

The Question of Resilience

Social Responses to Climate Change

Kirsten Hastrup, ed.

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Preface and Acknowledgements

The present volume originates in a symposium held to inaugurate a Research Centre at the University of Copenhagen, generously funded by an Advanced Grant from the European Research Council. The title of the collaborative research project is *Waterworlds. Natural environmental disaster and social resilience in anthropological perspective*. The short title, *Waterworlds*, refers to one of the key issues in current discussions of climate change, namely the water-related threats to social communities worldwide. Within our project, these threats are organized in three themes, the melting ice, the rising seas, and the drying lands, each of which points to ongoing processes of environmental change that are already unsettling local social communities as well as scientists.

This is the starting point for the question of social resilience, which is addressed in this book. Members of the *Waterworlds* team as well as international scholars who contributed to our symposium here seek to identify both the actualities of resilience in circumstances where people are already met by environmental threats, and the conceptual challenges that the notion poses to analysts. The analysts are anthropologists, geographers and a social epidemiologist, who are not aiming at producing any single answer to the question, but rather at reflecting on the feasibility of the concept of resilience in the social sciences.

Apart from papers presented here, the symposium also had the privilege of hearing presentations from Andre Gingrich (anthropology), Kjeld Rasmussen (geography), and Henrik Palmer Olsen (law), and I want to thank them for their vital contributions to the debate. I also want to thank the Royal Danish Academy of Sciences and Letters heartily for hosting the symposium and for publishing this volume of proceedings. As before, Henny Pedersen provided the practical and administrative support throughout the entire pro-

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Kirsten Hastrup

CHAPTER I

Waterworlds: Framing the Question of Social Resilience

Kirsten Hastrup

Abstract

This chapter introduces the larger analytical issues addressed in the book and places the individual chapters within that frame. Following a brief introduction of the implications of *Waterworlds*, three ‘regions of disaster’ are introduced as an organizing device for addressing water-related hazards of different kinds: the melting ice, the rising seas, and the drying lands. Each of these regions presents particular challenges to people living in threatened environments that are explored in the remaining chapters of the book. The theoretical challenge of combining detailed ethnographic interest with a new global consciousness is then briefly discussed with a view to identifying the degree to which local environments have become perforated, however much people still live locally. The major point made in this chapter is that while until now ‘resilience’ has been identified as a systems property, when focussing on *social* resilience it adheres not to systems but to human agency. As such it points both to past experience and to future expectation.

Since the drafting of the *Waterworlds* project in the spring of 2008, the international debate on climate change has accelerated dramatically. A sense of urgency has generated new collaborative efforts and a host of scholarly conferences on climate addressing issues of various scales and derivation. In March 2009, the University of Co-

penhagen hosted a congress with the title *Climate Change: Global Risks, Challenges and Decisions*, with the aim of producing the most up-to-date knowledge from the research community – natural scientists, social scientists, engineers, economists, humanities scholars – and attracting more than 2000 scholars from across the world. The event was remarkable in many ways, not least in the clear feeling that scholars of all kinds had come to join forces in order to address and mitigate the possible effects of the new climate scenarios for our common future. In a Synthesis Report (Richardson et al. 2009), six key messages to the world and not least to politicians were highlighted in the hope that the congress might not only contribute new knowledge to the world summit on climate in Copenhagen, December 2009 (COP15), but also point to necessary actions.

While scientific knowledge, admittedly, is not always directly translatable into policy and action, the congress proved to bridge many gaps, and the Synthesis Report in itself is a token of the will among scientists to act collectively in face of what now looks like a much worse scenario for the future than the one foreseen in the 2007 report from the Intergovernmental Panel on Climate Change (IPCC). What transpired during the congress was also a strong need for engaging the social and human sciences in order to address the economic, political, social, and cultural issues that naturally adhere to the environmental changes. Whether as (initial) perpetrators or (future) victims of the present processes of climate change, people are part of equation when the present challenges are addressed.

The present volume – and the entire *Waterworlds* project – offers a perspective on the place of humans and of social communities in the larger area of concern. While most of the papers take their point of departure in communities that are already affected by climate related risks, they also collectively highlight the general will to shape a livable future in spite of new fears. People take responsibility for their own history in many small ways; this fact is a promising start in any mitigation process that must include human action alongside technological innovation.

There are important lessons to be learnt from history, where the conspicuous cultural dynamics of the Mid-Holocene period have recently been linked to the prevalent processes of climate change at

the time (Anderson et al. 2007). History has also shown in more detail how humans have solved environmental problems before, often by developing new technologies. As we are now facing uncertainties of a planetary scale, technologies cannot be expected to meet the challenges on their own, so to speak; new socialities and collective responsibilities must also develop, given the fact that climate change will hit the globe unevenly. The present volume is offered as a contribution to new notions of human agency as based in a global consciousness.

Waterworlds: Identifying regions of disaster

The present times are haunted by a sense of human vulnerability in the face of major environmental disasters and global climate change. Whatever course and speed the current changes may accrue, their effects on the human world are already manifest. Reading the IPCC report, *Climate Change 2007*, leaves no room for doubt that the world is indeed facing a major challenge that can be met only by concerted efforts at understanding the place of humans in the earth system. There is no way one can think away people from the analysis of the current responses to the global changes of the climate. Even disregarding the anthropogenic contribution to the change, the urgency of acknowledging the human and social impacts is owed to the fact that whatever is decided or not decided internationally to mitigate pending disaster, people will be affected, possibly fatally, by climate change. If they are not hit directly they will have to live within changed environmental regimes and in some cases with severely degraded natural resources. In other cases, the balance may tip towards new possibilities, but there is no doubt that the face of the Earth and its many biological species are heavily affected already.

People worldwide are thus suffering from a loss of habitual natural resources, from fear of an increasingly unpredictable future, and from social disruptions as natural habitats are destroyed. In some ways, the current sense of vulnerability is a continuation of well-known patterns of natural hazards hitting particular regions and people who are at more risk than others, as demonstrated extensively in a major, and recently re-edited volume (Wiser et al. 2005). In the

introduction to that volume, the authors list the number of deaths during the 20th century as caused by various disasters. The toll taken by political violence by far outnumbers any other cause, being 270,7 millions of people or 62,4% of all deaths linked to disaster, while natural disasters of slow-onset (e.g. famines following prolonged droughts) account for 70,0 millions of deaths or 16,1%, and rapid-onset natural disasters (e.g. earthquakes and hurricanes) account for a mere 10,7 millions or 2,3% of all disaster related deaths. To this we may add deaths owing to epidemics, 50,7 millions of people or 11,6%, and road, rail, air and industrial accidents, tolling 32,0 millions or 7,6% of disaster related deaths (Wiser et al. 2005: 4). Given the magnitude of deaths owing to wars and political violence on the one hand and to the ‘ordinary’ accidents on the other, the authors feel a need to justify their focus on natural hazards, despite the somewhat artificial separation between the various risks. Their point is well taken:

Analysing disasters themselves [also] allows us to show why they should not be segregated from everyday living, and to show how the risks involved in disasters must be connected with the vulnerability created for many people through their normal existence. It seeks the connections between the risks people face and the reasons for their *vulnerability* to hazards. It is therefore trying to show how disasters can be perceived within the broader patterns of society, and indeed how analysing them in this way may provide a much more fruitful way of building policies, that can help to reduce disasters and mitigate hazards, while at the same time improving living standards and opportunities more generally. (Wiser et al. 2005: 4)

With respect to the current processes of climate change, this message is no less relevant. For both the authors of the above-cited volume and for the authors contributing to the present book, the crucial thing is to understand that natural disasters are not simply caused by nature. They become disasters within a combined natural, economic, political, and social framework shaping both the magnitude and the possible strategies of mitigating the hazard. In other words, disasters are the outcome of particular mixes of natural hazards and human action. It becomes the more urgent to develop new conceptual templates for addressing this coupling (Newel et al. 2005).

With the current threats to people posed by climate change this intimate coupling of the natural and the social domains is highly pertinent. Within the new global frame of socio-ecological systems, the notion of vulnerability has to be re-addressed, however, as it is not predetermined by economic or regional differences as conventionally described in terms of North/South for instance. Such differences may still play an important part in the actual risks that people are facing, yet human vulnerability increasingly relates to a comprehensive global situation in which we are all stakeholders. Addressing the climate-related natural disasters from below – that is from the point of view of people, living with the (pending) hazards – as we do in this volume, we focus mainly on human action by which people reshape their histories in response to perceived threats, not externally identified vulnerabilities. One question addressed is when the ordinary experience of variability in the weather transforms into a sense of climate change on a larger scale and when, therefore, a new sense of uncertainty about the future enters into ordinary life and provokes cultural responses (cf. Strauss & Orlove 2003). From outside the risk may be the same, but seen from within a particular life-world, the threat is not at all the same when it has been reclassified from weather variability to climate change.

Risks related to climate change are unevenly distributed. The global climate change therefore results in new patterns of regional migration, political unrest, economic vulnerability, shifting resource bases, and a profound sense of risk affecting everyday life in many parts of the world. The aim of the book is to explore how people deal with such uncertainty. Through detailed studies of distinct localities and strategies of protection, we seek to enhance the general understanding of living in environments at risk. This is urgent in the interest of understanding how far the social capacity for adaptation may be stretched in times of pending environmental change. It is also pertinent with respect to basic issues of local food security that may all too easily transform into problems of international security.

Focussing on water-related hazards, we stress that water is the most vital natural resource; it is the *sine qua non* of human life. Yet, excess or shortage of water may threaten that very life, and this ambiguity of the relationship between people and water poses new and

significant challenges to the social and human sciences, wanting to understand and mitigate the disastrous effects of global climate change as they impact water supplies, water flows, and water regimes that unmake the sense made of water (cf. Strang 2005). Initially, water also poses the challenge of how to become an object of anthropological analysis (Orlove & Caton, chapter 2). Through history, water has of course been of concern to people, largely organizing their society around a control of various water-flows and -boundaries, and relegating uncontrolled waters to the wilderness (Pálsson & Huijbens, chapter 3). A large scale impact of new water flows on social life has recently been highlighted in a work on the rising sea-level in the Mid-Holocene era forming the Persian Gulf and possibly fuelling the processes of early state-making and economic development in ancient Mesopotamia (Kennet & Kennet 2007).

In order to organize the analysis of various *Waterworlds*, we have identified three ‘regions of disaster,’ viz. the melting ice in the Arctic and in mountainous glacier areas, the *rising seas* that flood islands and coastal communities across the globe or result from bursting rivers, and the *drying lands* accelerating desertification in large parts of Africa and elsewhere, notably Australia. As ‘regions’ they are defined by the dominant source of environmental threats to society, yet all of them are interconnected through the larger atmospheric conditions of the globe. In many cases they are also linked on the ground, so to speak, one kind of disaster setting on or accelerating another, such as happens in some south and south-eastern Asian mega-deltas that are triply exposed to the melt-off from the glaciers and snow tops on the Himalayan and Tibetan plateaus, to the rising sea-level, and to altered hurricane patterns.

When we refer to the melting ice, the conditions in the Arctic immediately spring to mind, because the rapidly melting icecap in Greenland and the disappearance of the sea ice have become the global icon of the austerity of the process. It is also a localized phenomenon, however, deeply embedded in particular political and institutional systems (Sejersen, chapter 11). On the ground, the melting ice greatly affects the lives of Arctic hunters, for whom the traditional ways of living and moving within the landscape alter dramatically with the thinning ice and opening waterways (K. Hastrup,

chapter 12). A similar process takes place in Arctic (and Subarctic) Siberia, where the thawing permafrost greatly affects both hunting and herding, not to mention the infrastructure, given that both airstrips, houses and roads are built directly on the frozen earth. Significantly, there is evidence that people adapt to the changing conditions, also of wildlife patterns, by continuing age-old patterns of relating to animals that may have disappeared but which are still conceptually dominant (Willerslev, chapter 13).

Thus, several chapters in this volume explore how people in the far North perceive the threats to their environment, and how they respond to and incorporate prospective climatic changes into everyday economic, social and political practices. The vulnerability to change within this region of disaster is not restricted to the Arctic however, but is found also in mountainous areas elsewhere, such as the Himalaya and the Andes, where the retreat of glaciers greatly affects community life, first by sliding glaciers and wild-running water, next by water scarcity (Orlove et al. 2008). The Andean communities are alert to these risks and are already attempting at hemming them in by way of legal or paralegal declarations (Borg Rasmussen, chapter 10). This is a remarkable local attempt at redistributing responsibility.

The second region of disaster that we have identified, the rising seas, incorporates multiple potential or actual threats from the changing sea level, gradual or sudden. These disasters are often amplified by increasing discharge from rivers originating in ice-clad mountains, as mentioned above. What is more, the waters out of control in low-lying coastal areas are correlated with an intensified cyclone activity, contributing to the vulnerability of small islands and coastal communities in the Indian Ocean and in the Pacific – as well as in the Caribbean Sea and the Mexican Gulf. The issue of hurricanes is addressed in a chapter aiming at identifying social indicators of resilience in the wake of hurricane Katrina that may prove to be of general import (Sherrieb & Norris, chapter 4). In this case we are facing one of those vulnerabilities that Wisner et al. (2005) address; it is disheartening to realize that in their pre-Katrina work the authors already pointed to the possibility of large-scale disaster around New Orleans, not only due to an increasing number and in-

tensity of coastal storms, but also due to previous human regulation of the rivers and waterways that effectively laid the area bare for magnified disasters.

The threats from rising seas are thus spurred by several different environmental changes in concert with human action, spanning from sudden and unpredictable tsunamis to gradual disasters such as coastal erosion, global warming and recurring seasons of cyclones and hurricanes that often fuse into a comprehensive perception of climate induced uncertainty, quite irrespective of the actual origin of the singular events. The interpretation of such hazards may relate to local metaphysical notions that at one level seem to bypass the natural cause of the calamity, yet at the same time also draws on past experience and astute observation; this is documented from the South Pacific where several island communities are living on the brink of disappearing into the sea, yet still with a keen sense of survival (Rubow, chapter 5). Significantly, with the growing international media exposure of global climate change, this may also be invoked as a local explanation for unexpected disasters, such as the Asian tsunami striking in late 2004 (F. Hastrup 2009). While the submarine earthquake that spurred the tsunami has no direct relation to climate change, its differentiated effects locally are correlated with previous patterns of coastal erosion and human-instigated degradation of the natural coastal protection, for instance from mangrove. Within this region we are faced with a complex situation, where past experiences of variability and sudden catastrophe, always part of the environmental reality, become subsumed under present schemes of explanation along with the gradual rise of the seas; what is more, for some the sudden disaster created new opportunities (F. Hastrup, chapter 6).

The third and final region of disaster, the drying lands, comprises the problem of water scarcity. In many parts of the world, from Australia over the Middle East to southern Europe and Sahelian Africa, water has become a scarce resource. Deforestation and changing climatic conditions have contributed to an accelerating drought, which again has led to a loss of human lives on unprecedented scales. The concern about drought and hunger in Sahel is not new, but it has intensified as the drought has continued and local thresholds

reached; this has resulted in an intensified migratory pattern both within and out of the region. It has also contributed to new patterns of political violence and civil war. The focus on the drying lands and their consequences for human life, directs us towards an analysis of the strategies of coping adopted in the wake of impoverishment and hunger. It forces us to take a closer look at the double or triple exposures to natural, as well as social and global developments that may accelerate one another (Reenberg, chapter 7).

In the Sahel, the salient distinction is the annual rainfall; this has always varied, and it may be difficult to distinguish between climate variability and climate change, when the symptoms are the same. As for the chosen paths of mitigation and survival, these are also complex and relate to intensified migration patterns, new marriage practices as well as new livelihood strategies (Østergaard Nielsen, chapter 8). Zooming in even closer upon local strategies, the picture shows how nomads living in what seems an increasingly dry and vulnerable landscape navigates by way of landmarks of promise that escape the untrained eye (Vium, chapter 9).

The final three chapters in the book deal with the question of knowledge from different angles and with each their scale of addressing the question of resilience. An Amazonian case raises the issue of indigenous knowledge, and of water-literacy as the basis of local resilience (Rival, chapter 14). The idea of a particular water literacy resonates with the ensuing analysis of how international organizations are increasingly mainstreaming climate issues within traditional development policies; here a new kind of 'climate change literacy' comes to the fore in the development discourses that in and of themselves shift the ground of future projects (Fog Olwig, chapter 15). Finally, a chapter on the scientific configuration of nature and climate takes us to the question of planetary resilience as understood and interpreted in universalizing models (Skrydstrup, chapter 16). Here we get to the core of the present authority of natural science.

In the chapters of this book, the water-related 'regions of disaster' are thus explored from various angles with the aim of contributing to a renewed understanding of social resilience as something that inheres in social communities, be they hunters on the margins of traditional scientific horizons or the academic community itself. This has

induced us to take a closer look upon the notion of resilience itself. In the IPCC report of 2007, it is thus defined: 'The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change' (IPCC 2007: 880).

This corroborates definitions suggested by several scholars that I shall not cite here; there is ample discussion of definitions in the chapters to follow, and I shall only point to the major general issue at stake in the book as a whole, namely the fact that the concept of 'resilience' is originally, and continually cast as a systems property. Without some idea of a bounded social and/or ecological system, the concept seems to make little sense. Yet once we move into the human world, systems are not closed; they are in permanent flux, due to the inherent discontinuity between individuals and their world (Ardener 1989). Furthermore, social communities are always open to impulses from elsewhere, such as – in our case – to new knowledge about climate change that infiltrates local understanding and propels people to action. It is, therefore, difficult to ascertain whether a particular society is the same after a natural hazard as before.

The analyses to follow are based on the actualities of social life in distinct localities, and focus on human action as the pivotal point in people's quest for certainty in exposed environments. The general message is that resilience in the socio-ecological system, which has now revealed itself to be of planetary scale, resides in people. If absorption of a disturbance is the measure of resilience, we should realize that such absorption may lead to unexpected changes in social organization and local expectations. This is one of the pivotal concerns adhering to the concept addressed here, given the fact that we are dealing with *global* climate change. If social resilience inheres in human agency and not in any well-defined system, we face a conceptual challenge of a new order.

Globalization: A conceptual challenge

Apart from the empirical ambition of studying how people, who are exposed to climate change in various ways, respond to environmen-

tal reshaping, we also have a theoretical ambition of identifying new modes of linking global processes and universalist scientific knowledge about climate with local perceptions of risk and particular 'weatherworlds' (Ingold 2006). We want to complement the sweeping diagnoses captured in such notions as 'world risk society' (Beck 1998), 'runaway world' (Giddens 2000), and even 'global warming' itself. What the project and, indeed, the chapters below offer is a fine-grained knowledge of unbounded environmental hazards and their effects on localised social worlds. Theoretically, this focus will allow for a new understanding of the effects of environmental disaster on grounded senses of vulnerability and, not least, of the responsibility that people take locally to ensure the survival of their community in the face of perceived threats to their life-worlds from processes that may originate beyond the immediate horizon, but which take effect only as they become part of the local world.

Globalization is a historical fact of our times. Yet, it cannot of itself explain the actual connections and perturbations that arise in its wake. This also goes for such global phenomena as the current climate change. The wider aim of our work is to seek new knowledge about emerging causal explanations as these are inscribed in existing logics and practices, also of a scientific nature. At the local level, people continuously engage in safety measures and protection efforts in a sustained attempt at keeping danger at bay. In this fashion they maintain a sense of integrity within a physical environment under threat. Remembering that physical and social worlds are mutually constitutive (Hastrup 2005), this integrity is closely related to a sense of certainty, without which social life is impossible.

When we speak of global climate change, we immediately face an analytical challenge of bounding the object of interest; normally, what we experience is weather, while climate points to an external observation of systematic change in the weather over a generation or more. People are living in local weatherworlds, within which they experience new or intensified variability; at the same time the new sense of unpredictability is increasingly explained by reference to global climate conditions all over the world. The implied short-circuiting of weather and climate we are witnessing now is the main inducement to rethink global connection in anthropology. In earlier

times, people would not have the scientific knowledge or discourse on climate change; they were innocent with respect to the larger patterns and in some cases they would respond by sticking closely to the old ground rules, hoping the calamities would pass, as happened for the Icelanders during the little ice age (Hastrup 1990). Only later may we see how natural changes and cultural dynamics may foster each other over an extended period of time, such as the Holocene (Anderson et al. 2007). Nature has its own agency in the larger scheme of historical change (Tsing 2001). When this agency becomes of global impact, traditional notions of local environments explode.

With a view to another (but not unrelated) environmental issue, Anna Tsing has recently suggested a new ethnographic take on global connection in her *Friction. An ethnography of global connection* (2005). Tsing studied the fate of the Indonesian rainforest, increasingly threatened by capitalist enterprise and deforestation but also vigorously defended by a wide range of local and international environmentalists with each their vocabulary. Tsing's work is an important contribution to an understanding of the actualities of local environmental vulnerability in the wake of global capitalism and its uneven infiltration of local systems. About an ethnography of global connection Tsing writes:

How does one do an ethnography of global connections? Because ethnography was originally designed for small communities, this question has puzzled social scientists for some time. My answer has been to focus on zones of awkward engagement, where words may mean something different across a divide even as people agree to speak. These zones of cultural friction are transient; they arise out of encounters and interactions. They reappear in new places with changing events. (Tsing 2005:xi)

While I greatly appreciate the book and its composition, I would want to take the general ambition a bit further where climate is concerned. 'Friction,' 'interaction,' and 'encounters' all point to meetings, clashes, and exchanges – often on the border of language – and presuppose a kind of distinctiveness to cultures, discourses and life-worlds that perhaps is no longer tenable for the very reasons that make an ethnography of global connection expedient. They have

become as transient as the zones of frictions themselves. Indeed, they are nothing but. This is one reason why recent attempts at understanding the impact of climate change upon 'local cultures' (see e.g. Crate 2008) are obsolete from the outset.

Turning back to 'global warming,' it is certainly clear that factual statements about globalization in terms of encounters cannot account for the interpenetration of phenomena that belong to different scales. When we are dealing with the perceived threat of global climate change, its uneven nature is no less marked than Tsing's well taken suggestion with respect to global capitalism. Global warming introduces new disjunctions and inequities between local worlds, as established knowledge about the environment becomes destabilised. 'The global' is what envelops the local all while becoming part of it. Global terrors, climatic or political, thus 'descend into the ordinary' – to paraphrase Veena Das (2007) on violence, but they do so in uneven ways. We need new ethnographies to show how this imbalance occurs, and how people become literally unsettled as nature develops out of bounds.

The sense of society, understood as a shared horizon of expectation, is under threat from global connections of a new magnitude. Zygmunt Bauman (2006) speaks of a liquid fear, saturating the everyday life of people worldwide and seeping into the perception of what he calls the negative globalization. The perceived threats are unstoppable, uncontrollable and largely invisible and they relate to historical as well as environmental features of the imbalanced state of the global community, such as for instance international terror and global warming. The question, which Bauman does not answer, is how societies may still find ways of creating spaces of certainty, here seen as the human agent's modality of security, allowing people to act responsibly irrespective of the nanotechnologies of fear, infiltrating everything.

In a similarly panoramic fashion, Jarred Diamond (2005) has identified some of the major factors that have contributed to the collapse of past societies throughout human history. They, too, range from environmental fragility, including problems of water and deforestation, over political mismanagement and population problems, to loss of trade and other kinds of interaction. The cases are

illustrative and convincingly told. Yet again, by focussing on closed cases, Diamond leaves the reader wondering how it *really* happened; how did the minutiae of social life and individual action in the face of major threats to social life as known and taken for granted actually lead to the perceived collapse? We want to go beyond and to fine-tune such sweeping global statements by turning the attention to the flexibility of human agency in unfolding social worlds coined in a renewed concept of social resilience that may take the perforation of socio-ecological systems into account.

In anthropology there is a long tradition of studying peoples and cultures as embedded in a particular physical setting, and anthropology still has a remarkable potential for integrating natural and cultural dimensions due to its intrinsic holistic point of view (Crumley 1994: 2). This has been thoroughly demonstrated in historical anthropological studies, subverting or modifying prevalent ideas about causation (Hastrup 1985, 1990), as well as in a recent phenomenological interest in landscapes and the emplacement of people within an environment (Feld & Basso 1996). Into this, a new concern about climate and weather has inserted itself (Strauss & Orlove 2003). This trend combines with a reinvigorated interest in ecology and sustainable development reflecting a new awareness of the increased precariousness of the environment.

This means that anthropologists (and others) are bound to engage with new questions of how people take resilient action to change practices without jeopardizing their sense of belonging and knowing. Time is ripe for taking this further into a kind of ecological scaling that answers the experience of dangers seeping into society from beyond the known horizon. This challenges current ideas of environmental spaces, i.e. the limits within which sustainable lifestyles may be upheld (Agyeman et al. 2003: 22), as further underscored by migration of both people and images. In view of the intensified global entanglement and the emergent regions of disaster, local environments are increasingly perforated and 'sustainability' no longer captures the complexity of resource-management on a local scale. In the chapters below, the implications of this perforation is explored through a detailed attention to local topographies of meaning and of projected future resources.

Local environments are not affected evenly by climate change; many of the people who are already experiencing its adverse consequences are already in some sense vulnerable due to poverty and long-term deprivation. These are the people who have lived with what Baumann calls negative globalization, even without the climatic dimension. His point is that globalization in general is shaped as a “wholly *negative* globalization: unchecked, unsupplemented and uncompensated for by a ‘positive’ counterpart which is still a distant prospect at best, though according to some prognoses already a forlorn chance”, as Baumann has it (2006: 96). In other words, the actuality of globalization has allowed a free run of a highly selective and lopsided development of trade, capital, surveillance and terrorism that manages to create new protective boundaries around privileged zones, all while disregarding traditional national boundaries.

Negative globalization has done its job, and all societies are now fully and truly open, materially and intellectually, so that any injury from deprivation and indolence, wherever it happens, comes complete with the insult of injustice: the feeling of wrong having been done, a wrong yelling to be repaired, but first of all avenged. (Bauman 2006: 97)

If terrorism is one such form of avenge that may be seen as a symptom of negative globalization and give rise to a particular sense of liquid fear, global warming is a kind of avenge of an altogether different kind, not to speak of scale. Yet it contributes to the sense of negative globalization, where some people apparently still bear the brunt of other people’s actions. There is little point in simply distributing the blame, however, because in this era of planetary instability all people are in it together. Past and present, local and global are inextricably entangled and new skills must be developed to regain a sense of certainty by which to act in everybody’s interest. Here the richer parts of the world must bear the initial burden.

Risk may have been democratized – potentially affecting everybody in equal measure – but vulnerabilities are still very unevenly distributed (Beck 1998). In many areas, age-old certainties and patterns of resilience are melting away, thereby effectively blocking out people’s visions of a local future, and certainly shrinking the space of certainty within which they may act. The emerging global con-

sciousness spans from expansion and promise on the one hand to local contraction and fear on the other. There is a need of ethnographies of this historical process in its many versions that will not lose sight of the global.

Universalist scientific knowledge about climate change contributes to a new global sense of place, and eventually negative globalization may take on new significance. The horizontal, open access world of networks and flows has not obliterated social inequality and value distinction, but it has made the world more accessible to scrutiny from all over and laid it bare to an incipient sense of a new moral order shared by North and South alike. It has been suggested that climate change constitutes a 'perfect moral storm,' implying "the convergence of a number of factors that threaten our ability to behave ethically" (Gardiner 2008). There is a sense that the present moral order is inadequate for dealing with the implications of climate change, including the dispersal of cause and effect in both time and space, and increasingly skewed vulnerabilities and not least an intergenerational responsibility that distributes subjects (agents) and objects (victims) of actions in time, and poses new questions of culpability and justice. All of this converges in our 'current theoretical ineptitude' at dealing with global climate change (Gardiner 2008: 35). This is a political scientist speaking, but the anthropological echo cannot be overheard, given the negative globalization that we have sought to address since the process of decolonization took on speed in the 1960s.

In the domain of political theory it is now claimed that as far as climate change is concerned, possibly "the most confounding aspects of the problem are political rather than scientific" (Vanderheiden 2008: xiv). "Compared to the intellectual resources devoted to the study of climate change over the past two decades relatively little attention has been paid to the normative political issues surrounding this uniquely global and thus far intractable environmental problem" (ibid.). In redressing this, a new kind of anthropology must pull its weight and contribute to the discussion of a new global imaginary, and of shared if differentiated responsibilities. After all and however tenuous at times, the idea of holism upon which anthropology builds gives us a certain authority to address the critical im-

portance of the assumption of an inextricable link between the physical and the social world (Crumley 2001: viii).

Framing: The common objectives

Across the regions studied, there are similarities both of empirical substance and of conceptual pertinence. In most cases, the climatic change entails a shrinking of the liveable space, often followed by political unrest, or a displacement of resources and possibilities for survival. The aim of the volume is to show what people actually do under such circumstances, and to assess and compare the different scales and rationalities employed by the most important actors in the management of the precarious environment. The question is how people, whether hunters, herders, peasants, scientists or policy-makers, create and combine knowledge in new and creative ways to best prepare themselves for the future.

The issue of temporality, that is the question of whether disasters be seen as acute events or as gradual or even cyclical hazards, is an integral part of the over-all analysis of resilience as embedded in human action. It has been suggested that from an anthropological perspective disasters should be seen as processes rather than clearly identifiable events, because they are always embedded in social systems unfolding over time (Oliver-Smith and Hoffman 1999). However, by definition, floods – to take that example – provoke immediate reaction, often in the form of hurried displacement, as adaptation to a life-world under water is not an option. This inherent acuteness of flooding may make us forget that sudden disasters can turn into chronic conditions; conversely, hazards building up gradually can present themselves as unpredicted events occurring out of the blue.

In the social sciences, resilience conventionally points to the amount of perturbation a particular society or community can absorb and still be recognizable, also to itself. As will become clear, abstract definition must yield to concrete shifts in relevance and applicability within different regions and perceptions of disaster. While, evidently, the supply of water, food, and energy is basic to human life at the level of biology, social organization, political and economic stability and a measure of predictability are equally neces-

sary for sustaining social life. While nation-states have so far provided such frameworks these cannot by themselves mitigate the local effects of global climate changes. The idea of global climate regulation transcends received structures of protection, and must be re-grounded in the actualities of life as experienced, because however much globalization is a fact of history, people live locally and not in the world in general.

The vision of this book is to contribute to a better understanding of the nature of resilience in communities of various scales, from small settlements to the international community, *vis-à-vis* environmental change. It is a central argument across the individual analyses that a redefined concept of resilience must be able to take into account the complexity of social and cultural systems as a 'bottom-up complexity'. This implies that multiple actions, expectations and regulations fuse into a shared sense of society as a consistent space for social and moral orientation, which is never given or prefabricated. In this perspective, resilience is an emergent quality of all responsible social action; it is the rule and not the exception of social life, given that all societies must demonstrate a degree of flexibility to operate and ultimately to survive. As Bateson (1972: 497) defined it, flexibility points to an uncommitted potential for change. Resilience, therefore, is not simply a question of systemic (social or cultural) adaptation to external factors, but a constitutive element of any working society. This is where a new key to social resilience in relation to changing environments is to be found – and potentially harnessed into global measures of mitigation.

In sum, what the chapters below demonstrate in so many ways and through the lens of many places and environmental dangers, is that social resilience implies not only a practical flexibility in circumventing the threat, but also a conceptual flexibility in perceiving the temporality or degree of 'eventness' of the disaster as variable and contingent. In short, resilience is seen not so much as a systemic property, as a process of reorientation within local horizons of expectation and senses of being in the world. Ultimately, resilience is an aspect of agency – and thus thoroughly social.

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CHAPTER 2

Water as an Object of Anthropological Inquiry

Ben Orlove and Steven C. Caton

Abstract

Five themes are central within the anthropological literature on water. The first is the elemental nature of water: It combines material and symbolic properties in highly specific ways. The second is valuation: Water is a resource that has value for human well-being and productive activity, and hence is part of economic systems; it is also a right that has meaning from our place in a natural and cultural world, and hence is part of political systems. The third is distribution: This valued resource and deeply felt right is shared—often unequally—among members of societies and among the world’s inhabitants. The fourth is governance, since organizations and rules structure the control, management and distribution of water. The fifth is politics, understood as the conflicts to control water in civil society and the public sphere.

As an object of anthropological inquiry, water is both timely and timeless. It is timely because it corresponds so well to the combinations of disparate elements that make up the contemporary vision of engaged, innovative academic research. Water is at once a topic of profound scholarly significance and the object of widespread public concern, and its analysis requires many forms of collaboration, across nations, across disciplines, across the divide that lies between academic and applied research, and across the gap that often separates social scientists and the people with whom they conduct their

research. Indeed, the study of water integrates expert and lay knowledge, as much contemporary research does; it connects abstract notions and concrete experiences, and it examines the place of water in human life both through numerical measures of need such as the Water Poverty Index or the Falkenmark Water Stress Indicator, and through more concrete and vivid images, ones that virtually every anthropologist has seen, of herders desperate for pasture for their flocks, of women who every day carry jerrycans of water for kilometres, of children who cross open sewers on narrow planks to reach their homes.

And yet water is timeless as well. People are fascinated by the ordinary sounds that water makes: sounds produced by waves that lap, or crash, on a beach, or by a stream that rushes over rocks, or by rain that falls on leaves in a forest, or by drops that fall from the ceiling of a cave to a pool on its floor. These sounds evoke associations are at once familiar and fresh, showing attributes of water that people know instantly, without needing to think about it: the ability of water to surge as waves, with endless energy, on a beach; to flow steadily in a stream; to fall as rain in a forest; to drip slowly in a deep cavern. We recognize water instantly, we have all known it since our infancy, and yet it can hold our attention as if it were new to us each time. Water is widely spread in many places, and a fundamental component of each of those places. We can be struck equally by the immense diversity of forms which it can assume and by the underlying qualities present in all these forms. One way of describing the unity behind these characteristics is to call water “elemental.” It is this elementality that gives water its timeless quality.

The term “elemental” seems a productive one in the context of an overview such as this one. It evokes the early roots of European philosophy and science in the ancient Greeks, and, more specifically, the four elements that Aristotle discussed in many sections of his *Physics*. As is well known, he listed four elements, earth, air, water, and fire; he also spoke of a fifth element, ether, found only in the heavenly realm far from our world.

There are many interpretations that one can give to Aristotle’s *Physics*, a work that drew on many sources and that represented an effort to bring disparate ideas into a coherent whole. A simple, naïve

reading would see in the four elements a primitive, preliminary version of a scientific truth that was established later; this reading would claim that talking of earth, water and air was a crude foreshadowing of the principle that matter can exist in three states, as a solid, a liquid, or a gas (fire might be equated with energy, or plasma, or a kind of unstable gas). A more complex view would be to delve into Aristotle's opposed pairs of heat and cold, dryness and wetness, and to explore the logic behind his belief that is primarily cold and secondarily wet, is primarily dry and secondarily cold, and so forth. Some anthropologists and historians have examined the associations between these qualities as expressed in the natural world and in the human body.

One can also read *Physics* closely, seeing it as a reflection on the world which, despite its philosophical goals, is almost poetic in nature. It is interesting to consider the concrete examples upon which Aristotle focuses: the rain that spoils wheat left on a threshing-floor, the stone worn away by dripping water, the vessel that fills with air as the water which it contained is poured out, and to ponder his reasons for selecting these from so many alternative objects and processes that he could have described. These examples serve to elaborate his points about the underlying attributes of matter, volume, motion, and causation, but they also seem to have had an additional fascination for him. Perhaps it was the protean nature of water that stimulated his curiosity and caused his attention to linger more on this element than on the others. He was familiar to metamorphosis in the world of living creatures and in the world of myth, but water, alone among the elements, has the capacity to change its nature, by freezing and melting, by evaporating, boiling, and condensing.

To move towards the theme of waterworlds of this volume, and to suggest some specifically anthropological insights into water as an object of inquiry, it is a useful exercise to consider the worlds that could be associated with Aristotle's other elements. Our planet's atmosphere is much on our minds these days, so one could easily speak of airworlds. The main story would be one of pollution and scale, starting with the concerns about urban air pollution in the 1960s and 1970s, and continuing with the worries about acid rain, often a transboundary problem, in the 1970s and 1980s. At that time,

the genuinely global scale of atmospheric concerns developed, first with the attention to the ozone hole and then with the growing awareness of climate change, a topic of great significance within academic, policy and popular circles. Despite the overall importance of climate change, despite its links to the water issues that we face, and despite its suggestion of the need for a reshaping of environmental thought (McKibben 1989), one would not speak of airworlds: instead, there is a different vocabulary, one of impacts, of mitigation and adaptation.

Earthworlds might be a possibility, since soil bears such symbolic weight. It is the source of the food that sustains us, and it embodies the nations of which we are citizens. At its most evocative, we can think of the exiles who travel with a small vessel bearing a sample of the homeland's earth, and who kneel to kiss the soil on returning. And people have often been struck by the capacity of the earth to preserve objects buried in it. This capacity resonated particularly in the Romantic Era, when scientists and amateurs were struck with an excavation craze. They sought to impose some order on the objects that were accumulating in storerooms of museums and in the attics of private collectors, and proposed grouping and displaying them by three eras, the Stone Age, the Bronze Age, and the Iron Age, categories that were of interest in Denmark, throughout Europe and Asia, and of significance in Africa and the Americas as well. Students of earthworlds might look to the symbolic meanings and cultural framings of soil that influence agricultural policy, or study the efforts of city-dwellers to keep gardens, and to return to the soil each summer on vacation. They could consider the way that soil—as a source of dirtiness and pollution, but also as the basis of agriculture and human life—is linked to the human body and to distinctions among different categories of humans (Orlove 1998). But these earthworlds would not be as broad as the waterworlds.

Though the cultural history of fire is an enormously rich subject (Pyne 1992), fireworlds might be the most difficult to imagine, perhaps because fire itself is figured as changing and unstable. Perhaps one could look to the recent reshaping of forest management. There has been a striking shift from the fire suppression practices that were once dominant to an interest in controlled and selective burning,

often associated with indigenous groups—in Australia and California, among other places—who had an intimate, comfortable relation with fire. Or one could turn to the deep cultural meanings of fire, the ones that Claude Lévi-Strauss explored in many settings in his *The Raw and the Cooked*. The current attention to energy sources leads to heat and, in a certain way, to fire as well. But these topics do not link with each other as the different aspects of water do.

It is water, more than these other elements, that forms worlds. In contrast with these others, water has retained its elementality from Aristotle's times to ours. We now know that fire is a rapid and complex chemical process, or rather a set of such processes. Earth, in the sense of soil, is a kind of ecosystem, composed not only of physical particles of different size, clay and silt and sand, but of organic matter and many microscopic organisms. It seems like a substance peculiar to our world; though some planetary scientists talk of Martian soil and even lunar soil, the phrase has an odd ring. Air is a mixture of different molecules, mostly nitrogen and oxygen, which bears small particles as well, a unique mixture whose composition has varied throughout our planet's long history, more than four billion years long. If soil is specific to our world, very different from the dust and sand that might cover other planets, air has many analogues, in the atmospheres of other planets and satellites. But water, in its purest form at least, is a molecule, H_2O , far less removed from an element in our contemporary understanding than the other three in Aristotle's scheme. We continue to note many specific properties of water—the temperatures at which it freezes and boils, its almost complete incompressibility, its ability to dissolve many compounds. We explain these properties through contemporary scientific models, often drawing on the particular arrangement of electrons in hydrogen and oxygen atoms, though many aspects of water continue to elude physicists and chemists. Moreover, water is precisely the same molecule wherever it is found in the universe, identical to the substance on our earth. The first confirmed discovery of water on a planet outside our solar system was of sufficient import to gain the paper (Tinetti et al. 2007) that reported it the coveted lead position in an issue of the journal *Nature*. The paper's thirteen co-authors, writing in 2007, demonstrated the existence of water in the atmos-

phere of a planet named HD 189733b, of the class of planets called “hot Jupiters”. It lies about 63 light-years from our solar system, in the constellation Vulpecula. Much larger and hotter than our earth, it cannot support life, and yet the presence of water on it raises hope that water will someday be found on another, more hospitable world.

Four additional themes in waterworlds:

Value, equity, governance, and politics

Having considered other elements and other planets, we may now return to waterworlds. What insights about water can be stimulated by anthropological concepts and methods? What import do these insights have for academic research and for public debates? We would like to offer a provisional list of four specific key areas of anthropological contributions. These areas are the matters of value, equity, governance, and politics, terms that are of importance to anthropology and to other social science disciplines as well.

Value: natural resources and human rights

How do “nature” (or “environment”) and “culture” (or “society”) intersect in waterworlds? One way to answer that question is to say that water is on the one hand a resource that has value for human well-being and productive activity, and hence is part of economic systems, and on the other hand a right that has meaning from its connections to our place as conscious social beings who live in a natural and cultural world, and hence is part of political systems. Anthropologists are particularly well suited to consider the ways that water, a substance with specific properties, is understood and used differently in a variety of social settings (Bachelard 1942; Hamlin 2000). With the possible exception of air, water is the most immediate need and a right, especially since the human body has a maximum capacity for water as well as a minimum required for survival. Water is also essential for bathing, important to human health and, in most but not all cultures, experienced as a bodily need as well; water for domestic animals and irrigation is often crucial to assure

subsistence needs. Moreover, water is deeply linked to pleasure, as cultural histories of the seashore have demonstrated. This close association with the human body and with life brings to water a depth of symbolic importance that even exceeds its connection to survival. In Levi-Strauss' term, it is "good to think" (Renne 1991; Shapiro 1995); a particularly rich example can be found in the votive ships, with their multiple meanings, located in churches throughout Denmark. And water can be also termed "good to experience" (Anderson & Tabb 2002). A recent anthropological study (Wilk 2006) traces historical shifts in meanings of "potable" water in several countries. And yet, much as water moves from a biological necessity to a cultural substance, it also moves to an economic resource. It enables craft production, commerce and industry; in the form of fountains and baths, it is an amenity or even a luxury. It is worth remembering that waterworlds are threatened not only from climate change but also from increased consumption: one need only think of golf courses in Arizona, Andalucía and Abu Dhabi, all regions in which water tables are dropping and in which poor people have inadequate access to water. Moreover, water can be a resource with negative value as well as positive value. Water can be destructive, whether in the form of floods which ruin houses and farmland, damp which creates rot, or strong waves which erode coastlines. These multiple connections to water can mark the boundaries of groups and communities, defined by shared involvement with water. Hugh Raffles (2002) offers a particularly rich ethnography of the way a major waterway has changed over time and has also been imagined as a political fraught space. A counterexample is Timothy Mitchell's widely-read book (2002) on colonialism, modernity and power in Egypt; despite its attention to forms of control of persons, property and knowledge, this book pays scant attention to the Nile and to the role of water management and regulation in the shifts in political order.

Equity: access and distribution

How is this valued resource and deeply felt right to be shared among the members of a society or the inhabitants of the world? This matter

is ineluctably tied to two other linked questions: of justice, on the one hand, and of political economy, on the other. A particularly crucial issue is the equity of access to safe drinking water for people of all classes, ethnic and racial groups, of all ages, and of both genders. Sustainability of water use may not be feasible any longer in some especially pressed countries unless demand is cut back and available supplies better managed through conservation. Political scientists have studied the complex factors and strategic interests that shape water distribution within and between nations, as well as the consequences of treating water as a commodity and allowing the market to allocate it in the name of efficiency (Whiteley, Ingram, and Perry 2008). Peters (1994) offers a telling account of the factors that have led to a grossly unequal distribution of water in colonial and post-colonial Botswana.

Governance: organization and rules

How far do institutional economics and economic sociology lead us in understanding the organizations that manage and distribute water? These organizational questions interact with the distributional questions. The physical properties of water—its capacity to flow, its tendency to be absorbed by soil and to evaporate into the air, its incompressibility—strongly constrain the systems for its distribution. The uneven distribution of water in the world promotes the development of large-scale water distribution systems. Considerable investments of capital and labour must be made to build and maintain water facilities. Indeed, recent discussions of common property resources draw heavily from examples of irrigation works, which have been both a locus of efficient and just participatory governance (Ostrom 1990) and of state parasitism (Wittfogel 1957). This study of water organization is a particularly promising site for the integration of economic, sociological and anthropological perspectives on water, as Geertz (1972) noted in his contrast of irrigation in Indonesia and Morocco, and as Mosse (1997) described in his account of the patterning of irrigation institutions in semi-arid zones in India. These questions of governance can be of particular importance at times of crisis and scarcity, and the question of resilience of

water supply may be as much as question of governance as it is of the physical availability of water.

Politics: discourse and conflict

How do the three previous questions lead us to understand the struggles to control water in civil society and the public sphere? As Ernst shows in his study of political conflicts over regulation of Chesapeake Bay (2003), three categories or concepts seem to dominate the analytical talk about water sustainability: conservation, justice, and governance; these three categories correspond roughly to our first three. The term “governance” is a useful one, but its association with the notion of “management” may presume the agreement of all parties on the goals that they share and on the values that they place on water: the debates and conflicts over these goals and values lead us to the sphere of politics. With its propensity to flow, and with its ready partibility, water is almost without exception shared among people and among localities, and is therefore linked to collectivities. The organizations, mentioned above, that manage water operate within a broader political and regulatory context. These public contexts draw on a variety of forms of discourse, including property law and human rights. As Guillet (2003) indicates, water law is often a crucial site of contestation between earlier regional customary law and nationalist reform. The political contestations over the construction of dams and distribution of water show these interacting forces with particular clarity, since they lead water to shift between different individuals and groups (McCully 2001; McCormick 2007). In a discussion of dam-building in colonial and neo-colonial Rhodesia and post-colonial Zimbabwe, Hughes (2006) shows that the striking visual transformation of the landscape by water projects can become a subject of contestation as important as the actual distribution of water for drinking and agriculture. Many anthropologists look to see how different groups insert themselves in the larger debates over water sustainability. This question leads to an examination of the strategies of discourse of water sustainability, and to a comparison between the framings that consider practical challenges with solutions and the framings that address broader

relations among state, society and environment. Researchers can consider the representations of water mobilized by institutions (for example, NGOs or the state) in public media like newspapers and television or in commemorations like a water awareness day; Beamish (2000) traces the evolution of such images in a question of water pollution. More broadly, research can consider the debates that circle over large-scale water projects. The power of such representations can lead to massive mobilizations, whether in Bolivia, where municipalities privatized water supplies (McNeish 2006), or in Peru, where mines altered traditional systems for irrigation and potable water in rural areas (Li 2009).

Taken as a whole, these four themes (value, equity, governance and politics) show contributions of anthropology to the examination of the collective, visible and debatable dimensions of water, in sum, its public life. Though water is often consumed in private settings, and though many of the experiences of water are private, water passes through public institutions to reach its consumers. Even the residents on an isolated farm who draw water from a well form part of watersheds, of systems of water (and groundwater) management, of discourses of water quantity and quality. More than other topics, anthropology can allow researchers to integrate themes that range from value and symbolism, to identities and entitlements, to systems of distribution and governance, to conflicts and disputes, contributing in this fashion both to academic research and to pressing human concerns.

Three components of waterworlds:

Watersheds, waterscapes, and water regimes

Having touched briefly on these attributes of water, and knowing that they will be considered in greater depth and detail in the other chapters in this volume, we may now turn more generally to waterworlds. The four attributes of water that we have mentioned have been incorporated by many anthropologists into the study of waterworlds; these four elements are perhaps conceptual equivalents of the different-coloured blocks in a Lego set, which can be assembled into a variety of constructions. In recent years, anthropologists have

concentrated on three particularly important kinds of constructions, constructions that offer models of different components of waterworlds. These three components of waterworlds are watersheds, waterscapes, and water regimes.

The term watershed is probably the most familiar of the three. From the early nineteenth century, the term was used to refer to boundaries between drainages and to the high country that separated drainages; by the mid-nineteenth century, it was also used to refer to the slopes down which streams and rivers flowed. In 1877 the British biologist Thomas Huxley proposed, "to avoid all ambiguity it is perhaps best to set aside the original meaning of 'watershed', and employ the term to denote the slope along which the water flows, while the expression 'water-parting' is employed for the summit of this slope." (Huxley 1877:18) Huxley was also known for the strong support that he gave to Charles Darwin, for his famous grandsons (the novelist Aldous Huxley, the first director of UNESCO Julian Huxley and the Nobel-prize winning biologist Andrew Huxley), and for another lexical innovation: he was the person who coined the term "agnostic," a few years before he clarified the meanings of "watershed."

