasion for sustainability is likely to require transformative change. As a whole-person and all-domain change, transformative change unfolds in the social and psychological ecologies in which individuals make choices and act: It is more a way of living than a set of choices. Social marketing is an element in ecologies, and thus policy makers have a need to understand better how their efforts might better “play through” to the transformative learning needed to address climate change sustainably.

TWO PERSUASIONS

Methods of persuasion provide policy makers a way to “get alongside” people in order to advance some policy goal. Various social marketing methods classify different types of people, enabling messages to be tailored more effectively (Andreasen, 2002). The messages tend to be tailored to what is known about people’s beliefs or attitudes, and to how different variables in the message communication pathway operate. Research sheds light on what influences a person’s beliefs and attitudes, as well as on correlations between beliefs and attitudes and demographic variables; that is, on *how people are* and how they decide what to do next.

There is, however, a second approach to persuasion and changing minds, captured in theories of transformative learning. Unlike message-centered policy persuasion, transformative learning offers a person-centered version, in

which individuals engage in a self-referent and self-persuasive process. Most of the persuasive work involves not messages *per se*, but experience, reflection and dialogic exchanges. The focus is on *how people reorient themselves*, not with respect to just one attitude or behavior, but to a completely changed mindset and a new “global” objective.

Message-centered persuasion

The basic context for persuasion in social marketing involves a communicator, a message and an audience (Hovland et al., 1953). Within the basic context, persuasive messages—those that seek to induce a behavioral choice non-coercively—and the characteristics of people who would be persuaded, attract particular interest. Persuasion works when it affects a person’s judgments and decisions and thereby raises the probability that a person will make a desired choice in a specific context. Some messages are designed to reduce resistance among people who exhibit undesirable behavior, some to encourage acceptance of a policy initiative that comes with some measure of personal cost, and some to help build a wide base of public support for policies that may require tolerable accommodation among people who have different, and often deeply held, positions.

It is not enough to know simply that a person has been influenced somehow by a communication. We need to know about the influence if we are to make predictions about subsequent behaviors (Kelman, 1958: 51), and if we are to design communications intended to persuade. From early work in communication, exemplified by Hovland et al. (1953) and Kelman (1958), many theories and applied persuasion practices have developed around the framing of persuasive messages. Framing refers to ways in which messages are presented or to the personal or social filtering that bears on a person’s reception of a message. Research on framing and persuasion is held to be essential for optimizing message impact and delivery (Friedman, 2008; Latimer et al., 2008).

Persuasion’s effectiveness in policy applications is a function of a wide range of characteristics of both messages and the dispositions and information-processing capabilities of people. In their continuing efforts to get the persuasion mechanism to work well, policy designers turn to research in social psychology and behavioral economics. Social psychologists have developed theories about persuasion, which provide evidence for a variety of psychological and other assumptions underpinning the core policy logic. Attention centers on a wide range of variables at each link in the chain that may influence a person to be persuaded (see, for example, Petty, 2001; Jowett and O’Donnell, 2006; Thaler and Sunstein, 2008). The most frequently cited theories approach persuasion through multi-process cognitive frameworks, in which persuasion involves more or less mental effort (McGuire, 1972; Petty and Cacioppo, 1981; Ajzen, 1991; Chen and Chaiken, 1999). A variation on this, the cognitive-response theory described by Petty (2001), holds that thoughts are responsible for attitude change, with or without a persuasive message. Another still-prominent theory is Festinger’s theory of cognitive dissonance (1957), which holds that attitudes change in the presence of cognitive conflict because attitudes are easier to change than underlying beliefs and behaviors.

Whereas many theories apply at an individual level, social cognitive theories include interpersonal and environmental variables (Bandura, 1986). The normative basis for attitude change, concerning the need for “coherence” and favorable relationships with others is discussed in Cialdini and Trost (1998). Friestad and Wright (1994) have developed a model for how people cope with persuasion attempts, based on a person’s beliefs about how persuasion works. Cultural framing has been held to matter (Uskul and Oyserman, 2010).

To explain persuasion, researchers ask questions about what changes people’s minds, whose minds are changed, whether the beliefs people have about their attitudes are the same as those they act on, and whether changed minds are a factor in choices and behaviors. Clearly, these questions reflect researchers’ continued frustration with simple explanations of persuasion. Instead the field is parsed into finer layers, in the hope of explaining discrete choice situations.

Persuasion also matters at the level of policy debate, with a growing interest in engaging various stakeholders in some process of dialogue or deliberation (Hajer and Wagenaar, 2003). In contrast to an emphasis on the ways individuals make decisions, the policy-deliberation strand is approached from a more collective, or democratic, direction with a consequent emphasis on interactive processes in which people decide together. The process of science–society engagement often involves stages in which people come together, share and discuss views, learn and consider new views, and finish with confirmed or new understandings of the matter at issue. Many of these processes center on dialogue (Leitch, 2008). In policy deliberation, the further objective is to find, if possible, a consensus position in cases where only one policy choice is possible and people have strongly divergent views. This situation, according to the

“argumentative turn” policy theory, characterizes modern political life and explicitly reclaims a central position for rhetoric and persuasion consistent with democratic values (Fischer and Forester, 1993; Turnbull, 2005).

Existing scholarship has informed our knowledge about the sources and mechanisms of persuasion. Nevertheless, it has three evident limitations. First, the research base is fragmentary and replete with contradictory findings (e.g., Lewis et al., 2007). Second, despite the accumulation of research findings, the outcomes of persuasion-based policies—often the most politically palatable options—continue to disappoint their designers: people continue to behave “badly.” Finally, there are concerns that honest persuasion is endangered, overwhelmed by efforts perceived as manipulative (e.g., Walmsley, 2009). These limitations add up to a significant challenge for persuasion targeting many behaviors at once, as sustainable responses to climate change require. It is plain that there is scope to consider new ways to work with persuasion for policy.

Person-centered persuasion

The mainstream psychology literature suggests that self-persuasion occurs when a person “self-generates” reasons to change an attitude (Petty, 2001). Maio and Thomas (2007: 47) presented a model of deliberate self-persuasion, in which people recognize a discrepancy in their actual evaluation of an object and how they would like to evaluate it, and then use either reasoning or mental control strategies to “balance the need to possess a correct attitude and the need to possess a desired attitude.”

Other fields go beyond individuals’ attitudes. Researchers look holistically and experientially at the person who would be persuaded or at that person’s experiential and informational milieu. Such person-centered approaches to framing reveal a great diversity of theories and variables. Of particular relevance is work stemming from the narrative and discourse traditions. Discourses, according to Dryzek and Niemeyer (2008: 481), comprise the “categories and concepts embodying specific assumptions, judgments, contentions, dispositions, and capabilities [that enable] the mind to process sensory inputs into coherent accounts.” Discourses “help constitute identities and their associated interests” (p. 482). According to McAdams (2005), people carry a continually updated “story of their lives” and use these stories to frame decisions. Adding to Bateson’s “ecology of mind” and Bohm’s “system of thought” traditions, Isaacs (1999: 302, 308) noted that people “share patterns and habits of interaction, of thinking, and of feeling” and thus “we can influence and regenerate the inner ecology of human beings by transforming the quality of our conversations.”

“Transformative learning” involves a “deep shift” in a “frame of reference . . . [in] the way in which we know and make meaning” (Parks Daloz, 2000: 104). Transformation has both personal developmental and social aspects. Single events can serve as catalysts, but the learning requires a period of preparation, and entails a shift that may be long in coming (Parks Daloz, 2000: 106). Transformation occurs at “the moment in which we consciously realize the ‘big picture’ that redefines our world and our place in it” (Taylor, 2011: 7).

Better understanding of relevant transformative change for policy purposes requires appropriate methods to study whole person–experiential–situational frames of reference and to find patterns in the ways basic story elements are shared among groups of people in similar circumstances. Yet, simply finding typical patterns in discourses of change may be of little help if, in essence, the discourses are detached from the people who participate in them. We need, that is, both to understand what occurs for people who experience transformative learning that enables a big-picture perspective and to gain insights that can be used to improve the functioning of social marketing in support of transforming people. An exploratory Q-methodology study was designed to capture stories from a person’s life trajectory that retold aspects of the person’s readiness to change to a sustainability mindset, and to detect patterned elements in those trajectories of transformative self-persuasion that maintained experiential connections.

Q METHODOLOGY

Q methodology’s person-centered orientation works with individuals’ self-referent perspectives and with patterns that the researcher detects in their experiences as they have been revealed. Q methodology accommodates the common observation that multiple explanations of decisions co-exist within similar demographic categories, decision settings and individuals. It complements social marketing’s linear, individualized theory of change by opening up the black box in the theoretical chain, wherein we find—and can start to make sense of—that which is specific to a person, and common among groups of people. With Q methodology, a researcher can inquire into the grounds for persuasibility, or *readiness to change*.

Q methodology finds different (but often partly overlapping) ways in which people structure a matter from their own perspectives. Of interest is not simply the patterning of views on the topic, but the embodied, underlying dispositions of likes and dislikes that predispose a person’s engagement with a topic. Thus, understanding requires finding what Stephenson (1986: 47) called a “vector” of a person’s lived experience. Stephenson (1986: 53) noted that “past experiences, beliefs, and the like” are “active systems which determine what the individual will perceive or react to.”

Q-methodology research can seek new insight not only into the matter of how best to persuade a person, but into the policy relevance of their belief systems. These insights are important because in the social world of behaviors, policy addresses problems that are rarely solvable technically. Q methodology’s logic is abductive: the findings reached are discoveries, facts that cannot be predicted or deduced. Instead, the “logic is that if certain facts occur, they will have such-and-such explanation” (Stephenson, 1961: 10–11). That is, because the discoveries and explanations are about latent belief systems, Q methodology enables the discovery of *where people are coming from*, of the foundational belief systems that can give rise to attitudes on a wide range of topics.

RESEARCH DESIGN

This study looked at readiness to change, with respondents asked to reflect on their personal standpoint at a time when they adopted a sustainability mindset (or re-confirmed it). With this instruction in mind, participants were asked to sort 50 statements from highly unimportant/not influential (–4) to highly important/influential (+4) in a quasi-normal distribution. The statements were drawn from a variety of texts that set out theories of transformative learning, self-persuasion and “ecologies of thought,” such as Isaacs (1999), Maio and Thomas (2007) and Taylor (2011).

The statements, representative of the full spectrum of ideas people may have about their readiness to change, and the condition of the sorting exercise, set up an internal “swirl” of “self-referent” reactions that guide the sorting process; the “fulminations about a real situation” (Stephenson, 1965: 283). In Q sorting, a person brings prior experience and knowledge to bear on the matter at issue, using the statements as raw material for picturing what is personally, experientially, and situationally relevant. Although no demographic data were used in the analysis, the 22 participants from the Wellington region included 7 men and 15 women, aged between about 20 and 70. Participants held both senior and less-senior positions in the volunteer, business, public, and NGO sectors, or were elected officials, academics, graduate students or other researchers. All participants had self-identified as someone who had “experienced a change in attitudes, intentions or behaviors in the direction of greater concern for sustainable responses to climate change” (or, if they could not recall an initial change of mind, they could reflect on an explicit decision to continue to hold a sustainability mind-set in the light of fresh consideration). A diversity of participants better ensured that the various trajectories to a sustainability mindset would be discovered.

The Q sorts were correlated and factor-analyzed. Each factor draws together similar Q sorts (rather than similar items as in conventional factor analysis). The 50 statements are shown in the Appendix, along with weighted-average Q-sort scores for each of two distinct factors. Figure 1 shows the 22 sorts, which fall into four groups based on their “factor loadings,” or affinity with the two factors. One sort did not align significantly with either factor.

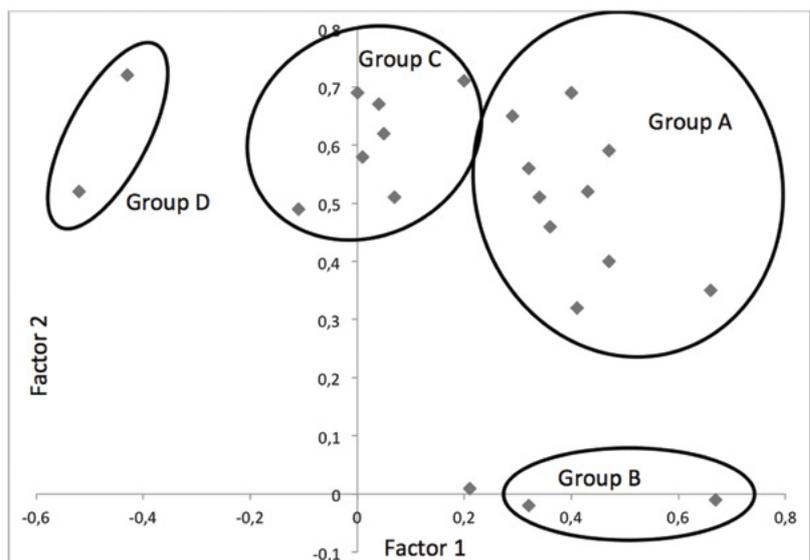


Figure 1. Sorters’ alignment with Factors 1 and 2. Loadings above 0.28 are significant at 95% confidence level and above 0.36 at 99%.

FINDINGS

The two factors are closely correlated ($r = 0.42$), which is not unexpected given that all sorters self-identified with a restricted condition for eligibility. The groups' orientations are briefly profiled, based on statistical diagnostics and post-sort, audio-recorded interviews.

Group A: Broadminded optimists

Sorts in group A had statistically significant positive associations with *both* factors, and their profile reflects much of what is held in common between the two factors. Indeed, a clear sense from this group was that being able to appreciate or hold multiple perspectives is part of their very orientation.

For this group, a sustainability mindset is part of them and pervasive, and may have begun at a very young age. They note a sense of generational flow or being involved in a widening circle of individuals who can just get on and do things. Lots of good ideas can be drawn on, and there is no one way to look at things. Each person should be the best they can be, not worrying about what they *could* do, nor getting angry. Readiness is a constant in continually finding new ways to be proactive, to connect with others, which is fulfilling in itself. This group experienced no inner conflict, ambivalence or distress. For one respondent, change was catalyzed by extreme discomfort from the sun on a walking trip, following which was an “overall awareness” and a new proactivity. For others, overseas travel, often in developing countries, contributed to an evolving and maturing view that, along with greater science knowledge, was experienced as a steady process of ripening and intensifying opportunities for action and reflection. Group A participants sense being part of the world in a non-spiritual way, and believe that nature signals humans to treat it better.

Group B: Inquisitive learners

The second group includes two sorts that are strongly associated with Factor 1 only. This group shares a number of features with group A (which was also associated with Factor 1), such as acknowledging that for them, change was coming in thousands of ways over a long time. They also lack a sense of spirituality, or of ambivalence or distress. In contrast, this group consider themselves as latecomers to the issues, and can identify triggers more readily than group A. Their readiness translates into a program of learning toward greater self-efficacy—reading, conversations with self and others, looking thoroughly at matters, continual thinking and questioning, and pursuing observations wherever they go. As a result, group B may find themselves acting and learning, but not always experiencing a sense that their beliefs are fully resolved, even as they trust their instincts and set goals accordingly.

Group C: Walking the talk

Seven sorts are strongly associated with Factor 2 only. Several sorters recalled catalytic moments—reading some science, watching Al Gore’s movie, being unhappy at work, exposure to other cultures, frustration as a research scientist with the lack of opportunity to act—that served to change their perspective. This group used more emotive terms to discuss their change: feeling protective of nature, feeling natural in nature, being connected to a place, relating intuitively and feeling supported when with like-minded people, seeking moments of clarity. As with the other groups, there was no sense of ambivalence or need to defend views; no one thing was determinative and the readiness came as part of them. One participant noted that there was a preparation phase, an “oh shit” moment, and now a continuing journey. Journey was a repeated theme in the interviews, with participants narrating the positive changes they’d made, and were making, albeit with varying degrees of confidence, to “walk the talk.” Some noted that it is easy to lose one’s positive outlook, and another admitted to wondering if the choices made were for the best in the bigger picture. Nevertheless, this group wants to continue to learn, to make positive contributions, to maintain a positive vision, and above all, to keep moving forward, continually striving to better align beliefs and actions.

Group D: Engaging with others

Finally, two sorts are significantly associated with Factor 2, but also significantly *negatively*¹ associated with Factor 1. Prominent in this group is the importance of getting involved with others and of learning while doing, from having had role models, freedom and independence at a young age in small-town New Zealand, to getting involved in the community, talking with others, and closely engaging with different cultures. Like others, this group did not experience conflict. Unlike group B (at the opposite end of Factor 1), this group does not turn to analyses for answers, but for support. There is a clear trust in “instincts” and own abilities, along with a facilitative and collaborative interest in working

¹ This does not imply negativity in the view, simply a view that is opposite those on the other side in Figure 1. The factor axes could be rotated 180° with no change in interpretation.

with others. Both participants conveyed a clear sense of empowerment that comes with embracing responsibility, allowing others to make contributions, and facing squarely the work to be done, all in an interconnected world.

DISCUSSION

According to an emergent-learning theorist, we “learn our way through to a demanding future” (Taylor, 2011: 3). Further, “we first engage a new perspective as *an experience*” (Taylor, 2011: 7, emphasis in original). The Q study sought to capture the active, experienced ingredients when people engage new perspectives in order to open up new thinking about how person-centered persuasion could work. The variables of interest to social marketers remain important in person-centered persuasion, especially as people need ideas, reasons, and suggested behavioral options regardless of their overall mindsets, to prepare them for change, or to reinforce their choices. The diversity of people’s experiences, however, reinforces the need for diverse strategies to reach people and warns against simplistic pigeonholing. There is merit in thinking about how to tailor messages, but this tailoring can be based on commonalities in distinct groups of orientations.

Four distinct person-centered orientations were detected among a diverse group of New Zealanders who conveyed how their experiences readied them to adopt a sustainability orientation. In keeping with an ecological perspective on everyday life, these orientations suggest how people may be “at home” with themselves as they encounter opportunities for sustainable choices. In the future, they can be expected to follow the same or similar trajectories that brought them to the holistic pictures they presented. Although many participants in the Q study found it difficult to recall being otherwise, they nevertheless conveyed clear pictures of the sorts of individuals they are and have been. These revealed trajectories provide strong signals of the types of messages and communication environments that may be effective in getting alongside others who have not yet fully engaged a sustainability perspective, but may be inclined to or ready to change.

To illustrate the nature of persuasion strategies that could follow from the study findings, group B (inquisitive learners) might respond well to interactive, content-rich material. Group C (walking-the-talk), by comparison, might react more positively to opportunities to take part in local activities with like-minded people. In both cases, the strategies align with people’s configurations of stories about themselves and where their experiences are taking them. They do not assume people need more information, or inspiration, or scary messages.

All four groups clearly conveyed *how they are in the social world*, which is a world of intersubjectivity. Talking with oneself and others permeates (and creates) this world. Policy makers are already paying more attention to the social milieu (for example, by tracking and participating in social media). There is potential for working with people as they seek to balance what they believe is correct (taking the threats of climate change seriously) and what they want to be (a person who makes sustainability a part of an orientation to the future). Persuasion policies can help people recognize and conceptualize the nature and implications of their changing ideas.

CONCLUSION

Changing perspective entails self-persuasion through reflection and dialogue. How people reorient themselves “in the round”—psychologically and in their existing social ecologies (the past, present and future of their social interactions)—matters for policies that tackle big issues such as climate change. People can be ready to change along different trajectories of experience. Policy makers should not rely solely on message-centric initiatives, but can use knowledge of where people are coming from to improve their communications with people about the need for sustainable responses. Future work could refine the grain of the distinct perspectives, replicate the study approach in different cultural settings, recognizing that a ready-to-change person and a persuasive message come together in a communication-and-action ecology, and develop and test new whole-person communication strategies.

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APPENDIX: FACTOR ARRAY

No	Statement	1	2
1*	Put simply, I had kids and I started looking at the future differently.	-1	0
2	Learning about other cultures and their perspectives changed mine.	1	2
3*	There was really no one thing; looking back, I can see change was coming in thousands of ways, over a long time.	4	3
4*	It was like I had to build the bridge I was walking on.	1	1
5*	A lot of it had to do with getting involved in some things going on in my community.	1	2
6*	I had to learn to look into things more intuitively, to see something I hadn't otherwise perceived and to hold onto it.	-2	-1
7*	I really had no choice and no good explanation. It was just part of me; what I felt I was about.	3	4
8*	I came to see myself as part of the world, not separate; when the world changes I change, and vice versa.	1	0
9	What mattered to me is that my memories, my habits, my ways of problem-solving needed to function as a whole.	-2	0
10*	I came to trust my ability to think, learn, understand, make decisions, and developed confidence in those abilities that lent courage to my convictions.	3	4
11	I would have found it impossible to get beyond my old thoughts and perceptions if I hadn't experienced a creative spark.	1	-4
12	I needed to learn to take myself less seriously; to see humour in situations—that's the best way to accept aspects of myself and the world that I have to live with.	-4	-1
13*	I used to think my thoughts were my own, but then I discovered how much they were the result of experiences I shared with others.	2	1
14	Talking with others—rather than analysing everything in my own head, I needed to just throw out thoughts and bat them around with others; it was very energising and generated lots of new ideas.	0	3
15*	It was a time of intense conflict inside me; there was a lot of unresolved ambivalence because I liked some things about my attitudes and actions, but not others.	-2	-3
16*	Musical metaphors come to mind: I experienced a sense of resonance, harmony; improvisational 'feel' when I adopted a new set of ideas.	-3	-1
17	I basically had a long, drawn-out conversation with myself, looking at the costs and benefits of my current way of seeing things.	3	-3
18*	The fear I had to overcome was being labelled as an idealistic dreamer.	-4	-2

19	I needed to look thoroughly at the choices before me, and the reasons to change, without letting emotion play a role at all.	1	-3
20*	It felt like any other major and possibly irreversible change—a leap of faith that I knew I was going to take, objectively very courageous, but subjectively just me going around a corner I can't see beyond.	-3	-2
21*	I needed to change so that my judgements were aligned with what I found psychologically and pragmatically useful.	1	-1
22	I had to start acting as if what I wanted was already available, so that my behaviour would become more consistent, even if my beliefs were still confused.	2	-2
23	It dawned on me that the beliefs I wanted to have and keep were the ones that made the best use of my strengths, the best way of putting them into action.	-1	2
24	Aligning my 'espoused values' and my 'values-in-use' was tough, because it was hard to detect the inconsistencies.	0	-1
25*	I got energy from facing forward to the future—I felt more open and ready to face uncertainty.	0	1
26*	I needed to keep inspiration and intention in the centre of my gaze, and sense and seize opportunities as they arose.	-1	0
27*	Like many people, I suppose, I had a conventionally self-interested outlook. I didn't lose my self-interest, but my values carried me over to look at others' interest perspectives too.	0	-1
28	I found it necessary to seriously love what needs to be sustained, to go beyond some calculus of resources and interests.	-2	2
29	I looked out on this unbelievably beautiful country—and realised that I wasn't doing anything positive to keep it stunning. That was the start: I had to be more proactive.	3	0
30*	Given the terrifying predictions and evidence of the increasingly severe impacts of climate change, I couldn't just bury my head in the sand and carry on with business as usual.	2	3
31	Feeling connected to something bigger than me just plain made me feel better—more joyful, more content.	-1	1
32*	There was a need to establish better links—with others and with nature—so I could develop my ability to question, challenge and influence accepted but imperfect models of business and society.	2	1
33*	There were strong people, role models, not soft on me: always pressing me to get beyond myself, to open my eyes and look around.	-1	0
34	It stemmed from the need to educate myself and others and make a meaningful contribution to increasing our collective knowledge and understanding of our planet.	4	3
35	I got a sense growing up; it wasn't a spiritual thing exactly, just the message that there was a way the world was meant to be and it wasn't ours to mess with it.	0	4

36	I realised that there isn't a single set of solutions because there isn't a single set of problems. Given this, optimism must come in the form of creativity.	0	2
37	I felt I was a long time in limbo—maybe like being caught by opposing weather fronts: it's quiet but also chaotic.	-1	-4
38	I set goals for myself in the sense of 'I intend to achieve x'. This was a powerful way of implementing specific changes in my thinking and behaviour.	3	0
39	It started with a little seed, imperceptible at first, but gradually coming to orient more and more of my life, more and more affirming of a new way of going about things.	-2	1
40*	I developed a positive vision of how I wanted to think and to treat the natural environment and other people in the future.	2	3
41*	It's true what so many wisdom traditions say—I had to learn to live in the present so I could maintain my balance and be in any shape to deal with the future.	-1	0
42	I had to continually defend my new thinking and behaviour until they became as automatic as my former thoughts and behaviour once were.	0	-3
43*	I had a preference for looking at things in only one way, and I had to explicitly try for a more balanced look; when I succeeded, I had more energy and focus.	-2	-3
44*	The biggest thing is simply overcoming inertia—or even worse, the realisation that slowly and steadily I had bought into more 'short-termism' than I truly accepted.	0	-1
45	I wanted very much to be someone who can think ahead, and one way to do that, I discovered, was by querying the full range of my observations about the world and people.	4	1
46*	At the heart of it was adopting one great idea as my own and letting it influence my thoughts and imagination, to stretch me to the heights and depths that I didn't think possible.	-3	-2
47*	I needed to go through a patch of feeling really distressed and anxious; if I hadn't had something like fear, I would not have been motivated to change.	-3	-2
48*	I felt like I was discovering new talents, a sense of empowerment and confidence, a deeper understanding of my inner self, and a greater sense of self-responsibility.	2	2
49*	I had had enough of analysis and scientific reasons that don't open up imagination; too sterile and fragmented and depressing for my one and only life.	-3	-4
50	I decided that we need to embrace a radical interconnectedness that revives mystery, a sense of the ineffable, the unknowable.	-4	-2

*Notes: * denotes consensus items*

Teaching for transformation? Norwegian teachers' and students' reflections on civic learning - some insights for researchers of climate change

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INTRODUCTION

In a rapidly changing climate, how we understand ourselves and our societies influences our expectations and attitudes about what is both desirable and possible. Over time, many societies have understood that education plays a critical role in transforming how we see ourselves as a society, what we value as priorities, and what we come to see as acceptable actions and ways of dealing with common problems. Dirx (1998) in particular draws on the work of Freire, Mezirow, Daloz and Boyd to distinguish between the role of education for adaptation and education for transformation. Dirx argues education for *adaptation* is too often an instrumental process of responding to conditions while *transformative* learning is a process of changing our understanding of both the situation and ourselves.

Dirx's argument resonates with the suggestion in much recent climate change research that there is an important difference between public understanding for adaptation to a changing climate and critical transformation of the dominant assumptions of how we understand our world and also who we are. If we begin to understand climate change as the outcome of our ways of living in liberal democracies, we very quickly find our debate 'runs up against the very powerful emotions that cluster around individuals, free markets and rising personal consumption' (Butler et al., 2011: 15). Reinforcing or transforming our ideas of who we are and how we connect to each other is a critical part of citizenship education in any community.

In this context, this paper reports on a preliminary study of the role and impact of civic education in Norway. The research examines civic education in one Norwegian *ungdomsskole* (lower secondary school). Discussion highlights the opportunities and barriers for developing transformational thinking with young people observed there and points to tentative lessons and wider implications for other colleagues interested in transformational learning.

Climate change and the need for transformation

Despite sometimes intense political debate, there is growing acceptance that climate change, caused by ongoing greenhouse gas emissions, is increasingly affecting the world in many ways. The wider public is beginning to understand some of the far reaching implications of the way human activity (creating increased emissions) is almost certainly altering the climate (IPCC, 2007), and causing more and greater physical hazards, including 'melting of polar ice sheets, sea level rise, and the potential for drought, storms and floods around the world' (Butler et al., 2011: 19). There is also increasing recognition of climate-related threats to economic and social stability in terms of food, energy, water and quality of life. Yet in spite of this, there is little action yet seen at a political level of the speed and scale that the research would suggest is needed (O'Brien, 2012).

Radical changes to the way countries carry out all sorts of everyday activities requires a change in existing worldviews and structures (O'Brien et al., 2009; Elshof, 2010; Leggewie and Welzer, 2010). But the complexities of country policy objectives, particularly in liberal democracies where some powerful communities benefit in the short term from climate altering actions and investments, particularly in fossil fuel industries, make for complex, and slow, negotiations at a global level (O'Brien, 2012). Yet, as Leggewie and Welzer (2010: 10) argue, 'successful climate policy will only be possible once the populations of the main polluting countries come to see that they themselves are responsible... "bottom-up" climate policy therefore needs to contain self-reflexive and participatory components'. In other words, transforming the way people think about what they do and why they do it.

Much of the transformational learning literature has focused on adults as learners (Dirkx, 1998). But ways of thinking differently about the world and our place in it can be learned by young people as well, and citizenship education could be a useful vehicle for this purpose, helping young people to think about issues such as climate change in light of existing political structures, agency and social justice (Hayward, 2012). In this wider context, this short research paper reports on a study of citizenship education to highlight some potential ways school based education innovations might support young people as they learn to transform the way they think and act, to give them the skills and tools that will be needed as future decision-makers and problem solvers in a changing climate. The lead author was based for a year in the community of one Norwegian *ungdomsskole* (lower secondary school). This discussion reflects on teacher, parent and pupil interviews and class room observations conducted for a Masters thesis researches civic education.

The purpose and effect of citizenship education

Citizenship (or civic) education is traditionally undertaken in liberal democracies with a very clear view of its purpose: to educate and inform young people about how to be ‘good’ citizens. However there is significantly more contention about what constitutes “good citizenship”. There is often emphasis on the importance of civic knowledge, or facts about the community culture ‘by teaching knowledge, emphasizing civic topics in the curriculum and imparting beliefs in the importance of various adult activities...’ such as voting and taking part in public debate (Torney-Purta and Richardson, 2004: 56). However there is often surprisingly less agreement amongst teachers about the importance of learning about citizenship and democracy by doing democracy, that is by taking an active part in decision making in the wider community (Børhaug, 2008; Hayward, 2010).

The usefulness of citizenship education is a contested area. Analysis of several large studies has shown that what enables young people to become adult citizens who actively participate is not necessarily dependent on what happens in the classroom (Kerr, 2003; Osler and Starkey, 2006). Participation or even just membership in extra-curricular activities can also be significant determining factors (Wollebæk and Selle, 2003; McFarland and Thomas, 2006; Ainley et al., 2012). However, other studies show that how citizenship is taught in schools can have a profound impact on the development of young people’s ability and willingness to participate in public life, and consequently, on the health of a country’s democracy (Levine, 2003; Torney-Purta and Richardson, 2004; Osler and Starkey, 2006; Chawla, 2009; Hayward, 2012).

Norway in particular has much to offer other countries because some international studies suggest that Norwegian young citizens report some of the highest rates of public participation in learning and doing democracy in school than most (Torney-Purta and Richardson 2004; Schulz et al., 2010). The Norwegian curriculum has been traditionally based on the transformational idea of *Bildung* which is the idea that ‘through education, the individual develops a critical stance toward oneself and the society and becomes a critical thinker’ (Stray, 2013: 177).

So what might transformative citizenship learning look like?

In a highly influential study, Westheimer and Kahne (2004) examined citizenship education in the United States and produced their conceptions of three kinds of citizen that they believed teachers encouraged their students to become, the Personally Responsible Citizen, the Participatory Citizen, and the Justice-Oriented Citizen. These were developed from their analysis of democratic theory and school program goals and practices. Of the three types, they argue that personal responsibility receives the most attention from teachers, because it develops people who are good and responsible, but it ignores the need for collective and public sector initiatives, while volunteerism and kindness end up as ways of ‘avoiding politics and policy’ (2004: 243). The second and third types, the participatory and justice-oriented citizens, are more active and deep-thinking about political problems and social justice - the kinds of people societies today need if they are to confront and think differently about the challenges faced by climate change (see Table 1). These latter types fit well with Freire’s theories of critical consciousness, in which ‘learners develop the ability to analyse, pose questions, and take action on the social, political, cultural and economic contexts that influence and shape their lives’ (Dirkx, 1998: 3).

Table 1. *Kinds of citizens.*

Personally Responsible Citizen	Participatory Citizen	Justice-oriented Citizen
<i>Description</i>		
Acts responsibly in his/her community	Active member of community organizations and/or improvement efforts	Critically assess social, political, and economic structures to see beyond surface causes
Works and pays taxes	Organizes community efforts to care for those in need, promote economic development, or clean up environment	Seeks out and addresses areas of injustice
Obeys laws	Knows how government agencies work	Knows about democratic social movements and how to effect systemic change
Recycles, gives blood	Knows strategies for accomplishing collective tasks	
Volunteers to lend a hand in times of crisis		
<i>Sample action</i>		
Contributes food to a food drive	Helps to organize a food drive	Explores why people are hungry and acts to solve root causes
<i>Core assumptions</i>		
To solve social problems and improve society, citizens must have good character; they must be honest, responsible, and law-abiding members of the community.	To solve social problems and improve society, citizens must actively participate and take leadership positions within established systems and community structures.	To solve social problems and improve society, citizens must question, debate, and change established systems and structures that reproduce patterns of injustice over time.
Source: Westheimer and Kahne (2004: 240).		

THE CASE STUDY

Citizenship education in a junior high school in Mid-Norway

In light of this wider view of transformative learning and the idea of developing transformative citizens, the case study reported here draws from the preliminary findings of the lead author’s Masters thesis. This involved embedded field interviews of the views of teachers and students engaged in a civic education programme in an 8-10 grade junior high school (*ungdomsskole*) in Trondheim, a city of 180,000 people in Mid-Norway. The case study school selected was urban and state-funded, with the majority of students (around 90 percent) born in Norway.

Ideally, transformative effects of education are best understood over time. Given however that this field work was embedded in a Norwegian community for one year, the focus became to understand the practices and variety of perspectives on developing young people through citizenship education, from the principal, a social studies teacher and Norwegian/religious studies teacher, and three focus groups of students in Year 8 and Year 10 who had taken part in everyday citizenship actions in the classroom and in the wider school community (through school councils and local student lead organisations pressing for political change). Triangulation was also used to strengthen the findings by discussing these with a local education official and two key informants, (university professors who also work in citizenship education locally and nationally). The interviews were also accompanied by class observations. The observations included social studies, Norwegian and religion classes (with around 25 students in a class), and a student

council meeting. An interpreter was used throughout the data collection process and discussion with the translator was used as a way of debriefing. Students were interviewed in accordance with University of Canterbury ethics policy.

The questions focused on how young Norwegians learn about democracy at school. With the teachers and principal, questions were asked in an open format about the students' interest in democracy, what they thought was important to teach the students about democracy, and whether they discussed current events and controversial topics. The researcher also asked about ways students are involved in decision-making within the school. With the students, the questions asked were again framed as open prompts, about their interest in politics and democracy, what they thought of being taught those subjects at school, and their views on climate change as related to themselves, to Norway as a country, and the wider world.

Civic education in the norwegian school curriculum

In the junior secondary school in Norway there are several curriculum areas that cover learning about citizenship and democracy. The Social Studies curriculum (where most citizenship education is based) has recently been revised and the new one will be rolled out in the 2013/14 year (from August 2013) (Utdanningsdirektoratet, 2011). It is composed of three subjects: social science, history and geography. It is third largest in the curriculum with around 1.7 hours per week. Human Rights Education (HRE) is also included in the Curriculum for Social Studies (grades 1-11) and in the Curriculum for Christianity, Religion, and Ethics (grades 1-10).

All pupils in 8-10th grades have also traditionally taken a compulsory subject translated as 'pupil council work' (*elevrådsarbeid*) comprising 71 hours over a three year period (Utdanningsdirektoratet, 2011). This hour per week was like a class meeting where students discuss problems they want their class representatives to bring to the student council. In the 2013-14 year, this has been replaced with fourteen elective subjects, one of which is called 'democracy in action'. Schools have to offer a minimum of two electives. Students do not necessarily choose which electives they take, the school decides how these are allocated (Utdanningsdirektoratet, 2013). This change is part of the reforms to the Norwegian curriculum in 2006 (*Kunnskapsløftet*) following public fallout from Norway's average performance in international tests on reading and maths (Sellar and Lingard, 2013) Some academics believe that this shift to making democracy an elective topic will erode the emphasis and value long-placed on democratic practices underpinning all teaching approaches (Stray, 2013).