The term watershed and its synonym water catchment are widely used in scientific and policy contexts. The notion is a simple and powerful one: because water flows downhill, each spot in the world can be assigned to a specific topographical basin. The water in each connected basin forms a watershed, and each watershed can be managed and governed as a unit. The boundaries of a watershed define a set of participants in this management. The term serves to bring together natural scientists, government officials, members of local organizations and ordinary citizens. In the last few decades, many watershed councils have formed; these are generally non-profit participatory organizations that seek environmental quality and sustainable development. In addition to such councils, other groups seek participatory processes to promote more effective, equitable, and sustainable water management; the semi-arid region of north-eastern Brazil contains a number of examples (Lemos & Farios de Oliveira 2004, 2005). The popular notion of Integrated Water Resource Management rests on watersheds as units of management. At a much lar-

ger scale, there are many watersheds, such as those of the Rhine (Cioc 2002), that extend across national boundaries and that are managed as units by organizations whose members are nations.

Though we recognize that these watershed councils and other groups have done much good work, and seem generally in agreement with the authors in this volume, we would like to include a few words of caution about the term. As anthropologists, we think that the conceptual boundaries that humans use reflect cultural systems as well as the natural world, so it gives us pause to hear that an administrative unit has a material existence prior to human thought. It is widely recognized that other environmental and ecological categories, such as “forest” and “wetland,” include both natural and social elements, since their characteristics and boundaries are complex. One can grasp that such categories are socially constructed, while also understanding that such construction is at times more constrained, at other times less constrained, by nature. Watersheds may be simpler, more straightforward units than forests and wetlands, but they are not entirely and unproblematically present in nature, as Strang shows in her account (2004) of the River Stour in England. Firstly, watersheds vary enormously in scale, so that a single watershed may both contain smaller sub-watersheds, and form part of a larger watershed, so the selection of a particular scale is at least in part a social choice. Secondly, water moves in many ways. Groundwater is a crucial resource in many regions, including several settings in Africa and the Middle East that are discussed in this volume; the boundaries of groundwater basins do not always correspond to watersheds, so that residents of a given watershed may dig wells that directly affect the residents of another watershed. Deforestation in one watershed may reduce the amount of water vapour that is carried to another watershed downwind of it, creating water scarcity in this second watershed. And the long human history of digging canals, levelling hills, and constructing dikes has also led water to move from one watershed to another. In this way, watersheds are not always the well-bounded management units that they can be imagined to be. And, finally, the notion of watershed tends to go hand-in-hand with the notion of stakeholder. The participatory democratic practices of watershed councils and other groups rest on

this notion. They usually understand stakeholders as the residents, property-holders and public bodies within the boundaries of the watershed and presume that these stakeholders seek to assure sustainable water use because of their commitments to the watershed. Though these concerns are generally positive ones, it is worth keeping in mind that they represent certain exclusionary practices as well: individuals may well care deeply about areas far from the ones in which they live. (Stated most forcefully, the idea of stakeholder can be linked to the archaic and widely rejected principle of allowing only property-owners to vote [Holston 2008].) And even among the stakeholders who gain seats at the discussion table, some are more powerful than others. Phrased more simply, a focus on watersheds can rest on a naïve and simplistic view of ecological citizenship, even though this focus is often progressive in practice.

The second term, “waterscape,” has been used since the mid-nineteenth century, by analogy with the word “landscape,” to describe works of art that depict scenery that includes bodies of water; in recent years, natural scientists have spoken of “waterscape ecology” as an aquatic specialization within “landscape ecology,” the field that studies the interactions of contiguous ecosystems. This term gained attention after its appearance in an influential 1999 article by the geographer Erik Swyngedouw, in which he considers Spain in the period 1890-1930. He draws on political economy approaches within geography in order to examine the production of places, more specifically waterscapes. He emphasizes the ideological dimensions of place in his account of the construction of dams and canals, and of the creation of new administrative units based on watersheds. Other works examine the visual, experiential and cultural aspects of waterscapes more extensively; the historian David Blackbourn’s 2006 account of the reshaping of rivers, marshes, lakes and coasts in nineteenth and twentieth century Germany is a good example. These and other works show that water is not merely an economically valuable resource that flows through spaces, but also a culturally and experientially meaningful substance that is present in places. Though humans are never fully aquatic, they are often, perhaps always, hydrophilic, and the human sense of place often engages with water as well as with land. A number of examples can be

found in the anthropological literature; of particular importance are the accounts of irrigated rice landscapes in East Asia and Southeast Asia by Harold Conklin (1980), Francesca Bray (1986), Steve Lansing (1991), and others. Other chapters in this volume address waterscapes, including South Indian coastal fishing villages, Icelandic bogs, Siberian rivers, and Saharan oases and wells.

The third term, “water regime,” had a specific meaning within the field of hydrology, as the pattern of water flow in a freshwater ecosystem, but it is increasingly used in political science and other fields. It borrows the term “regime” from the field of international relations, where regimes are defined as “sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors’ expectations converge in a given area” (Krasner 1983:2). The term has been useful in this field, because it helped explain how nations often cooperate. Similarly, it can be used to examine cooperation and coordination among water-users, who, like nations, might seem to be autonomous and to have conflicting interests. Reflecting its origins, the notion of water regime has been applied to international relations; for example, the political scientist Stefan Lindemann recently (2008) traced the multiple factors that have led to successful management of water quality in the Rhine and Elbe watersheds. But the term can also apply to specific national systems for regulating and managing water; Buller (1996) contrasts the French and British rules and institutions in the period of increasing integration into European frameworks. Galaz (2004) contrasts the water regimes in periods of public and corporate provision of water in Chile. He offers useful insights into the ways that the more recent water regime, consistent with other politics of privatization and market regulation of resources, weakens the rights of several groups of water users and reduces their ability to voice their concerns. Though Galaz’ commitment to game theory is quite different from the major approaches in this volume, his use of the notion of water regime is a productive one that could well be applied to other social movements associated with privation of water. One could study water regimes at other scales; the anthropological research on water regimes in East and Southeast Asia is particularly rich, showing the interactions of local, regional and state institutions. Several chapters in this volume

consider water regimes that are under pressure from climate change, and they hint at different types of regimes, found in different parts of the world. Similarly, research on the indigenous fishing villages of Lake Titicaca in the Andean highlands of Peru and Bolivia traces conflicts between local and state regimes that govern water, granting fishing rights, permission to travel, and the management of economically important aquatic plants (Orlove 2002). The notion of water regime can be associated with resilience, because the rules and institutions that form part of specific water regimes shape response to external pressures such as climate change.

Conclusion

We would like to recapitulate briefly the main points that we have tried to make: anthropologists have offered some insights into the study of the social life of water, emphasizing four themes—value, equity, governance, and politics. These lead to critical engagement with the notion of watersheds, to detailed understandings of waterscapes, and to examination of the unfolding of water regimes as they are created, contested, and transformed; these three components, in turn, compose entire waterworlds. Anthropological research documents the threats to waterworlds, pressed by climate change, population growth and increasing demand for material goods, but this research also points to many forms of resilience. As we turn our attention to these broad questions, as we consider large areas and shifts that take place over years and decades and generations, let us remember as well water in its immediacy, in its intimate connections with our bodies and lives—its timeless elementality.

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CHAPTER 3

The Marsh of Modernity: Iceland and Beyond

Gísli Pálsson and Edward H. Huijbens

Abstract

Wetlands occur practically everywhere, on every continent, in every zone and biome, in all shapes and sizes. Despite their massive scale, they have usually remained marginal in social discourse. This is reflected in the fact that in only a century humans have reduced global wetland areas by 50%, in the name of modernization and progress, without much concern or debate. Towards the end of the 20th century, however, wetland areas began to be recognized as constituting some of the most sensitive and useful areas on Earth. Focusing on Iceland, this chapter discusses the social history and understandings of wetlands. Any discussion of the resilience of wetlands, we suggest, and of environmental issues more generally, needs to move beyond narrow definitions of the ecosystem, taking into account the mutual interdependence of human activities and the communities and environments in which they are embedded.

Nature, we know, has nasty surprises, among them flooded rivers and perfect storms, and, of course, receding glaciers and global warming. In the modernist language of mainstream ecology, things spin out of control, beyond steady states and points of equilibrium. While some of the surprises may be less surprising than they used to be, they often pose spectacular problems for human society and, as a result, demand close attention and concerted action. Wetlands have repeatedly provided apt examples, refusing to “behave”. Re-

presenting a substantial part of the Earth's land surface (about 6%), wetlands occur practically everywhere, on every continent (except Antarctica), in every zone and biome, in all shapes and sizes. Two wetland areas are in excess of 1 million km², seven are in the order of 100.000 to 400.000 km², other wetland areas are smaller. Despite their massive scale, wetlands have usually remained marginal or liminal in social discourse. This is reflected in the fact that in only a century humans have reduced global wetland areas by 50% (Fraser and Keddy, 2005: 448), without much concern or debate. Towards the end of the 20th century, however, wetland areas began to be recognized as constituting some of the most sensitive and useful areas on Earth. Focusing on Iceland, this chapter discusses the social history and understandings of wetlands (for the comparative literature on wetlands, see e.g. Giblett, 1996, Strang 2005).

One of the central terms often used to address pressing environmental problems is that of "resilience". In an attempt to move beyond modernist definitions of resilience highlighting linearity and equilibria, Berkes and Folke suggest a definition which "emphasizes conditions in which disturbances (or perturbations) can flip a system from one equilibrium state to another. In this case, the important measure of resilience is the magnitude or scale of *disturbance that can be absorbed* before the system changes in structure by the change of variables and processes that control system behaviour" (Berkes and Folke 1998: 12). While such a definition in terms of systemic states is still somewhat modernist, it does allow for uncertainty and fleeting boundaries. One thing to note is precisely the openness and relativity of any demarcation of environmental systems; after all, environmental interactions and ecological processes usually eschew geographical confinement and systemic boundaries are inevitably somewhat arbitrarily defined for specific human purposes rather than "written" in the organic world. Not only are the boundaries of ecosystems relative, depending on the scale of action and observation, they also stretch across both natural and social space, conflating the key terms of dualist, modernist thought (Descola and Pálsson 1996, Pálsson 2006). Once seen as entirely beyond the human domain, climate is now known to become increasingly artificial, a byproduct of human activities. Hurricane Katrina, partly, at

least, the result of human engagement with the marshes of Louisiana, is a case in point. Any discussion of the resilience of wetlands, we suggest, and of environmental issues more generally, needs to move beyond narrow definitions of the ecosystem, taking into account the mutual interdependence of human activities and the communities and environments in which they are embedded.

Nature as we know it

Etymologically derived from the words *natura* (“the course of things”) and *nascere* (“to be born”), the concept of “nature” is a product of Latin translations of the Greek word *physis*. Usually “nature” (and the “environment”) has connoted that which is given from birth or independent of human activities. Nature, then, is often presented as one half of a pair – nature/culture, the natural/the social – in opposition to the “artificial” products of human labor. Highlighting such distinction, the ecosystem approach increasingly seems analytically restrictive and conceptually problematic, although early on it represented important advances. For one thing, it tends to relegate human perception and social discourse to the margin.

Attempting to redress the balance, in the context of wetlands research, Strang (2005) suggests, drawing upon phenomenological approaches emphasizing direct perception, that while human sensory and perceptual engagements with water are necessarily informed by particular “cultural landscapes and engagements with water”, it seems that human bodily experience of water exhibits many common characteristics:

common human physiological and cognitive processes provide sufficient experiential continuity to generate common undercurrents of meaning. These undercurrents persist over time and space – inter-generationally and inter-culturally. (Strang 2005: 115)

We would argue, along with Strang, that the experience of water and wetlands poses similar challenges and opportunities for humans irrespective of culture and context. Arguably, however, the global environmental crisis presents unprecedented challenges to human

cognition and discourse. Some of these challenges relate to the limits of direct perception and our inevitable reliance on virtual representations. As Cronon notes,

some of the most dramatic environmental problems we appear to be facing ... exist mainly as simulated representations in complex computer models of natural systems. Our awareness of the ozone hole over the Antarctic, for instance, depends very much on the ability of machines to process large amounts of data to produce maps of atmospheric phenomena that we ourselves could never witness at first hand. Noone has ever seen the ozone hole. However real the problem may be, our knowledge of it cannot help being virtual. (1996: 47)

Another challenge to those concerned with the environment relates to the non-modern or “postmodern” recognition that observers of the environmental crisis and the languages available to them are necessarily embedded in the world they observe. The critical interrogation of the humanities and the social sciences of central concepts in current environmental debates is essential; without it, there would be no way of knowing whether we are taking the “right” track. While it is easy, however, to dismiss the virtualism of climate discourse as just one more social construction, postmodern critique is sometimes paralyzing and beside the point.

The scale of the environmental crisis and its global connections demand new kinds of social institutions and communities, robust and flexible enough to generate the necessary trust and cooperation. The demarcation of the environment as a domain for human concerns and coordination implies, it seems, new kinds of socialities and citizenship. As Latour emphasizes, the global-warming controversy demands a new and hybrid kind of politics: “The sharp difference that seemed so important between those who represent things and those who represent people has simply vanished” (2003: 33) with the imbrications of nature with the distinct sphere consisting “of a specific sort of phenomenon variously called ‘society’, ‘social order’, ‘social practice’, ‘social dimension’, or ‘social structure’ ” (Latour 2005: 3). One innovative perspective in this vein is that of Agrawal (2005: 8), who proposes the framework of *environmentality*, combining the

notions of *environment* and *governmentality* to develop “an approach to studying environmental politics that takes seriously the conceptual building blocks of power/knowledges, institutions, and subjectivities”. The global nature of many environmental problems not only poses difficulties for mitigation, it also presents particular methodological problems for environmental researchers. In recent years, partly as a result of globalization and a growing emphasis on the mutual links between center and periphery, humanities scholars and social scientists have increasingly come to advocate multisited fieldwork. Thus, in her discussion of environmental change in Indonesia, Tsing focuses on a series of sites – among NGOs, peasants, politicians, scientists, etc. – exploring “the productive friction of global connections” (2005: 3).

“Sweet is the swamp”

The recognition of the importance of wetlands is reflected in an international convention, signed in Ramsar in Iran in 1971, entitled *Convention on Wetlands of International Importance*. The Ramsar Convention contains provisions on action and international cooperation that contribute to the protection and intelligent utilisation of wetlands. Currently, 158 countries have signed the convention. A total of 1500 wetland areas are on the Ramsar list, all considered important in an international context. Three of these are in Iceland: Mývatn District in Northeast Iceland, Þjórsárver in the highland interior, and Grunnafjörður in the western part of the country. The Ramsar Convention illustrates a certain global view of the ecological value of wetlands, whose manifestations may be worth studying in a local context.

With the Ramsar rationale, international studies go as far as to approximate the annual value of wetlands, given their ecosystem services and natural capital. The price tag is US\$12.790 trillion, no less than one-third of the presumed total value for the world (Costanza et al. 1997). Dubious price-tagging aside, a metaphor frequently used with respect to wetlands is that of “biological supermarkets”, on the grounds that they are characterised by biological

variety (proportionately large numbers of organisms) and substantial biomass (Fraser and Keddy 2005). The assertion is also often made that wetlands are “biological machines” (White 1996) or “kidneys of the environment” (Fraser and Keddy 2005), a reference to the important metabolism that acts within them, purifying waste from humans and other organisms. In demonstrating their importance, Mitch, a prominent wetland ecologist, constructed an experimental wetland with two man-made ponds in the shape of kidneys to monitor wetland purification processes (see Fink and Mitch 2007). As indicative of the rationale of the Ramsar agreement, the area and the ponds were listed in April 2008.

The ecological valuing sketched above draws its imagery from early Romantic traditions. In poetic and cosmic contemplation of thinkers such as Dante, Milton and Ibsen, wetlands represented the forum of evil. For them, wetlands were an infernal domain where disease and nefarious acts were rampant. Dante said that wetlands encircled four of the innermost circles of Hell, where heretics and those who deliberately lie and cheat are tortured till the day of doom. Staged in the Fens of England, the novel *Waterland* by Swift, perhaps, offers a modern version of Dante’s approach. At the same time, it provides a series of intriguing observations of landscape and water:

Realism; fatalism; phlegm. To live in the Fens is to receive strong doses of reality. The great, flat monotony of reality; the wide, empty space of reality. Melancholia and self-murder are not unknown in the Fens. Heavy drinking, madness and sudden acts of violence are not uncommon. How do you surmount reality, children? How do you acquire, in a flat country, the tonic of elevated feelings? (Swift 1983: 13)

Not to mince matters, children, and to offer you, in passing, an impromptu theory, sexuality reveals itself more readily, more precociously, in a flat land, in a watery prostration, than in, say, a mountainous or forested landscape, where nature’s own phallic thrustings inhibit man’s, or in the landscape of towns and cities where a thousand artificial erections (a brewery chimney, a tower block) detract from our animal urges (Swift 1983: 137).

Wetlands have also been seen as holy territory, as symbols of life and renewal. The protagonist of this reaction, as it were, was the philosopher and environmentalist Henry David Thoreau, sometimes referred to as the protector and lover of wetlands, who emphasized that our ideas about wilderness are always inspired by Nature as reflected within ourselves: “It is in vain to dream of a wilderness distant from ourselves, there is none such. It is the bog in our brain and bowels, the primitive vigor of Nature in us that inspires that dream” (Thoreau 1856; quoted in Prince 1997: 337). To Thoreau, it is absurd merely to make room for Nature exclusively in our minds, since our guts generate the dream of Nature and the Wilderness. Emily Dickinson makes a similar point in her poem “Sweet is the swamp with its secrets.” Addressing a potential editor in 1862, she wrote: “You ask of my companions. Hills, sir, and the sundown, and a dog large as myself They are better than beings because they know, but do not tell: and the noise in the pool at noon excels my piano” (1959: 7).

Literary criticism has for long theorized the relation of place and text, of *oikos* and literary representation. The warp and weft of literature as it is written, read, distributed and translated remains the historically dense and often discordant experiences of language and places in all their complexities. While place alone, Howarth suggests, does not inform literary imagination, “one locale stands out because it has a long history of ambiguous and also evolving cultural status: the wetland, in its manifold guises of bog, fen, marsh, or swamp” (1999, p. 513). In combining literary criticism and the ecological view of natural scientists, Howarth emphasizes the importance of knowing nature, challenging the popular view of literature as imagined territory without any natural limits; “Only those who know little of nature”, he argues, “think imagination can surpass it” (1999: 510). “Ecocriticism”, he goes on,

seeks new ways to concur with nature, to see it as environs, or surroundings, in which human lives transpire. If we include in our readings the wetlands with all their tangled shimmer of meanings, we will begin to imagine territory that has natural limits, for such places tell us what we may hold close, and what we must let go. (Howarth 1999: 533)

Elsewhere (see Huijbens and Pálsson 2009) we have demonstrated how a particular genre of representation, i.e. the landscapes shown on maps, necessarily reflects the pragmatic motives and social bonds of the map-makers, their ideologies, and strife. We argue that it is indeed not self evident what constitutes wetland, as Cosgrove points out (2006: 51): "...the pictorial in landscape incorporates a more visceral and experiential reference".

Arguably, it is not enough to know nature, in Howarth's sense, comparative ethnography is important too. Discussions of resilience need to take into account the mutual interdependence of human activities and the communities and environments involved. In line with this, the notion of "ecological anthropology" popular in the 1970s and the 1980s seems to have been replaced by the more open-ended label of "environmental anthropology", emphasizing the unity of humans and "that which surrounds" (the etymological root of *environ*). Worster rightly suggests (1988: 6) that "we ... have two histories to write, that of our own country and that of 'planet Earth'", adding that "when that larger planetary history gets fully written, it will surely have at its core the evolving relationship between humans and the natural world". As Latour states "we have been taking the whole Creation on our shoulder and have become now literally and not metaphorically in our action coextensive to the Earth" (2008: 4).

In the bog

For centuries utilisation of Icelandic wetlands has been subject to changes. From the time of settlement, Icelanders living on a wet weather island have had to cope with wetlands, avoiding them or tailoring them to their needs, extracting peat from them, ferric oxide and plants for food and fodder. Simultaneously they have given them meaning through art, literature and mythology.

A cultural attitude to marshes can be detected in the Icelandic sagas. Marshes are there described as both oases and treacherous obstacles. Hrafnkel's Saga offers the following narrative:

They now ride westwards out of the lava field and then arrive at another marsh named Uxamýri. It is grassy. The area is very wet, so that

it is barely passable for those unfamiliar with it. (Halldórsson et al. 1987: 1413)

Vatnsdælasaga tells about a struggle in the middle of marshland between a man named Thórólfur and a Norwegian:

The Norwegian ran after him down towards Vatnsdal river. Thórólfur reached a point where there were deep pits or bogs. Thórólfur then turned against the man, seized him and placed him under his arm saying: “You are now instigating a race that we will both take part in” and he ran into the bog, where they both sank and neither one came up. (Halldórsson et al. 1987: 1877)

The marsh, here referred to as a *fen*, is grassy but barely passable. Those familiar with it can use it, even to get rid of unwelcome strangers. The sagas, one may note, and indeed much Scandinavian mythology and literature (Hastrup 1985), similarly often contrast, on the one hand, the wild and uninhabitable domain of mysterious beings and, on the other hand, the domesticated world of the farm or the estate, *óðal*, symbolically demarcated and protected by a fence.

Prominent in the dealings of the early Icelandic settlers with the land, is a dual use, so to speak, of wetlands. Some of the best hayfields were associated with wetlands or river floodplains subjected to cyclical inundations, especially those of the glacial rivers, e.g. Hvítá in Borgarfjörður. But also accounts of the wetland's nefarious potential echo some of the notions of wetlands via Dante, Milton and later Ibsen. In more recent accounts, the barely passable fens are often veiled in humour, but tinged with seriousness. In a tale of his travels in 1862, the Californian John Ross Browne describes his trip to Þingvellir in the company of Geir Zoega (Magnússon 1976). At the outset Browne had difficulty understanding why his guide consistently avoided what appeared to be easily traversable flatlands and persisted in laboriously climbing hills and slopes. At one point he decided to demonstrate how folks in western parts of North America travel and he sallied forth into the flatlands, but his steed refused to continue when it reached the marshland. Finally, John managed to coax the horse to move but as soon as they were in the marsh they began to sink. Zoega's speedy reaction enabled him to

rescue the horse from drowning, but Browne had in the meantime found safety on a small hummock nearby.

When they were back on dry land and Zoega was scraping the mud off the horse, John commented: "It was rather wet out there." Zoega stoically replied: "Yes, sir ... that is why I was planning to go around it" (Magnússon 1976: 87). It is safe to assume that the Californian was not familiar with the old Icelandic proverb which roughly translates "better to go around than end up in the bog" (Ic. *betri er krókur en kelda*). After this adventure, he describes the marshland as follows:

It is a strange feeling to look over such a stretch of land where the hummocks almost equal the height of a man. It is as if the treacherous ground had swallowed a group of bellicose Vikings, making their way through the wilderness, leaving them still standing there, covered up to their necks, with their ruffled heads exposed and defenceless against the elements.

You can often see human expressions on the hummocks and on moonlit nights, it does not require much imagination to see in them the phantoms of slayers struggling to get out of the swampland. Indeed, the ignorant farmers have, with their lively imaginative skills, endowed these phantoms with life and enjoy telling tales about their pranks on dark, foul weather nights, when the apparitions have allegedly been seen thrashing about and kicking in the swamp. Hoarse shrieks can be heard through the wind squalls and solitary travellers take a round-about route so that those uncanny spectres, seeking companionship, do not pull them into the bogs. (Magnússon 1976: 88)

Drawing on other literary accounts of wetlands, *Iceland's Bell* by Laxness contains a lengthy account of an escapade in "ugly bogs", meant to take place in the 18th Century. It reads as follows:

It was after nightfall that men rode off from Galtarholt and they were all quite drunk. But because of the ale they had imbibed, they lost their way as soon as they were outside the home field wall, when they found themselves in rotting marshland with deep pits, swamps, ponds and peat bogs. This landscape seemed to have no end and the travellers wallowed in this entrance to Hell for the better part of the night. (Laxness 1943: 18-19)

In these two more recent writings, referred to above, the marshland is clearly the abode of evil, “entrance to Hell” or the home of “uncanny spectres”. This description also applies to the Icelandic sagas cited, where the marsh serves as an appropriate place to get rid of strangers, but therein on the other hand, is also a hint that Icelanders have always utilized wetlands for cutting grass and for grazing purposes. How the benefits of wetlands could be reaped came to the fore towards the end of the 18th Century. The marsh gradually ceases to serve as material for tales about the infernal domain of dark deeds and fades into the shadow of logical reasoning and modernism.

Grand engineering

The marsh that for long had been a concrete obstacle to travel later turned into an impediment to the ideology of modernism where humans in the company of God were to shape the world to their needs (Glacken 1967: 680 & 689). This can be gleaned from the detailed descriptions in the travel books of Eggert and Bjarni (Ólafsson 1978), Sveinn Pálsson (1983) and Stanley (1979) and also from the district descriptions of the 18th and 19th centuries, prepared at the behest of the Icelandic Literary Society. Along with these travel accounts, the first ever detailed account of land in Iceland in the *Book of Farmlands* by Árni Magnússon and Páll Vídalín (1982 [1703]), heralded the dawn of the Age of Enlightenment in Iceland. The descriptions of wetlands in the above travel accounts resemble in many ways the excerpt taken here from the travel book of Ólafur Olavius from 1775-1777:

Kaupangur Parish is ... grassy, but land there has gravely deteriorated because of marshes and ponds, which can possibly be drained, in a similar way that road improvements could be implemented there by building bridges and digging ditches. (Olavius 1965: 18)

Illuminated by the progressivism of the Enlightenment era, wetlands underwent more radical changes at the hands of humans than previously known. By innovative creativity in Icelandic agriculture in the past century and with the equipment then introduced (e.g. excavators, tractors and ground levelling equipment) wetlands in most

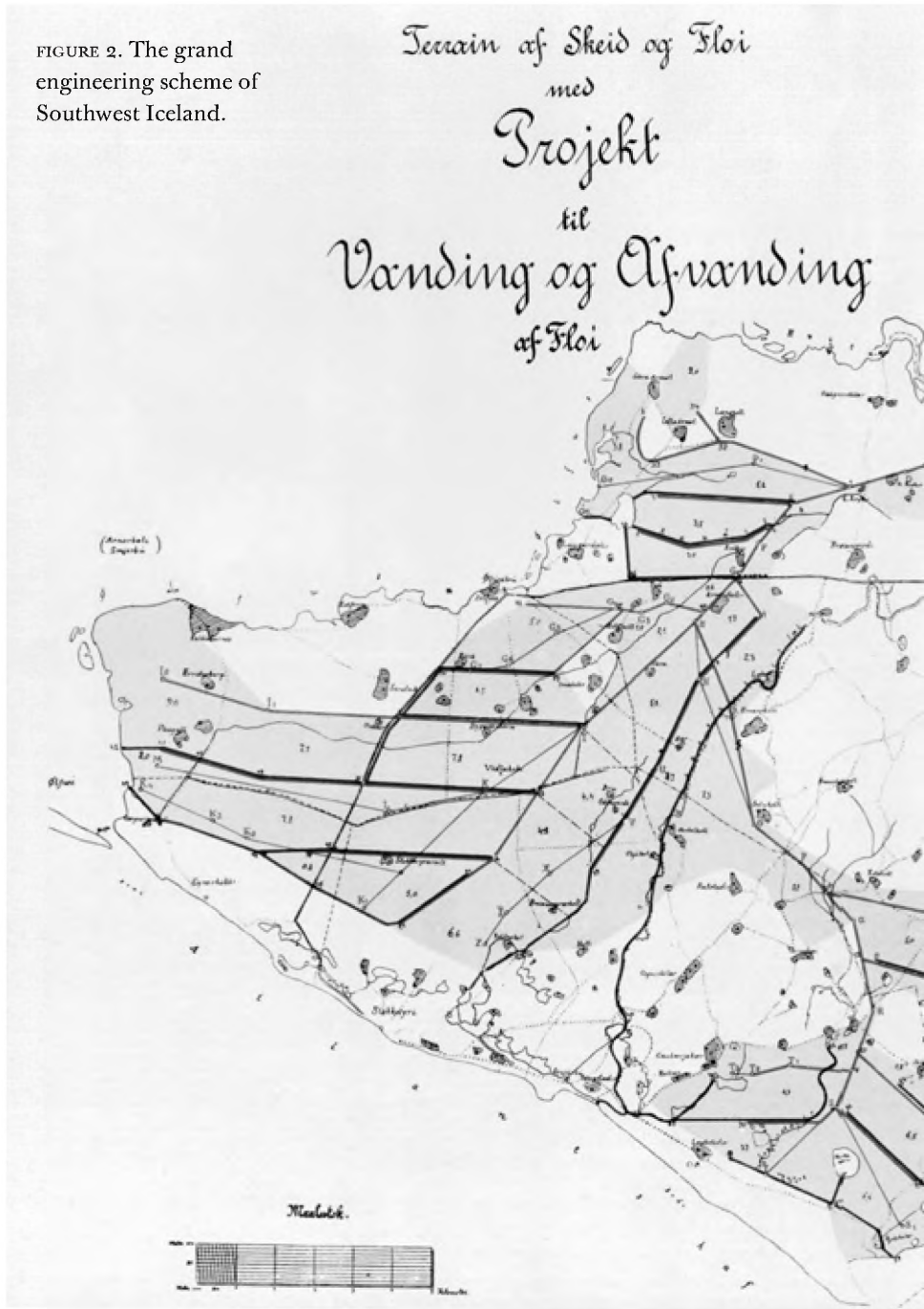
areas were drained. The use of powerful heavy equipment made it possible to manage wetlands, drain them, plan and bring order in accordance with current requirements relating to economy and profitability. For the proponents of modernism and progressivism the marsh is regarded as destructive to land and shameful, but the solution consists in digging ditches, much like the solution to transportation problems consists in road construction.

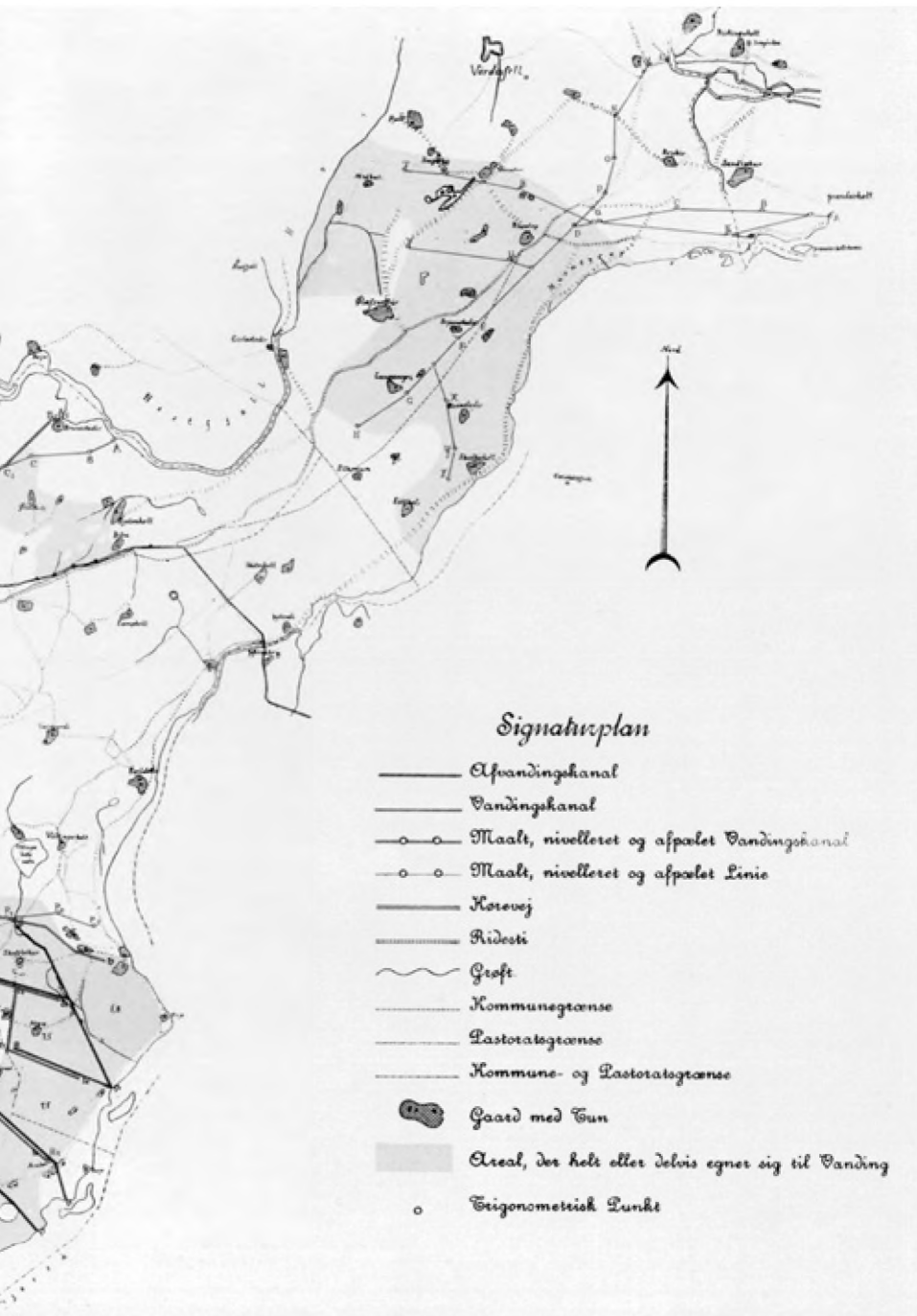
Many projects in Iceland and elsewhere have either not lived up to modernist expectations or proven to be dubious investments. Amongst them are many attempts by the Icelandic state authorities to gain control of marshlands, including large irrigation projects in the southern regions of Skeiðar and Flói (Kjartansson 1988; see Figures 1 and 2). Here, a grand engineering scheme was launched in 1914 with the financial aid of the national authorities, for the purpose of facilitating flexible management of water on individual farms and for increasing overall productivity in agriculture. An Icelandic engineer was in charge of the project, drawing upon plans developed by the Danish engineer Carl Thalbitzer. The project demanded massive funding, but the results were disappointing. Ironically, when the project was “completed” it turned out to be more or less obsolete, due to other innovations in agriculture.



FIGURE 1. From the Flói irrigation system (Photo: Gísli Pálsson).

FIGURE 2. The grand engineering scheme of Southwest Iceland.





The drainage schemes were later heavily criticized by, among others, Laxness (see, especially, his article “The warfare against the land”, 1971). Eventually, the “reclaiming” of land gave way to a strong social movement favouring the reclaiming and protecting of wetlands along the lines of the Ramsar Convention. Many of the regions heavily drained in early decades have seen the rebirth of wetlands with renewed vegetation and bird colonies. This is the result of both government initiatives and those of NGOs (as were the drainage schemes before). In some contexts, wetlands have turned out to provide new opportunities for local communities, underlining the resilience of human communities as well as environments. Thus, one of the communities in the Flói region engineered last century, Stokkseyri, now offers canoeing for tourists in the coastal wetlands (see Figure 3).

The scenic and the unscenic

One important issue to emerge from recent discussions of wetlands is the aesthetic notion of the unscenic landscape and the resultant devaluation that tends to inform environmental practice and politics. Rolston emphasizes that for many people wetlands are by definition ugly: “A ‘beautiful bog’ or a ‘pleasant mire’ are almost a contradiction in terms. Mountains are sublime; swamps are slimy” (2000: 584). Swift’s *Waterland* presents a nice example of the unscenic in the context of wetlands:

For what is water, children, which seeks to make all things level, which has no taste or colour of its own, but a liquid form of Nothing? And what are the Fens, which so imitate in their levelness the natural dispositions of water, but a landscape which, of all landscapes, most approximates Nothing? (Swift 1983: 10)

Whereas Rolston (2002) challenges the notion that the landscape of wetlands “most approximates Nothing”, and is ready to see scenic beauty almost everywhere, Saito remains sceptical. The picturesque emphasis on vision, Saito argues, clearly reduces some parts of nature to being “scenically challenged” and, moreover, the unscenic deserves more attention and appreciation. But on the other hand,



FIGURE 3. Canoeing in the “Dælur” of Stokkseyri (Photo: Gísli Pálsson).

she suggests, it makes no sense to claim that “everything in nature is aesthetically appreciable” (2000: 109). Thus, wetlands constitute part of a larger pattern in nature. The literary interpretations of wetlands counter modernism by pointing out that not all is gained by the mechanisation of agriculture and the resulting drainage of a substantial portion of marshes and wetlands. Wetlands are not necessarily the manifestation of evil or obstacles to progress.

In modern Iceland, wetlands can be seen in a variety of roles created by writers. *The Mire* by Indriðason (2000) and a film by the same name render the North Mire in Reykjavík the scene of crimes and nefarious acts. Daníelsson (1981) and Laxness (1971) on the other hand both write about wetlands as something very different from and much more significant than muddy bogs requiring drainage. Water, including its currents and flow, is, as Kress (2000) points out, an important and familiar theme both in Icelandic and foreign literature.

The fickleness of the self-image was the constant interest of the novelist Ásta Sigurðardóttir. In a book published in 1961, she de-

scribes the areas where she grew up, i.e., in Hnappadalur valley area and in Mire area. She says: “The Mire area is not particularly beautiful, as we generally understand the meaning of the word” (1961: 13). Ásta on the other hand talks about the “beauty of the marshland”: “blessed peace pervades the hilly marshland and the spirit of God hovers above the swamps in the form of the plover that sings glory, glory” (1961: 13). She describes the fragrance of the plants and the lovely colours of the marshland. She walks about the marsh and depicts how “the pitch black lye water billows up from each footprint.” It presumably was a valley bog, near the childhood home of Sigurðardóttir, which she walked through. Some Icelandic writers have described wetlands as inspirers of emotions, kindlers of both self-image contemplation and understanding of nature, in a manner similar to that described in the words of Thoreau: “This inimitable charm of the marshland simply oozes through you, especially when you are barefoot” (Sigurðardóttir 1961: 14).

Conclusion

In recent years, the writings of natural scientists have been oriented towards the ecological context of drainage and protection. “Reforms” of wetlands have, on the one hand, initiated controversial ecological changes and, on the other hand, have occasionally turned out to be anachronisms, of little use or even at odds with other innovations in agriculture (see e.g. Robertson 2000: 463-464). Many natural scientists have pointed out that wetland areas are very important in terms of climate and its changes (see e.g. in an Icelandic context, Ólafsson 1998, Óskarsson & Guðmundsson 2005). Little attention has, on the other hand, been paid to the analysis of the perceptions, attitudes, and relations of those who are in close contact with wetlands and involved in discussions about them, their drainage, reclamation, management and research thereof. In their writings, natural scientists often refer to the usefulness of wetlands. Thus modernism appears, but laced with ecological valuation that draws on a more holistic understanding. The progressive ethos remains, aiming to gain the perfect understanding in order to utilize and harness resources for human benefit. It seems essential to expand the

notion of resilience, to allow for communities as well as “environments”. In an international context, the ambiguous relation between place and its literary representation, the dream of nature, and its generation are echoed in the expanded ecological understanding presented by Mitch. Partly with reference to the catastrophes in New Orleans in 2005, he explains how local urban development, through its neglect of the needs of the water and the drainage projects of the wetlands surrounding the city, had actually caused these catastrophes, which will recur (see Mitch and Gosselink 2007: 353). Mitch contends that in our approach to wetlands we must “think like water” and realise that it will always find its way.

For Deleuze and Guattari (1988) deserts and water are examples of smooth space while the land, subject to the control of humans, is constantly striated, distributed and divided. Borders and property boundaries can be drawn on land, even in the form of walls. This is more difficult at sea, and ownership boundaries in marine regions must be controlled from shore. Wetland falls, on the other hand, between land and sea:

The two spaces in fact exist only in mixture: smooth space is constantly being translated, transversed into a striated space; striated space is constantly being reversed, returned to a smooth space. (Deleuze and Guattari 1988: 474)

From the unmolded mass of water of the marshland of the mind, ideas are shaped that are controlled by the discussion and technological competence of the day. These ideas are transformed into action and have now striated the land with ditches. Nowadays these ditches are occasionally filled up and in the course of time marshland is formed anew – we let the water sometimes decide. Thus, the wetland is transformed into a mass of water, which is never the same from one day to another, smooth under foot, the source of endless ideas – smooth space.

When the rhetoric of modernism was at its peak, in the 18th and 19th centuries, marshes and wetlands constituted obstacles to progress. This approach reached its climax in the grand engineering schemes developed in southern Iceland at the middle of the last century. Later on, a strong social movement advocated the reclaiming

of wetlands. A somewhat romantic reaction to modernism created the ideological flexibility needed to see wetlands in another light. Holistic ecological valuation became the founding understanding of wetlands as an ecological system of global significance. Modern Icelanders are concerned with retreating glaciers, dynamic water-courses and the implications for the resilience of marshes and nearby communities, aware of the recycling and movement of water both locally and globally.

By now it seems patently clear to most people that the “natural” climate of the globe has a lot to do with human activities (Crate & Nuttall 2009). Not only have humans significantly contributed to global warming during the last decades, also they have had an important impact on climate for thousands of years, particularly through their use of fire. For some scholars, the notions of “naturecultures” and “biosociality” capture the fact that nature is increasingly being remade through technique, becoming more and more artificial. This is an issue often addressed by the social sciences and the humanities, including anthropology, through discussions of human perceptions and understandings of short-term and long-term atmospheric fluctuations, weather and climate of which wetlands and the social attitudes towards them form an integral part.

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CHAPTER 4

Community Resilience and Health Outcomes in Mississippi Counties

Kathleen Sherrieb and Fran H. Norris

Abstract

This chapter explores the relationship between community resilience and public health outcomes using the community resilient measure developed by Sherrieb and colleagues (2009) and maternal-child health indicators, with Mississippi pre-Hurricane Katrina as the case study. The Norris et al. (2008) model of resilience links adaptive capacities for community resilience with functioning and wellbeing, and assumes that resilient communities will adapt so that health and wellbeing will ultimately be promoted and maintained. Thus, in general, people living in more resilient communities would have better health and functioning than those living in less resilient communities. We test this assumption using the Mississippi pilot data in which we measured community resilience at the county level. Health outcomes are defined as the maternal-child measures of infant mortality rate, low birth rate, and premature birth rate. We found that community resilience was significantly and negatively correlated with the outcomes of infant mortality and low birth weight, though not with premature birth rates. Thus, community resilience is related to specific indicators of health and may have a protective effect for the health and wellbeing of women and children.

What are the qualities or characteristics that allow a community to survive, adapt, or even thrive following adversity? Communities con-

front adversity in many different forms, including disasters, war, epidemics, and economic recessions, and they respond to these challenges in just as many ways. This process is not merely the additive result of individual responses in the wake of a problem but emerges from the capacities or strengths a community embodies prior to experiencing the threat. Given the unpredictability of some potential hazards it becomes important to understand the characteristics that make entire communities adaptable to unexpected events. This chapter will briefly discuss a model of community resilience, review the measurement of community resilience developed by Sherrieb, Norris and Galea (2009), and explore the relationship between community resilience and public health outcomes, with Mississippi pre-Hurricane Katrina as the case study.

Understanding community resilience

Norris, Stevens, Pfefferbaum, Wyche, and Pfefferbaum (2008) have outlined a theory in which they apply the concept of resilience to explain the responses of communities to events such as disasters. In this model, pre-event capacities influence the potential for resilience, which in turn influences the functioning, health and wellbeing of community members and the community as a whole as it responds to trauma. In this theory, four sets of networked resources or capacities – Economic Development, Social Capital, Information and Communication, and Community Competence – define and shape the process of community resilience, i.e., the community's ability to “bounce back” from severe stress. These adaptive capacities are not specific strategies for emergency preparedness but are a part of the social and economic fabric of the community. In theory, communities with the right mix and balance of these resources will support and sustain positive functioning, while communities with limited capacities run the risk of delayed recovery or prolonged dysfunction. Thus, three components are linked in the resilient process following a severe stress – pre-stress adaptive capacities, a trajectory of adaptation following the stress, and the outcome of positive functioning and wellbeing after responding to the event.

The broader meaning of resilience has shaped the specific appli-

cation of resilience to communities in Norris et al.'s model. The concept of resilience appears in a variety of disciplines, including physics and engineering (Bodin & Wiman 2004; Gordon 1978), biology and ecology (e.g. Holling 1973), sociology (e.g. Adger 2000; Godschalk 2003), and psychology (Bonanno 2004; Rutter 1993; Werner & Smith 1982). Across domains of concern, most definitions of resilience emphasize a capacity for successful adaptation in the face of a disturbance, stress, or adversity. Attempting to integrate various definitions across levels of analysis, Norris and colleagues (2008: 130) defined resilience as "a process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance". This definition of resilience encompasses two primary conceptions that are important (Norris, Sherrieb & Pfefferbaum 2009).

First, in this definition, resilience *emerges from* adaptive capacities, but it is not synonymous with those capacities. Resilience is not a trait that a community invariably has or does not have. Post-event trajectories or responses are contingent upon both the capacities and the stressor. Resilience occurs when resources are sufficiently strong to buffer or counteract the effects of a stressor such that a return to functioning, adapted to the altered environment, occurs. For example, cities with strong adaptive capacities should, when a disaster hits, experience less structural destruction, fewer deaths and injuries, and fewer breakdowns in communications and recovery efforts (Godschalk 2003). In the case of Hurricane Katrina, fewer deaths would have occurred if low-income citizens were not stranded because they lacked money and/or methods for evacuating the city (Cutter et al. 2006).

There is perhaps no community that would *always* exhibit resilience or a community that would *never* exhibit resilience. The current emphasis on resilience is essentially a reframing or evolution of stress theory, now decades old, in which stress outcomes are viewed as the product of stressors interacting with risk and protective factors (Dohrenwend 1978). Importantly, however, the contemporary frame of resilience directs attention to the potential of communities to adjust and stay well in the face of threats, losses, and challenges. Be-

cause adaptive capacities are more than just resources that relate to specific emergency preparedness, and refer more to the social and economic fabric of a community, the potential for resilience could theoretically be fostered in a community so that it can respond effectively to any stressor, be it natural or human-made, intentional or unintentional.

Second, resilience *is manifest in* outcomes of interest, but it is not synonymous with those outcomes. The definition of resilience as a process implies that it is not observed or measured directly, but it is evident in the patterns of change observed after significant stress. Norris, Tracy, and Galea (2009) outlined six possible trajectories for post-traumatic stress symptoms in individuals, of which resilience was just one, the others being resistance, recovery, relapsing/remitting, delayed dysfunction, and chronic dysfunction. In analyses of two four-wave data sets collected from population-based samples after the 1999 floods/mudslides in Mexico and the 2001 terrorist attacks in New York, all of the hypothesized trajectories except one (relapsing/remitting) occurred with measurable frequency in one or both of the samples.

While the analyses conducted by Norris et al. (2009) focused on one particular outcome (posttraumatic stress), “wellness” provides a more complete criterion for assessing human adaptation (Cowen, 1983; 1994; 2000; Norris et al. 2008). Wellness goes beyond the mere absence of psychopathology to include healthy patterns of behaviour, adequate role functioning, and quality of life. Community-level adaptation can be understood as “population wellness,” defined as high and non-disparate levels of mental and behavioural health, role functioning, and quality of life in constituent populations. However, it is important not to confuse resilience, the process, with wellness, the outcome. A resilient trajectory could be observed for one outcome (e.g. mental health, well-being) but not for another (e.g., quality of life). The outcomes of interest vary across levels of analysis, as do the specific resources that influence the patterns of change, but the basic nomenclature of adaptive capacities, observed trajectories, and adequate functioning applies to all.

Testing a model of community resilience

a. Defining the unit of analysis

There are multiple steps required to fully test a model of community resilience that emphasizes pre-event capacities, post-event trajectories, and population health outcomes. The first step is to decide on a unit of analysis. In our work in the United States, we have used the county as the unit of measurement to describe “community.” Much debate has been dedicated to understanding what appropriately constitutes a community. Existing research has used various definitions of communities, including communities as identified by their residents, block groups, census tracts, and clusters of census tracts (Curtis & Rees Jones 1998). However, conceptually, there is likely no single contextual unit that is important to the exclusion of all other units. For example, studies of social capital and health have been conducted at both the small community scale in Chicago and the statewide scale across the United States (see Kawachi et al. 1997; Sampson et al. 1997).

Therefore, we recognized that “communities” are social constructs that need to be defined on a case-by-case basis and proposed to focus on county as the key community unit of analysis. There were several advantages to this choice. One advantage is that counties are generally important for U.S. disasters because disaster declarations are made at the county level. Also, there is precedence for measuring characteristics of counties in disaster research. An excellent example is the Social Vulnerability Index (SOVI; Cutter, Boruff, & Shirley 2003). Cutter and colleagues conducted factor analyses with data from all U.S. counties to create the SOVI. It contains 11 factors representing income, age, race/ethnicity, occupation, commercial establishment density, single-sector industry, and housing and infrastructure dependence to depict community vulnerability to environmental hazard. Although social vulnerability should be related (inversely) to community resilience, it is conceptually distinct, suggesting that new measures are needed.

Moreover, for our specific work, it is important that counties, in most states, are an important unit of government. In Mississippi, which contains 82 counties, each county has an elected board of su-

pervisors and departments offering county-specific services. The counties are the seats of municipal administrative responsibility across Mississippi and decision-making powers that influence material resource distribution, thus affecting social and economic capacities. Counties also vary in population and resources; the county population in Mississippi in the 2000 census ranged from 2,274 to 250,800. Several studies have used the county as the unit of analysis, demonstrating their usefulness as community units (Felix & Stewart, 2005; Ruphasingha et al. 2006). Nonetheless, the methods we use are independent of the unit of analysis and could just as easily be used with other community units, given the availability of data.

b. Operationalizing community resilience

The second step in testing a model of community resilience is to measure the range of capacities that represent the potential for community-level resilience in a range of settings. In order to empirically explore and test this model of resilience, the pre-adaptive capacities of economic development, social capital, information and communication, and community competence had to be defined and measured. This step was completed by Sherrieb, Norris, and Galea (2009). They explored the use of publicly available data for assessing capacities for community resilience to create a metric that can be applied across communities. They used the state of Mississippi as their pilot case, with county as the unit of analysis. In reviewing the literature related to the measurement of the capacities included in the Norris et al. (2008) model, Sherrieb et al. (2009) observed that Economic Development and Social Capital had structural characteristics that were possible to measure with secondary data, but the same was not true for Information and Communication and Community Competence. Sherrieb et al. (2009) described previous measures of economic development and social capital in some detail, noting both their strengths and limitations with regard to utility for inclusion in a measure of community resilience. Through a multi-step process beginning with a "wish list" of measures and continuing through searching for and selecting indicators and validating indices, Sherrieb et al. (2009) selected ten indicators to form an index of Eco-

conomic Development. The *level of resources* in a community was measured with indicators representing employment rate, household income, rate of community medical doctors, corporate tax revenues, and the rate of occupations classified as “creative.” The *equity of resources* was measured with the indicators for income equity and racial differences in educational attainment. The *diversity of resources* was measured with indicators for the net gain/loss rate in businesses, occupational diversity, and urban influence on the community. Likewise, they selected seven indicators to form an index of Social Capital. *Social support* was measured with the ratio of two parent households to one parent households. *Social participation* in the community was measured with the indicators for density of sports/arts organizations and of civic organizations, voter participation in presidential elections, and religious membership. The *level of community bonds* was measured with the indicators for community in/out migration and the inverse of the property crime rate. Thus, indicators that yielded the community resilience measurement were observable and measurable. These indicators were then linked to create a parsimonious yet relevant index we named the community Resilience Index, which measures adaptive capacities thought to be important in the resilient process.

In their initial research, Sherrieb and colleagues (2009) were able to validate their community resilience measure against the SOVI measure of social vulnerability, as well as against aggregated survey data from 21 Mississippi counties. They found a significant and inverse correlation between their resilience measure and the SOVI. In addition, they found a strong correlation between their composite measure for social capital and Mississippi survey data measuring community collective efficacy, two concepts believed to overlap in definition. Finally, the distribution of scores was also consistent with what is known about different regions of Mississippi. For example, the rural region bordering the Mississippi River known as the Delta was in the highest 20% for social vulnerability across the state as well as in the entire United States using the SOVI. Alternatively, and providing support for the Sherrieb and colleagues’ (2009) community resilience measure, this region was in the bottom 20% for community resilience.

c. Defining population health outcomes

The third step in testing a model of community resilience, and one of the goals of this chapter, is to define measures of community health. In general, people living in more resilient communities should have better health and functioning than those living in less resilient communities. In the current study, we tested this assumption using the Mississippi pilot data. Using the Mississippi county-level communities from the Sherrieb et al. (2009) work, we assigned the maternal-child health population outcomes of infant mortality rates, low birth weight rates, and premature birth rates to represent health outcomes specific to women and infants to test the relationship of community resilience and health outcomes. We chose these specific indicators because historically women and children are at significant risk for poor health and mental health outcomes following disasters (Norris, Friedman, Watson, et al, 2002). Maternal and infant health indicators are identified as short-term health indicators because they can be influenced by short-term changes that occur over the nine-month period of a pregnancy and thus act as an early warning system to presage long-term health problems experienced by the larger community over a longer course of time (Galea & Ahern 2005).

For decades, the infant mortality rate (IMR), defined as the number of deaths in children under 1 year of age per 1,000 live births in a given year, has been used as a proxy for population health (Newman, 1906; Woodbury, 1925; Yankauer, 1990; Wise, 1993; Reidpath & Allotey, 2003; Black, Morris, Bryce, 2003; Zeitlin, Wildman, Bréart, Alexander, Barros, et al. 2003). As early as 1906, Newman indicated that “a nation grows out of its children; and if its children die in thousands in infancy it means that the sources of a nation’s population are being sapped, and further that the conditions which kill such a large proportion of infants injure many of those which survive” (p. 2). Indeed, this measure has been a key indicator for comparison of population health by the World Health Organization, the Office of Economic Development, and EUROSTAT (Statistical Office of the European Communities), three organizations who regularly compile cross-country comparison data (Zeitlin et al. 2003)

as well as by the United States Centers for Disease Control and Prevention (Matthews, & MacDorman 2008). In Europe, these maternal-child measures were being followed as early as the mid-nineteenth century; following the wars in the first half of the twentieth century, public health interventions focused on women and children, and IMR became the indicator of choice for measuring population health (Zeitlin et al. 2003). The IMR, along with low birth weight and prematurity rates are attainable for most industrialized countries from birth and death records, and efforts have been made to standardize documentation of these indicators to facilitate cross-country comparisons.

Social variations in maternal-child health indicators are well documented. In 1906, Newman noted that infant mortality in the UK was higher among births to unmarried women compared to births to married women, reflecting the social and economic disadvantages experienced by unmarried women during that time. Woodbury, in 1925, found differences in IMR in eight U.S. cities related to maternal employment and paternal income. Other social and economic factors associated with the maternal-child health indicators of interest in this study include social class (Antonovsky & Bernstein 1977), poverty (Gortmaker 1979), educational attainment (Singh & Yu 1995), access to prenatal care (Cramer 1987; Centers for Disease Control and Prevention 1999), and race/ethnicity in the U.S. (James 1993; Singh & Yu 1995; Centers for Disease Control and Prevention 2002a; Centers for Disease Control and Prevention 2002b; Hessol & Fuentes-Afflick 2005) as well as internationally (Smith et al. 2000; Barros et al. 2001; Schulpen et al. 2001; Burgard & Treiman 2006; Friberg et al. 2004; Pearson 1991), although this latter factor may be considered a proxy for socioeconomic status or racial discrimination (Smith 2000; Braveman et al. 2001; Kreiger 2001). Thus, there is a differential risk for infant morbidity and mortality that is related to the social and economic status of women.

More importantly, there are ecological-level determinants for infant mortality that are related to the social and economic environments in which women and children live. According to Macintyre and Ellaway (2000), ecologic factors refer to the socioeconomic context of a community rather than the socioeconomic status of the in-

dividuals that live in that community and these may in turn, significantly influence health. In our study, community resilience is an ecological-level variable that measures the capacity for resilience at the community level and not necessarily the resilience of individuals who live in that community. Neighbourhood or community effects have been identified as important factors in infant mortality (Ellen et al. 2001). Income inequality, or the unequal distribution of income in a defined area, has been found to be positively associated with infant mortality (Rodgers 1979; Flegg 1982; Sohler et al. 2003; Macinko et al. 2004). Neighbourhoods with a high concentration of poverty are associated with higher rates of low birth weight births as compared to neighbourhoods with less concentrated poverty (Collins & David 1990; O'Campo et al. 1997; Rodwin & Neuberg 2005; Cerdá et al. 2008). The neighbourhood effect of racial segregation for African Americans is negatively associated with IMR (Yankauer 1950; Brooks 1980; Guest et al. 1998). Finally, Kawachi, Kennedy, Lochner, and Prothrow-Stith (1997) found that income inequality was related to IMR as a result of a decrease in neighbourhood social capital. There are, however, no studies to date that have tested the relationship between community resilience and maternal-child health indicators.

d. Testing the relationship between community resilience measures and health outcomes

The next step, and the other goal of this chapter, is to test the relationship between concurrent measures of community resilience and health outcomes. We used the Community Resilience Index, briefly described above and in more detail in Sherrieb et al., 2009, as the independent variable. The community resilience score was standardized with a mean of 0 and a standard deviation of 1. We defined three separate dependent variables for this study: infant mortality, low birth weight rate, and preterm birth rate. Infant mortality rate is defined as the number of deaths in the first year of life per 1,000 live births. Low birth weight rate is defined as the percentage of children weighing less than 2,500 grams at birth. Preterm birth rate is defined as the percentage of births occurring at less than 37 weeks gestation.

We calculated the mean yearly rate using the years 2002, 2003, and 2004 for low birth weight rate and preterm birth rate, and the years 2000 through 2004 for the infant mortality rate (Mississippi Statistical Abstract, 2002, 2003, 2004). We chose to include these years because they closely matched the time period for the measurement of community resilience which included indicators measured at the 2000 census or as the mean of 2002-2004 yearly data.

Bivariate correlations were calculated between (a) each maternal-child health outcome measure and (b) the Community Resilience Index and its component scores for Social Capital and Economic Development. These results are shown in Table 1. Community resilience was significantly and negatively associated with low birth weight rates, as well as with infant mortality rates in Mississippi counties. Figure 1 illustrates this for the total community resilience index and infant mortality. As expected, the composite measures were negatively and significantly correlated respectively with low birth weight rates and with infant mortality. However, economic development had a stronger correlation than social capital with low birth weight rates whereas the opposite was true for infant mortality rates. Although the associations were negative between the community resilience measures and preterm birth rates, they were not statistically significant for a sample of 82 counties.

Overall, however, we were able to confirm an inverse relationship between concurrent measures of community resilience and maternal-child health (rates of infant mortality and low birth weight births), using Mississippi as our case. Thus, in Mississippi counties, as community resilience increases, the rates of infant mortality and low birth weight births decrease. While the present study advances the case for the influence of community-level resources on population health, we did not include additional variables in our analyses that might influence the relationship between community resilience and maternal health outcomes, such as average population age. In addition, these correlational data cannot establish a causal relationship between community resilience and maternal-child health outcomes.

e. Predicting resilience in the aftermath of disasters

The final and future step required to fully test the model of community resilience is to study whether pre-event measures of community resilience influence the patterns or trajectories of health outcomes after disasters and other major community-level events. This step will answer the question of causality in the relationship between community resilience and health outcomes. Furthermore, establishing that community resilience is a determinant of health outcomes following community trauma can pave the way for the development of strategies that can be used to strengthen and improve community capacities and ultimately impact the resilient process in communities.

We have defined community resilience from a broad perspective. Our model of community resilience takes us beyond making plans for dealing with a specific and defined trauma or adversity to building strengths in a community that will facilitate the process of resilience when needed, regardless of the threat. Translation of our findings into policy recommendations, of course, involves a discussion of changes in the socioeconomic structure of communities. These challenges are not easily met. But they may be more manageable if they are disaggregated in terms of the components or even subcomponents of resilience identified in this paper, which opens up a whole new area for community research.

Note

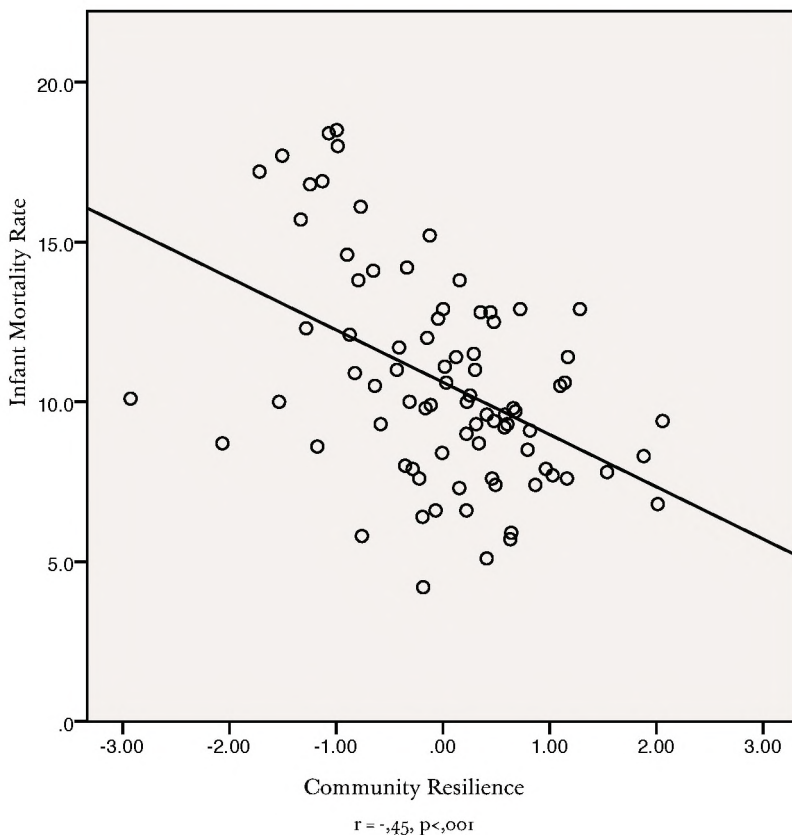
This research was supported by the United States Department of Homeland Security through the National Consortium for the Study of Terrorism and Responses to Terrorism (START), grant number N00140510629. However, any opinions, findings, and conclusions or recommendations in this document are those of the authors and do not necessarily reflect views of the U.S. Department of Homeland Security. Address correspondence to Kathleen Sherrieb, NCPTSD, VA Medical Center, 215 North Main Street, White River Junction, VT 05009 or kathleen.sherrieb@dartmouth.edu.

TABLE I. Correlations of measures for the Community Resilience Composite and its components, Economic Development and Social Capital with the outcomes of Infant Mortality Rate and Percent Low Birth Weight using Mississippi county data (2000- 2004) (n=82).

	Community Resilience Composite	Economic Development	Social Capital
Infant Mortality Rate	-.45**	-.31**	-.46**
Percent low Birth Weight	-.55**	-.51**	-.39**

* p< .05 ** p<.001

FIGURE 1. Scatter plot and fit line depicting the associational trend for community resilience and infant mortality rates in Mississippi counties (n=82)



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CHAPTER 5

Metaphysical Aspects of Resilience: South Pacific Responses to Climate Change

Cecilie Rubow

Abstract

As many studies reveal, practiced ethics and religion are put to work in many areas of existence in complex and often mixed ways. Local theologies include both everyday knowledge systems, motivations and sentiments, power relations, and fundamental ontological presuppositions in a negotiation of the borders between 'this world' and the 'other world'. In this chapter it is argued that religion can be a valuable perspective in the anthropological study of resilience and climate change. The global scale of climate change and the local environmental and social consequences play at past experiences, existing cosmological notions and visions and social imaginaries of the future. Using sources primarily from the Cook Islands it is argued that it is crucial to develop a dynamic understanding of the local, heterogeneous responses to climate change, involving both various religious traditions, oral history, myth, and secular ways of knowing, including the often uncertain scientific measurements and projections of climate change.

In recent years, Pacific Islands have been pointed out as particularly vulnerable to climate change. In the media, small island states as Tuvalu and Kiribati are depicted as the canary in the mine or as the epi-

tome of the lost paradise, the first victims of a devastating rising sea level on the previously exuberant tropical shores (Lazrus 2009: 248; Mortreux & Barnett 2009: 106). The public awareness of sinking islands, drowning atolls and forced refugees is high. A number of documentaries from Tuvalu and Kiribati have been produced with telling titles comprising wordings as ‘disappearing nation’, ‘that sinking feeling’ and ‘paradise lost’ (Chambers & Chambers 2007, www.pbs.org). A simple test on an internet search engine can confirm how an outcry of the president of Kiribati, Anote Tong, about a final loss of land and a possible final migration of the island state’s inhabitants has toured the world press with headlines in major newspapers. Here, allusions to the Deluge seem more than tempting.¹ The South Pacific has for centuries been plastered with metaphors of paradise by explorers, missionaries, poets, and tourists. Now it conveys the warning of a time of gloom and doom. According to IPCC, small islands do have characteristics that make them “especially vulnerable to the effects of climate change, sea-level rise and extreme events” (Minura et al. 2007: 689). In the Pacific area the risks enumerated are: 1) Sea level rise resulting in inundation, storm surge, and costal erosion, 2) reduction of fresh water resources, 3) impact on coral reefs and fisheries, agriculture and bio-diversity and, 4) negative influence on tourism (ibid.: 689). Besides, expected hazards throughout the Pacific are an increasing occurrence of heavy rainfalls and instances of hot days, drought, and cyclones (ibid.: 691-692).

Cook Islands² is one of the small island states getting the world’s

1. E.g. “Paradise lost: Climate change forces South Sea islanders to seek sanctuary abroad”, *The Independent*, June 6, 2008; “Climate refugees in Pacific flee rising sea”, *The Washington Post*, April 19, 2009; “Small Pacific Islands Call for Big Carbon Cuts”, *New York Times*, August 5, 2009.

2. Cook Islands is a small country with a population of 19,000 (2006 census), and a landmass of 240 square km. scattered over 15 islands, located south of equator between 9 and 23S latitude, and 156 and 167 longitude, neighbouring French Polynesia, Samoa, and Kiribati. The climate is typical of tropical maritime climate with monthly average temperature ranging between 21 to 28 and an average humidity around 84%. The islands elevation above mean sea level ranges from low-lying atolls of 5 metres to a high volcanic island rising to 652 meters (Rongo & Rongo n.d.).

attention, and one of the states that respond to climate change on many levels. Cyclones (sometimes called ‘storms’ or ‘hurricanes’), storm surges, and flooding of low-lying areas are part of the local experience and have been recorded ever since the first European contact in the 17th and 18th centuries.³ The geographer Terry describes tropical cyclones as “nature’s most intense phenomena in the South Pacific”, during the last 30 years occurring on average nine times a year, and “.in short they are storms to be reckoned with for the people who live in this region” (2007:3, 33). In recent years – in all probability related to the global warming – increased cyclone activity in terms of intensity and frequency has occurred. In 1987, a cyclone extensively damaged Rarotonga; in 1997, a cyclone destroyed 90% of the houses and killed 19 persons on Manihiki atoll; and in 2005, Cook Islands encountered a sequence of four cyclones.

Rarotonga, Cook Islands, 1831: Buzacott, a British missionary resident at Rarotonga, experiences the rage of a hurricane:

It is almost impossible for the English reader to conceive, much more realize, the disastrous consequence caused by this hurricane at Rarotonga. For culture and beauty the island had been a garden of Eden. Provisions had been abundant. In three short hours, the whole land had become one vast wreck; houses not only demolished, but their very sites buried deep beneath sand and masses of coral blocks.

All the property of the natives, being perishable by water, had been destroyed. The fruits and vegetables which supported the whole population, had been hurled to the ground and saturated with salt water – the trees themselves either torn up by the roots, or their boughs broken off that no fruit could be expected from them for at least two years. Buzacott, *Mission Life in the Islands of the Pacific* (1996 [1855]: 88)

3. Some of the islands were visited and described by James Cook in the 18th century, and beforehand by Spanish and Portuguese ships in the 16th and 17th centuries, but eventually colonized by British and Tahitian missionaries in 1823. Ministers from London Missionary Society had a huge impact from 1823 to 1888, enforcing Christianization with the making of mission station villages. After a short period with British residency, Cook Islands was annexed to New Zealand in 1910 until 1965, at which point they became self-governing in free association with New Zealand (Gilson 1980).

Suvarrow. Cook Islands 1942: Robert Dean Frisbie, an American writer, and his four young children endure a cyclone at Suvarrow. The atoll is flooded by wild waves. Tied to five trees and with a bottle of rum as the only provision they survived:

The storm centre must have been close to us during those three hours. The wind had ceased to be a wind: it had become a monstrous thing that did not belong to the physical world. For three hours we ceased to live on the familiar Earth; and perhaps that is why I find it so difficult to describe the wind, the sea, our own emotions. Vocabularies were built around the things of everyday life; this thing belonged to the frenzied life of delirium. Frisbie, *The Island of Desire* (1944)

Cook Islands 2005: The Cyclone Meena was forecast to pass very near or over the main island of Rarotonga as category 4-5 super-cyclone with the capacity of causing severe damage to the capital:

“Frequent heavy rain with squally thunderstorms, phenomenal seas, damaging heavy swells, flooding including sea flooding of coastal areas,” the Fiji Meteorological Service website said. Waves up to 11 metres were expected to strike areas around the main island of Rarotonga and nearby Mangaia within hours, it said.

“It doesn’t look very good for us,” said John Strickland, speaking from the National Emergency Operations Centre in the Cooks’ capital, Rarotonga. He said people were securing their homes on all the islands in Meena’s path, while on Rarotonga seven hurricane centers had been opened and people were moving to higher ground inland to take shelter. The Aitutaki Lagoon Resort on the island of Aitutaki, 80 km north of Rarotonga, said about 300 tourists were evacuated to Rarotonga in the past two days. tvnz.co.nz (Feb. 7, 2005)

The terror of a cyclone battering the shores, destroying buildings and crops, flooding and eroding land areas and roads, is obviously causing anxious concern. The threats are immediate in terms of both personal safety and cognitive and emotional capacity to grasp what happens to “the familiar Earth” lashed by damaging winds and waves. Due to the infrastructural dependency on coastal areas, the long-term consequences are probably worse now than ever. The majority of the population on the volcanic and atoll islands live closely to the coast, and the beach and shallow waters harbour economically decisive sectors (tourism and pearl farming). Characteristically, dur-

ing the past few years, the local awareness of climate change and environmental problems has increased. The main newspaper *Cook Islands News* has added an 'environment' section to it, reporting from regional conferences on climate change and from the local sites of consequence. The pages reveal that the local awareness and the number of actors are rising in the environmental field. Major concerns are climate change related but also issues such as overfishing, pollution, renewable energy, and alien invasive species.

Today, Cook Islands participates in a number of international and regional political commissions and organizations, among others the South Pacific Regional Environment Programme (SPREP), established by the governments of the region. SPREP publishes and acts as library for a rapidly growing amount of reports on climate change, as well as vulnerability and adaptation assessments. The reports paint a rather homogenous picture of the general environmental situation in terms of land degradation, bio-diversity, changes in air and sea temperatures, sea level rise etc. Recent studies show that the annual and seasonal temperatures on both ocean surface and the islands have increased by 0.6. to 1.0 since 1910 throughout a large part of the South Pacific (SPREBa n.d.). Locally, at Rarotonga, a 2.5 mm/yr sea level rise since 1992 has been measured, compared to the IPCC of 1-2 mm/yr over the last 100 years (SEAFRAME 2006). Data for 92 months to November 2000 indicates a rising sea level trend of 5 mm/yr, and may account for some observed costal erosion over the last few years, however, it is still considered too early to deduce a long-term trend (SEAFRAME 2006: 22-23, Carruthers n.d.).

Generally, there are many uncertainties concerning future sea and air temperature, sea level rise, rainfall, and cyclone activity. For the next two decades the IPCC has projected a warming of 0.2 per decade, and a sea-level rise ranging from 18cm to 59cm in the end of the 21st century (Bernstein et al. 2007: 45). The local projection for Cook Islands reports "marked increases" of climate-related risks of extreme weather events such as a daily rainfall of at least 200 mm, strong winds, and significant on-shore waves, and drought (SPREBb: 2009: 132). Thus, the figures are open for interpretation. Concerning the island states' ability to adapt to the climate change, the human geographer Barnett in 2001 states that the uncertainties

of climate change and sea level rise are unlikely to be reduced in the near future due to the nature of the ‘problem which is cross-scale, temporally complex, spatially complex and highly interconnected’ (2001: 3, 10). Moreover, he maintains that ‘pessimism should not prevail, as there is good reason to think that even the atoll states can adapt providing a high level of sustainability’ (2001:5). However, two years later, in 2003, Barnett & Adger warn about ‘a possible future in which atoll countries become effectively uninhabited’ (2003: 321), quoting former IPCC chair Watson: low lying small island states face the ‘possible loss of whole countries’ (ibid.:326). Yet, in 2009 Mortreux & Barnett in the case of Tuvalu warn against ‘unhelpful sensationalism’, stating that ‘there is nothing inevitable about climate-induced catastrophe in Tuvalu’ (2009: 106).⁴ Concerning the Cook Islands, the SPREP assessment of vulnerability and adaptation includes a caution against too far-reaching conclusions and suggests that adaptive responses are possible, ‘if there is community understanding and support, backed up by consistent local government policy’ (Carruthers n.d.). Or as the director of the National Environment Service of the Cook Islands frames it: ‘it is not likely that all of the Cook Islands would disappear under the sea even with the highest projected rates of sea-level rise’ (Tupa 2004).

The rapidly growing knowledge on environmental change and the built-in insecurities are a significant part of the framing of the local understanding of the possible dangers threatening the shores

4. Also focusing on data of sea level from Tuvalu, Lazrus reports a recent situation where the data was treated differently by two agencies causing contradictory results. One study determined that sea level had fallen, the other study indicated a sea level rise of several millimetres (2009: 246). Uncertainties are also a part of the scientific study of coral reefs and atolls. Contrary to the often reported end result of sea level rise in terms of sinking islands, Kench & Cowell (n.d.) argue that “reef islands will physically adjust to sea level change and will not totally disappear”, since changes in the sediment caused by changed sea level, wind, and currents more likely will cause alterations in the coastal areas rather than simply effect a drowning. For Tupa, writing from the Cook Islands, the question too remains open whether coral reefs by their growth can catch up with the sea-level rise or whether they will bleach and die due to higher temperatures. A question which is related to how healthy the reefs presently are (Tupa 2004).

on which they live and the wider horizon of existence. Yet people at the Pacific islands draw on many sources of knowledge. They have more than IPCC reports and local vulnerability and adaptation assessments within their frame of reference. Past experiences, oral history, the ethical and religious conceptions of the environment, and hopes and fears of the future are important elements in the fabric of local communities. For some societies, institutions, families, and individuals, all having many interests to protect and nurture, planning must begin, decisions must be made and strategies formed.

Resilience: New questions in recent studies

Current studies in the social sciences of human reactions to climate change and natural hazards have taken an interesting turn from concepts of 'risk' and 'vulnerability' indicating ideas about potential loss or shortcomings to concepts of 'adaptation', 'sustainability', and 'resilience' denoting more creative aspects of societal responses. The conceptual width appears fruitful, since social and cultural ways of actions imply a complexity *sui generis*. Climate change is a powerful concept of a potentially all-encompassing phenomenon, and therefore it has the capacity of attracting many scholarly branches. While focusing on the recent literature on resilience in the next section, I will argue that the study of human response to climate change may also gain from a thorough attentiveness to ethical and religious aspects of people's life. By highlighting recent (and not so recent) research on pacific islanders' experiences with cyclones, storm surges, flooding, and other natural hazards, I identify two common problems in the scholarly understanding of the role of religion and present some examples and notions suitable for grasping the significance of local mythologies, ethics, and theologies that are the heterogeneous everyday metaphysical notions of human existence in the natural and cultural world.

The neglect, and the incipient awareness, of metaphysical dimensions

Recent resilience literature is characterized by a striking neglect of

the role played by myth and religion in communities' comprehension of climate change and natural hazards, not only in the Pacific, but also in other regions. This may be explained by the traditions of the dominating disciplines such as science of the environment, human geography, and psychology. Thus, important studies with resilience as a focal point by Adger (2000), Barnett & Adger (2003), Norris et al. (2008), and Leach (2008) linking social and ecological resilience, ignore or only peripherally touch upon religious and ethical aspects in terms of "social institutions defined in the broadest sense to include habitualized behaviour and rules and norms that governs society" (Adger 2000), the religious communities as "part of citizen participation" (Norris et al. 2008: 139), or "lost confidence in atoll futures" as "important thresholds" (Barnett & Adger 2003: 330).

Lately, in a neighbouring field of natural hazards, the study of volcanic eruptions, Chester & Duncan (2007) have called for the continuing relevance of religious worldviews, carving out a burgeoning field of 'geomythology' and 'theodice' defined as the "attempt to reconcile theistic belief with the reality of human suffering" (2007: 203). On the basis of an abounding set of historical and present records of local experiences with volcanic eruptions, Chester & Duncan conclude that "there are relatively few eruptions where no religious elements in human response are recorded" (2007: 214). The religious elements mentioned include both the appeasement of saints, warnings against God's anger, processions and sacrifices, intrinsic fatalism, and belief in miracles, collective sin, and so forth. Turning to the Pacific responses to natural hazards such as cyclones, storm surge, and flooding, recent studies too show an incipient awareness of the role of religious aspects. Campbell (2009) argues that research in resilience tends to neglect 'traditional knowledge' and demonstrates how traditional Pacific island communities have coped with the effects of extreme events. Key elements in traditional disaster reductions, he states, were built around food security, settlement security, and inter- and intra-community cooperation, traditions known to be closely connected to ancient cosmology (2009: 85, 86). Campbell adds that present-day Christianity in many Pacific communities are also considered traditional, and remarks that

churches are often used as “safe havens during tropical cyclones”, when smaller and less secure dwellings fall (ibid).

Historically, several studies on ancient mythology attest that Pacific cosmology included an environmental awareness. According to Oliver (2002), “each wind was believed to be controlled by one or another god, who was therefore supplicated to assure its periodic occurrence or to curb its occasional excesses..(..)..on some occasions gods also took direct unsolicited action vis-à-vis humans(..).. such as causing an individual to sicken or a whole community to be devastated by a storm” (2002: 30, 46). D’arcy (2006: 85, 128) suggests that individual islands in the Pacific experienced up till five to six cyclones per generation and confirms Malinowski’s findings that the building of canoes and voyages at sea involved ritual and prayer, just as oracles were consulted and offerings made to sea gods before departure (Malinowski 1922).

According to a myth of creation known in many different versions throughout the Pacific, changes in the weather and climate were the result of a struggle between the principal gods and their offspring, often personified as natural and climatic entities. (King et al. 2008)

“According to the traditions of our race, Rangi and Papa, or Heaven and Earth, were the sources from which, in the beginning, all things originated.” Rangi and Papa lie close locked together, and their offspring are forced to live in the darkness between them. At last they consulted amongst themselves, saying, “Let us now determine what to do with Rangi and Papa, whether it would be better to slay them or to rend them apart”. The children, all male, discuss among themselves what the best solution is, and after many attempts they succeed to force the parents apart, light comes into the world, a space is revealed, and human beings, who had been concealed in the dark. All the brothers had consented to the plan, with the exception of Tawhiri, the father of winds and storms, and he grieved greatly: “Then arose in the breast of Tawhiri, a fierce desire to wage war with his brothers”. He creates the winds, and “next send forth fierce squalls, whirlwinds, dense clouds, massy clouds, dark clouds, gloomy thick clouds, fiery clouds, clouds which precede hurricanes, clouds of fiery black, clouds reflecting glowing red light, clouds wildly drifting from all quarters and wildly bursting, clouds of thunderstorms, and clouds hurriedly

flying". Tu (or humankind) is the only brother who stands erect and unshaken, and later he manages to capture and eat the gods of fish and reptiles, vegetables, the forest ect. and their children. However, Tawhiri he could not vanquish, so he was left as "an enemy for man", and "still, he ever attacks him in storm and hurricanes, endeavouring to destroy him alike by sea and land." Tu made incantations for the defeated brothers and for Tawhiri to cause favourable winds. "Up to this time the vast Heaven has still ever remained separated from his spouse the Earth. Yet their mutual love still continues... and the vast Heaven, as he mourns the long night his separation from his beloved, drops frequent tears upon her bosom, and men seeing these, term them dew-drops."

Grey, *Polynesian Mythology* (1855: 1-15)

The incipient interest in traditional environmental knowledge has resulted in an academic interest in the differences between Western and Polynesian (Maori) beliefs and views on nature, often opposed as a mechanistic, dualistic, objective, and negative anthropocentric Western view vs. an open, holistic, dynamic, value oriented, and positive anthropocentric Maori view (Klein 2000). Also, more detailed studies with practical consequences in terms of conservation projects has emerged, such as a fine study of *ra'ui*, a customary prohibition in the Cook Islands, not in use for years, but in the late 1990 re-implemented to protect marine resources. According to Tiraa, one of the project managers, *ra'ui* was traditionally a ban imposed by the chief of a tribe or the head of a landowning lineage for a period to control the use of resources. "These included land areas, lagoons, rivers, freshwater ponds, lakes, swamps, fruit trees, coconuts, birds, and other wildlife such as turtles and coconut crabs for conservation management" (2006: 12). Hoffmann (2002), in a study of the project Tiraa managed, extends the understanding of *ra'ui* by relating it to the ban's traditional spiritual context. Not only would a person who broke the *ra'ui* be punished by the chief and the village; since the area was *tapu*, *ra'ui* areas were policed by *mana*, power, and he or she would also be harmed by "supernatural sanctions" (2002: 405). Today, the *ra'ui* system has respect from most of the community members: "If a person does not abide the Ra'ui he/she will be embarrassed in front of the community, and it is considered to be a bad omen" (ibid: 409). Thus, spiritual and ethical value is apparently

still (or again) attached to *ra'ui*, although Christianity has been a major player on the religious scene for nearly two centuries.

These examples of the role island traditions have played and may still play indicate that the ethics implied in myth and religion has relevance for the human response to environmental changes. In a broader perspective Mercer et al. (2007), Berkes (2007), Minura et al. (2007: 708) argue that indigenous knowledge and past experiences (on land use planning, building methods, food etc.) are gradually being identified and included in the attempt to reduce vulnerability and build resilience to cope with environmental hazards in small island states. Yet, a contemporary and much stronger religious tradition must be considered too – Christianity, or rather the Christianities of the Pacific. This is the theme of the next section.

'The problem of belief' revisited and the local Christianities

In the beginning of the 1990s an estimated 95% of people on 25,000 Pacific islands acknowledged their involvement with some Christian tradition or another (Trompf 1995: 192). The impact and reception of the European missionaries and their local successors have varied greatly. Some denominations were aiming for a total replacement of the darkness of heathen belief, some were less denouncing of traditional culture. Furthermore, the histories of the national churches vary during the 20th century due to different roads to political independence and different forms of association with France, New Zealand, and the US. Thus, Trompf's judgement is that at village level the local varieties of Christianity are distinctly indigenized, and the relationships between old beliefs (in fx. spirits) and new beliefs manifold (ibid: 197, 205, 208). Barker argues along the same lines by emphasizing that Christianity today is the most widespread religion in the Pacific and that Christianity has shown to be "amazingly syncretic". The Pacific peoples "are steadily making it their own" (1989: 1,11).

While in 1989 Barker convincingly demonstrates that research in the Christian traditions in their own right has lacked anthropological attention, with the exception of a large amount of studies of cargo

cults, in 2007, Cannell is able to note that within anthropology a new wave of anthropological writing on Christianity throughout the world has begun (2006: 5). A very important insight in these studies is the diversity of the Christianities, the immense variation in doctrines, rituals and local beliefs.

Some links between local Christian beliefs, environmental hazards, and climate change have emerged too. One link is studies showing how local Christianities mainly have a negative impact on the attentiveness towards climate change and the ability to recover after a natural hazard. Thus, in a series of articles Taylor, with a background in psychology, has reported and reflected on “the effect of certain Christian belief/value systems in the immediate post-impact period of recovery” after a cyclone striking Manihiki in 1997, the effect in general considered to ‘imped their recovery’ and ‘exemplify a maladaptive method of coping with trauma’ (Taylor 1998, 1999, 2001). In a recent study in Tuvalu, Mortreux & Barnett (2009) also become aware that “religion plays a very significant role in shaping people’s responses to climate change”; however, the seemingly surprising find, in the context of a rapidly rising global alertness to the consequences of sea level rise, is that “these people believed that climate change was not an issue of concern due to the special relationship Tuvalu shares with God and due to the promise God made to Noah in the Bible” (2009: 109).

Another link seems to demonstrate quite the opposite, namely that Christianities offer a sustainable way to cope with climate change. Throughout the world, a growing field of green theology has emerged, appearing as both an outline of a new dogmatic field and as a field for ecological activism. Recently, an appeal from the Pacific Conference of Churches reached a Danish newspaper, calling on the Danish government and population, hosting the COP15 in 2009, to realize that Western life style is ruining the Pacific islanders’ life. Here, a basic eco-theological perspective is communicated: The earth and the sea are the gifts of God, gifts supposed to make the livelihood not only for the present generations, but also for our descendants for ever (Emberson 2009). I will return to the rapidly growing field of green theology in the last section, and for now con-

centrate on the findings of Taylor and Mortreux & Barnett and the methodological and analytical problems they are raising for interdisciplinary research in local responses to climate change.

In 1989, Taylor is called on an assignment on Rarotonga and Manihiki to provide professional advice to the indigenous care-givers, and, among other things, to assess the capacity of the churches, community groups etc. to provide support. Eyewitnesses reported that the crescendo of the cyclone lasted 30 minutes, “during which the biggest wave surges above 30 metres ... and left widespread damage” (1999). Eleven people had died, nine were missing and many injured. About 400 people were evacuated to Rarotonga, 1200 kilometres to the South. In his conversations with the islanders, Taylor learns that the clergy, and many others, hold “religious explanations” for the occurrence of natural hazards, “despite” the advancement of scientific explanation and the expanding acceptance of it among the political leaders in the Pacific. Taylor also reports that “others were critical of ..[those].. who publicly attributed the cyclone to Divine intervention for the transgressions of the community (individually and collectively), to the over-utilisation of pearl farming, failure to attend church, and working on Sundays” (1998). In 2001, Taylor finds this response “inappropriate and anachronistic”, arguing that the issue is “the validity of using moral transgression as the cause of natural disasters and of expecting atonement, when a tenable and well-attested scientific alternative explanation is available” (2001).

To Taylor it seems obvious from a scientific point of view to criticize religious explanations attributing a cyclone to divine intervention. If islanders make a causal connection between declining church attendance and other moral transgressions and a cyclone, the reasoning goes, they obviously must be wrong. In addition, it troubles Taylor that the islanders live under the shadow of the ‘punishing God’ of The Old Testament, accepting the condemnation and blaming of themselves, instead of turning to the ‘loving God’ of the New Testament, which suggests that Christians could place more emphasis on redemption or inner spiritual growth (2001). However, to Taylor the really curious fact was that the islanders, in spite of their religious worldview, actually managed to return to normality and move into recovery, making improvements of the villages, within two or three

weeks. They proved resilient in spite of the prevalence of a seemingly reactionary, punitive religious worldview – in psychological terms exhibiting ‘a maladaptive method of coping with trauma’.

Mortreux and Barnett have a somewhat parallel case from Tuvalu, finding in 28 personal interviews that for most respondents climate change and the often suggested need to migrate is not a concern, mainly for three reasons: The special relationship Tuvalu shares with God, the fact that they themselves had not observed any extraordinary environmental changes, and the strong experience of and attitude to Tuvalu as a ‘home’, a category bundling together all the things in everyday life denoting the good life and thus making it impossible to leave. However, as Taylor also notes from the Cook Islands case, some inhabitants criticize the strong belief in God’s promise to Noah, and in Mortreux and Barnetts words “identified religion as a barrier to awareness of an adaptation to climate change” (2000: 110).

While Taylor is concerned with the reactions to the disaster of a cyclone attacking an island, and Mortreux & Barnett have a focus on whether or not island inhabitants might migrate due to future threats, they seem to share basic ideas about what religious beliefs are and what role they play in people’s life. During a fieldwork in the Cook Islands, primarily studying the burial traditions in the Cook Islands Christian Church, I too witnessed the linking of people’s immoral actions such as taking a swim just outside the church on Sunday mornings to the enhanced cyclone activity. However, I also learned that this was only one voice among many others, not only in a community with many different attitudes towards the church and Christianity, but also in the individual speaker, having more than one position to think, act, and speak from. This kind of multivocality is quite often mentioned in anthropological literature on religion, and has given rise to a discussion of the ‘problem of belief’ (fx Keesing 1985, Tambiah 1990, Good 1994), questioning how can we interpret local theologies within shifting social and cultural contexts. Central to these discussions are, *firstly*, the danger of instrumentalizing religious statements contradicting scientific explanations as if religious notions automatically imply a direct causation; *secondly*, the problem of reducing lived ways of believing into a sys-

tem of beliefs; and *thirdly*, the tendency to confuse metaphorical and literal meanings, often notoriously indistinguishable for outsiders.

Bearing in mind the first problem, religious and symbolic explanations typically belong to another domain of social reality than the scientific. The religious answers *may* locally function as accepted explanations of the natural order, yet they should not, from the outsiders' scholarly perspective, automatically be considered as belonging to the same level or stratum as scientific explanations and therefore automatically considered backward and superstitious. In some societies, or in some areas of existence, science and religion are indeed competing within one and the same domain of knowledge, resulting in both secularism and fundamentalism. Often, though, the two domains are not competing, but remain as different traditions of knowledge kept at different levels of social reality (or kept together as unsolved paradoxes). Thus, the theory of 'big bang' may explain *how* the creation of the universe evolved, whereas myths of creation may explain *why* the universe came into being. As such, in the sociology of Durkheim and in the tradition of cultural anthropology (for instance Geertz 1965), we have to consider the link between morality and community, instead of starting with science as the producer of truth and by imposing its standard of truth and measures of validity on everything else to understand how societies work. In this light, instead of making, *a priori*, a problematical equation between the islanders' claims about divine intervention and well-attested scientific explanations, we should concentrate our interpretation on the social aspects of the islanders' beliefs and hopes and the moral implications of the extreme weather events they seem to highlight themselves within an everyday context.

Regarding the second problem, the scholarly temptation to assemble natives' statements into a belief system as if their conversations, actions, and representation were dogmatic statements, it is commonly observed in the anthropology of religion that people hold contradictory beliefs (Luhmann 1989, Mitchell 1997, Besnier 1996). Thus, when inhabitants at Manihiki and Rarotonga link immoral behaviour to cyclones, Taylor seems to report valid bits of data, but what seems less convincing is that these statements are isolated and fixed as 'the belief' of certain persons, the clergy or the majority of

the community, true in every situation and firmly related to certain chapters in the Bible. It is telling in both Taylor's and Mortreux & Barnett's texts that the native belief in God's providence and all-powerful capacity is carved out most unmistakably in the eyes of the local and scholarly critics, thus viewing the religious beliefs as a 'barrier to adaptation' and as a 'maladaptive method'. The irony in Taylor's case is that he cannot conclude that the maladaptive method actually was a barrier. This indicates that from the believers' point of view the link between 'the punishing God' and human beings is not simply to delegate everything to God literally in terms of strict causality. Local theologies are much more complex, both in terms of causation and in terms of symbolic variety, including seemingly contradictory notions of e.g. human stewardship and charity, notions entailing human agency in accordance with God's wish as creator.

The third suggestion in this context is therefore that the beliefs expressed in the providence of God could be understood in a less dogmatic and literal way. In both scholarly and local theologies, the relationship between the literal and the symbolic interpretations is delicate and usually hard to unravel and make explicit, not only for outsiders, but also for the professional theologian and for local people attached to Christianity. Myth and ritual are played out at the borders of 'this world' (the mundane here and now) and the 'other world' (the spiritual or existential moral order beyond) and the connections made and the proposed implications vary (Luckmann 2003, Rubow 2000, n.d.). In an excellent study Firth has shown how traditional and new cosmologies are the source of many possible interpretations in a small community in the wake of a cyclone, and how an understanding of the question of causation is critical in the religious imaginary:

In 1952 Raymond Firth returned to Tikopia, the island he had studied in 1929, with the intention to study social change. He arrived shortly after a cyclone had devastated the island.

"What I found was a rising population, and a severe intensification of pressure through the effects of hurricane in greatly reducing the food supply.

Where such a lowering of the food supply takes place fairly rapidly, the strain on the social system are not only nutritional – belly-gnawing; they depend on recognitions, sentiments, moral evaluations and symbols of social relations. They involve emotional attitudes .. moral attitudes .. social attitudes.. (..).

In traditional Tikopia religious ideology, there is an elaborate set of links between chiefs, their clan gods, and the phenomena of wind, sunshine and rain, which can be controlled up to a point, by the direction of energy from chiefs and gods upon them. But on the one hand, competing interests may negate the ordinary bounty of nature; and on other, the favour of the gods towards their representatives, the chiefs, may still further affect the issue. Hence the hurricane and the drought could, in the more traditionally minded Tikopia be explicable in terms of competing religious forces (including perhaps those of Christianity), and the personal quality of specific chiefs.. (..)

Their view of nature may be called *socio-centric*. For them, natural order and prosperity were related to social harmony. .. the association of natural event and social circumstance was one of indirect causation rather than direct causation – or perhaps hardly one of ‘causations’ at all. It was rather that the ‘unnatural’ condition of society was manifest in the abnormal conditions of nature.”

Firth *Social Change in Tikopia* (1959: 52, 79, 80)

Adding to the complexity of Firths observations of competing religious traditions, I have found within Rarotongan (and in other Christian) church communities that there are not only many ways of believing (in e.g. the resurrection as ‘a spirit’ opposed to a ‘physical human being’ or more existential as ‘the courage to be’) among church members, but also different interpretations of e.g. local ministers’ statements. Thus, statements are often negotiated, resulting in a locally noticed or unnoticed variation of interpretations. In other words, beliefs are not ‘only’ statements, or what is usually termed ‘propositional belief’, with fixed meanings. Beliefs are *verbally interpreted* in many ways, and *lived* in various settings, motivating diverse actions in more complex way than (even) the believers themselves may be able to express verbally. As such, beliefs in God as punishing immoral acts may indeed involve condemnation, self-blame, and requests for church attendance, but it does not neces-

sarily entail a direct causation between the acts of human beings and the acts of God. Furthermore, concomitant belief in God as creator of the human and natural world may at the same time relate to actions of charity and a moral inclination to serve the community. This indicates that the study of local Christianities and other religious traditions in the context of environmental hazards and climate change meets a number of challenges in avoiding infertile instrumentalizations of belief. Existing myths and religions have an abundance of references to the environment, and the anticipations of insecurities concerning future changes will undoubtedly spawn many new song lines and debates.

Emergent green theologies

The interface between the world's religions and the environment is evident in innumerable tales, myths, symbols, and rituals connecting 'this world' and the 'other world' in different anthropocentric, sociocentric, ecocentric, or theocentric cosmologies. In the Christian case there has been a heavy sea for at least four decades in discussions about the Christian legacy and its concurrent course in the contexts of environmental problems. In 1967 L. White, a professor of history, brought up a discussion which is still alive – or more precisely which has once again been enthusiastically revived in recent years. White's basic claim was that "human ecology is deeply conditioned by beliefs about our nature and destiny – that is, by religion" (1967: 1205). However, what stirred the debate was White's claim that Christianity was the only religion making it possible for human beings "to exploit nature in a mood of indifference to the feelings of natural objects" as a "realization of the Christian dogma of man's transcendence of, and rightful mastery over nature" (ibid.: 1205, 1206).

White's appeal that 'we' must rethink 'our' attitude to nature, also considering the more or less suppressed Christian traditions of the Eastern church and Francis of Assisi (who, according to the legend, had humility for the human and animal species), has effectively led to a theological response. In recent years, many of these address explicitly the climate change crisis, developing new green

theologies, interfaith climate manifestos, ecological services, and all kinds of Noah's Ark projects. Central to the discussion is the recognition of a double Christian legacy concerning an environmental ethics implied by White's reading and critique. Simmons (1993) has summarized the two salient traditions in the following way: a) The idea of an ethics for *the use of the environment*; the Earth is a resource which humanity is free to employ, and b) The idea of an ethic *of the environment* in which non-human entities of the cosmos are given equal value (1993: 53). In a more dogmatic language the difference may be spelled out as man's dominion over nature vs. human embeddedness in nature and a role to fulfil as steward or caretaker.

John T. Houghton, co-chair of the Nobel Peace Prize winning IPCC scientific assessment group has on several occasions expressed a green Christian perspective to his views, to emphasise the need for long term thinking.

"We are bound to ask therefore questions about the sort of relationship we should have to the earth that is our home and to the rest of creation with whom we share the earth. Let me suggest that a helpful picture of this relationship can be found in the early chapters of the Judaeo-Christian scriptures. Humans were placed in a garden to care for it. We are encouraged to see ourselves as gardeners of the earth." "Christians and other religious people believe that we've been put on the earth to look after it. Creation is not just important to us, we believe also it is important to God and that the rest of creation has an importance of its own... we are destroying forests, important forests. When I say "we" I mean "we" the human race of which we are part. We are party to the destruction, we allow it to happen, in fact it helps to make us richer. We really need to take our responsibility as 'gardeners' more seriously." 25 May 2001, Trinity College, Cambridge

"All disciplines within the natural and social sciences must be brought to bear upon it. But more than that, choices have to be made by individuals and societies, choices that need to be influenced by new attitudes and paradigm shifts – changes in heart and minds. At its core, therefore, climate change is also a spiritual and religious issue."