Practising democracy at school

More students aged fourteen participate in democratic activities at school in Norway than in nearly all other OECD countries, as shown by the International Civic and Citizenship Education Study (ICCS) carried out in 2009 (Schulz et al., 2010). Among students aged fourteen (Grade 8-9 in Norway), in all categories except one¹, Norwegian students participate at more than 10 percentage points above the ICCS average, and rank as the 3rd highest country in most of them (Table 2). These categories included: active participation in a debate; voting for class representative or school parliament; taking part in decision-making about how the school is run; taking part in discussions at a school assembly; and becoming a candidate for class representative or school parliament. Ainley et al. (2012), analysing the European countries only, found that in only six countries, one of which was Norway, were there positive influences on expected active political participation based on students' participation *at school*².

1. Only 'voluntary participation in school-based music or drama activities outside of regular lessons', is at the ICCS average.

2. In most other countries, participation in activities outside of school was a predictor of future political participation.

Table 2. National percentages for students' reported participation in different civic activities at school.

Civic Activities	Norway	ICCS Average	Norwegian Rank for all surveyed countries
Voluntary participation in school-based music or drama activities outside of regular lessons	61	61	Average
Active participation in a debate	62	44	3 rd
Voting for class representative or school parliament	90	76	3 rd =
Taking part in decision-making about how the school is run	58	40	3 rd
Taking part in discussions at a school assembly	52	43	8 th
Becoming a candidate for class representative or school parliament	62	42	3 rd

Source: Schulz et al. (2010: 138-139)

A focus on critical thinking

The ICCS study also found that in asking teachers and principals about goals for citizenship, they emphasised 'knowledge' as the most important goal, while 'critical thinking' was rated as the second most important (Schulz et al., 2010: 184). Solhaug (2013: 189) notes however, that 'in the Nordic countries, critical thinking was regarded as the most important goal'. He points out that this is not surprising given the traditional underlying German philosophy of *Bildung*. In his view, 'to become politically literate, students need to wrestle with concepts and issues which are authentic and to some extent relevant to their lives' (op cit).

FINDINGS

Teacher and student perspectives on civic education in an ungdomsskole

In the case study school, through interviews and class observations, several key aspects about teaching and learning for transformative citizenship became apparent. First, that Norwegian teachers interviewed expressed the strongly held view that they want students to be informed about and think critically upon, current issues, both in Norway and in the wider world. There appeared to be very little 'off-limits' in terms of discussion topics – the students were encouraged to talk about anything and everything! Students interviewed reported they also enjoy these kinds of discussions and find them helpful for learning.

Second, the students observed, even in 8th grade, showed a good grounding in and experiences with democratic processes, although it is debateable whether they get to practice their skills and influence outcomes as much as they would like. The current challenge however is that Norway is a society in change, with strong moves away from its traditional social democracy towards neoliberalism, in which there is greater emphasis on participation of individuals as consumers making choices through market mechanisms (Wiborg, 2012). What is happening in this school reflects some of those changes and the Principal and teachers interviewed commented with concern about the importance of preserving some of the important "Norwegian" values of active collective participation, that they believe are central to developing young people as transformative thinkers.

Developing transformative skills of thinking, discussion and debate

In class, discussion of ideas (at appropriate times) by students is strongly encouraged, with subjects like social studies, Norwegian and religion and ethics, focusing on getting students to think about their worldviews on many subjects. In one observed 8th grade class the students were canvassing a range of topics to write an editorial-style article about. They talked around a number of subjects for 45 minutes, had a five minute break, then continued for a further 45 minutes. Impressively, there was a high level of participation, engagement and thoughtful contributions throughout the entire session. Part of this was due to the skill of the teacher, who managed to keep the conversation flowing and cover off the few topics she wanted to draw their attention to, but it was also evident that students were comfortable discussing their different views in this way. However, the teacher did note that this particular class obviously felt very 'safe' with one another and the teacher, and that not all classes were (yet, nearly a year through their time in the *ungdomsskole*) as able to have successful discussions in this way.

The students themselves were enthusiastic about class discussions as a learning tool. An interview with two tenth grade students who were running a political group at the school highlighted the students' perspectives on class discussion and how it was beneficial to their thinking and learning.

Researcher: At school, what are the most interesting things you have learned/done in your classes in learning about democracy/participation?

Berit³: We haven't really worked specifically on democracy, or the environment, it's been kind of a general term that's been combined with other themes. Like in social studies we often have homework to find news articles and to discuss what's happening in the news and then democracy can be an issue as part of that, how we see different countries deal with democracy in different ways, and we've had this project where you choose a third world country and then you discover the political structures and so on in that country. So it's good to work on those issues in groups but also to go more in-depth on your own.

Ingrid: Yes, like in religion, we quite recently had discussions about abortion and euthanasia and that makes people more conscious.

Berit: I really like discussions as well in class, where you can hear other student's opinions.

(Interview with 10th graders from political group, May 2013)

Other students agreed. When asked the same question as in the transcript above about the most interesting things they had learned or done in class, a boy in the Grade 8 focus group said 'when we as students get to participate and have discussions among us' (May 2013).

Topics that might be seen as controversial in other countries are often encouraged to be discussed in schools in Norway, and the transcript above illustrates this with references to recent topics such as abortion and euthanasia. As one teacher put it: '...but then an important part of Norwegian democracy is that we talk about everything' (Interview with Social Studies teacher, May 2013). With Norway's national day of celebrating signing their constitution rapidly approaching (May 17th), several teachers emphasised to students the importance of the Norwegian constitutional rights to freedom of speech and print [writing]. As a result, in one observed Grade 8 class discussion topics ranged from 'what is freedom' to 'definitions of citizenship' to 'caring for old people' and 'allowing euthanasia' - subjects that were currently being debated in the media. Instead of shutting down these kinds of topics and limiting the conversation, the teacher challenged and encouraged students to offer their opinions and reflect on them, as the following segment from the class observation shows.

Teacher: Now I am going to give you an example. So if I write this word on the black board, *frihet* (freedom).

Student 1: It's like when you can do whatever you want.

Teacher: [To another student], what's freedom?

Student 2: It's in the Constitution of Norway, that you can have your own opinions, and your own thoughts.

... [the teacher goes around the room, asking each student for their opinion]

Student 3: Democracy, everyone can decide and make decisions together.

Teacher: The opposite of democracy is dictatorship. What do you think about that?

3. Students' names have been changed.

- Student 4:** In a dictatorship there is only one person deciding. So all the schools are going to close down and no one can protest. In North Korea there is a dictator and what he says is the norm...
- Teacher:** Yes, and what does that have to do with school?
- Student 4:** So if he wants to he can just close the schools down. No one can say what they want, what their opinion is.
- Teacher:** And that's not freedom. That's the farthest away from freedom that you can [go].
- Student 5:** And not everyone is allowed to go to school there [in North Korea].

(Class Observation, 8th grade, Norwegian class, May 2013)

Deliberation or word games?

The researcher also interviewed a professor from the local university who teaches in this area (Interview with Professor, September 2013). The researcher noted her observation of teachers encouraging critical thinking skills in classroom teaching. The professor pointed out that there are two kinds of approaches that Norwegian teachers often take when teaching using a discussion-based session. The first is what he called a 'word game', where the teachers ask questions and the students answer, but these are more association-type questions with expected answers rather than open-ended discussion. The second approach was the more open-ended question where the teacher is asking for opinions and debate on a topic, but he thought this was less commonly used. Both approaches were observed in the case study school, with a mix of both being used during the class sessions, as seen in the transcript above, when there are some fairly prescriptive answers to begin with about freedom, before a student starts talking about his views on North Korea.

Reflections on climate change

The students were also asked about their views on climate change - for themselves, and for Norway and the wider world, and showed not only an awareness and ability to reflect on the actions of those around them, but also the observation that transformation for adults can be hard. Some of their comments showed frustration with adults' actions, with one tenth grader saying 'they [adults] are actually being an example for young people and at least they could try to separate the different kinds of waste and do every day small things to show that they are [environmentally] conscious'. However, another acknowledged that 'human beings naturally have strong habits, and changing your whole lifestyle to be 'green' is a very drastic thing that many people would find difficult' (Interview with tenth graders, political group, May 2013). An 8th grade girl commented that 'I think adults could be more conscious about the climate, and, for example, not drive when they are only going to move 100 metres' (Focus group, 8th graders, May 2013).

Practising democracy

In this case study, it was evident that students experience and understand how democratic processes work. As well as challenging students to think about the differences between democracy and other forms of government in class, schools are required by Norwegian education law to form a student council that contributes to the running of the school and decision-making. In the *ungdomsskole* observed, this comprised two representatives from each class at each grade level (8-10), around thirty students. Watching a student council meeting, there were clear processes in place: two students 'chaired' the meeting, standing at the front and presenting the agenda and taking notes from the feedback of other class representatives. The other students there were clearly comfortable with reporting back class views and issues they wanted addressed. In a class following the council meeting, the representatives were then observed informing their classmates of decisions made there and asking for volunteers for an activity as requested.

How well teachers facilitate these processes and support the students' decision-making was not, from this case study, always clear. A teacher is always present during the student council meeting to present information from staff and ask for feedback. However some students pointed out that an issue that was raised there had been brought up for several months with no response from staff. While Norwegian education law requires that teachers consider students views on how they are taught, the students interviewed did not think they were asked or listened to that much – and they saw little evidence of change as a result. This may be, in part, because students don't always realise the ways in which teachers consider their views when making decisions about teaching, but perhaps also because teachers don't

always make their considerations explicit, telling the students *how* they have responded or changed things as a result. One teacher identified this as an issue, and explained there had recently been discussion amongst staff on how to improve their feedback to students. The education official also pointed out that sometimes the language used meant that students didn't realise they were being consulted with:

Official: I think it's very typical that situation [students not feeling listened to] you just described. I think it's part of being a teenager as well. Because teachers create expectations among young people and say that you will be able to participate and so on, but it's also that the pupils don't always register when they are actually participating in democratic processes...so it's an issue of communication, and also that we don't use the same words as say the national curriculum or the national student survey. A very specific example from the student survey is "are you participating in...at school?" Whereas in Trondersk [local dialect] they [the teachers] would say "now you're planning with us", so use more everyday words. Maybe that makes them [the students] confused and think that they don't have a lot of influence. *(Interview with Education Official, September 2013)*

One of the examples both teachers and students used about the students developing interest and involvement in a political way was the annual 'campaign week' where students raise money for charitable organisations. This usually coincides with an annual national telethon event run by the national broadcaster, the Norwegian Broadcasting Corporation (NRK) along with other organisations, which supports a different charity every year. In October 2012, the charity was Amnesty International. The principal noted that they use teaching materials from the national campaign to support the school campaign, in which the whole school is involved. He thought that it really stimulated interest and activity in the organisations involved.

Furthermore, students decide how and where the money that has been fundraised will be distributed. As the teacher who supports the student council commented, this can be a large sum of money, between 30,000-50,000 Norwegian kroner (US \$5,000-8,500). While observing the student council meeting, there was a discussion of whether some of this year's money should be spent on child sponsorships in other countries through a charity organisation. The student representatives had already talked about this option with their classmates, and gave feedback that the students saw this as a positive option. They then had to decide how much of the money would be used in this way. They chose to support several children. The teacher emphasised to the council members during the decision-making process that it was *their* decision to allocate the money, not the teachers.

Reflecting change in the wider society

Norway is a society in change, moving towards neoliberalism from strong socialist roots in the past and this has profound long term implications for education and citizenship (Wiborg, 2013). While this shift is so far appearing to have limited observable impact on students interviewed in this case study and their views of citizenship, the ways communities act is changing. One of the teachers talked about this and the rise of individualism as a result:

Teacher: In Norway we have a community spirit [to] help each other out, and that kind of spirit is about to evaporate in Norway, because we are richer and parents have money and they can buy their way out of community work.

Researcher: So you're seeing that decline, it's changing?

Teacher: Because of the welfare [state support], we are in a good economic situation so I think...I've been a leader of a sports club for 18 years, as a leader for the overseeing board so in that situation I see a lot of people, they [now] want to pay instead of work [volunteer], often. So my meaning is that I get hope when I see youngsters have good qualities and good attitudes, but I think our welfare [state] is a trap for the development of our society, [with regards to] volunteer work and charity organisations and the community spirit. It warms my heart when I see youngsters with good attitudes, because we will have a problem in future because of that [lack of support]. Because of all the [wealth] - everyone wants to travel, or sit at their home and do things [for themselves], not for the [wider community] and people around them.

(Interview with Social Studies teacher, May 2013)

DISCUSSION

Challenges and opportunities for transformation through citizenship education

This study suggests that in this Norwegian school at least, teachers are encouraging and preparing young people to become transformative citizens, people who will act to solve challenges like climate change. Norwegian society is not yet too focused on the neoliberal, personal responsibility model of citizen that Westheimer and Kahne (2004) argue too many schools in America teach as ideal. Rather the students observed in this case study were learning to organise charity events and lead campaigns, but could also articulate strong social justice goals as ‘participatory’ and ‘justice-oriented’ citizens. These students experienced every day ‘opportunities to learn about practical social action and critical resistance’ (Hayward, 2012: 64), which can help young people to develop a sense of ‘care, empathy, responsibility, and duty’ (Elshof, 2010: 107) to make future contributions to decision making around difficult climate change issues.

While we cannot speculate too widely from one case study, the Norwegian approach to active collective participation and critical thinking has important implications for liberal democracies. Young people have a key role to play in wider societal transformational change. O’Brien (2012) argues that examining what she calls the ‘big assumptions’ is a possible way forward to changing societies’ views and existing paradigms associated with continued global climate change. In the Norwegian case study, the willingness of the teachers observed to discuss pretty much any “big issue” means that their students have opportunities to be challenged to think about their own worldviews. In the classes observed, young people were having those kinds of discussions – about euthanasia and abortion and what democracy means and looks like. In other democratic countries, such as Britain and America, researchers have identified these kinds of discussions as lacking. In some cases teachers are reluctant to open the debate because of fear of parental backlash or because of the limited ability of teachers to conduct such discussions (Hess, 2004; Osler and Starkey, 2006). In Norway, parents are much less likely to object to students having these kinds of discussions and instead take an interest (Schulz et al., 2010). This encourages transformative thinking not only amongst young people but also their parents, making them potentially powerful influencers of future change (Cherry, 2011; Flanagan, 2013).

If young people are to have the skills to contribute to politics and help solve big problems like climate change, young citizens need support as future thought leaders. As well as teaching all young people democratic skills, the role and use of councils within the school structure helps to prepare young people for present and future political involvement. In the case study, it was evident that young people were well practised in participation in this way, and from the ICCS study that this was a national trend (Schulz et al., 2010). However, it also highlighted the importance of teachers clearly showing how they respond to the concerns of students, otherwise students may feel ineffectual and lose enthusiasm for the process.

However Norway’s shift towards neoliberal capitalism from traditional socialism, described by several researchers (Telhaug et al., 2004; Østerud and Selle, 2006), is creating some of the greatest changes to the way education, and citizenship education in particular, is taught (Stray, 2013). The recent national elections in October 2013 saw a shift from the left towards the centre-right, with the further-right Progress Party included in the new coalition⁴. Our comparative studies of New Zealand argue that neoliberalist thinking there has influenced many young citizens (Hayward, 2012). Although we cannot generalise from one qualitative case study, there were some echoes of experiences amongst Norwegian children and their teachers that reflects a similar experience in a shift from a collective view to a more individualistic one. New Zealand’s younger generations are only just waking up to the ‘power of social action and collective will formation, redefining the ideas of agency beyond making choices, to consider life’s purpose and meaning’ (Hayward, 2012: 67) at a time when Norwegian education policy is trying to reduce the importance of this approach and focus on raising individual achievement to score better on international tests (Stray, 2013).

The great wealth Norway has amassed due to oil has created some ‘political fence-sitting’ in the fight against climate change. Minority governments and the 67 percent state share in large oil company Statoil led Østerud and Selle (2006: 3) to describe Norwegian state capitalism, somewhat pessimistically, ‘as a passive owner with no goal-oriented strategy regarding the globalisation of trade and industry’. But citizens are not all as ambivalent. On the 9th May, 2013, 39 organisations, including a number of youth ones, sent an open letter to the Norwegian government asking them to withdraw from extracting oil in the Canadian Tar Sands (Hansen, 2013). Increasingly, louder voices are calling for change. It is important that the views of young people are included in these dialogues, in spite of not being able to vote (Chawla, 2009; Elshof, 2010). As Hansen (2009) points out, they will live with the consequences of climate change

4. However right-of-centre political parties in Norway are generally acknowledged to still have fairly socialist policies (compared with the USA or UK for example).

longer than the rest of us. The Norwegian lesson of how critical collective voices can be encouraged and nurtured is a lesson in hope for civic education to assist in this debate.

CONCLUSION

As New Zealanders looking in from an outside perspective, we believe that Norway is in a unique position – with a schooling system that already gives young people many opportunities to participate, practice democracy and think about the world and their place in it. As a result, we have several thoughts about future directions and possibilities. First, as our case study showed, transformative thinking can be encouraged and taught to young people, not just adults. Second, that teaching young people to think this way can also influence wider society, as parents learn from and are challenged by their children's views. Finally, that young people can and should be part of the wider conversation around complex issues like climate change.

This observation of how citizenship education is taught and practised in one *ungdomsskole* in Mid-Norway has underscored how a collective social spirit has been and for now, continues to be nurtured over many years through teaching practice. However this sense of social agency for social justice, which we identify as a valuable resource for effecting transformation, is at risk of being lost or significantly eroded, by the social changes oil prosperity has brought to the country. Yet the young people talked to through the course of this study are aware that they and their families have a responsibility to act towards change for the greater good, and the way that they have been taught how to think through citizenship education in school has contributed to that raised awareness.

The study suggests that when classrooms can foster social agency for social justice, teaching has a powerful potential to contribute to society's views and actions, encouraging significant opportunities for young people to share in the debate and decision-making that is required to deal with climate change.

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1. Ranking is out of 36 of the 38 countries who participated in the survey (two countries did not meet sampling requirements).

Terraforming ourselves: A causal layered analysis of interior transformation

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INTRODUCTION

It is now abundantly clear that human actions are altering the Earth on a planetary scale (Climate Commission, 2011; Rockström et al., 2009; OECD, 2012). Humans possess the power to change the climate, alter water and nutrient cycles and send species and even ecosystems into extinction. So far, we have shown little ability to control this power. It could be harnessed for planetary restoration and creativity, but is instead delivering destruction that makes our planet less habitable for humans and other forms of life.

In this paper, my goal is to use futures thinking to explore the nature of the transformations required to shift towards a sustainable trajectory for human civilisation. Sohail Inayatullah (2008) outlines six pillars of transformative futures thinking: mapping; anticipating; timing; deepening; creating alternatives; and transforming. Here, I focus particularly on deepening thinking about human transformation and identifying alternative perspectives on transformation, as a foundation for transforming practice. I am specifically interested in transformation of human interiors – our perspectives, values and cultural commitments.

My key starting point is that there is a lot of wishful thinking about human interior transformation. A common diagnosis of the current human situation is that we are heading towards, or already in, a crisis, which can only be averted through transformation of human values and culture (see for example Raskin et al., 2002; Slaughter, 2010; Gilding, 2011). While I agree with much of this diagnosis, the characteristics of the necessary transformation are rarely explored in any detail and few authors provide tangible suggestions for facilitating and supporting such transformation. As a result, human transformation takes on an almost magical character, held up as the solution to all of our ills. It is the solution we fall back on when all other approaches seem to have been exhausted – but its feasibility remains uncertain. I want to look more deeply at the nature of human interior transformation as a way of testing its feasibility as a conscious strategy for human sustainability.

To guide this deeper exploration of human interior transformation, I use a futures method called causal layered analysis (CLA). A secondary goal of this paper is to introduce this method for transformative foresight to a wider audience.

CAUSAL LAYERED ANALYSIS

CLA is a futures theory and method developed by Sohail Inayatullah. Inspired by poststructural and critical thought, particularly the work of Foucault, CLA ‘takes as its starting point the assumption that there are different levels of reality and ways of knowing’ (Inayatullah, 1998: 820). Exploring these different ‘ways of knowing creates the opportunity for “transformation” – opening up new conceptual spaces where genuine alternatives can be discovered and considered’ (de Simone, 2004: 486). As such, CLA is a method that is particularly well suited to exploring the concept of human interior transformation.

Inayatullah defines four levels of reality. The first, or shallowest, is the **litany**, which is the official public or media description of an issue. This is ‘the day-to-day future, the commonly accepted headlines of the way things are or should be’ (Inayatullah, 2008: 12). Descriptions at the level of the litany focus on quantitative trends and problems. Explanations tend to be visible and obvious and issues are presented as unconnected, engendering feelings of helplessness and apathy (Inayatullah, 2004: 11–12). Identified solutions tend to be short-term and the onus is on the government, or those with power, to implement the solutions (Inayatullah, 1998).

The second level 'is concerned with **systemic causes**, including social, technological, economic, environmental, political and historical factors' (Inayatullah, 2004: 12, my emphasis). It provides interpretation based on quantitative data, technical explanations and academic analysis, with a goal of providing causal explanations. Good work at this level analyses the actions that precipitate an issue and explores the roles of various actors, but rarely reaches back far into the past or forward into the future. While assumptions may be questioned, the paradigm within which a problem is framed remains unquestioned (Inayatullah, 2004: 12). Solutions are often located in civil society, in partnership with institutions (Inayatullah, 1998).

The third level 'is concerned with structure and the discourse/worldview that supports and legitimates it' (Inayatullah, 1998: 820). This is the level of **culture or worldview**, where:

"The task is to find deeper social, linguistic and cultural processes that are actor-invariant (not dependent on who the actors are) and to some extent system-invariant. Discerning deeper assumptions behind the issue is crucial here, as are efforts to re-vision the problem. At this stage, one can explore how different discourses...do more than cause or mediate the issue, but constitute it." - (Inayatullah, 2004: 12)

At this level, it becomes clear that the way problems are seen depends on the perspective that is taken. There is a focus, at this level, on uncovering frames, paradigms, mindscapes and discourses (Inayatullah, 1998). Interestingly for this paper, solutions are often found 'in consciousness transformation, in changing worldview, in rethinking politics of reality' (Inayatullah, 1998: 829). The focus shifts from the short-term to the long-term.

The fourth and deepest layer is concerned with **metaphor and myth**, focusing on 'the deep stories, the collective archetypes, the unconscious dimensions of the problem or the paradox' (Inayatullah, 1998: 820). These deep stories can fuel or blind our vision (de Simone, 2004). At this level: 'The language used is less specific, more concerned with evoking visual images, with touching the heart instead of reading the head' (Inayatullah, 2004: 13). Problems are constituted by unconscious core myths that need to be brought into consciousness. The intent is to draw out and deconstruct conventional metaphors, articulate alternative metaphors and bring the unconscious and the mythic to futures work. Solutions may then emerge in non-rational ways.

CLA moves up and down these four layers and explores the plural scenarios within each layer that are the seeds of alternative futures. The intent is to integrate understanding and solutions emerging from each of the layers. Below, I consider each of the layers in turn with respect to human transformation.

THE LITANY

At the litany level, we are bombarded on a daily basis with bad news about environmental trends, good news about technological breakthroughs and endless debates about political responses. The media breathlessly reports each new milestone in environmental destruction – species going extinct, glaciers melting, ecosystems collapsing, extreme weather events and so on. To take just one recent example, carbon dioxide levels in the atmosphere touched 400 parts per million (ppm) for the first time in at least 800,000 years on 2nd May 2013. This milestone prompted news stories around the world, with headlines like 'Greenhouse Effect: CO₂ Concentrations Set to Hit Record High of 400 PPM' (Walsh, 2013) and 'Carbon-dioxide concentrations hit their highest level in 4m years' (The Economist, 2013). Of course, CO₂ levels have been continually rising for a long time, and reaching this abstract milestone changes nothing of substance. It is merely an opportunity for the media and campaigners to create some new interest in climate change. As is common with the litany, there is not much that an individual can do in response to this kind of news. Solutions are not presented, just worrying news about climate change, deforestation, water wars, grinding poverty, and ecological and social collapse. While some people may use this news to motivate personal actions to reduce environmental impact, others are more likely to respond with fear, apathy, nihilism or fundamentalism (Eckersley, 2008).

A second strand of the litany is entirely focused on solutions, typically presented in the form of technological breakthroughs that will save us from environmental destruction. Which technology will save us is open to debate – various forms of solar power, nuclear power, carbon capture and storage, and geo-engineering are all presented as candidates. In the same week as carbon dioxide levels reached 400 ppm, there were headlines like 'Breakthrough in solar efficiency by UNSW team ahead of its time' (Hannam, 2013) and 'Clean energy can be the answer to our gas woes'

(Thornton, 2013). Where the environmental news tends to create fear and concern, the technological news reassures us. The connection between the two is easy to make: the environment is in trouble, but government and business are developing technologies that will save us. Therefore, we can go ahead with our lives as normal.

A third strand of the litany is best described as political gossip, focusing on the daily ups and downs of political responses to environmental challenges. This strand of the litany has been prominent in Australia over the last few years during political debates about pricing carbon. When Kevin Rudd became Australia's Prime Minister in 2007, there was support on all sides of politics for putting a price on carbon. That support rapidly evaporated and the media has closely followed all the political ups and downs. Most analysis is superficial, however. The complex political debate is reduced to a clash of slogans – a 'clean energy future' (Australian Government, 2011) versus a 'great big new tax on everything' (Taylor, 2009). In the political battle, soundbites prevail and political point scoring drowns out the environmental challenges.

In this entire litany, there is almost no discussion of human transformation. Human values, lifestyles and cultural commitments are rarely questioned. There is a sense that human nature is fixed in the face of environmental challenges, technological determinism and political debate. In other words, the idea that transformation of human values and cultures might be a fruitful path towards sustainability has largely failed to penetrate the litany level. It is not on the mainstream agenda.

SYSTEMIC CAUSES

Analysis at this level digs deeper, beyond fears of environmental apocalypse, technological breakthroughs and political posturing to look at the immediate origins of sustainability challenges and a broader range of technological, economic, political and social causes and responses. This deeper and broader analysis opens up transformation of human values and culture as a possibility. However, there are diverse views on the feasibility, desirability and pace of such transformation. I consider several common arguments about human transformation below.

Probably the most common view is that transformation of human values and culture is unnecessary, either because environmental problems are overstated (e.g. Lomborg, 2007; Plimer, 2009) or because we can achieve the necessary changes in our technological and economic systems without significant sociocultural change (e.g. Garnaut, 2008). The argument that environmental problems are overstated rarely stands up to scientific scrutiny (for example, see McKewon, 2012 for an overview of scientific responses to Plimer, 2009) and is supported by a relatively small minority of the population (Leviston, Walker and Morwinski, 2012).

The argument that human interior transformation is not necessary to achieve transformation of technological and economic systems is much more pervasive. In this view, responding to sustainability challenges like climate change is a matter of shifting technological, economic and institutional policy so that our infrastructure changes around us, while humans carry on unchanged. Thus we see discussion about pricing carbon so that markets will take care of climate change, or investing in technological innovation so that new technologies will take care of climate change, or putting in place international agreements to limit greenhouse gas emissions. In these analyses, human transformation is simply not on the table. We can make the transition to a clean energy system without changing our way of life. Most of the time, this silence about human interior transformation is simply an omission, or blind spot. Occasionally, it is a conscious choice, as when George H. W. Bush famously stated at the 1992 Rio Earth Summit that 'the American way of life is not negotiable' (Vidal, 2012). Either way, most of the time, human interior transformation is simply not discussed as a possible response to sustainability challenges.

When human interior transformation is considered, a common argument is that such transformation is not possible because human nature is fixed. Human nature can be fixed in different ways. Some argue that humans are naturally selfish and that this is a virtue (e.g. Rand, 1964). The hegemonic neo-classical economic model of human choice is slightly less radical, but does claim that humans are rational beings that will act to maximise their utility (van den Bergh et al., 2000), leaving little room for interior transformation. This rational choice model underpins modern Western capitalism and is a pervasive assumption in analysis of sustainability challenges. Others recognise plural human natures but argue that those positions are fixed and wholesale human interior transformation is not possible. For example, grid-group cultural theory identifies four types of human solidarity: hierarchical, individualistic, egalitarian and fatalist (Mamadouh, 1999). The potential for human transformation is constrained to movement between these four types.

An alternative argument sees human interior transformation as both possible and desirable, but too slow to offer a viable pathway towards a sustainable human civilisation (Riedy, 2010). Human interior transformation implies a fundamental developmental shift in interior structures, such as values and worldviews. Developmental psychology indicates that processes of interior development in adults are slow, inconsistent, unpredictable and personally challenging (Brown and Beck, 2009; Kegan, 1982). Little is known about ways of reliably triggering human interior transformation but it seems that successful strategies, such as meditative practice (Wilber et al., 2008) or transformative learning (Mezirow, 2009), either take years of dedicated practice to deliver results or require substantial resources to implement (Riedy, 2010). When coupled with sustainability challenges that require urgent responses, human interior transformation is often discounted as a feasible strategy in favour of strategies that work with existing values and worldviews.¹

Others believe that human interior transformation can happen very fast and, indeed, is an inevitable response to sustainability challenges. For example, Paul Gilding argues that a series of cascading, overlapping crises lie ahead that will lead to a tipping point when ‘denial ends, and the reality that we face a global, civilization-threatening risk will become accepted wisdom, virtually overnight’ (Gilding, 2011: 106). At that point, he argues, there will be a Great Awakening in which humanity will respond with ‘extraordinary, imaginative transformation and political shifts that will in this case be capable of bringing us back from the brink’ (Gilding, 2011: 106). For others, technological development drives this kind of rapid human transformation. Ray Kurzweil (2006) argues that the continuing exponential growth in technological development is leading us rapidly to a point – called the singularity – at which humans will merge with machines to transcend our biological limitations. In this radical, techno-optimist view of human transformation, sustainability challenges become irrelevant in light of almost limitless human potential to manipulate our environment.

The final perspective I will consider here is that we are already in the midst of a process of human interior transformation, as evidenced by emerging social movements that prioritise collaboration, cooperation and sharing. These include the collaborative consumption movement (Botsman and Rogers, 2010), the commons movement (On the Commons, n.d.), the global justice movement (Hawken, 2007) and the growing prevalence of social networking. This perspective is supported by research (e.g. Rand et al., 2012) that highlights the cooperative nature of humans over the selfish rationality assumed by neoclassical economics. Proponents of this perspective seek to facilitate and harness these emerging transformations to respond to sustainability challenges more rapidly.

This is certainly not an exhaustive review of perspectives on human interior transformation in response to sustainability challenges, but it does give an indication of the diversity of analysis at this level.

WORLDVIEW AND CULTURE

At the level of worldview and culture, we move deeper still to explore ideological positions and discourses that underpin the diverse perspectives uncovered in the previous layer. Some of the key discourse clashes should already be apparent from the above discussion, such as clashes between those who see humans as dominant over nature and those who seek to accommodate human civilisation to natural constraints.

There are multiple options for uncovering and categorising discourses and worldviews. Here, I will draw on a developmental perspective to explore worldviews on human interior transformation. Specifically, I will use broad stages of human development identified by integral theorists (Kegan, 1982; Beck & Cowan, 1996; Wilber, 2000; Esbjörn-Hargens, 2010) to categorise worldviews. Integral theorists argue that human interiors develop through recognisable stages. While the labels used to represent these stages vary, the general direction is one of widening identity: ‘from “me” (egocentric) to “my group” (ethnocentric) to “my country” (sociocentric) to “all of us” (worldcentric) to “all beings” (planetcentric) to finally “all of reality” (Kosmoscentric)’ (Esbjörn-Hargens, 2010: 42). These broad identity stages correspond, roughly, to differing discourses or worldviews. Below, I will examine how each of these discourses views the potential for human interior transformation. I have excluded the Kosmoscentric discourse as it remains exceedingly rare. My characterisation of the discourses draws particularly on Beck and Cowan (1996), Wilber et al. (2008) and Esbjörn-Hargens (2010).² The characterisations of each discourse are caricatures to some extent, as real discourses are often complex mixes of these different positions. Nevertheless, exploring these distinct positions is a valuable way

1. For example, see Solitaire Townsend’s (2009) dismissal of attempts to change values in favour of tailoring the message to appeal to existing values.

2. I am also indebted to the summary diagram presented with an online version of Esbjörn-Hargens (2010) at <http://integrallife.com/integral-post/overview-integral-theory>.

of mapping different worldviews. To ground the discourses a little, I have provided a typical quote at the end of each discussion, drawn from the comments pages of *The Conversation*.³

Egocentric

Those participating in an egocentric discourse are focused on their own needs and protecting their self-interest. This discourse is exploitive and opportunistic, and sees others as a means to an end rather than people in their own right.

This discourse is entirely focused on satisfying present needs, so problems that lie in the future are simply not visible. As such, any perceived impetus for human interior transformation is missing. If the egocentric discourse is urged to transform, it will see this as an imposition, which it will resist unless there is some immediate and obvious benefit from going along with the transformation agenda. For example, if sustainability challenges present an immediate threat to well-being, as Gilding (2011) in different ways, trying to break through, until it gives up, recognizes the limits are immovable, and change. Then there are two ways to go. The system can stop growing and stabilize, usually evolving to a higher state, or it can break down into a simpler system with less complexity (that is, collapse argues is inevitable, then the egocentric worldview may accommodate change as a survival mechanism. Egocentrics may also be willing to change if there is an immediate competitive advantage to be gained. Otherwise, egocentrics are likely to take the default position that they are doing fine, they are meeting their immediate needs, there is no need to change and the environment is just a source of resources to exploit for short-term gain. Nihilistic responses to fears about environmental catastrophe are common here (see Eckersley, 2008).

Typical comment: We will go sustainable when we have sucked every last hydro carbon out of old mother earth and not before.

Ethnocentric

The ethnocentric discourse or worldview identifies with the immediate group and values the hierarchical authority structures that keep the group functioning. This worldview seeks to belong and adhere to group norms as to what constitutes socially acceptable behaviour.

Those participating in an ethnocentric discourse are likely to take their cues to change from their authority figures. If they are directed to change, by church leaders, governments or others that they trust, they will endeavour to do so. The default position, however, is that the current system is working, they know their place and change is not necessary. The specific teachings of authority figures become very important in an ethnocentric worldview. A leader arguing that humans should have dominion over nature, rather than being stewards of nature, will provoke very different responses. Ethnocentrics may externalise environmental problems, arguing (for example) that they are doing the right thing but there are too many people in developing countries and they are the ones that need to change. Transformation of human interiors may be valued, as in particular religions, but the desired form of transformation may be constrained to comply with religious teachings.

Typical comment: If all the women in the world got together and agreed to have only one child each per lifetime: 1. Climate change would be arrested. It would be a NON -TOPIC.

Sociocentric

The sociocentric discourse is individualistic and nationalistic, focused on achievement and getting ahead. It values rational, objective responses to environmental problems, often favouring technology and markets. This worldview recognises that its beliefs are self-chosen, so may be resistant to questioning of those beliefs.

A typical sociocentric response to environmental problems is to question whether they are really that bad and to argue that, if we do need to do something, then technology supported by market mechanisms will save us. Innovation and hard work are the appropriate responses and there is money to be made by coming up with solutions. In this view, there is no need for radical lifestyle changes – we can keep our current values and culture but be cleaner and greener through technological advancement. In other words, it is not an interior human transformation that is needed but a transformation of our techno-economic systems. Indeed, there will be strong resistance to interior transformation if that is likely to threaten the strategic interests of individuals or organisations. In extreme versions of this worldview, we see

³. See <http://theconversation.com/au>. I have used this source as it is a site where I regularly publish and one of the most popular journalism sites in Australia.

techno-utopian visions like the singularity (Kurzweil, 2006) that have boundless optimism about the human potential to tame, shape and replace nature to meet our needs. The rational bent of this discourse means that all options are on the table and need to be weighed up scientifically.

Typical comment: Alas it appears impossible to have a sensible, reasoned discussion about what role modern nuclear power might play in solving our problems - driven by evidence and facts rather than fear and misrepresentation (from both extremes). I'd like to see all options on the table - tactics to reduce excessive consumption, better ways to produce the world's energy requirements (renewables and nuclear), greater efficiencies, coupled with real ways to recognise the value of the environment, biodiversity, and the "services" the environment provides us - including making companies "pay" for them.

Worldcentric

The worldcentric worldview is aware of multiple perspectives and subjectivity. It embraces this diversity, finding a sense of identity that takes in all people. It is a pluralist perspective and the source of most environmental concerns.

From a worldcentric perspective, the Earth and its people are in peril and we all need to take urgent action to become sustainable. Interior transformation is essential to create a world where all perspectives are valued. In the worldcentric discourse, everyone needs to be part of the required transformation and governments are failing us on sustainability challenges because they are not including people in decision-making and not listening to our concerns. However, the worldcentric perspective does not recognise that ecological awareness emerges from a long and difficult process of interior development that many people have not yet experienced. Worldcentrics are baffled that others do not see sustainability challenges the same way they do and tend to label people as bad for not seeing the problem and taking action. They see sustainability challenges as urgent and are driven to act to avoid dystopian futures. Human interior transformation is valued but there is little understanding of how such transformation occurs.

Typical comment: We need to really examine our expectations and "entitlements". We must reduce our carbon emissions full stop, no ifs or buts. People are dying, we are contributing to their deaths. I demand that Australia reduces its carbon footprint, Other countries are reducing their greenhouse gas emissions, we are not leading the way. We are dragging our feet and saying "its too expensive, it's inconvenient, they have to do it first, it will cost jobs," but per capita we are the highest polluters in the world.

Planetcentric

The planetcentric worldview is an integrative perspective that is aware that its perspective is the culmination of a process of interior development through the stages discussed above. It is able to see and recognise other perspectives and their developmental relationship to each other. While it values all perspectives, including those of other species, it also recognises that some perspectives are more complex and inclusive than others.

A planetcentric discourse sees interior transformation as valuable, but potentially slow and difficult. It recognises the need to find ways for people operating from all discourses to engage in responses to sustainability challenges, with or without any transformation of those discourses. The worldcentric discourse realises that interior transformation is not a magical saviour but one of many available strategies that need to be employed strategically and simultaneously. For example, using scarce resources wisely to help key leaders to transform their practices is likely to leverage much greater results than seeking wholesale transformation. Planetcentrics engage in 'dialogue with the system' - they are able to repeatedly sense into what is needed to help a system develop (e.g., make it more sustainable), try different interventions (e.g., prototype; experiment; seed ideas), observe the system response, and adapt accordingly (Brown, 2011).

Typical comment: How about we all simply attend to what is possible here in this landscape, and by that criterion consider more closely what is the most probable scenario, and direct our time, energy and capital into making the best we can of it.

What emerges from this review of discourses on interior transformation is that most of the discourses, and certainly those that are most prevalent globally – the egocentric, ethnocentric and sociocentric – are not seeking interior transformation and are likely to resist external urging to transform. Interior transformation is only valued as people move into worldcentric discourses. It is valuable to recognise that those promoting transformation are therefore engaged in a deep discursive conflict with those that resist the basic premise for transformation.

MYTH AND METAPHOR

Moving deeper still, into the realm of myth and metaphor, means searching for the deep stories that fuel the discourse visions and their artistic expressions. I will explore two deep stories before introducing a third metaphor that may have transformative potential.

The dystopian story

Dark, dystopian visions of the future, where human civilisation collapses under the pressures of climate change, ecological catastrophe, war, disease or invasion, are pervasive in popular culture. They are the fodder of Hollywood, giving us films like *Blade Runner*, *The Road* and *The Hunger Games*. They are commonplace across multiple media, from literature, to comics, to television, to gaming. The specifics of the story vary. Sometimes, humanity reaches too far and apocalypse is a punishment. I am reminded here of the story of Icarus, who built wings from feathers and wax but soared too close to the sun and fell to Earth when the wax melted. Sometimes, the apocalypse seems unjust, like an alien invasion of a thriving human civilisation. Raskin et al (2002) identify two variants – a barbarization scenario in which all of civilisation collapses and a ‘fortress world’ scenario, where the rich protect their standard of living with force, consigning the rest of humanity to despair. Regardless of their specific form, stories of future doom are all around us.

When images of apocalypse are so accessible, it is not surprising that some people will react to information about sustainability challenges like climate change with urgency and activism. It is easy to map the scientific warnings about climate change onto the ever-present story of future doom and see future climate scenarios as apocalyptic. The dramatic imagery of the dystopian story helps to communicate a sense of urgency about responding to sustainability challenges that may motivate people to take action to avoid an unpleasant future. However, for some, it may be overwhelming, leading to nihilistic and fundamentalist responses (Eckersley, 2008). Further, there is a risk that the dramatic imagery of the dystopian story overplays what humanity is facing and actually hinders the development of particular responses. If we hold firmly to the deep story that urgent action is needed to respond to sustainability challenges (for example, that we are living in the ‘critical decade’ (Climate Commission, 2011)), then perhaps we will discard responses like interior transformation and cultural change that can only happen gradually. Something important might be lost in doing so.

The techno-utopian story

An alternative deep story, almost as pervasive as the dystopian story, is the techno-utopian story. This is a story of dominance over nature, where humans adapt the environment to suit our needs using ever more ingenious technologies. It is a story of eternal progress, steeped in optimism about human potential and possibilities. In the techno-utopian story, humans will find new technologies to solve the climate crisis – either new energy technologies or geo-engineering technologies that allow us to manage the Earth’s ecological systems and prevent the worst impacts of climate change. It is a particular staple of science fiction, where humanity has often fanned out beyond the Earth to conquer other planets and other galaxies. *Star Trek* and *Star Wars* are typical examples. In this story, there is no limit to human potential and planetary boundaries do not constrain us.

Whereas the dystopian story can engender too much urgency, the techno-utopian story leads to complacency. If technology will save us, then there is no need to worry about the future or to take action to live within planetary boundaries. Instead, we should embrace new technologies and enjoy the benefits they bring. The potential dark side of technology is ignored. In this story, interior transformation is not necessary. Instead, we pursue transformation of our technologies to allow us to continue living our lives as we do now, but on a grander, wealthier scale.

An important metaphorical concept within the techno-utopian story is that of terraforming. In science fiction, terraforming is the process of deliberately modifying a planet or moon so that it becomes habitable by humans. Literally, the term means ‘Earth-shaping’. As the Earth is unique in the solar system in its ability to support human life, and there may be few planets like ours further afield, the techno-utopian story relies on terraforming as a way of allowing humanity to leave the confines of the Earth.

Terraforming ourselves

Both of the deep stories presented above are problematic. The dystopian future narrative can provide an impetus for action but can also provoke fearful reactions, nihilism and fundamentalism. Further, it may overstate or overly dramatise the urgency of our predicament. The techno-utopian future narrative is blindly optimistic, failing to see that human pursuit of technological solutions is leading towards ecological crisis. It requires humans to reliably manage the Earth’s complex systems, which is a task that may well be beyond us. As we rely more and more on technology, we become, in many ways, less resilient and more vulnerable.

In the search for a metaphor that could navigate between these two extremes, I found the concept of terraforming useful – if we could just turn it on its head. What if, instead of terraforming other planets, we sought to terraform ourselves? What if we collectively decided to become more ‘Earth-shaped’ and to live within planetary boundaries? What would that story look like? We would transform our values, worldviews and institutions so that they take shapes that are in harmony with the Earth.

Clearly, this is a transformative story, where humanity shifts its values and culture to be satisfied with a way of life governed by what the Earth can sustain. It shies away from the techno-utopian reliance on exterior transformation alone, recognising that interior transformation is needed. On the other hand, it rejects some of the urgency of the dystopian story. In science fiction, terraforming is typically a slow process that happens over decades or centuries. It does not deliver instant results. This means letting go of our ability to transform ourselves instantly or rapidly in response to climate change, but opening up the potential for interior transformation to be part of a suite of response to climate change, some rapid, some slower. Terraforming ourselves would be an ongoing, long-term project. Finally, terraforming is typically an experimental process, where different approaches are tested out, evaluated and retained or discarded. Terraforming ourselves would be a similar process, where various initiatives for transforming human interiors were tested and evaluated in an environment of conscious experimentation.

CONCLUDING DISCUSSION

In this article, I have applied causal layered analysis to explore four layers of human interior transformation: the litany; social causes; worldview and culture; and myth and metaphor. My intent was to move beyond wishful thinking about the potential for human transformation in response to sustainability challenges like climate change. My hope was to deepen our perspectives on human transformation and open up alternatives for transformative practice. So, what has been revealed?

At the deepest level of myth and metaphor, stories and images of dystopian and techno-utopian futures hinder the potential for transformative practice. Dystopian visions can paralyse us or create such a sense of urgency that interior transformation is discarded as too slow to make a difference. Techno-utopian visions comfort us with the promise that interior transformation is not necessary and technology will save us. Stories that navigate between these extremes need to emerge if interior transformation is to find space in our sustainability practices. I have proposed a metaphor of ‘terraforming ourselves’ as one contribution towards such a story. Terraforming ourselves, or making ourselves more Earth-shaped, would be a slow process of conscious experimentation, but could offer a long-term narrative frame within which more rapid actions could be taken. Surfacing this story requires at least some sustainability practitioners to abandon urgency in favour of more gradual strategies of facilitating the development of human potential.

Moving back up to the layer of worldview and culture, it is apparent that most worldviews do not value interior transformation. It is an elite concept that only emerges as a valuable goal at the worldcentric stage of development. Thus, practitioners that choose to work on interior transformation will need to work strategically with those who are receptive to such an approach and, importantly, may have influence with other discourses. Focusing scarce resources on facilitating interior transformation for key discourse leaders emerges as a promising strategy. Meanwhile, much of the work required to respond to sustainability challenges will not be about transformation but about working with existing discourses to find ways to engage them in responses that make sense to those discourses. This is a process of translation, rather than transformation – of finding language that works with where people are and responses that resonate with existing values.

As we rise further to the layer of social causes, many different analyses of sustainability challenges and interior transformation are evident, underpinned by conflicting discourses and myths. One possible strategy emerging at this level is to continually draw attention to the transformations that are already taking place all around us. Staying as we are is not an option, but steering the transformations that are already underway is an option. When we draw attention to emerging movements that are underpinned by worldcentric or planetcentric values, like the collaborative consumption movement, the commons movement and the global justice movement, and new practices like social networking, we are making transformation tangible and real for people. This has the potential to both reduce the fear of transformation and draw attention to practical ways in which people can participate.

Finally, at the level of the litany, we emerge into a sea of disconnected soundbites. There are warnings about climate change, stories about technological solutions and endless political gossip. Finding space for interior transformation at the litany level is undoubtedly challenging. One small step is to always attempt to bring the different strands of the litany together when we communicate. This might mean always offering a practical solution when we give a warning about sustainability, so that people can see a clear action they can take. Or it could mean drawing attention to how disconnected the political process is from what climate science is telling us.

The metaphor of terraforming ourselves may not appeal to all and may end up falling flat. That is not really important and advocating for this metaphor is not the point of my paper. Instead, my key argument is that we need to resist the temptation to see a transformation in human values as a realistic short-term solution to climate change, while also resisting the urge to discard it as too slow to be of any value. We must continue to experiment with transformative practices in support of long-term sustainability, while simultaneously trying everything else we can think of to make sure that we survive on this planet long enough to truly transform.

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Factors shaping scientific framework change

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ORIENTATION

Our understanding of and adaptation to climate change is influenced by both pre-theoretical and theoretical epistemic frameworks. On the pre-theoretical side, frameworks such as worldviews and fundamental motives influence the way that we perceive the environment and the place of humanity in nature (Loubser et al., 2009). Whilst on the theoretical side, frameworks such as scientific axioms, theories and special scientific disciplines are drivers of environmental policy-making that ultimately aims to influence human behavior towards nature. Interestingly, the basis of the theoretical frameworks is to be found in the pre-theoretical frameworks (Loubser et al., 2009). This means that changes in pre-theoretical frameworks often lead to changes in theoretical frameworks as well.

In fact, integral adaptation to climate change necessitates transformation at both pre-theoretical and theoretical level, so that, as our belief systems change, our scientific practices change as well.

Scientific frameworks have some kind of plasticity or capacity for change and through the history of philosophy, different conceptions of how this change supposedly occurs have been proposed. In previous articles (Loubser, 2012, 2013) I have explored different models of framework change and found that epistemic frameworks change according to a pattern referring to the irreducibility of coherents, where change and constancy exist in cohesion. Intuitively, however, changes in frameworks are also influenced by various factors. These change factors, of *theoretical* epistemic frameworks in particular, are the focus of my current article.

Traditionally, the change factors have been categorized as being either internal or external to science. For example, Kuhn (1970: ix-x) states that his main focus in *The structure of scientific revolutions*, is the influence of internal (i.e. epistemic) factors on scientific development. Although the external factors (e.g. social pressures for reform) are not his focus, Kuhn (1970: 69) admits that they are “immensely important” and “principally significant” in determining the timing of revolutions, the ease of acceptance of changes and the areas of mature sciences which are first affected.

Feyerabend (1975: 68) argues that, for the sake of scientific development, scientists need to contrast scientific ideas with other incompatible ideas, without excluding those external to science. Notably, he claims that it is necessary to “step outside the circle”, and to import a new system “from outside science, from religion, from mythology, from the ideas of incompetents or from the ramblings of madmen” (Feyerabend, 1975: 68).

In these examples, one gets the impression that what is defined as “internal” to science differs markedly from author to author, to the extent that whatever is identified as crucial for determining scientific change (by each specific author) is considered “internal” while all the other influencing factors are regarded as “external”. Also what is (or is not) included in the external factors can differ radically (from Kuhn’s “technological advances” (1970: x) to Feyerabend’s “mythology”).

The problematic nature of the traditional internal-external distinction, leads me to the adoption of a different classification scheme. In this article, change factors are classified along the lines of the different aspects of reality, as distinguished by Dooyeweerd (e.g. 1979: 40-41). These aspects are the numerical, spatial, kinematic, physical, biotic, psychical, logical, historical, lingual, social, economical, aesthetic, judicial, ethical and certitudinal.

In the literature of contemporary¹ philosophy of science, several change factors are proposed as the most important for science: the logical and psychological factors (e.g. the positivist tradition), the physical and logical (e.g. Popper), the logical, social and psychological (e.g. Kuhn), the social and political (e.g. neo-Marxism, cf. Habermas, 1971: 198; 308-314), the social and linguistic (e.g. Rorty) and the certitudinal and psychological factors (e.g. Feyerabend).

Since some of the aspects are often absolutized while others are simultaneously reduced², the relationship between the change factors becomes problematic. The problem statement of this article can be formulated as follows: which factors are crucial to shaping science and (i.e. which factors have a regulative role?) Furthermore, which factors should *legitimately* have a shaping influence? Are there factors which should not have such influence on theory change (e.g. economic or political factors)?

The hypothesis of this article is that a wide variety of factors influences changes in frameworks but that some of these factors have a regulative function, pointing towards a normative element in scientific changes. Support for the hypothesis is provided through the following plan: I investigate contemporary literature in philosophy of science and explore approaches which indicate different key-factors for change in frameworks. By concentrating especially on theoretical frameworks, I evaluate the different approaches, pointing out some problems.

I propose an alternative “pattern” following the reformational theory of qualifying functions. According to this perspective science is qualified by certain functions, which are supposed to play a more regulative role in scientific change. However, a variety of factors shaping science exists and since all the aspects of reality are necessarily related to each other, they should not be ignored. Before concluding, a few hypotheses in the form of questions are formulated on this issue, as a possible contribution to open up new avenues for research. Let us start the exploration by considering the physical and biological change factors identified by the positivist tradition.

LOGICAL AND PSYCHOLOGICAL CHANGE FACTORS

Frederick Suppe (1974: 12) regards the Received View of science as occupying a central place in logical positivism. According to him the original version of the Received View can be formulated as follows: a scientific theory is to be axiomatized in mathematical logic (Suppe, 1974: 12). This axiomatization consists of: (1) logical and mathematical terms, (2) theoretical terms and (3) observational terms given phenomenal or observational interpretation (Suppe, 1974: 12). Furthermore, the Received View analogously characterizes the way in which science develops. According to Suppe (1974: 13) science initially consists of empirical generalizations formulated using (3) above. This is later followed by the introduction of theoretical terms and theoretical laws or by the formulation of the generalizations by theoretical terms (Suppe, 1974: 13).

I am of the opinion that, in this approach, some change factors are over emphasized, whilst others are reduced, or even disregarded. One of the most important change factors emphasized in this manner is the logical. Logical positivism proceeded from mathematical statements of scientific laws and definitions of theoretical terms given in the form of mathematical logic (Suppe, 1974: 13). Secondly, since logical positivism assumes epistemological assertions to be empirically verifiable through sensory perception, the psychological factors are emphasized as well. In fact, according to Suppe (1974: 15) the sensory verification of physical assertions was taken as “non-problematic”.

Unfortunately, the emphasis placed on the logical and psychological change factors by the logical positivist tradition can be problematic at least in two senses. Firstly, it seems that the absolutization of the psychological factors caused other factors to be reduced. For example, the members of the positivist tradition were opposed to the introduction of metaphysical concepts in scientific frameworks, since such concepts could not be empirically verified (Suppe, 1974: 13). This means that, for example, the influence of certitudinal change factors (e.g. beliefs, expectations *et cetera*) on the development of science was rejected. Secondly, absolutization of some factors can cause other factors to become distorted. In the positivist tradition, some struggled with reducing physics to sense perceptions (observations) and logic. This means that the linguistic change factors become subjected to the norms of the psychological and logical aspects.

1. My usage of the adjective “contemporary” refers to the period circa the Second World War, characterized by the emergence of a solid anti-positivist approach (e.g. in authors such as Popper), as well as its subsequent elaborations (e.g. in authors such as Kuhn, Polanyi, Feyerabend, Dooyeweerd). The humanist thinkers considered here are discussed because they are among the most influential contemporary philosophers of science and the reformational philosophers are included because they contribute valuable insights towards a solution of the problems explored here.

2. Absolutization occurs when all of reality is viewed through one or a few of its aspects, so that all the other aspects become sub-aspects of the absolutized one(s) and in that sense reduced. In the reformational tradition one can find attempts at serious analysis of this issue. For example, Clouser (1996: 77-78 fn. 23) distinguishes between “strong reduction” (referring to either “meaning replacement” or “factual identity”) and “weak reduction” (manifesting as “causal dependency” or “epiphenomenalism”).

In the subsequent sections of this article we will see more examples of different change factors which have been emphasized in philosophy of science. Let us proceed with the physical and logical factors in the next section.

PHYSICAL AND LOGICAL CHANGE FACTORS

For Karl Popper, the purpose of science is the testing of universal laws (1961: 144). These laws are “the laws of nature” equivalent for him to physical laws and representing immutable regularities throughout space and time (Popper, 1961: 5). Popper regards scientific theories as seeking correspondence to the immutable physical laws (1963: 224;229) and changes in theories are the result of increasing approximation to the physical facts (1963: 231-233; 1970: 57). In this way, Popper gives fundamental importance to physical change factors. This also implies that, when it comes to scientific certainty, Popper locates it in the object of study rather than the human subject³. It should be noted, however, that Popper does not subscribe to a form of unmitigated objectivism. Popper holds a rather moderate position, where the human subject does play a limited role in grounding scientific certainty.

For Popper, the role of the subject is not to be found in the individual scientist, but rather in “social institutions”. He states that “science, and more especially scientific progress, are the results not of isolated efforts but of the free competition of thought” (Popper, 1961: 154-155). Competing scientific hypotheses need personal representation, but the latter must be institutionally organized if it is to be effective (Popper, 1961: 155). It is in these institutions that scientific knowledge progresses through conjectures and refutations. According to Popper (1979: 261) hypotheses which survive criticism better than their competitors, are to be accepted tentatively as part of scientific knowledge. Furthermore, scientific institutions have to be protected politically, so as to insure democracy and freedom of thought.

The implication is that social and political factors shape science *indirectly* by creating the space for the logical change factors to function. For Popper, however, the combination of logical factors (rational criticism of competing hypotheses through conjecture and refutations) and physical factors (the physical universal laws) is the key to scientific change. According to Stafleu (1987: 204, 253) Popper absolutizes these two aspects (cf. also Coletto, 2007: 33, 72-73).

In the next section we will explore the work of Thomas Kuhn who adds social and psychological factors to the list.

LOGICAL, SOCIAL AND PSYCHOLOGICAL CHANGE FACTORS

In *The structure of scientific revolutions* (1970), Thomas Kuhn mainly focuses on what he regards as the internal factors that influence the development of science, but he states that an analysis of the external factors, e.g. technological advance or social, economic and intellectual factors, will add an important dimension for understanding scientific advance (Kuhn, 1970: ix-x). According to Kuhn (1970: ix-x) the “conditions outside the sciences” may influence the range of revolutionary alternatives available to end a scientific crisis, although an explicit consideration of them would not alter his main thesis that scientific change is primarily dependent on internal (epistemological) and therefore logical change factors. Nevertheless, social and psychological factors play a relevant role as well.

For him (1970: 169) the unit for scientific progress is the solved puzzle. However, because the scientists adopt a certain paradigm and try to apply it to new areas of research, they will only be open for alternatives once nature has problematized their previous answers (Kuhn, 1970: 169). Even after reality itself has “kicked back” and forced the existing paradigm into crisis, the role of the human subject enters Kuhn’s equation again. During the revolutionary phase of science, the group of scientists decides which of the proposed alternative paradigms to embrace. Their

decision (according to Kuhn, 1970: 169) will be based on important conditions: (1) the new paradigm must promise to solve well-known and previously unassailable problems and (2) must preserve a large part of the concrete puzzle-solving ability of preceding paradigms.

This means that, when it comes to explaining scientific change, Kuhn holds a moderate position between emphasizing the role of nature and the role of the knowing subject, however, ultimately leaning more towards the role of the subject. It is important to note that Kuhn does not regard the individual scientist (on a personal level) as influencing changes, but rather a community of individuals (Kuhn, 1970: 168). The scientific community must have a certain composition

³. In *Normal science and its dangers*, Popper (1970: 57) states that scientific knowledge may be regarded as subjectless.

of members, namely individuals who share specialized training and experience. This makes the scientific community the “sole possessors of the rules of the game” capable of unequivocal judgments (Kuhn, 1970: 168). In this way, Kuhn emphasizes the social change factors for science.

Kuhn’s emphasis on the role of the scientific community has lead authors like Lakatos (1970: 140 fn.3) to believe that (for Kuhn) the history of science cannot be fully understood without taking psychological change factors into account. According to Lakatos (1970: 178) there can be (in Kuhn’s view) no logic, but rather the psychology of scientific discovery. In Kuhn’s conception anomalies are always found in science, but during the phase of normal science, the dominant paradigm secures a pattern of growth which eventually gets overthrown by a “crisis” (Lakatos, 1970: 178). There seems to be no stringent rational cause for the appearance of a paradigm “crisis” and Lakatos (1970: 178) perceives the crisis to be of a rather psychological nature, akin to a “contagious panic”.

Furthermore, in Kuhnian revolutionary science, there seems to be no super-paradigmatic standards to compare old paradigms with new paradigms, since the latter bring in a totally new rationality and are perceived to be incommensurable (Lakatos, 1970: 178). Lakatos proceeds to noticing the crucial role of the psychological factors by stating that, in Kuhn’s philosophy, scientific change becomes a “bandwagon effect” which resembles an “irrational” matter of “mob psychology” (Lakatos, 1970: 178). Kuhn (1970b: 260-263), however, does not regard his philosophy as over-emphasizing the psychological change factors, since standards for theory choice (e.g. accuracy, scope, simplicity, fruitfulness, etc.) continue to exist.

This view of science as being social, i.e. subject-dependent and non-neutral, is shared by authors in the neo Marxist tradition (e.g. Habermas) who emphasize social and political change factors (critically ignored by Kuhn). Let us proceed to an investigation of such factors in the next section.

SOCIAL AND POLITICAL CHANGE FACTORS

Neo-Marxism considers theoretical science to be intimately related to practice and to historically-bound human interests. As such, the purpose of science is not merely description of the facts, but social change. Jürgen Habermas can be regarded as supporting this thesis.

For Habermas (1971: 308-311) science can be categorized into three different types, each characterized by specific interests: (1) the empirical-analytic sciences characterized by the “cognitive interest in technical control over objectified processes”, (2) the historical-hermeneutic sciences characterized by a “constitutive interest in the preservation and expansion of the intersubjectivity of possible action-orienting mutual understanding” and (3) the systematic sciences of social action (i.e. economics, sociology, political science) determined by an “emancipatory cognitive interest”. Of the three different types of interests, the emancipatory interest is the most important, since it shapes our understanding of the other two interests (Habermas, 1971: 198). This means that for Habermas, scientific change is influenced by the scientist’s perception of and reaction against existing social repressions and exploitation. In this way, Habermas emphasizes the social and also political change factors in science.

The list of change factors mentioned in the previous sections does not exhaust all the factors proposed in the history of philosophy of science. In the next section we will see that linguistic factors can also be regarded as crucial for shaping scientific theorizing.

SOCIAL AND LINGUISTIC CHANGE FACTORS

In *Contingency, irony, and solidarity*, Richard Rorty states that, with regards to knowledge, we need to distinguish between our claims that “the world is out there” and “truth is out there” (Rorty, 1990: 4-5). Truth, for Rorty is equated to our *descriptions* of the world (supplied via sentences or language) and cannot exist “out there” independently of the human mind. What is important is that even though the world itself is out there, the world does not make one particular “language game” better at corresponding to reality, i.e. the world does not help us “decide” between alternative theories (Rorty, 1990: 5). According to Rorty (1990: 6) this does not mean that our choices between alternative languages are arbitrary, or even the expression of something deep within us. Furthermore, it does not follow that objective criteria for choice of vocabulary are to become subjective, it rather means that the notion of “choice” is no longer the issue (Rorty, 1990: 6). For Rorty, changes are the result of habits of vocabulary and therefore he emphasizes linguistic change factors.

Of course, these habits of vocabulary are made, rather than found and our holding of certain habits is the result of “other human beings” allowing us to do so (Rorty, 1990: 6-7). This means that social factors, as well, play a crucial role in scientific change.⁴

From the way the survey has been progressing since Kuhn, one can see the increasing importance of the role of the human subject (either as an individual or a community) in influencing scientific change, through the emphasis on psychological, social and linguistic change factors. In the next section, we will see this progression towards the subject become even more pronounced, with Paul Feyerabend insisting on the role of certitudinal⁵ change factors.

CERTITUDINAL AND PSYCHOLOGICAL CHANGE FACTORS

For Feyerabend, scientific change is shaped by the decisions and needs of the free individual (1970: 210). The individual’s freedom of choice allows for worldviewish beliefs to influence the direction of scientific research, even if the beliefs are counter-inductive with respect to contemporary theorizing and experience (Feyerabend, 1975: 26). Beliefs stemming from the subject’s whims, passions, emotions, wishes etc. are all causes of the proliferation of ideas, which together with tenacity, form the two cornerstones of Feyerabend’s explanation of scientific progress (1970: 210). Scientists must be allowed to “retain ideas in the face of difficulties” and “introduce new ideas even if popular views appear to be fully justified and without blemish” if science is to prosper as a critical activity (Feyerabend, 1970: 210). Because new ideas stem from personal worldviews and beliefs, this means that Feyerabend emphasizes the certitudinal change factors.

Although Feyerabend regards certitudinal factors as important, the desires of the individual seem to be even more crucial. For Feyerabend (1970: 209) the most important question remains: to what extent has scientific progress increased the happiness and freedom of individual human beings? For Feyerabend, the certitudinal factors are also shaped by hedonistic inclinations, preferences and conveniences of individuals or groups. He demonstrates this by analyzing the change from the geocentric view to Copernicanism. According to Feyerabend (1970: 141) Galileo, writing in Italian, “appeals to people who are temperamentally opposed to the old ideas and standards of learning connected to them” and so becomes preferable to Aristotle. The new classes emerging in society want a “new world” and therefore instinctively side with Galileo. Although Feyerabend gives a normative element to guide scientific framework change (the desires of the free individual/group) it is not clear how this element should qualify science as opposed to non-science. At this point, it is time for an evaluation.

EVALUATIVE REFLECTIONS

Through the history of contemporary philosophy of science, there seems to be an endless search for the factors shaping science. A gradual movement from lower aspects (such as the physical) to the higher aspects (logical, social, economical, linguistic and certitudinal) can be detected. This movement seems to correspond to the increasing role attributed to the human subject in science.

In fact the first (or lower) aspects qualify the objects of study of the natural sciences, while in the later (higher) aspects only the subject of knowledge functions actively. It should be granted, however, that the distinction between the object and subject can never be mutually exclusive, since the lower and higher aspects exist in cohesion. The physical, biotic *et cetera*, are also aspects of the human subject and to an extent they can qualify the objects of study of the humanities. Although it will be difficult to determine a precise system, it seems as if the order in which the change factors were chosen through history, is not completely random. The broad variety of proposals examined above shows

that whatever modality is identified as crucial for revealing the factors shaping science seems “to make sense” for the purpose, as it is possible to observe everything in reality via any modal aspect. The impression is created that each aspect can be regarded as the key aspect qualifying the factors shaping science. In the end, however, the key aspect

4. More recently, social factors for scientific change are radically emphasized by authors representing the Edinburgh school of the sociology of knowledge, cf. Collins (1992); Barnes, Bloor and Henry (1995). Space constraints do not allow an exploration of this very interesting trend in philosophy of science. It can only be mentioned that, for Bloor and others, the scientific community becomes the norm and means for framework change.

5. I follow Olthuis (1985: 21-40) in using the term “certitudinal” to refer to the aspect originally designated by Dooyeweerd as the pistic (or faith-) aspect.

remains elusive. What more can we gather from the choice of change factors in history? The issue of absolutization and reduction emerges as well.

It is through studying practical examples of absolutizations in the philosophy of science that one becomes aware of the consequential under-appreciations of other aspects. One such example is the seminal work done by Kurt Lewin in the field of change management. Although this is a relatively old example, it demonstrates the point quite clearly. In *Field theory in social science* (1951) Lewin describes social change in terms of physical forces (1951: 199-212). Lewin uses a theoretical device known as the “phase space” to describe certain aspects of social dynamics. For Lewin, the phase space is a system of coordinates, each corresponding to different amounts of intensities of one “property” (1951: 201). This means that a social group’s tendency to change (or remain constant, i.e. resisting change) can be measured (mathematically) as the result of opposing physical forces, namely (1) those forces striving to maintain the *status quo* and (2) those forces pushing for change (Cummings and Worley, 2001: 22). Initially, the social group’s behavior is in a state of “quasi-stationary equilibrium” where both sets of forces are about equal (Cummings and Worley, 2001: 22). Change can then be brought about by increasing the forces pushing for change, or decreasing the forces maintaining the *status quo* (2001: 23).

Interestingly, the phase space represents, through graphs or equations, the quantitative relation between a few aspects of the field (Lewin, 1951: 201). This means that the mathematical and physical aspects of change in social groups are absolutized. My dissatisfaction with Lewin’s proposal lies with the concomitant under-appreciation of the other aspects of social change. Lewin states that the phase space “does not intend to represent the layout of a field composed of groups, individuals, and their ecological setting, but concentrates on one or a few factors” (Lewin, 1951: 201). This means that the theory of social change in groups will tend to neglect (or only peripherally deal with), for instance, the human psychological aspect of groups dynamics.

It may perhaps be noted that even Lewin admits the “representation by way of a phase space takes into account only certain aspects of the actual processes in the social field” (Lewin, 1951: 211) and that, in the end, one must “finally refer back to the actual social field” (1951: 202). Even after this realization, however, Lewin seems unable to escape the physicalistic metaphor describing the social aspect as a (physical) force field. Further examples of how the absolutization of certain aspects in science tends to reduce other aspects, can be found in the discussions of Ponti Venter on how scientific developments (and the nature of the university) are determined by economic and utilitarian interests (cf. Venter, 2006: 275-318).

A further problem with the proposals by authors such as Feyerabend, is that “the way that science is” becomes a sort of normative statement, so that it is also “the way that science is supposed to be”. This means that, in these authors, the difference between “which change factors are crucial” (*de facto*) and “which change factors should legitimately be crucial” (*de jure*) is not always clear. In the next section, I am investigating an alternative view towards a possible solution to these problems.

LEADING AND FOUNDATIONAL FUNCTIONS

Revisiting the theory

An answer to the question of which factors should legitimately shape science, may come from the theory of qualifying functions, developed in reformational philosophy. According to Kalsbeek (1975: 352) a “guiding function” qualifies a thing in the sense of characterizing it (plants are qualified by the biotic, the state by the judicial, etc.) The guiding (or leading) function is “the highest subject function of a structural whole (e.g. animal, business enterprise, or state)”. It “leads” or “guides” the substrate functions of the structural whole, e.g. the guiding function of a plant is the biotic and the “physical function of a plant is different from physical functioning elsewhere, since it is guided by the biotic” (Kalsbeek, 1975: 348).

The leading function can also be called the “function of destination” (Kalsbeek, 1975: 348). It is one of two qualifying functions of (e.g.) a social institution, the second (modally lower) is called the “founding function”, e.g. the state has its function of destination in the judicial, while its founding function is historical. However, things are qualified by only one modal function, which we can call the qualifying function.

Deeper insight into the nature of leading and foundational functions is given by Roy Clouser in *The myth of religious neutrality* (2005). According to Clouser (2005: 260) the qualifying aspect of a thing is “the aspect whose laws regulate the internal organization of the thing taken as a whole”. The qualifying aspect is also the highest aspect in which a thing functions “actively” and the fact that the thing only functions “passively” in the successive aspects is partly the reason why things are seen intuitively as having a typical nature (Clouser, 2005: 260-261). This striking correspondence between the intuitive grasp of a thing’s highest active function and its qualifying function leads Clouser to give the following definition of the qualifying function:

“that aspect whose laws govern the overriding internal structure and development of a thing considered as a whole, and which is the highest in the sequential order of aspects in which the thing functions actively. This deliberately includes both the pre-theoretical intuitive recognition of a thing’s nature as centered in the last aspect in which it functions actively, and the theoretical reasons for identifying which kind of laws have overriding governance of the internal structure of a thing taken as a whole” - (Clouser, 2005: 261)

What is important is that the concept of the qualifying function provides us with a way to account for the nature of things in a manner that is both “non-reductionist and subject to empirical confirmation” (Clouser, 1991: 261). Clouser’s discussion of artifacts deserves special attention.⁶

Artifacts differ from natural things because their leading function is an actualized passive function rather than an active function (Clouser, 2005: 266). Since human beings make artifacts in accordance to a preconceived plan, the modal qualification of human artifacts consists of three elements. According to Clouser (2005: 264) in addition to (1) the qualification of the kind of natural material used and (2) the process of transformation (of the natural materials) there is also (3) the qualification of the plan by which the process was guided. Of the three elements, the aspectual qualification of the plan can be seen as the artifact’s leading function, while the other two elements are regarded as foundational functions (in the sense that they provide the means for the accomplishment of the plan) (Clouser, 2005: 264). Since all of the aspects are interrelated to each other, none of the aspects can be neglected.⁷ How do we apply the theory of qualifying functions to scientific changes?

Reformational discussions

In order to determine which aspects should be qualifying for science, it is necessary to decide whether science should be regarded as a thing, an artifact or an activity. For Stafleu (1981; 1982) theories are “logically qualified artifacts”. Nevertheless, “science is not a set of statements or theories or an amount of knowledge, but an activity, something people do” (Stafleu, 1987: 102). According to Dooyeweerd (2003: 15) activities function in all aspects and are qualified by the aspect whose laws govern the internal organization or event taken as a whole. Thus, formulated more precisely, science refers to a collection of activities or events which aim at the production of artifacts (such as theories) where both activities/events and artifacts can be qualified (Clouser, 2012). On this point I agree with Clouser and Stafleu.