Foreword in Spencer & White (2007: viii).

A surge of theological soul-searching has affirmed that White's critique was (more or less) correct and that protestant theology is a special case, when relegating God to a highly transcendent realm, concentrating on issues of personal redemption and abandoning the world of nature to science and technology (and thus allowing for the scientific and industrial development in Western Europe). As Cobb tellingly adds: "...the story of Noah and his ark had been marginalized as a nice story for children. But today we appreciate how it emphasized that human history is interconnected with and dependent upon the conditions of nature. In particular it shows God's concern for the preservation of species, or, in contemporary parlance, for biodiversity" (2001: 216-217). In 2008, Mcfague, a prominent American protestant theologian, states in *A New Climate for Theology* that in light of the IPCC's recent report scepticism about global warming is irresponsible, and that the first step is to overcome denial (2008: 11). Mcfague calls for an ecological church, bringing the church back down to Earth, and a new worldview, where human beings are seen "as caretakers of God's household, the earth, just as Adam and Eve were told to tend the garden" (ibid.: 34), and we are "living with the world as God's body" (ibid.: 112).

Although observers of practiced religions should take caution in placing scholarly theology on an equal footing with local theologies, usually less verbal and more situational, these examples of the new green theologies exemplify how 'climythologies' emerge along with the new environmental concerns. Interesting in themselves and politically powerful they are important to include in the research of the social and cultural responses to climate change. The challenge for a practice-oriented anthropology is to understand how religious, ethical, and mythical concerns and notions are put to work together with all the other traditions of knowledge. Answering this question with an anecdote from my fieldwork in Rarotonga does not suggest a tight theory, but opens for the recognition of the heterogeneity in local theologies.

On a veranda, I had a conversation about the Polynesians' ancient migration routes with a minister, publicly known to be something of a fundamentalist, among other things warning people about taking a swim Sunday morning, explicitly alluding to the coming

cyclone season. Sitting with his hungry foster child in a sofa he told me that as a child on one of the outer islands, he was told that the Polynesians came from the East, i.e. South America (the unproved thesis of Thor Heyerdahl), and later in the secondary grade he learned they migrated from the west, i.e. Asia (confirmed by traces of DNA). He stated that he does not know the right answer, and when we continued our conversation about the long trends in human history, he stated that the world is 6000 years old now, and that the Polynesians probably are one of the lost tribes mentioned in the Old Testament. The possible confusion of the different temporalities in his narrative (and many other narratives I was told on the island), was apparently entirely my problem. Local theologies are usually masterpieces of polydox metaphysics. The borders between 'this world', the sensible and knowable 'here and now', and the 'other world' of the past, the future, and the possible 'beyond' are constantly negotiated in many different framings.

Metaphysical aspects of resilience

Man's actions and the acts of God, spirits, and natural forces are intertwined in beliefs and social symbols, and the study of communities' perceptions of changing environments presupposes an awareness of the heterogeneous responses. Changes in the environments due to alterations of sea level and battering cyclones have for centuries been a condition and a challenge to the populations at the South Pacific islands. In this chapter I have argued that the inclusion of metaphysical aspects in the study of the human response to climate change has a rich potential in new, local studies of islanders' local theologies, drawing on both the anthropology of religion and the interdisciplinary field of resilience (and the related fields of vulnerability, adaptation, natural hazards and so forth). Historically, extreme events such as cyclones have wrecked havoc on the shores, mirrored in the mythologies, novels, and many other desperate narratives searching for words to describe the extraordinary, otherworldly, terror of winds and water. Today, the narratives include new notions of global warming and human-induced climate change, but as both headlines in the news media and local community studies

testify, they include scores of metaphysical allusions and ethical implications. Questions of vulnerability, responsibility, motivation, and awareness build on existing cosmologies in the search for new existential grounds and new horizons for hope, destiny, and action.

Resilience is one of the promising concepts in the study of climate change, opening for a dynamic theorizing of the human ability to adapt to and reconfigure existing environments and cosmologies. However, the ambitious effort to link the social and ecological aspects of climate change presupposes a nuanced analytical comprehension of the role of the different parts in the alleged cultural and natural whole on different scales. The inclusion of religious beliefs in studies of resilience does not gain much insight, if 'belief' is instrumentalized and systematized beyond its practiced limits. On the contrary, it locks people up in doctrines they do not defend, and limits the understanding of human capacity to negotiate and re-imagine the vulnerable frontier between shores of safety and the horizons of risk and danger.

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CHAPTER 6

A Sense of Direction: Responsibility and the Span of Disaster in a Tamil Coastal Village

Frida Hastrup

Abstract

On the basis of fieldwork in a tsunami-affected village in Tamil Nadu, India, this chapter argues that the inherently temporal nature of people's actions should be brought to bear on the understanding of resilience against environmental dangers. Ethnographic examples are presented to show that although the tsunami was an unprecedented disaster, the contours of the event are in no way clear for the local actors. To the survivors, events of different origin and date combine into an experiential whole, and acting in the aftermath of the disaster implies responding to an indefinite demand of reorientation on the basis of past experience as well as future aspirations. This chapter thus suggests that a concept of resilience as residing within social-ecological systems is problematic, not so much because it risks overlooking the creativity of individual actors, but because it rests on a spatial understanding of the expanse of disaster, which does not pay sufficient heed to temporality as a condition of subjective agency.

The Asian tsunami in December 2004 spurred by an underwater earthquake off the coast of Sumatra was an unprecedented natural disaster, and as a sudden calamity the tsunami obviously tested the numerous affected populations' level of resilience. Following

Melissa Leach, resilience can initially be understood as ‘the capacity of a social-ecological system to absorb disturbance and reorganise while undergoing change so as to retain essentially the same function, structure, identity and feedbacks’ (2008: 3). A focus on resilience in settings subject to environmental threats of various kinds has been highlighted for being a realistic means of analyzing reactions to unexpected events. As Neil Adger et al. have observed in an article dealing with coastal disasters:

The concept of resilience is a profound shift in traditional perspectives, which attempt to control changes in systems that are assumed to be stable, to a more realistic viewpoint aimed at sustaining and enhancing the capacity of social-ecological systems to adapt to uncertainty and surprise. (2005: 1036)

To be sure, the assumption of an underlying condition of stability, to which social-ecological systems impacted by disaster can return by way of adaptation and reorganization, can rightly be labelled as out of date. Indeed, within recent anthropology of disaster, one of the main points is that disasters cannot analytically be seen merely as extreme events disturbing an inherent societal equilibrium, but should be approached as processual phenomena that are often but an intensification of existing and long-term conditions of vulnerability. Accordingly, the reason why natural hazards sometimes turn into disasters is that people in many places around the globe live in vulnerable environmental and social settings, where they are susceptible to calamity (Oliver-Smith 1996, 1999a, 1999b; Oliver-Smith & Hoffman 2002; see also Hilhorst & Bankoff 2007; Wisner et al. 2004).

However, even if the recent reconceptualizations of resilience mentioned above reject the idea of a social-ecological equilibrium, they still appear curiously devoid of people from an anthropological point of view. A ‘social-ecological system’ is portrayed as playing the leading role, to begin with as that which is disturbed and surprised by an unexpected event and, in consequence, as that which displays a more or less elaborate capacity to adapt and reorganize. In the following, I will show that a focus on resilience as residing within *systems*, even those qualified in one way or another as social, can be

complemented by a view of resilience as a fundamentally human agentive capacity, resting firmly with people acting continuously to sustain and recover a sense of direction in their everyday lives.

The problem with the systemic approach, as I see it, is not so much that it risks neglecting the dynamic and improvisational character of social life by assigning mere supporting roles to individual human actors. Rather, the real issue is, in fact, that such systemic conceptualizations of resilience build on a spatial mode of thinking about social-ecological organization and about the expanse of environmental disaster. Essentially, concentrating on an adaptive – or maladaptive – social-ecological system rests on an implicit identification of a closed circuit with a limited extent, within which the cause for the need to be resilient can be squarely located. As I will show, this approach to resilience does not pay sufficient heed to the work of time in people's resilient actions and to the adherent complexity of defining causes and effects.

In other words, my overall argument is that thinking about environmental threats in terms of *spatial expanse* is only one element in grasping resilience to calamities; if the concept is to make sense at all, an acute attention toward the *temporal span* of human responses to social-ecological challenges is equally required, not only because disasters must be seen as processes, but because human subjectivity is created with time as much as in time and is conditioned by duration (Das 2007: 95 ff). However systematic they may appear, social worlds need to be performed in order to exist, and this performance inevitably unfolds within temporal frames (K. Hastrup 2007: 193). Thus, drawing on these insights, the main purpose of understanding resilience as an agentive rather than a systemic property is to allow for apt recognition of the complex ways in which temporality features in people's practical responses to disastrous events.

The ethnographic basis for my claims is a total of ten months of fieldwork conducted in the coastal village of Tharangambadi in Tamil Nadu, India, which was badly hit by the Asian tsunami (see E. Hastrup 2008, 2009). My fieldwork spanned a period of just over three years from February 2005 to April 2008, during which the villagers, the majority of whom belong to a Hindu marine fishing community, acted in numerous and comprehensive ways to absorb the

disaster and get on with their lives. As will become clear, however, these actions were directed at a number of concerns that featured in people's lives both before and after the onslaught of the tsunami, and which were both directly and indirectly attributable to the disaster as such. Though unparalleled in scale and clearly datable in calendar time, the contours of the tsunami were not obvious at all. Veena Das' reflections on the complex relation between notions of time and event are relevant here. She has noted that:

[T]here are publicly observable events for which we cannot name an observable "now" (...) The point is not that there are moment-to-moment beliefs and then there are stable temporal maps, but rather that the particular mode in which the subject is immersed in the temporal shapes the contour of the event. (Das 2007: 97)

With this notion of the subject as inevitably immersed in temporality in mind, I argue that from the point of view of the survivors in Tharangambadi, what was at stake in the aftermath of the disaster was not so much to react appropriately to the tsunami as a unique and identifiable event, the expanse of which was gradually diminished to the point of absorption by a resilient social-ecological system. Rather, as the three ethnographic cases presented below will illustrate, for the villagers of Tharangambadi resilience implied an overall sense of responsibility, which was in constant and indefinite demand.

The ties that bind

A week or so went by after the tsunami before my translator, field assistant and friend Renuga learned that her close relatives in the fishing community of the nearby town and district capital of Nagapattinam had been badly struck. At first Renuga had thought that all was well with her elder sister and her family in Nagapattinam, since their house was located in safe distance from the sea. To begin with, she had worried mainly about her other elder sister, who lived near the waterfront in the nearby town of Karikal, and in whose care Renuga's own three daughters had been on the day of the tsunami. The three girls and the rest of the Karikal family had all come

through unhurt, and Renuga's relief was immense. The shock was thus all the greater when she eventually found out that her sister in Nagapattinam, the sister's daughter, and her two granddaughters had all been swept away by the waves. Renuga's sister had gone to the beach with her two granddaughters to fetch some firewood for the cooking stove. When the first of the two waves to strike the coast hit the beach, Renuga's sister's daughter had gotten worried about her mother and her two children. In response, she herself had gone to the beach to look for her family, only to be washed away by the second of the two tsunami waves that struck the Tamil Nadu coast.

Four people from three generations were gone in a matter of minutes. Two boys, then aged six and eight, were left behind as the only survivors in the three-generational family unit. The children's father was already gone, as he had been shot dead in the summer of 2000 by the Sri Lankan marine police. On the suspicion that fishing boats from Tamil Nadu transferred arms and other supplies to support the rebellion of the Tamil Tigers in Sri Lanka, the marine police had started a policy of cracking down hard on fishing boats if they entered or came too near Sri Lankan sea territory, whether the fishermen onboard did this knowingly or not. With the father gone, the family had been in a precarious situation even before the tsunami, because the primary breadwinner was no longer there. The widow and her mother had struggled to keep economically afloat, supported by Renuga and by being enrolled local women's self-help groups establishing small businesses of various kinds.

Michael Moseley has suggested the concept of 'convergent catastrophe' to describe the fact that a disaster will have more serious effects if it occurs in close succession to other disasters, than it would have had if it had been suffered individually (1999: 59). While this idea aptly captures the fact that an existing level of social and environmental vulnerability shapes people's resilience in the face of calamity, the very idea of convergence seems to build on a delineation of disasters as definable events with certain expanses. In the case of Renuga's family presented here, one could of course argue that the two bereaved boys did indeed suffer a convergent catastrophe, where the death of their father and the devastation caused by the tsunami mutually aggravated each other. However, if the notion of conver-

gence is to make sense as a description of the boys' situation, we must, I suggest, extend this with a temporal dimension so that what is seen as (analytically) convergent must be matched by what is experienced as existentially simultaneous. Das has noted that 'the simultaneity of events at the level of phenomenal time that are far apart in physical time make the whole of the past simultaneously available' (2007: 97). In this light, the whole of the boys' story and that of their extended family was present all at once in the aftermath of the tsunami; a condition that once again complicates the spatially founded idea of resilience as absorption, because absorption basically posits a *relation* between domains, where there is only a compound whole with an unlimited temporal scope.

With the two young boys being the only survivors in the nuclear family on account of both marine police brutality and the roar of the tsunami, it was clear that some other adult person had to step in and take charge of the boys' lives and make plans for their future. As Patricia Uberoi has noted on the nature of Indian families: 'Even if households are nuclear in composition, the members are still located within joint family spheres' (2003: 1070). In the case of the surviving boys in Renuga's family, however, the exact placement of them within a joint family sphere was contested after the disaster's brutal decimation of the family.

In order to compensate the surviving next of kin for the loss of family members to the tsunami, the Tamil Nadu government issued the following order four days after the disaster: 'The Honourable Chief Minister has announced an immediate relief at the rate of Rupees 1 lakh [100,000] per person dead in the family (next of kin) from the Chief Minister's public relief fund' (Government Order No. 574). The compensation, which was doubled by an equal compensation sum from the Federal Indian Government, was a huge amount of money by all local standards. As for the two boys in Renuga's family, the compensation was further multiplied because they had lost several family members, and discussion soon arose between their maternal and paternal relatives as to who should be considered next of kin, and who should thus be in charge of the sudden newfound wealth. Renuga wanted to enrol the boys in a well-reputed English medium boarding school and set the remaining fortune

aside for further educating the boys later on. Their paternal grandmother and their paternal uncle offered to take the boys in and have them live with them, following the custom of patrilocal residence prevalent in the fishing communities on the Coromandel Coast (see Bharathi 1999). Renuga, however, complained to me during my fieldwork in 2006 that the boys' grandmother and paternal uncle might not be proper role models for the boys, and without going into details she hinted that she thought there was a so-called "value problem" pertaining to that side of the family.

Such conflicts of interest between different sides of an extended net of family relations were not uncommon, and although I was not able to extract the precise background for this particular disagreement, I gathered that it had a long history and that it had been amplified by the murder of the boys' father in 2000. With the sudden acquisition of wealth after the tsunami due to the compensation money, the discord became full-blown and attained a new kind of urgency. In line with her overall view of the family that her niece had married into as having somewhat tainted morals, Renuga suspected that the grandmother and uncle only offered to care for the boys in order to get a share of their compensation money. Quite simply, Renuga was suspicious that the boys had become mere economical assets to the family on their late father's side. The grandmother, in turn, accused Renuga of using the boys as hostages in an attempt to practically rob her of her only surviving family.

Much to Renuga's relief, however, the two sides of the family eventually settled on a solution, which in Renuga's eyes put a welcome stop to the draining family quarrel. Toward the end of my fieldwork in 2006, the boys had been enrolled in a good boarding school in Nagapattinam, and their paternal grandmother and uncle who lived close by had been given the status as the boys' formal guardians under the shared understanding that the compensation sums should eventually finance higher education. Thus, while submitting to Renuga's request that the compensation money be put aside for educational means, the boys' paternal relatives had kept a say with regard to their future.

The effects of the tsunami in this case were multifarious and played into a composite whole made up of past marine police brutal-

ity resulting in a tragic loss of life and dire financial consequences for the immediate family, and a long-lived family discord intensified by the sudden attack of the disaster. For the two surviving boys, the tsunami entailed an irreversible change of their lives within a matter of minutes. However, what the disaster also entailed – at least potentially and for the time being – was a newfound truce between factions of a joint family network that otherwise had a history of collision. Abetted by a sudden financial wealth, which would have been completely inaccessible if not for the compensation sum, the actors in the extended family network joined forces to ensure the future of the boys left behind.

Although stories of discord can break out again without notice (Das 2007: 80), what was at stake in the wake of the tsunami seemed for the adult relatives of the boys to be both to mend the ties that bound the extended family relations together, and to take over the responsibility of charting a clear future course for the surviving children through the means of a funding that would otherwise have been unobtainable. In other words, ensuring a measure of durability in the lives of the boys took precedence over past family disagreement, which in a roundabout way was defused by the occurrence of the tsunami.

Certifying the future

The Hindu celebration of *Deepawali* is observed annually as a festival of lights throughout all of India to symbolically mark the victory of light over darkness, and the return of faith and goodness after a period of absence. In 2006, I was in Tharangambadi for the festival and I had seen how excitement about the holidays had been building up over weeks. Shopping for firecrackers, sweets, and new clothes had been on most people's minds, and all Hindu houses in the village had been thoroughly cleaned as is part of the practice pertaining to the *Deepawali* festival. I had been invited to the celebration by Renuga, and at five o'clock an October morning I made my way through the dawn to her house. After a small and homely *pooja* ceremony, her three daughters and I took turns in lighting small firecrackers in front of their house on the temple square in the

heart of the fishing community's settlement. Afterwards, according to the *Deepawali* custom, the girls went around to their friends' houses with sweets; neighbours came and went, and all along the handful of women gathered in Renuga's house showed me how to prepare the traditional snacks and foods that go with the festival.

Outside the house, the noise from the fireworks gradually grew louder as more and more people in the fishing area of the village joined in the celebration. A few hours later, while we were resting inside Renuga's house, a group of yelling children could be heard running by outside, rushing away from the nearby seashore. Renuga and her daughters were startled, as they usually were when someone ran away from the seashore yelling, because this was the way they had been alerted on the day of the tsunami, and we rushed outside to the temple square to see what was going on. Round a corner a few streets away we saw high flames sprouting into the sky. The roofs of two fishing houses were ablaze. Until the local fire fighters showed up after about ten minutes, we could see young men rushing back and forth between one of the burning houses and a porch on the opposite side of the street, carrying whatever items they dared to retrieve from inside the burning home. A big crowd had gathered, and shouts rang the air, as the plumes of smoke rose to the sky.

Word quickly got around that some fireworks from the *Deepawali* celebration had gone astray and had set a roof made of dry palm leaves on fire, which quickly spread to the neighbouring house. The house from where the various belongings were retrieved, I was told, belonged to a fairly well-off family with a member of the local fisherman caste *panchayat* – or council of elders – as the head of the household. Seen from where we witnessed the flames darting into the sky, I suspected that the other house on fire was that of Arivu's family. I had met Arivu because he worked as a watchman during the nights at the guesthouse where I was staying. He spoke English quite well and had helped me translate various texts from Tamil. Sometimes in the evenings I would show him photos of things I had seen and places I had been to during the day, and he would explain to me the meaning of a temple rite, a road sign, a flyer, a poster or other. Early on, Arivu had taken it upon himself to enlighten me about life in the fishing community of Tharangambadi, where he had lived all his life.

When I first met him in 2006, he was 19 years old and studied for a BA in physics at the local college in the neighbouring small town of Porayar. His father, who worked as a fisherman, had left the family when Arivu was five years old and was now living in a different fishing village, and as the oldest son in the household the responsibility for supporting his mother, younger sister, and younger brother weighed heavily on Arivu's shoulders. His mother, Jayanthi, had no formal employment but made a small and occasional income by producing and selling shopping bags made from knitted plastic strings and by stitching clothes for family, neighbours and friends.

As the primary wage earner in the family, Arivu had a very busy schedule. From ten o'clock at night until seven in the morning he was a watchman at the guesthouse. After this night duty, during which he would often study for college, he lead a tuition class in mathematics for some 10th grade students from the village, whereupon he went to the college until about two o'clock in the afternoon. During college holidays, he often helped out as a crew member on his uncle's fishing boat. According to Arivu, people outside his own nuclear family put quite a pressure on him to give up college and start working full-time as a fisherman, as this in their view would secure a better income for his family than his various part-time jobs. In Arivu's words, they simply considered his studies a waste of time. Arivu, however, had his mind clearly set on completing first the BA and then an MA degree, if he could get a scholarship. In Arivu's eyes, it was his responsibility to ensure not only the day-to-day survival of himself and his family, but also a long-term improvement of their situation. To this end, Arivu explained to me, formal education was the only chance he thought he had, even if the profit was not as immediate as it could perhaps have been if he had entered the fishing business.

The house that burned on the day of *Deepawali* was indeed Arivu's. When he showed up for his watchman night duty that evening he told me how he had been home alone sleeping inside the house and had suddenly opened his eyes to a roof on fire. Dry palm leaves burn quickly, and fearing that the roof would fall down on him, Arivu knew that he had very little time to get out of the house. What he did have time for was to collect his college and school certificates

and diplomas documenting the results and progress of his studies. These papers, to Arivu, were apparently the most precious belongings in the house. The fire fighters put the fire out and when taking stock afterwards, almost all the belongings in the house except the papers that Arivu had salvaged were more or less ruined, if not by the fire, then by the water that had put it out. As illustrated by Arivu's salvaging of his exam diplomas from the fire, in his eyes the papers were – quite literally – his tickets to a better future.

With financial support from the fisherman *panchayat's* emergency fund, the leafed roof of the family house was replaced within a week. However, other traces of the fire were not erased that quickly. When I visited Arivu's house some time later, the smell of smoke and the sense of dampness were still evident, and the interior of the house was permanently dim because the electricity supply to the house had been destroyed by the fire and the water.

At the time of the tsunami in 2004, Arivu's house, which was located in the part of the fishing village furthest away from the seashore, had suffered only superficial damage. The family had returned to the house after a few weeks in a temporary shelter, and had lived there since then. From Arivu's point of view, the tsunami had not been nearly as destructive as the fire almost two years later, as he told me. For a person in Arivu's situation, the tsunami, though sudden and unexpected, was clearly but one obstacle in an ongoing struggle to make ends meet; a struggle which went back at least as long as to the time when Arivu's father had left the family many years before, and which was accelerated for shorter or longer periods of time by events such as the tsunami and the fire in the house.

To get by in this composite situation, Arivu had set his course and he kept expressing his luck that he had managed to get his exam certificates through the fire unharmed; indeed, he never for a moment seemed to doubt that these were the most valuable objects in the house. They were in a sense what certified his drawn-out endeavour to improve his family's conditions and create a durable everyday life for them all. As Arivu acted to push against the limitations structuring his life, he did not merely react to existing conditions; in a way he was acting to get the future back in place. Once again, re-

silience implies a measure of temporal envisioning. Sandra Wallman's observations are highly relevant here. She states that:

Planned change is not possible without a view of how things might be, and even the rehabilitation of individuals or groups who survive disaster depends on their being able to visualise a better or safer time to come (...) Again, it seems that without a view of the future there may not be one. (Wallman 1992: 3)

At the time of my latest fieldwork in 2008, the Tamil Nadu State's official re-housing programme was well underway. Arivu's family had been allotted a solid brick house in what was known locally as the tsunami village, which neared its completion. When we discussed the prospect of moving to the new house, Arivu highlighted that the new house would have electricity. For want of money, the electric wiring in the old house had never been reconnected after the fire, and the family had gotten through the dark hours by way of kerosene lamps and candles. Although Arivu expressed that he was slightly saddened to leave the home where he had lived most of his life, he was excited by the thought of having electric lights in the new house, a feature which was part of the make-up of all the newly built houses to be paid for by the Tamil Nadu State authorities. The electricity, Arivu explained, would make it much easier for himself and for his younger brother and sister to study for their exams, just as it would make it easier for his mother to produce the shopping bags and do the stitching that she relied on as her personal source of income.

What this case story shows is that Arivu acted within a compound setting made up of a range of experiences, such as the father leaving the family to stay in another fishing village, the outside pressure on his educational plans, the appearance of the tsunami, and the destruction brought about by the fire in his house and the water that put it out. This, quite simply, was the composite situation, on the basis of which Arivu worked to improve the present and ensure the future for himself and his family. What Arivu was engaged in was a drawn-out process of replacing his father by taking on the financial responsibility for his family and, quite literally, the task of refurbish-

ing and improving the family home after the flooding and after the destructive fire. Interestingly, within this total situation, the tsunami turned out to be a kind of shortcut to Arivu's effort of improving his family's situation, as it had brought about an unexpected opportunity of re-housing, which again sustained his long-term struggle to acquire a sound profession on the basis of formal higher education. To put it shortly, in Arivu's case, the greater disaster had proved to be the lesser evil. Seen in this light, the tsunami supported Arivu's vision of a brighter future – in more senses than one.

Upward mobility

In the small town of Porayar neighbouring Tharangambadi, a large hostel houses about 300 girls, mostly orphans. After the tsunami, the hostel, which is funded mainly by private charity organisations from abroad, had increased the number of girls staying there with about one third, and the already full dormitories had become even more crowded. During my fieldwork in 2006, I paid almost daily visits to the hostel, because my Tamil language teacher worked as a director there. Upon ending our Tamil classes, she would usually call on a handful of girls staying in the hostel for them to help me practice the day's lesson. This was how I met Pressana, a girl from Tharangambadi who was then 17 years old and who had come to stay in the hostel shortly after the tsunami. Before the disaster, Pressana had lived with her father, who worked as a gardener at the hotel in Tharangambadi, and the two of them had been living in a small house close to the sea. The house had been damaged by the tsunami but had since been replaced with a small hut built in the same spot. For reasons unexplained to me, Pressana's mother had committed suicide when Pressana was 12 years old, and at that time her father had tried to get Pressana enrolled in a hostel in the area, primarily with a view to improving her educational opportunities. In addition to providing basic shelter and food, the hostels put strong emphasis on the children's schooling, and by way of an often rather strict regime of tuition and homework guidance the enrolled children are motivated to study hard in order to improve their situation on a long-term basis.

When the family had applied for admission to the nearby hostels at the time of Pressana's mother's death, Pressana could not immediately be accepted because her father was, in fact, capable of caring for her and because she was only semi-orphaned. Instead, she had been put on the waiting list of the hostel where I eventually met her. However, due to increased funding in consequence of the tsunami, the hostel had allowed more girls to come and stay, and this meant that after four years of waiting Pressana was finally admitted in the spring of 2005. For Pressana, the admission to the hostel was high time since she had only one more year to go in the public school system, but by the same token it was all the more important as a way of preparing for the final exams. In the summer of 2006 when I met her, Pressana had completed her schooling successfully and was awaiting a decision as to what would happen to her then and where she might continue further education. This decision, I gathered, was primarily in the hands of the managers of the hostel, who collaborated with various educational institutions all around the state of Tamil Nadu and saw it partly as their responsibility to have the girls enrolled in further studies, primarily within the fields of nursing and teaching.

When I left the field in December of 2006, Pressana had been admitted in a nursing school in the city of Coimbatore in the Nilgiri Hills about eight hours' bus-drive from Tharangambadi. When I talked to her father, who had been left behind in the village, he assured me that she was doing fine, studying well – and feeling a little cold in the mountainous region. Again, what this example shows is that, in a roundabout way, the tsunami helped realize an aspiration that had long been in the family, namely that of Pressana being admitted to a hostel with a view to improving her future educational opportunities. Even if the tsunami disturbed Pressana's housing arrangement because of the immediate destruction of the family home, this disruption was overwritten by the fact that Pressana was on her way to fulfilling a long-held educational ambition, conceived at least as long back as at the time of her mother's death, and which pointed clearly to a future beyond the immediate. If, at first glance, the tsunami might appear as a catastrophe that converged with the tragedy of Pressana's mother's death, each disaster exacerbating the

other, it became clear that to Pressana this was not so. What is interesting here is that Pressana, her family, and the managers of the hostel acted within a complex repertoire of possibilities for future upward social mobility, some of which were incidentally occasioned by the tsunami. Again, the identification of chains of causes and effects is difficult; the whole of Pressana's story was available to her at once, not just as a convergence, but as a simultaneity in which specific events did not necessarily aggravate each other, but could equally neutralize each other.

Conclusion: A sense of direction

The examples above clearly show that to the people of Tharangambadi, existing social structures, sudden disruptions and potentials for future progress are completely intertwined, making it impossible to identify the tsunami as a specific disturbance with a definable expanse. I do not mean to present this as a celebration of the will to survive by making the banal statement about being strengthened by that which does not kill. Rather, I have wanted to demonstrate in ethnographic detail that human subjectivity cannot be thought of as independent of temporality; this goes for post-disaster settings as well as other social worlds. In all three examples, the effects of the unique event of the tsunami are intersected by issues of complex family relations, educational ambitions and economic aspirations, among which the individual actors had to navigate to act responsibly. The point of identifying such merging of hardships is not just to say that the consequences of the tsunami were surprising and uncontrollable, spilling over into unexpected terrains. While this was undoubtedly often the case, my aim here has been to show that the villagers perceived and practiced their world as one whole social condition unfolding within an unlimited temporal span, that demanded a constant and indefinite ability of reorientation.

At a more general level this highlights the point that catastrophes hitting at various points in time may merge into a contemporary experience, framing the sense of urgency upon which people act. In other words, the impulse which, for instance, made Arivu choose to save his school papers before anything else, was occasioned by sever-

al events. In that sense, I argue that resilience can never be understood in spatial terms alone, but must be complemented by an analysis of temporality and the way in which events datable in different times are simultaneously present in people's lives. To avoid the circular argument that existing patterns of vulnerability are what transform natural hazards into disasters, and that resilience, conversely, is what stops hazards from becoming disasters, the work of time must be properly analyzed.

In this chapter I have focused on individual courses of life marred by diverse calamities and hazards of various scales and historical origin. This was a strategic device on my part, aiming at ethnographically demonstrating the limitations inherent in thinking about resilience in terms of a socio-ecological *system*. For all its merits of attempting to combine the social and the ecological dimensions of human life, the notion of a system cannot harbour the differentiated perceptions of and responses to the disturbances, which must be absorbed – as Leach saw as the key-element in resilience. The idea that responding to disaster is a capacity of the social-ecological system, as Adger *et al.* saw it, blurs the vision of individual people acting as best they can on the basis of past experience as well as anticipated futures. Even if in a bird's eye perspective, people's resilient actions may gradually sum up into a perceived social systemic change of a larger scale, social resilience takes off at the level of human agency and the individual responsibility taken at the conjuncture of pressure and promise.

If the concept of resilience is to be appropriately applied within the social domain, it must encompass the temporal dimension that conditions all human agency, unfolding in actions that bear the mark of a deep-seated ambition to sustain a sense of direction amidst the disturbing unknown.

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CHAPTER 7

Embedded Flexibility in Coupled Human-Environmental Systems in the Sahel: Talking about Resilience

Anette Reenberg

Abstract

This chapter aims at demonstrating how the concept of resilience can serve to characterize the condition of a human-environmental system. It briefly presents different definitions and disciplinary uses of the term resilience and employs a case study from the Sahelian region of Burkina Faso as illustration. The case focuses on understanding the dynamics and pathways of change of the land use systems as a result of complex interactions and feedback mechanisms. It emphasizes aspects related to the rhetoric of climate change research, e.g. vulnerability, adaptive capacity and resilience. It demonstrates, for example, how the change of local livelihood and land use corresponds to the evolution of socio-economic and biophysical driving forces. The issue of field expansions and interrelation between pastoral and agricultural strategies is specifically explored.

The conclusion suggests how some of the different meanings of the 'resilience notion' may serve to characterize important features of the human-environmental system in Sahel.

The present anthology aims at addressing the question of resilience on the basis of insight into the ways in which local communities meet new environmental challenges, for example rooted in global climate change. In this spirit, the following paper presents a case study from the Sahel¹ which specifically focuses on the living conditions on the margin of the desert.

The main concern is to illustrate how a selection of different meanings of the concept of resilience may serve to characterize the condition of a human-environmental system. The case study from northern Burkina Faso serves as point of departure for this illustration. It presents the land use and livelihood system in a village which has previously been studied in depth over decades, specifically with focus on understanding the dynamics of the land use systems as a result of complex interactions and feedbacks between social and environmental factors. The example illustrates the explanatory importance of incorporating the temporal dimension in the analysis of man's interaction with and responses to the environment, for example by demonstrating the co-evolution of driving forces by use of coupled human-environmental timelines. In more concrete terms, the example provides insight into recent land use dynamics that challenges commonly accepted narratives of land use and livelihood development pathways in response to the triple exposure of globalization, climatic variability and population pressure.

The presentation of the case rests on the rhetoric related to climate change research, e.g. vulnerability, adaptive capacity and resilience, recognizing the multiple sources of vulnerability of the Sahelian livelihood and land use systems. The notion of resilience, in some of its multiple meanings and definitions, is scrutinized in order to demonstrate the potential problems related to the lack of general consensus concerning the meaning of this term which has become popular across a wide range of different disciplines.

1. Sahel refers to the agro-ecological zone bordering the Sahara desert. It is most frequently defined by an average annual precipitation of between 200 and 600 mm. It includes parts of Senegal, Mali, Burkina Faso, Niger and Chad.

Background – climate and human-environmental systems in the Sahel

In the Sahelian region, agricultural and pastoral production constitutes a very important sector that sustains the majority of people living here. Hence, the overall livelihood conditions are to a very large extent linked to the agricultural activities and the natural resource endowment. The significant attention given to agriculture in official national documents dealing with climate adaptation and sustainable development issues, such as the Burkinian national plan for climate adaptation, is therefore well justified. While many important traits are taken into account in such policy documents, it can also be noted that simplified notions of the state and dynamics of Sahelian land use systems have a prominent position. This concerns, for example, the pertinent issue of the development of the agricultural frontline across the drier part of the Sahel, which is presented in the well-established narrative of a simplistic notion of more people/less rain => more need for land => field expansion on marginal land => soil degradation => even more need for land etc. (PANA, 2007).²

Especially the desert fringe region of the Sahel is characterized by a fragile balance between limited natural resources and a rapidly growing population. Agriculture (including pastoral production) is the main source of sustenance for the predominantly rural population. To a large extent and in different ways, livestock interacts with the environment within a production system, such as grazing, mixed farming and industrial systems. While agriculture and pastoral production constitute the backbone of the livelihood portfolio in the Sahel, it should be noted that circular migration plays a significant role as well. Specifically, male migration to the coastal cities or the plantations during the dry season has been an important source of remittances to the villages in the Sahel.

2. On a more theoretical level of understanding, Reynolds et al. (2007:848) also mention the expansion of cropping into rangeland during wet periods as an inherent general feature in dry land systems, which leads to vulnerability and environmental collapse.

The very high variability in climate, specifically the spatial and temporal variability in precipitation both within and between years is well documented and known to be a major challenge for local livelihood conditions (Dietz et al. 2004).

Seen in a long-term historical perspective, significant climate variability is a key issue (Brooks 2004). If we look back 10,000 years, the climatic situation in the Sahel was characterized by an intensified monsoon situation, and the landscape was dominated by lakes and open woodland. By 5,000 BCE a final collapse of the monsoon was experienced after periods of abrupt arid crises. At this point in time, cattle herders migrated to the Sahel. Unlike in e.g. Asia, Sahel pastoralism was not from the outset linked with sedentary agriculture; lack of water in terms of rivers for irrigation was considered the main cause of the lacking development of urban civilizations in the region. Pastoral land use has played a prominent role in the drier parts of the Sahel, which are well known for its nomadic cultures that are well adapted to the spatially and temporally erratic resource base. In the 1950s and 1960s, the Sahel experienced unusually high rainfall, which coincided with the independence of the nation states in the region. This development of societal and environmental events created a powerful incentive to expand cultivation into marginal land, and has, in turn, had profound implications for the vulnerability of the land use system at the margin of the desert.

It is a widely debated question whether a recent increase in rainfall can be interpreted as a return to earlier levels or whether it is simply an example of natural variability. Bolwig et al. (2007) summarize that from around 1986, rainfall generally increased compared to the 1970-1985 period and that in the 1998-2003 period, rainfall had recovered in the southern parts of the Sahel zone (12-16°N) compared to the 1968-1997 period, whereas drought has intensified in the northern part (16-20°N). In the southernmost Sahel (12-14°N) conditions in the 1998-2003 period seem to have been comparable to the very wet period in the 1950s and 1960s (Nicholson, 2005).

As regards future climate predictions, IPCC's' Fourth Assessment Report is inconclusive (Christensen et al., 2007). The West African region is one of the regions of the world where global climate models diverge in their predictions, yet variability is likely to increase, and

both prolonged droughts and extreme rainfall may become more frequent.

The scientific literature on land use systems in the Sahel provides a useful general portrait of contemporary agro-ecological systems in the region (e.g. Keulen & Schiere 2004), see figure 1. In farmlands, livestock and crop activities are often integrated, and for agriculture in general this integration has been a significant path to intensification. Generally speaking, population increase in the Sahel has led to the expansion, intensification, and often closer integration of crop and livestock production systems (Powell et al. 2004).

The principal linkages between crops and livestock are income, animal power, feed, and manure. Most livestock derive their feed almost exclusively from natural rangeland and crop residues, and live-

Rainfall yearly	Agroecology Zone	Pastoral activities	Agriculture Main crops
<100 mm	Sahara	Nomadism	No cultivation
200-600 mm	Sahel	Transhumance	Millet Cowpeas Sorghum Peanuts
> 600 mm	Soudano-Sahel	Sedentary	

FIGURE 1. Rough, schematic overview of the agro-ecological zones and land use activities in the West African Soudano-Sahelian region.

stock manure is an important soil fertility amendment. Hence, the productivities of livestock, rangelands, and croplands are linked. Crop residues can be vital livestock feeds during the dry season, and manure enhances soil fertility for crop production. Forage from rangelands and fallow lands provides important livestock feed and, through manure, nutrients for cropland. A farmer obtains manure either from his own livestock or through exchange relationships with pastoralists.

Research concerning pastoral production systems and agricultural production systems as separate functional systems has been comprehensive and much detailed knowledge about productivity and sustainability aspects has been gained (Hesse & Cotula 2006). Crop-livestock interaction has also been carefully analysed in agro-ecological research on semi-arid land use systems, notably with empirical focus on the more humid part of e.g. the Sahelian region (Banzhof 2005; Brooks 2006; Nori & Davies 2007). Much less is known, however, about the complementarities of pastoral and agricultural components in local livelihood systems which take advantage of a dynamic and flexible prioritization of balance between livestock and crop production, adjusted in an optimal fashion to the temporal fluctuations in environmental or societal production conditions.

In recent history, the especially severe drought years which occurred in the 1970s and 1980s drew attention to the Sahel region and occasioned a significant amount of research activity aimed at assessing the sustainability of the natural resource management strategies. A large body of research results has been presented in the literature as discussions of the processes of land degradation or desertification (Bolwig et al. 2007; Raynaut 1997; Marcussen & Reenberg 1999; Ba et al. 2000; Barbier 2004) and a number of narratives have developed to become established truths with no need for further documentation. This includes, for example, the earlier mentioned notion of vicious circles of land degradation prompted by population pressure and low rainfall, leading to excessive expansion of fields onto marginal land, which in turn leads to irreversible degradation of the natural resource base, lower productivity and the need for larger areas to sustain the population. Recent literature, however, encour-

ages readers to look critically at received wisdom in order to avoid misinterpreting the processes of change and their likely future directions (Mortimore 2005).

Any future changes to the northern limit of agriculture may have crucial implications for the vulnerability of the land use system to possible changes in the monsoon regime. If the recent 'greening of the Sahel' (Olsson et al. 2005) leads to an expansion of cropland onto pastureland as was the case in the 1960s, this may again expose the region to acute food shortages caused by new drought situations.

It has been noted (Desanker et al. 2001, Dietz et al. 2004; Brooks 2006; Brooks et al. 2005) that knowledge of climate variability and adaptation in the Sahel can be improved, and that insight into some of the mechanisms that Sahelian communities have used to cope with current climate variability may be a useful complement to technological innovations (Kandij et al. 2006). Such full understanding of the climate-livelihood interaction is needed to assess the potentiality, vulnerability, and resilience of food production vis-à-vis perturbations related to climate changes.

New ways of formalizing thoughts about complex human-environment systems and their feedback mechanisms, such as resilience thinking (Walter & Salt 2006) are currently suggested as supplements to previous approaches such as livelihoods, sustainable development, etc. It will be worthwhile to investigate whether such lines of understanding could be valuable complements when examining development processes that support flexible and climate robust pathways. Thus, the following section will briefly present some of the key concepts and notions related to resilience thinking, with the aim of using the perspectives as a source of inspiration for the exploration of our case study.

The issue of resilience

While it is beyond the scope of this chapter to present a thorough scholarly discussion of the concept of resilience, I shall briefly explore some lines of thought related to the usage of this term, primarily with the aim of supporting the application of the term in the discussion of the dynamic traits of the land use system.

The term resilience is widely used in several scientific disciplines, underpinned by an equally wide range of definitions of the exact meaning of the term, complicating cross-disciplinary communication. Confusion arises because different groups adopt different meanings to fit their understanding and purpose.³ In recent years, resilience has become a frequently used notion in different contexts related to sustainability issues and to broader reflections related to the precautionary principle and the future challenges for the planet under pressure from human growth and environmental changes. In simple terms, resilience can be viewed as the ability to ‘bounce back’ in a timely way from adverse impacts and shocks, i.e. the ability to withstand the consequences of an incident, the power to recover to the original situation or the capacity to adapt without harm.

The resilience perspective emerged from a branch of ecology that addressed ecosystem system dynamics. More recently, social scientists have contributed actively with perspectives on the dynamics of human-environment systems and challenged the concept of an equilibrium based system; among those were scholars dealing with natural resource management systems in anthropology and geography (e. g. Vayda & McCay 1975; Zimmerer 1994). The resilience perspective is increasingly used as an approach for understanding the dynamics of social ecological systems (Folke 2006).⁴ Adger (2000: 347) defines ‘social resilience’ as the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change. Scholars emphasizing this meaning of the notion stress the necessity to ‘learn to manage by change rather than simply react to it and the key role that individuals and small groups of individuals play’ (Folke 2006:255). In the social sciences concerned with crises and disasters, resilience has been under-

3. The original definition as presented by Holling (1973) is: ‘the capacity of a system to absorb disturbances and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks’.

4. The terminology used in connection with systems that embrace human/societal as well as nature/environment/ecology components varies across research communities. In this context we use the term human-environment (Turner et al. 2007), unless we refer directly to wordings used in citations from papers by other scholars.

stood as comprising three aspects of people's response to disasters; resistance, recovery and creativity (Maguire & Hagan, 2007). In one of the most recent presentations (Walker et al. 2009) it is specifically stressed that the resilience approach treats biophysical, social, and economic elements of a region as components of a single social-ecological system, and that it emphasizes the capacity of the system to continue delivering goods and services to people. However, taking the concept of resilience from the ecological sciences and applying it to social systems is not straightforward because it assumes that there is no essential difference in behaviour between social systems and ecological systems.

The concept of resilience has been frequently employed together with the concepts of vulnerability, adaptation and transformation in recent research related to environmental change, thus reflecting the inextricable linkage between human and environmental systems (Berkes & Folke 1998). Resilience is a loose antonym for vulnerability as it increases the capacity to cope with stress. More broadly speaking, the vulnerability of human-environmental systems has been researched in three conceptual lineages: one that draws on risk-hazard or biophysical approaches, one that draws on political-ecology approaches and explores vulnerability with respect to broad processes of institutional and environmental change, and one that relates to the concept of ecological resilience and sees vulnerability as a dynamic property of a system in which humans constantly interact with the environment (Eakin & Luers 2006).

Adaptability is defined as the capacity of actors (humans) in a system to influence resilience (Walker & Salt 2006:163). Turner et al. (2003) employ the term resilience or 'adaptive capacity' to assess the ability of actors to shield themselves and to recover from adverse impacts. The concept of adaptive capacity (Yohe & Tol 2001) describes those characteristics of an individual, household or population group that enable it to alter and structurally reorganize its activities to diminish present threats to survival while enhancing its ability to address new risks.

Hence, resilience provides adaptive capacity (Smit & Wandel 2006) that allows for continuous development of the system, but it

does not imply that resilience is always an advantage; it may hamper transformation from the current stage or architecture of the system into a more desirable one (Folke 2006).

Social and physical approaches are both essential parts of a framework to understand the vulnerability and adaptability of coupled human-environment systems (Paavola 2008). It is, however, important to be cautious in using the term adaptation as well, as it has likewise a number of different meanings. Orlove (2005:590) points to a broad range of adaptations, where several axes can be recognized, such as anticipatory/reactive adaptation, private/public adaptation and autonomous/planned adaptation.

Finally, it is worth noting that leading scholars in the 'resilience alliance' (Folke 2006) stress that resilience is 'a way of thinking' (an approach) that provides a context for the analysis of socio-ecological systems. It can be seen as an area of explorative research with implications for sustainable development policies; hence, it can be seen as one amongst several arenas for interdisciplinary scientific approaches to research concerning sustainable development pathways (others being vulnerability research, ecological economics, sustainability science, and land change science) (Lambin 2005; Turner et al. 2007).

A case from Northern Burkina Faso

Biidi 2, a village situated in the Oudalan province in Burkina Faso (cf. map in figure 2), serves well to illustrate a number of pertinent characteristics of the dynamics of change in a Sahelian land use system. The perspectives selected for presentation in this paper aim specifically at exploring the traditional coping mechanisms that have helped the local population deal with recurring droughts and rainfall variability and thereby create a relatively resilient livelihood system.

In more concrete terms I shall illustrate that changes to the agricultural frontline in the Sahel may not always conform with the simplistic notion of more people/less rain => more need for land => field expansion onto marginal land => soil degradation => even more need

for land => etc. In order to do this, a simple set of questions about field expansion and contraction in the northern Sahel (millet agriculture) is addressed:

- How has the limit of cultivation changed in recent years?
- How do human and biophysical factors drive land use change?
- How do local people perceive and explain directions of change?

The information needed to respond to these issues is extracted from a number of surveys and field visits that have been carried out in the course of the past fifteen years (partly reported in e.g. Reenberg 1994; Reenberg & Fog 1995; Reenberg & Paarup-Laursen 1997; Reenberg et al. 1998; Reenberg 2001).

The studies mentioned above have drawn from a wide range of theoretical lines of thought. It has proven useful employ a portfolio of complementary approaches and methods (Young et al. 2006) in order to provide a comprehensive analysis of event driven adaptation of human coping strategies in land use systems in Northern Burkina Faso. More precisely, they have striven to combine, for example, classical theoretical approaches to rural populations' adaptability to exo-



FIGURE 2. Location of the study site, Biidi 2.

genous and endogenous stressors in terms of shifts in the availability of natural resources, changes in population pressure or the introduction of new technologies (e.g. Boserup 1965; Bennett 1976; Netting 1993; Diamond 2005); livelihood analysis approaches to understanding how rural communities respond to environmental and social change (e.g. Chambers & Conway 1992; Scoones 1998); adaptation and vulnerability concepts (e.g. Adger et al. 2003; Yohe & Tol 2001); conceptual frameworks of coupled human-environmental systems and land systems that include environmental factors, social factors and feedbacks at various spatial and temporal scales and identify the driving forces of change (e.g. Fox et al. 2003; GLP 2005; Haberl et al. 2006; Lambin & Geist 2006; Marcussen & Reenberg 1999; Scoones 1999; Walker et al. 2006; Zimmerer & Bassett 2003); and more heuristic approaches such as 'ecological timelines' (Reid et al. 2000) or 'coupled human environmental timelines' (Reenberg et al. 2008) as a means to capture different causes and consequences of land use change over time. By doing so, we advocate a human-environment systems approach to the 'wicked problem' of managing a fragile environment under conditions of uncertainty caused by the triple exposure to globalization, climatic variability and population pressure.

Biidi 2 village is located on an East-West-oriented dune band, superimposed on a pediplain. In this respect it resembles a large number of villages in the Sahel region of northern Burkina Faso (figure 3).

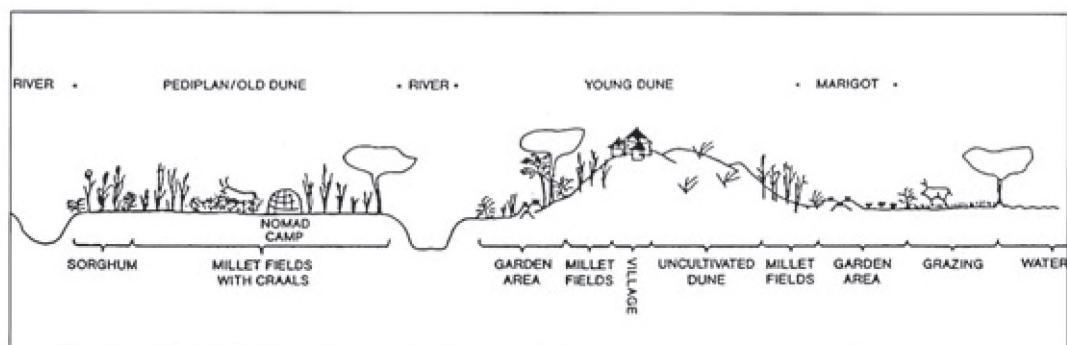


FIGURE 3. Landscape profile around Biidi 2. Source: Reenberg (2001).

Traditionally, these two different landscape types (i.e. dune vs. pediplain) have had alternating relative importance for cultivation, although there is a relative preference for fields in the dune landscape units in drier periods (Reenberg et al. 1998). In the contemporary situation, fields in Biidi 2 are primarily located on the pediplain. In addition, the local farmers cultivate gardens bordering the dune. The main crops are millet and sorghum, supplemented by a limited amount of cowpeas and groundnuts. However, the yield of these basic food crops far from suffices to meet the requirements of the village, even in good rainfall years (Nielsen & Reenberg in prep). The gardens have in recent years become a very important component in the land use system; the local wells provide water to sustain a reasonably stable production of vegetables (e.g. sweet potatoes, eggplants, tomatoes, various tree crops), which are mostly sold at the local market.

As an important supplement to the livelihood portfolio, the male population engages intensively in seasonal migration during the dry season, but normally comes back during the agricultural season, which is concentrated in the short rainy season (approximately June-October), and the harvest immediately thereafter.

Three main sources of data have been used for the study. The land use pattern and its spatial relation to the landscape units are explored by use of high resolution satellite images and aerial photography (in the early and mid-1990s) and field mapping by use of GPS (in 1995 and 2007). Two rounds of household surveys (total coverage of the entire village, 43 households in 1995 and 104 in 2007) have been conducted to provide information that goes far beyond the few issues addressed in this chapter, where I mainly rely on these surveys to provide information on population figures and insight into agricultural strategies and environmental events. Furthermore, in-depth group interviews and field walks were conducted, primarily to construct the coupled human-environmental timelines.

Figure 4 shows the land use history since the mid-1990s. Mapped on the aerial photography we see the entire extent of the village territory as well as the limits of the fields. The 1995-situation shows a detailed field outlay, which enables us to distinguish the single fields (a farmer has as a rule of thumb 1-2 fields, and most of them are,

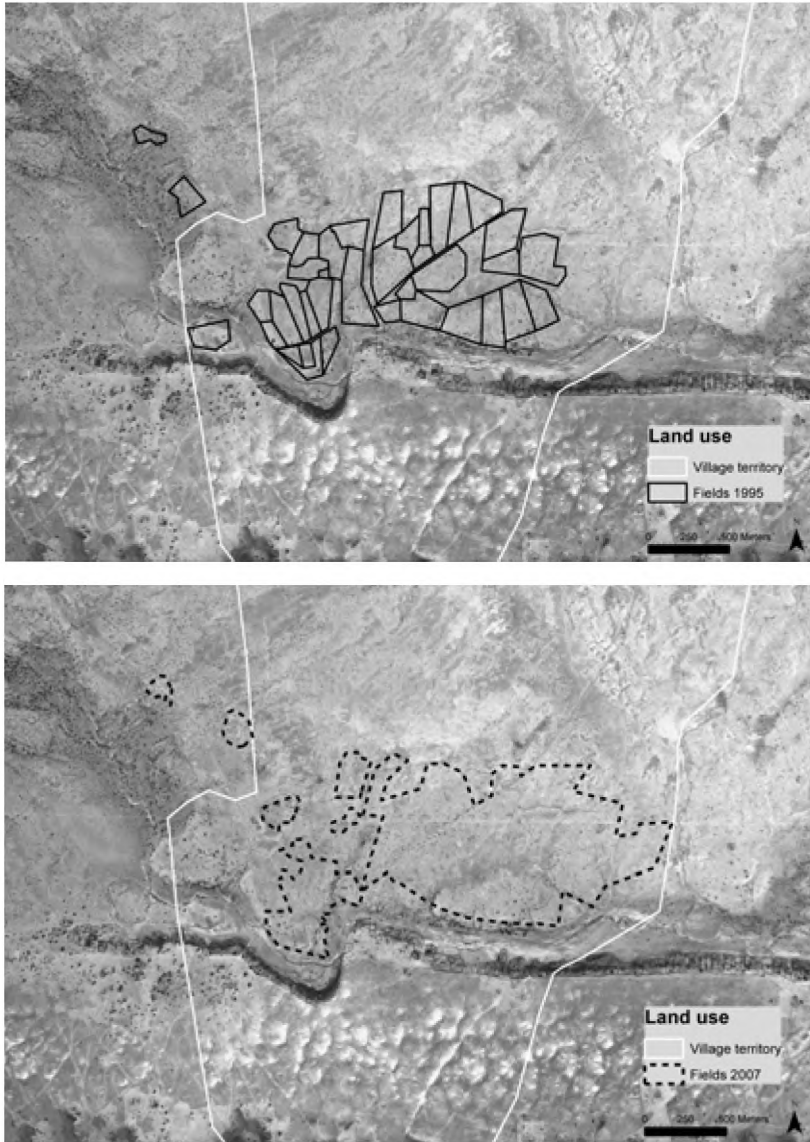


FIGURE 4. Field patterns in Biidi 2 in 1995 and 2007, respectively. The total acreage of the cropped land has only changed marginally. Source: GPS measurements.

again as a rule, cultivated every year). The mapping conducted in 2007 is less detailed and concerns only the outer limit of the field

area. However, the area within this circumference is almost entirely occupied by fields, with the exception of a cattle corridor which has been permanent since the first recording year. Hence, there is a reasonable basis for overlaying the two maps to identify possible shifts in the location and size of fields between 1995 and 2007.

Two main observations are conspicuous; the total amount of land cultivated has only changed marginally but the location has shifted towards the east. The new locations are mainly a result of the long-term fallowing which is practiced in the sense that fields are cultivated continuously for many years, but if the yields become too low, new land is taken into use.

The co-evolution of field patterns and socio-economic and environmental conditions that constitute the local livelihood context are visualized in a coupled human-environmental timeline (figure 5). Whereas population growth is a significant 'slow' variable (i.e. a gradual change), three main sets of drivers are proposed in the diagram to catch the main events of importance to change: climate, development intervention and infrastructure. Perception of climate change amongst the villagers appeared to be rather fuzzy, yet recent years were seen to be a mixture of 'good' and 'bad' years. Climate variation has some impact on field expansion and contraction, but certainly not in a very systematic manner. While a tendency towards expansion, conforming with the commonly held notion described earlier, is reported by farmers to have occurred in the 'good years' before our study period, it is equally important to note that farmers actually report abandoning fields in recent years – explaining this too as a result of good rains (the reason being that the good rain provides good grazing in the bush, which enables them to increase their herds; with more animals to sell, they have less incentive to embark upon hard work in the fields and as a consequence diminish cultivation).

A number of income promoting factors have a much more prominent place when farmers are listing factors of significance for change

PAGE 147 · FIGURE 5. Time line of human-environmental interactions in Biidi 2 from 1960s to 2007. Information is based on group interviews and portrays farmers' perceptions and observations.

in livelihood strategies. Project intervention was, for example, perceived as a major factor of change, as was establishment of infrastructure (road access). The latter greatly facilitates access to markets as well as the seasonal migration activities, and hence increases the ability to earn money and provide remittances to sustain the village.

Seen in a population pressure perspective, the lack of field expansion is interesting. The village surveys revealed that the population of the village has increased from 346 to 585 persons in the course of the twelve years (1995 to 2007). Hence, a suspected close correspondence between population size and the incentive to expand land cannot be observed.

To sum up, the land use change trends, traditional crop production on the pediplain fields has remained almost the same throughout the period. Land available for cultivation is perceived as having been sufficient until around 1987, but insufficient hereafter because of the growing population. Yet, in reality, expansion of cropland is not restrained by the lack of more idle land, but rather by the fact that farmers do not want to invest more labour in marginal lands.

Livestock has changed in importance in Biidi 2. The dry years in the 1970s led to large losses of animals. Consequently, livestock became insignificant in the daily livelihood of farmers, who expanded the fields to provide food. The herds remained small until the mid-1990s when new sources of income, created by e.g. project activities, were invested in animals with a significant increase in the village's livestock as a result. More rain in recent years has further supported this development.

Hence, the observed land use dynamic can be described as a result of two different feedback loops – both to some extent triggered by rainfall change (towards more rain). *One pathway* (a positive loop: more rain => more fields at the desert margin) is conforming to the classical notion. It certainly holds true that the establishment of millet cultivation in the region was supported by the unusually favourable rainfall conditions in the 1960s. Field expansions even continued to be an important response to food demand in the dry years that followed for some time, probably as a result of a certain inertia or adjustment time. *Another pathway* (a negative loop: more rain => less fields at the desert margin), describes well the contemporary

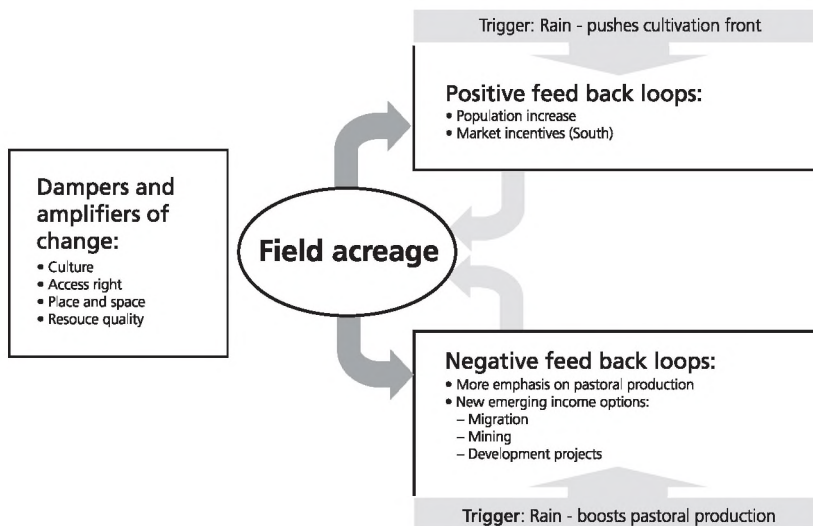


FIGURE 6. Rainfall impacts in bi-directional ways on field acreage. Increasing rain may explain expansion of fields at the desert fringe as well as reduction. No single, universal causal relation can be established.

situation in Biidi 2. Good rainy seasons in recent years have led to increased pasture productivity, which, as described above, leads to more emphasis on livestock and less incentive to cultivate all available land. This loop is further strengthened by the emergence of a range of other, alternative income options that enable farmers to rely on other sources for food and even invest in livestock to build up the herds (figure 6).

Lifestyle in terms of food habits and people's perception of primary occupation has changed very little in Biidi 2. Millet or sorghum porridge is the main staple in the village and agricultural activities are considered the main occupation in spite of the fact that agricultural output rarely suffices to provide food for a major part of the year. Supplementary income from other activities is needed to survive. In fact, people explicitly explained that they perceived themselves as farmers and that these activities constituted their cultural identity. Migration has played a role throughout the period of investigation, and though the precise reasons for the migration have changed with available options (such as migration to the agricultural

plantations in Ghana in the 1960s, migration to the local goldmines from the late 1980s, and migration to work in the transport sector in Abidjan in recent years), it remains a permanent part of the livelihood portfolio. Variations in migration through time were not explained as responses to the climatic variability or to other of the proposed main driving forces of land use change.

The coupled human-environmental timeline in figure 5 serves to give a glimpse of the many factors which interact in enabling and constraining the ways in which local people manage the natural resources and modify their livelihood strategies.

Conclusion

Looking through the lens of resilience terminology, how can the land use and livelihood system that have been briefly described above be characterized? Some of the important notions mentioned earlier in this chapter can be captured under a number of perspectives, some of which are to a certain extent contradictory:

Resilience in the sense of the ability of the system to bounce back: The land use strategies in Biidi 2 have revealed flexible traits that enable alternating emphasis on pastoral and agricultural components in the land use system. The trends in recent years towards less cultivation can be interpreted as an ability to shift back when pasture productivity increases and hence opens the opportunity for a re-focusing of the natural resource management strategies.

Social resilience as the ability to cope with external stresses and disturbances as a result of social, political and environmental change: Biidi 2 has been exposed to stressors from population growth, political instability in neighbouring countries (target regions for the seasonal migration), and climatic variability. The timeline studies have documented that farmers have been able to compose a flexible livelihood portfolio, picking up new opportunities within the agricultural domain as well as in new areas of income generation. Hence, the village has, on the one hand, managed to remain 'the same' to a remarkable extent, containing the same families, and maintaining its cultural identity as a peasant society. On the other hand, this has only been possible because of the continuously increasing reliance on external generation

of income to support the population, which has increased by almost 70% in the course of 12 years.

Social resilience as capturing aspects of people's response to disasters; resistance, recovery, and creativity: The pronounced local and temporal variability in the rainfall conditions is an inherent trait in the Sahel region to which land use has had to be adapted for centuries. The above-mentioned flexible combination of and alteration between pastoral and agricultural land use has been a central feature of the traditional land use systems. It has, in turn, enabled the local population to cope to a reasonable extent with extreme events by moving in the landscape, or by putting more or less emphasis on the different types of production in the land use system.

Resilience as a measure of the capacity of the system to continue delivering goods and services to people: By relying on relatively flexible livelihood strategies that include an increasing range of activities that are not directly related to farming, the human-environmental system has been able to deliver food (or at least part of the food requirement) to the local population, and maybe more notably to deliver the appreciated service of enabling people to maintain their cultural identity as farmers.

Resilience as a loose antonym of vulnerability: By relying on a flexible combination of pastoral and agricultural production, the land use system can counteract vulnerability to some extent by choosing the most advantageous strategy in times of e.g. climate events. The development of a broader livelihood portfolio, with income generated from many different sources, has also implied that people are much less dependent on the local food production in a specific year. Hence, the contemporary system is much less vulnerable to climatic variations.

Resilience or 'adaptive capacity' characterizing the ability of actors to shield themselves and to recover from adverse impacts: Mobility and migration are a further set of important indicators of resilience. Where migration is circular in nature and stimulated by the demand for labour elsewhere outside the region, as is the case in Biidi 2, the resource flows associated with remittances can help enhance resilience.

Resilience as hampering transformation from the current architecture of the system into a more desirable one: Resilience is related to stability, but it is not clear whether this characteristic is always desirable, for example, in

development terms. Stafford Smith et al. (in press) note that for some dry land regions, the main issue is not to increase resilience. They portray a development of the human-environmental system which is undesirable, but resilient, and which is the outcome of cross-scale effects coupled with inherently low adaptive capacity. For these regions, they suggest, the problem is not to increase resilience, but to increase transformability in order to enable a transformation from the current type of system to some other kind of system. This may entail changing the ways people make a living, developing new 'goods and services' and operating at different scales. Hence, transformation and transformability are emerging as critical areas of concern and discussion for areas like Biidi 2 that have a very low level of material living standards under current conditions.

Perspectives

The study of resilience in coupled human-environment systems can be viewed as a purely intellectual activity intended to shed light on the intricacies of nonlinear dynamics, cross-scale interactions, and complex adaptive systems (Redman & Kinzig 2003). Describing a specific system by use of resilience rhetoric as exemplified above can, however, also have a more practical purpose by way of characterizing aspects of sustainability, adaptive capacity, and functioning of the prevailing human-environmental systems. One aspect of improving our ability to flexibly manage for resilience (in its different meanings of the term) lies in understanding the long-term dynamics of the system. This includes insight into critical time lags in perception, decision, and response as well as in mismatches in monitoring scale and response scale. Insight into longer term dynamics of the human-environment system and human response to changing conditions may make it possible to identify the key signals humans choose to respond to and what determines the range of response options which actors have at their disposal.

The accelerating complexity of changing environmental and societal conditions that local people are confronted with has been coined by (Liechenko & O'Brian, 2008) in the phrase 'double exposure', pointing to the fact the societal transformations are altering

the context for adaptation to climate change. This captures well the serious problems that Sahel villages face. Local and regional studies of human resource management strategies in Sahel show, however, that local people have considerable resourcefulness in the face of external change. Social and economic systems have been dynamic enough to allow farmers to adapt flexibly to climate change. Livelihood diversification is the key; it can occur *within* agriculture and natural resource use as well as *beyond* activities reliant on the environment. Diversification is indicative of a level of responsiveness to external forcing factors that may be significant in terms of the capability to adapt.

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CHAPTER 8

Drought and Marriage: Exploring the Interconnection between Climate Variability and Social Change through a Livelihood Perspective

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Abstract

Understanding the feedbacks and interconnections between the social and ecological domains is a key aspect in studies of resilience, adaptation, and vulnerability to climate change. The ability of human actors to respond to environmental stimuli, like climate change, is, however, shaped by multiple non-environmental factors. A key challenge is thus how to understand the link between climate change and human actions. The present chapter suggests that a livelihood analysis approach offers a way to explore this link. Taking as its point of departure the recent drought in the West African Sahel, this chapter traces the intertwined trajectory of drought, the demise of rain-fed agriculture, circular labour migration, and social change in a small Sahelian village in northern Burkina Faso.

This volume seeks to understand how local communities meet new environmental challenges, often rooted in climatic changes that will occur, or are already occurring, due to past and present carbon emissions (IPCC 2007; UNFCCC 2007). Human adaptation to a changing environment is not a new phenomenon, but a sense of urgency has entered the scene, and researchers, policy makers, and civil soci-

ety have engaged in a race against time to understand how these challenges can be met in societies at risk from climate change impacts (Coulthard 2008).

Over the last decade, the concepts of resilience, adaptation, and vulnerability to climate change have taken centre stage in academic discourses and are widely recognized as fundamental aspects of how human societies meet the threat of current and future climate change (Adger 2000, 2006; Adger et al. 2007; Folke 2006; Smit & Wandel 2006). While diverse in scope and aim, these studies all focus on the coupling of socio-ecological systems, as 'it is not possible to meaningfully understand the dynamics of one of the domains in isolation from the other' (Walker & Salt 2006: 31; Berkes & Folke 1998; Gunderson & Holling 2002). While the emphasis is on understanding feedbacks and interconnections between social and ecological domains, resilience, adaptation, and vulnerability to climate change literature stresses that the ability of human actors to respond to specific environmental stimuli like climate change is shaped by multiple historical, political, and economic contexts. Thus, environmental changes might not be a significant driver of human actions in societies around the world. A pivotal point in much of this literature is therefore how to single out, or simply understand, the link between climate change and real-world decisions taken by individuals or groups living in places affected by climate variability and change. This chapter suggests that a livelihood strategies analysis approach may constitute a way to explore this connection by looking at the relationship between drought, the demise of rain-fed agriculture, circular labour migration, and social change in a small Sahelian village, Biidi 2, in northern Burkina Faso.

The chapter will begin with a brief theoretical review linking livelihood studies and the concepts of resilience, adaptation, and vulnerability to climate change research. It will then introduce the setting and the methodology. The analysis' point of departure is the recent drought in the Sahel and the negative consequences of this on rain-fed agriculture in the village. Circular labour migration by young men to Abidjan, Côte d'Ivoire, is shown to be a key livelihood strategy negating this. Having presented the relationship between

drought, the demise of rain-fed agriculture and labour migration, the chapter argues that this livelihood strategy is also connected to the payment of bride price. Finally, I explore how this link has resulted in a number of other social changes in the village, focusing primarily on changes in marriage practices and power structures.

Linking environmental and social domains through livelihood studies

Recent livelihood studies found their intellectual inspiration in an IDS discussion paper by Robert Chambers and Gordon Conway published in 1992. In their interpretation, a livelihood refers to individuals or groups striving to gain a living, attempting to meet their various consumption and economic necessities, coping with uncertainties, and responding to new opportunities (1992: 9-12). This actor-oriented perspective led to a keen interest in the world of lived human experience, and a micro-orientation became predominant, often focusing on the household (Johnston 1993). In these studies, attention was increasingly paid to household livelihood strategies as a means of capturing the behaviour of low-income people (de Haan & Zoomers 2005).

Household studies and, more specifically, the concept of household livelihood strategies, emphasize the active or even proactive role played by the poor in 'providing for their own sustenance despite their lack of access to services and to an adequate income' (Schmick 1984 cited in de Haan & Zoomers 2005: 28). Thus, poor people are shown to be able to adapt to or cope with changing circumstances and different types of crisis, such as market instability, famines, and droughts, by evolving or changing their livelihood strategies. Scoones (1998: 6) accordingly highlights how livelihood adaptation, vulnerability and resilience is closely connected to the ability of a livelihood 'to cope with and recover from stresses and shocks'. The idea that households have a veneer of free choice and a capacity to act in the face of change is hence heavily embedded in these studies. However, many have also shown that household decisions are often made within the 'confines of limiting structural con-

straints, although families nevertheless operate with a degree of relative autonomy' (Humphries 1982, quoted in de Haan & Zoomers 2005: 29).

The livelihood strategies analysis approach focuses, in other words, on many of the same issues as resilience, adaptation, and vulnerability to climate change studies. Like these studies, it emphasizes that human beings act in the face of positive or negative stimuli, but these acts are not strictly autonomous: they take place within hierarchical structures and are constrained by institutional, political, economic, and historical processes. In a study from Mexico, for example, Eakin (2005) illustrates how a focus on four livelihood strategies opens up for an exploration of how globalization, market liberalization, and climatic risk simultaneously structure the livelihood strategies embraced by local farmers. Eakin shows that economic uncertainty is more important for household decisions than environmental risk. Coulthard (2008) similarly investigates the adaptive capacity, vulnerability, and resilience of Indian fishermen through a focus on livelihood diversification, which is analyzed as a key adaptive strategy to environmental change at the household level, showing how caste and traditions along with climatic changes play a mayor role in livelihood decisions. In the Pacific, Reenberg et al. (2008) also deal with human-environmental interaction by exploring livelihood strategies, arguing that they provide a useful framework for analysing the link between humans and their biophysical environment. Again, climatic events are assessed in conjunction with wider political, economic, and historical issues, showing how all of these contexts play a part in household livelihood strategies decisions.

In all three studies, and in the analysis that follows, livelihood strategies are thus used as a means to explore what people do in the face of external stimuli. While connecting climate change to livelihood strategies remains difficult, the focus on livelihood strategies makes it possible to explore what people perceive as the driving forces behind these, and, in turn, to establish whether or not climate is one of these. In the following analysis based on ethnographic fieldwork I will focus on labour migration as a livelihood strategy aimed

at negating the negative impact of drought on rain-fed agriculture. Simultaneously, I will argue that the continued practice of this strategy is closely related to the need for young men to pay bride price.

Study area and methods

Biidi 2 was founded some 125 years ago by Fulbe herdsmen and is located approximately 14 km south-west of Gorom-Gorom, the provincial capital of Oudalan Province.¹ Oudalan belongs to the Sahelian zone of Burkina Faso, which receives around 400 mm of precipitation annually. Biidi 2 is surrounded by more or less continuous fields. The fields are mainly located on the pediplain and millet, sorghum, and cowpeas are grown (Rasmussen & Reenberg 1992; Reenberg & Paarup-Laursen 1997). The dune, on top of which the village is situated, is rimmed on its southern side by gardens. Agriculture, pastoralism, gardening, development project work, small-scale commerce, and labour migration constitute the economic mainstays of the village. Three ethnic groups live in Biidi 2: *Rimaiibe*, numbering 302 individuals, *Fulbe*, 167, and *Wahilbe*, 116 (as of January 2008). Of these, 246 are under the age of 15, constituting 42% of the total population. *Wahilbe*, who are blacksmiths, constitute a kind of professional 'caste', which separates them from the two other groups (see also Riesman 1977).

The data presented in this chapter come from six months of intensive fieldwork carried out between August 2007 and February 2008. Participant observation, semi-structured interviews, and focus group interviews were the main methods used. A household livelihood strategies analysis approach focusing on household composition, income sources, and material possessions was used in the study to explicitly explore household decisions and how they are related to broader contexts (Bebbington 1999; Eakin 2005). The fieldwork

1. See Reenberg (chapter 7, this volume) for more details on the Sahel region and the village.

was hence designed to explore and assess how households in the village construct their subsistence and risk management strategies. In the semi-structured interviews and the focus group interviews respondents were asked to describe these strategies and the main changes (if any) to these over the past 50 years and to assess the main causes of these changes (if any). No indication of the focus on climate was presented for respondents at this stage in order to minimize biases in the answers. At the end of the interviews and the focus group discussions, the respondents were asked to assess their perception of climate change generally and the perceived impacts of climate change on chosen livelihood strategies, natural resources, and social aspects. When impacts were assessed as negative, the respondents were asked to explain their adaptive actions to reduce these impacts.

Besides exploring livelihood strategies, the fieldwork focused specifically on the socio-cultural consequences of livelihood diversification. Various questions were addressed, such as: what happens to life in the village when most of the young men migrate; what happens with the money earned on migration; and does migration change household structures and power relations? Often the data needed to answer these questions and explore sensitive topics such as changing marriage patterns and political issues were collected during informal conversations and observations of life in the village. Participating in a number of marriage negotiations, engagement parties, and marriages offered great insight into the practices surrounding these events and an arena in which to ask about marriage practices in the past. Similarly, observing how political decisions were made provided insight into the workings of political power and changes in this over time.

Analysis

Perceptions of climate change and variability

Drought in the Sahel is not a new phenomenon, and drought periods lasting one or two decades have been a persistent feature of this region over the past 500 years (Nicholson 1978; Rain 1999; Watts

1983; Webb 1995). Concern about climate and its impact on human populations in the Sahel was, however, an immediate response to the most recent of these drought periods commencing in the early 1970s (MaCann 1999). Averaged over thirty-year intervals, annual rainfall in the Sahel fell by between 20 and 30% between the 1930s and the 1950s and the three decades following the 1960s (Hulme 2001). This dramatic climate change caused a 'horrifying famine' and the 'death of several hundred thousand cattle' and provided the first evidence of a 'huge ecological crisis in the Sahel' (Raynaut 2001: 9). This change in rainfall had major consequences for the populations of the Sahel, who were already under stress from deteriorating political and economic conditions (Warren 1995).

No rainfall record exists for Biidi 2, but the meteorological station in Gorom-Gorom has collected monthly rainfall data since 1955. This dataset indicates a rainfall trend similar to the general development in the Sahel: the wet 1950s and 1960s were followed by a prolonged dry spell, lasting from the early 1970s until the 1990s, aggravated by major droughts in the early 1970s and early-mid-1980s. The high degree of interannual variability and an increasing trend in the yearly rainfall average since the mid-late 1990s have likewise been observed.

While rainfall in the Sahel is spatially highly differentiated even within small areas, people in Biidi 2 agree about the similarity between rainfall in Gorom-Gorom and Biidi 2. The 1950s and 1960s are uniformly cited as very wet and 'good years', whereas the 1970s and 1980s are cited as very dry and 'bad years'. The high interannual variability of the rain over the last 10 or so years has also been observed by the villagers, who often argue that 'the normal no longer exists; one year the rain is good, the next bad'. Moreover, the villagers perceive that a number of other negative climate trends have taken place over the last fifty years. The rainy season is perceived to be shorter now than in the 1950s and 1960s, with periods of more intensive rain often resulting in flooding or with long breaks resulting in drought. They also perceive it to have a larger number of 'false starts', which makes it very difficult to know when to sow. Temperatures during the cold as well as the hot season are said to have increased and both seasons to have become longer. The wind is perceived to have be-

come stronger, causing more wind erosion with the result that sand is filling up river beds and destroying crops. Degradation of the soil, the disappearance of wild fauna, plants, trees, and watering holes, and growing problems with pests are also mentioned by the villagers as consequences of the changed climate; all these aspects have made rain-fed agriculture difficult, and livelihood diversification increasingly important.

Diminishing importance of rain-fed agriculture

In the wet 1950s and 1960s, millet (the staple crop in the region) production 'was easy', as it was often expressed, because of 'good rains'. But the prolonged drought commencing in the early 1970s and lasting well into the 1980s, followed by interannual rainfall variability in the 1990s, made rain-fed agriculture extremely difficult and unreliable. Even in the best of years, the harvest today meets only between seven and nine months' requirement for food, and this only for the largest and most efficient households. In 2007 and 2008, for example, the household with the largest fields and the best access to labour only produced enough cereal to meet the household's needs for seven months and two months, respectively. The low yield combined with the intensive demand for labour (sowing, weeding and harvesting) has resulted in households giving up rain-fed agriculture altogether because 'it is simply not worth the effort', as I was often told.

The villagers, in particular the *Rimaiibe*, have responded to this situation by diversifying their livelihoods, and today off-farm livelihood strategies represent the mainstay of their income. It is difficult to assess the actual income generated by engaging in off-farm livelihood strategies, but most households earn enough money to buy food to last the whole year.² The money is mainly earned through development project work, gardening, and small-scale commerce,

2. Most households buy millet immediately after the harvest from more fertile regions of Burkina Faso and store it in granaries next to their huts. Well-off households often buy enough to donate to less fortunate households.

but it is circular labour migration – going away in the agricultural off-season to make money – that generates the most income.

Circular labour migration

Circular labour migration has a long history in Biidi 2. Migration in the 1950s and 1960s was mainly directed towards Ghana where 7 of the now elder men had gone either to fish on the coast or work in the large plantations. However, the drought in the beginning of the 1970s and its prolonged aftermath played a significant role in the increased labour migration seen in Biidi 2 and the rest of Sahel over the last 30-40 years (Hampshire 2006; Henry et al. 2004; Mortimore and Adams 2001; Rain 1999). Almost all young *Rimaiibe* men left to earn money, primarily for food, as the ‘harvests failed and the cattle died’ as it was often expressed, and labour migration mainly to Abidjan became very important for household survival ‘because of the drought’.

The importance of circular labour migration has continued. Each year, after the agricultural activities have ended in November and December, a large proportion of mainly young *Rimaiibe* men leave. In December 2008, 10 youths between 15 and 25 years left, followed in the beginning of January by three more, for a total of 36% of this age group. Among the men aged between 25 and 35, seven out of 25 left, or 28%. And among the men older than 35 years, eight out of 50 left, or 16%. Two other *Rimaiibe* aged 24 and 28 were already in Abidjan, living in a small rented room. The value of this accommodation is closely related to its location near a marketplace where all the men from the village work loading and off-loading trucks and buses during the day. At night, they all work as private security guards. During this 24-hour working day, only interrupted by slow periods in the marketplace, during which they return to the room to sleep, the men earn between US\$5 and US\$30. The average amount the men bring home to the village after all expenses such as food and transport have been paid is between US\$200 and US\$300 for six months of work. A large proportion of this money is used to buy millet and other goods, but bride price is also an important motivation behind the circular labour migration.

Labour migration and bride price

Biidi 2 is made up of virilocal households. The women thus always live with the family of their husbands. As in most virilocal societies, the family of the woman is 'compensated' through a bride price. Prior to the 1970s, bride prices in Biidi 2 were always paid by the father or another older male relative of the young man (see also Riesman 1992: 76). The bride price depends, then as now, on a number of factors, such as how closely related to the young man the woman is, her ethnicity, her social standing, and how far away she lives, but it is normally around US\$300.

Prior to the 1970s, the bride price was raised through the sale of millet and cattle, but due to the drought many of the fathers lost the means to pay.³ Losing consecutive harvests and whole herds of cattle was a very common experience in Biidi 2 in the 1970s and early 1980s. The now older men and women often told stories about carcasses of cattle lying along the roadside and fields devoid of any crops because the 'rain had stopped'. Such narratives were always followed by others stressing economic hardship, hunger, and large-scale migration. Abdoulaye, a now middle-aged man, explains:

It used to be the father that had money. But when the rain stayed away the millet disappeared and the cattle died. Everything was gone due to drought and I remember that for many of us [young men] migrating, earning money to get married was almost as important as earning money to buy food.

Today, earning money to pay bride prices remains an important motivation behind labour migration. Like their fathers who left in the 1970s, the young men leaving in 2007/08 uniformly told me that labour migration provides them with more than just money for food,

3. Only in two cases was I told that the father had paid part of the bride price in the years following the 1973-74 drought. The 1983-84 drought reinforced this trend and during the late 1980s and early 1990s I know of only three young men whose fathers partly paid. During the last 15 or so years this trend has continued. Only one young man in the village has during the last 5 years had his marriage completely paid by his father, while three more has had part of the bride price covered by their father.

a chance to get away from the boredom of village life, and a taste of adventure. 'Why am I leaving? Because I need money to get married', as Layya expressed it one afternoon.⁴

While Layya and the other young men in the village would not have had to shoulder this expense before the onset of drought, they never really complained. In fact, they seemed quite content with this new arrangement. The reasons behind this revolve around choice, the age at which they can get married, independence, and power.

Love marriages

Prior to the major drought in the early 1970s, marriage was not only paid for by the parents, particularly the father or uncle of the young man, but also arranged entirely by them. Children were either promised to each other at birth, or marriage was arranged during a prolonged process of gift giving known as 'asking'. During 'asking', presents were sent by the boy's parents to the parents of the girl. If these and the family of the boy were deemed suitable, a marriage was arranged by the parents and the final bride price settled upon.

None of the now older men and women who got married in the 1960s remembers having had any say in the matter of marriage. Walking home from a marriage in a neighbouring village with a group of older men, I was thus told that 'We did not choose. Our fathers did. We grew up knowing who we were to marry. We never questioned that'. This they contrasted to the situation in the village today: 'Now the young men choose their wife; or at least they have a say.'

Because daily life in the village is sharply demarcated according to gender, young people have very few opportunities to mingle socially. Love therefore develops during social occasions such as baptisms, religious ceremonies, engagement parties and weddings where the gender separation is less pronounced. Markets are also good

4. See Cleveland (1986; 1991), Francis (1995; 2002), Hampshire & Randall (1999), Hampshire (2006), Timaecus & Graham (1989), and Rain (1999: 207-214) for similar examples from across Africa.

places to meet as the young couple can disappear together in the crowds. When the relationship becomes serious the young couple may decide to get married. If the young man has the money he will approach his father and ask him to make contact with the uncle of the girl. At this time negotiations between father and son always takes place. The father, if he disagrees, might try to persuade his son not to marry the girl, and in some cases he might even succeed. If so, the young man will break of the relationship with the girl. This happened once during my fieldwork but the young man dismissed the situation telling me that 'he did not really love the girl anyway'. But in most cases the fathers agree. There are two major reasons for this. Either the father is content with his son's choice, or he has no say. With regard to the latter situation, the fathers unanimously mentioned their lack of power in the matter since 'my son pays the bride price'. The young men are equally blunt and I was often told that 'my father is not going to decide who I am going to marry when I am paying for it myself'. Such statements were nearly always followed by observations regarding arranged vis-à-vis 'love marriages'. Mamadou, a young man soon to be married to Fatimata, captures the opinion of many in the village when he told me that 'love marriages' last longer than arranged ones. The older men agree, and their relatively relaxed attitude towards losing the power to decide whom their sons are to marry is related to this as well as to the fact that they do not have the money.

I can't wait!

Another important reason why the young men are relatively positive about paying bride price is related to the age at which they can marry. Prior to the drought, bride price was paid by selling cattle or millet. This was not a fast way to raise cash and it often took the father years to save up for his son's wedding. Only a little millet and very few cattle could be spared for sale, and there was often more than just one son in the household. Thus before the early 1970s, the men in Biidi 2 were normally between 30 and 40 years of age before they got married. Today the money for bride price can be earned during three or four seasons in Abidjan. The young men typically

make their first trip when they are 18-20 years old, and consequently they can marry when in their early twenties, which all of them do.

In a very frank discussion with me and his two best friends, Moussa revealed how he planned to marry Digga soon and why he thought this was a good thing:

I am off next year. On the truck to Abidjan. Imagine being more than thirty years old when you marry, or even older! It is a long time to wait for the girls. I like Digga now and would like to have a house where I could take her at night.

Moussa was 17 years old and clearly sexuality played a part in his desire to marry soon, but as Moussa continued his narrative, other factors were expressed:

It is not just that! If I had a house, a wife, and a child I would be free to make decisions. I would make a garden, have a field, and claim the cattle my father and my future wife's father are looking after now. I would be a man.

Marriage, independence and political power

Getting married soon was important for Moussa for various reasons, but noticeably he associated marriage with independence and power. A man in Biidi 2 has a complex potpourri of traits, but crucial among these is being head of a household. A household consists of a man, his wife and their child/ren; thus in order to be head of a household, marriage is essential.

A newly established household gains access to part of the fields and garden belonging to the father of the male. Moreover, the young man and woman are given the offspring of the cattle that their grandparents gave to them when they were born and which was subsequently taken care of by their fathers. Money earned by working for development projects, participating in small-scale commerce, or through labour migration is furthermore often kept exclusively by the young men after marriage.

This status as an independent man in charge of his own household and resources is transferred to the political stage in the village. In order to have a political voice in the village, a man needs to be

head of his own household. When decisions are made regarding, for example, the village's participation in a development project, the male heads of households get together. While age and rank play an important role in the discussions, the final decision is often based on votes. Because the men now marry at an earlier age than their fathers and grandfathers, they become heads of households earlier. This means they enter the political sphere earlier than their fathers, giving them access to power earlier. Because the village population is growing (since 1995 there has been a growth rate of 3.3%) and the younger men marry earlier, the number of households in the village is expanding. In 1995 there were 43 households in Biidi 2 (Reenberg & Paarup-Laursen 1997); in 2008 this number had grown to 104. Of the 61 new households, 55 have young (<35 years of age) heads of household.

This development has shifted the political power base within the village downwards and the younger men now wield significant political power. This trend is obviously not bemoaned among the younger men, but the older men in the village are worried: 'The young men have too much of a say. How can they make good decisions? They do not know about life'. The young men dismiss this, and again labour migration plays a part:

Know about life! What life? Life here in the village, or life outside the village? It is us [the young men] that speak French with the authorities; we have learned that while on migration. Migration has taught us how things are done today. We depend on the outside; the village is no longer enough.

Knowledge gained on migration has, in other words, given the young men a sense of subjective importance. 'We know about life in the city'; 'We know how to speak with white people', 'We know how to use mobile phones'; 'We know what things should cost'; 'We are not cheated by traders from the South' were statements often heard when the young men were asked to contrast their knowledge with that of their parents and grandparents. These, in turn, largely accept this state of affairs. I was often told by older men and women that the young men 'speak the language of the outside world better than we do'. The older generations therefore let the younger men

negotiate with development projects organizers, cattle buyers, or official authorities, heightening the young men's sense of themselves and their importance and influence over life in the village.

To sum up, the young men's contentment with having to pay for their own marriage is related to love, sexuality, independence, knowledge, and power, and all the young men I spoke to mentioned these aspects as a good side effect of labour migration and, although always said with a smile, the drought.

Conclusion

Considering the growing need to understand how local communities around the world at risk from current and future climate change meet this challenge, focusing on how people adapt or cope with changing circumstances through livelihood strategies seems particularly relevant. While the livelihood strategies analysis approach often reveals how household or community adaptations to a changing environment are influenced by multiple external stimuli, focusing on actual observed livelihood strategies makes it possible to explore what local people perceive as the driving forces behind these. Understanding what people do and why, opens up, in turn, for an exploration of how, and if, such actions reduce or enhance vulnerability or resilience to external stimuli like climate change. In this vein, I have suggested that for resilience, adaptation, and vulnerability to climate change studies, analyzing livelihood strategies might contribute to an understanding of the drivers behind human actions and lived consequences of these.

Analyzing the intertwined trajectory in Biidi 2 of drought, diminishing agriculture, circular labour migration, bride price, and social change, the chapter has focused on social consequences of drought. It has illustrated how changing marriage patterns and power structures were triggered by the most recent of Sahelian droughts. The drought in the 1970s and 1980s, followed by climate variability in the 1990s and 2000s had a large impact on rain-fed agriculture in Biidi 2. Enough food could no longer be obtained through agriculture and the villagers responded by engaging in various livelihood diversification strategies. Of these, circular labour migration by the

younger men is the most efficient in terms of cash earnings. Consequently, a large proportion of young men migrates each year to earn money for food no longer available from the fields.

Right from the start the young men had, however, another incentive to migrate. Their fathers, who traditionally paid the bride price, had lost the means to do so. Bride prices were normally paid by selling millet and cattle, but the millet had withered away and the cattle died due to the drought. For many of the young men labour migration provided the opportunity to earn money for a bride price, and this remains a very important reason for the continued scale and importance of this strategy in the village.

Paying the bride price has resulted in a number of social changes for the young men. Arranged marriages have largely been replaced by 'love marriages', and marriage is entered into at an earlier age. This development has shifted power relations in the village toward the younger men. They now establish households earlier than their older male relatives, and political decisions are to a large extent based on votes cast by heads of households. Moreover, knowledge gained through migration is valued and the younger men use this knowledge to further cement their position. Consequently the young men often have a large say in political decisions.

How this development influences the village's vulnerability and resilience to future climate change is an open question. But considering growing evidence that future climate change will strongly affect the African continent and particularly the dryer regions (Adger et al. 2007), continued emphasis on off-farm livelihood diversifications is likely to remain necessary. As many of these, like circular labour migration, depend upon the ability to navigate in the world beyond the village, the skills the young men return home with will probably maintain a significant degree of importance. In this light, the growing power of the young men might not simply be a consequence of, but also an adaptation to current and future climate variability.

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CHAPTER 9
NOMAD_SCAPES
Mobility and Wayfinding as Resilience
among Nomadic Pastoralists
in the Islamic Republic of Mauritania

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Abstract

In this chapter I investigate the concept of nomad_scape in relation to the Kounta nomadic pastoralists, inhabiting the arid Hodh Ech Chargui province in the Islamic Republic of Mauritania. Through the application of Ingold's dwelling perspective and Deleuze and Guattari's concept of nomadology, I provide an analysis of the interrelated dynamic mobility of humans, animals, water, pastures, and the landscape within what may be termed a disequilibrium environment or, as I propose, a *nomad_scape*. I argue that mobility and wayfinding constitute fundamental aspects of a particular form of social organization, the nomadic pastoral, which represents a unique model of human adaptation and social resilience under conditions of extreme drought.

In my current long-term research project I am aspiring to facilitate a comparative analysis of both rural and urban forms of contemporary resilience with a particular focus on water scarcity, and while national processes of mass sedentarization and urbanization represent important contemporary manifestations of new forms of resilience, a detailed discussion of such is beyond the scope of this chapter. Here, I limit my focus to groups of nomads who have cho-

sen to remain in the rural areas, continually applying their mobile livestock rearing strategies in a constant dialectic with the changing climate and landscape. In the following I wish to discuss the concept of resilience as embedded in practices of engagement among nomadic pastoralists in the arid Hodh Ech Chargui province in the Islamic Republic of Mauritania.

Wayfinding in a changing landscape

Mahmoud pointed towards the horizon, turned towards me and smiled. 'There you see. This is where we are going. Right there. You see. It is not far now, no more than one hour.' This was the first time he spoke in at least an hour. To me there was nothing particular to see in the direction, which Mahmoud had designated. The landscape looked exactly the same in whichever direction I looked: arid, open land, distinguished only by sporadic vegetation in the form of dry bushes and shattered acacia trees. Nothing seemed to stand out or demarcate any form of distinguishable feature or landmark which could be relied on for navigation. I asked Mahmoud how he knew the direction, and he answered: 'We were here two seasons ago, the animals ate well here. The *badyya* is good here. Do you remember we



used to take the animals out to that place for three weeks, Ishmael?’ Ishmael, a young man from the camp replied: ‘Yes, but at that time, it was over there.’ He too pointed towards the horizon, in what seemed to me to be the exact same direction. It all made very little sense to me, thus spurring my curiosity immensely, but I left it at that for the moment, enjoying the walk, the immaculate silence only broken by the sound of our respirations, footsteps, an occasional exchange of words and, of course, the goats moving along in the vastness of the landscape. After what seemed like an hour of walking, Mahmoud stopped and opened his small bag and pulled out his little kettle, while Ishmael began collecting some dry acacia branches. It was time for a tea-break.

This incident took place during one of many days spent walking with the herders Mahmoud and Ishmael during my first fieldwork among a group of Kounta nomads in Hodh Ech Chargui province in the south-eastern part of the Islamic Republic of Mauritania in January 2004.¹ It serves as an illustrative point of departure for the analysis of nomadic dwelling (Ingold 2000:55) or being-in-the-world (Heidegger 1971) which I propose in the following. First and foremost, it gives a number of clues as to how the nomad perceives and narrates his surroundings, and how perception is embedded in practices of engagement.²

As can be interpreted from Mahmoud’s recollection of how they had been in the same area two seasons earlier, and Ishmael’s response that the place, or point, they were referring to had shifted location (Deleuze & Guattari 1980:471), the nomadic perception of the landscape as a dynamic environment is informed not only by changes in the environment, but to a large extent by a constant dialectic between the immediate mastery of tasks such as wayfinding (Ingold 2000:155) and memories of past experiences (Hastrup 1998:121). To know their whereabouts, the herders must be able to connect movements to narratives of journeys previously made, by

1. I have undertaken fieldwork in the area continually since 2001.

2. See also Hastrup (1998:21); Ingold 2000:10; Merleau-Ponty (1962:82); Tilley (1994:13); and Tuan (1977) for elaborations on the notion of embodiment.

themselves and others. Basic navigational skills alone are not sufficient in a landscape which is constantly changing. Wayfinding is social in its essence.

My main argument is that adaptation to arid environments and resilience in face of extreme droughts is primarily a matter of social engagement, here exemplified by the twin concepts of mobility and wayfinding. Rather than merely traversing the surface of a world whose layout is fixed in advance – as represented on a cartographic map (de Certeau 1984:102) – Mahmoud and Ishmael ‘feel their way’ through a world that is itself in motion, ‘continually coming into being through the combined action of human and non-human agencies’ (Ingold 2000:155).³ Wayfinding represents a skilled performance of tasks, which are continually adjusted to the changing environment in response to an ongoing perceptual monitoring of the surroundings, as exemplified by moving about in it (Ingold 2000: 220-230; Pedersen 2009:146-148). Continuously moving through the environment, the Kounta develop their capacity to find their way and estimate the potentiality of different areas (Ingold 2000:230). Their dwelling is contingent upon individual and collective choices motivated by an evaluation of constraints and incentives (Barth 1966:1) first and foremost related to water and pastures for their animals. The Kounta’s perceptions of the environment are mediated through the performance of tasks related to mobile livestock rearing which forms the primary means of subsistence (Bonte & Guillaume 1998:219; De Bruijn & Van Dijk 1995:14-20).⁴ In Ingold’s terminology, the nomadic landscape as a whole can be understood as the taskscape in its embodied form (see also Pedersen 2009).

Through the performance of the daily tasks related to mobile livestock rearing, the nomads follow customary paths, which transport them between different points or places defined by their potential

3. See also de Certeau (1984:102) for investigations of movement through landscapes and cityscapes.

4. The etymological meaning of the term nomadic pastoralist is to be found in a juxtaposition of the Greek word *nomás* (pasturing flocks), akin to *némein* (to pasture) and the Latin word *pastor* (shepherd), indicating the paramount importance of livestock to the nomadic pastoralist livelihood.

for supporting the animals. In the nomad_scape of the Kounta, points and trajectories cannot be separated from each other. They are interrelated parts of the total landscape. I do not find that the one has primacy over the other, as do Deleuze and Guattari (see Deleuze & Guattari 1986:50). What is important to notice is that points are *not* fixed or static. They are rather part of the moving space, or landscape, of the mobile Kounta. At the core of this nomad_scape are the constant, interrelated movements of the primary elements in it: people, animals, water, pastures, and landscape.