On the issue of which aspects in particular qualify the activities of science, the opinions do not coincide fully. Authors such as Botha (1984) seem to suggest that scientific activity is qualified by the (logical or) linguistic aspect, while other authors, for example Strauss (2011) regards it as logically qualified and Stafleu (1987) seem to emphasize the historical aspect.⁸

For Botha (1984: 63) the growth of scientific knowledge is dependent on lingual devices (such as metaphors) and occurs as a result of “constant modification and accommodation of theories as lingual or semantic networks”. For her, the critical question regarding the qualifying aspects for scientific activities, is whether a closer approximation of the structure of reality can take place without lingual means (such as conceptual frames of reference or semantic networks) and whether new discoveries in science (as a result of new ways of viewing the world) are possible without support by lingual means (Botha, 1984: 63). Theory-constitutive metaphors (as well as theories derived from them) aim

6. Due to our focus on science I leave aside Clouser’s interesting discussion of animal artifacts.

7. A brief but interesting “synopsis” of reformational positions (Dooyeweerd, Hart, Chaplin) concerning the qualifying functions of artifacts and social institutions is supplied by Geertsema (2004: 58 ff.).

8. One should note that their discussions are not always framed in the context of the qualifying functions for the activities of science, but are “collected” from various contexts.

at understanding the world through a logical act, which is nevertheless supported by lingual means (Botha, 1984: 64). The theory-constitutive metaphors are, in turn, rooted in a metaphor which provides the overall view of reality and which functions as a pre-theoretical perspective (Botha, 1984: 63-64). This means, that (for Botha) although the logical aspect is important for the activities of science, the most fundamentally qualifying aspect seems to be the linguistic. A different proposal is developed by Strauss, who seems to regard the logical aspect as the one qualifying the activities of science.

For Strauss (2011: 18) all language (including metaphorical language) is based on the ability of “lingual identification” and “lingual distinction” which presupposes the original logical-analytical meaning of identification and distinction. This means that the logical aspect precedes the sign mode (or lingual aspect) and that, viewed from the perspective of the interrelatedness of the aspects of reality, language use is built on the basis of logical skills (Strauss, 2011: 17-18). The activities of science are therefore logically qualified. A third suggestion for the qualifying aspect of science is provided by Stafleu.

Stafleu (1987: 159) admits that “language has an important hermeneutic function in science” but maintains that this does not mean that science (as a collection of activities) is linguistically qualified. For Stafleu (1987: 151; 159) science, instead, has a definite aim in the sense of “the progressive opening up of the lawful character of reality”. This means that (for Stafleu) the leading function of the activities of science is historical (cf. 1987: 98-107, 151-157). The aim of science “characterizes science” (1987: 102) and Stafleu can say that “science is history” (1987: 103). Stafleu also characterizes theoretical thought as “opened up by the historical aspect” (1982: 166). I would argue that the historical (i.e. cultural) aspect is the foundational function of science. However, although Stafleu emphasizes the historical aspect of science, he (2008: 154-169) recently rejected the existence of the historical aspect and it is possible that he may reformulate his views.

Although these proposals differ from each other the general approach of determining the qualifying aspects for science, whilst not diminishing the other aspects, provides some ground for the solution of the problems examined in this article. While the discussion is continuing, in my opinion the most accurate proposal is that the activities of science are historically founded and logically qualified (cf. Clouser, 2012).

At this point, allow me to suggest a hypothesis in the form of orientating questions with regards to the relationship between the logically (and historically) qualified factors of influence and the “secondary” factors. Could the anticipations and retrocipations of the qualifying function perhaps provide a clue about the relationships that should exist between the influencing factors, so that the secondary factors are recognized but placed in a kind of “subordination” to the qualifying one? If this is so, might this perhaps also lead to establishing a difference in importance between the anticipations and retrocipations? Another consideration may be whether the modal point(s) of entry of each science should also indicate legitimate and particularly relevant shaping influences for that science. I will conclude the article here.

CONCLUSION

Through the history of philosophy of science, many authors have emphasized certain factors as crucial for scientific change, while simultaneously reducing others. This has induced a lack of normativity. Authors seem to *describe* the change factors which they regard as relevant, often with no *prescription* concerning the legitimacy of such factors. The implication of the lack of normativity is that scientific change can become reduced to aspects by which it is not qualified, for example economic factors (Habermas) and power struggles (Foucault). I have proposed an alternative approach where the anticipations and retrocipations of the qualifying function suggest a relationship, so that the qualifying function remains crucial, while influences from the other factors are recognized in a “secondary” capacity. This places me in (partial) agreement with some of the authors examined above and provides a starting point for argumentation about the legitimacy of the factors influencing change in scientific theorizing. I would like to call attention to the fact that there remains fertile ground for future research on this topic.

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Conditions for Transformative Change: The Role of Responsibility, Care, and Place Making in Climate Change Research

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INTRODUCTION

The current framing of the climate problem has been described as “quintessentially ‘modern’” (Head and Gibson, 2012: 3) as it separates people practically, cognitively, and emotionally from their environment and from climate change, both in how the problem is articulated and in the solutions that are proposed. As a counter framing, the concept of transformation is increasingly used to advocate for individual and systemic change, not just responses to climate change (IPCC, 2012; Kates et al., 2012; O’Brien, 2012). The transformation language emphasizes systemic thinking, yet it tends to avoid a relational sense of connectedness between the human and non-human world, and the willingness to embrace the future with responsibility and care, despite its intrinsic complexity and unknowability.

In this paper, we use the term transformation in two ways. First, to convey the need for *change* beyond responding to a changing climate, and second, to rethink the premises, values, and assumptions as well as the structural conditions that create and perpetuate vulnerabilities in a rapidly changing world, focusing on interdependencies and interconnectedness as precondition for transformative change. We first offer a relational framing of climate change and conceive possible pathways that foreground collective well-being through deliberate and deliberative transformation. We propose a radical notion of transformative change, and the tasks for responsibility and care to materialize such change. In the main part of the paper, we reflect on interconnectedness and transformative change processes as cornerstones for new transdisciplinary climate change research. We highlight two main perspectives: 1) a relational ontology of responsibility and care; and 2) an epistemology of place based on a relational politics of place beyond place. We close by advocating more inclusive, care-full, responsible, and actionable relational climate change scholarship.

TOWARD A RADICAL NOTION OF TRANSFORMATIVE CHANGE

The term transformation is appearing in academia to political agendas, referring to the need for substantive change toward true social and ecological sustainability (e.g., Pelling, 2011; IPCC, 2012; Kates et al., 2012; O’Brien, 2012; ICSU, 2013). In a generic sense, as also used in the recent IPCC report (2012: 5), transformation refers to “the altering of fundamental attributes of a system (including value systems; regulatory, legislative, or bureaucratic regimes; financial institutions; and technological or biological systems).” Transformation can be a deliberate and desirable process or an unintended, unexpected, and undesirable outcome of a particular event or process. Moreover, intentional change can have unintended consequences. Some recent literature sees transformation as the necessary response when incremental adjustments to climate change is no longer sufficient; such “transformational adaptation” may range from regional flood management to resettlements (Kates et al., 2012).

Acknowledging this usage, we nevertheless find it inadequate to deal with the enormity of the social challenge ahead. We hence adopt the notion of deliberate, intentional transformation, drawing upon Karen O’Brien’s (2012: 670) definition as the “intention of achieving a particular goal, recognizing that some fundamental shifts are necessary to enable desirable futures to emerge”, a normative process that interrogates “the values, the challenging of assumptions, and the capacity to closely examine fixed beliefs, identities and stereotypes.” Similarly, the International Social Science Council’s (ISSC) Transformative Social Science Cornerstones for Global Change situate transformation as part of a collective effort of many communities of actions, including research, stressing a normative agenda that fosters global

and intergenerational justice, based on “a critical questioning of the systems and paradigms that have created climate change and on which climate change rests” (Hackmann and St. Clair, 2012: 18).

At the core of this recent discursive opening toward values, attitudes, and lifestyles are epistemological and ontological conceptions of the world, the self, space and time, others and nature, linked to notions of progress and the modern “good life.” Nonetheless, we argue that this conceptualization of intentional transformation still lacks fundamental components. Though the relationship between attitudes, values, and individual and collective transformative action is considered critical for deliberate transformation (O’Brien, 2012), little is said about the conditions under which this relationship can flourish and when it is constrained. Equally little is said about the specific values that are to guide proposed transformations, and particular articulations of responsibilities along alternative pathways.

Hence, we propose a notion of transformation that we choose to qualify with the adjective “radical.” Radical transformation goes beyond the recognition of altered values and behavior; the *radicalness* implies a fundamentally different conceptualization of the world, shaped by *inter-relationality and intrinsic interdependencies* between people, places, and the non-human realm. Our proposed conception focuses explicitly on connectedness and interrelationality, allowing us to delineate how such deliberate and deliberative transformative change may be achieved and what possible pathways may lead to collective well-being. Furthermore, it views responsibility (including obligations) as underpinned by care (affective and moral engagement with others, and recognition of reciprocal vulnerabilities), and by solidarity (acting upon affective and moral engagement). While we acknowledge the primacy of the needs of those most vulnerable as an important moral position, we highlight the role of interconnectedness and mutual vulnerabilities that climate change triggers in everyone as an essential motivation for transformative change. Our normative notion of deliberate and deliberative transformative change hinges on being responsible, accountable, and forward-looking.

Radical transformative change calls to question persistent and taken-for-granted assumptions and to reframe them as an “epistemological/ethical project of creation” (620) to “generate actual possibilities where none formerly existed” (Gibson-Graham, 2008: 624). We argue that this task requires explicit attention to the discursive, epistemic, and ontological spaces that characterize interrelationality, connectedness, detachment, and interdependencies in a rapidly changing world. By making these connections visible in and through responsibility, solidarity, and care, we are better able to recognize *how* to navigate toward radical transformation.

The aim of this paper is twofold: first to frame climate change as a quintessential social and relational problem by linking it to responsibility, care, and ethical place making; and second to provide inspiration for novel transdisciplinary climate change research to assess and inform vital transformative processes and identify discursive and practical barriers. Two key questions guide our reflections for such research focused on transformative change: When and how do individuals, communities, and entire groups establish and sustain relationships of responsibility, solidarity, and care for and with human and non-human others, within their own collective, and beyond proximate geographical and temporal boundaries? How can diverse forms of interconnectedness be explored more systematically and enhanced across different scales? Building on writings in philosophy and human geography, we propose two entry points to these questions, one ontological, the other epistemological: 1) a relational ontology of responsibility and care; and 2) an epistemology of place based on a relational politics of place beyond place.

A RELATIONAL ONTOLOGY OF RESPONSIBILITY AND CARE

Our first entry point to radical deliberate transformation is a relational ontology of responsibility and care. We call it an ontology because it concerns re-thinking of being and being in the world that connects ethically and politically with practice. This section illustrates how such a relational ontology of responsibility and care can address interconnectedness and interdependencies, including the proximate and distant as key scalar dimensions of relationality. We first present a moral argument for responsibility and care and then introduce interconnectedness as embedded in embodied enactments of care. Thirdly, we discuss the notion of corporeal vulnerability, in contrast to intrinsic vulnerability, and how it allows for an understanding of connectedness as an openness of peoples and places to both benefits and harm.

Shared moral understandings

In a first step, we approach responsibilities for radical transformative change as a set of factors that create and sustain particular shared moral understandings and delineate the space for responsible action. We draw upon two influential bodies of work to ground this particular conception of responsibility that we consider most valuable for transformative

climate change research. The first contribution is Margaret Walker's (1998: 16) claim that one can locate morality "in practices of responsibility that implement commonly shared understandings about who gets what to whom and who is supposed to do what for whom." In Walker's view, in setting the boundaries of responsibility, we create the boundaries of ourselves and the selves of others, we show for whom we care and disclose to whom we are accountable. Morality is then practice, and it is eminently social, linked to caring, and to expressions of solidarity. This view of responsibility acknowledges that moral judgments cannot be dislocated from social roles; they are part of the moral understanding in Walker's conception of responsibility.

The boundaries of responsibility, according to Walker, are kept flexible yet coherent through a constant narrating of the roles they create. They entail both the opening and the closing of ties and relationships through on-going processes of negotiating, doings, and undos in social relations. By disregarding or cutting ties, connections are dropped from the shared space of moral understandings that sustains responsibility. This is a very different notion of responsibility than the traditional liability model where blame is allocated to past actions according to ethical guidelines. A relational conception of responsibility as the space where morality emerges, on the other hand, enables us to rethink the making and unmaking of connections in the wrongs (producing the harmful conditions that create climate change), as well as in the gains, as a relational practice, a shared space of moral understandings. It allows for ascriptions of responsibility and obligations toward all those who may be harmed by or benefit from climate impacts, including the perpetrators themselves.

The second contribution to locating responsibilities stems from Iris Marion Young's latest work, also linking responsibility as liability with a version of responsibility as connectedness and forward-looking. Responsibility both guides in moving toward the future and becomes political, individually and collectively. Young's (2004, 2006) social connection model of responsibility and justice stretches the boundaries of connection to include not only personal relations but also structural conditions. She argues that we are politically obliged to assure the morality of relations that link people and institutions across space, for instance through transnational production in sweatshops. This specific transboundary nature of Young's vision of responsibility as political and forward-looking complements Walker's and enables questions regarding the construction of shared moral understandings attached to institutions and structural factors. This is of crucial relevance for a theory of the responsibilities under climate change, creating the *ethical space* needed for locating responsibility and materializing ethical relations.

In a second step, we highlight care as underpinning responsibility. Insights from care ethics help us recognize that our well-being and individual suffering are intrinsically related to other beings and hence shape us as who we are. A focus on care as intersubjective also draws attention to the affective, emotional attachment to others, as well as the recognition of our own vulnerability, both of which have significant consequences for identity. Early on, Carol Gilligan (1982) portrayed concern for relationships and caring toward others as an extension of the relational self. Moira Gatens and Genevieve Lloyd (1999) unpack this idea further, proposing a relational construction of subjectivity that considers basic sociability as inseparable of human individuality as the core of responsibility. Stressing "an inherent orientation of joy towards engagement with what lies beyond the self, and hence toward sociability" (53), Gatens and Lloyd see identity construction as an ongoing process, drawing upon the past, present, and future, constantly enabling new sites of responsibility.

Embodied enactment of care and interconnectedness

Care is no longer understood as exclusively caring *for* and caring *about others*. Increasingly, scholars conceive care as *embodied enactments of care*, largely independent of the spatial or temporal distance between the one who cares and the other who is cared for. This notion of care abandons rigid delineations between affective engagement and obligations. Hence, understanding and facilitating embodied enactments of care constitutes a crucial ingredient for radical transformation, outside of traditional care domains (e.g., caring for children, the sick, the elderly), as it explores the multiple ways that people care for each other, and non-human others. Jeff Popke (2006: 507), for instance, sees care as a universal activity emerging from a sense of responsibility toward others that is "located not in the abstract universals of justice, but rather in the recognition of our intersubjective being." Similarly, Vicky Lawson (2007) portrays caring for and about socially and spatially distant others as a central form of citizenship.

Recent debates in critical human geography address how individual caring can be enacted in spatially distant social relationships. The goal is to explore ethical and responsible being and doing throughout our interconnected world. Such a relational lens to care allows us to conceive of care of bodies and embodied care experiences to distant others

beyond our proximate spatial and temporal horizon, guiding broader transformative change processes. It also challenges the hegemonic notion of concentric circles of care, emanating from those close to one self and eventually reaching those at the periphery of our care horizon. Christina Milligan and Janine Wiles (2010) argue that this collapsing of the time-space continuum not only disrupts the notions of proximate and distant, advocating for social and emotional closeness even at a physical distance, but also starts drawing attention to interdependencies, reciprocity, and multi-directionality. When internalized, caring as an “embodied phenomenon” can “shape an individual’s personal politics and belief systems (742). It is precisely this type of embodied care that may trigger shifts in values and worldviews so critical to radical societal transformation.

A related strand of research expands this relational conception of interconnectedness toward non-human others. Increasingly, scholarship challenges the modernist social/nature divide prominent in debates on global environmental change, for instance through the notions of “naturecultures” (Haraway, 1988) or “socio-nature” (Swyngedouw, 1999). Inspiring research examples and transformative learning in and through naturecultures/socio-nature come from permaculture and community and guerrilla gardening. For instance, Puig de la Bellasca (2010) explores an ethos of transformation and ethical obligation through collective everyday doings that embody *being in* relations of mutual care, embracing most ordinary interdependencies such as with earthworms. Crane et al. (2013) show how guerrilla gardening – the reclaiming and transforming of dire urban space into relational places of hope and encounters – can open up temporary, unexpected, dialogical, future-oriented, and reflective spaces for practicing sustainability through connectedness, by subverting status-quo meanings and uses of space. Community gardens can be sites for nurturing civil society, for reciprocity and cooperation, and for emotional, sensory, and transformative learning embedded in processes of social change (Walter, 2012).

Corporeal vulnerability

This strengthened emphasis on connectedness in scholarship on care and responsibility is relevant for transformation in climate change debates as it compels us to reconsider the often uncritical targeting and labelling of “the most vulnerable” to the negative impacts of climate change (e.g., the poor, women, children, often in low-income countries), now marked out as the new category of dependents for whom care is called for. Although attention to suffering is morally right, such a narrow and disempowering application of care ethics to climate change would simply perpetuate the typical care flows from the global North to the South and curb any attempt for wide-reaching transformative change. Instead, the notion of *vulnerability* itself and its dominant mobilization as a discourse are put to a test. Janine Wiles (2011), for instance, in the context of care work for the elderly, rejects the conceptualization of vulnerability as fragility, passivity, and weakness. She argues that recognizing and accepting vulnerability as openness, susceptibility, and receptiveness, in all of us, may create a “potentially transformative process incorporating collective and individual journeys of change as well as more corporeal and material changes to people, places, and relationships” (583). Paul Harrison (2008), addressing the linkages between vulnerability and embodiment, views vulnerability as an “inherent and noneliminable aspect of corporeal existence” (423). He asserts that (427):

“[v]ulnerability is not simply the antithesis of strength, imperviousness, or resistance, and to think that this is the case is to continue to mistake the inherent nature of vulnerability for an extrinsic attribute or condition. Vulnerability cannot be willed, chosen, cultivated, or honed and neither, therefore, does it necessarily or even primarily denote a weakness or a misfortune; rather, it describes the inherent and continuous susceptibility of corporeal life to the unchosen and the unforeseen—its inherent openness to what exceeds its abilities to contain and absorb.”

Notions of such corporeal vulnerability as intrinsic humanness are not new, but they are novel ingredients to the debate on care and responsibility under climate change. Judith Butler (2004) saw the precariousness of life and literal, bodily vulnerability as a perpetual openness of the self to alterity and essential affective dimensions of global interdependency. Such a bodily and relational ontology depicts vulnerability as open and reciprocal, an ability to affect and be affected, constituting the precondition for interrelationality (Butler 2005). We ought to acknowledge and embrace this openness rather than chasing an “ideal of invulnerability” (Gilson, 2011) as “[b]eing vulnerable makes it possible for us to suffer, to fall prey to violence and be harmed, but also to fall in love, to learn, to take pleasure and find comfort in the presence of others, and to experience the simultaneity of these feelings” (310).

In the context of climate change, Stacy Alaimo (2009) portrays embodied connections and experiences as a relationship to others, including those that inhibit the over-consuming world and the inequalities it perpetuates. Invoking images

of disrobed humans on vulnerable ice, Alaimo sees this “trans-corporeality” as “a precarious, corporeal openness to the material world” and “a place of possible connections, inter-connections, and ethical becomings” (2009: 23). Understanding vulnerability as the condition of being in relation to others, rather than a positive or negative state, allows us to grasp the openness of peoples and places to both benefits and harms. This understanding mirrors the conceptualization of “shared fragility” as a prerequisite for human security, as advocated by Gasper and Truong (2010: 25), coupled with “joined-up feeling” and “joined-up thinking” to nourish relationships of care and flourishing.

AN EPISTEMOLOGY OF PLACE

The second entry point that we propose for research on radical transformation is an epistemology of place that considers place as open and connected. Paying attention to dynamics of politics and power embedded in connectedness and interdependencies allows us to understand responsibility and care across time and space. Inspired by postcolonial theory, we first address the shared presence and shared relationship between the global North and global South. We then discuss ethical place making and the negotiating of change trajectories in a conceptualization of interconnectedness that is constantly in the making.

The mutual constitution of place

Let us first explore care and responsibility from a postcolonial perspective. Raghuram et al. (2009), for instance, argue that “responsibility for change is not the preserve of the relatively powerful acting on behalf of the relatively powerless, but is a dialogic, intersubjective process” (8). This relationality becomes more tangible when one apprehends how different geographic places are mutually constituted. We are reminded of a “shared presence and shared relationship of the North with other places” full of connections and flows but also disjunctures, abruptness, and separation (Raghuram et al., 2009: 9). This shared presence emanates from a history of exploitation and inequalities. Knowing and acknowledging this history can rectify the ‘absences’ that dominate Western discourses about the South. In climate change debates, such ‘absences’ are mobilized in discussions about ‘adaptation deficits’ in developing countries that need to be overcome. Rather than treating such deficits as temporal anachronisms, Raghuram et al. (2009) propose to take account of, and be accountable to both connections and gaps, accepting that some may not be entirely traceable while others may come as surprises (see extreme events below). Focusing on a shared presence swiftly dissolves the distinction between close and distant others for whom one may care or is responsible—we are all already imbricated in each other’s presence.

Such co-constitution, however, does not mean that all power inequalities are automatically resolved and any embodied enactment of care at a distance is ethical. Cheryl McEwan and Michael Goodman (2010) expose hidden assumptions in presumably ethical and fair trade, stating that “desire for ethical action in the North is not always triggered by a sense of communality, affinity or solidarity but by images of downtrodden ... Southern workers that reinforce a sense of cultural difference” (108). They expose in affluent Northern consumers both wishful thinking regarding healthy working conditions in the global South and the mobilization of poverty-stricken images of Southern workers fuelling the consumers’ post-colonial ethical obligations. Ethical consumption, based on a set of values and ethical priorities, indicates at least an elementary embodiment of connectedness that may set the foundation for the capacity for change, even if true solidarity and reciprocity are debatable, and individual moral agency and action trump collective, political responsibility for change.

Ethical place making: Negotiating transformative trajectories

To comprehend further how global responsibility may emerge and flourish in the face of climate change, we draw upon another angle of relational understandings of space and place: ethical place making. We build on Doreen Massey’s (2004, 2005) politics of place beyond place in which she charts a politics of connectivity that instills a sense of responsibility for places beyond their geographic locales.

Massey (2005: 9) offers three propositions that illustrate how place-making practices shape and implicate individual and collective relations. The first reinforces what we discussed above, recognizing space as the product of interrelations, intrinsically constituted through interactions, from the intimately tiny to the global, denoting a relational understanding of the world in which we carry responsibility for the relations made and those to be made. More important for moving toward *deliberative*, in addition to deliberate, transformative change are the following two propositions. An understanding of space as harboring the possibility of the co-existence of multiple yet distinct trajectories, rather

than one single encoded story of what may be possible. This proposition not only advocates for a lively sphere of co-existing heterogeneity that opens the future to endless possibilities; it also suggests that responsible agents ought to shape this future, in an ethical and forward looking way that makes space for multiple voices, knowledges, and possible pathways, including future generations. Such a dynamic notion of place making allows for diverse practices and processes, a multiplicity of histories, and ever shifting constellations of social and natural trajectories. Massey's third proposition emphasizes an appreciation of space as always under construction, always in the process of being made, never closed, never finished, as the relations embedded in material practices are just about to be carried out (or not), rendering space a simultaneity of stories-so-far, with loose ends and missing links. This last notion reflects the earlier discussed postcolonial understanding of flows, discontinuities, and surprises. It adds a word of caution to remind us that relationality is not always linear, predictable, or manageable, and that there may well be a counter narrative to modernity's single climate change story.

Research on urban imaginaries such as Transition Towns (TT) illustrates real opportunities and challenges in ethical place making that are of direct relevance for radical transformative change. TTs with origin in the UK are community-based efforts to make places resilient to the threats of climate change and peak oil while thinking relationally about one's locally-based yet global responsibility. While recognizing TTs as a relational fabric of place, Mason and Whitehead (2012) reveal practical challenges in merging social justice at a distance and directly obligated care, and tension between ethical commitments of inclusion and the need for critical voices to provoke change. Proponents such as North (2010) describe TTs as new articulations of livelihoods, less resource-intensive yet intrinsically normative and political, offering a "radical emancipatory programme" (589) of what is necessary and desirable on the path toward a good society and more even development.

IMPLICATIONS FOR RESPONSIBLE AND CARE-FULL RESEARCH ON TRANSFORMATION IN A CHANGING CLIMATE

We proposed a relational ontology of responsibility, solidarity, and care combined with an epistemology of place for an inclusive, care-full, responsible, and actionable relational research agenda on radical transformation under climate change. The relational ontology is centered on an understanding of morality as a set of social practices and moral conceptions that create a shared moral space, including both personal and structural relations. It is a space of connectedness, interdependencies, and shared corporeal rather than individual and intrinsic vulnerability from which to assess shifts in values and worldviews. Adopting such a relational perspective of shared vulnerabilities and interdependencies between human and non-human actors is a noteworthy expansion to investigating what may drive "the propensity or predisposition to be adversely affected," the most recent IPCC definition of vulnerability (IPCC, 2012: 564) or to examine transformation as a change in complex, coupled systems. Consequently, a relational lens may provide a more compelling practical base for acting responsibly under climatic and other uncertainties, across spatial and temporal distances.

The second entry point – our epistemology of place – allows us to assess how connectedness and interdependencies are made and unmade through our day-to-day practices in particular places and beyond. We highlight five concrete areas of engagement that expand scholarship on transformation between and across people and places. They open vital analytical space to understanding the mutual constitution of places and ethical place making as they shape responsible action and the multiple ways people negotiate ethically sound trajectories, in spite or because of the openness of places and lived experiences, and their susceptibility to change and surprises.

First, we acknowledge place as generated through the interaction of people all of whom carry responsible and ethical agency that is place making, in their own places and across places. Instead of promoting climate change solutions inside a well delineated yet disconnected place (e.g., climate change adaptation programs in distinctly privileged communities), a focus on place making locates an inherent responsibility for people to do the right thing in their day-to-day practices that make places what they are, in relation to other places (Raghuram et al., 2009). This refers to the places we call home as well as to places we visit, such as markets, and those we engage with virtually, for instance through music and art, and places we dream about. Massey (2004: 16) states that "[we] are responsible to areas beyond the bounds of place not because of what we have done, but because of what we are." In the context of climate change, a critical relational research agenda may want to investigate place-making agency as the responsibility we carry due to our lifestyles as affluent, cosmopolitan consumers and polluters, rather than historic responsibilities of states as debated in international climate change negotiations.

Second, a focus on relational politics of place and connectedness brings to the fore the unavoidable challenge, and obligation, to negotiate multiple possible trajectories toward the future. Openings and closures along these trajectories need to constantly be negotiated, contested, and made. Examining this deliberative angle to transformative change requires explicit attention to ethical and responsible trajectories to be chosen, taken, shaped, and reshaped, especially once we recognize our own complicity in alerting places due to our day-to-day interactions and social relations. Radical transformative change is not a one-time decision, not one single act. It is responsibility in the making, every day anew, a process that requires consideration for how we are in a place and how we negotiate possible pathways.

Third, openness and incompleteness in place making holds the potential for unforeseen encounters that may trigger care, responsibility, and solidarity, perhaps in the most unlikely places, further blurring the lines between who is responsible for whom. Such emphasis on responsibility in the making calls for explicit attention to the agency of particular events that reveal the inevitable openness and vulnerability of places and their actors (Head and Gibson, 2012). Lessons from extreme events such as Hurricane Katrina point toward spontaneous responsibility and acts of solidarity that defy any critical research on structural inequalities and unevenness of power hierarchies. Care then is no longer a matter of moral or political identity but becomes solidarity and as such changes who we are. For instance, Nigel Clark (2007: 1128) describes the generosity during the Indian Ocean tsunami, when expectations of hosts and guests dissolved and new forms of 'being-with-others' emerged in the 'throwntogetherness' of the unfolding event. Clark states that "in the very impossibility of containing or rendering transparent the encounter with otherness lies the essential openness of the future – the very possibility of being-together with others and being-together otherwise" (1134). This appreciation for openness and unforeseen encounters, we argue, is a major gap in current research on transformative change. Let us investigate human lessons on unexpected encounters, preferably without a disaster's unleashing.

Fourth, such responsibility is not limited to the individual level but unravels structural relations, evoking a shared agency and global citizenship in a political sense. Political responsibility is always collective responsibility that recognizes the connections between the local and the global (Young, 2004, 2006; Raghuram et al., 2009; McEwan and Goodman, 2010). Creative research on the collective is important but so far scarce; it would move conventional vulnerability assessments beyond the typical dichotomy between those who ought to feel, think, and act responsibly and those presumed to be recipients of this responsible, enacted care. We need better scholarship on how we are imbricated, obligated to each other. Research on deliberate and deliberative transformative change, we suggest, ought to adopt a forward-looking conceptualization of political responsibility, based on a more care-full interpretation of the UNFCCC's reduction of greenhouse gases as "common but differentiated responsibility." Such an interpretation recognizes that not just nation states carry an obligation to bring about positive change, but also individuals and institutions, independent of their carbon footprint. While a core emphasis remains on examining lifestyle choices among the affluent to place making around the globe, transformative change research calls for explicit attention to multi-directional embracing and enacting of caring at a distance that identifies obligations as a prerequisite for to solidarious action, anywhere.

Fifth, we advocate for research on the openness of the future and relationships as always in the making. Such forward-looking research explores visions of alternative futures, including future generations, and ethical obligations to strive toward this future, with all its inconsistencies and surprises, in a responsible way. Even if a post-colonial lens reminds us of painful histories of injustices and exploitation, Raghuram et al. (2009) paint an agenda that builds on emotions such as anger and loss as well as hope, anticipation, and visions of a better place, making "responsibility not a burden but forward-looking", as "these productive emotions can form the basis for generating long-term embodied and pragmatic responsiveness" (11). We see this embracing of an uncertain yet difficult future, born out of an affective appreciation of interconnectedness and interdependencies, as a fundamental driver of transformative change. Yet, little research exists to date that assesses success stories and potential barriers and limits to what forms of interconnectedness are feasible, and ethical. Figure 1 depicts a conceptual framework for exploring transformative change processes (dotted spiral suggesting uneven, incomplete, and multifaceted trajectories), through success stories and barriers, and the ways they exemplify embodied experiences of responsibility, solidarity, and care situated along an axis of connectedness and corporeal vulnerability.



Figure 1. Conceptual framework for exploring transformative change processes in a changing climate.

CONCLUSION

Inclusive, responsible, and relational climate change research enables an explicit focus on how people take responsibility for their relationships with current and future others, and what imaginative alternatives may be shaping their relational doing. It allows for scrutinizing how responsibly social actors negotiate the multiple trajectories they encounter as well as particular decisions they make when altering relational spaces through their day-to-day social relations. Empirical scholarship on interconnectedness, such as in ethical consumption, Transition Towns, and permaculture, provides inspiration and conceptual guidance for research on radical transformative change under climate change. Conceptual appreciation for relationality and ethical place making suggest several entry points for overdue scholarship on caring across distances, forward-looking political responsibility, and a care-full negotiating of responsible trajectories. They provide a glimpse into the multifaceted angles of transformation that a novel and critical climate change research agenda may care to investigate.

The overarching objective of our proposed transformative climate change research agenda is to expand the conditions for more inclusive concepts of who “we” are and how we relate to one another and to nature. Such a relational framing of climate change, embedded in notions of human and non-human connectedness and flourishing, opens an invigorating and long overdue door to unearth the possible in us, for our and future generations. At the core is an explicit attempt to broaden socio-spatial interconnections epistemologically and ontologically, to design creative and forward-looking methodologies, and to locate responsibility at the center of transformative change processes and reveal and subsequently strengthen a culture of shared responsibility that goes beyond self-interest and emotional shortsightedness. The intentional and deliberative transformation toward equitable, low carbon societies, guided by the respect of basic human rights, a forward-looking conception of responsibility, and solidarious and caring relations between people, places, and the non-human world will only be possible through an iterative pragmatist process of learning to and from theory and experience.

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Abstracts

O-001

Critical Reflections On Social-ecological Transformations And A Proposed Framework For Assessment

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Some scholars use transformations to refer to long-term shifts in the fundamental characteristics of social-ecological systems. Others are adopting transformations and transitions discourses to incite more action-oriented approaches to challenges such as climate change. This research on transformations of social-ecological systems has added an important dimension to resilience thinking and adaptation debates, yet there is very little consistency in the ways that the concept is applied. What do we actually mean by transformation? How can we know if a transformation has occurred? Further, who may be in a position to guide or navigate transformation processes, and whose interests are served in doing so? In this paper we develop and test a conceptual framework for understanding transformations in social-ecological systems. Key components of the framework include consideration of: 1) fundamental changes and system identity; 2), path dependencies that perpetuate current systems; 3) drivers of change at multiple levels; 4) thresholds; and 5) scale. The framework also includes cross-cutting issues that bring attention to normative aspects of transformations: a)

agency and controllability; and b) power. The framework is applied to a case study from the Cau Hai lagoon in central Vietnam to empirically characterize social-ecological transformations. The lagoon has undergone rapid changes over the last two decades and there have been concerns that the system has come close to critical thresholds. At the same time, the emergence of governance networks centered around Fishers' Associations (and supported by government agencies) are enabling more participatory and collaborative management of the lagoon and its resources. The transformations lens we outline here may help to reframe ways of thinking about social-ecological processes in the lagoon, and to identify key requirements to navigate change.

O-002

Transformations From A Social-Ecological Network Perspective

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The study of transformations requires an integrative understanding of social and ecological components. Models of social-ecological systems can help us understand the co-evolution of natural and societal processes. Every transformation of a social-ecological system will necessarily imply a re-configuration of the underlying social-ecological network. Social-ecological network models can be used to understand dynamics of network topology and

processes playing out in the network. These models can be used to infer what types of processes give origin to the observed network structure. In this explorative paper we present ways in which particular features of transformations can be studied through the study of evolution in networks. First we present an overview of the multiple methodologies that can be used to study transformative processes - e.g. laboratory experiments, network models and simulations. In the second part we illustrate the use of some of these tools. Transformation literature has highlighted the importance of particular aspects of social network structure. Climate change is however likely to significantly shape ecological functions and structure. Here we use statistical network models to provide insights on how patterns of social-ecological configurations affect the likelihood of transformations. Social-ecological network structure constrains or facilitates change and how the system will behave in a transformation process. We use network structure to lever out hypotheses about what defines transformative capacity and what types of change that have to be nurtured in order to move the system towards a transformation trajectory.

O-003

Transformation In The Context Of Social-Ecological Crises Phenomena - Case Study Post-Disaster Recovery And Reconstruction Indian Ocean Tsunami

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The Indian Ocean Tsunami in 2004 - nearly 10 years ago - caused 230,000 fatalities and widespread destruction of large areas. It there-with also showed rigorously the vulnerability of coastal communities and social-ecological systems to coastal hazards, particularly tsunamis. Although it was widely agreed that Sri Lanka and Indonesia faced a mega disaster, the problem definition and respective solutions for resilience building and transformation were contested (Fernando 2010; Birkmann 2011). Formal institutions and governmental organizations, for example, emphasized the need for fundamental changes in legislative instruments, such as the coastal buffer zone and relocation policies, as well as changes in technologies (e.g. early warning systems). In contrast, individual households exposed to coastal hazards showed fundamental changes in risk perceptions due to the magnitude of the disaster (Birkmann et al. 2008a). In addition, the capacity of and trust in governmental institutions to manage such risks was also questioned. Against this background, the paper examines the role of crises, disasters and reconstruction processes as triggers for transformation. It differentiates various types of transformation observed at the national and local level in Indonesia and Sri Lanka following the Indian Ocean Tsunami up to the present day. Finally, it also discusses selected factors that facilitate or hamper transformation towards coastal resilience in the context of crises and post-disasters processes.