The Kounta of Hodh Ech Chargui: Mobility and topography

The Kounta is one of the larger nomadic tribes in Mauritania, spread over a vast area encompassing the Tagânt, Hodh Ech Gharbi and Hodh Ech Chargui regions of central and south-eastern Mauritania. They practice varied forms of livestock rearing, from fully nomadic to semi-nomadic. Relatively few of the Kounta inhabiting these regions have become fully sedentarized. The empirical object of this chapter is groups of fully and semi-nomadic pastoralists living in the extreme south-eastern part of Hodh Ech Chargui.⁵

Hodh Ech Chargui is a remote region in the Islamic Republic of Mauritania, situated in the south-eastern part of the country.⁶ It is mainly composed of desert and dispersed areas of arid and semi-arid bush steppe or savannah. The region is sparsely populated with only a few city structures in the far south of the region, along the trans-national bitumen road which facilitates the transportation of goods between Mauritania and neighbouring Mali. Extreme climatic con-

5. See illustration page 183.

6. Following Hastrup, I qualify remoteness as not just geographical but also conceptual in the sense that 'remoteness' is 'a specific quality attributed to a social space from outside; while from the internal standpoint people have their own (counter-) specification of local reality as the centre of the world' (Hastrup 1998: 186). Here, remote is understood in terms of Hodh Ech Chargui's distance from the capital of Nouakchott, both geographically and in terms of distance from the sedentary nation-state ideology.



ditions, limited rain-fall, and poor soil and vegetation render the environment poorly suited for agricultural cultivation. From an ecological viewpoint it can be distinguished as a ‘non-equilibrium’ or ‘disequilibrium’ environment (Niamir-Fuller & Turner 1999; Raynaut et al. 1997), characterized by extreme seasonal variations in the availability and locality of natural resources such as pastures and water. The notion of disequilibrium stipulates that we are better suited to understand the nature of such areas by accepting that they are dynamic, influenced by change and fluidity, rather than by pre-

dictable variation. As exemplified by the abovementioned case story, the area inhabited by the Kounta is governed by a particularly dynamic topography in the sense that landmarks continually change positions and structure with time. Large sand dunes move, areas that were once fertile become dry and vice versa, wells dry out and new wells are constructed. It all depends on the climate, which varies tremendously.

Hodh Ech Chargui was seriously affected by the large-scale droughts which swept the entire Sahel region during 1968-1973 and 1982-1985.⁷ I understand these droughts as particularly disruptive moments, being the extreme manifestation of the aforementioned disequilibrium environment. Droughts radically reconfigure the environment in terms of availability of pastures and water, forcing the nomads to apply ever more flexible livelihood strategies in order to survive. In Hodh Ech Chargui, these strategies are integrated in a social organization based on flexible mobile livestock rearing,⁸ i.e. a form of nomadic dwelling, in which animals are the fundamental medium of production and reproduction. The character of pastoral migrations of the different groups varies considerably, even within areas within the regions. Regularity and stability vary; cycles (inter-seasonal and in-season pastoral migrations) vary; distance varies; directionality varies, and economic priorities vary. Most often the migrations are elliptical or radial-circular, and insofar as it is possible, the Kounta strive to migrate according to pre-existing migration patterns developed over time.

The following statement by Alrouna, an elderly nomad I interviewed regarding communal land use, illustrates a particular notion of boundless space (Pedersen 2003), while at the same time pointing to a high degree of solidarity and communality within the nomadic pastoralist community:

7. The Sahel is the denomination of an ecological /climatic belt stretching west-east across the African continent immediately south of the Sahara desert – one of the most ecologically unpredictable areas of the world (Raynaut et al, 1997).

8. Mobile livestock rearing is the most common form of pastoralism in the dryland areas of Africa, the Middle East and Central Asia (Pedersen 1994; Scoones 1995).

There are no boundaries here – we can move wherever we want, camp wherever we want, let the animals graze where we want, and get water from the wells we want. Here, in the *badyya*, we share the resources. Everything depends on solidarity (*assabiyya*).

The fact that Alrouna experiences the territory or space as boundless does not mean, as his evocation of the notion of solidarity indicates, that there are no rules regarding access to resources. On the contrary, it is exactly because Hodh Ech Chargui represents a communal territory governed by a large conglomeration of Kounta fractions (*fahd*) that resources are accessible to everybody. Other tribes (*qabila*) are not permitted to appropriate resources in this territory without prior arrangements with the overall head of the Kounta in the region. Similar models of communal land-use are predominant among nomadic pastoralists all over the Sahel region (Bourgeot et al. 1999; de Bruijn & Van Dijk 1995; Thébaud 2002:221-235).⁹ Whereas semi-arid territories often are subject to intense conflict between various nomadic groups and agriculturalists, Hodh Ech Chargui is considerably more homogeneous.¹⁰ Negotiations take place on a communal level and there is a wide appreciation of how the space used by the various segmentary elements of the larger conglomerate is governed by fluidity and overlapping social fields.

In this sense, this mode of human territoriality appears democratic and well adapted to the changing nature of the nomadic landscape, in that it optimizes access to key points in the form of temporarily or permanently localized resources (pastures and wells), so as to satisfy survival, while at the same time minimalizing the probability of conflicts over those resources (Mearns 1993:73; Niamir-Fuller 1999:277). The communal system is largely dependent on flexibility and strategic mobility in large collectively managed areas (Galaty & Bonte 1991:13; Mearns 1993:74).

9. See also Galaty & Johnson (1990) and Niamir-Fuller & Turner (1999:22) for an elaboration on this form of land-use.

10. Hodh Ech Chargui is exceptionally dry and unpredictable in terms of rainfall, even compared to the Sahel region, which is among the most difficult climates for people to survive in (Raynaud et al. 1997).

The Kounta tribe (*qabila*) is organized in terms of segmentary lineages, which permits the maintenance of the autonomy of the families (*haïma*),¹¹ who control the herds, while at the same time ensuring their integration into a larger community structure which guards the rights of access of each of the families to collectively utilized resources. The tribe (*qaliba*) designates a large agnatic group which represents the overall economic and institutional frame, guaranteeing the allocation of rights in the form of distribution of pastures and access to watering points in the overall territory (Bonte 1979:204-7; Marchesin 1992:32). We might, for analytical purposes, conceive of the social organization of the Kounta as a concentric circle with the individual and his *haïma* in the centre, and the rest of society ordered in a progressive distance from the centre.

To understand the life worlds and the dynamics of the topographic engagement of the nomadic pastoralists, I divided my time among the Hodh Ech Chargui equally between two main activities: walking with the herders and time spent in the camp.

The long periods spent with the herders when moving further away from camp, tracking for pastures (Niamir-Fuller & Turner 1999) and mapping the movements (Ingold 2000) gave me an understanding of the topography of the space they inhabit and their experience of it (Hirsch & O'Hanlon 1995).¹² In the process of 'topological appropriation' (Tilley 1994:28) I was inspired by de Certeau's image of walking as a constitutive and creative activity of producing meaningful 'places' in the environment rather than merely inscribing physical paths on the landscape (de Certeau 1984: xiii-xiv). This approach, foregrounding the individual and his emplacement in the world, has been further developed as a methodological approach by Gray (2003) and Lee and Ingold (2006), among others. Together these topological methodologies provide an understanding of how 'movement through space constructs "spatial

11. The word *cima* designates both family and tent, i.e. refers to those who live in the same tent.

12. Here, the main references were de Bruijn & Van Dijk (1995); Deleuze & Guattari (1980); Gray (2003); Hastrup (1996); Ingold (2000); Jackson (1996); and Pedersen (2003, 2009).

stories”, forms of narrative understanding.’ (Tilley 1994:28). The long days of endless walking with the herders provided fundamental empirical data to support my later analysis of the constitutive elements of the nomadic livelihood and their intimate connectivity – mobility, wayfinding (Ingold 2000) and livestock rearing (de Bruijn & Van Dijk 1995; Thébaud 2002). In essence, understanding this nomadic ‘taskscape’ (Ingold 2000), which I call ‘nomad_scape’, provided me with clues as to how the nomads perceive and interact with their surroundings.

Mobile dwelling: Dispersal as a means of adaptation

Following Hastrup I believe that ‘The life world of people is established in practice’ (Hastrup 1998:66), and that ‘...most of its defining parameters are invisible and exist only in action’ (ibid.: 88). This understanding is reflected in what Ingold, inspired by Heidegger (1971), has termed ‘the dwelling perspective’, which ‘...explores the implications of the position that awareness and activity are rooted in the engagement between persons and environment for our understanding of perception and cognition, architecture and the built environment, local and global conceptions of environmental change, landscape and temporality, mapping and wayfinding, and the differentiation of the senses’ (Ingold 2000:5).

Dwelling is akin to the notion of livelihood as it is essentially about how human beings relate to their environments while making a living that does not set up a polarity between the subject and his or her environment (Ingold 2000:5). In this sense, it is closely related to the concept of resilience. According to Ingold, the individual perceives the world through the process of ‘enskillment’ (Ingold 2000:22). Skills are defined as ‘...the embodiment of capacities of awareness and response by environmentally situated agents’ (Ingold 2000:5), and when acted out, they become ‘tasks’, defined as ‘any practical operation carried out by a skilled agent in an environment, as part of his or her normal business of life. The environment is made sense of through the performance of tasks, most often social, which in their total ensemble are referred to as taskscapes’ (Ingold 2000: 195). It follows from this that, ‘...the landscape as a whole must be

understood as the taskscape in its embodied form: a pattern of activities ‘collapsed’ into an array of features’ (Ingold 2000:198). This is what de Certeau means when he argues that ‘space is a practiced place’ (de Certeau 1984:117), where historically and culturally situated people create a locality of familiar heres and theres in the same way as speakers act out language systems in the creation of vernacular meanings (Gray 2003:224). My prime interest is analyzing what dwelling entails for nomads, given their mobility through a landscape practically devoid of fixed landmarks.



The camp provides a temporarily fixed recreational place, from which wanderings are performed up to the point when pastures are too far from camp to ensure adequate time for grazing, due to the time spent reaching them and returning back within the day. The individual herders of the camp move in radiant elliptic circles from the centre towards the margin and back again. The walking typically starts around one hour before sunrise and continues until sunset. Herders alternate between taking the animals to the pasture, and taking them to drink at water-points, depending on the distance to the well. Furthermore, to minimize the risk of losing their means of subsistence in the case of severe droughts, the Kounta diversify their

herds, so as to be able to exploit different forms of pastures dispersed over a wide area.¹³

Once the immediate area around the camp has been grazed, the Kounta pack their belongings and mobile homes (tents), and move to an area in which they continue this strategy. Depending on the season, the quality of the pastures, the availability of water, as well as the size of the herds of the different households, the Kounta move camp anywhere between every three weeks and every two months, often splitting up in to smaller groups or merging with larger groups depending on their needs. This changes continually, from season to season and from year to year. This, however, only represents a minor eccentric pattern within the total nomad_scape of the Kounta. The different *āial* live in close proximity with each other, sharing the same water points and to a certain extent pastures. This means that the herders of different conglomerations of families often meet each other, either while grazing the animals or giving them water at the communally accessible wells and watering points.

In order to understand the nomad_scape of the Kounta it is important to first of all keep in mind that a host of mobilities are, so too speak, operational at any given time. Individual actors, families, groups of families, and entire factions of Kounta nomads traverse the landscape in a dense network of predominantly circular trajectories, centred around a temporary centre in the form of their camps. Analytically speaking, these movements are not just horizontal or geographical, but also vertical or social, in the sense that individuals and groups of different status interact in the process of their hori-

13. This corresponds well with André Leroi-Gourhan (1964), who opposed the concentric representations of space, which he attributed to the sedentary societies, with the radiant representations of space practised by the nomads. The former is organized from near to far (from centre to periphery), whereas the latter its organised by trajectories, points of confluence and dispersion (Leroi-Gourhan 1964). Leroi-Gourhan's vivid juxtaposition of confluence and dispersion translates well to my analysis of the nomad_scape of the Kounta. From the camp, which in itself represents a temporary place, the trajectories of the herders radiate out into the nomadic landscape, guided by a pragmatic desire to fulfil the basic need of ensuring pastures and water for the animals. Through this process, animals and people are dispersed in the landscape in dynamic, ever-changing constellations.

zontal or geographic movements. While beyond the scope of this paper, the political dimension of mobility and access to resources is constantly present in the lives of the Kounta, as manifested in their complex networks of alliances, which penetrate and order this existential mobility.

Through their dwelling, the Kounta continually develop their notions of this dynamic environment, through their active engagement in mobile livestock rearing strategies. Their movement is primarily informed by perceptions of where there is pasture and water for their animals. Depending on the nature of the climate in a given season or year, some areas become more interesting than others. As I have argued, the area inhabited by the Kounta is far from stable in terms of climate. Survival depends on flexibility, foresight and mastering demanding skills such as wayfinding in a world where the navigational fix-points are continually changing. Furthermore, commandment of the environment is largely contingent upon memories, meetings and rumours. When moving they meet others who, like them, are moving in a landscape or space which itself is moving.

In this sense, my empirical observations support the notion that the space occupied by nomads is a rhizomatic and dynamic space, which is neither localized nor delimited. It is a space, which is tem-



porary and shifts location according to for example rain and wind (Deleuze & Guattari 1981:474).¹⁴

The nomad_scape: Some concluding remarks on wayfinding as adaptation

As we have seen for the Kounta, and as suggested by Deleuze and Guattari in their essay on nomadology (1980), the nomads dwell in trajectories or itineraries, as much as in territories. These nomadic trajectories do not parcel out a closed space to people, assigning each person a share and regulating the communication between shares. The nomadic trajectories do the opposite, they distribute people (or animals) in open space, that is indefinite and non-communicating (Deleuze & Guattari 1980:471-472).¹⁵

For the Kounta, I argue, the nomad_scape consists of a network of changing focal points from which radiant elliptical mobility patterns disperse the animals within circular areas, which are connected by a multitude of trajectories. Translated into social terminology, the Kounta carry out a way of life in a nomadic landscape consisting of overlapping social and spatial domains, where they belong and feel at home (Gray 2003:231; Ingold 2000:54; Pedersen 2009). This inherent radiant quality of the nomadic space illustrates Heidegger's and Ingold's concept of dwelling, and it also correlates with the implicitly segmentary social system of the Kounta. Through livestock rearing, space is transformed into meaningful places as the Kounta move about in the landscape.

The Kounta continually create places connected by paths or trajectories (Pedersen 2009; Tuan 1977:182) in what Miller, following Leroi-Gurhan among others, has termed *adaptive radiation* (Miller 1965:371) in which '...systems may spread out, searching for space, food, raw materials, or new experience and so encounter other sys-

14. This is what Raynaut et al (1997) and Niamir-Fuller (1999) labelled 'non-equilibrium' or 'disequilibrium' environments with an ecological term.

15. Here we see a reference to the etymological root of the word nomad, nem, or nemein, which refers to a distribution or scattering of animals in open space (Webster's Unabridged Dictionary).

tems or environments they had not experienced before, to which they must make adjustments.’ (Pryor 1975:35). In this sense landscapes are turned into places by human action (Hirsch 1995), and specific places are notionally extracted out of undifferentiated space by becoming imbued with particular meaning by, and for, human sociality and identity (Sack 1986:6).

To recapitulate, for the Kounta place is an organized world of meaning (Tuan 1977:179), or a centre of ‘...human significance and emotional attachment’ (Tilley 1994:15), largely catalysed by movement through a space which is itself in movement: ‘...in dwelling in the world, we do not act upon it, or do things to it; rather we move along with it. Our actions do not transform the world, they are part and parcel of the world’s transforming itself’ (Ingold 2000: 200).

In his study of the Duxa nomads of northern Mongolia, Pedersen (2009) suggests that they operate with a notion of *void* space, which is unqualified and used to pasture the animals. This is in marked contrast to my observations in Hodh Ech Chargui, where places are most often designated by exactly the use of the animals. An important point to make in this discussion is the fact that while the Duxa are heavily informed by their belief in spiritual features of the landscape, the Kounta are not so. In this sense, they are more pragmatic than the Duxa. The Kounta certainly perceive of their surroundings as harbouring underlying, non-visual, potentialities, but these potentialities are understood with reference to pastures and water, not spirits (cf. Hirsch 1995). With reference to the etymological meaning of nomadic pastoralism, there seems to be an inherent contradiction in nomads letting their animals graze in *void* or *unqualified* spaces. One would think it makes sense for the nomad to consider the space used for grazing to be particularly qualified, as is the case of the Kounta, and as exemplified in Mahmoud’s distinction of the place we were looking for as ‘*good badyya*’.

In Mauritania, the word commonly used for open space, designating that which is beyond cities, is *badyya*.¹⁶ The *badyya* is the space

16. The *badyya* thus represents the contrast to what Deleuze and Guattari terms striated space or sedentary space.

inhabited by the nomads. Contrary to the Duxa, the nomadic people of Hodh Ech Chargui, do not operate with the notion of 'void' space in their everyday life. Only a small proportion of nomadic pastoralists ever traverse *void* or empty space.¹⁷ Rather, they navigate within spaces conceived of as pure potentiality (Hastrup 1998; Hirsch 1995) in terms of points or centres defined by their qualities as pastures or watering points.

The Kounta construe places through pausing in their movements. When the potentiality of a particular area becomes evident in terms of satisfying particular biological needs of animals and people, the Kounta pause. A locality then becomes a centre of felt value. It becomes a place imbued with value experienced through the act of pausing in space and time (Tuan 1977:138). When Mahmoud and Ishmael pause to make tea at the spot they have designated as a suitable area for the animals, they produce (or reproduce) a place. The pause reinforces the potentiality of the space and makes it possible for them to remember that particular locality easier next time. They make place out of space.

The ability to understand the inherent potentiality of the landscape becomes even more important during severe droughts. In order to adapt, the Kounta activate not only their internal network of memories and knowledge of the environment, but also their social networks. Often, droughts engender diversions from the mobility patterns and conglomeration of people and animals in areas with water and pasture. This calls for negotiations between the different users of the same scarce resources. For the Kounta, the permanent wells outside the oasis of Oualata are natural abodes. The mass arrival of people and animals to the outskirts of this small oasis during severe drought requires intense negotiation, not only between the sedentary oasis dwellers, but also between nomads. Water is scarce, and systems of controlled access must be adhered to so as to satisfy the needs of all local actors. In the case of prolonged droughts, it is not unusual that a more distant network is activated, permitting

17. The void exists beyond the open space, and only salt caravans and trading nomads transgress the *badyya* into the Sahara.

members of nomadic pastoral families to take up residence in areas outside the Kounta heartland for longer periods of time. Similarly, in times of prolonged drought, herders increasingly make use of alternate trajectories enabling them to access pastures outside drought-struck areas.

To recapitulate, resilience in the case of the Kounta is dependent on flexibility, diversification and intense negotiation of rights to access to resources. Although not a focus of this chapter, permanent settlement of parts of the family in urban areas is likewise a common long-term strategy employed by the Kounta. The continued maintenance of mobile livestock rearing as practised by the Kounta in Hodh Ech Chargui depends on their continued application of flexible strategies, which permit them to adapt their movements to the changing features of the landscape. Today, GPS and other technological solutions are slowly becoming part of these strategies, as is the intensification of networks with sedentary members of the Kounta.

In this chapter I have described and analyzed aspects of wayfinding as an integral part of resilience in the case of the Kounta. My argument is that wayfinding cannot be isolated from other practices of engagement such as mobility, livestock rearing, negotiation, social networks, and indeed kinship. Resilience in this particular case is a complex whole of interrelated features and practices. While not pretending to have discussed the total complex of resilience in drought-ridden areas, I have tried to account for some of the central elements in Kounta's spatial practices that enable them to live and navigate in a drought-prone landscape.

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CHAPTER 10

Andean Meltdown: Comments on the 'Declaration of Recuay'

Mattias Borg Rasmussen

Abstract

This chapter examines the impact of global climate change in the Peruvian Andes by addressing the issues posed by the Declaration of Recuay in 2008. It is a document signed by communities residing in the Ancash highlands, who are beginning to feel the dire effects of global warming on their livelihood. By examining the main points of the Declaration of Recuay, this chapter shows how the local effect global climate change is integrated into a broader framework of rural resistance, attacking the neo-liberal politics of the government and its general negligence of the rural highlands. By putting the Declaration of Recuay into hydrological, socio-political, and geo-cosmological context, it argues that in order to investigate the social responses to climate change, it is necessary to focus on resilience at different scales, and on how different levels of socio-political organization relate to each other.

In July 2008, Lima based newspaper *Peru21* reported serious problems in the Ancash peasant community of Catac in the Peruvian highlands due to the melting of the glaciers and the subsequent lack of water in the community. According to the person interviewed, American geographer Jeffrey Bury, the Yanamarey glacier had by then retreated so much that serious water scarcity in the community was imminent. This was by no means the first account on irregular climate events by the media in Lima, itself highly vulnerable to cli-

mate change due to its position on the arid Pacific coast, and once more, the urban *Limeños* were reminded that the emblematic, snow capped peaks of the Andean highland were in danger of disappearing. In this case, as often before, it was the marginalized rural poor who were the first to be affected by the consequences of climate change originating elsewhere.

Climate change is generating instability, social insecurity, and conflict throughout the world. As a result, global warming has become an important security issue on the political agenda in the Global North that is concerned about the current overexploitation of such natural resources as oil, timber, and minerals. However, to many people in the Global South the global climate change results in the lack of a resource of far more vital importance: Water (Whiteford & Whiteford 2005). As in the case of Catac, the current climate change has severe consequences for populations inhabiting mountain regions that rely on melt water from glaciers and permanent ice layers, not only for drinking and washing in the household, but also for agricultural irrigation and other purposes (Orlove et al. 2008a).

In May 2008, representatives from the surrounding communities had gathered in the provincial capital Recuay in the high Andes of Ancash, just some 10 kilometres north of Catac. The result of this meeting was a short five-page document, the 'Declaration of Recuay', addressing the issue of global warming in the region and the vulnerability of the communities, and fiercely attacking the neo-liberal politics of the national government. The government was blamed for their part in the global warming that is now beginning to show its dire effects in the Andes, and for its lack of appropriate action regarding the suffering communities of the highlands (cf. Carey 2005, 2008). The problem is not limited to that of water scarcity in itself, but also to the increasing demographic pressure on the land and water resources (cf. Beniston 2003: 14). The Peruvian Andes is a virtual hotspot for the effects of global warming, as put clearly by geoscientists Bradley et al.: 'It is in the tropical Andes that climate change, glaciers, water resources, and a dense (largely poor) population meet in a critical nexus' (2006: 1756). In this short chapter I will address the issues posed by the Declaration of Recuay, and discuss how to handle ethnographically the intra- and inter-

community experience of global climate change and the theoretical challenge of identifying and measuring the scales of resilience posed by it.

Scales of resilience: a segmentary model

Understanding the complex relation between nature and society in the context of current climate change requires analytical concepts that capture not only how the physical environment changes, but also how social and political institutions respond to these changes. In the growing body of literature on natural disasters and environmental crisis, the concept of resilience is often used to describe the dialectic interaction between nature and society (Norris et al. 2008). Resilience is closely related to stability (Holling 1973), as it denotes the ability of a given system to return to equilibrium after a disturbance, and thus a community's adaptive capacity (Tompkins & Adger 2004; Folke 2004). It resembles Bateson's definition of flexibility (1972: 497) in that resilience can be described as *a process of ongoing adaptation to change generated by both natural and social forces* rather than the ability to overcome a single natural disaster by restoring a former state of equilibrium. The theoretical challenge is to grasp how climate change as an infinite event is encapsulated and absorbed locally. Resilience, then, is a process and not an outcome, insofar as it describes momentary social dynamics and interactions that relate to the potentialities of the future, the state of the present, and the disruptive events of the past.

As shown in numerous studies on irrigation in the Andes (e.g. Gelles 2000; Trawick 2006; Pærregaard 1994), water and water management is closely linked to power relations, both within the communities, between the communities, and between the communities and other agents such as the grand haciendas, the mining corporations, and ultimately the Peruvian state. This linkage between water and power, which is clearly reflected in the Declaration of Recuay, reveals that it is important to focus on different scales of resilience. In order to identify the resilient units it might be fruitful to look at Evans-Pritchard's classic description of the Nuer (1940) and his much cited concept of a system of segmentary oppositions. In a seg-

mentary system any socio-political group, any segment, exists only in relation to another segment on the same scale. In an Andean context this implies that two households combined is a community, two communities united form a district, all communities are Quechua, Quechua and Aymara are indigenous and so forth. The solidarity, writes Evans-Pritchard, is more pronounced the closer you get to the centre of these concentric circles, and conflict with others is an important engine of social and political integration on different scales. A conflict with a neighbouring community brings the households of the community close together; a conflict between the communities and, for example, the mine brings the communities closer together. By looking at resilience as a socio-political process, and bearing the insights of Evans-Pritchard in mind, it is possible to look at how the social and political institutions at different levels, for instance the head of household, the water manager, the district mayor etc, react in the situation of a conflict, and how actors of different segmentary scales relate themselves not only to the segment at play, but also to segments of greater or smaller scale. When studying the impact of global warming on Andean society, the question is which role it is ascribed in the articulation of local conflict, and where the disruptive events are placed in the narrative structure of global climate change. An enlightening example of how climate change is integrated into the local power structures and struggles is the Declaration of Recuay.

The Declaration of Recuay: addressing colonial mentality

The Declaration of Recuay, signed during the *II Encuentro 2008 de Comunidades Campesinas de la Provincia de Recuay*¹ by a number of peasant communities, hamlets, and peasant groups (28 in total), addresses the issues of national government behaviour in the rural areas before 'Ancash, Peru, and the World'. It begins by stating that globalization and the neoliberal model is designed purely for the extraction of the natural resources of Ancash, where the government's role is

1. The 2nd 2008 Meeting of Peasant Communities from the Province of Recuay

to provide all the facilities to the multinational companies. Mining concessions are being granted indiscriminately, as if ‘the holy headwaters of the Rio Santa Valley (...) were a waste dump for mining residues’. It continues by criticizing infrastructural planning, stating that road projects and the like are being initiated without consulting or paying attention to the local communities and their needs, solely to comply with the requirements of the transnational companies operating in the region. The last main point is the supposed attempt by the government to neutralize the law of peasant communities (Law N° 24656) by way of new decrees, introducing the concept of ‘abandoned lands’, which is hardly compatible with the fallowing cycle system of the Andes and the Amazonian lowlands. According to the authors, this is a reflection of the ‘colonial mentality’ of the national government that secures the continued existence of the ‘golden centralist bureaucracy’, in which politicians and their staff seek only to enhance their own wealth at the cost of the poor marginalized peasant communities. Before posing a number of demands, the Declaration of Recuay reaches a lyrical crescendo in a passage, which is worth citing at length:

To the government, and to those who today decide the destiny of our *patria*, with the authority of being heirs of the wise and insuperable Andean culture, we are warning them: The neo-liberal destruction of the Andean Sierra and the Amazon, will rapidly rise the global temperature from the 0.7 degrees C to the terrifying 2 degrees C of the global apocalypse. Therefore, our peasant and native struggle is literally and precisely for our survival, and the survival of the entire humanity. And that is an inalienable destiny (Declaration of Recuay, p. 2).

The main text is followed by eight demands concerning the points mentioned, and the declaration is concluded by a 12-point list of agreements on future action to be taken by the communities themselves, including social mobilization in order to confront the challenges of the region by planning a national strike, strengthen the local and regional defence fronts, and call for a new meeting of the peasant communities of Recuay in order to secure the continued struggle.

The authors of the declaration highlight three intertwined points that are affecting the region: the corruption of the state bureaucracy, the neoliberal model, and global warming. The latter is presented as the ultimate threat to not only the peasants of the region per se, but humanity as such, and, more importantly, conceived as a direct result of government policies, i.e. the former two points. In other words, in order to reverse or slow down global climate change, drastic measures within the national administration and international order is required.

The Rio Santa watershed: the lay of the land

The Declaration was formulated in the provincial capital of Recuay. At 3400 meters above sea level Recuay and its 4500 inhabitants are placed in between the Cordillera Negra to the west and the Cordillera Blanca to the east. The Rio Santa flows at the bottom of the narrow valley between the two ranges, and is the main watershed, i.e. drainage basin or catchment, of the highland area known as Callejón de Huaylas. It means the Alley of Huaylas, and has taken its name from a small, but emblematic Quechua community situated in the northern end of the valley (see Doughty 1968). The river, which is the largest and one of the most important westward rivers in Peru, originates in the Conococha Lake to the south of Recuay, and receives a substantial amount of water from the many tributaries, mainly from the Cordillera Blanca. A large amount of the stream discharge stems from glacier runoff from the Cordillera Blanca, and as the glaciers continue to melt the river is also likely to diminish (Coudrain et al. 2005: 931). It runs north through the regional capital of Huaraz (approx. 60.000 inhabitants) some 25 kilometres downstream from Recuay. Around Huaylas it turns to the west, entering the deep Cañon del Pato, where a huge hydroelectric plant, *La Central Hidroeléctrica de Cañón del Pato*, is situated close to the community Huallanca, some 1800 metres above sea level. The plant demarcates the upper Rio Santa watershed, the Callejón de Huaylas, an area of approximately 4900 km² (Mark et al. 2005: 977). From there on it descends rapidly towards the narrow, dry coastal line and reaches the Pacific just north of industrial boomtown Chimbote.

The communities of the Callejón de Huaylas are mainly placed at the bottom of the valley on the brink of the Rio Santa. Recuay, being district and provincial capital, still relies largely on agriculture, as does the neighbouring peasant communities such as Catac and Olleros. Like pearls on a string the communities, small towns and Huaraz itself are placed on a south-north axis along the Rio Santa with rather limited distances in between them. The community territories stretch along an east-west axis on either side of the river, in the case of Catac reaching altitudes up till 5000 metres above sea level (CEDEP 1986: 65).

The Andes features a dramatic continental divide; to the east lays the lush, humid Amazon basin, and to the west one of most arid deserts of the world (Vuille et al. 2003: 78). It is a rather dry mountain range, especially the deserted western slopes, and in the dry season, glacial meltwater from the Cordillera Blanca constitutes the main river flow (Coudrain et al. 2005: 930). The high Andean mountain range effectively blocks the clouds, both coming in from the Atlantic Ocean to the far east and those forming over the Amazon basin close by, meaning that the clouds discharge their precipitation when reaching the Eastern slopes of the Andes. As an effect of this, 98% of Peru's available water is located in the Amazon basin east of the Andes, while it is the Pacific coast that constitutes the demographically and economically most important region. However, being a desert, the coast is highly dependent of runoff from the high Andes (Vergara et al. 2007: 261), and as much as 80% of the water on the densely populated pacific coast of Peru stems from the highland glaciers. Therefore, the coastal area, which includes the capital city of Lima and a number of important agro-industrial facilities, will be hit hard by the melting glaciers of the highlands.

Recuay and the Callejón de Huaylas are situated west of the Cordillera Blanca, receiving year round glacial melt water which secure their water supply even in the dry season. The Cordillera Negra to the west is lower and dryer, gradually turning into desert as it reaches the coast of the Pacific Ocean. The peaks of the Cordillera Blanca are the highest in the Peruvian Andes, with Nevado Huascarán reaching an altitude of 6768 metres above sea level as its highest point. The highland Quechua peasants are well known for their diversifi-

cation of crops and their domination of a variety of different ecozones each with its characteristic set of flora and fauna.

Anthropologist John Murra (1972) introduced a model of ecological verticality in order to describe the way in which the communities, both as agriculturalist and pastoralists, seek to enhance their probabilities of a successful harvest by exploiting a maximum number of ecological levels. This is in itself a reflection of the ecosystem that they inhabit: Due to the drastic shifts in altitude, mountains are home to a high biodiversity and a number of rare and endemic species of flora and fauna (Beniston 2003: 6). Rising temperatures pushes the flora and fauna upwards, following the ecological zone to which they have adapted. This means that due to the cone shape of the mountains, as the eco zones move upwards, the surface diminishes, and competition between species will tend to increase with a number of possible extinctions as the outcome. Likewise, the rise in temperature, even as modest as it might seem, may lead to an alteration of the crops available for the peasants (cf. Beniston 2003: 16). For the farmers, this vertical ecological displacement could actually be one of the more positive results stemming from the rising temperatures as they potentially could be allowed to grow crops which used to belong to the lower regions of the Andes. This is, however, hypothetical because of the complexities of global warming, and the benefits from a rise in temperature might very well be minimal compared to the problems emerging, especially the issue of water scarcity.

Glacier retreat: communities under threat

Mountain glaciers are highly sensitive to changes in both precipitation and temperature, and they therefore provide some of the clearest and most visible evidence of climatic changes (Beniston 2003: 10). Concerning global warming, Bradley et al. (2006) state that the highest increase in temperatures are predicted to occur in the high mountains of Ecuador, Bolivia, Peru and northern Chile. And they continue: 'If the models are correct, the changes will have important consequences for mountain glaciers and for communities that rely on glacier-fed water supplies' (ibid.: 1755). In their study on 20th cen-

ture climate change in the tropical Andes, geoscientists Vuille et al. (2003) show that since the 1950, temperature has increased by 0.15 degrees C per decade. This includes the variation associated with the El Niño phenomenon,² but also shows that over the last 25 years the warming rate of the Andes has almost tripled (2003: 83). Bradley et al. (2006) put the average estimate to a 0.11 degrees C per decade, but still, compared to the global average of 0.06 degrees C per decade, this is a substantial increase (ibid.: 1755).

The Cordillera Blanca of the Peruvian Andes is the world's highest and most extensively glaciated tropical mountain range, and the glacier runoff contributes a significant percentage of the running water of the region. There has been a general trend of glacier retreat in the Andes in the 20th century, and there is clear evidence that the glacier retreat has accelerated over the last two decades, and data shows that for example the Qori Kalis Glacier, which tops the Cordillera Vilcanota of the Cordillera Oriental in south-eastern Peru, in the period between 1983 and 1991 has been retreating at a rate almost 3 times that of the period between 1963 and 1978. And in the Cordillera Blanca glaciers have lost between 11 and 30% of their mass over the last 40 years (Bury et al. 2008: 332). It is indeed a complex process, and glacier retreat can not only be attributed to increasing temperatures, although evidence suggests that this is the main cause, but also to alterations in precipitation, humidity, wind, and cloud cover (Vuille et al. 2003: 75-6). Projections have been made, indicating that a great portion of the lower-altitude glaciers may completely disappear within the next 10-20 years, such as has already happened with for example the Cotacachi in Ecuador (Vergara et al. 2007: 261, see also Rhoades et al. 2008).

2. El Niño is a recurrent climatic phenomenon associated with elevated temperatures of the otherwise cold Humboldt Current. This leads, among other things, to increased rainfalls on the northern coast of Peru, and an alteration of temperature and precipitation patterns in the Andes. According to the Peruvian meteorological institute, the SENAMHI, 2010 is going to be an El Niño year (Peru21b). This may prove to be an instance of the ethnographical task of distinguishing between immediately disruptive events and the long term, gradual climate change (see also Frida Hastrup, this volume).

Coudrain et al. (2005: 930) note that in spite of a virtually unchanged precipitation in the Andes, river runoff has been increasing over the last decades. However, the general increase in water in the rivers of the Cordillera comes at a price: the shrinkage of the 'natural water towers' (Bury et al. 2008: 323), which means that the momentary increase in the rivers are not likely to last long. Glaciers serve as important runoff regulators, and provide water in the dry season. With increased glacier retreat, both the Andean highland and the coast will be affected dramatically (Vergara et al. 2007: 261). While the retreat of glaciers initially leads to an increase in the outflow of the glacial streams, on longer terms it will lead to a partial or complete dry-out of many riverbeds. As glaciers disappear, so does the buffer that secures the Andean highlands with a stable water source, independent of the rainy season (Bury et al. 2008: 332).

In their study of changing melt water contribution to stream discharge, hydrologists Mark et al. (2005) examine the Yanamarey Glacier mentioned in the introduction, which is situated just above Recuay and Catac, and which is the main contributor to the Querococha Lake that continues downhill to the Rio Santa. It is one of the 722 glaciers of the Cordillera Blanca, averaging a size of approximately 1 km², which has been counted by the Glacier Inventory in Peru, and with a size of 1,3 km² it is very much like the majority of glaciers in the region. In recent years it has had an extensive recession (Mark et al. 2005: 977). By subtracting the Querococha discharge from precipitation (and in the process eliminating evaporation and groundwater recharge which is both estimated to be minimal), the scientists are able to reach an estimate of the recession of the Yanamarey Glacier.³ They found that whereas in the period from 1998-1999 glacier melt outflow contributed 35% (+/-10%) of the annual discharge, in the period from 2001 to 2004 it had increased to 58% (+/-10%). This coincides with measurements of the glacier that show 'continuous and dramatic recession over the same period' (Mark et al. 2005:981). This obviously leads to an immediate increase of water in the valley,

3. This is of course a simplification of a rather complicated measuring process which I shall not deal with in details.

but the data also shows that the peak discharge period from the glacier has changed and now coincides with the peak of the wet season (*ibid.*). So, with at least 40% of the Rio Santa discharge deriving from the glaciers of the Cordillera Blanca (*ibid.*: 986), the *comuneros* of Catac, Recuay and the other communities in the valley are likely to experience both periods of excess of water and periods of drought. This means that they will have to find alternative ways of exploiting the soil and managing the water flow.

The increased runoff from the melting glaciers may cause flooding of rivers and the formation of glacial meltwater lakes. Glacial lakes are a direct result of the retreat of the glaciers, leaving unstable pockets of meltwater where the glaciers were previously situated. These are a potential threat to the communities below, as floods caused by continued melting or calving of ice chunks into the lakes do happen from time to time (Coudrain et al. 2005: 931). A similar threat is that of avalanches caused by dislodged glaciers, as happened with the town of Yungay north of Huaraz. In 1970, following a massive earthquake, a single flood and landslide killed as many as 15000 people and left the town buried in mud and residues from the lake above (Carey 2005, 2008; Oliver-Smith 1986). The town is now relocated, but the death toll and the story is a reminder of the forces at play in the high Andean mountains. From 1951, when scientists completed the first inventory of glacial lakes, to 1997, the number of these lakes have risen from 223 to 374 (Carey 2005: 125), increasing to probability of outbursts and avalanches considerably.

Hydropower account for 80% of the total energy production in Peru, but in areas such as the Rio Santa watershed in Ancash, where one of the major hydroelectric plants is situated in the Cañon del Pata, glacier contribution to the watershed is diminishing rapidly with serious problems ahead for the Peruvian power supply⁴ (Vergara et al. 2007: 261). Thus, glacier retreat is not a local problem, af-

4. Based on data from the Peruvian Ministry of Mines and Energy, Vergara et al. estimate that a 50% decrease in glacier runoff from the Cordillera Blanca, which contributes to the Rio Santa, would lead to a decrease in the yearly energy output from the Cañon del Pato hydropower plant from 1540 gigawatt hours to 1250 gigawatt hours (Vergara et al. 2007: 261).

fecting merely local level *comuneros*, although these are those to be hit first. It is a phenomenon that relates to all levels of society, affecting a variety of scales from the single household, the ayllu, community, communities on district level, regional and ultimately to the national and international level. The effects vary, and solutions and responsibilities are found and ascribed in very different ways, as shown by Rhoades et al. (2008).

The overall increasing water scarcity in the Andes is most likely to contribute to an enhancement of already existing and emerging conflicts, as has already been seen in other regions of the world (e.g. Shiva 2002). The task is how to address these different scales of conflict ethnographically. It is important to assess the way that people act and react when put under pressure by their environment, threatening their livelihood. In the case of Yungay, Carey (2008) shows how decisions are made not just as a response to the immediate threat, in this case in the form of glacial lake flooding, but are put into a wider conceptual framework. While analytically we may identify the pressure from the changing hydrological cycle on different socio-political scales in a variety of forms, people live composite lives in which all of these challenges are intertwined. People tend to seek coherence in their everyday lives, and as the glaciers melt, so does a core element of the Quechua cosmology.

Cosmology: the retreat of symbols

As was most clearly demonstrated by the finding of a sacrificed twelve- or thirteen-year-old girl from the time of the Incas at the summit of Mount Ampato, mountain worship, and sacrifice is central to the Andean cosmology. The Incas might have been extreme in their measures, but still today the sacred geography of the Andes attributes agency, authority, and ultimately power to the glaciated mountain peaks (Gelles 2000: 80). Thus, another corollary, much less tangible but of great importance, is the impact upon cosmology that a continued glacier retreat might have (Vergara et al. 2007: 261). The mountain deities, the Apus, are those who secure the wellbeing of the Quechua of the Andean highlands. In the case of Cabanaconde,

in the southern regions of Peru, water originates primarily from Mount Hualca-Hualca. It is associated with the mother's milk, and 'remains the most essential, highly valued, and ritually elaborated natural resource of the community' (Gelles 2000: 79). By way of sacrifice of coca leaves, llama fat, and alcohol, the Quechua communicate with the gods, who in turn secure the necessary water for agriculture and consumption (cf. Pærregaard 1989).

Irrigation rituals likewise hold a central position in the annual cycle of ritual in the Andes. They constitute a powerful medium for transmitting and reproducing beliefs about fertility, disease, power, authority, and ethnic identity and are therefore an important means to secure the continued flow of water (Gelles 2000: 78). Water is thus linked to perceptions of power and authority within the Andean communities, being not only a valuable resource, but also an essential symbol of ethnic identity. In the Andes, irrigation and water management are closely linked to the Pachamama, the Earth Mother, who is the foundation of the Andean worldview. According to this view, the Earth is alive and animated, but requires constant attention in form of worship in order not to upset her. The landscape, the mountain peaks, and the Pachamama are seen as extensions of the social world (*ibid.*: 83), and changes in the landscape require changes in social organization and/or perception. Rhoades et al. (2008) demonstrate how in the case of Cotacachi glacier in Ecuador, even though the ice layer has now disappeared, rendering a dark grey surface where the mountain was once shining white, the people continue to conceive the mountain as being snow covered. However, as Orlove et al. (2008b) highlight, global climate change is always framed culturally, and glacier retreat is likely to affect the cosmological order, and therefore the power relations within the community, as those responsible for the irrigation ritual are no longer able to communicate efficiently with the mountains deities. This means that glaciers are not limited to being chunks of ice on mountaintops, but age-old totems of deep cultural and emotional meaning. In turn, this could mean a subsequent impact on political authority in the communities as the glaciers continue to melt, eroding the very foundation of subsistence in the Andes.

Local economies: the need for diversification

The uses of the Rio Santa are manifold and diversified along the flow: From irrigation and drinking in the small highland communities, through the major city of Huaraz, where the river is also an important means of waste disposal and where it supplies an important part of the energy production at the hydro plant, to its final dispersal as irrigation water on the coast and main source of drinking water for Chimbote's still expanding population. And high above all this, vertically as well as economically, in the middle of the fragile highland ecosystems of the Cordillera Blanca lies the great mine of Antamina, which accounts for the vast majority of income in the region of Ancash and constitutes an important part of the ever growing mining industry upon which Peru's economy depends so heavily.

In terms of infrastructure, Peru continues to be a country designed for extraction-based economy; a grid which was initially laid out by the Spanish. From the early *conquista* to present day, the Peruvian economy has been largely founded on the extraction of raw materials: First to supply the Royal Spanish Court with silver and gold, and after independence different economic booms of e.g. *guano*, rubber, saltpetre to the present day highland mining of cobber, silver and gold, and the large scale timbering of the Amazon (see Contreras & Cueto 2000). From the highland towns and mines roads lead to the harbours on the coast, while the connections between the highland cities are often in a poor state, wherefore travel in the highlands continues to be quite time consuming. This reflection of the ways in which the Peruvian national economy is still structured is to a large extent mirrored by the signing of the Free Trade Agreement (TLC) at the beginning of the new millennium, which was one of the main points of the protest posed in the Declaration of Recuay. As emphasized by geographers Bebbington and Williams (2008), global climate change and the continued expansion of mining in the Peruvian highlands combined are likely to put an enormous amount of pressure on the available water resources. Thereby, the extraction-based economy introduced by the Spanish and its exploitations of natural resources such as water is brought into question. Estimates are that mining uses about 5% of Peru's freshwater, but as in the case

of Antamina and the neighbouring smaller mines closer to Catac and Recuay, they are placed in headwater areas in the high Andes. Its effects on water resources are not merely quantitative, but also qualitative, implying that the pollution of the water extends far beyond the extraction site (*ibid.*: 191), as was also stressed in the Declaration of Recuay.

Furthermore, the Cordillera Blanca and neighbouring Cordillera Huayhuash comprise one of the tourist hotspots of Peru, with a number of trekking routes encircling the white peaks and deep blue glacial lakes. In this area, the above mentioned village of Catac is the starting point of tours to the famous Pastoruri Glacier, which has been declared near extinction a number of times by the Lima based press (e.g. *El Comercio*), but none the less seems to be surviving so far. As highlighted by geographer Jeffrey Bury (2008) in the case of Huayhuash, a growing number of communities depend economically upon the tourist sector. But tourism also contributes to the increased pressure upon both mountain resources as such and on the resources of the local communities in particular (Beniston 2003: 6). And as the glaciers disappear, the peasant economy increasingly dependent on tourism will once more have to be restructured, and as often before the solution is likely to be outward migration towards the coast (see Pærregaard 1997), which, as mentioned, itself is likely to be hit hard by the changing hydrological cycle of the highland. It is therefore important to analyse the re-configurations of the socio-political landscape of the Andes by looking at how institutions at different levels handle the impacts of climate change.

Local-level resilience: tracking the watershed

In the formulation of The Declaration of Recuay the communities of the region united to confront a shared foreign threat, but the question is to which extent the politics of water on one level continue to be compatible with those of another level. As Orlove writes in this volume (chapter 2), because water is always shared among people and among localities, it is inextricably linked to forms of control and power. Focusing on the way the watershed of Rio Santa is shared and contested we may shed light upon the fight for water rights, thus

offering an analytical perspective on how climate change transforms the interactions of local, regional, and national institutions.

In the case of the Ecuadorian Andes, Niels Fock argues 'that it is the partition of water that gives rise to the socio-political segmentation and the existing oppositions' (1981: 407). A map showing how irrigation canals bifurcate simultaneously reveals the power structure of the region, and the spatial and territorial division is therefore closely connected to the watershed. Thus, the binary system of political organization in Cañar resembles the model of segmentary oppositions in that the two localized groupings of the community, who at one point stand in opposition to each other, together stand in analogous opposition to the neighbouring community. On the other hand, the Declaration of Recuay challenges Evans-Pritchard's model of segmentary oppositions in that the communities very actively dissociate themselves from the Peruvian state. Like in Evans-Pritchard's account on the Nuer in Sudan, the (post)colonial order embraces everything in the Andean highlands, and according to Evans-Pritchard it is actually the presence of the colonial administration that enhances the segmentary organization (e.g. 1940: 189). However, contrary to the colonial administration, the Peruvian nation-state is expected to secure the rights and wellbeing of all its citizens, and that is the central issue addressed by the Declaration of Recuay.

In the Declaration of Recuay, the local effects of glacier retreat and global warming are closely associated with the neo-liberal politics of the national government, and are inscribed in a long-term struggle for land and water rights. In the case of the now disappeared glacier on Cotacachi in Ecuador, Rhoades et al. (2008) show how conflict over water arises on different scales among the people below the volcano: From the individual farmers who compete internally over the decreasing resources while basing their claims on outdated flow figures, to problems with state grants of water concessions favouring the economically and politically powerful, and the haciendas' excessive (mis)use of water (ibid.: 223). Conflicts are likely to burst in the densely populated Callejón de Huaylas as well, where communities, mining concessions, townspeople, and *hacendados* all compete for the same fundamental resource.

People employ a variety of strategies in order to cope with the en-

vironmental disruptions. As Carey (2008) demonstrates in the case of Yungay, the place where people live is a historically produced space that implies deep cultural, economic, social, and political meaning. This means that relocating and reorganizing the way of life is no easy task, implicating 'major compromises and significant risks to their livelihoods, connection with ancestors, material well-being, social status, and political power' (ibid.: 229). When trying to understand the resilience of a community at any scale, it is important to consider these risk calculations, and identify exactly what is at stake in any given situation: What is gained and what is lost by any action, collective or individual. As we saw above, cosmology is embedded in everyday life in the Andes, where ritual practices form part of the interactions between people and people, and between people and environment, and thereby acting as an important constituent of authority, power and identity (Gelles 2000). Climate change put the socio-political organization of the Andean communities under severe pressure, as the cosmological and economic basis of their lives continues to retreat further up the steep Andean mountains. The ethnographical challenge is how to identify and measure the impact on the socio-political organization of the Andean highlanders. As demonstrated by putting the Declaration of Recuay into hydrological, socio-political, and geo-cosmological context, a good place to start is to identify the resilient units on different scales, and to scrutinize how these different segments and levels of Peruvian society relate to each other both vertically and horizontally by tracking the watershed.