O-004

Adaptation To Transformation Of Coastal Ecosystem In Changing Climate: Theory To Practical Experience

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Coastal ecosystem is facing dynamic biophysical and social changes across the globe. Increasing stress from large scale resource exploitation and climate change solicit for desirable transformation of the complex social-ecological system. Transformation of coastal ecosystems can occur by deliberative or induced way depending on scales of responses and preparation of the communities and institutions to shift into new regime. There is yet under-addressed questions for the social-ecological system: who transforms, how transformation occurs, and what are appropriate level for interventions to trigger transformation. The paper discusses transformation perspectives by focusing on an innovative adaptation practice in coastal areas of Bangladesh. Study shows that transformation process is largely influenced by resource management legacy of the institutions and their capacity to engage diverse stakeholders for finding consensus solutions. Community's transformation is related to their access to resource use, new climatic information, participation and adjustment to improved and secured land use practices. Collaborative relationship between community and institutions, within community or institutions itself play vital role to deploy the small scale innovation practice at local level following gradual effects for large scale policy response. However, observed contention of winner and losers around land ownership increase uncertainty in the early stage of transformation and persistence

of potential outcomes from the innovation. Enabling political and regulatory institutions with collaborative arrangement is important as well as enforcement must be engaged in facilitating transformation for broader social and ecological interests to shift into desirable trajectory.

O-005

Adaptation, Mitigation And Transformation - Four Propositions On Their Relation And Consequences For A Transformative Mitigation-adaptation-science

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How do adaptation, mitigation and transformation relate to each other? In this paper, we discuss four propositions addressing this question and illustrate them with empirical examples from a five-year study on climate change adaptation in the coastal region of Northwestern Germany. Proposition 1: Transformation refers to fundamental cultural, political, economic, infrastructural and technological changes - fundamental changes that are necessary for most mitigation measures. In contrast, adaptation is often mainly driven by the motivation to secure the current state into the future and is therefore mostly not transformative in this fundamental sense. Proposition 2: However, there are large differences between adaptation measures on the transformation dimension. Some are more transformative than others. For example, relocation of settlements to adapt to increasing flood risks is more transformative than flood-proofing of buildings. Proposition 3: Considering the climate change challenges, both

- mitigation and adaptation - are necessary, but the smaller transformation costs of adaptation today compared with mitigation can lead decision makers to take solely adaptation measures because they try to avoid fundamental changes (= transformations). We call this the mitigation-adaptation trap. Nevertheless, often not even the “transformation cheap” adaptation measures are realized. Proposition 4: If proposition 3 is true, it would be necessary for transformative climate change science, which strives to contribute to necessary transformations for the realization of mitigation, to integrate mitigation and adaptation research much stronger than today and focus on combined mitigation and adaptation solutions, that are as “transformation cheap” as possible. The paper ends with a discussion of the consequences for a transformative mitigation-adaptation-science, if the four propositions are true.

O-006

Linkages Between Sustainable Adaptation And Transformation: Exploring Humanitarian Approaches For Disaster Risk Reduction And Climate Adaptation

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Climate change adaptation has become a pressing issue. Yet little attention has been paid to the consequences of adaptation policies and practices for sustainability. Adaptation has gone from being understood mainly as technical adjustments, to increasing focus on reducing vulnerability. Transformation adds another dimension, where adaptation is not only about reducing vulnerability but proactively choosing what future we want. This leads to a debate about different values and interests that determine what is ‘desirable’. By sustainability we here mean actions to reduce emissions as well as addressing the social, political and cultural causes of vulnerability, including efforts to improve justice and equity. We argue that values that promote sustainable adaptation should be central to this debate.

In this paper, we explore how humanitarian approaches in the context of disaster risk management may contribute to sustainable adaptation. The paper forms a conceptual and methodological discussion, exemplifying how linkages between transformation and sustainable adaptation can be explored using case studies in Africa and Asia. We explore four principles for sustainable adaptation pathways. Firstly, recognize the context for vulnerability, including multiple stressors; secondly, acknowledge that differing values and interests affect adaptation outcomes; thirdly, integrate local knowledge into adaptation responses; and fourthly, consider potential feedbacks between local and global processes. Hence our value systems and social and political processes at local, national

and international level that determine who effectively participates in problem understanding, what constitutes a desirable future, and how we respond to and manage climate change in order to achieve such a future.

O-007

Community-based Transformation- What Does It Take? An Example From Orissa, India

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Deliberate transformations in societal systems are increasingly seen as a necessity in order to both reduce green house gas emissions and address the social, political and cultural causes of vulnerability to climate change. But what does it take to fundamentally transform a society and adapt to a changing climate? In this brief paper I give one example of what it takes to deliberately transform a community, drawing on empirical research from Orissa, India where the local NGO Gram Vikas have enabled rural and marginalized villagers to come together and transform their lives and livelihoods through progressive community-based projects based on the needs and priorities established by the communities themselves. The paper argues that 1) community-based transformations takes time, hence they can only occur when there are long-term commitments made by all stakeholders involved, far beyond the length of development project cycles and political appointments of between three to five years; 2) that community-based initiatives must be integrative in their approach in order to respond to both, cultural context, worldviews as well as the effectiveness and functional fit of the adaptations that communities value and want; 3) that social hier-

archies and patriarchal structures which disempower individuals and creates mistrust between people must be challenged and broken down in order for mutual accountability and cooperation to develop and flourish; 4) the sustainability of the community transformation lies in the systematic transfer of responsibility from outsiders to insiders, whereby the local governance structures and participatory management that provides the financial and institutional capacities to increase both well-being and sound management of natural resources are established from the outset and designed in such a way that facilitates the incremental transfer of responsibility to the community themselves.

O-008

Transformational Climate Adaptation At The Organisational, Community And Individual Level: Case Study Insights From Australian Primary Industries

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Primary industries are predicted to increasingly need to implement innovative and proactive responses to climate change. The challenge lies with how they will adapt and what level of response is required. Research into large-scale, novel responses to a changing but variable climate and associated risks and opportunities, known as transformational adaptation, is an emerging area in the climate adaptation literature. However, there is still a gap in empirically-based examples of how agricultural organisations, individuals and communities are changing and what factors instigate and facilitate transformation to agricultural systems that are suited to future environments. We have

developed the Adaptation Action Cycle framework to describe incremental-transformational adaptations. The aim of this paper is to test this framework by applying it to four Australian case studies (peanut, rice wine industries and a rural community). This approach provides a systematic comparison regarding experiences of transformational adaptation at the organisational, community and individual levels. Ninety semi-structured interviews were conducted with individuals, farming enterprises, businesses, service providers, and agricultural organisations who are pro-actively preparing for, and adapting to, the impacts of climate change. Our findings highlight the importance of context in determining success and failure of transformation, including timing of decisions and external influences such as risk and broader political and social structures. In addition, aspects such as scale, dependency on others, leadership, personal characteristics of decision makers, perceptions of agency, and social networks can also play a key role in driving transformation. Understanding the decision-making processes underlying adaptation and communicating lessons learnt is expected to be important for informing successful future transformational adaptation strategies.

O-009

Exploring Urban Transformations In Latin America

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We suggest a framework to explore urban transitions in Mexico city and manizales colombia, two latin american cities faced with similar triggers and pressures to create sustainability and resilience.

Networks of actors introduced innovative responses to their own particular pressures, constraints and opportunities and attempted to expand the supports and reduce the threats posed by nature. Yet the innovations that took place presented very different results with regard to regime transition. Mexico city's success at creating an urban regime change seems to have been based on the use of a top-down approach as it was driven mainly by actors within the existing power structure with access to the power and the resources of an authoritarian state. Actors in manizales have been largely outside the power structure and had less success in creating a city-wide transformation. This highlights the importance of power structure dynamics that can promote or prevent transformations from within or impede transformations from without.

O-010

Bridging Dichotomies In Urban Water Governance

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Assessments in environmental governance are often criticized for applying simplistic frameworks that provide fragmented results. In the same way, disciplinary research is being accused of deepening artificially constructed dichotomies, for instance in contrasting global versus local scales, and 'developed' versus 'developing' parts of the world/of the city. What is more, even within the holistic political ecology school of thought, limited attention is paid to the nexus between patterns and processes of injustices at the full range of spatial and temporal scales. To facilitate the design of transformative governance responses, assessments need to

take into account the complexity of socio-environmental relations. This requires integrated, transformative thinking both in governance and in science. What are the nexuses that remain underexplored in environmental assessments and ignored in governance responses? We address this question taking urban water governance in a West African coastal city as an example. In this region, cross-scale interactions are particularly relevant due to the accelerated rates of urban development over the past decades. Based on an analysis of narratives in scientific literature and policies, plans and programs, misfits or blind spots in knowledge on nexuses relevant to urban water governance are identified. More precisely, we assess qualitatively in what ways issues of place, scale and (governance-) processes are addressed; firstly in scientific research, and secondly in governance programs. Based on the results, narratives that currently hinder transformative thinking in governance of urban waters in coastal cities are identified and needs for further research outlined.

O-011

Multi-level Governance, Climate Change And Flooding in Urban Africa

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It is widely assumed that the response to the impacts of climate extremes such as urban floods, raises complex development is-

ssues that are best addressed at the local level with substantive community involvement. This paper utilizes a multi-level governance approach as an analytical tool to analyse interactions among state and non-state actors in flood risk management in the coastal cities of Saint Louis, Senegal and Dar es Salaam, Tanzania. Field work has been done in selected locations of the city combining interviews with citizens and decisions makers and policy reviews. Depending on historic and contextual circumstances, we find forms of command and control modes of governance (neo-patrimonialism) dominated by central government that show both high and low degree of developmental effectiveness in interactions with city and sub-city actors in addressing climate change floods. However, despite emerging networks and capacity to cope with flood risks among local groups and wards, limitations in support by higher-level governance, including by international agencies, undermine opportunities for local groups to become really effective partners with the municipality and the state in co-producing services required to enhance city-wide and local resilience, and more so, to bring local actions to scale beyond the jurisdiction of the local wards and the city. Compared to Dar es Salaam, the city of Saint Louis is overall better planned and serviced, including by a national flood risk management system. We explain this mainly by a more accountable central and regional state administration (providing financial and institutional support for services), but also by a municipality more accountable to poor citizens as well as greater capacity and associational strength at the community level. This reflects in part the institutional history of Saint Louis as a former capital of Senegal with long municipal governance traditions. This encourages us to extend the institutional annually.

O-012

Governing Urban Climate Change Risk: Evidence Of Early Transitions In Maputo, Mozambique

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In thinking about planetary boundaries and dangerous climate change, cities are grappling with the challenge of how to govern, anticipate and respond to large scale, uncertain, biophysical changes. Public, private and civil society partnerships are being recognised as important and effective ways to leverage change. Yet there remain major gaps in our understanding about the transformative nature of partnerships in urban adaptation governance and their operation in practice within specific urban contexts.

In this paper we present preliminary findings from a 12-month project, which assists the development of partnerships in Maputo to contribute to Local Climate Change and Development Plans at the city level, with a view to influence the on-going development of the Mozambique National Climate Change Strategy. Sea level rise poses a direct threat to Maputo, specially, to informal settlements in peri-urban areas. National Institutions confront the bleak prospect of having to evict communities from high-risk areas. This is a critical juncture for the poor who are, on the one hand, at risk from power inequalities reinforced through the eviction process and, on the other, at the core of the positive transformation, which could emerge through partnerships. In the paper we explore the features of transformative capacity that is generated by the “intense relations” inherent to the urban context, through mapping formal and informal actors, and their relation-

ship to the objectives and modes of climate governance operating currently. We also critically assess how far local partnerships and innovations are leveraging access to change within this context and the implications for current thinking on socio-ecological resilience and adaptive governance.

O-013

Transitions In Pathways Of Human Development And Carbon Emissions

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Previous work has sought to highlight the relationship between human well-being, carbon emissions and pathways of country development. We extend this analysis to categorise the drivers of consumption-based carbon emissions and identify potential transitions going forward. Using clustering techniques, countries are grouped according to their underlying drivers of carbon emissions and analysed with respect to a sustainability criteria of one tonne of carbon emissions per capita and a life expectancy over 70 years (Goldemberg’s Corner). Five clusters of countries are identified with varying patterns of drivers and highly differentiated outcomes of life expectancy and carbon emissions. Four clusters intersect within Goldemberg’s Corner, suggesting diverse combinations of drivers may still lead to sustainable outcomes, presenting many countries with an opportu-

nity to follow a pathway towards low-carbon human development. By contrast, within Goldemberg’s Corner, there are no countries from the core, wealthy consuming nations. The results reaffirm a need to address economic inequalities within international agreements for climate mitigation, but acknowledge plausible and accessible examples of low-carbon human development for countries that share similar underlying drivers of carbon emissions. In addition, we note differences in drivers between models of territorial and consumption based carbon emissions, and discuss interesting exceptions to the drivers-based cluster analysis.

O-014

Post Carbon Pathways: Removing Roadblocks And Driving Transformational Change

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‘Post Carbon Pathways: Removing Roadblocks and Driving Transformational Change’ ABSTRACT This paper provides an overview of findings from the Post Carbon Pathways research project which aims to strengthen understanding of i) key features of the most promising and innovative large scale post carbon economy transition strategies; and ii) the most effective ways of overcoming barriers to their rapid implementation. The methodology for this project has involved critical analysis of eighteen of the most promising and ambitious large scale de-carbonisation strategies augmented by in depth interviews with leading climate and energy transition researchers and policy makers. The paper begins by noting that the overall suite of actions required to reduce the risk of runaway climate

change is now widely understood: rapid replacement of fossil fuels by renewable energy; rapid reductions in energy consumption and improvements in energy efficiency; and the drawdown and sequestration of carbon into sustainable carbon sinks. While significant technological and financial challenges remain, the most significant roadblocks preventing rapid implementation of post carbon roadmaps are social and political. Key priorities for overcoming these roadblocks include: * Denial of the necessity and urgency of action * Power of fossil fuel industry and its allies * Political paralysis, short termism and ‘moral corruption’ * The dominant economic paradigm of unconstrained and unsustainable consumption * Technological, social and economic path dependencies and lock ins * Financial and governance constraints. The paper concludes with a discussion of critical factors most likely to trigger the transformational change needed to drive a rapid transition to just and resilient post carbon future. Keywords De-carbonisation; resilience; social and technological innovation; leadership

O-015

Transformative Learning For Climate Change Engagement: Regenerating Perspectives, Principles And Practice

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The worldview from which climate change continues to occur is identified as late modernism. This worldview is critiqued as being unduly economic, reductive, mechanistic, and fragmented. There is a clear requirement for a

radical transformation of this worldview toward one substantively more able to meet the challenges that climate change presents, as well as an understanding of the processes which facilitate such a transformation. This paper foregrounds transformative learning as a generic process that might well be key to this transformation. The paper addresses transformative learning both as an active process and as a feature of a regenerated worldview, identified here with respect to Griffin's reconstructive postmodernism. Transformative learning is exemplified by the seminal approach of Mezirow as well as Scharmer's Theory U. Inayatullah's Causal Layered Analysis is used to vertically differentiate the discussion of worldview perspectives, principles, and sectoral practice. Principles addresses the regeneration of the philosophy of science, and explores the critical contrast between atomism acting as attractor for modernism, and complex integration acting as attractor for reconstructive postmodernism / the ecological worldview; it indicates the fecundity of Bhaskar's critical realism for aptly addressing climate change. Sectoral practice is represented by higher education, specifically addressing andragogy, heutagogy, the transformative learner and the transformative educator. Climate change is a complex, big-picture issue, one which requires a complex, integrative epistemology and transdisciplinary orientation.

O-016

Can Changing Climate Be Reversed And/or Halted Without Radically Transforming The Human Psyche?

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Throughout history human beings have organized societies and economic systems primarily based on the principles of self-centred behaviour that promotes acquisitiveness and greed. Human beings are caught in the habit of fulfilment of incessant desires/pleasures that drives the growth of production of economic goods, which has led to a serious problem of environmental degradation, which in turn has threatened the sustainable well-being of both society and Earth's ecosystem. One of the key factors missing from the discourse of "transformation" is the urgent need for bringing about a radical change in human behaviour which is the root cause of all the problems that our society is currently facing. The dominant economic view currently prevailing across countries in the world is the neo-liberal economic policy which is based on the following principles: consumption is more important than sufficiency; production is more important than sustainability; growth is more important than distribution of goods; accumulation/possession is more important than use. Given the backdrop, the objective of the present paper is to critically analyze the prevailing socio-economic and political/ institutional systems; and develop an alternative theoretical/conceptual framework for transformation in a changing climate. The paper argues that social, economic, ecological, technological and institutional transformation that is urgently required to reverse the changing climate cannot be achieved without bringing about a radical transformation in the human psyche; for these structures have been put for achieving narrow selfish interests. It argues that human behaviour can be changed by understanding the workings of human mind through right education.

O-017

Communicating For A Change

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There are good reasons why mainstream media have long struggled with climate change as a story, but it is important to acknowledge some of the achievements of media coverage in terms of communicating the basic issues surrounding it. But it feels at the moment as if we need to move on to the next chapter. To do so the environmental research and policy community needs to move beyond the remarkably narrow emotional range that has generally been presented by environmentalism. That movement's startling achievements over just four decades have largely been driven by fear or loss narratives, with occasional proposals of just-add-water 'solutions' thrown in. What might be achieved (and what risked) by generating more plural and dynamic accounts of humanity's journey with the difficult new knowledge surrounding climate change? The paper will offer suggestions as to how to counter some narratives that block positive change. It also points to forms of communication that support it.

O-018

The State Of Our World, The State Of Our Worldview(s): The Integrative Worldview Framework And Reflexive Communicative Action And Transformation

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The contemporary climate change debate is characterized by deep-seated disagreement and gridlock. Differences in worldview often appear to undergird such polarized perspectives within the public sphere and stakeholder negotiations, thereby hampering the communicative action and cooperation that is so urgently needed. The aim of this article is therefore to summarize insight into the predominant worldviews in the West, and demonstrate how such insight can be applied to communicative action for climate solutions. To do so, we introduce the Integrative Worldview Framework (IWF), an interdisciplinary framework that synthesizes research from a number of fields, notably developmental-structural psychology and sociology. The IWF operationalizes worldviews into five major aspects (ontology, epistemology, axiology, anthropology, and societal vision), and offers a synoptic overview of the major worldviews in the West—generally referred to as traditional, modern, postmodern, and integrative. The IWF is then applied to climate communications, demonstrating how this framework has the potential to serve as: 1) a heuristic for cultural and psychological self-reflexivity; 2) an analytical tool for understanding worldview-dynamics in society; and 3) a scaffolding for effective climate communications and solutions. Lastly, we end with a discussion on the IWF and offer suggestions for further research.

O-019

Readiness And Persuasion In Transformative Learning For Sustainable Responses To Climate Change

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This study examines the case for augmenting message-centric social marketing initiatives with person-centric initiatives tailored to ‘where people are coming from’. Social marketers aim to persuade people to adopt new behaviours, including sustainable responses to climate change. Persuasive messages are devised according to analyses of the existing perspectives and the responsiveness of target audiences in light of various mediating and moderating variables in communication situations. Transformative learning theories support a person-centric view of persuasion, which emerges from an essentially self-persuasive process involving reflection and dialogue. Transformative self-persuasion engages individuals’ learning and readiness to change, which is primarily about them and their experiences within a communication-and-action ecology. Attention to a person’s initial position vis-à-vis some ‘change of mind’ brings person- and message-centric persuasion into alignment, and opens up potential for improved communication initiatives. An exploratory Q-methodology study investigated the readiness positions of individuals to seek insights for policy efforts to ‘get alongside’ people as transformative learning and sustainable behaviours develop. Four readiness perspectives emerged, highlighting optimism, questioning, walking the talk, and engaging with others. Rather than directing messages to individuals as they are, policy actors can enrich persuasive intersubjective message environments guided by the orientations of different groups of people.

O-020

The Role Of Deliberative Processes In The American Climate Change Debate

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Engaging citizens and decision-makers in discussion about climate change and how to deliberately change society’s course is one of the greatest challenges our nation faces. Societal disengagement on the issue is well documented in the United States. Several political, cultural, and psychological factors negatively influence our capacity to engage people in decision-making about climate change. Indeed, many politicians and scholars look at the growing schism over climate change and question the possibility of meaningful dialogue and negotiation. Societal transformation for North Americans will require creating new public spaces that foster sustained, productive dialogue on how to create alternatives that avoid the worst climate change predictions. Public deliberation offers an opportunity to engage students, general citizens, and decision-makers in facilitated conversation about ways to move forward on climate change.

This study explores the phenomena of engagement on climate change deliberation and action using participatory action research. Two deliberative forums were convened at the University of Montana that engaged 160 participants, including students, faculty, staff and administrators with a diversity of viewpoints and experiences. Through pre- and post-survey questionnaires, participant observations, and follow-up interviews with moderators, new knowledge was gained about the deliberative process as a tool for engaging

people in climate action planning. The results suggest the deliberative process facilitated meaningful engagement and built participant sense of efficacy in climate action planning. The process also helped generate informed, reflective, and agreeable strategies for taking action on climate change. The deliberative process can help build understanding of different perspectives on climate change and how to respond in light of those different perspectives.

O-021

Recipe For Misdiagnosis: Obstacles To Social Transformation In Media Structures And Cultures Of Science

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In this presentation, I discuss how cultural, political and economic factors shaping media structures cause a misdiagnosis of the problem of climate change in Brazil, silencing public focus and debate on the most central cause of the country's national greenhouse emissions. The example illustrates the general difficulty for publics to be both informed and motivated to provoke change, which begs questions about frequent hopes that social movements - or at least greater public participation - together with the impact of new social media will be forces for structural transformation. I discuss this and the need for transformation of the political economy of media structures, and how cultures of science are part of the problem and need to change if they are to help the process of identifying and addressing key structural obstacles for a transition to environmental sustainability.

O-022

Factors Shaping Scientific Framework Change

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Through the history of philosophy of science, several different change factors are proposed as crucial for scientific framework change: the logical and psychological factors (e.g. the positivist tradition), the physical and logical (e.g. Popper), the logical, social and psychological (e.g. Kuhn), the social and political (e.g. neo-Marxism), the social and linguistic (e.g. Rorty) and the certitudinal and psychological factors (e.g. Feyerabend). The relationship between the different change factors becomes particularly problematic when some of the aspects are absolutized, often simultaneously reducing the others. The aim of this article is to discern the factors shaping framework change. The article suggests a pattern in which changes in epistemic frameworks occur as the result of many aspects, some of which are qualifying aspects for science, so that these should play a more regulative role. The latter position does not reduce some aspects to sub-aspects of the absolutized one(s) and suggests a normative direction for framework change. A few hypothetical questions on the role of non-qualifying aspects (and related functions) conclude the article.

O-023

Environmental Change, Transformation And The Social Sciences

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The concept of transformation is

growingly used in environmental change research. However, while transformation is generally associated with the idea of radical change, different and often contrasting conceptualizations have been proposed. Furthermore, transformation is used both as a model of change and as a policy, i.e. normative, goal. Given such lack of consensus and conceptual clarity, it is meaningful to ask whether transformation is a useful concept. This paper examines concepts of transformation used in environmental change research on the basis of seven analytical criteria derived from Sztompka (1993): system model, levels, form, seat of causality, social consciousness, temporal range, outcome. This 'anatomy' of transformation helps to characterise different conceptualizations, and discuss their implications for social scientific engagement in global environmental change research. The most significant differences among the concepts of transformation concern the system model (the system definition), the seat of causality (the agent of change), and social consciousness (deliberate or unintended change). The paper argues that a distinction between the normative and the analytical dimensions of transformation is needed, and that they correspond to two different, but complementary social scientific approaches. The former relates to a direct and active role of science in bringing about change (transformational social sciences), whereas the latter, which requires a more rigorous definition of transformation, supports the analytical understanding of transformative change. The paper also identifies some knowledge gaps, i.e. system models, definition of social constructs and their relations, and mechanisms of change, and argues for the dialogue of social scientific paradigms as a way to advance under-

standing of change in the face of global environmental change.

O-024

‘Transformation’ And Scientific Knowledge Production: ‘Transformation’ As An Ethical Practice

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In my paper, I explore the concept of ‘transformation’ as a tool in itself for re-thinking the relation between knowledge production and the ordering of reality that emerges out of this knowledge. My aim is to suggest one way of thinking about science as a form of ethics. The proposal to ‘transform’ climate change-oriented sciences is provocative: the nexus of difficulties with solving climate change has become science itself in how it is conceived and practiced. At issue are questions about the goals of action-based science, the repertoire of methods and frameworks to achieve these goals, and the commitments that hold members together. More fundamentally are questions of how a scientific collective develops a relationship to itself as a mode of knowledge production that can order reality. This relation of ‘science to itself’ can be fruitfully explored as summarized below. Drawing on studies from a history of science (Bachelard, 1934; Foucault, 1966, 1969; Kuhn, 1970), I explore how the knowledge generated by science orders the world, and in turn how we can act, relate to, and intervene in it. To the extent that ‘transformation’ is a tool for changing what the sciences can be, and insofar as scientific knowledge (though not exclusively so) gives form to our experience of reality an exciting possibility arises: through transformation’ scientists are faced with a choice about how the world gains shape

through how they know it. I focus on how a new practice of ethics as understood by Michel Foucault (1997) is inscribed in this re-conceptualization of science and conclude by exploring the possibility of constant transformation.

O-025

Transition Theory And Deliberate Transformative Change In Social-ecological Systems

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In a changing climate, and in the context of developed agriculture, deliberate transformative change in social-ecological systems (SES) may, in some cases, be essential for sustainability. In this presentation we use transition theory and concepts to analyse a recent attempt by Australian governments to restructure an agricultural industry. Our study investigates the case of market deregulation on 1 July 2000 and the subtropical dairy (SD) industry as an example of a top-down or macro-meso pattern of change. We conducted semi-structured interviews with SD producers, service providers, and industry and government staff. We found that deregulation had substantially altered the industry’s culture, specifically, actors’ social roles and relationships; and the structure and practices of the dairy system, supply chain, industry organisations and government agencies. In transition language, macro-level policies and free-market forces created sufficient tension triggering change that weakened the incumbent industry to such an extent it was overthrown and replaced by a stronger industry. In our case

study the need for innovation and learning at the micro-level was a consequence of enacting deregulation at a particular point in time. In hindsight, if deregulation had been rolled out over a longer period the industry may have had an opportunity to experiment and learn so as to mitigate the chaos, uncertainty and instability that followed deregulation. Transition theory and concepts identified the nature and extent of change in the SD industry suggesting it was an example of deliberate transformative change. It also identified those unintended consequences of deliberately transforming an agricultural industry.

O-026

Climate Change Undermines The Livable Climate: -a Key Transformation Issue For Sustainable Living And Working Conditions Of Most People On The Planet

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A Livable Climate represents the range from cold to hot and wet to dry that human beings can live and work in during each year without serious daily difficulties or clinical health impacts. The boundaries are reasonably well established, and technical solutions are available, including insulation, ventilation, heating and cooling, which create indoor environments that are “Livable”. Global atmospheric climate change and wide-spread urbanization lead to local climate change with an expected shift towards the hot end. The shift towards hotter seasons, days and hours will therefore undermine the space where a Livable Climate

exists. Very few people live in the coldest parts of the planet and the vast majority live in the hottest parts, so a major proportion of the global population will be affected. This is a Transformation issue which involves the values, norms and worldviews on climate change impacts, the related research and technology approaches, the informing economic analysis, and the necessary policy and program development. Initial estimations indicate that the undermining of the Livable Climate affects local economies in a major way and Sustainable solutions need to be identified and implemented. The risk of climate related clinical illness and death, which until now has been one focus of climate change and health analysis, is only a part of the overall health risks linked to the changing climate. This paper calls for concerted efforts to analyze this climate change impact, and to find ways to integrate the results into climate change policy development and implementation based on the principles of Sustainability. Timely progress on this Transformation issue will require cooperation between academia, enterprise, governments and global agencies.

O-027

Triggering Transformation: Managing Resilience Or Invoking Real Change?

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Societies respond to pressure to change mostly through incremental steps, which focus on maintaining the current system or accepting gradual partial change. However, this is increasingly inadequate - given the multiple dynamic pressures under current and future global change - and

there is a need to develop more robust understandings of how change can be managed and what promotes positive transformative action. This would ideally contribute to achieving the goals of development, disaster risk reduction and adaptation simultaneously. Much of the focus has however been dedicated to changes that are far from revolutionary, and less attention has been paid to the issue of scale and the evaluation of the nature of that change and its long-term implications. This presentation will use Handmer and Dovers' (2007, 2009) three-staged resilience typology to investigate and understand those factors that bring about transformation. It also explores through different examples how transformation could be characterised and evaluated. We argue that not all transformation is necessarily positive and welcome, and that greater focus needs to be placed on understanding the drivers which enable long-term positive transformation, and which inhibit maladaptation. This includes also complexities around the issue of scale and the normative elements embedded in attempts to evaluate change. Our interest lies also in identifying spaces in policy processes where negative transformational change could be reversed and commitment to non-sustainable agendas could be reduced.

O-028

Migration Amidst Social-ecological Regime Shift

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A debate in the research on migration in the context of environmental change centers on the extent to which migration is adaptation to

adverse environmental conditions, or evidence of a lack of the capacity to adapt. Evidence suggests that even within communities, migration can be both. One way of resolving this contradiction is to view migration as evidence of social-ecological regime shift. Environmental disturbances can force a system from one stable state to another. The various types of migration that result are evidence of affected people's search for new stability in livelihood strategies and modes of residence. This paper presents a case of catastrophic social-ecological shift from Garifuna villages in Northern Honduras. In this context, the array of migration strategies represent people's individual searches for a new stable mode of residence, but collectively these strategies affect the emergence of new states.

O-029

Pathways Of Change And Response: The Importance Of Reconceptualising Adaption For More Transformative Outcomes

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Three different kinds of adaptation have been proposed: Those aiming to enhance resilience, transition and transformation. Such terms are often used loosely and are poorly defined. In this paper we suggest that conceptualising adaptation as pathways of change and response avoids dualistic notions of adaptation and focuses attention on the dynamics and processes operating within social and ecological systems and the key sustainability and equitable outcomes emerging from them. This then leads to different ways

of understanding adaptation and how it can be used to facilitate more transformative change. Three case studies are used to illustrate the different ways that adaptation influences transitory and transformative potential: (1) trajectories of change in communities in the Solomon Islands that emerge through adaptive responses to environmental change and social pressures; (2) The way gender roles in households have changed following loss of employment in Canadian wood mills; (3) The role of social, political and symbolic capital of different ethnic groups in Romania that influences retention of access to resources and livelihoods. These case studies respectively highlight that there are systemic, collaborative, and competitive ways adaptive responses influence the degree to which adaptation may be transitory. Conceptualising adaptation as pathways of change and response provides a new perspective for understanding change itself, and the role of culture, context, and human agency.

O-030

The Relationship Between Adaptive Capacity And Adaptation: Household Responses To Bushfire Risk In Mount Dandenong
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In the absence of empirical data, climate change research relies heavily on adaptive capacity as a tool to predict transformative adaptation (Engle, 2011; Pelling and High, 2005). It is typically assessed by measuring a system’s wealth, technology, governance, social capital and human capital (Yohe and Tol, 2002). There is an assumption within the literature that high adaptive capacity leads to

adaptation and there is an optimistic expectation that latent adaptive capacity can be developed to improve transformative adaptation. Using the example of household responses to wildfire risk in Mount Dandenong, Australia, this research examines whether there is indeed a direct relationship between adaptive capacity and adaptation. The adaptive capacities of Mount Dandenong households were assessed using a quantitative mail-out survey. The results were mapped against the actions households had taken to prepare for wildfire, as established through household visits and qualitative interviews. The findings indicate that the relationship between adaptive capacity and adaptation is far more complex than the literature suggests. The research then attempts to explain disparities between capacity and adaptation by examining alternative factors found to be influencing household adaptation. The results suggest that greater attention needs to be paid to the factors that trigger systems to apply their available capacities, as well as factors unrelated to capacity that may be driving or constraining transformation.

O-031

Transformative Adaptation And Resilience. Visions Of Resilient Housing In Germany 2050
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Our research addresses the question: How do climate resilient social systems look like? Our research aim is to propose a vision of climate resilient housing in Germany in the year 2050. Under “housing” we mean the set of social systems and activities that satisfy the need for appropriate dwelling.

The presentation is based on an ongoing research project and will include:

1. We shall propose a concept of resilient social systems that includes the dimension of transformational change. The term “resilience” refers to the ability of a system to preserve its services sustainably in spite of external stresses and, if necessary, to change its structure such that the system’s services will be provided sustainably. Therefore resilient social systems should possess the following capacities: robustness and capacity to change. The latter can be actualized in two degrees: as adaptive capacity or as transformative capacity. The concept of resilience does not determine which properties of a considered social system should be changed and which preserved. This depends on what is considered as a sustainable society.
2. We shall demonstrate this by sketching two visions for climate resilient housing: an adaptive and a transformative vision. The first takes the Green Economy to be the sustainability ideal whereas the latter considers De-Growth approaches as its normative motif.

Within the adaptive vision the prevalent conceptions of what people consider as appropriate dwelling are hold constant. Resilient society changes the infrastructure and technical facilities in order for the need for dwelling to be satisfied in spite of climatic changes. The transformative vision presupposes that people change their conceptions of the appropriate dwelling and establish new kinds of social practices and cultural customs.

O-032

The Role Of Agency And Networks In Agricultural Transformational Adaptation: Exemplars At The Individual Farmer Level

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A growing body of literature supports the notion that major, purposeful action, known as transformational adaptation, is required in some areas of the agricultural sector to adapt to climate change and other driving factors. Yet, unlike incremental adaptation, there is far less understanding of what factors instigate and facilitate transformational climate adaptation. Therefore, a key question still remains: what factors and/or structures do agricultural industries need so as to plan and implement large-scale, transformational adaptation options? This paper helps bridge this knowledge gap by investigating the competencies and capabilities of decision makers required to achieve effective transformation in Australian agricultural industries. Drawing upon our data from the wine and peanut industries and one primary industry dependent community, sense of agency (optimism, self-esteem, perceptions of the problem and empowerment) and network structure (social and information connections) can influence the way individual farmers approach and manage change. Compared with incremental adaptors, individuals undertaking transformational change demonstrated higher levels of agency as well as more positive attitudes to change, likely outcomes, risk management and personal motivations. Transformational adaptors were also found to have more far-reaching information and knowledge network connections yet their social links to family, friends and local and industry colleagues were less

extensive. Demonstrating the strength of weak ties, this finding indicates an ability to facilitate action that differs from established social norms, hence empowering transformational adaptors to plan and implement novel strategies and options. We discuss the potential to build these capacities and relate some implications for sustainable and ethical decision making for transformation.

O-033

Cities And Climate Change: What Drives Change In Urban Environment?

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The following paper addresses, through a mixed qualitative-quantitative study, the issue of what factors may facilitate transformation towards sustainability in urban environments by asking how and why cities have adopted policies for greenhouse gas reduction. The study focuses on a small set of case-cities and is carried out in two steps. First, a theory of linkages is used to investigate the drivers behind the action, suggesting that the cities need to link climate change to objectives in other policy areas since the issue may not be part of the local government's core objective. Second, a large number of actions are tested through binary variables in a set of indicators, and a smaller number of actions are studied more qualitatively and with a more eclectic data collection. The conclusion of the study is that linkages may play a part as to how cities can transform towards sustainability. These linkages, however, are often not detected, as they are part of the city's wider strategy. By seeing climate change in the light of strategy, cities have more opportunities to address the issue. Finally, the

differences in the level of development in cities will affect the way climate change can be linked to other policy objectives.

O-034

Urban Transformation In The Face Of Climatic And Demographic Change: The Case Of Shrinking Cities

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Many cities in Europe and Northern America experience a decline in population resulting in shrinking cities. This poses new challenges for policy- and decision-making processes as well as for everyday practices, since shrinkage questions many established values (e.g. the idea of growth and economic prosperity) and existing practices (urban planning), but also the very idea of how a city should physically be constructed (e.g. less inhabitants, abandoned properties, decay, compactness etc.). Shrinkage thus provokes the question of how to transform urban areas sustainably in the face of demographic change. At the same time, offers the very process of transforming urban areas in the face of demographic change new opportunities, such as reducing exposure to climatic risks. This paper connects conceptual reasoning with insight of a case study conducted in Eastern Germany. It is based on a document analysis as well as interviews we conducted in seven cities experiencing severe population decline since the 1990s. We scrutinize to what extent shrinkage is understood and utilized by planners and decision-makers as an opportunity to develop more sustainably. The paper concludes with outlining pathways towards urban transformation in the face

of demographic and climatic challenges.

O-035

Governance Of Urban Transformations Towards Sustainability In The Nordic Countries

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Cities have become not only the main contributors to global environmental change but also the spaces within which solutions to these problems need to and can already be found. In terms of climate change, cities are major producers of greenhouse gas emissions and also part of the solution. When it comes to adaptation, cities are concentrations of people and assets, making the vulnerable to the impacts of climate change. This paper contributes to the understanding of governance of urban transformations by focusing on the governance systems of Nordic cities, since these represent forward looking cases that have begun action on climate change, sometimes prior to action on the national level, by publishing a climate strategy for both mitigation and adaptation. Nordic cities can thus potentially serve as examples in order to understand how climate change is governed in the urban context and how transitions towards sustainability can be made. Firstly, this paper examines the theoretical thinking behind governance of urban transformations and focuses on understanding what modes of governance are particularly relevant in terms of responding to climate change. With the help of this theoretical framework, this paper then

identifies different kinds of policy instruments that are employed in the two case study cities, Copenhagen and Helsinki. In doing this, the paper utilises cutting-edge policy research tools and produces a typology of modes of climate change governance and the policy instruments. By assessing these, the paper then discusses to what extent transformations have taken place and concludes by suggesting factors that are necessary to govern them.

O-036

Behind The Scenes Of Transformations: The Greening Of Oslo

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The transformations towards green cities are imbued with forceful discourses, building on different knowledges and interests, and supported by convincing representations. Traditionally dystopian representations, like “The City of Dreadful Night”, and utopian visions, like “The Garden City of Tomorrow” and “The Radiant City”, have played an important role on the scenes of urban transformations, policies and planning. They were grounded in ideologies and contributed to the formation of new discourses that came to dominate urban planning. Increasingly urban sustainability or green urbanism is part of urban place marketing, either selling the whole city, or in reinventing parts of a city. This is also the case for Oslo. What role have representations of green urbanism had in transforming and modernizing the city? How are today's urbanisms constructed through planning representations and an entrepreneurial policy discourse? If the greening of cities like Oslo, is used

selling the city, what are the social consequences? Can we learn from the history of visions, planning and discourse?

O-037

A Low Energy Transformation Will Demand A Disembodying Of The Growth Imperative

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In order to minimize the severity of climate change, there is an urgent need for a pro-active transformation in the ways we produce and consume energy. The aim of this paper is to contribute to a theory of transformation towards low-energy everyday practices. The economic growth imperative, so deeply embedded in every facet of life in OECD countries, associates more with better in virtually every arena of energy production and consumption. At the level of the individual, growth is embodied in the form of associations with better lives. Theories of transformation have not engaged with dispositions embedded through lived experience in the cultures of growth. In hegemonic theories and policies, brains are regarded as the sole change agents and incentives for change appeal to deductive reasoning, economic utility maximization and motivational information. I will argue that we must acknowledge the power of body and habituated knowledge if we are to transform the ways we use energy in practices such as transport, cleaning, heating, cooling and preparing food. Moreover, in accounting for this embodied knowledge, the low-energy policy framework must introduce a new class of policies encouraging practical learning through exposure to new experiences and experimentation with low-carbon practices, such as sharing, leasing, reduced

working hours and living with greater material simplicity.

O-038

Decarbonization With Individual Responsibility: The Influence Of Exempting Basic Needs

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Transforming the world onto a low-carbon path may depend on individuals taking personal responsibility for reducing their emissions. However, people may alter their consumption patterns only after meeting their basic needs. While consumers' needs may be universal, the ways in which they satisfy those needs are not. This presentation elaborates a needs-based approach to analyzing consumption. It distinguishes needs from the satisfiers of those needs, and material needs from non-material needs. With this framework as a basis, and using the United States as a case study, this study examines how households with different levels of affluence alter their consumption patterns to meet an emissions constraint. The results illustrate the limitations of restricting non-essential consumption in reducing emissions, and the variation in the value that different households place on these emissions constraints.

O-039

TREE: Transition - Reporting, Evaluation And Engagement “Innovative Approaches To Support The Shift To A Sustainable, Low Carbon Society”

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As depicted in this figure, my project proposal is grounded on the technological, economic and social innovation happening at the niche level (at local to regional scales), which includes change agents' initiatives and projects driven by the citizens (bottom-up) or by policies (top-down). Through processes of reporting, evaluation and engagement of niche innovations, the TREE team of researchers will be able to, together with policy and decision makers (stakeholders) but also with local change agents (practitioners), address the potential and constrictions of current policies, develop guidelines to improve these policies and understand how can society can better implement the national and EU policies at local to regional levels. TREE main goal is to empower society for multi-level transitions and strongly impact the different societal sectors. TREE will be a four-year research project. Its workplan will draw mainly on the experience and evaluation of local to regional case studies that are consciously promoting transition to S&LC societies, by using Trans-disciplinary and Participatory Action Research methodologies, so as to integrate theoretical and empirical knowledge that can be used by practitioners and policy-makers alike. TREE is based on the following organising principles (Fig. 2): WP2 (SOIL), Mapping & Assessing Transition Knowledge, identifies and reports existing values, policies, mechanisms and actors. WP3 (ROOTS), Case Study Research, will characterise & evaluate key

niche innovations. WP 4 (TRUNK), Developing and Testing Tools to Assess Drivers of Transition. WP 5 (CANOPY), Enhancing Science-Policy-Society Co-learning, produces reliable guidelines with multi-level stakeholders to support cost-efficiency policy response and an improved understanding of the socio-economic and environmental impact of transition. WP6 (FRUIT), Dissemination, Impacts and Legacy, supports the building of an extended community of practice. do please visit: www.treeproject.eu

O-040

Transforming Extractive Economies To Resilient Communities

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In order to mitigate the impacts of anthropogenic climate change, our society needs to reduce our dependence on a fossil fuel based economy. This transition offers much promise to burgeoning industries and markets based on renewable resources, but communities that are currently dependent on an extractive economy will suffer unless they also transform towards more sustainable infrastructures. Historically, single-resource dependent economies endure through boom and bust cycles and are vulnerable to market fluctuations of these resources. This talk will focus on the case study of the coal-mining region of Central Appalachia in the US. Within an area that spans six states and over a century of mining coal, these communities have been afflicted by some of the worst economic, health, environmental and infrastructural challenges in the coun-

try. The past decade has shown some dramatic shifts in certain communities across the region. Utilizing technological tools and connectivity, an increasing amount of activity in the nonprofit, governmental and business sectors are focusing on economic diversification, educational accessibility and environmental protection. We have used causal loop mapping and historical analysis to understand the complexities of the current social-ecological system and identify opportunities to leverage transformation. A social network analysis is then used to distinguish organizations and agents that can collectively help shift the current system into a new state, referencing case studies of previous transformation theory research. The case study of transformation in one of the largest and historic coal mining regions in the world can provide an example to many other fossil-based economies.

O-041

Rome, Cross Roads For New Food Cultures

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Feeding Good/ World chefs,
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Every road leads to Rome! But if you want to make progress you have to know in what direction Rome is. And the cleverest of us investigate the obstacles on our road to make sure we are prepared for the bridge between Sweden and Denmark, know where what rivers to cross and avoid the Alps. The kitchen is the most complex place in the food chain. Every innovation in agriculture, ingredients, logistics, food industry, etc, enters the kitchen in one way or another (both consumer and professional kitchens). Therefore every sustainability issues from climate change to biodiversity, water and food

sufficiency has it's largest and most complex impact on activities the kitchen. If you want to design a strategy for food cultures or different parts of the food chain you have to design the roads towards Rome. In this paper and presentation a new approach is proposed how to build very detailed transitions for future foods. Transitions are powered by a series of changes in resources, perceptions, prices and new competitions. Those changes can be described in general through so called social economical statements. Those statements result in food macro trends for coming 5-20 years. Every food culture and ingredient takes another road towards Rome. Some products shift from artisan towards industrial, others the way around. Some become luxury and others mainstream. Some are produced locally and others will move towards global markets. The macro trends can be added up to form new food chains and understand logical transitions. This will lead to a detailed strategy for countries and regions, for products and food cultures and can power new innovations and policies. This can help to speed up the process to make sure next generation have access to sufficient, healthy, tasteful and divers food. I hope you become inspired!

O-042

How New Theories Of The Major Transitions In Evolution May Shed Light On The Human Challenge Of Climate Change

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The book "The major transitions in evolution" (1995) by J. Maynard Smith and E. Szathmáry labels the start of a new trend in evolutionary biology where previously

unique human achievements like language, advanced technology and cooperation are understood as evolutionary products of a different and more complex kind of transition than the transitions traditionally explained solely by Darwinian natural selection. The specific transformations brought about by human culture may be unique. But the kind of transformation may be sufficiently common to other evolutionary transitions that it will be useful to try to understand the exploitation of fossil fuel and dangerous climate change in the light of modern evolutionary theory, e.g. as a case of ecological niche construction turned into an evolutionary trap.

To do this in a more than superficial and metaphoric way, there is a need for a radical, multidisciplinary cooperation between experts in human culture and society, evolutionary biology and several other disciplines from both sides of C.P. Snow's "two cultures". The paper will also report on one such initiative at the University of Oslo called "Beyond dualism" which is supported by the project "Overheating: The three crises of globalization" (climate/environment, finance/economy, culture/identity). An important activity within Beyond dualism is to try to agree on basic concepts with validity across culture and science disciplines. Candidates for important, encompassing concepts are found in the writings of, among others, Terrence Deacon. We believe that the current academic separation between natural and human science is an important obstacle to the endeavor of understanding what transformations are needed to face dangerous climate change.

O-043

Creative Responses To Climate Change: Rethinking Knowledge, Transforming Societies And Realizing Biohappiness

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Climate change is a critical challenge of our times which calls for rethinking existing knowledge of self, society, nature and cosmos and transformation of self as well as society. My paper is an attempt to rethink existing knowledge of self, science, society and development coming from both natural and social sciences which would contribute to cultivating creative responses to climate change. It discusses how we would have to go beyond the language of adaptation in the existing climate change discourse and think in terms of creativity and transformations. In this we need transdisciplinary creative collaboration involving not only natural scientists and social scientists but also artists and novelists. It discusses how realizing biohappiness which ensures both human and social security such as food and livelihood security as well as ecological security is a creative way of responding to climate change. It discusses the pathway of biohappiness recently discussed by the noted scientist and thinker M.S. Swaminathan and his concept of ecology of hope and spiritual globalization in place of greed revolution as ushered in current neo-liberal global capitalism. It also discusses the climate care movement that we all can initiate for realizing climate justice and sustainable futures.

O-044

Sacred Mountains And Values For Transformation

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Scientific research has contributed to raise awareness about the fact that mountain landscapes are particularly vulnerable to climate and global change. However, little attention has been paid to the sacred dimension of mountains and the creative ways in which native peoples have modified their systems of beliefs and rituals to cope with the unexpected changes in their environment. Summarizing 17 years of research in the fields of high-altitude archaeology and the anthropology of sacred mountains, this presentation seeks to identify the underlying spiritual values shared by communities in different parts of the world, pondering the diversity of ways in which mountain cultures in the Americas, Oceania, Europe, Africa and Asia have interacted with landscapes that are perceived as sacred. We believe that mountain worldviews, past and present, can inspire us to face the challenges and opportunities of ethical and sustainable transformation in the XXI century.

O-045

Towards A Transdisciplinary Analytical Framework For Understanding Social-Ecological Transformations

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We have entered a new geological era, the Anthropocene, where human activity has emerged as major force shaping the Earth system. From local to global scales evidence is mounting that many human-environmental interactions have become “locked in” to unsustainable pathways that cannot ensure the long-term generation of critical ecosystem services and human wellbeing. We urgently need to identify actions for deliberate, ethical and sustainable transformations at the rate and scale that is called for, which lead us to new development trajectories where both human wellbeing increases and where a wide range of ecosystem services are sustained over time. This will require radical shifts in values and beliefs, as well as in patterns of social behavior and in current governance arrangements.

With increasing interest in this type of sustainability transitions, a variety of frameworks for analyzing transformations have emerged over the past years. However, most of the time, this literature tends to emphasize either the social aspects of transformations, not linking the processes of social change to a demonstrated ecological outcome, or it emphasizes the ecological aspects, demonstrating a shift in the ecosystem without

coupling this to some sort of social improvement. This paper aims to bridge the current gap, by providing a more rigorous definition of the core elements of social-ecological transformations and a theoretical framework for analyzing the phases of transformative change in social-ecological systems. To arrive at this, the paper combines insights from three branches of literature focused on radical change - social movements, socio-technical transitions, and social innovation - with insights from existing transformation frameworks emerging primarily from studies of resilience in social-ecological systems.

O-046

Let's Play Transforming! Performative Methods For Sustainability

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To a large extent, transformation in the context of sustainability is about learning to play a positive active role in the drama of unsustainability. In the present situation, different kinds of learning are required to produce different types of knowledge able to support sustainability transformations. Being sustainability a multi-dimensional, highly dynamic and complex challenge, different processes of transformational learning need to be created. These entail the provision of new forms of civic engagement and interaction able to link diverse sources of scientific knowledge with personal experiences, emotion and ethical judgment for the

integrative understanding of global environmental change.

In this paper, we assess the potential, as well as the limitations of novel innovative participatory tools and methods based on dramaturgical approaches aimed at supporting sustainability learning and transformation. To this aim, we first review a series of experiences using theatrical performance and introduce the notion of performative methods ('performance + transformative'). Second, we assess to what extent these new approaches can be of relevance in environmental research-action and policy and provide a general framework to analyse the possible functions of performative methods for sustainability science, practice and learning. Finally, we list a series of key research questions to further guide methodological innovation in this novel area of sustainability science and practice.

O-047

Transforming Conventional Research Practice For Natural Resource Policy And Management. The Yorta Yorta "Learning From Indigenous Knowledge" Program.

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Conventional data structures and western scientific paradigms do not adequately accommodate spiritual and cultural elements of landscapes and waterways, nor do they protect the culture and identity of Indigenous peoples. An innovative and unique transdisciplinary research program, being

carried out in Yorta Yorta country, Australia, is seeking to address this gap by integrating Indigenous knowledge for more effective and ethical decision support in natural resource and climate adaptation policies. The framework that underpins this program is designed to create a safe repository for cultural knowledge, foster opportunities for skill and capacity building among Indigenous youth, and facilitate genuine participation in resource management processes affecting traditional lands. A key innovative aspect of this research program rests on the development of new data structure paradigms that recognise the importance of connectedness and relationship in Indigenous and western data as well as actively engage Indigenous youth in the cultural data collection process. However, this engagement goes beyond skills development alone. It also serves to uphold and support key traditional methods in intergenerational knowledge transfer, as well as the kinship and spirituality of landscape, flora and fauna over time. This unique transdisciplinary partnership between scientists, Yorta Yorta Elders and their youth has fundamentally challenged conventional research practices, raising important considerations for how research quality and impact ought to be considered and evaluated. This presentation seeks to share experiences and lessons learnt on the development of this research design and associated fieldwork tasks, as well as show how these new practices are initiating and facilitating a transformation that is both ethical and sustainable for a new kind of science.

O-048

Formalisation And Separation: Summarising Science For Climate Policy

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In studies of environmental issues the question of how to create a successful interplay between science and policy has been widely debated, especially in relation to climate change. By means of the dimensions of formalisation (offering guidelines on how to structure the procedures for summarising and using research, e.g. by protocols) and separation (maintaining a clear boundary between science and policy), the ambition of this paper is to make a contribution to a better understanding on how science is summarised for policy purposes. We argue that all activities relating to the synthesis and use of research can be placed along these dimensions. Indeed, separation and formalisation are key components of the canonical image of scientific practice. The theoretical analysis performed in this paper, however, is based in science and technology studies (STS), an academic field well known for its critique of attempts at separation and formalisation. From the two-dimension diagram we observe an attraction to the endpoints, i.e. supporting (the canonical image of scientific practice) or criticising (the standard STS view) highly separated and formalised initiatives. By the help of three examples mapped into the diagram - the IPCC; the EU "Science for Environment Policy" (SfEP) initiative; and the UK Climate Change Committee (CCC) - we try to bring out salient differences and a space of possibilities

concerning how formalisation and separation are dealt with. We argue that STS is in need of a more nuanced understanding of the two crucial dimensions of formalisation and separation, enabling analysts to critically but constructively assess practical mechanisms designed for summarising scientific knowledge for policy, and more specifically for climate policy. This means going beyond the ambition of debunking the false pretensions that formalisation and separation usually involve.

O-049

Ecomodernity: A Preamble

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Objectives: The study has a two-fold aim: 1) To re-read the story of modernity's environmental destruction in narrative terms, inspired by Aristotle's Poetics. 2) To propose a Ecomodernity as a concept - and a story - which captures the current Zeitgeist and creates a synergy between green economy on the one hand and "cultural creatives" on the other. 3) To propose cultural innovation for a sustainable future as part of ecomodernity's agenda and a missing link in the attempts to overcome climate crisis. Our questions are: What stories have dominated modernity's progress and environmental decline? Which stories have most successful? Why has "sustainable development" failed as a persuasive story? What is the promise of ecomodernity in this regard? Method/material: We propose a conceptual and narrative reframing of current attempts to save the planet. Ecomodernity is a stage of modernity which challenges both the boundless narrative of the American Dream and the

unsavory narrative of limitations (sustainability) with the story of transcendence. We study ecomodernity's manifestations in politics, economy and culture. Results: 1) In the commercial realm ecomodernity envisages the firm as a potential agent of green transition and eco-innovation which fosters new industrial fields, stimulated by green policy initiatives. 2) In culture ecomodernity involves re-designing our system of education, contents of religious instruction, media narratives, and the model of cultural heroes, and imbuing them with ecological ethics. Conclusions: Ecomodernity is a positive, unifying term which designates innovation for sustainable future in the domains of politics, economy and culture. Representatives of these realms need to feel that they have become a part of the new ecomodern commons which has a value-charged programme and an edifying story to follow.

O-050

How Does The Global Power Shift Affect The Low Carbon Transformation?

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The starting point of this paper is that most Western countries are politically paralysed and have little financial room to manoeuvre. They cannot carry out their expected role of leading the green transformation. In contrast, the rising powers, in particular China and India, have stepped up their low carbon investment. China has become the global lead investor in renewable energy and India has seen the highest recent growth rate. The problem is that these countries are also major contributors to the increases in carbon emissions. The rising powers have thus become the default movers and shakers

in the global economy, including the global green economy. The question is how the global power shift from West to East affects the transition from high to low carbon development. This paper sets out the economic and political issues to be examined in order to assess the outcome. It pays particular attention to the policy drivers and the prospects for transformational alliances in China and India. The paper includes a case study which underlines the interconnectedness of changes in China and Europe; it shows how China is reshaping the European wind power industry, identifying four corridors of influence through which China drives the changes. This power shift affects the cost and speed of the transformation and the distribution of the gains between Europe and China.

O-051

Homo Consumens, Needless Consumption And Sources Of Transformation

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When Western economies struggle, the remedy is to increase consumption. To deal with the climate crisis, however, the remedy is to reduce consumption. The problem is not consumption, per se, but the needless consumption perpetuated by a nihilistic, narcissistic and secular time that perpetuate the climate crisis and the widening gap between rich and poor in the world. A driving force is the evolving of homo consumens, which exists on the basis of what it shops, trapped in a culture of consumer-addiction. To mobilize the transformative power of change, homo consumens needs to break with patterns of consumer-addiction, which is a deep, existential

challenge for the self and for communities. This paper addresses four areas: 1) the climate crisis as an existential crisis of the self, 2) the rise of homo consumens and the culture of consumer-addiction, 3) sources of transformation deep enough to break the patterns of consumer-addiction, and 4) how transformation needs to take place, i.e. through reconnecting to self in communities of place (with examples from the Transition Town movement).

O-053

Pathways To Sustainable, Adaptive Development In An Era Of Climate Change

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Addressing the root causes and path dependencies that reproduce social vulnerability have been largely absent in climate adaptation policy. Arguably, climate change adaptation will not achieve such a transformative potential without better understanding of the complex interaction of human cognition, risk perception, resource access and institutions. In this paper, we propose a heuristic for evaluating the relationship between adaptive capacity in face of climate change and the critical capacities necessary for transformative development, which we define as development investments that fundamentally alter the structural conditions that circumscribe choice sets over time. First, we outline the critical tensions between climate adaptation policy and development practice. Then we consider four domains of tradeoffs between capacities for risk management ('specific adap-

tation') and capacities of sustainable development ('generic adaptation'). We apply this heuristic to empirical case studies from NE Brazil, Mexico and the SW United States to illustrate how institutions and public policy are potentially limiting the potential for synergies between adaptation and development trajectories. We argue that the relative role of specific or generic capacities in creating pathways for transformative adaptation will depend on the initial system states. Nevertheless, the predominant policy interest in specific risk management may only exacerbate existing inequalities and foster complacency among those who otherwise would be in the best position to proactively respond to the challenges of climate change.

O-054

Transformations In Land Use In The Southwest Coastal Zone Of Bangladesh: Resilience And Reversibility Under Environmental Change

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Land use has been transformed by human action over many millennia, and increasingly so in the past half century. The deliberate transformation of delta environments has been undertaken on the premise that such changes, notably through irrigated agriculture and aquaculture, significantly improve economic activity and well-being. Yet the paradox remains is that insecurity and a lack of well-being persist even in fertile and productive environments across the world's deltas. Here we examine

land transformation experiences in delta environments in south west coastal Bangladesh, and show that aggregate economic activity increases through the observed transformation, but an economic system where surplus value is extracted from producers ensures that the benefits are not widely distributed. The temporal dimensions of risk mean that aggregate well-being may also decline over time as transformations fail to sustain economic activity. Further, we show argue that transformations in the social-ecological systems involve significant hysteresis and may be difficult to reverse engineer when the benefits of the planned transformations are not realised. This has implications as Bangladesh continues to protect its development from the negative effects of environmental change.

O-055

Capacity Building And Critical Development Practice For Social Transformation

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Climate change poses a number of critical questions to what we understand as development and how we practice and behave in the field of development aid. In this paper we want to explore, particularly, what kind of capacities need to be developed to initiate and facilitate transformations or, as we named here, to develop a critical practice of development. Based on works of different authors we define three key capacities for critical practice: navigating complexity, understanding and engaging with power and the capacity for continuous learning and adaptation. These

capacities emerge constantly as a result of a continuous and endogenous process, which takes place in individuals and groups. These processes are driven by comprehensive learning experiences (experiential, emotional, and intellectual experiences); by constant questioning, redefinition, and development of values and visions of social change, and by relationships. In this paper we characterize this proposal and we explore a postgraduate university programme in development management offered by the Universidad Polit cnica de Valencia (Spain), with a twofold aim: first, to carry out an inquiry of the programme as a capacity development process in the training of critical development practitioners and second, to discuss the suitability of the framework for understanding similar capacity development processes. The methodology employed for this study consisted of undertaking semi-structured interviews of thirteen students who have completed the Master's programme training process, complemented with an analysis of the students' dissertations, as well as their internship reports.

O-056

Where The Rain Falls: Households' Use Of Migration In Eight Countries Facing Shifting Fainfall Regimes

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This research explores the inter-relationships among rainfall variability, food and livelihood security, and human mobility in a diverse set of research sites in eight countries in Asia, Africa and Latin America. While climate change

affects nearly all aspects of food security - from production and availability, to the stability of food supplies, access to food, and food utilization - the Rainfalls research focused on linkages between shifting rainfall patterns and food production and the stability of food supplies . The central focus of the of the initiative was to explore the circumstances under which households in eight case study sites in Latin America, Africa, and Asia use migration as a risk management strategy when faced with rainfall variability and food and livelihood insecurity. Climate change is likely to worsen the situation in parts of the world that already experience high levels of food insecurity. The consequences of greater variability of rainfall conditions - less predictable seasons, more erratic rainfall, unseasonable events or the loss of transitional seasons - have millions of people, and the migration decisions of vulnerable households. In order to make informed decisions about adaptation planning, development, and a transition to a more climate-resilient future, policymakers and development actors need a better understanding of the linkages among changes in the climate, household livelihood and food.

O-057

Transformative Communities

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The term transformation is in the air, as a way to avoid dichotomies between mitigation and adaptation efforts, addressing both simultaneously and going beyond busi-

ness as usual or mere incremental changes. In this paper we present and define the term transformative communities. We ask what are the circumstances and factors that underlie transformations from both theoretical and empirical perspectives in specific contexts. This includes attention to factors and circumstances such as values, worldviews, knowledge, policy, institutional settings, social practices, or focusing events. We set up a conceptual model on what these communities may look like using empirical examples of transformative action of various kinds (towns, villages or neighborhoods; technological, social, or virtual). Drawing from a literature review as well as from past and ongoing research projects on adaptation and mitigation, the paper presents a typology of cases where different transformative processes have emerged as a measure to handle climate challenges and have either driven, or created, a community of action. Particular emphasis is placed on investigating the values, policies and mechanisms that underlie such transformations; and the factors that make these cases a community of action. We identify four different types of transformative communities according to their drivers: Bottom up or social movement led; top down, or policy led; knowledge or research led, and private sector driven.

O-058

Engaging Community Knowledge And Energy Towards Transformation: A Participatory Systems Approach To Understanding Climate Adaptation Needs, Australia

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Emerging literature on climate adaptation suggests needs for effective ways of engaging or activating communities and supporting community roles, coupled with whole-of-system approaches to understanding climate change and adaptation needs. A study across South East Queensland, Australia has developed and tested a participatory approach to elicit community and stakeholder understanding of climate change adaptation needs, and connect diverse community members and local office bearers as a stimulus to potential action. The study was conducted in a series of connected social-ecological systems along a transect from a rural area, through a culturally diverse and low-income peri-urban and urban area, to the coast and islands of ecologically sensitive Moreton Bay. We conducted 'Climate Roundtables' with 30-40 participants in each of three areas along the transect, while a fourth Roundtable of 65 people reviewed and added to the initial findings, extending the results from the local areas to the region as a whole. Influence diagrams produced through the process show how each climate variable forecast to affect this region (heat, storm, flood, sea-level rise, fire, drought) affects the natural environment, infrastructure, economic and social behaviour patterns, and psychosocial responses together, and how sets of people, species and ecosystems are affected, and act, differentially. The influence pathways were cumulative with current trends such as the building of new towns reducing wildlife habitat. They provided insight into the ways people think about and deal with these considerations. Participants were highly interested in forming networks for future action together, and evaluated the participatory process very positively.

O-059

Community-based Transformation In Rural Communities Of El Salvador

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In the past few years disasters following climatic extreme events have increased in El Salvador. They are often understood as natural and unavoidable. This misconception builds barriers against urgent transformations needed in the country. Giving voice to vulnerable communities is the main purpose of this work. The paper summarizes research carried out, within the framework of an NGO project, on capacities and vulnerabilities of two Salvadorian campesino communities prone to annual flooding. Analysis covers community, municipal and national levels and uses quantitative and qualitative tools with strong elements of participatory research. Results show that community vulnerabilities are based on unsatisfied basic needs such as access to education, health service, public infrastructure and constant food insecurity. Capacities of farmers are evident on their 19 adaptation strategies at work, presenting 26 proposals for the future. Their initiatives combine traditional and innovative approaches based on Disaster Risk Reduction (DRR), climate-resilient livelihoods and capacity development, addressing also underlying causes of vulnerability. Capacity assessment in state institutions shows, however, insufficient comprehension of the poverty/vulnerability relationship. While transformations towards self-sufficiency and sustainability are already taking place in vulnerable communities, governmental support for rural areas is almost non-existent. State development

approaches ignore traditional knowledge and consider the natural environment as a mere resource to use. Consequently and far too often government projects generate new local risks. Will transformations taking place in communities at risk percolate from the bottom-up? It remains to be seen if, for developing countries like El Salvador, there will be the political will.

O-060

Climate Risk Management And Entry Points For Adaptive Smallholder Systems In The Peruvian Andes

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Andean highland communities have shown a pronounced capacity to adapt agricultural practices to multiple and consecutive weather perturbations. Operating in dynamic socio-ecological systems, they have used traditional strategies of risk distribution to deal with the pronounced climate variability. However, farming systems are undergoing critical transformations due to demographic, economic and social changes. In light of the currently untenable development trajectories relating to food insecurity, the question arises of what role traditional strategies play in managing weather-related risks. To address this question, we analysed agricultural practices in the southern and central Peruvian Andes. Household surveys, group discussions, participatory cartography and pattern analysis served to assess strategies of risk management. Results demon-

strate that major strategies such as the cultivation in a diversity of agro-ecological niches and local weather observations have been undermined by resource scarcity, market orientation and increasing off-farm activities. These conditions favour a depletion of assets and related food insecurity. Entry points for improving the farmers' adaptive capacity relate to the building-up of agricultural assets, improved weather forecasts and livelihood alternatives. In particular, the application of weather forecasts to adjust agricultural management has been intensively discussed. Available forecasts in the study area however do not reflect well the multitude of microclimates created by the mountain topography and have scarcely been integrated into the agricultural decision-making of smallholders. Therefore, more reliable forecasts and their integration with local observations would be essential to increase the smallholders' adaptability. Overall, this research opens up possibilities for redefining research priorities and reconsidering the role of smallholders in facilitating climate resilient transformations.

O-061

Interventions For Enhancing Transformational Change In A Changing Climate: Insights From Organisational Change Management Theory

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When transformational change is a rather new topic in the climate change literature, it has been intensively debated in the field of organisational theory for over 30 years. This paper argues that we can learn much from organisational change management theory. It

addresses three topics. 1) How to conceptualize the processes of transformational change in response to long term climate change? 2) To what extent and through which interventions can processes of transformational change be influenced? 3) What are the implications of these insights for the role of governance actors who aim to enhance transformational change? The paper concludes that the different ambitions associated with transformational change, namely a deep level of change, large-scale and intentional, do not fit together. Therefore it proposes an approach of redirecting small-scale in-dept changes. This approach involves three groups of interventions: encouraging continuous adjustments; sensemaking; and unblocking stagnations. The role of governance actors is that of enabler, sensemaker and sparsely that of interventionist. This proposed approach of transformational change is in contrast with the impatience surrounding governance actors involved in climate change. Their challenge is to temper their ambitions and make sense of small wins.

O-062

Naive Transformation, No Thanks: Lessons From The Caribbean For New Institution Builders

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The Caribbean region is at the frontline of environmental change-development tensions. It also offers a laboratory of contrasting social and political contexts with which to examine pathways of adaptation. This paper sees adaptation as part of a progressive movement towards

sustainable development. It focuses on the efforts of Oxfam GB to work across three contrasting polities (Guyana, Dominican Republic and Haiti) to open local solution space within which adaptation could take on a wider, progressive direction, with multiple stakeholders including those at risk, scientists and local government. Where such partnerships are not the norm, the opening of such a space is itself potentially transformative, elsewhere it offers focus for transitional adaptation that can engender practical and attitudinal change without challenging existing structures of governance or deeper assumptions about society. In each country, Oxfam sought to open solution space at three connected levels to stimulate: individual risk awareness for attitudinal change and the generation of leadership, community based risk management organisations and engagement with national level risk governance. At its heart this is an effort to confront existing values, of citizenship, neighbourliness, individuality and communality, worked out through risk and its management. The paper presents the moments and outcomes of confronting existing with alternative values in each national context and for each level of intervention exploring the effectiveness of Oxfam's strategy with those implied by the behaviour of local stakeholders.

O-063

Policy Innovation In A Changing Climate: Sources, Patterns And Effects

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The governance of climate change is in a state of great flux and

scholars are still far from possessing a solid appreciation of current processes and future possibilities. Recently, the focus on the international regime has been supplemented by the study of more distributed forms of governance involving and sometimes even led by non-state actors. Nonetheless, in the rush to think in less hierarchical terms, analysts are under appreciating the capacity of states to engage in policy innovation - defined as the process and/or product of developing new, widely adopted and impactful policies when existing ones are perceived to be under performing - at all levels of governance. The capacity to innovate is one of several important capacities that political systems seek to possess, but it is likely to be especially political if attempts to change the policy status quo challenge established distributions of policy costs and benefits. Based on a systematic review of the existing literatures, this paper makes the case for looking afresh at policy innovation drawing on three perspectives focused on: the source of new elements (ideas for 'invention'); the spreading out and wider entry into wider use of those elements ('diffusion'), and their subsequent effects ('evaluation'). The analytical and methodological challenges that arise from combining these perspectives in new ways are systematically unpacked and related to the other papers in the special issue, which interrogate the politics of invention, diffusion, and evaluation. In doing so, they seek to politicise a topic which has tended to be treated in a rather fragmented, technocratic and unreflexive manner.

O-064

Transformation Of Urban Lake Governance In Bangalore, India- A Comparison Of Civic Initiatives

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The neglected tank system in Bangalore, India, is regaining attention to deal with urban water scarcity as well as increasing recurrence of high precipitations and urban flooding events. However, on-going lake restorations often focus on recreation while excluding other users such as the urban poor, and fail to pay attention to lake connectivity and ecological function. Furthermore, restorations are not followed up by adequate management. This study compares a set of 5 lake rejuvenation projects where management is shared between city authorities and a local association. We address two key questions: 1) what are key social network features that have navigated transformation of lake management, and 2) to what extent can these cases be described as local transformations of lake governance, in terms of sustained management, ecological function, and equity. Preliminary results suggest that strong leadership connected with a sense of place is key to initiate and navigate early stages of the transformation efforts, while stages related to the preparation of plans and proposals require a varied set of actors organized in shadow networks or informal groups. The presence of actors with knowledge on lake biology (knowledge brokers) notably improves the ecological outcomes of the restoration. Finally, successful interactions with formal authorities seem to be leveraged

by politically engaged actors with knowledge about the functioning of the government system across scales. In identifying and analysing the capacities and competencies needed to initiate, develop, and facilitate transformation, the study will provide general lessons for local and cross-scale governance of urban commons.

O-065

Transition Management As An Approach To Deal With Climate Change

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Mitigation and adaptation are undoubtedly a highly debated topic in science and policy. Facing the potential consequences of inaction, several authors (e.g. Stern, 2007; IPCC, 2011) have stressed the need for transitions away from dominant towards more sustainable regimes, e.g. by cutting emissions drastically or rapidly advancing adaptation. Respective transitions imply radical shifts towards new systems or system configurations: carried by multiple actors over long time spans while encompassing multiple changes in societal systems. Transition theory draws out key characteristics of transitions such as multi-actor, multi-level and multi-pattern dynamics. Building on this, reflexive, multilevel governance approaches such as transition management are proposed, building on co-evolutionary steering using visions, experiments and cycles of learning

and adaptation. Transition management aims to help societies transforming themselves in a gradual, reflexive way through guided processes of variation and selection, the outcomes of which are stepping stones for further change. While discourse and application of transition management has been rapidly increasing lately, links to the field of climate change research remains limited.