Conclusion: identifying units of resilience

As it has been shown throughout this chapter, a number of different interests are aligned along the watershed. Warmer climatic conditions will enhance the hydrological cycle of the mountains by reaching higher rates of evaporation and changing precipitation, seasonality and the water storage capacity of the glaciers affecting soil, groundwater and the frequency of drought and flood incidents (Beniston 2003: 7, 10). This may lead to changing patterns in water distribution and management, and it is therefore important to track

the watershed and identify the possible zones of conflict and analyze how this is dealt with by the local communities. In the Declaration of Recuay the communities are united in order to address the issue of water scarcity towards an outer opponent. However, as earlier studies such as Trawick (2006) and Gelles (2000) have shown, conflicts are likely to occur not only between communities but also within one single community. These are the socio-political processes to be tracked in order to identify not only the resilience of a community, but to broaden the perspective to include different the units of resilience on a variety of scales. Likewise, as stressed by Orlove and Caton in this volume, watersheds themselves vary in scale. Thus the Rio Santa contains a number a sub-watersheds, and it is precisely this, as highlighted by the account of Fock (1981), which provides a step-stone for identifying units of resilience in terms of socio-political organization. As a process that describes momentary social dynamics and interactions, resilience highlights questions of disturbance, change, and stability. By focusing on both the intra- and intercommunity experience of global climate change it is possible to explore how these environmental perturbations are handled socially and politically on different institutional levels, and how these relate themselves to each other.

As noted by Orlove et al. (2008b), the people who experience the effects of glacier retreat can do very little about it in their daily lives. The causes of global climate change are on a completely different scale than the effects. Even so, this is an issue that is also reflected in the Declaration of Recuay, where responsibility is placed with the government and its association with multinational corporations. Thus, the inhabitants of the communities are not only existentially threatened directly by increasing temperatures and the mines, but also indirectly by a state incapable or unwilling to act against its immediate economic interests. Global warming is thus integrated into a broader framework of rural resistance, and in the eyes of the signatories to the Declaration, it becomes yet another symptom of the negligence and greediness of the national government.

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CHAPTER II

Resilience, Human Agency and
Climate Change Adaptation
Strategies in the Arctic

Frank Sejersen

Abstract

In the Arctic, indigenous peoples, researchers, and governments are working to develop climate change adaptation strategies due to the rapid changes in sea ice extent, weather conditions, and in the ecosystem in general. These strategies are often based on specific perceptions of vulnerability and work with a number of barriers for resilience. The objective of this chapter is firstly to address the position of institutional barriers in the studies and strategies. Secondly, the chapter analyzes the role human agency is ascribed in proposed strategies and projects in Nunavut and Greenland. With a focus on institutions and human agency, the question is not only ‘how do people manage to adapt?’ but moreover ‘what restrains people from pursuing a given adaptation strategy?’ The chapter introduces the concept of *double agency* which stresses two different aspects of human agency that can be used to understand the political processes taking place in the Arctic: one aspect emphasizes *stakeholder participation* and *integration* while the other aspect emphasizes *rightholder possibilities* and *self-determination*. The focus is thus on how adaptation strategies relate to political and legal processes at different scales and the implications for resilience.

People's possibilities to deal successfully with climate change and to establish viable adaptation strategies including solutions to contemporary and anticipated problems, are, among other things, dependent upon the ability to cross a number of barriers. The Intergovernmental Panel on Climate Change (IPCC) fleshes out these barriers in its publications and addresses the complexity of issues. One of these barriers is the institutional and legal setup but even though equity and the diversity of coping potentials are addressed by IPCC, the structures of critical institutions and the derived allocation of decision-making authority are underplayed by IPCC in its work on resilience. This is striking as political institutions are often crucial for people's abilities to take action and to activate human resources and innovation. The Arctic, the region of focus in this chapter, offers interesting perspectives on the complexities and path dependencies of the institutional and legal setup as well as on potential solutions. Institutional change and reorganization, presently taking place in the Arctic at great speed, may constitute an important tool for Arctic societies to improve their horizon of possibilities and to pursue strategies in line with their visions and capabilities. In the Arctic, indigenous rights, decentralisation, participation, empowerment and self-determination figure very prominently in the rhetoric of Inuit organisations due to the colonial history and relations indigenous peoples have with the states. Their focus is both on how to empower people and on how to identify and evaluate people's vulnerabilities. Seen from an indigenous point of view, the lack of political elbow room and agency may actually make them vulnerable to climate change. In this chapter agency is understood as the potential to seize, create, develop, and pursue opportunities as well as to change, create, negotiate, and develop policy. Improving peoples' agency may improve their possibility to adapt to climate change and to create viable futures for their communities. However, one should not be so naïve as to assume that more agency in the hands of indigenous peoples in itself will lead to more equity and social justice or automatically reinforce sustainability, resilience, and workable climate change adaptation strategies. Conflicting knowledge claims, visions, positions, ideas, and needs within and between communities are indeed part of the indigenous world as everywhere else in the

world. In fact, a conceptualization of an unambiguous relation between indigenous empowerment and improved resilience and adaptation fail to acknowledge the ironical possibility that positive responses to and applications of that very conceptualization may actually result in social and political conflict as well as lack of adaptation.

However, the focus on agency may urge us to change the focus from *how to adapt to* change to *how to create* change when working with climate change adaptation strategies. A focus on agency favours a more complex representation of political processes to widen the scope of contexts in which climate change has to be dealt with. It is futile to attempt to design climate change adaptation strategies without a broader perspective that encompasses the legal and institutional setup. Furthermore, the focus on agency challenges one-sided solutions and simple systemic representations because it provides an analytical platform to approach the dynamic, open, and conflicting nature of social, cultural, and political life. As such, a focus on agency may contest the standard definition of resilience. Resilience is commonly understood as related to a system's ability to maintain stability in times of shock or under stress, either through reaction or by change (Folke 2006: 255). In the words of Holling and Gunderson, the pursuit of resilience supports a 'future that encourages innovative opportunity for people to learn and prosper, that incorporates responsibility to maintain and restore the diversity of nature, and that is based on a just and civil society' (2002: 22). The concept of resilience and its built-in normative content may not, however, be the best all-encompassing analytical tool to navigate humanity in a more sustainable direction when faced with the complexity, openness, and dynamics in systems that are to be made resilient. Especially, with respect to climate change, we face challenges at all scales which need to be approached with more prevailing approaches than those stemming from the theories of resilience and adaptation. The focus on agency may add a dimension to the resilience discussions as it questions the systems and their structures that are to be made resilient, and it opens up for creativity and alternative futures in constant changing systems, which are difficult to demarcate. A focus on agency in climate change adaptation strategies furthermore points

our attention to the temporal aspect of agency employed in any adaptation strategy. The article will show how the temporal aspect may influence the contemporary as well as future possibilities to pursue societal goals.

Vulnerability and victimization

The issue of agency is not ignored by IPCC and policy makers, who clearly acknowledge that the possibilities of people to adapt to climate change are unevenly distributed in the world where aspects such as gender, ethnicity, education, economy, and dependence on particular ecosystems among other things are stipulated as factors affecting people's coping potentials (Bruce et al. 1995; Garcia-Alix 2008; Tauli-Corpuz & Lyngne 2008; United Nations High Commissioner for Human Rights 2009). Research into the vulnerability of people has been pursued parallel with studies into vulnerable regions. The extreme vulnerability of very large sections of the world's population and the need to push for adaptation strategies incorporating and benefitting these marginal groups have become increasingly pressing as contemporary and future mitigation policies cannot neither in the short or long run successfully obviate the challenges and problems of vulnerable groups facing the double exposure of problems related to both climate change and globalization processes (O'Brien & Leichenko 2000; Leichenko & O'Brien 2008). Globally, these groups increasingly demand that the international response to climate change also focus on their adaptation problems and capacity building due to the damaging climate events that will occur (Pielke et al. 2007).

Marginal and vulnerable people are already struggling with existing societal and economic problems and thus their potentials to cope with climate change have to be seen in a larger framework (Nuttall et al. 2005). Therefore, the solutions to reducing their vulnerability are extremely complex and involve issues related to societal transformations only distantly related to what we normally consider relevant and necessary for climate change adaptation. In line with this, the *Working Group II* of IPCC points out that '[r]ecent studies on the implications for adaptation...indicate that such changes may imply

larger policy shifts; for example, towards protection of the most vulnerable' (Klein et al. 2007: 759).

Indigenous peoples worldwide often perceive their position to be marginal at both the national and international scene, and they demand greater influence in decision making with regards to climate change and push for more respect for their self-determination and land rights as essential tools to adapt to climate change (Nilsson 2008). Indigenous peoples experience different kinds and degrees of colonial and post-colonial asymmetrical power relations with state institutions, and for these groups any climate strategy is carried out within these relations – and thus carries political implications. With respect to the climate change discourse, indigenous peoples are often placed in a position as victims (Bravo 2009). However, the current discourse on self-determination emphasizes agency and it is actually changing and challenging the position as victims.

Although the 400.000 indigenous people of the Arctic comprise less than 2 percent of the world's indigenous peoples, their experiences with a rapid changing and destabilized Arctic ecosystem due to climate change and its profound implications for their societies may serve as a case not only for other indigenous peoples but for marginalized and vulnerable groups worldwide. The Arctic as a region is unique with respect to the de-colonization processes that have taken place since the 1960s. In 1971, Alaska Natives got the Alaska Native Claims Settlement Act, in 1975 the Cree and Inuit signed the James Bay and Northern Quebec Agreement, in 1979 Greenland got Home Rule, in 1984 the Inuvialuit signed the Inuvialuit Settlement Agreement, Inuit in Northern Canada established Nunavut in 1999, in 2005 Nunatsiavut was settled in Labrador, and in 2007 the Nunavik government in Northern Québec was established. These are just examples of the many agreements in the Circumpolar North that have been signed since the 1960s. Last year (2008), Greenland and Denmark negotiated a law giving more self-rule to Greenland and opening up for total independence if Greenland so wishes. This law was launched June 2009 on the national day of Greenland and marks a major step in the relationship between Denmark and Greenland. Despite a common point of departure (a widespread wish of more self-determination among indigenous

peoples), these pan-Arctic processes of political devolution are quite diverse and assign different potentials of agency to indigenous peoples. The agreements vary in character from region to region. By using very comprehensive categories, one could characterize the conditions as state capitalism in Greenland, state intervention in Canada and state subventionism in Alaska (Rasmussen 1999: 222). Some agreements work with regional self-government, some with land claims, and others with ethno-political governments (Dahl 1993). Some indigenous peoples (e.g. Inupiat of Northern Alaska) have pursued more autonomy under existing political structures (boroughs). In some regions the political solutions are combinations (e.g. in Nunavut (Canada) where regional self-government is combined with land claim). The complexities and diversities of processes of de-colonization and path-dependencies make indigenous empowerment a very unclear concept but it points to an ambition and a process of increased agency rather than a definite end goal where 'scores are settled' and 'things are set right'.

The extraordinary movement of indigenous empowerment and regional political decentralisation we observe in the Arctic (Dahl 1993) direct our attention to three points: *First*, these political and institutional setups are negotiated and reflect the possibilities, agendas, and contexts existing when they were adopted. *Second*, these agreements and laws are living and changing in order to meet new challenges. *Third*, the institutional setup is an important tool for Arctic peoples to cope with societal challenges (e.g. climate change) themselves. It is therefore crucial to ask the following questions: Do these agreements act as institutional and legal barriers or do they actually provide Arctic peoples with agency to cope successfully with changes in their society? And what kind of agency do they provide?

Vulnerability and institutional barriers

The institutional, legal, and political setup is critical when evaluating vulnerability and improving the adaptation capacity of people, communities, and societies (see e.g. Chapin III et al. 2006; Handmer 1999; Nuttall 2008a,b; Nilsson 2008; Keskitalo 2008; Adger & Kelly 1999; Yohe et al. 2007). It is widely mentioned that the political re-

alities at different scales influence vulnerability. Anisimov et al. for example state that:

[r]esilience and adaptability depend on ecosystem diversity as well as the institutional rules that govern social and economic systems. Innovative co-management of both renewable and non-renewable resources could support adaptive abilities via flexible management regimes while providing opportunities to enhance local economic benefits and ecological and societal resilience...Although Arctic communities in many regions show great resilience and ability to adapt, some responses have been compromised by socio-political change. (2007: 673)

Increasingly, institutional structures are pointed out as barriers: 'New studies carried out since the ... [Third Assessment Report (TAR)] show that adaptive capacity is influenced not only by economic development and technology, but also by social factors such as human capital and governance structures' (Adger et al. 2007: 728; see also *ibid.* 733). In Smit & Pilofosova (2001: 895-897) six features of communities or regions that determine their adaptive capacity are put forward: economic wealth, technology, information and skills, infrastructure, institutions, and equity. However, in the Fourth Assessment Report of IPCC (FAR) political and institutional barriers are not dealt with in detail nor separately in the section (17.4.2) named 'Limits and barriers to adaptation' (Adger et al. 2007: 733-737). Future assessment reports from IPCC may include this aspect more in detail, but an elaboration of the abovementioned features put forward in TAR by Smit & Pilofosova is needed. Presently, the scattered remarks on institutional barriers by IPCC offer very few hints as to what importance institutions have in climate change adaptation strategies and resilience.

Framing the adaptation problem as an institutional one helps to address the political and legal contexts within which adaptation is implemented and discussed. Vulnerability then becomes a problem *of society not for society* (Hewitt 1995, 1997). FAR (Klein et al. 2007) deals to a limited degree with the policy and institutional contexts within which adaptation and mitigation can be implemented and discusses inter-relationships in practice (Klein et al. 2007: 766). The

institutional perspective is relevant as it directs our attention to different arenas and levels where solutions to climate change adaptation can be found. Governance and the distribution of rights and benefits are crucial factors to how adaptation capacity is distributed and activated. The lack of local sufficient political institutions and hindrances to access political frameworks may constitute barriers to institute changes that can support local people's adaptation strategies and ways of doing, being, and knowing (see also Keskitalo 2008). Despite the fact that institutions shape, enforce, constrain, and reduce adaptive capacity and so prefigure adaptive action (Pelling et al. 2008), vulnerability, and adaptation discussions have, according to Keskitalo (2008: 23), for long '...exhibited a rather instrumental and management-oriented view of adaptation in social systems and excluded explicit discussions of power and politics from the process of adaptation, despite acknowledging their importance.' Smit & Wandel (2006: 289) suggest that where political constraints are particularly binding, adaptation may be considered by attempting to change those structures themselves. This is an endeavour which in some cases is *beyond* fixing institutional inefficiencies and weaknesses as well as avoiding institutional instability.

I suggest that political and legal institutional structures should be addressed directly when evaluating adaptation capacity (see also Nilsson 2008: 15). This is particularly important when working with indigenous peoples, as their relationship to the authorities carries a particularly political dimension where the question of *collective rights* to self-determination is of paramount importance. For many indigenous peoples the question of collective land rights (and the right to manage and develop the use of those lands) is a core issue but a political can of worms when addressed to the state.

Double agency

Indigenous peoples are often pointed out as vulnerable with respect to climate change and they are indeed experiencing the double exposure of processes related to both globalization and climate change (O'Brien & Leichenko 2000; Leichenko & O'Brien 2008). Their vulnerability is among other things closely linked to their political and

legal status which limits their agency. Indigenous peoples in the Arctic aspire to activate what I term *double agency*. Both aspects of double agency are important and the question is how to mobilize human resources in order to activate the human potential of creativity so much needed to deal with climate change.

The first aspect of double agency is people's possibilities to influence, add knowledge, experiences, perceptions, anticipations, and perspectives to political processes and decisions; in short to make a difference in climate change adaptation strategies and policies. This aspect emphasizes *stakeholder participation* and *integration* and often involves connecting people between different levels of decision making. Co-management regimes in Canada (Berkes 2001) are good examples of an institutional integrative system where indigenous peoples participate in most aspects of decision making concerning resource management in what they consider their homeland. This aspect of agency is primarily pursued within existing structures.

The second aspect - and for indigenous peoples often a crucial one - is people's possibilities of actively pursuing creative, flexible, and innovative strategies that create change and transform society in directions that lie within a horizon of expectation and possibilities of the group in question. This aspect emphasizes *rightholder possibilities* and *self-determination* and involves expanding the framework of choices and decisions. This entails considering mechanisms to improve peoples' political and legal entitlements and rights to negotiate, create, plan for, seize and pursue opportunities and change be it societal, political, economical, technical, cultural, or institutional. This aspect of agency thus supports the creation of new institutions and structures, among other things. Consequently, it necessitates that the political context and institutional setup are revisited and evaluated in relation to indigenous peoples' rights to land and self-determination. In the Arctic, the contemporary political context but also indigenous peoples' political and legal struggles can be understood by applying both aspects of agency.

By stressing the two aspects of agency our attention is directed to the fact that coping with climate change is not only about improving the *integration* of stakeholders and their knowledge. For indigenous peoples it is in a number of cases also about *removing* legal

barriers and about *creating* enhanced governance opportunities. By doing this indigenous peoples may better carve out their own spaces of hope and vision rather than – as is often the case – be reduced to knowledgeable stakeholders or clients to be integrated in existing programmes and institutional setups. Having agency as an analytical tool it is possible to accentuate potentials, directions, and limitations in political processes, strategies, and actions.

Human agency in relation to a changing environment due to climate change is often seen to be prioritized in comparison with human agency in relation to society (Bertelsen 1996: 67). For Arctic indigenous peoples, as for most of the world's population, adapting to climate change may imply making radical societal changes and reforms. Even though group solidarity and coherence cannot and should not be taken for granted, indigenous peoples want to act as a collective, in order to improve their possibilities as a collective and to deal with disagreements about strategies, priorities, and even the demarcation of the collective in question, which cannot be clearly defined. When indigenous peoples strive to gain a political platform furnishing what I term double agency it implies that they are able to pursue strategies building both on a status as *stakeholders* (participation and integration) and *rightholders* (self-determination). Both aspects of human agency for indigenous peoples spring from a collective categorization and representation often combining indigenous cultural identity with expansionist colonial histories. Group legitimization and justification thus assumes vital importance and climate change adaptation strategies are in some way tangled up in politics of identity. In fact the politics of identity may inhibit strategies reflecting the diversity within indigenous communities. This will be shown later in this chapter where politics of identity place local people in a position as Inuit hunters because it fits the general discourse.

Participation and integration of indigenous peoples within existing and improved institutional structures is an important platform for agency when formulating climate change adaptation strategies and I term it the first aspect of double agency. The second aspect of double agency is people's possibilities of actively pursuing new, flexible, and innovative strategies and to activate the human resources

that are needed in order to navigate towards a horizon of expectation and possibilities. There has been much focus on the first aspect in IPCC but very little on the second one.

Human agency is, according to Emirbayer & Mische (1998), a temporally embedded process of social engagement that may orient itself in different ways towards the past, the future, and the present. The temporal dimensions of agency have implications for how societal problems are approached and how solutions are designed. According to the authors some actors approach projects and realize them on the basis of habitual and selective reactivation of past patterns of thought and action as routinely incorporated in practical activity, where stability and order are emphasized (the iterational element) (ibid. 971). Other actors apply a more projective approach where the possible future trajectories of action may be creatively re-configured in relation to actor's hopes, fears, and desires for the future (the projective element) (ibid. 971). Finally, actors may apply a more practical and normative approach based on emerging demands, dilemmas, and ambiguities of presently evolving situations (the practical-evaluative element) (ibid. 971). When analyzing how human agency is advanced in the Arctic it quickly becomes apparent that people swift between the temporal orientations, but in some contexts some of them become more dominant. The chapter will show, how in Arctic Canada, climate change research pursued in cooperation with indigenous peoples often puts emphasis on their past experiences and patterns of action. As a consequence, research into ways of strengthening adaptation capacity often encourages habitual approaches rather than focussing on adaption to alternative future societal scenarios and activate human agency in relation to those. In Greenland, the climate change debate is tightly tangled up in questions of future self-determination, economic development and new occupations. This focus stimulates an agency potential that is rather detached from past and present experiences, where even present limitation and concerns are downplayed. In both regions, the fundamental understanding of what constitutes adequate human agency has consequences for the selection of participants in policy and strategy design, for the implementation of strategies and for how future engagement and agency are framed.

In the Arctic, several adaptation strategies are in the process of being formulated (see Decker et al. 2008; Fugal and Prowse 2008; Indian and Northern Affairs Canada 2008; Intergovernmental Climate Change Impacts and Adaptation Working Group 2005; Kelman 2008), and my research into some of these processes in Canada and Greenland indicates that each process emphasizes different aspects and temporal dimensions of agency that may influence coping strategies in fundamental ways.

Climate change adaptation strategies in Canada and Greenland

The politics of scale and the temporal dimensions of climate change adaptations strategies set the ground for Arctic peoples' participation as well as the directions and success of the strategies. These aspects have to be closely revisited, especially now when the melting ice makes the Arctic accessible to resource extractive industries and the shipping sector to a degree never seen before. The future global attention and activity in the Arctic will transform the possibilities and have impact on the socio-economic, cultural, political and security setting of the Circumpolar North. The expansion of economic activities in a rapidly transforming Arctic poses management challenges for the entire Arctic region related to security, governance, and international cooperation as the transformations in the Arctic will affect the world and most likely change the global system of transport and geopolitics.

Arctic states are working to ensure the long-term stability of the region and the future of northern communities. Adaptation strategies may thus find strength in equipping people at a local level with the possibility to influence and manoeuvre in this rapidly changing natural and political landscape. A major challenge in adaptation strategies is to raise awareness of the long view (Folke et al. 2002: 6) and to provide the fundament for human agency to deal innovatively with the developments in the region. Otherwise they might not be in a position to seize new opportunities. Inuit Tapiriit Kanatami, representing the Inuit in Canada, also wants to break the history of dependence and has a desire to bring about a reduction in outside

support and to reduce the heavy reliance on public sector activities and subsidies (Inuit Tapiriit Kanatami 2008); so Inuit are pushing for change (see also Inuit Tapiriit Kanatami 2007). This political agenda coupled with the challenges of climate change pose legal questions as pointed out by Beach (2000): ‘... [w]ere the climate to change so as to demand or make possible new forms of livelihood for northern indigenous peoples, the new livelihoods would not entail the legal or moral justifications for Native monopoly of resource access enjoyed by many Natives today’ (see also Budreau & McBean 2007: 1313f; Fenge 2001: 82). Beach is directing our attention to the fact that indigenous peoples’ present status as rightholders is not sufficient to secure a legal basis for alternative futures.

With respect to the Arctic, climate change is yet another challenge to many communities which are already struggling with a number of cultural, legal, social, economic, and political problems. Climate change may magnify existing local problems and amplifies the international stakes in the Arctic. The number of cross-cutting issues and scale-crossing relations even in the most remote communities present the researchers and policy makers with a setting of great complexity which do not invite to simple reductions. In spite of this many researchers have a particular interest in how climate change will affect the indigenous way of life based on hunting and fishing. It is an easy focus in relation to climate change discussions because they are easily pointed out as vulnerable. The focus may indeed also spring from the very fact that indigenous peoples themselves put emphasis on these activities as an important element in their own culture, political identity, and group justification vis-à-vis the state. In the contribution of the Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change Anisimov et al. (2001: 827) predict that climate change in the Arctic ‘...will entail adjustments in harvest strategies as well as in allocations of labor and resources’. Other authors (Nuttall 2008b) emphasize that the hunting way of life is affected and constrained by many factors, where climate change is but one and they thus add more complexity to the contemporary Arctic reality. Still, the hunting way of life is the centre of attention.

In the Canadian north the institutional and political setting em-

phasizes the inclusion of communities and indigenous peoples and quite a few workshops have been held to integrate local perspectives, indigenous knowledge, and local perceptions of vulnerability and risk (Ford & Smit 2004; Ford et al. 2006, 2007, 2008; Government of Nunavut 2005a,b,c,d). By doing so the strategies respect and become more related to local needs, conditions, and ideas, and the strategies and capacity building strategies thus have a strong local resonance. This local integration and partnership is one aspect of human agency. It opens up for alternative ways of doing, being, and knowing and thus challenges the privileged voice of authorities and scientists. This approach is a direct result of the empowerment of Arctic indigenous peoples since the 1970s and Canada's special responsibility to honour indigenous peoples' interests and concerns (Inuit Tapiriit Kanatami & Inuit Circumpolar Council (Canada) 2007). Several studies on indigenous peoples' observations and vulnerability have been pursued in the Circumpolar North and Canada, and are using these kinds of *down-scaled studies* to strengthen research into how climate change is experienced and will influence local communities as seen from the local point of view. According to Ford et al. (2008: 55) these 'down-scaled projections provide detailed regional and site scenarios of climate change for community-based vulnerability analyses...' and the approach can identify what capacities for coping with change exist, and thus inform the development of adaptation policies. This local focus circumvents the problems linked to national adaptation programmes of action which often lack micro-level socio-economic information, and contain gaps in stakeholder participation in the planning, design, implementation and monitoring of projects (Adger et al. 2007: 733).

Seen from an indigenous perspective this involvement and respect for indigenous knowledge is quite different from earlier dominating relations they have had with scientists and state authorities. Their observations, experiences, worries, and ideas matter in this perspective. Social vulnerability is defined at the local level, and Ford finds that local knowledge and the land-based skills allow 'response with experience' (Ford 2007: 155). People-participatory processes are important as cultural traditions and livelihoods are at stake.

Community based studies integrating community stakeholders aiming to contribute to practical adaptation practices are indeed important for indigenous capacity building, for policy recommendation, and for the direction of action taken. Part of the methodology (see Smit & Wandel 2006) is to identify *relevant* conditions within the community and then apply risk and vulnerability assessments aiming to provide suggestions for new initiatives, policy modifications, economic and technological support programs, and capacity building plans that will enhance the adaptation capacity of that particular community.

Institutional aspects are integrated, but it is often addressed as a question of how to make the existing system better and of 'getting it right'. In Canada, the focus on the hunting system among other things results in proposals of giving financial support to purchase new equipment to cope with the changing environment (Ford et al. 2008: 54). Adaptation policy identifies what policy measures are required '...to moderate or reduce the negative effects of climate change, as well as how best to develop, apply, and fund such policies' (Ford et al. 2007: 151-152). Focus is primarily on ways to change behaviour (like change in hunting strategy or the sharing of meat) as the main adaptive strategy (Ford 2007: 154), although Ford & Smit (2004: 395) in one sentence mention that '...increased political autonomy and comprehensive land-claim agreements may further strengthen the adaptability of communities'.

These local studies of potential coping strategies are informative. However, by extreme down-scaling and sector-focussing the research approach detaches itself from the complex social, economic, cultural, and political setting outside the chosen sector (here the hunting sector) which influence changing behaviour and perspectives. Societal and economic changes related to tourism, militarization, commercialization of harvests, industrial development (e.g. mining), and wage-based activities are treated as something from the outside that influence the coping strategies within the hunting sector rather than as something that have to be understood as an integral part of the system and the community's adaptation capacity. In these approaches, the Inuit are therefore kept in a position as hunters - an image that fits into the discourse of indigenous peoples as traditional

and closely linked to the land only by their hunting activities. These studies do not consider urbanization or industrialization as part of Inuit adaptation strategies, even though most communities have experiences with and orient themselves towards these two forces (AHDR 2004). Therefore, some conclusions seem rather disconnected to the complex contemporary Arctic context. For example it is stated that the '...adaptability of younger generations to future climate change will depend upon how well they acquire Inuit traditional knowledge and land-based skills' (Ford et al. 2008: 58; see also Ford et al. 2006). As climate change will transform both the ecosystem and boost many non-indigenous activities in the north, the younger generation probably needs more than that. Making sector-oriented analyses uninformed about the political institutions is a way to 'deconstruct actors to a point where adaptation to change is no longer possible' (Keskitalo 2008: 2). When *mainstreaming* adaptation strategies, it takes place within existing structures of power and discourses. Indigenous peoples struggling to break their asymmetrical power relation to the state and to establish platforms of agency (in particular the second aspect) may not benefit much from mainstreaming, which can be perceived as a continuation of their marginal position. Rather, they need *upstreaming*, where existing institutional and political structures are revisited and changed to facilitate adaptation strategies which place agency more firmly in the hands of indigenous peoples giving them the right to pursue alternative societal strategies that may or may not prove to be viable in their dealings with climate change.

The focus on local and indigenous knowledge linked to the hunting sector is so strong in the Canadian Arctic that it among other things raises the question of the 'politics of scale' (see e.g. Nilsson 2007) both with respect to spatial and temporal dimensions. First, the clear demarcation of locality and community as the point of departure and main frame of reference underplays local people's entanglement in extra-local structures of economy and urbanization. The research projects which inform policy makers downscale human relations and human agency and by doing so maintain Arctic communities in an arena of limited resources which will affect the understanding of them as vulnerable. The urban entanglement is for

example taken out of the strategies by down-scaling the focus, and the potentials in the urban structure for local people are left out, even though urbanization is extremely strong in the Arctic both with respect to migration-patterns and positive and negative impact on peoples' lives – even for people living far away from urban centres (Nielsen 2005; Sejersen 2007; Sejersen forthcoming)

Inuit knowledge is a major resource in the adaptation strategies as it is closely linked to the understanding of Arctic peoples as intimately bound to the natural surroundings of their communities. In this case the temporality of agency is characterized by an extreme cramming of the past into the present. This perspective, which in fact may be supported by a majority of Inuit community members, also demarcates relevant knowledge and thus carves out only a fraction of the experiences and perspectives that local actors have and may use to mobilize new ideas, strategies, and scenarios. In these adaptation processes the history and political experiences of Arctic indigenous peoples are left out, as are their visions to establish and maintain self-governing and economic viable regions. The downscaling of perspective is linked closely to a discourse of *societal maintenance*.

In Greenland, on the contrary, climate change adaptation strategies are *up-scaled* to such an extent that Greenland is turned into one single community. This national point of departure silences local concerns and the Greenlandic authorities have not had any major processes which integrates local people to any great extent in the few discussions they have had on climate change. The knowledge regime and the research pursued stress scientific understandings of economy and technology, and the government encourages the young generation to pursue education in technical and academic disciplines. The discourse is one of *societal transformation*, where extra-local structures (e.g. the global financial market) are important in defining adaptation strategies. Urbanization is not only accepted as a major force in society but used actively by the Inuit run government to strengthen self-determination (Sejersen 2007). The eagerness to work towards more self-rule and economic development is supported by the population (75% voted yes on the referendum on self-rule in 2008). In Greenland, the strategy is to diversify the econ-

omy through hyper-industrialisation which involves a major transformation of society. By doing so the society hopes to be able to break the economic dependence on the fishing industry which faces severe changes due to climate change and other factors. However, the social, cultural, and environmental costs of hyper-industrialization are difficult to evaluate as routines for Environmental Impact Assessments and Social Impact Assessments are not as elaborate as in North America (Lyngø 2008; Nuttall 2008b). The integration of elaborate local knowledge and community studies in policy making is not given the same priority as macro studies of the national economy and the labour market. Greenland may thus be limited in their adaptation strategies due to lack of adequate research and local involvement. At the moment one of the major problems of the Greenland government is to politically solve the predicament of combining the initiation of national hyper-industrialization with global mitigation goals (in fact Greenland has requested to be allowed to increase their CO₂ emission with 1500%). The extreme push for societal transformations and the political drive to gain more self-determination affect the temporality of agency in Greenland in ways that cram the future into the present (Hastrup 2007).

Double agency in the Arctic

Ecological changes caused by climate change along with socio-economic changes are increasingly pushing for the need to diversify the economies of Arctic communities. Many communities are now directing their attention and activities towards non-renewable resource industries operating in the Arctic in one way or another. If the Arctic communities are to adapt to climate change and diversify their economies, indigenous peoples therefore have to benefit from these industrial activities, and any adaptation strategy has to integrate this. The main question is to what extent the legal and institutional setup stimulates them to activate agency in this direction when it comes to climate change adaptation strategies.

The first aspect of agency (*participation*) is already quite elaborate in Nunavut and Greenland. In Nunavut, for example, land claim agreements clearly stipulate that Inuit are to benefit from these in-

dustrial activities through job opportunities, as formulated in the Inuit impact and benefit agreements. This is an integral aspect of the first aspect of agency which is based on respect, integration and benefit. However, if one looks at the second aspect of human agency (*rightholder possibilities* and *self-determination*; the capacity to act and work for change) it is possible to identify political and institutional barriers for change not only within the existing co-management regimes, but also within the land claim agreements. Stated differently, although the Nunavut Land Claims Agreement is the most far-reaching agreement between an indigenous group and the federal government ever signed in Canada (Légaré 2008: 346), it may be appropriate to revisit and evaluate the existing land claims agreement in Nunavut in order to find out if it is geared to meet the challenges of climate change. The Agreement gives Inuit ownership rights to 18% of the 1.9 million square km. land in Nunavut of which 10% includes subsurface rights by which Inuit can benefit from any mineral or energy extraction. Benefits in the form of taxes and royalties from the remaining 82% are primarily given to Canada. Therefore, it may strengthen Inuit communities to get a larger share of the revenues as rightholders in order for them to broaden the horizon of possibilities and to seize new opportunities by acquiring more control, management, and benefits over Crown lands and resources in Nunavut (O'Reilly & Eacott 1998). This will require major political re-negotiations as those we have seen recently between Denmark and Greenland which acknowledged Greenland's subsurface property rights. Considering the fact that mining by far is the most dynamic private sector in Nunavut, it is therefore interesting to note that this sector is not integrated in climate change adaptation strategies at the community level neither by researchers nor indigenous peoples.

However, Nunavut and Canada have recently taken steps to address questions of community development that may have an influence on climate change adaptation strategies and by doing so they distinguish themselves from the US, which primarily maintain a strong focus on continued research into risks and uncertainties related to climate change (Trainor et al. 2007: 633). The Inuit Action Plan (Inuit Tapiriit Kanatami & Inuit Circumpolar Council 2007) is designed to initiate a comprehensive long-term vision planning,

where Inuit specific solutions designed in full partnership with Inuit are implemented (ibid. 20). The new partnership established between Canada and Inuit – as established in 2005 in the Partnership Accord between the Inuit of Canada and her Majesty the Queen in Right of Canada (see Inuit Tapiriit Kanatami & Inuit Circumpolar Council 2007: 91-95) – calls for a new and more positive relationship between Inuit and the government. The Action Plan states that even though its success is linked to the ability to use existing structures the plan will ‘research the creation of new or reformed institutions and processes to address Inuit issues be they national or international in nature’ (p. 22). It contains a full section (pp. 53-74) on the inclusion of Inuit into foreign policy related to the management of the oceans and coastline. These institutional changes are also reflected in the Aboriginal and Northern Community Action Plan (ANCAP) (Indian and Northern Affairs Canada 2006) which encourages Inuit organisations, businesses, and authorities to apply for funding in order to ‘[r]eview existing policy and legislation, including land claims and implementation plans, as well as Aboriginal dimensions of international initiatives to identify major policy gaps and options for addressing climate change adaptation’ (Indian and Northern Affairs Canada 2006: 3). These initiatives revisit the political structures and the cross-scale relations, partnerships, and cooperation that are available for communities and important for further development (Folke et al. 2002: 21; Keskitalo 2008: 22). Thus, the dominant perspective emphasizing habitual and past patterns of thought and action as well as stakeholder participation and integration is slowly beginning to be replaced by a focus on rightholder possibilities and perspectives emphasizing projective approaches addressing alternative futures.

One may approach the new self-rule agreed upon by Denmark and Greenland with a similar focus on agency. It provides Greenland with the possibility of taking control over own affairs to a large extent and thus supports the unfolding of the second aspect of double agency. However, the premise of the new law is that Greenland initiates an industrial revolution of a magnitude where it is difficult to anticipate the consequences. The law – the legal framework for future agency – may in fact limit Greenland and may not provide the

tools and means for this industrial revolution and the societal transformation that the changing climate opens up for. In a more globalized Arctic the ability to act on the international arena and to attract foreign investments is a necessity for a successful adaptation. Greenland has already sufficient expertise and political possibilities in terms of foreign policy, and these are now formally being integrated into the self-rule law. But are they far reaching enough? For example, the law does not provide Greenland with satisfactory prospects of pursuing its own foreign policy on matters related to climate mitigation strategies.

Inuit in Nunavut do not share these international political openings to the same extent, and this may in fact limit their adaptations strategies as the international arena and the Arctic as a global geopolitical and economic hot spot will demand increased involvement in international negotiations and relations. However, the Inuit Action Plan paves the road for more involvement in foreign policy affairs and Inuit in Nunavut may thus be in a position where they can influence issues of sovereignty and international engagement in the Canadian North. The Arctic Council, where indigenous peoples are permanent participants, also offers a regional circumpolar arena for Inuit to put forward these international concerns, but the policy mandate of the Council is rather limited and it is difficult for the Council to fully address and act on the complexities of climate change. A focus on institutional barriers to adaptation to climate change could thus also include a revision of the Council.

Conclusion

The two Arctic examples presented in this chapter each show the difficulties in demarcating the system agents have to navigate within and adapt to. In Nunavut, the dominant discourse demarcates a system that *shrinks* reality beyond recognition, whereas in Greenland, the discourse demarcates a system that *slings* reality in all directions. This is also reflected in the research studies pursued. In Canada, they focus on processes at the community level while in Greenland they focus on processes on a national level. There is an uneasiness about system demarcation to such an extent that agency becomes limited

in both cases. In both regions people face rapidly developing futures in which learning to manage by change may be too vague a strategy for creating room for manoeuvring where the ability exists for the agents, taking responsibility, and anticipating future trajectories of life (Hastrup 2009: 211-217).

The chapter's focus on agency also directs our attention to institutions and political structures as barriers when pursuing climate change adaptation strategies. We probably need total transformation and rethinking of institutions and systems altogether. To address these challenges, adaptation may be a concept that is too instrumental (Thompson et al. 2006: 2) and which does not accentuate our role as social and cultural engineers. Adaptation seems to reduce the full potentials of human agency and creativity, and it downplays the fact that climate adaptation is to make societal choices informed by many other concerns and challenges than climate. The question in the Arctic is who influences these choices and whether there is institutional capacity to deal with entangled and perforated socio-ecological systems that are complex, dynamic, and prone to non-linear, uncertain and often abrupt changes. Faced with major contemporary and future changes, it is important in climate adaptation strategies to address Arctic peoples' capacity to play a key role in the regional and global dialogues about the kind of development that should take place in the Circumpolar North (Nuttall 2001: 28). Adaptation strategies developed now will set the framework for future agency. It is therefore of paramount importance to give attention to the legal and institutional setup in climate change adaptation strategies and studies. This attention may also give priority to factors and a broader perspective that are downplayed in IPCC as well as in both analysis and policymaking – factors that paradoxically may erode viable adaptation strategies and all the work that is done to strengthen resilience.

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CHAPTER 12

Arctic Hunters: Climate Variability and Social Flexibility

Kirsten Hastrup

Abstract

In the Arctic, climate change is widely experienced and talked about. Based on my own work in a north Greenlandic hunting community, I shall address the question of resilience in both a historical and a contemporary perspective. Historically, the Arctic communities have always had to live with changing weather conditions and larger climatic cycles, and their survival has depended on mobility. In modern times, the climate changes cannot be confronted in the same way, for a number of reasons that will be investigated with special reference to hunters in northern Greenland.

A central concept in the discussion of resilience in the far North is *flexibility*, as defined by Bateson, and it is argued that due to composite changes induced upon people from the outside, they experience a loss of flexibility. The ambition is to contribute to a general discussion of social action in face of climate change.

The melting ice in the Arctic has become an icon of global climate change along with the polar bear clinging to the last tiny ice-floe in the sea. This icon has some basis in reality, as I shall show from northern Greenland, where hunters are possibly also facing the demise of their age-old way of life, all while catching more polar bears than before, as these leave the ice-floes for firmer grounds (Born et al. 2008). The aim of this chapter is not simply to lament cultural change, which is well known to the Arctic populations (Csonka &

Schweitzer 2004). While hunting is of course an ancient way of life in these regions, the people are wholly integrated into the modern world (see e.g. Dahl 2000). My aim is to seek a deeper understanding of how a hunting community responds to perceived changes in their environment of the current magnitude. Whether these will turn out to be irreversible, we cannot know, but what we do know is that the people of the far North are already living with an unstable 'sense of place' (Feld & Basso 1996). As the topographical realities shift, so does the emplacement of people – even when they remain in the same geographical location.

It is well known that whatever speed climate changes are accruing at the moment, and whatever the complex of causes that is fuelling them, they hit the Arctic environment more severely and rapidly than any other inhabited region, because the changes accelerate one another. This is not only a scientific fact but also very much part of local experience. Yet the people in the far North are exposed also to new political realities and to international quota systems designed at protecting particular species, often with adverse effects on the hunting community. In the following, I shall deal with these three dimensions of climate, politics, and species protection in order to show how they converge and constrict local social flexibility in North Greenland, mainly in the Thule district, the northernmost settlement in Greenland – and in the world.

Analytically, a central concept is that of *flexibility*, as defined by Gregory Bateson as 'uncommitted potential for change' (1972: 497). Bateson uses a parable of the acrobat on a high wire to illustrate the implications of this. To maintain his position on the wire, the acrobat must be free to move from one position of instability to another, and his arms must have maximum flexibility to secure the stability of more central parts. If the arms are locked, the acrobat will fall. During the period when the acrobat is *learning* to walk on the wire, and thus learning to move his arms in an appropriate way, a safety net is necessary; this gives him the freedom to fall off the wire. 'Freedom and flexibility in regard to the most basic variables may be necessary during the process of learning and creating a new system of social change' (ibid.:498). As I am going to suggest, the north Greenlanders are short on both of these accounts.

Climate: A chronic disaster

In the *Third Assessment Report* from the IPCC (2001), it was noted how in the Arctic, during the 20th century, air temperatures over land increased by 5°C, the sea ice thinned and declined, the ocean warmed, and terrestrial permafrost decreased in extent. Since 2001 the process has accelerated dramatically, and its consequences for the *social* systems have become conspicuous, as multiple reports based on solid scientific ground have emphasized (ACIA 2005; IPCC 2007; AMAP 2009).

One thing is the external, scientific observations another is the local perception of the changes. In the North American Arctic, people say that ‘The earth is faster now’, referring to the sense of rapid changeableness in the weather that is now prevalent (Krupnik & Jolly 2002). At the same time, they also note that ‘We have seen these warm weathers before,’ acknowledging the fact of living within an environment that was always prone to changes and demanding close attention for people to make the proper responses (Krupnik 2006). Thus there seems to be divergent local perceptions of the consequences of the scientifically established climate change; this is significant with respect to the argument of this chapter, because it immediately points to two different views of the world – one, the scientific, seen from outside of the landscape and generalizing particular trends; another, the local, which is seen from within the landscape and the concomitant practical tasks by which one engages with the environment (see Ingold 2000). However, there is no immanent conflict here; there are simply points of view. Among Arctic hunters, the relevant point of view relates to an age-old relationship to the animal world, which always compelled them to movement.

When the Inuit (or Eskimo, as they were called then) were first studied by anthropologists in late 19th century, their mobility was particularly highlighted. In his general observations on the Eskimo tribes, the founding father of American anthropology, Franz Boas, notes: ‘That the mode of life of the Eskimo depends wholly on the distribution of these animals will therefore be apparent, for, as already observed, they regulate their dwelling places in accordance with the migrations of the latter from place to place in search of

food' (Boas [1888] 1964:11). Mobility was a *sine qua non* for survival in the Arctic, not in itself but in response to the movement of those animals upon which they subsisted. In the process, mobility became more than an activity getting from one place to another for the Inuit; it became a fundamental aspect of who they were, and still are, and how they learn about their environment (Henshaw 2009: 155).

At Boas' time the interest in cultural history and in the ways of culture across continents was a prominent feature in the evolving science of culture in continental Europe, from where Boas originally came. This led to another interest in Eskimo migration across the North American continent, and their becoming 'Eskimos' in the first place. The origin of Eskimo culture, geographically and 'culturally', was located at the precise moment when the migrating populations from the western shores of North America finally conquered the Arctic coastlands and archipelagos and adapted to the marine resources (Steensby 1905). Since then, the Eskimos were by definition hunters, primarily of marine mammals.

The general pattern of seasonal migration in search of prey was further analyzed and systematized by Marcel Mauss, another ancestor of modern anthropology, in his claim that the movement between summer and winter dwellings was accompanied by two distinct social morphologies (Mauss [1906] 1979). His thoughts are still highly pertinent in the Arctic, where time, space, and community continue to be closely interwoven, even where mobility has decreased (Stuckenberger 2006). Both the long-term unidirectional migration and the shorter seasonal and partially cyclical movements were part of the strategy by which the Inuit were able to populate the northernmost regions on the Earth. In 1898, the Norwegian Eivind Astrup, who was a member of the two first Peary expeditions to the Smith Sound Eskimos in the early 1890s, was highly impressed by the people he encountered: 'Our small merry brethren in the Arctic regions represent an extremity of the human race; an insignificant section of it, who take up the battle of existence in regions which to our eyes offer poor prospects for life's sustenance, and where icy death would seem to reign supreme' (Astrup 1898: 48). They alone had been able to see the possibilities in the Arctic, where the climate was a chronic challenge.

With Peary and Astrup we are finally in the Thule district, known as such only since 1910, when the Danish Polar explorer Knud Rasmussen established a trading station in the area where Peary had worked, and gave it the name of Thule (Hastrup 2006; 2007). Later, the arch-typical (archaeological) 'Thule-culture' was established by reference to a dig in the same area, showing the artefacts and bone remains typical of a population of marine hunters (Hastrup 2008). However, when the inhabitants of the district were first described, they had abandoned some of the typical gear for reasons of impoverishment. Mauss, summarizing the situation of these people on the basis of the works by Astrup and Rasmussen among others, the Eskimos at Smith Sound were in a miserable state:

The expansion of inland ice and the persistence of drifting ice throughout most of the year not only put an end to the arrival of driftwood but obstructed large whales, and made it impossible to hunt whales, walrus and seals in open waters. The bow, the kayak, the *umiak* and most of the sleds disappeared because of a lack of wood. These unfortunate Eskimo were reduced to such circumstances that they retained merely the memory of their former technology. (Mauss 1979: 42-43)

What transpires here is a double exposure to increasing ice and disappearing means of mobility and communication. When social life becomes too circumscribed, it tends to disintegrate. The vital strategy of mobility is hampered and people are stuck. Today, the ice is melting, but once again people are losing access to their hunting grounds due to the ice conditions, and their mobility is hampered.

A recent study of north Greenlandic polar bear hunters testifies vividly to a change in the ice conditions (Born et al. 2008: 31ff). All of the hunters in this study affirm that there is less ice than before and add a variety of more specific observations, notably that the ice thickens later and breaks up earlier than before, that is has thinned and is now perforated by more and larger holes. Travel by dogsled has become more restricted and difficult. Meanwhile, boating has not become easier, not least due to new sea currents that will often pack the drift ice tightly in the fjord outside of Qaanaaq, the principal settlement in the district, numbering some 600 people.

The thinner ice is more likely to break up during storms, and it will take more time to re-freeze due to waves.

A hunter from Siorapaluk, another small settlement in the district, tells how the sea ice now is only 0.5 m thick, while before it was between 1.5 and 2 m thick; this severely affects walrus hunting from the ice front. He and his co-hunters blamed the currents. The people in the district also noted a decrease of the glaciers, now calving so massively that the ensuing swelling disturbs the narwhal hunt taking place in the bottom of the fjord. When I was in the field in the summer of 2008, I was struck by the soundscape produced by calving glaciers and tumbling icebergs. The thundering noise reminded us all that, indeed, the ice was faster now; with a new rhythm to the soundscape, a sense of urgency crept in upon people (cf. Feld 1996).

The new pace of the meltdown of the glaciers even affects the freshwater supply in Qaanaaq (and elsewhere), because the glacier river that supplies most of the water to the town is dwindling and melting down below its own deposit above the village. Precipitation in the Arctic likewise shows signs of an increase over the past century (Anisimov et al. 2007: 657). The trends are variable in space, but people in North Greenland assert that the weather has changed a lot recently, and become more rainy and snowy. In the Thule District the hunters stress that increasing wind, more rain and generally far more unpredictable weather conditions have had negative effects on their economy. They explain it with reference to the increasing patches of open water even in wintertime, and together with the break-up of the ice, it hampers communication and travel by traditional means. Fogs have also become more common, they tell me, again forcing people to stillness even at the peak of the whaling season, because boating as well as sledging is absolutely dependent upon sight and landmarks.

The changing weather conditions, therefore, not only affect the hunting by itself but also the use of ancient sledge routes. The early break-up of the ice seriously hampers communication between the settlements within the district and endangers travel. As pointed out by Nuttall and others in the Arctic Climate Impact Assessment Report: 'The mobility and flexibility that indigenous peoples once possessed to move in response to shifts in the pattern and state of their

resource base is no longer possible' (2005: 685). There are other reasons than weather variability for the constricted mobility, as we shall see below, but when we speak of climate change as an impingement upon social life it is important to stress the multitude of implications. The whole orientation system by which people have known their place in the world is breaking down; this includes forecasting techniques that are no longer reliable and which therefore add to the risk of travelling by land, sea and ice (Henshaw 2009: 156).