O-066

Can Development Projects Transform Energy Systems? Transition Management As A Model For Southeast Asia

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The transformation of energy systems towards a sustainable and renewable energy supply is one of the biggest challenges of our time. It is vital for our climate and the reduction of greenhouse gas emissions. Today, most transition research focuses on the question how industrialized countries need to transform their economies towards a more sustainable path. However, it is the developing world that becomes more and more relevant with regard to climate change, greenhouse gas emissions and energy consumption. The ASEAN energy outlook predicts that Southeast Asia's energy hunger will almost triple by 2030 - leading to a high rise in greenhouse gas emissions.

New technologies could change this emissions-intensive path of development, but their implementation and deployment faces severe economic, social and political barriers, as development projects prove. This raises two fundamental questions: (1) Can development cooperation after all promote re-

newable energies in a way to support the transformation towards a sustainable energy system? And (2) how can development cooperation activities have an impact not only on their local environment, but also national energy system?

To answer these questions, this paper combines a theoretical approach that is new in the field of development cooperation with empirical experiences from Southeast Asia. It argues that transition management provides a useful theoretical framework and adopts it to the developing countries' context. Its application will then be exemplified with three renewable energy projects in the Philippines, Indonesia and Vietnam. As a result, we can highlight that the impact of development projects on an energy transformation mainly depends on two fundamental variables: the design of the project activity itself and the political capacity of the developing country. This is relevant for researchers dealing with development theory, but also for practitioners working in the field of development cooperation.

O-067

Wind Power In China And In The EU: A Comparative Analysis Of Key Drivers

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Although China and the EU differ vastly in their preconditions for environmental governance and investment, both political entities have expanded their capacity for wind-power generation greatly over the last decade. The EU

member states have generally been regarded as modern and prosperous, with high and stable energy consumption and large, high-tech wind industries. China, in contrast, is an emerging economy under autocratic rule, with rapidly-increasing energy consumption and comparatively little domestic R&D in wind turbine technology. What can explain the fast development of wind-power production capacity in the EU and China, despite the very different political systems and basic pre-conditions? Applying the method of ‘most-different systems design’, this paper shows that, in both regions, large-scale investment in wind power has come about through a specific set of political motivations. These include strong governmental support policies based on similar aims such as security of energy supply, creating future-oriented and promising industries, and reducing greenhouse gas emissions. Furthermore, the parallel increases in wind power have been consolidated by several interaction ventures, such as European wind companies’ licensing of technologies and investment in China, and some mergers and acquisitions between European and Chinese wind manufacturing companies. These three factors may explain the political motivations driving rapid investment into renewable generating capacity elsewhere.

O-068

Pathways To Sustainable Living In Times Of Crisis Integrating Individual And Structural Approaches For Sustainability Transitions

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Developed countries face not only major sustainability challenges, but also major social and economic challenges too, due to the current financial, social and economic crises. This calls for novel participatory methodologies that are capable of addressing major societal challenges, bring about social innovations and empower citizens. The interdisciplinary EU research project InContext has taken up this issue. It addresses the complexity of the contexts of individual behaviour by integrating both individual and structural explanations. A core aim is to foster sustainable communities. The paper present theoretical as well as first empirical results: First, at the individual level the theoretical framework is based on the capabilities approach and focuses on the fulfilment of individual needs through strategies that support sustainable development. The capability approach has been extended by modelling the influence of values, learning, awareness and emotions on behavior. Practice theory is used to embed individual behaviour in societal structures. Second, case studies explore alternative consumption and production practices towards greater sustainability in both the energy and food domains. Case studies focus on the conditions of emergence and diffusion of alternative and more

sustainable niches. Third, action research, consisting of three pilot projects, incorporates the theoretical and case study findings into a transition management process. The process involves a group of frontrunners who go through a process of reflective learning, experimentation, awareness rising and capability development. Increased involvement and capability development will make communities more capable of addressing local sustainability problems. While the first and second part of InContext aim to understand changes in individual sustainable behavior in it’s interplay with the surrounding structures, the third part explores ways to consciously manage this interplay.

O-069

International Research On Business Sustainability In Business Networks: Current Status And Future Studies

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The aim is to describe an ongoing international research project and its research network’s efforts to develop a business sustainability index. ‘Business sustainability’ is defined as a company’s or an organization’s efforts to manage its impact on Earth’s life- and eco-systems and its whole business network. Cases studies across countries form the basis for a grounded approach to data gathering within the research project. Elements of business

sustainability have been categorized in terms of stakeholders and sources as well as based upon the triple bottom line approach. Subsequently, common denominators have been extracted to provide dimensions of business sustainability. The main contribution is to show a breakdown of economic, social and ecological categories, based upon empirical observation. It is about companies' efforts to go beyond only focusing on profitability, but to also manage its environmental, social and broader economic impact on the marketplace and society as a whole. Further outcomes include research propositions, derived from the empirical findings that enable future research on business sustainability to be measured. The findings indicate the extensiveness required to operationalise a business sustainability index.

O-070

Industry And European Integration: Institutional Feedback Trumping National Economic Power?

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We have only scattered knowledge about how and to what extent industry affects EU policy making. This article discusses the relevance of three industry influence mechanisms: Instrumental Governments, with dominant member states defending the interests of their economically powerful national industries (drawing on Liberal Intergovernmentalism); Institutional Feedback, focusing the dynamics of the organizational fields involved in policy-making (New Institutionalism); and Network Entrepreneurship, focusing industry actors with exceptional

skills or intensity in the policy process (Multi-level Governance). A historical comparative study of three EU climate policies - emissions trading, renewable energy, and energy policy for buildings - concludes that the Instrumental Government mechanism hardly captures industry influence. Instead, industry exerts influence primarily through Institutional Feedback, a mechanism previously given little attention. The entrepreneurial mechanism contributes only minor adjustments.

O-071

Corporatism And Social Movement Power For Ecological Transformation: The Case Of Portland And Oregon

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This paper addresses the factors promoting successful political entrepreneurs and the kinds of coalitions associated with more successful, durable political interventions related to the environment or conditions in Portland and Oregon? It also shows how various factors helped promote an ecological region. These include: (a) the ability to exploit crises for social change; (b) the enlistment of social movement support which can be extended via the "circulation of struggles" or certain intellectual and network ties among movements, as well as via migration processes that promote learning, contacts, and extend change over geographical spaces; (c) the ability to enlist media capital based on journalist careers, face-to-face networks, and campaign donations which provide a foundation for gaining secondary or later stage establishment capital; (d) the ability to forge alliances with part of the business elites and promote corporatist bargaining, without becoming coopted by such elites.

O-072

Historical Case Studies From Oceania: How To Account For The Benefits And Losses Of Transformation

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Historical analogies of social transformations can be used to identify what factors are conducive to transformation in the context of climate change. Through a series of case studies from Oceania we examine how the widespread environmental and social changes associated with European colonisation in the nineteenth and twentieth centuries resulted in multiple transformations. Diverse examples, ranging from environmental transformation in New Zealand, to social transformation in Australia, and political transformation in Vanuatu, highlight how transformation is often not a rapid or singular event, but rather is a cumulative and incremental process. These case studies provide us with an opportunity to consider both the circumstances under which transformation occurs and the long-term consequences of transformation. While purposeful transformations can be instigated by small groups of committed individuals working in formal or informal networks, our case studies highlight that deliberate transformations are often imposed on societies and result in the loss of resilience, increased vulnerability, and the creation of new risks within socio-ecological systems.

O-073

Distilling The Characteristics Of Transformational Change In A Changing Climate

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This paper investigates the growing interest in, and use of, the concept of transformation in the context of climate change and development challenges. Climate change response strategies are taking a wide variety of forms, but there is increasing interest in the distinction between those which regard climate change as an incremental addition to existing actions and more transformational responses which fundamentally alter the approach, the institutions, the actors and their inter-relationships. The term ‘transformation’ is consequently climbing climate change agendas, stimulated by both the ongoing failure efforts to curb greenhouse gas emissions and growing likelihood of dangerous levels of climate change impacts that push natural and human systems over key thresholds or tipping points.

The concept of transformation has its roots in a wide range of disciplines and it is frequently used un-problematically or without explanation. This paper addresses this issue, highlighting the characteristics of transformational change in the context of climate change adaptation and development, based on a literature review and interviews with experts. While recognizing the existence of multiple pathways and transformations, the analysis distils six common characteristics that include: Radical change, innovation and experimentation; Addressing power imbalances; Critical reflection,

beliefs and values; Effective leadership; Collective vision and future orientation; and Moments of opportunity and policy windows. By collating the reflections of experts and key findings from academic papers, we attempt to create the foundations of a more robust conceptual grounding for transformational change in the context of climate adaptation and development.

O-074

Learning About Transformational Design In Pakistan’s Climate Compatible Development Space

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Pakistan has been described as a ‘hard country’; moreover one in which climate change already wreaks havoc. Lieven (2011) argues that Pakistan will survive terrorism and chaos but climate change may be its undoing. The hard country of Lieven’s title refers to the resilience of its people to recover from frequent shocks in the social, political and ecological realms, beginning at partition in 1947 and most recently manifested in the floods of 2010 and 2011. We have recently had the privilege to work with the challenge of transformation in Pakistan’s climate compatible development (CCD) space. In approaching this work we have drawn on a portfolio of systemic and transformational design practices which, while well established in other areas of public value transformation, remain relatively poorly explored in the CCD domain. Yet as a ‘super wicked’ issue, CCD suggests fertile ground for their application. Through narrating and reflecting on some of

the entailments of working with systemic and transformational design praxes in the CCD context, this paper explores the early stages of an emerging innovation platform for CCD in Pakistan, looking at the role of holding frameworks, unlikely alliances and designing for social learning in developing and progressing this platform within a dynamically unfolding context. We conclude by reflecting on some of the challenges of facilitating CCD pathways in so-called ‘difficult environments’.

O-075

Livelihood Diversification And Social Network Transformation In Northern Tanzania

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Research to examine how social networks transform will be necessary as economic and environmental dynamics evolve in response to global climate change. In the developing world, where social welfare programs are limited, traditional social networks of exchange and reciprocity are critical components of household security, disaster relief and social wellbeing especially in rural areas. Ultimately, networks serve to spread risk, reduce vulnerability and support the capacity for collection action within communities. Much of the prior research on social networks has focused on (1) describing the structure and function of networks and (2) examining the consequences of networks for individual outcomes. Fewer studies have examined how established networks transform in response to outside factors and indirect effects. This research focuses on an area of Tanzania where households have diversified their economic activities (i.e., livelihood diversification) in response

to constraints and opportunities associated with local biodiversity conservation. Within this context, this study uses a comparative, mixed methods design to examine (1) the character and incidence of inter-household exchanges of material goods (IHE) and (2) the association between IHE and livelihood diversification, in ethnically Maasai communities near Tarangire National Park. Findings for this study: (1) describe the primary mechanisms of IHE; (2) describe recent adaptations in the use of IHE; and (3) show that the utilization of IHE is significantly inversely related with livelihood diversification at the household-level. Given the often unidirectional nature of livelihood diversification, these findings support the idea that a social network transformation is taking place in the study area.

O-076

Transformation And Barriers In The Context Of Multiple Stressors: Understandings From Two Rural Sites In The Eastern Cape, South Africa

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Poor rural communities in South Africa are exposed to a suite of interacting risks and stresses that are growing in intensity and frequency and impacting severely on livelihoods and human well-being. At the same time rural society is undergoing longer term 'background' change (e.g. deagrarianisation) with no clear trajectories evident. In this context, consideration of transformation measures is essential if communities are to deal with an ever more

uncertain future and the predicted impacts of climate change. This paper draws on findings from several sub-studies and an intensive parallel social learning process over three years in two sites in the Eastern Cape. The overall project, funded by the IDRC, sought to explore how climate change, together with several other livelihood stressors including HIV/Aids, affect vulnerability, food security, livelihood strategies and choices, adaptive capacity and coping, adaptive and transformational responses amongst different types of households. We use the study findings to consider the conditions, changes and stressors that may result in some people being trapped in a state that prevents transformative action in response to vulnerabilities experienced and to future uncertainty. In particular, we try to understand how historical processes, national policies (such as the provision of social welfare), and changing local dynamics might act as barriers that hamper local people's ability and capacity to amend their practices and activities and to consider new trajectories.

O-077

Exploring Transformation For Resilient Australian Landscapes And Communities

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A new model for natural resource management (NRM) is emerging in Australia driven by i) recognition that current paradigms are inadequate for addressing complex problems such as climate change and ii) the need for radical transfor-

mation in many regional systems. This new model draws together resilience, adaptive governance, social learning and transformation concepts into a learning-by-doing process that builds the capacity of regional social-ecological systems for adaptive and, where required, transformative self-organisation. We report on our work since 2009 with regional NRM organisations and their communities in the Murray-Darling Basin developing a transformability framework, a heuristic for evaluating capacity for transformation, practical change strategies and a supporting toolkit. The heuristic consists of five critical 'management capacities' that provide the conditions for change and five 'stimulants' of transformative action that support going beyond adaptive incremental change, towards more radical transformative change. The heuristic provides a diagnostic for assessing transformative capacity and guidance for designing transformative interventions in planning processes. We report on both successful and unsuccessful application of the framework and toolkit. In the former, a regional agency has successfully transformed into a change organisation well placed to lead to wider social-ecological system transformation. The latter demonstrated the importance of defining the system, transformative leadership, identifying shadow networks and jumping through windows of opportunity.

O-078

Enfolding: Unfolding-Tracing Socioecological Collective Action In Cape Town And New Orleans

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Transformation is about ‘upscaling’, when something escalates, entering the awareness of others and enfolding itself into practice. However, the word ‘upscaling’, alongside ‘transformation’ is merely shorthand for intricate processes that necessarily work in-place and through social, cultural, political and indeed ecological relations. Based on participatory observation, we trace how collective action have emerged in marginalized neighborhoods of Cape Town and New Orleans through the construction of ‘platforms of engagements’. In the apartheid era township of Grassy Park, a resident’s house became the site to rehabilitate vegetation and bring dignity to forgotten spaces. Our tracing opens the ways by which memories of oppression from apartheid and colonization unfolds with collective action to challenge who can claim to be in the know of urban ecology and sustainable development. In New Orleans’s Lower 9th Ward, a wooden platform overlooking a degraded swamp forest was constructed in the wake of 2005’s Hurricane Katrina. With its placement in a once flooded neighborhood, the platform staged memories of historical use of the swamp, promoting reconnection with regional ecosystems and visions of extensive ecological restoration. We interpret our case studies through the word combination of enfolding and unfolding-to unfold and perform on a wider scale, collective action needs to unfold more and more actors and spaces to sustain transformation. Our contribution lies partly in working against ready-made frameworks to study change, e.g. ‘sustainability transitions’ (STRN 2010) and ‘ecosystem management transformation’ (Olsson et al 2010), which tend to divide the world in social and ecological spheres. We work towards a relational way of tracing more-

than-human collective action, which remains sensitive to cultural, political and ecological dimensions of transformation.

O-079

Perceptions Of The Decision Process Through Drought And Flood In The Murray-Darling Basin, Australia

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The Murray-Darling Basin incorporates Australia’s three longest rivers and spans four States and one Territory. It is important for an agricultural industry worth more than AUS\$9 billion per year, but is also the life source and spirit of the Indigenous Yorta Yorta people. Persistent severe drought and extreme flooding episodes have presented new challenges in the region. The exceptionally wet conditions experienced since the break of the “Millenium Drought” beg the question as to whether key drought and flood characteristics are changing due to anthropogenic climate change. Many alternative goals for the management of the Basin answer to the requirement for an evidentiary basis. However, a choice cannot be made on this basis alone - interests and values are implicated in any alternative. Here we use Q methodology, an approach that elucidates patterns of subjectivity, to explore the perspectives of Indigenous and non-Indigenous residents, workers and decision-makers in the region. Empirically-grounded evidence on these diverse perspectives plays an important role in facilitating a transformation towards policy processes that are more inclusive of non-monetary and intangible val-

ues, acknowledging these as vital dimension of analysis. We address the inherent diversity of viewpoints on the risks from and responses to flood and drought, and identify the potential for common ground.

O-080

A Developmental Perspective On Climate Change Leadership

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Adult developmental psychology research reveals that there are fundamentally different ways of making meaning of our world, and that these ways of making meaning develop in consistent ways over time and across cultures (Cook-Grueter 1999, 2004; Kegan 2002; Torbert 2004). Some of the patterns to this development relate directly to how people perceive, make sense of and the opinions they are likely to form about complex issues such as climate change. They are also relevant for cultivating the leadership skills and capacities that are valuable and some would argue necessary, for tranformatively addressing climate change challenges. Understanding developmental differences can help climate change leaders navigate values-based conflicts, communicate in ways that transcend the differences of worldviews while including what each one values and design solutions or initiatives that address the needs of different communities. This study explores the impact (developmentally and with regards to leadership behaviors and the practice of teaching and mentoring) of introducing an adult developmental model and perspective into a PhD in sustainability leadership and education. It will also look at the role that adult development plays in how participants approach sustainability leadership and education. This mixed

methods study includes pre and post developmental assessments, an action inquiry process and pre and post interviews. Participants include faculty and students in the PhD program and the research cycle will last 6 months. Further research on the application of constructive-development theory to climate change leadership could contribute significantly towards catalyzing sustainable transformations within society and complement other research that integrates the social and natural sciences within the larger field of climate change. It also offers insight into the process of transformation itself - of both groups and individuals.

O-081

Transforming Natural Resources Governance - Opportunities Created By Socio-political Change

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Faced with accelerating environmental challenges, research on social-ecological systems is increasingly focusing on the need for transformative change towards sustainable stewardship of natural resources. Transformative change entails significant alterations of the system and its functions (in contrast to adaptive change, which leads to changes within the respective systems' logic). This pa-

per analyses the potential of rapid, large-scale socio-political change as driver for transformative change of natural resources governance. We hypothesize that shocks at higher levels of social organization may open up opportunities for transformation of social-ecological systems into new pathways of development. However, these opportunities may not always be realized. We investigate (i) under which circumstances socio-political change has been used as a window of opportunity for initiating transformation (ii) which key features of resilience get mobilized for transformation (such as institutional settings, networks, bridging organizations, memory, leadership, knowledge, learning) and (iii) how those features and processes of change interact across scales. This is achieved through analyzing natural resource governance regimes of countries that have been subject to rapid, large-scale political change: water governance in South Africa and Uzbekistan and governance of coastal fisheries in Chile. In South Africa the political and economic change of the end of the apartheid regime resulted in a transformation of the water governance regime while in Uzbekistan after the breakdown of the Soviet Union change both at the economic and political scales and within the water governance regime remained superficial. In Chile the democratization process of the late 80's has been successfully used to transform the governance of fisheries. The paper provides insights on successful transformation to improved stewardship of natural resources and sustainable pathways of social-ecological system

O-082

The Role Of Organisational Culture In Transforming Natural Resource Governance: A Case Study Of Adaptation On The Great Barrier Reef, Australia

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The Great Barrier Reef (GBR) is the largest coral reef system in the world. It is an iconic World heritage listed property, provides critical ecosystem services and economic activity around A\$5B p.a. However, the GBR is threatened by climate change. Since 2003, the Australian and Queensland Governments have jointly managed the risks climate change poses to the reef through a policy framework called the Reef Water Quality Protection Plan (ReefPlan). Its key objective is reducing pollutant inflows from catchment land use by changing on-farm practices, thus enhancing the GBR's resilience, including to climate change. The effectiveness of the partnership created between the Australian and Queensland Governments, the five Reef-facing Natural Resource Management bodies, and main industry associations is critical to ReefPlan's success. Interdependent roles means participant organisations, with significantly different cultures, must learn about, and from, each other. This paper draws on initial results of the study to examine the impact of the various organisational cultures on the implementation of the first (2003 - 2009) Reefplan. It finds that the implementation of policies with transformative potential like Reefplan can be significantly influenced by differences in the organisational cultures of both policymakers and participating organisations. The lesson from this study is that organisational networks can play an important part in the transformation of gover-

nance necessary to better manage climate risks, provided attention is given to ensuring that different organisational cultures correctly interpret the intent and direction of adaptation policy.

O-083

An Analysis Of Gender Mainstreaming In Philippine Institutional Responses To Climate Change

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Global climate change has become a pressing environmental, social, political and economic problem in highly vulnerable developing countries like the Philippines. A number of socio-political institutions are thus now involved in climate change initiatives in Philippine locales. While institutional efforts are underway, there is also a parallel growing concern that institutional responses to climate change will reinforce gender inequalities or undermine the gains made towards gender equality. This apprehension is significant in the Philippines since it has long subscribed to gender mainstreaming as a means to transform institutional operations and make them more gender-fair or equitable. This paper is based on a study that aimed to analyze the extent to which Philippine climate change institutions integrate the state policy on gender mainstreaming. Data collection made use of feminist approaches and institutional ethnography to reveal the complex ruling relations that influence practices on the ground. Interviews and focus group discussions were conducted with representatives from international institutions working in the Philippines, national government

agencies, local government units, civil society groups and grassroots communities. Study results highlighted that gender mainstreaming has largely remained rhetoric in the face of organizational masculinism, since gendered structures and processes impact on project implementation. Hence, there is minimal integration of gender concerns in Philippine institutional climate change initiatives, despite specific policy pronouncements and years of bureaucratic gender mainstreaming. The results generated implications and recommendations for transformative, gender-fair, equitable and sustainable strategies to address climate change concerns.

O-084

Transformation In Risk Governance For Adapting To Climate Change: Case From China

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Decision making under changing climate has become uncertain and complex, which take great challenge on traditional governance process. Take a mega city case in China as an example, this paper aimed to address weakness and strengths of existing governance system, and explored potentials to achieving for transformation to adaptive risk governance. Based on a participatory planning research with methods of expert evaluation, stakeholder meetings, interviews and SWOT analysis, this paper identified major hazard risks and impacted sectors, analyzed strengths and challenges on adaptation to climate change. With case study for a severe flooding disaster, this paper pointed out the mega city's vulnerability to climate risk exacerbated from the

weakness of coordination system, urban planning and risk perception. Then it implied that transformational responses can be facilitated by improving risk awareness, knowledge sharing and experience learning, innovation for risk communication, public participation and stakeholder involvement in decision making.

O-085

Learning For A Change? Emerging Challenges To Transformative Learning For Climate Change In South Africa

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Global environmental change, including climate change, is already presenting a number of challenges to both the environment and peoples of Africa. Socio-economic and environmental projections into the future (e.g. next 30-50 years) show that in some cases, parts of Africa may be particularly stressed. In southern Africa, for example, such projections already overlay chronic vulnerabilities to various stresses. Education, both formal and informal, presents a way to critically and fundamentally build transformative adaptation to stresses, including climate stresses. In this paper various case studies from South Africa including education at the tertiary, secondary and primary levels are presented. This work is then critically compared to various existing theoretical and pedagogical approaches for effective transformative learning. These studies show that by using transformative, transdisciplinary and social learning approaches 'education' (used here in its widest sense) can become a powerful vehicle for

building participative adaptation and enhanced resilience to climate change and climate variability. Finally, it is argued in the paper that such approaches are well poised in the southern African region to make fundamental and sustainable changes particularly for and with the next generation who will be 'living' with such future change. Such approaches also have the potential to be well mainstreamed and to resonate with policy given that both informal and informal education are also undergoing major changes in the region.

O-086

The Eternal Quest For Integration: Frameworks For Transdisciplinarity And Transformation In A Big-Ten U.S. University

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The focus of this presentation is on the efforts of the author and other colleagues at the University of Wisconsin - Madison to introduce and test a series of frameworks to frame discussions in higher education on the multidimensional complex change on the interaction of humans and nature. The first framework comes from what has been labeled "integral theory" (Wilber, 2001) and in particular its application to "ecology" (Esbjörn-Hargens and Zimmerman, 2009) and "sustainability" (Brown, 2007). The second framework has been proposed by the International Social Science Council (ISCC, 2012) in order to reinvigorate the contribution of social sciences to solve global environmental challenges and to foster dialogue with natural scientists to find a common ground and be more effective to meet "user" needs. I will argue that these frameworks have great po-

tential to craft a new way of thinking in trans (or inter) disciplinary graduate programs and engage students and faculty on discussions about "transformation" in order be more effective on the study and design of alternatives to such multidimensional complex change. Wicked problems such as climate change, or the management and conservation of natural resources and water in multiple regimes could be more effectively addressed when more dimensions are included in a coherent framework. References: Wilber, K. 2001. Brief History of Everything. Shambhala Press. Esbjörn-Hargens, Sean and Michael Zimmerman. 2009. Integral Ecology. Integral Books. Brown, Barrett C. 2007. The Four Worlds of Sustainability. Integral Sustainability Center. ISCC. 2012. Transformative Cornerstones of Social Science Research for Global Environmental Change.

O-087

Teaching For Transformation? Norwegian Teachers' And Students' Reflections On Civic Learning- Some Insights For Researchers Of Climate Change

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As the complex impacts of climate change are better understood, it is becoming increasingly apparent that facilitating long-term transformation across society will require far reaching change in not only to our economic and social systems, but changes which also challenge conceptions of who we think we are, as individuals with freedom to live high fossil fuel energy intensive lives. In this context the changes required of Norwegians are significant. Norway is a country for whom oil production

has created enormous wealth but also enormous responsibility to consider how to distribute benefits and manage negative environmental effects. Many Norwegians are aware of this responsibility and the societal changes being forced upon them as a result of rapid economic growth. For many educators and scholars, the first step to influence society's future attitudes and actions is through civic education: teaching and supporting young people to become critical thinkers and active citizens. So how are Norwegian teachers preparing young people for their roles as citizens and future global citizens in a small but influential state? What are the challenges of and opportunities for developing transformative thinking in Norwegian schools today, what are the implications of how children come to understand climate change and what can other countries learn from the Norwegian experience? This paper reports on the preliminary results of a detailed qualitative case study of one typical Norwegian secondary school as it wrestles with the challenges and opportunities for teaching citizenship education. In closing, we reflect on the possible implications of citizenship education to transform young people's attitudes and responses to their changing climate.

O-088

Transformative Tertiary Teaching And Learning For Achieving Adaptive Management

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Calls for transformation in operational frames of natural resource/environmental management are widespread, but mechanisms for

achieving such transformation are lacking. Adaptive management (AM), or learning from management action, is sometimes proposed in complex and uncertain situations. However, rather than acting as mechanism for transformation, AM is frequently reduced to being a new name for mainstream practice. Transcending tenacious behaviour requires people capable of thinking and acting in new, systemic and reflexive ways, but these skills are poorly nurtured within many of the tertiary institutions that train future natural resource/ environmental managers. Improvement requires considering not only what is taught, but also how teaching and learning is approached. In this paper we evaluate two examples of tertiary teaching designed to encourage students to think and reflect by mirroring AM with adaptive teaching. The first is a single subject introducing social science to first year environmental science students in Australia; the second is a module on sustainable development taught to first year students in Scotland. We explore if and how these examples of adaptive teaching build the reflexive capacity of the natural resource/ environmental managers of tomorrow. We also consider whether adaptive teaching helps us better understand AM, particularly in relation to role of teachers and AM leaders as facilitators, and how learning in both contexts can be structured to provide opportunities for developing creative, open and flexible expertise. The extent to which the goal of both teaching/learning and AM is not just to learn, but also to encourage learning about learning, is also considered.

O-089

World-centric Problems Like Climate Change Cannot Be Solved With Nation-centric Thinking

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This paper sees the inability to address climate change as symptomatic of the gap between, on one side, the inadequate, nation-centric way most people still understand the world and, on the other, the new world-centric realities of globalization. The key reality preventing action on climate change, we argue, is the need for nations to maintain their economic competitiveness in the global market. We argue that a transformation of consciousness towards the global is needed, and that the nation-state system needs transforming towards a new mode of politics that results in a global agreement that addresses climate change and other global problems. Towards this, we present a new global political campaign. Since genuine transformation is required, we analyse the campaign using Ken Wilber's theory of transformation: "the 20 Tenets of holons and holarchies". The paper demonstrates the campaign to be consistent with the 20 Tenets and thus capable of delivering the necessary global agreement. The campaign is argued to be the world's first genuine form of global electoral politics; a higher, transformative, transnational mode of politics that fits with the new realities of globalization and so opens the way-potentially-to solving climate change and other global problems.

O-090

Institutional Transformation In A Devolved Governance System: Possibilities And Limits

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Theories of transformational change are lighter on 'how' change is achieved than on 'what' change is needed. Two decades ago, New Zealand transformed its national resource management institutional framework. The framework streamlined decision-making, devolved it to local authorities, and later explicitly mandated decision makers to take climate change effects into account. An ideological shift in governing perspective, alongside a national financial crisis, drove the changes. Fast-forwarding to the present, we can see the need for a further round of transformation given the scale and complexity of changing climate risks. But how do these new challenges align with the legacy of transformation in the existing institutional framework? What drivers would enable further transformations to occur? We undertook a fine-grained case study of decision making in response to more extreme climate effects like rising sea levels and increased coastal storms and flood frequency in New Zealand. Governance arrangements at both local and regional levels within the frameworks established by central government were examined. Guided by transformational change theories, we examined the fitness-for-purpose of current institutions for decision making about changing climate

risk. We found that the institutional framework contains barriers to transformational responses and that a fundamental rethinking of the enablers that support the framework is required. Enablers include strengthening the links between levels of government to facilitate faster feedback and learning; greater national-level direction through existing frameworks; and institutional embedding of new analytical tools that can address uncertainty.

O-091

Ability To Influence - Stakeholders In Climate Policy Processes In The BASIC Countries

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China, India, Brazil and South Africa (BASIC) have all experienced rapid economic growth over the past decade, with subsequent increases in energy use and greenhouse gas emissions. The increasing emissions and international demand have placed climate change mitigation on the political agenda in the BASIC countries, and all four countries have approved national climate policies since 2007. This paper identifies and compares important stakeholders in the climate mitigation policy processes in the BASIC countries in order to explore how these actors influence the policy process, and whether their interests are integrated in winning coalitions for more ambitious policies. Energy and climate politics are closely linked in all the BASIC countries, and business, industry and NGOs are all potentially important stakeholders in climate policy development. Analysing the roles of these stakeholders in

domestic mitigation policy development in key emitting countries is a prerequisite for enhanced comprehension of future climate policy trajectories. I find that there are both similarities and differences between the preferences and influence-possibilities of the stakeholders in these countries. Finding co-benefits between stakeholder interests and mitigation measures was crucial in all the BASIC countries.

O-092

Sea-level Rise And The Sirens: About Self-coercion And Binding Agreements In The Age Of Individuals

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Deliberate and sustainable transformation has recently gained prominence in the debate on climate change, and more generally in the debate on global environmental change in the contemporary era of the Anthropocene. In this paper, I engage with an analysis of the politics underlying a mutually agreed upon ecological transition in contrast to coercions either of nature or authoritarian regimes. Following Ophuls, and drawing upon the well-known Hobbesian figure of the Leviathan as well as upon Hardin's political theory, I discuss the necessity, the alternative, the potential and the limits of political coercion, and argue that the type of transformation actually needed is, from an ethical and political point of view, of a very particular type. I then illustrate this theoretical inquiry with scenarios sketching how this kind of option, which I suggest is the most desirable one, yet not the more likely, could be applied and implemented in a consistent

way with the ethics and practice of ecological sustainability. I finally argue that the quite generic framework I offer would probably differ in its applications across spatial scales (from the individual, family, community, regional, national to supra-national levels), and for this reason, have more or less potential to shape both the future of Earth and the human societies' prospect. My concluding remarks assess this weakness of this approach regarding systemic transformations.

O-093

'Practicing Narratives': Exploring The Meaning And Materiality Of Climate Change

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This paper outlines an approach to climate change research and practice that emphasizes the exploration of the underlying meanings embedded within particular ways of viewing the issue. We suggest the use of a narrative analysis to explore the multiple meanings of climate change, and review the major applications of narrative within the field thus far. We outline the insights that these approaches offer as well as their insufficiencies, and promote the use of narrative as a foundation from which to explore the various meanings of climate change as they arise and the focal point for discussions about possible futures. We further suggest the coupling of narrative approaches with a social practice

lens in order to more firmly ground narratives within their social and material dimensions, and offer possible ways forward for their integration.

O-094

Transformations And The Culture Of Mainstreaming

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Spread of new ideas is central for transformations. But new ideas, even very good ones, are often unable to supplant prevailing practices. A 'lock-in' framing is in vogue for explaining entrenchment of regulatory and technological systems. These explanations are predominantly economical. My paper argues that the social process of sifting through new ideas, where - something is admitted, something is rejected and something supplemented - is more complex; it is also largely cultural. Innovation research often exhorts us to 'think out of the box'. The theme of ways in which people respond to things that don't fit 'into the box' is central to the anthropological work of Mary Douglas. Drawing on anthropological examination of processes for the production and use of knowledge for climate adaptation decision-making around the Tonle Sap Lake in Cambodia, this paper argues that the dominant 'culture of mainstreaming' is a major impediment to promoting fundamental transformations in aid of adaptation. Cultural Theory framed analysis suggests that the mainstreaming narrative on adaptation is rooted in the hierarchical social solidarity. Hierarchical solidarity deals with knowledge that is threatening to entrenched ways of doing things by 'mainstreaming' new ideas into existing

paradigms. For example, the logic of mainstreaming is reflected in climate proofing strategies for upgrading the existing and planned infrastructure around the Lake by making the waterways a bit wider, dykes a bit higher and roads a bit wider. Mainstreaming here amounts to paradigm protection: containment of the problem without altering the established order. To suggest a move away from the mainstreaming discourse around climate adaptation, perspectives of other solidarities need to be incorporated into the adaptation discourse. A cultural framework is needed to understand 'lock-in' more deeply; to unlock locked in mindsets.

O-095

Mindfulness, Well-being And Sustainability

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There is an increasing interest in, research on, and use of mindfulness practice in a number of professional and private arenas. Most attention has been on how this mental training may help a variety of health and psychological related conditions on the individual level, such as chronic pain, stress, anxiety, depression, etc. In this paper we discuss how mindfulness may contribute to a more sustainable lifestyle by fostering well-being, but we also focus on a number of other - but less discussed - factors that we believe are especially relevant in the context of transition to sustainability. For instance: mindfulness may increase awareness of causes and consequences of one's own behavior; it can lessen self-centeredness and increase compassion and empathy for hu-

mans and nature; it may disrupt automaticity of thought patterns allowing individuals to more deliberately and creatively shape thoughts and actions; and mindfulness may lessen attachment to unsustainable and unhealthy habits and life styles.

O-096

Climate Change In Andean Cosmivision: An Indigenous Perspective On The Transformative Power Of Worldview

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Despite mounting evidence that currently accelerating climatic change is linked to human action, behavioral change to mitigate this dangerous development delays. Greenhouse gas emissions continue to increase, yet so far, climate change has been addressed only through limited adjustments to current lifestyles and societies. How can we achieve an urgently needed transformation of our behaviors and actions? The present paper approaches this question through the lens of the Andean cosmivision. It is based on data collected and insights obtained through multiple-method, long-term ethnographic field work in Cotacachi, Ecuador. Specifically, we show how Kichwa elders explain climate change as resulting from a disturbance of the relationships among the world's natural, divine and human beings, ultimately caused by the loss of a local belief system in favor of a local belief system in favor of imported worldviews. Elders make a clear connection between worldview, behavior and environmental balance, and call for the resto-

ration of respect for the natural world in order for the climate to normalize. Although their explanation is situated in local geography and culture, their perspectives may offer lessons relevant to wider settings.

O-097

When Is Change Change? What Can We Learn Regarding Societal Transformation In The Face Of Climate Change From The Previous Work Of Local Authorities On Promoting Sustainable Development?

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Since the presentation of the Brundtland report in 1987 there has been an astonishing world-wide activity at the local level of governance on promoting sustainable development. Astonishing, because most policy makers and academics seem to agree that solving the global challenges outlined in the Brundtland report – such as avoiding climate change, protecting biodiversity and increasing global justice – is first and foremost a quest for the international and national level of governance. Some – among others economist scholars – even argue that local government should stay out of this quest, because involving local authorities could lead to sub-optimal policy solutions. Others argue that local authorities have at least two important roles to play: First, as implementers of national policies on sustainable development, and secondly as “test sites” to develop new innovative sustainable development policies. Both of these modes apply to local authorities as policy struc-

tures for national policymaking. However, a third policy mode for local authorities has also emerged in the context of sustainable development, namely that of policy actor; that is acting more or less independent (in some situations in conflict with) of the national government and even international policy institutions. Resting on insights from a number of studies from the last 25 years on the role of local authorities in promoting sustainable development, we discuss what can be learned from local authorities regarding the problems and prospects of societal transformation in the face of climate change.

O-098

What Factors Facilitate Transformation In Practice? A Study Of The International Diffusion Of The Transition Network.

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Grassroots innovations (GI) are “networks of activists and organisations generating novel bottom-up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved” (Seyfang and Smith, 2007). They are interesting examples of deliberate transformation in response to environmental change. The literature has highlighted many positive accounts of GI, but critical views have recently emerged. GI often do not operate as inclusive and supportive communities, struggle with securing and sustaining participation, and are undermined by ideological disputes, poor financial resources and weak links with the wider community. There is therefore a need for understanding what

factors facilitate transformation in practice in different contexts. With reference to the Transition Network, this study comparatively investigates the factors behind the success and failure of GI internationally. An online survey (N=407) of local transition initiatives was conducted. Both active initiatives and initiatives that had stopped operating were considered. Objective and subjective definitions of GI success were compared, and a broad spectrum of internal (e.g. socio-demographic, social capital, group governance) and external factors (e.g. location, integration in the wider community) potentially contributing to GI success were investigated. The results depict GI diversity, but also their common traits, and give an insight into different facilitating factors or barriers. These are discussed considering literature on transition and transformation. Needs for further in-depth, participatory research are identified, and policies to facilitate the diffusion of GI and to increase their ability to bring about change in society are discussed.

O-099

Transforming Australia - Community Leadership On Climate Change

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Ultimately any nation’s success in tackling climate change depends on community commitment and political willingness to act. An island continent blessed with abundant natural resources, Australia remains on the horns of dilemma - highly vulnerable to extreme weather, yet addicted to fossil fuels. This paper outlines the national appetite for action and de-

scribes three community initiatives to illustrate leadership and the real, time-bound potential for transformation in Australia. Repower Port Augusta plans to build Australia's first concentrating solar thermal plants with storage to replace two ageing coal-fired power stations. Port Augusta, a coal town, now hosts a solar campaign backed by residents, unions, environment groups, doctors and Alinta, the coal plant owner. This project can create 1800 jobs, save five million tonnes of greenhouse gas emissions/year and provide stable electricity prices and energy security. It could be a national demonstration of the carbon price delivering decisive action on climate, practical outcomes for jobs and regional co-benefits to health. Imaginations fired across Australia when 100 people did an iconic 328km "Walk for Solar". 100% Renewables is a national grass-roots movement, building support for an Australia powered entirely by clean renewable energy. Big Solar polling generated a social license for action, by providing direct feedback to politicians on community views of large-scale solar. Clean Energy for Eternity has inspired community action on climate change in southern NSW since 2006. It combines science and creativity to harness community commitment to installing renewable energy for emergency services: surf lifesaving clubs and fire brigades. Australia's Carbon Price could blossom into a pathway for national transformation if invested in practical examples of transition to a low carbon economy. Business-as-usual wreaks havoc on the resilience of vital ecosystem services and threatens the wider global energy

O-100

The Role Of Participatory Mapping In Community-Based Transformational Adaptation To Climate Change

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As climate change poses new challenges in developing countries, incremental adaptation may not be enough. Capacity for transformational adaptation is needed, entailing planning for deliberate adjustment and change in communities' activities and goals. Bottom-up, participatory methods have the potential to enhance communities' ability to understand, plan for and manage change for adaptation and transformation. In this paper we explore how participatory mapping can serve as a valuable tool to combine expert-driven and participatory approaches with the potential of enhancing capacity for deliberate transformation. We reflect on transformational adaptation in the context of community-based adaptation and explore, both in theory and practice, how the process and outcome of participatory mapping can contribute to facilitate transformational adaptation.

Preliminary findings, from a case study on community-based adaptation to drought in rural India, show that participatory mapping integrates different knowledge in defining the problem and opportunity space for adaptation. We used satellite imagery to map vulnerability with communities and the process served as a method to facilitate a collective dialogue and learning about drought impacts and drivers of vulnerability. It helped bring in local knowledge about vulnerability and impacts, which is invisible to top-down

assessments. Participation of local stakeholders may also help enhance better understanding, learning and social acceptance for transformation throughout the process. The mapping process can help initiate discussion on dynamics of vulnerability over time, encouraging learning and anticipation for transformation. We find participatory mapping to be a valuable complement to other methods, opening space for dialogue and exploration for local communities, decision-makers and scientists to learn together and work towards community-based transformation.

O-101

Human-environmental Integration And Social Power In Global Environmental Change Research

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Global Environment Change (GEC) is often formulated as an environmental phenomenon with a "human dimension". Efforts within disaster risk and IHDP research communities to bridge this dichotomous framing and reformulate GEC as a human-environmental phenomenon have been largely unattractive to mainstream social sciences. This paper reviews recent contributions from prominent social scientist to the climate change debate. Are such contributions useful to build a truly integrated perspective of GEC? One of the main findings of this review is that social scientists bring to fore the "political question" by repositioning GEC in relation to contemporary socio-political phenomena such as the recurring crisis of capitalism. At the same time, social scientists are increasingly engaging with systems and relational thinking. Thus, a key issue to ex-

plore further is the role of relational paradigms, such as systems and complexity, in further bridging the gap between biophysical and social sciences. Are we at the verge of a scientific revolution marked by the integration of the environment into social thinking through systems and relational theories? If so, what will be the role of GEC, and the IHDP community, in setting the agenda? In any case, the question remains of how to problematize relational and systems-based paradigms when they are applied to socially conflicting issues rooted in power structures and related with global inequality, such as GEC. Can concepts such as attractors, patterns, feedbacks, trajectories, or thresholds equally describe the melting of icecaps as much as the collapse of financial institutions? What ontologies and epistemologies of human-environmental interaction are more useful for dealing with GEC challenges and bringing to the fore the “political question”?

O-102

The Natural Contract And Transformation In The Times Of Climate Change

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The transformation of our ways of life needed to face up to a changing climate may seem to constitute an inordinate challenge, given the inertia of human cultures. Values, norms and worldviews generally are resistant to change but may themselves be trans-formed. Here we explore Michel Serres’ proposal for a new ‘natural contract’ (Serres 1995), which echoes 17th and 18th century proposals for a ‘social contract’ of Hobbes, Locke and Rousseau). While the idea of a social contract directs our attention to the possible consistency

among the interests of diverse autonomous agents, the idea of a natural contract points toward the importance of incorporating in our decision-making ‘the world’ as an active participant that increasingly shapes our lives. It is argued that, insofar as the idea of a social contract has wide, tacit, acceptance and is part of our common cultural heritage, the idea of a natural contract already has a degree of initial plausibility.

O-103

Exploring Political And Economic Drivers Of Transformational Climate Policy: Early Insights From Ethiopia’s Climate Resilient Green Economy Strategy

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In recent years, the label ‘transformational change’ has rapidly gained traction within the climate discourse. Much of this arises from the recognition that incremental adjustments may, in many contexts, be insufficient in addressing the dual challenges of mitigating and adapting to climate change in the longer-term. Most importantly, the term transformation carries with it a clear sense of the urgency and scale needed to tackle the problems facing coupled human-environment systems. This push has trickled through to the political arena. Policy-makers tasked with designing and implementing climate policies are increasingly referring to transformational change in justifying the scope of national climate strategies. However, largely missing from policy and science discourse is a framing and appreciation that the delivery of transformational

change is as much political as it is economic, technological or infrastructural. Drawing on early insights from the on-going development of Ethiopia’s Climate Resilient Green Economy strategy, this paper explores the political and economic drivers behind the design and delivery of transformational climate policy. Guided by a refined political economy lens, it explores the implications of a transformation agenda on participation, incentives and interests ranging from national to local levels. In so doing it highlights challenging trade-offs in matching the need for transformational change with meaningful action and policy. Above all, it argues that, alongside technical inputs, a more nuanced appreciation of the social and political implications of transformational strategies is needed, both in relation to design and delivery.

O-104

Challenging And Defending The Status Quo - A Framework For Addressing Power In Social-Ecological Systems Transformation

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Resilience studies are often criticised for not adequately addressing the role of power in processes of social-ecological change. This critique has yet to systematically review approaches used in resilience studies, or outline which types of power concepts can be used to understand change in social-ecological systems (SES). This is unfortunate since studies of SES will benefit from accounting for power as a significant factor facilitating or constraining change. The aim of this paper is to study how power, and its effects on

change in SES, can be usefully addressed. This paper identifies several relevant conceptualisations of power and reviews how these are (not) used in the context of SES transformation. Reviewing past attempts shows resilience places emphasis on how power affects key issues surrounding resilience, including transformation, and adaptive capacity. Power can be implied as something positive, as in the case of key leaders, or shadow networks. Resilience has also identified key instances of dominating (top-down) power including agenda-setting and denying alternative voices, which are important for innovation and emergence of solutions. Here a framework is presented that accounts for power emanating from not only power holders, but also groups of people with little power, and even the unexpected and unintended effects of the power struggle between these two groups. Instead of fixed relationships, power relations might be better considered as fluid depending on the circumstances and opportunities available to the actors involved. The study of power's effects can furthermore be strengthened by expanding beyond intentional actions of individuals, to tracing unintentional and emergent effects of performances of actors engaged in power relationships.

O-105

Learning Pathways For Climate Change Transformational Adaptation: Towards A Conceptual Framework And Guide For Primary Industries

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Transformational change in Australian primary industries in response

to climate change and other factors is a reality - not just theory. But it is high risk and potentially inefficient. In this paper, we look at learning-based approaches to support primary industries' transformation in a changing climate. We argue that incorporating processes of learning that engage multiple social groups (from primary industry decision-makers to policy makers) who operate at different scales, and hold diverse perspectives and understandings of climate change and ways to best respond, is critical to support the emergence of effective and legitimate climate change transformational adaptation decisions and strategies. However, there is still much to be understood about what processes and types of learning have individual and collective transformative potential, and how to translate these into practical guidelines that can support primary industries' successful adaptation to climate change. Building on three bodies of scholarship (climate change adaptation, complexity science and social learning), we explore the following questions: What types and combinations of individual and collective learning (single, double, triple loop learning) are needed under (1) different climatic conditions and uncertainties (low climate variability, high climate variability, climate change trend)?, and (2) diverse impacts (simple, complicated, complex, chaotic)? (3) for supporting transformational adaptation responses? In doing so, we develop a conceptual framework and guidelines that are intended to serve as a template for developing context-appropriate approaches and tools to support effective learning for climate change transformational adaptation among primary industries in Australia.

O-106

Environmental Disasters And Agrarian Transformations: Frictions, Articulations, And Challenges

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This paper explores the transformations of agrarian societies, landscapes, and policies within the context of increasing environmental disasters and accelerating climate change. The idea of transformation entails two different but interrelated dimensions. First, contemporary rural societies not only face longstanding problems such as the concentration of private property, the commoditization of land, and the expansion of industrial agriculture, but they are also facing profound transformations brought about by the escalating impact of floods, hurricanes, and other environmental disasters associated with the acceleration of climate change. The articulation of these social, political, economic, and environmental transformations presents complex challenges to the ways in which both academy and the policy sector have understood rural societies to date. Second, these new articulations call forth new theoretical and political approaches that set the foundation for an environmentally and socially sound transformation in the countryside. Drawing on a case study of flood-induced disasters in Colombia, this paper will propose that such a transformation can be facilitated by the consideration of three issues: a) the theoretical and political problematization of the ideas of 'resilience' and 'adaptation to climate change'; b) a dialogue between disasters and agro-economic development policies; and c) the critical incorporation of local agrarian and envi-

ronmental histories into the policy agendas of climate change and rural development.

O-107

Transforming Agriculture In Tanzania’s Southern Agricultural Growth Corridor - From Rhetoric To Reality

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Contract farming schemes are being promoted within current agricultural policy initiatives in Tanzania that seek to transform the country’s agricultural sector to make it more modern, competitive, productive, and climate resilient. SAGCOT, the Southern Agricultural Growth Corridor of Tanzania, is one of several initiatives that aim to increase public and private investment in the country’s agricultural sector in order to boost national food security, reduce rural poverty, and increase agricultural productivity. It is argued that directing investments to “bread-basket” regions and clusters of large, medium and small farmers within the country will enhance smallholder farmers’ access to agricultural technologies, markets, inputs and services, and make farming a more profitable, resilient, and productive activity for them. But do partnerships between small and large farmers and public and private service providers hold the key to transforming Tanzania’s agricultural sector? We explore this question by drawing on research in the SAGCOT region and a review of key agricultural policy documents. We find that the transformative potential of contract farming is limited by a number of

dichotomies and contradictions that are entrenched in past and current agricultural development approaches and policy discourses regarding the desired aims, means and ends of agricultural transformation, the root causes of agricultural development challenges, and the perceived agency and legitimacy of different actors in bringing about the desired transformation. These dichotomies conceal a rich diversity of perspectives, reality and experience on the ground and in academic scholarship that we argue should be harnessed to identify best practices and partnerships for achieving inclusive and sustainable agricultural transformations within and beyond Tanzania.

O-108

Managing Change In Dairy Regions: Understanding The Determinants Of Transformative Capacity

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This research aims to define critical processes of significant change (transformation) in the dairy industry and communities and potential points for intervention to improve the way transformation happens. It draws on resilience thinking as a suitable framework for exploring continuous change in socio-ecological systems and aims to: understand how transformative processes contribute to community capacity building and collaborative action in the dairy industry, and; develop an expanded understanding of the transformation stage of the adaptive cycle in resilience thinking. The working hypothesis developed in this project is that the five categories of ‘determinants’ (of transformational capacity) proposed by

(Walker et al., 2006) are required to develop effective interventions for supporting transformational change at a regional scale. In exploring this contention, preliminary findings from this research are that ‘determinants’ of transformation applied or valued by the main three different professional practice groups in dairy regions in northern Victoria (farmers, service providers and government/s) are currently inconsistent and non-comprehensive. For example, dairy farmers, dairy industry and government professionals were found to propose regional change management associated with current water policy reform in different ways. Governments have provided incentives programs to support ‘structural adjustment’ and participation in evolving water markets by farmers, however their practices focus on the economic factors and do not (to date) provide systemic support for adaptation. The dairy industry, although it demonstrates a broad recognition of the systemic nature of regional change, generally emphasises its role in supporting individual farmers to make strategic business decisions to enhance productivity. Farming practitioners, however, understand the practices of significant change to be determined by the collective action and leadership of farming communities.

O-109

Transformation Of Local Government Institutions And Professional Staff In Response To Extreme Climate Events In Uganda

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District institutions play a key role

at the interface between national policies and individual/community level adaptation efforts. Failure of such meso-level intuitions to implement new climate advice are usually framed as being due to a lack of will due to ‘political’ or ‘bureaucratic’ factors, i.e., ‘problems’ that need to be ‘addressed’. However, labels such as these do not explain the political and bureaucratic processes that generate these problems and enable or constrain potential solutions. This paper explores the processes and drivers that frame responses by meso level institutions to extreme climate within a theoretical framework of concept of institutional bricolage that seeks to bring together concepts related to path dependency and gradual institutional change . Using transformative learning theory , the paper further explores the extent to which the occurrence of institutional bricolage gives rise to perspective transformation among processional staff. The paper analyzes perspective transformation and institutional change as the outcome of local government staff and politicians participation in a multi-stakeholder platform in Teso and Karamoja Regions in Uganda in the context of recurrent extreme floods and droughts since 2007.

O-110

Disentangling Feedback Loops Between Government Policies And Value Priorities Of Public Opinion

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The question of what drives the

feedback loop between public opinion’s values and government policies is central to understanding how societies’ political priorities evolve – and thus how better responses to challenges such as poverty or climate change can come about. This paper aims to explore whether public policy drives public opinion, rather than the other way round. Taking departure in theories on democratic responsiveness and policy feedback loops, it is based on Schwartz’ (1992) value typology, in which one of the organising axes of values is self-transcendence (ST) vs. self-enhancement (SE). Higher ST and lower SE scores are associated with pro-social behaviour and attitudes (Schultz et al., 2005). The paper compares European Social Survey (ESS) data for six countries (Czech Republic, Greece, Ireland, Portugal, Spain and Sweden) that have experienced large changes to their ST and SE mean scores from 2002/3 to 2010/11. In these countries, a survey was conducted amongst academics in political science to rate the implicit ST/SE value priorities of each government 2002-2012. The chronology of changes to the mean ST and SE scores in ESS is compared to the chronology of changes to the ST and SE scores of respective governments. This trend analysis points to changes in governments’ priorities driving value change in public opinion rather than vice versa. However, conclusions on the basis only of these chronological graphs are tenuous as most ESS data points are separated by almost two years. Political analysis is therefore made of those circumstances where the ST and SE scores of both government and public opinion experienced major changes. Finally, political implications and recommendations for future research are discussed.

O-111

Adaptive Climate Change Governance For Urban Resilience

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Urban areas are the forefront of climate change adaptation and mitigation. Climate governance and urban discourse is often tied into a particular narrative around socio-technical transitions and mitigation of greenhouse gases. Much of this ‘frontiers’ urban climate governance work focuses on the deficits of neoliberalism and technical fixes as ‘eroding’ social resilience at the city level, in contrast the social-ecological resilience discourse examines possibilities, avenues for change, and transformative actions through partnerships and networks with limited critical analyses of the outcomes of those actions. In this paper we aim to conceptualise adaptive climate change governance for urban resilience by bringing together the social, ecological and the technical characteristics of the urban system. We draw on the Global Urban Transitions project database and the literature to explore three interrelated questions: what is unique about governing urban climate change? Are the current transitions contributing to the emergence of adaptive governance? Can adaptive climate change governance help to build sustainable and equitable urban spaces?

O-112

Dealing With The Enemy? Social Learning To Support Transformative Attempts At Governance Of Socio-ecological Risk

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Many socio-ecological systems are highly stressed irrespective of climate change. For that reason, responses to climatic risk need to be conceptualised within a broad framework of socio-ecological risk. Research approaches that work with key decision-makers to support transformative change can support institutions to learn about and own such future risk. Work with the South Australian government and two regional Natural Resources Management Boards, one that incorporates the capital city of Adelaide, the other that includes remote indigenous communities within a vast semi-arid area, has enabled an active learning approach to respond to socio-ecological risk. Community and industry have played a variety of roles in the research, especially during workshops and interviews, but the main focus of the research has been to support effective state-led regional adaptive governance. The state is often viewed as a hindrance to effective transformations to manage socio-ecological risk. The experience of this research was that rather than the state hindering transformations in the conception of risk or constraining adaptation, innovative regional government can support effective and democratic local planning, investment and action. Focussed social learning research with appropriate government organisations supported the governance process and helped to facilitate strong decision-making. If implemented appropriately, risk management decision-making and policy may begin to reinvent approaches to development to become a cornerstone of a “Green New Deal” for society.

O-113

Conditions For Transformative Change: The Role Of Responsibility, Care, And Place Making In Climate Change Research

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The concept of transformation is increasingly used to advocate for individual and systemic change, not just responses to climate change. Deliberate, intentional transformation foregrounds relationships between attitudes, values, and individual and collective transformative action. However, it says little about the conditions under which this relationship can flourish and when it is constrained. Equally little is known about the specific values that are to guide proposed transformations, and particular articulations of responsibilities along alternative pathways. To address this gap, we first offer a relational framing of climate change and conceive possible pathways that foreground collective well-being through deliberate and deliberative transformation. We propose a radical notion of transformative change, and the tasks for responsibility and care to materialize such change. Of particular interest are embodied practices and the multiplicity of trajectories and encounters that define individual responsibilities of place while connecting us to distant others. In the main part of the paper, we reflect on interconnectedness and transformative change processes as cornerstones for novel and forward-looking climate change research. We highlight two main perspectives: 1) a relational

ontology of responsibility and care; and 2) an epistemology of place based on a relational politics of place beyond place. We close by advocating more inclusive, careful, responsible, and actionable relational climate change scholarship that focuses on transformative processes.

O-114

How Frames As Conceptualisations Of Coping Affect Transformations Towards Adaptive Outcomes

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Responses to environmental change are often focused at simply coping, rather than longer term, more resilient adaption (Fazey, 2010). Although coping and adaption are used interchangeably, coping is a mechanism of recovery and resistance to an initial stress, whilst adaptation is a longer term adjustment that can incorporate proactive use of strategies to an experienced and expected stress or risk (IPCC, 2012). It is therefore important to understand processes that encourage adaptation rather than simply coping. Moreover, how adaptation is framed influences how policy is developed as well as the implementation and outcome of that policy (Juhola et al. 2011). It is however, not known how different framings as conceptualisations of coping affect the success of policy implementation, which can result in more transformative adaptive responses beyond simply coping. As noted Berman et al, (2012), how current coping capacity could be transformed into longer term adaptive outcomes is a crucial question for those involved

in adaption planning and policy. This paper therefore explores how frames as a conceptualisation of coping affect transformations towards adaptative outcomes by focusing on a case study from Argyll and Bute, Scotland. Communities in this area are currently developing community based emergency plans in conjunction with the local council and the Scottish Government Resilience Division to increase preparedness for extreme weather events and other crises. It attempts to uncover how the concept of coping is framed using discourse analysis to further understand the current effectiveness of community emergency plans.

O-115

Terraforming Ourselves: A Causal Layered Analysis Of Interior Transformation

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Human actions are altering the Earth on a planetary scale. Humans possess the power to change the climate, alter water and nutrient cycles and send species and ecosystems into extinction. So far, we have shown little ability to control this power. It could be harnessed for planetary restoration and creativity, but is instead delivering destruction that makes our planet less habitable for humans and other forms of life. A common response to this sustainability crisis is to argue that human values and culture need to transform. However, the nature of this interior transformation is rarely explored in any detail. Instead, transformation is held up uncritically as the saviour that can get us out of trouble. In this paper, I apply a futures method called causal layered analysis (CLA) to

tease out the dimensions of interior transformation in more detail. CLA explores four layers of reality: the litany or conventional day-to-day story; deeper social, economic and political causes; culture and worldview; and myth and metaphor. I follow interior transformation down through these four layers in an attempt to deepen our perspectives on transformation, draw out alternatives and identify new transformative practices. At the deepest level of myth and metaphor, a metaphor of terraforming emerged as a possible way of navigating between dystopian and techno-utopian stories about our collective future. In science fiction, 'terraforming' is the process of altering a planet so that it becomes more Earth-like. Literally, the word means Earth-shaping. In this paper, I argue that the primary transformation we must seek if we are to avert disaster is to terraform ourselves; we must transform our values, worldviews and institutions so that they take shapes that are in harmony with the Earth. Humanity must become more 'Earth-shaped'. This will be a slow process of conscious experimentation that requires us to abandon some of the sense of urgency that drives many sustainability practitioners.

O-116

Love In The Time Of Climate Change: Exploring The Transformative Potential Of Care And Love In Environmental Crisis

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Emotionally driven narratives centred on love and care have permeated the human experience since its beginning. These dis-

courses are present in our historical epics and texts, philosophy, religion, and spirituality. They are represented in novels and film and we have all experienced the deep emotional impact of love and compassion in our lives. As such, they are deeply integral to the human experience yet often remain confined to individual and vernacular narratives about crises such as climate change. This powerful emotional landscape does not explicitly transfer and translate into the institutions and bureaucracies we use to address climate change. Instead, we privilege mechanisms built on notions of competition and rational interest to address what are ultimately deeply emotional phenomena. Examples such as Viktor Frankl's existential analysis; Edward Said's contrapuntalism; Gabor Mate's addictions studies; Rupert Read's meditation on love and justice provide alternative frameworks for understanding the experience of climate change. These are linked to insights from studies on Indigenous on resilience, to discuss ways of incorporating love, compassion, and empathy into climate change research and action, with important practical implications for positively transforming our current approaches.

O-117

Trading Places And Transformations

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Moving permanently from one place to another is a major transformation in anyone's life. And around one seventh of the current world's population has indeed migrated, depending on the definition of the term. This paper exam-

ines the transformational potential of migration and mobility. It is well established that migration is driven by economics, demography and the demand for services such as education, and shaped by political and cultural drivers. All of these drivers are sensitive to various degrees to global environmental change. Environmental change affects patterns of migration by altering the economic geography of the world - the location and mix of possible economic activities. This paper focuses on migration processes and reviews evidence of how migration and increased mobility are central to presently observed global transformations in economy and society. I argue that migration is an essential and potentially progressive dimension of necessary transformations towards sustainable futures. Yet there are inherent risks and challenges. Migration and the inability to migrate are characteristic responses to environmental change; immobility leaves vulnerable populations at increased risk and the trend to migrate to cities often puts migrant populations at risk.

O-118

Is Relocation Transformation?

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Abandoning one's established home and livelihood to relocate in another country would normally be seen as transformative for the people concerned. Relocation within the same country or region would be seen as less challenging, but could still involve dramatic changes for those moving - this could include "migration" within an almost borderless region such as the EU or between Australia and New Zealand. Modern communi-

cations make the experience of being away from home very different from the past, and it is likely that today's migrants may be able to avoid many of the transformative experiences earlier migrants could not avoid. The field of DRR has long employed relocation as an important strategy to reduce risk through reducing exposure to some natural or human made hazard. This includes voluntary and compulsory permanent relocation, but more usually involves temporary movement as a way of avoiding the hazard. This temporary relocation can be seen as a way of avoiding the transformation that would likely occur if the move was permanent - or if the people remained fully exposed to the hazard with its consequences in death and injury. Relocation can be and is used in other ways to avoid transformative action, eg remittances that allow people to remain in areas even when local livelihoods have collapsed. Relocation may enhance resistance to broader change. Despite this, relocation may be transformative for those who actually move. This raises the issue of scales of time, space and numbers of people.

O-119

How To Disappear Completely: Migratory Farm Workers, Climate Change Adaptation And State Intervention In Turkey

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While it is widely accepted that the political economy of capitalist development creates and maintains vulnerability to environmental change, the role of the state in creating and maintaining vulnerability of marginalized social groups to environmental and in particular climate change is relatively un-

der-investigated. Focusing on a series of state interventions in the field of social policy and climate change policy, this study aims at investigating how top-down reductionist state interventions are framed as vulnerability reduction measures with a focus on migratory agricultural workers in Turkey. By following the shift of understanding of adaptation from collective transformation to adjustment of the cohorts of individuals to respond to multiple changes, this article suggests that when adaptation is understood as a biopolitical intervention to reduce vulnerability, it falls short in removing the root causes of vulnerability. Based on a case study in southern Turkey, we argue that biopolitical state policies provide a particular view of climate change adaptation on migratory farm workers, one of which is securitized, individualized and based on a distinct set of values. Furthermore, we observe that the concept of circulation in biopolitics is crucial in understanding varying visions of migratory farm workers, landowners and state officials on adaptation and vulnerability. Analysis of two key policy documents as well as interviews with key informants and participant observation in the region suggest that there is a need to turn to collective transformation rather than individual adaptation in order to avoid disappearance of these marginalized communities from policy making in Turkey. In such a case, adaptation in labor-intensive agriculture should be envisioned as a deliberate transformation of ground conditions rather than patch-wise adjustments in order to be effective and to serve the needs of these most vulnerable communities.

O-120

What Gestalt Approaches Can Contribute To Climate Change Transformation

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For many people climate change, natural hazard-related disasters and displacement represent major life changes. This paper addresses the following questions: what can Gestalt approaches contribute to climate change transformation in general, and how can Gestalt-inspired transformation be put into practice in a refugee camp in particular. A fictional case loosely based on experiences from the Dadaab refugee camps serves as a basis for theoretical speculation. The Gestalt concepts explored are field theory, existential phenomenology, relationships and contact, and conflict and change. Field theory, which posits that everything is in mutual interaction, can be the basis of an ecologically oriented psychology. Phenomenology is a method that helps people stand aside from their usual way of thinking, and have an immediate, naïve perception of what is in the current situation. It is important to consider interpersonal relationships as well as relationships between people and trees, animals and the wider environment. Several contact forms may be particularly relevant in a climate change context, including collective “chewing” of certain norms. Sometimes contact forms are related to intrapersonal and interpersonal conflict. An essential task is to think about how a safe space can be provided for conflicts to be explored. The Gestalt theory of conflict sees the person as a conglomerate of polar forces. Change happens when one becomes what one is rather than trying to become what one is not.

The paper concludes that Gestalt approaches have much to offer and points out future research possibilities, including carrying out actual case studies based on Gestalt-inspired transformation.

O-121

Children, Citizenship And Climate Change - Why A Democratic Imagination And A Social Handprint For Transformation?

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Today over half the world are under aged 25 years. These young citizens face four difficult and intersecting challenges: dangerous environmental change, a global economy marked by unprecedented youth unemployment, growing social inequality and weakening democracies as local communities struggle to hold global financial capital to account. Yet on streets everywhere there is also a strong, youthful energy for change. In this paper the author asks: how can we better support youth citizenship, as a new generation learns to ‘make a difference’ to the issues that concern them? Discussion compares three kinds of social handprint, or citizenship responses to difficult challenges: the FEARS model of authoritarianism, the SMART handprint of thin environmentalism and a ‘SEEDS’ model of ecological citizenship. The paper examines the elements of the SEEDS model (Social agency, Environmental education, Embedded justice, Decentred deliberative democracy, Self transcendence), arguing this ‘social handprint’ of ecological citizenship is most likely to support young citizens’ democratic imagination for more sustainable and socially just future.

O-122

Youth Voices On Challenges And Transformations In A Changing Climate

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While Norwegian youth seem to be mainly occupied with school work, sports, music, friends and family in their everyday lives, they do have concerns and opinions about the challenges we face and transformations needed in a changing climate. This paper presents preliminary findings from the ‘Voices of the Future’-project, on how young people perceive current and future challenges and envision required and desirable transformations, and is based on focus group interviews with youth in Oslo, aged 13-19. This research project investigates how Norwegian youth perceive their futures in a changing climate, and the implications for their sense of agency, responsibility and political engagement. For their own individual futures these young people dream of ‘normal’ lives with good education, secure jobs, a home, car, travel and being surrounded by family and friends. However, they also worry about financial, social and environmental problems, and wish for transformations that include greater social and intergenerational justice and redistribution of resources on both national and global scales, as well as reduced consumption and pollution. They express hopes related to development of green technologies and alternative ways of living, and reflect on the paradox that the wealth and social security in Norway is closely connected to oil and gas production. Some youth do think this makes Norwegians, including themselves, particularly responsible to make the sacrifices and great transformations needed to secure a sustainable future.

O-123

The Hero's Journey: The Significance Of Initiation Rites And Practices For Transformations To Sustainability

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A deeper understanding of how people transform fundamental aspects of themselves is necessary for developing capacities for responding to volatile social, economic and environmental change. Concepts and practices of initiation are prevalent across cultures and through time and contain important insights for modern processes of change and transformation at both individual and collective levels. This paper connects disparate literature from anthropological, psychoanalytical, psychosocial and spiritual perspectives on initiation and perspectives on shifts of consciousness and collective transformations to explore the relevance of understanding initiation for moving society towards more sustainable trajectories. This breadth of literature highlights that initiation is a process involving a transformation of concepts of self and social identity and typically occurs as a transition from adolescence to adulthood, often marked by initiation rites. By shaping individuals, social interactions and cultural practices, transformative initiation practices potentially influence values and behavior. The deficiency of understanding and appreciation of initiation in current Western societies has led to a decline in healthy initiation rites and practices which negatively impact upon psychological development, social cohesion and

cultural authenticity. The literature on initiation also consistently identifies key phases that imply commonalities in processes of change. These processes can guide active promotion of sustainable change such as in youth development, transformative learning, community regeneration, innovation and problem solving, intergenerational cultural knowledge, leadership and behaviour change. These processes also have wider implications by providing a metaphor of, and insights about, societal transformation in times of major change and upheaval and towards more sustainable societal trajectories.

O-124

Coping With Climate Change Related Emotions Among Adolescents: Associations With Communication Patterns And Environmental Engagement

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Climate change is one of the most severe threats that humanity is facing today. In order to get people involved in the societal transformation process that is needed to combat this problem many emphasize the importance of people becoming involved not only at a cognitive level, but also at an emotional level. Research has also shown that many young people experience different negative emotions in relation to climate change, and that worry is especially common. Few studies have, however, explored how people cope with these emotions at an individual level and in a social context. This is unfortunate since coping strategies could be even more important than the emotions themselves in influencing engagement concerning the climate problem. The aim of this questionnaire study was, therefore, to investigate how a

group of Swedish late adolescents cope with climate change, and how these coping strategies are related to communication patterns with parents and friends about negative emotions in relation to societal problems, environmental efficacy and pro-environmental behavior. Preliminary statistical analyses show: three reliable coping strategies, two broad main communication patterns and significant relations between the different variables included in the study. The results are discussed in relation to theories about the importance of specific forms of communication for constructive emotion regulation and pro-social engagement. The results of the study are valuable for all who want to communicate with young people about global environmental problems in order to evoke feelings of action competence and hope instead of helplessness and hopelessness.

O-125

Transformation And Adaptive Pushback

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In the global change arena we see more and more the need for leaders to know about what happens in transformative processes inside out in order to play a different game. It is ironic that our best whole systems thinkers are becoming ever more frustrated at the lack of visible change in response to knowledge and evidence about growing threats to sustainability. The problem is that the intrinsic mechanisms of transformation are still not widely understood or mastered. Transformations that respond to adaptive challenges involve a fundamental shift in perspective and meaning. In order

to be able to design, catalyze, foster or lead such shifts, leaders need to recognize stages, depth and width of the process, need to identify patterns of systemic pushback, know what to do with immunities to change and how to handle the usual resistances and escape mechanisms. Welcome to the world of trim tabs.

O-126

Breakthroughs For Thriving

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Catastrophe thinking is not getting us the world we want. We get it. So how do we reframe the situation so we can get to breakthrough transformation? Can we build on the strengths we are discovering in a vast array of domains? My forthcoming book on thriving explores this more fully. Here we will hit the high points of how to inspire greatness and strive toward new creative possibilities for transformation to move from breakdown to breakthrough.

O-127

Enabling Social-Systemic Transformations

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By transforming our key societal systems (public informing, governance, research, education, finance...) we can enable them to solve our problems, and ourselves to begin a Renaissance-like cultural and social renewal. This talk will introduce enabling social-systemic transformations as a creative frontier, by outlining eight projects where this strategy is being pursued.

O-128

Collaboration Ecology, Networks And Worknets

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The process of collaboration is complex when regarded through analytical and linear lenses. From within a collaborating entity it is a naturally unfolding emergent dynamic which could be regarded as a worknet - 'practical beauty' is a term that comes to mind; a beauty as in a natural landscape or ecology. Participants in complex and adaptive systems mostly follow a surprising low number of simple rules that, if they can be captured, allow for the creation of a web-based worknet enabling agents of transformation to do "a better job."

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TRANSFORMATION

in a changing climate

How Do We Transform

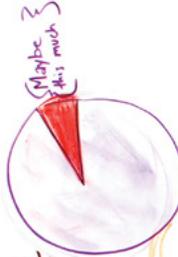
The Future?



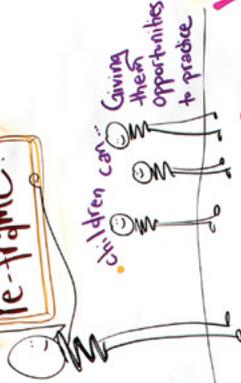
What is Transformation?

• Exuberant
 • Spontaneous
 • Vision looking outward AND inside
 • Intentional
 • outcome of resistance
 • Action "Positive"
 • Working with diversity
 • Respective

Would you like to know the future?



Can you re-frame?



THINKING



ACTION

Simply thinking about transformation is not transformation... intentional
 And action requires thinking

VISIONS

More just, ethical, beautiful

Using today to create the future

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