The changes in the icescape have another major implication for local orientation, as here suggested by Uusaqqak Qujaukitsoq, a hunter from Qaanaaq:

Sea-ice conditions have changed over the last five to six years. The ice is generally thinner and slower to form off the smaller forelands. The appearance of *aakkarneq* (ice thinned by sea currents) happens earlier in the year than normal. Also, sea ice, which previously broke up gradually from the floe-edge towards land, now breaks off all at once. Glaciers are very notably receding and the place names are no longer consistent with the appearance of the land. For example, Sermiarsusuaq ('the smaller large glacier'), which previously stretched out to the sea, no longer exists. (In Huntington & Fox 2005: 84)

This is a very important observation pointing to a deep-seated sense of change in the local sense of emplacement. Place names have for a long time served as a means to crystallize memory and society in the Arctic environment of infinite extension. As Kleivan has it: 'Past Greenlanders whose culture was based on oral and not written sources, were not in possession of maps, but the place names functioned as a kind of map which constituted a description of the land. Using place names enabled them to plan hunting trips as well as social visits: knowledge of place names was thus an important aspect of their hunting culture' (Kleivan 1986, quoted by Sejersen 2004a: 72-73). In Greenlandic, most place names refer to physical features of the landscape, to particular hunting grounds, or to activities of some kind, thus testifying to what Basso has called the people's participation in the landscape (Basso 1996: 44ff). For Inuit outside of Greenland it has also been noted how place names testify to a particular environmental knowledge; increasingly, they also serve as his-

torical markers of past possibilities and activities (Henshaw 2009: 161).

When place names are no longer consistent with the appearance of the land, a sense of homelessness enters perception. Memories are no longer valid, and this affects the sense of self; possibly even more important, at least when resilience is discussed, the people are also being deprived of their visions for the future (cf. Sejersen 2004a). Thus, the changing environment not only affects the hunt and communication, it unsettles people profoundly. This also goes to show that environmental disaster is never simply an event, because its effects are folded into both subjectivity and social relationships. Climate related disaster quickly becomes chronic in a precarious environment like the Arctic – and people are stuck.

Politics: The signature of the state

However small and remote some of the Arctic communities seem, they are tightly linked to the national (and international) political order and to the global economy (Nuttall et al. 2005). Political interests, trade barriers and conservation efforts affect and constrain the capacity for action in the Arctic communities. It has recently been suggested that a new ‘environmentality’ – i.e. the way human subjects understand themselves in relation to their environment – will change with new technologies of governance; this is extremely significant in the Arctic, where people have generally lived on the margin of the state (Lovecraft 2008). The hunters in focus here have subsisted on their own account since times immemorial, all while they have increasingly become inscribed into the modern political order. As pointed out by Nuttall, the current topographical reshaping of Greenland as the ice dwindles coincides with the emergence of a new Greenlandic nation that in itself redefines people’s relationships to place and to their natural and social environment (Nuttall 2009: 297). Politics is thus very much part of current changes in Greenland.

One of the most pervasive trends in the general political development in the 20th century is centralization of the population. Most Arctic peoples were either forced or encouraged to settle perma-

nently in fixed locations. In Greenland, the early colonization by the Danes made the local population concentrate around the new store, the focal point of the 'colony' alongside the mission station. In later colonial times, during the twentieth century, further 'encouragement' to concentrate was provided when the stores of the tinier settlements were closed down. When communities had become accustomed to modern goods like guns, needles, sugar, and coffee, to mention just a few of the items that were traded for fur, closing the store was tantamount to closing the community. In North Greenland, having been completely outside of the colonial order of the rest of (western) Greenland, this pattern of trade and centralization first began with the foreign explorers. Before Robert Peary arrived in the late 19th century, contact had been sparse and left little trace. With Robert Peary, who wintered in the Thule District for several consecutive years, and kept coming back for two decades, this changed. Peary was the first to supply the people of Thule with guns etc., originally in his own interest since he and his team were totally dependent on efficient hunters. It is above any doubt, however, that he came to respect the people (see Peary 1898). When in 1910 Knud Rasmussen established his trade station, the road towards inclusion into the colonial order was definitively open. As Fabian noted for central African explorations, once stations – however scientific and friendly – were established, the political relations between hosts and guests changed; at the station 'exploration reached the end of the road and turned into colonization' (Fabian 2000: 48).

Knud Rasmussen was a polar explorer and ethnographer, who first arrived in North Greenland with the Danish Literary Expedition to Greenland in 1902-04 (Hastrup 2006). He was the first one to name the local inhabitants 'Polar Eskimos', a tiny and widely dispersed population numbering some 250 people in the entire district. On his initiative a mission was established in 1909, and in 1910 the trading station of Thule was built at Uummannaq in the North Star Bay. His explicit ambition was to help the Polar Eskimos make the transition from an isolated hunting community to a modern society. The chosen means were conversion, trade, modern technical equipment, health care, and local laws. The result was a kind of centralization that made hunters and their families congregate at the

station; they were flexible, and might as well live there as anywhere else.

The trading post was named Thule after the ancient notion of Ultima Thule, the farthest, mythical north on the edge of the world (Hastrup 2007). In this barely inhabitable region, a people was 'discovered' and named, and thereby drawn into the modern world. The trading post was a great success, in that the hunters could here sell their furs (mostly polar fox) and hides for rifles, ammunition and household utensils. The surplus created financed most of the seven Thule Expeditions, led by Knud Rasmussen, that were to follow. The local people were as satisfied as Knud Rasmussen with the setup, and they soon adapted to the more permanent settlement pattern. The Thule trading station had managed to attract hunters from the entire area between Cape York and Etah, and they had more or less settled down in its shadow. This had a predominantly negative effect on the age-old subsistence activities of hunting, fishing, and herding.

After some years, the centralization of the population had affected the game badly, while human mortality had decreased and the population had started to grow in the same period (Gilberg 1984). Consequently, Knud Rasmussen and his associates in Thule sought to re-disperse the population by establishing a second trading station further north in Siorapaluk, being the first wooden structure to appear there, and making the settlement happen in 1929. Today some 50-60 people live in Siorapaluk, still a viable settlement, almost exclusively living from hunting. At the time of its establishment, Siorapaluk offered easier access to trading for people from further north; today there are no people further north, but walrus and polar bear are still to be hunted up there, and the people of Siorapaluk are efficient hunters. The old shop still stands, although trade has now been taken over by a new building next to it.

Apparently, this first attempt at dispersal was not enough. At a meeting held by the Hunters' Council (*Fangerrådet*) February 3rd 1930, Knud Rasmussen made the following proposition: 'It is suggested that the population at Thule is thus regulated that each individual hunter may only stay in Thule three years at a time, and that the number of families living there is decided by the Council according

to the hunting conditions. This should be done in the interest of the people' (read in *The Thule Museum Archive*, Qaanaaq 2008). At first it was impossible to agree on this, and it was decided not to legislate on the matter until more people had been heard, but on the subsequent meeting May 16th 1930, the Council agreed about the proposition. The irony is that by now, the people were no longer driven by their own desires to move in search of game, but were forced to do so by the colonial power – yet still in their own interest. In 1953 the entire population at Thule was forced to move for completely different reasons, because of the establishment of an American air-base, and some 60 of them chose Qaanaaq as their new home place. (It has been hotly debated whether the migration was actually *forced* in a juridical sense, not least because it had already been established that the area around Uummannaq could not support the population. Space does not allow me to go deeper into this, however.)

Today, it seems that dispersal is the last thing governments want to propose. Instead they encourage further centralization and as people generally want access to modern technologies, schools and health care, they mostly comply. In the Thule District it has meant a vast increase in the population of Qaanaaq, the main settlement, now inhabited by some 550-600 people while another 100-150 live in the four remaining settlements in the district (numbers are fluctuating according to statistics). Roughly half of the townspeople in Qaanaaq come from further south and fill administrative and other professional functions, while the other half are in some sense natives to the region and mostly hunters.

One of the important functions of the village is still to run a shop, and just like in 1910, the inhabitants are dependent on ships coming in with goods. They can reach the fjord only during summer, and while before only one ship made it – if at all – now at least two ships are needed to provide the village with necessities for the next 11 months. In 2008, the 'first ship' landed on August 1st, and unloaded its goods over five days and nights when the tide permitted the floats to get to the shore. The store was next to empty, and for the spectator it is amazing to think of the calculations that precede the shipment; baby-food, socks, sweets, frozen rye bread, guns, washing machines, ice-tea, beer, birthday cards – you name it; how much is needed of

everything? Larger items like windows, dishwashers, and outboard motors for the dinghies are individually ordered. Yet at least some spare items should be at hand in the store. The weekly flight in and out of Qaanaaq may help out for lesser items and vegetables, but larger items must be brought in during the short summer – locally defined by open water. In 2008 the second and last freight ship arrived a month after the first. The current warming may make the sea ice break up earlier, but the ice floes and icebergs still prevent the ships from passing by except for within a very limited period.

In Greenland, centralization is extending even further these years. The municipality of Qaanaaq, flagging the narwhal on its emblem, has already been amalgamated into a larger northwest Greenlandic municipality, with Ilulissat as its centre, some 2000 kilometres to the south. This is where people will soon have to go in case of emergencies, and Thule will definitively be reduced to a tourist bureau and a crafts shop, catering for the increasing (albeit still very small) number of tourists. The general point is that the match between the age-old patterns of life and new global realities is not easily done. As stated in the ACIA report: ‘Arctic peoples cannot adapt, relocate or change resource use activities as easily as in the past, because most now live in permanent communities and must negotiate greatly circumscribed social and economic situations’ (Nuttall et al. 2005: 685).

Climate change plays an important part in this circumscription as we saw already, but as demonstrated here, it is accelerated by political realities. These are not only noted locally, but also increasingly brought to the attention of international bodies. The two strands are woven together in a recent submission to the United States Senate by the Inuit Circumpolar Conference in which it is held that climate change is ‘an infringement on human rights because it restricts access to basic human needs as seen by the Inuit and will lead to the loss of culture and identity’ (Watt-Cloutier 2004, cited in Anisimov et al. 2007: 661). This is highlighted also in the ACIA Report, where it is stated that ‘Hunting, herding, fishing and gathering activities link people inextricably to their histories, their contemporary cultural settings, and provide a way forward for thinking about sustainable livelihoods in the future’ (Nuttall et al. 2005: 685). History,

locality, and sustainability in the Arctic have always been related to hunting, and to unrestricted mobility in pursuit of the game for survival, as we have seen,

Returning to the theme of environmental threats, it seems clear that the uncertainties related to climate change in North Greenland are magnified, because they are underwritten by the ‘signature of the state.’ The notion is proposed by Veena Das, who also identifies the paradox of illegibility (Das 2007: 162ff). The state apparently works by way of decrees, laws, and rational calculations on the basis of intentionality and direction; it works on behalf of the common good. We have seen this in the shifting patterns of either centralization or decentralization in North Greenland. However, laws and regulations are always read in a wider context of anonymity and illegibility, the implicit feature of the workings of the state, and subtly infiltrating local self-perceptions within the larger political order allegedly working for the common good. With each regulation, the hunters have become more integrated into the state, colonial or otherwise, yet at the same time they have become marginalized from their own histories.

Today, outside the written, the state and its policies show up in everyday concerns about the future. Rumours of resettlement further south have spread in the wake of the latest and very recent effort at rationalizing (that is centralizing) the administration. This is a real enough fear, but misreadings of intention occur all the time due to the general sense of constriction in the north. Health campaigns – teaching people to eat vegetables, rye bread, and fish, and warning people against eating too much seal, walrus, and whale due to the presence of heavy metals in the meat, are seen to degrade the hunters’ wish to continue eating their traditional food. Another local misgiving I stumbled upon during a conversation was the training of local, lay-judges able to act quickly in cases of local misdemeanour – the nearest official judge being some 2000 kilometres away – being read as a wish to split up local social solidarity. As seen from these examples, the ‘illegible’ aspects of the distant (if ever-present) state over-determine an interpretation that feed into the worst fear, expressed to me by an inhabitant of Thule: “in ten years we are no longer here”. A new economic rationality with its own con-

cerns about sustainability will have overwritten the age-old and inherently sustainable subsistence economy – not to speak of the sense of belonging within a particular landscape and its affordances. As yet, no new technology of governance has seen light that might make the local subjects' and the policy-makers' sense of the environment converge. So far the local environmentality is at loggerheads with the state as rumoured, if not read.

Protection: A measure of responsibility

Politics enters into the sustainability equation in many ways and on various scales, local, national, and international. This also applies to my last point, namely the point of international protection and national wildlife management. As pointedly observed by Nuttall:

Administratively, Greenland is being redefined as one national hunting and fishing territory, contrasted with a diversity of local hunting and fishing territories that have long characterized the social, cultural and economic make-up of the coastal areas. Caribou, whales, seals and fish, which have traditionally been subject to common use-rights vested in members of a local community, are becoming national and privately owned divisible commodities. The ways they are caught, used and consumed are now subject to rational management regimes defined by the state and the interest groups of hunters and fishers (such as KNAPK, the Greenland Association of Hunters and Fishers), rather than locally understood and worked-out rights, obligations, and practices. (Nuttall 2009: 307)

In the wake of global concerns with the changing climate the concern with bio-diversity and the protection of particular species has gained further momentum. In the Arctic, the polar bear has become an emblem of the new threats from the climate, and the big marine mammals are being counted and controlled with a view to assessing the possible harvest each year if the species are to survive. The Greenland Institute for Natural Resources gives regular advice to the administration, and hunters must report their catches in detail. There are not always unanimity between the biologists' view and the hunters', but in general this is not seen as a remnant of the colonial

structure, because (in contrast to North America) Greenland's game resources were always seen to belong to the Greenlanders, and local knowledge is often integrated into the biologists' advice (Sejersen 2004b).

Obviously, the 'counts' made by the two groups are not necessarily convergent; a case in point is provided by an analysis of halibut fishing in the Disko Bay area (Roepstorff 2000). Noting their different measurements, Roepstorff concluded that local fishermen and biologists have different kinds of knowledge, because they have distinct practical interests. Yet, and this is the point, it is not a simple conflict of interests, as some would read it; the two kinds of truth about the stock cannot be measured directly against each other. Without a careful consideration of the processing of observations and the production of knowledge, the two kinds of knowledge are but that: two kinds of knowledge. The reason for stating this is a wish to confront any idea that anthropologists are always taking sides for local culture and against science; this makes no sense. For the biologist, a long-term reproductive estimate and the abstract entity of 'the stock' frame their counting, while the fishermen measure by sightings, by previous experience, and by catch. For both parties, the fluctuation of the populations is part of experience, and even within biology this is still largely unexplained (Meldgaard 1996). 'Protection,' therefore, may not always address the reason for stock diminishment.

In the Arctic, people have survived the fluctuations in their prey by basing their economy on a broad range of resources in addition to their high mobility. In the Thule district, apart from seal, narwhal, walrus, and polar bear are the most important species hunted, but reindeer and muskoxen are also hunted (by some) on headlands accessible by boat in the summer season. Additionally, people will fish for polar cod from the ice when possible.

The narwhal is the dominant 'cash-crop;' both the tusk and the *mattak* (a thick layer of blubber and skin) are sold at a high price, and it is no surprise that the hunters are keen on the narwhal, arriving in numbers in late July, early August and populating the fjord running eastwards from Qaanaaq for some weeks. The fjord has appropriately been named the Whale Fjord since the first Europeans

reached its shores. In 2001 the narwhals of the fjord were counted from the air, using new digital photographic equipment and a digitally superimposed fine-meshed grid; the count – corrected for submerged whales etc. – arrived at a little over 4000 narwhals in the fjord during the selected weeks (Heide-Jørgensen et al. 2002). I did not know about this count when I was in Qaanaaq in 2007 and talked with a man who had been allowed up in the aircraft to see how it was done. I was curious, not simply about the biological monitoring per se, but also of its level of convergence with local estimates. I asked whether the assessment made by biologists (of which I knew nothing, and had not been given any count), matched the hunters' own idea of how many whales there were. My friend took some time to answer: "It is difficult to say; how many is many? The hunters some times say that there are many, but they cannot know for certain how many there are. If they just get one, and there are more left, then there are many." The point is, that there seems to be *enough*. This feeling also applies to polar bear and to walrus, otherwise threatened by the warmer weather (Rosling-Asvid 2002; Born et al. 2008; Born 2005), because in the far North, there is so far no concrete indication of a lack of animals. The 'virtual' stock available in Greenland as a whole may be shrinking in the eyes of biologists, who assess the numbers from above, so to speak. But seen eye-to-eye with the prey, there is still more than enough.

In 2008, the hunters of Qaanaaq caught approximately 70 narwhals, I was told – just about their given quota. Compared to the estimated number of the pack in fjord, this does not seem excessive, and the hunters would have liked to go on. Yet, apart from the quota, there were other challenges to the hunt; the rapidly calving and thundering glaciers descending from the ice cap at the bottom of the fjord, where most of the whales were found, threatened the summer camps on the closest shores and islands by flooding. Also, while the hunters could normally float the narwhals to safer shores, and possibly even back to Qaanaaq for cutting up, this summer it was too risky, because the fjord was visited by killer whales who could not resist the temptation of a free meal floating behind the dinghy. It would therefore take many trips back and forth to bring a whale in; the tusk, if there was one, and as much *mattak* as the boat

could carry, was always in the first load. Relatives would gather on the beach at any time of the (polar) day, to celebrate the catch and receive a share. Although not exactly sub-standard in terms of actual catch, there was a sense that the hunt was somewhat circumscribed by the glacier melt down, by hostile whales in the wake of the 'good' ones, and also, certainly, by the quota – being distributed equally among all the registered full-time hunters of the village, who did not have equal success, of course.

It is not that the hunters want to hunt freely and that they do not care about potential over-hunting; they care more than anybody, but they also know more than most. First and foremost, they have always lived in close dialogue with the animal world and have killed only for survival. They followed the game, and migrated between winter dwellings where they largely subsisted on last summer's catch during the long polar night – with the odd polar bear or other animal added – and more dispersed summer dwellings where they had to fill up their larder. Not surprisingly, Qaanaaq was originally a summer settlement, where people went to catch whales and birds. Evidently, the hunters did whatever they could to ensure their survival, and by implication they paid close attention to their prey. They even courted it in earlier times.

Thule was always the gateway to Greenland, meaning that it was up there in the far North that the pre-historical Eskimo hunters crossed the strait between the American continent and Greenland. Archaeologists have documented several waves of immigration, among which the so-called Thule Culture, mentioned above, was the latest. Throughout the entire Eskimo region and across all of the archaeologically defined cultures, there is a remarkable continuity in the making of the harpoon head. It is carefully cut in bone and fashioned like a seal head, and it is generally established, historically and ethnographically, that the soul of the prey resides in the harpoon (Rasmussen 1929: 185; Gulløv 1997). The harpoon head had to attract the seal, whose soul was then incorporated into it for some time after its death. Quite apart from the fact of courting the prey, the harpoon heads also tell another story: Gulløv has been able to show how changes in the design of the harpoon head correlate with climatic changes. In the twelfth century a new harpoon type enters the

scene up north at the time of warmer climes, where the prey consisted of smaller seals (Gulløv 1997: 132). After a couple of hundred years the Thule culture disappeared and there are no finds from the around 1500 to 1800 – the time (later) known as the Little Ice Age. Further down the west coast of Greenland, the harpoons are ‘characterized by quick changes of types, some disappear completely, new paths are sought, and at the same time the design becomes less fixed, the variations increase. I will call this a period of stress’ (J. Meldgaard 1986, quoted in Gulløv 1997: 136).

In order to fight off poverty and deprivation, the Greenlanders worked creatively to manage the environmental change. When in the 17th and 18th centuries a significant change in the natural resources took place due to the changing climate, the appeasement of the prey had to be ensured by all means. As Gulløv has it:

Our earliest ethno-historical sources originate from this period. They tell about the necessity to change the design of the hunting tools if for some reason the prey failed to come. Just as it was the case at the Gateway to Greenland half a millennium earlier, this process of change was not characterized by random choices, but was deeply rooted in a tradition which determined the design. (Gulløv 1997: 136)

As long as the seals approved of the harpoon head, people would be able to survive. When climate-derived stressors affected the local economy, designing new harpoon heads was one way to circumvent potential misery, and to flatter the Sea Woman, who was in charge of releasing the seals from the bottom, and who played her own role in the process of cultural change (Sonne 1990).

There are several lessons from this story of harpoon heads, in itself a testimony to the value of detail in scholarship. The first lesson is that, evidently, hunters care very much about their prey, and that they always went a long way to please it – even to court it, one might say, so that the prey gave itself up for consumption. The second lesson is that the climate has changed before and that artisan creativity was a counter-measure to destitution. Further, it goes to show how the sense of place and the perception of nature’s affordances are deeply embedded in a cosmological order, which makes no distinction between nature and culture. Characteristically, ‘the Greenlandic

word for “overfishing” is a moral concept, qualifying a person, not a virtual stock’ (Roepstorff 2003: 134). The local version underscores the direct relationship between hunter and prey as well as the paramount value of not killing more than is strictly needed for survival. By contrast, the biological view of overfishing points to a global perspective and to absolute numbers – that will always remain estimates.

This takes us right back to the people of Thule and their misgivings about the quota system with which they must comply. They have always lived by their own measure of protection, and in many ways this is far more efficient than the counts and numbers appealed to by scientists. Again, the important thing is to make clear that the possible conflict is between points of view, and not between long-term interests. The first written measure of protection of the prey is found in the Thule law, made by Knud Rasmussen and his associates in 1927, in the name of future generations – or as we would say today, with a view to sustainability. The law was designed at regulating life in the Thule District, still a privately owned and autonomous colony in the far North, but the law itself was administered by the local population and has been appropriated by later generations as well: ‘Local people from Avanersuaq/Thule have themselves made these rules. As far as we know, regulations were printed for the first time in 1927 with the assistance of Knud Rasmussen’ (Qujaakitsoq 1990: 104). Today, the main protection relates to modern technology: ‘We prohibit direct involvement of motor boats in the hunt. The reason for this is the fact that the narwhal is one of the most important resources in the Thule region. The hunter is requested to use his kayak, and the narwhal must be harpooned before it is shot’ (ibid.). Hunters still live by these rules and are very proud also of the measures by which they have contributed further to protect the animals upon which their life depends.

While covering the longer distance to a hunting camp the hunters travel in their dinghy with an outboard motor, but as soon as they get near to a pack of whales they descend into their kayak and approach it with the harpoon. The harpoon is fastened with a line, furnished with a seal skin floater that prevents the whale from disappearing into the deep. Only when secured do they use their gun to finally

kill it off. No whale is ever wasted by this method. By contrast, the Thule hunters claim, everywhere else hunters sail directly into the pack of whales in the motorboats, scaring the pack off for the next hunter, and shooting directly at the prey. Many killed whales are lost this way. Even worse, in some places that were named to me people would kill the whales only for the tusk, and leave the meat to rot. This is the ultimate insult to the animal and to nature in general. Qujaakitsoq explains further:

We try to avoid making our own shadows when we hunt narwhal. The narwhal is a sensitive creature, and when it sees your shadow in the water, it will not come up. In order that we shall not make shadows, our hunting position is determined by the position of the sun. And we try to avoid making any noise. The narwhal is very sensitive and hears well. So we try to be quiet when paddling or walking on ice. We try to hunt in the way tradition teaches us.

Our equipment is: the harpoon (*unaaq*), the bladder (*avataq*), and the throwing-stick (*niutaq*). (Qujaakitsoq 1990: 104)

Small wonder that the people of North Greenland are likely to feel mocked when they are allotted their quota on the same premises as everybody else. Up there, no diversification of livelihoods is possible, and people must continue to respect the soul of the prey. Economics is one thing, another is the sense of being alive and belonging to a network of social relations that is also closely related to the hunt. When whales are landed, relatives gather on the beach to have a share, and when winter darkness turns into collective stillness, people need the *mattak* to fight off depression, they tell me – and I am convinced.

For a community based on the hunting of marine mammals since times immemorial, the concern about species protection is immanent in hunting practices. Yet the circumscription of nature's potentiality with international measures that cannot pay heed to local variability threatens their sense of justice. For the hunters, bear, walrus, narwhal and seal are part of an environment to which people also belong; they play different parts in the ever unfolding environmental drama, yet together they constitute a whole, still struggling to find a place within the modern world, where qualitative differences are

taken into account before quantitative restrictions are imposed upon their living.

Once again we see how climate change converges with other changes and make the community's space of manoeuvring shrink to the point where local sustainability is no longer an option. The national measures of protection, deriving from international biological monitoring and internationally acknowledged values of protection, are – for all their right intentions – overwriting the local sense of responsibility with adverse effects.

Resilience: An exercising of flexibility

This finally leads me back to the general discussion and to suggest that an important parameter in any notion of resilience is that of flexibility. In the Arctic, flexibility – and indeed survival – has been closely linked to mobility. People have lived within a nomadic landscape in the sense suggested by Deleuze and Guattari. In their often-cited essay on nomadology, they claim that ‘even though the nomadic trajectory may follow trails or customary routes, it does not fulfil the function of the sedentary road, which is to *parcel out a closed space to people*, assigning each person a share and regulating the communication between shares’ (Deleuze & Guattari 2004: 420, original emphasis). By contrast, ‘the nomadic trajectory does the opposite: *it distributes people (or animals) in an open space*, one that is indefinite’ (Deleuze & Guattari 2004: 420, original emphasis).

In the far North, the territory as such is relatively unmarked. In the polar North the Inuit have migrated, moved apart, regrouped, and exchanged news and kinsfolk as a matter of course. This in itself makes a huge difference from living within more confined spaces, where territory is closely related to property rights and other well defined social relationships. But today, people have become ‘sedentary’ with all that this implies (Hastrup 2009). Their mobility has become circumscribed as has their access to game – both by the chronic climate disaster, by political trends, and by an increasing emphasis on an internationally endorsed quota system.

Bateson says: ‘To maintain the flexibility of a given variable, either that flexibility must be exercised, or the encroaching variables

must be directly controlled' (Bateson 1972: 503). Since the Arctic peoples cannot control the encroaching climatic, political, and ecological changes, they must exercise flexibility – pursuing whatever problem is set before them without a fear of falling. Exercising flexibility is not necessarily to explode traditional thinking. By contrast it could be argued that traditional thinking, in the sense of disciplined and recognizable ways of rationalizing about the environment, is a precondition for a sustained creativity. Conversely, creativity incorporates knowledge and features deriving from many sources – ranging from biological to cosmological.

The Arctic hunters have always had to be creative to capture the possibilities of the moment and, as we saw for the harpoon heads, this creativity was based in a sense that the environment had to be courted rather than fought (compare Willerslev, this volume). The point I want to make is that local knowledge and a tradition for physical and conceptual flexibility in an ever-changing environment provide the necessary safety net for the hunters, while still uncovering the basic variables of the emerging reality. Another safety net is of course provided by the welfare state, leaving no-one starving.

It is important to note here that by referring to *local* knowledge, it is an agglomeration of many kinds of knowledge, traditional and modern, experiential and scientific, as these have been brought to bear on the engagement with the landscape. A case in point is the gradual adoption of satellite navigation in the Arctic, which cannot replace age-old orientation systems by way of landmarks and implicit routes, but which may improve it in some ways (Aporta & Higgs 2005). This is still not part of life in the Thule District, however – but it is known and wished for.

Exercising flexibility is an implicit part of social life. Resilience at this level implies a commitment to exploring the gaps between convention and creativity, or between fixed cultural frames and individual agency in the face of new challenges. This applies thoroughly in the Arctic where an ever changing and challenging environment has been part of experience and where survival has depended upon an acknowledgement of that fact. Climate change in Greenland is understood as consistent with the constant remaking of the world (Nuttall 2009: 299). Flexibility has been the hallmark

of local resilience in a world of flux, as has the sense of community within which one knew who one was.

However, concerning flexibility, there is not much potential for change that is not already committed to fighting off immediate disasters; flexibility of response with respect to climate change is restricted because of the collateral changes of the political and the ecological order taking place at the same time. The well-known safety net fitted to the Arctic hunters' environment – their mobility and their feel for nature – is becoming increasingly threadbare. While not starving, the hunters may not be able to recognize themselves for much longer; if flexibility is already committed as merely a means of complying with specific rules, it is no longer flexibility in Bateson's sense.

In anthropology we encounter another challenge in the face of this and other histories of climatic impact on the social life of people: we no longer know what to mean by 'resilience' in the social world. This challenge is a welcome inducement to conceptual creativity.

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CHAPTER 13

Hunting the Elk by Imitating the Reindeer: A Critical Approach to Ecological Anthropology and the Problems of Adaptation and Resilience among Hunter-Gatherers

Rane Willerslev

Abstract

Within ecological anthropology it is a widely held assumption that small-scale indigenous societies will undergo unprecedented change as a result of global warming and the dramatic ecological effects that it brings about. This chapter reveals that this is not necessarily the case. Drawing on ethnographic data from the Yukaghirs, a Siberian group of indigenous hunters, it is shown that hunter-gatherer communities can be confronted with radical ecological changes, without this leading to simultaneous change in the symbolic makeup of their subsistence practices. In making this argument, the chapter questions the view that ecological pressure is the prime mover behind the production of cultural forms.

In a few pockets at the margins of the globe live small and scattered groups of people, who continue to exist in intimate contact with the natural world, using only relatively simple technology for their survival. These societies, which customarily go by the name 'hunter-gatherers' number in total only a few thousand peoples. They have been widely used as representatives of what our ancestors may have

been like when living in their natural habitat. Despite recent criticisms of using living hunter-gatherers as models of human evolution, pointing to all the ways in which they are not appropriate illustrations of our natural human condition (see, e.g., Ingold 2000: 58, Suzman 2001), I belong to those who believe that these peoples can teach us a good deal about the range of possibilities of human adaptation (Krupnik 1993, Bernard 1999). At a time when, in the light of current and future climatic changes, researchers, and policy makers are working to identify frameworks and developing analytical tools for analysing human adaptation, it appears useful to look at the most apparently 'simple' of human societies, those who are most directly dependent on the land for their survival, to find out how they respond to these changes. Perhaps then we can get a better grip on the extent to which adjustments to climatic and other ecological pressures will affect core elements within human cultural forms.

It is almost a truism to claim that small-scale indigenous peoples, marked as they are by spiritual beliefs, cosmologies, and worldviews that are firmly situated in their everyday, subsistence-related activities, will undergo unprecedented change as a result of global warming and the dramatic ecological effects that it brings about. It is no surprise, therefore, that this is the commonly adopted position within what can broadly be characterized as 'ecological anthropology'. But while it may appear sufficiently obvious to need no further comment, I am not so sure that this position actually holds true when we begin testing it empirically. In fact, I intend to show that there is no obvious conjunction of environment and culture, in that hunter-gatherer communities can be confronted with radical ecological changes without this leading to simultaneous changes within their subsistence practices, worldview and cosmological make-up.

In making my argument, I shall challenge two different approaches of ecological anthropology. One is situated within the tradition of 'cultural ecology' and is concerned with 'the anthropology of climate change'. In the version discussed here, it emphasizes the role of 'traditional ecological knowledge' (TEK) as evidence for global climate change. I oppose this idea as based in a misguided view of culture as providing a translucent window on the objective

physical reality out there. Drawing on my Yukaghir ethnography, I show that there is no such thing as a simple one-to-one correspondence or fidelity between a culture's symbols and the physical world they represent. We cannot, therefore, assume that indigenous peoples' mythology, rituals, and all the other elements of culture will provide us with a straightforward, accurate, referential insight into what goes on in the natural world.

The other approach criticized belongs to the tradition of 'evolutionary ecology' and is referred to as the 'optimal foraging theory'. It suggests that hunter-gatherers undergo an evolutionary process towards optimizing their subsistence practices, and that symbolic and cultural practices are essentially impeding this optimisation. What this theory neglects, however, is that the pursuit of symbolically defined goals is essentially human, even in the seemingly most practical moments, such as during hunting. Also here do the Yukaghirs serve as evidence as their hunting practices are abundant with symbolic meaning. The question of adaptation, therefore, can never be reduced to narrowly behavioural aspects.

Without denying that there is always an absolute barrier to adaptation, beyond which a community is no longer able to maintain its cultural heritage, I end up by proposing an alternative view to the two ecological approaches discussed, namely that ecological pressures never produce cultural forms – that is, the physical environment never determines symbolic structures, meanings, and values and cannot, therefore, be seen as the prime mover in the production of culture. Instead, I hold that the symbolic content of these cultural forms are in some important way both their means and their end.

But I am running ahead of myself. There is much ground to be cleared before these arguments can be sustained. To begin this clearance, I need first to introduce the people with whom my analysis is concerned and their environment.

The Yukaghir and their changing environment

The Yukaghirs are a small group of paleo-Siberian hunters who inhabit the upper tributaries of the Kolyma River in north-eastern Yakutia (Sakha) within the Russian Federation. They are remarkable

in having survived centuries of demographic decline (Jochelson 1926) and in having maintained an almost pure hunting economy throughout all the vicissitudes of Sovietisation (Willerslev 2007a). Today the Yukaghirs number no more than about a thousand, and while all the surrounding indigenous groups have turned to reindeer or cattle breeding, they have continued living almost exclusively from hunting and even today the dog is their only domestic animal.

The Sub-arctic forest environment of the Yukaghirs is the coldest humanly inhabited place on earth with winter temperatures as low as minus 65 degrees Celsius. Winter starts with the first snowfall in early October and persists into late May. In fact there are only seventy to eighty frost-free days in the course of the whole year (Ivanov 1999: 153). Despite the cold and the darkness, the people continue to hunt throughout the winter. This dependency on hunting has deepened after the disbanding of the Soviet state farms in 1991 and the economical crisis that followed, which has situated the Yukaghirs outside the Russian wage-employment and cash economy (Willerslev 2007a: 7). Today people have largely returned to a pure subsistence-based lifestyle and the great majority is totally reliant on hunting for their survival. Apart from bread, tea, and tobacco, no imported food products are consumed on a daily basis. Old people, women, and children set nets for fish, gather berries, and set hoop snares for white grouse and hares near the settlement, while the men travel deep into the forest to hunt for big game, especially elk – the Asian ‘cousin’ of the American moose – which is by far the most important game animal in the present-day subsistence economy of the Yukaghirs. Today elk meat accounts for fifty percent or more of the people’s total intake of calories (*ibid.* 30).

This absolute dependency on the elk is relatively recent, however. The animal entered the Upper Kolyma region in large numbers only in the 1970s, where it replaced the wild reindeer, which had been the mainstay of the local economy since the ancient past. Huge flocks of reindeer numbering thousands vanished almost over night, leaving behind scraggly groups of tens or even less. Today it is a rare event indeed to kill a reindeer in Yukaghir country. In contrast, the elk has steadily increased in numbers. On a trip at any length from

the Yukaghir settlement, it is quite common to encounter one or more elks and see the tracks of many more.

This fluctuation in game populations may have been caused by local landscape responses, such as lichen recovery cycles and short or medium-term local climatic shifts (Krupnik 1993: 147-48), but it might also be directly or indirectly related to global warming, caused by the increased burning of oil, coal, and gas, since the Industrial Revolution. The world's radically shifting climate is currently most visible in the Arctic regions, and it seems quite certain that north Siberia is heating up faster than anywhere else in the world. The area's permafrost, spanning thousands of square kilometres, has started to thaw for the first time since it formed at the end of the last ice age (ACIA 2005; Weller 2000), and as the ground collapses, the landscape turns into a mass of shallow lakes and marshland. In addition, the warmer climate gives rise to massive forest fires throughout the summer. This combination of warmer climate, wetlands, and low forest country, springing from the ashes of the burned down forest, makes a perfect habitat for the elk, whose numbers and range increase rapidly during warm periods, and especially following forest fires (Krupnik 1993: 149). By contrast, the reindeer, which lives on lichen and prefers cold and dry winters, must, during periods of warmer climate, make a general shift to the north. Indeed, as the Yukaghirs themselves are aware, the elk and the reindeer are 'antagonistic' animal species: favourable ecological conditions for the one are unfavourable for the other.

Now, the question I want to explore here is how the Yukaghirs, who find themselves at the mercy of environmental changes far beyond their control, have adapted in response to the extreme instability of their shifting natural world. For we may ask: if indeed adaptation means the adjustments that populations make in response to current or predicted environmental changes (Nelson, Adger and Brown 2007: 397), then how do the Yukaghirs, who are fully dependent on concentrated animal resources for their survival and can do little to control them, face up to the radical fluctuation in game populations?

The anthropology of climate change

We find suggestive answers to these questions among contemporary anthropologists, developing perspectives on the impact of global climate change on small-scale indigenous communities. Some of these scholars predict that the rapidly shifting climate is going to have far-reaching cultural implications, entailing a loss of the particular intimate human-environmental relationships that substantiate indigenous worldviews (see e.g. Salick & Byg 2007, Crate & Nuttall 2009). One such argument is promoted by Susan Crate (2008), who assesses the Siberian Sakha's (a neighbouring group of the Yukaghirs) vulnerability to global warming. She states

We need not be overconfident about our research partners' capacity to adapt ... as anthropologists we need to grapple with the implications of the loss of the animals and plants that are central to a people's daily subsistence practices, cycles of annual events, and sacred cosmologies. The cultural implications could be analogous to the disorientation, alienation, and loss of meaning in life that take place when people are removed from their environment of origin, when Native Americans were moved onto reservations [...]. It follows that the result will be great loss of wisdom, of cosmologies and worldviews, and of the human-environment interactions that are a culture's core. (Crate 2008: 573)

Thus, Crate's overall message is that climate and culture in many indigenous worldviews, such as that of the Sakha, are inextricably linked and that the impact of the rapidly shifting climate on the people's subsistence oriented cosmology will be devastating. Yet it is exactly here that we confront the contradictory thesis that Crate confusingly appears to entertain: On the one hand, she argues 'that global climate change – its causes, effects, and amelioration – is intimately and ultimately about culture' in that it 'is caused by the multiple drivers of Western consumer culture' (Crate 2008:570). On the other hand, when it comes to small-scale indigenous peoples, such as the Sakha with their relatively simple technologies, she considers ecological pressures to structure entire institutions and belief systems. Thus, what Crate in fact seems to suggest, is that small-scale

indigenous communities are somehow directly influenced by ecological pressures in a way that urban Westerners are not, so that among the former nature is first, only then to be embraced by symbolic forms of culture. But is it really the case that that climate and culture among indigenous peoples are associated in a sequence in which the former directly shapes the latter? Even if there is little doubt that all human populations are ultimately subject to the same ecological laws that affect any animal population and that human beings, therefore, must maintain an adaptive relationship with their environments, I find little evidence in the empirical data presented by Crate to support her assertion that the Sakha's religious beliefs, cosmologies and worldviews are directly shaped by climatic or other kinds of environmental pressures.

A case in point is Crate's chief ethnographic example of what she sees as an illuminating incidence of 'traditional environmental knowledge' (TEK). She quotes a Sakha elder, who recounts an age-old myth of the 'bull of winter' (ibid. 570). The man concludes his tale by saying that 'it seems that now with the warming, perhaps the bull of winter will no longer be', and Crate interprets this as a direct and unswerving testimony of the Sakha's experience of global climate change and the loss of traditional culture that it entails (ibid. 583-84). On this basis, she suggests developing 'research scenarios', which among other things, involve the development of 'elder-knowledge programs focusing on climate change ... and then exchanging Western science information with them' (ibid. 583). But how can Crate be sure that what her Sakha informants are talking about is in fact global climate change? Well, she can't.

The trouble is that Crate's analytical starting point is the commonsensical view of culture as somehow providing a translucent window to the objective physical reality out there. In line with this view, cultural symbols, such as myths, rituals, and cosmological beliefs, are thought of as somehow transparent; Crate thus believes that she can look through them to the actuality they point to. But her unquestioning acceptance of the referential capacity of indigenous symbols to offer us access to physical reality is at best intellectually naive. I am not denying that that a myth, such as the 'bull of winter', talks about real things. Indeed, its function is to do exactly

that. But it does so in a particular way, giving things a mystical quality, which is not that of a scientific explanation (see Barthes 1970: 143). Indeed, this is the reason why the 'bull of winter' is a symbol and not the actual winter. If in fact the mythical animal somehow constituted the winter in a literal sense, there would be no talk of symbols here at all. My point is that it is a mistake to believe that indigenous culture is literally literal in containing a straightforward accurate, referential correspondence to what goes on in the natural world. Rather, human culture is always symbolic, not natural – and it is this very feature that separates us from nature (see Sahlins 1977).

The optimal foraging theory

With this criticism in mind, let me turn to the evolutionary limb of ecological anthropology, which is marked by a broadly Darwinian bent. In particular, I want to focus on what goes under the heading of the 'optimal foraging theory' – currently one of the most influential approaches within hunter-gatherer studies. To my knowledge, the theory is not directly linked with current debates about climate change, but it has a good deal to say about the nature of human adaptation and the actions needed in response to shifting resources. I can only treat the theory here in bold strokes, but it is fair to say that its overall claim is that hunter-gatherers' subsistence behaviours are subject to natural selection as are all other primates. Energy and time spent in searching and capturing animals must be offset by the caloric and nutrient value of the animals that are caught. Basically this means that the hunters with more efficient foraging strategies will have a reproductive advantage over those with less efficient strategies. In this regard, the theory is yet another expression of the rather widespread assertion that the primary shaping cause in the development of human behaviour is the imperatives of survival under shifting ecological pressure (see e.g. Harris 1977).

Now, according to the principles of this theory, the concrete task at hand for the evolutionary ecologist consists in predicting how, under given environmental conditions, a hunter should behave, assuming that the overriding objective is to maximize the balance between the energy intake from harvested resources and the energy

costs of procurement. Bruce Winterhalder, one of the foremost exponents of the theory, presents an empirical example of this in his study of the Cree Indians of northern Ontario, who apparently hew closely to the balance sheet of energy and time expected to calories obtained (Winterhalder 1981a: 86-89).

But what about the numerous examples of hunting cultures throughout history which seem far from optimal in their subsistence strategies, the sceptic might ask. Winterhalder is quite aware of this problem and finds an explanation within the local culture itself. Thus, he explicitly singles out the 'cultural goals', situated within systems of belief and meaning, as the key reason for the disjunction 'between modelled optima and observed behaviors' (1981b: 16). Likewise, Robert Foley (1985: 237), another follower of the theory, argues that built into the human capacity for culture are a number of characteristics that 'may inhibit the achievement of optimality'. In other words, the ideal hunter in the optimal foraging theory is a creature, rather like his animal counterpart, that is totally free from cultural constraints to act out of pure, calculated self-interest of maximizing resources. Indeed, as Tim Ingold has recently pointed out:

Nothing is more revealing of this attitude than the commonplace habit of denoting the activities of hunting and gathering by the single word "foraging"... the concept ... has an established usage in the field of ecology, to denote the feeding behaviour of animals of all kinds, and it is by extension from this field that the anthropological use of the term is explicitly derived. (Ingold 2000: 58)

Thus, when Bruce Winterhalder and Eric Smith (1981: x) note that 'the subsistence patterns of human foragers are fairly analogous to those of other species and are thus more easily studied by ecological models', they are in fact suggesting that hunter-gatherers have never really extricated themselves from the natural world. But to equate the subsistence efforts of hunter-gatherers to animal foraging behaviour is to misconstrue dramatically the actual hunting practices of these peoples, which, as we shall see below, are abundant with symbolic significance. As such, the optimal foraging theory is a prime example of what Gilles Deleuze and Félix Guattari (1977) call 'interpretation as impoverishment'. It is what happens when the lived

complexity of human life is 'rewritten' within the confined limits of mathematical modelling.

Ecological determinisms

To be sure, the two eco-anthropological approaches described above, that of Crate, who seeks to develop perspectives on global climate change's impact on small-scale indigenous cultures, and the followers of the optimal foraging theory, appear at first glance to be very unlikely bedfellows, among other things because, whereas the former focuses on climate change as being 'ultimately about culture' (Crate 2008: 570), the latter relegate culture to a kind of epilogue, something which may intervene negatively on a group's ability for survival and reproduction.

On closer inspection, however, the two theories have a rather similar take on the human-environment interface. First, Crate's phrasing in terms of 'adaptation', 'vulnerability', and 'resilience' – the main terminology used to address global climate change – is also used by the optimal foraging theory. This terminology developed outside anthropology in population and landscape ecology and applied resource management, and has a strong mathematical focus on modelling (Nelson, Adger & Brown 2007: 398). As such the terminology provides an aura of being scientific. The climate, and the food resources that depend on it, acquire the extraordinary and limitless capacity to shape indigenous peoples' behaviour and modes of thinking. And since subsistence, like indigenous culture, is understood to be directly shaped – if not actually determined – by the natural environment, all transformations in human practical doings or cultural forms are explained by ecological changes in energy calculations, adaptability and other so-called 'hard' facts.

But how hard are these facts really and how valid are the assumptions on which they rest? For we may ask: Is it really reasonable to expect that the adaptation of small-scale indigenous societies to climate change and other forms of ecological pressures directly shapes core aspects of their subsistence efforts (as suggested by the optimal foraging theory), let alone poses an imminent threat to their cultural heritage (as suggested by Crate)? I don't think so. In my view, both

theories underline the over-simplification and danger of assuming that ecology is somehow the secret essence of the livelihood of so-called 'primitive' peoples.

Let me give my warning some substance by returning to the Yukaghirs. My aim is twofold: I want to show that the Yukaghirs, although they too belong to the category of so-called 'foragers' and inhabit one of the world's harshest environments, where ecological pressures are most direct, organize their subsistence efforts, just like any other human society, around symbolically defined goals - as opposed to the narrowly utilitarian and functional goals of the optimal foraging theory. Moreover, I intend to show that Yukaghir hunters, although they imitate their prey, are by no means identical with that which they represent through imitation. I take this as evidence that Yukaghir symbolic culture, even during its seemingly most practical and goal-directed moments, functions completely differently from mirrors and, therefore, does not and cannot faithfully reflect the ecological state of affairs in the natural world.

Animal imitation

For the Yukaghir, hunting is an exercise in trickery in which the hunter undergoes a long process of preparations by which his body is transformed into the image of his prey. Accordingly, hunters will visit the sauna on the evening before leaving for the forest, where, instead of using soap, they wipe themselves with whisks from birch trees. They say that the animal recognises the attractive smell of birch and does not flee, but comes closer to the hunter (Willerslev 2004). Moreover, small children, who are said to have a particularly strong human odour, are kept away from hunters. At home, affection for children is expressed by sniffing. Parents apply their noses to the napes of their children's necks and inhale their odour. However, when a hunter sets off for the forest, he rarely embraces his offspring. This is in order to avoid contamination with their odour. The same goes for sexual intercourse, which is banned before any hunt, because of the stench it leaves on the body (*ibid.*). Likewise, hunters will, when leaving for the forest, dress up in skin coats worn with their hair outward, take on headgear with characteristic protruding

ears, and they will put on skis covered with smooth leg skins, so as to sound like the animal when moving in snow. When hunting, then, Yukaghirs cease to be extraneous bodies, alien to the forest world and to the animal hunted.

Now, mimetic capacities such as this have been characteristic of human beings since prehistoric times. According to Steward Guthrie (1993: 134-36), animal imitations in material art can already be observed in Neolithic cultures. They also appear in ritual objects resembling various animal creatures and objects of the world and in the ways these objects have been used to influence reality through magical practices, as has been described by Sir James Frazer (1960). But what is the nature of this kind of mimicry? Are we to regard it as a perennial instinct of all life forms, one that does not essentially differ in animals and humans? Indeed, this is the view of Charles Darwin in his evolutionary account of mimesis as an offensive or defensive adaptation, a way of surprising prey or tricking predators. He writes:

Assuming that an insect originally happened to resemble in some degree a dead twig or a decayed leaf, and that it varied slightly in many ways, then all the variations which rendered the insect at all more like any such object, and thus favoured its escape, would be preserved, whilst other variations would be neglected and ultimately lost; or, if they rendered the insect at all less like the imitated object would be eliminated. (Darwin 1958: 205)

Is the Yukaghir hunter's imitation of his prey a concrete example of this Darwinian process of 'natural mimicry'? If we subscribe to the optimal foraging theory, the answer could only be 'yes', because, as Winterhalder (1981a: 66) himself has stated, 'The forager's choices make up a strategy of adjustment to ecological conditions, an adaptive pattern resulting from evolutionary processes'. I for my part, however, take this narrow stance of evolutionary adaptedness to be fundamentally misguided, and the best way to demonstrate it is to move deeper into my Yukaghir ethnography.

Let me begin by pointing out that Yukaghirs do not conceptualize the hunter's imitation of his prey as a purely technical manipu-

lation of nature. Rather, they see it as the climax of a long process of sexual seduction (Willerslev 2004). The prey is generally conceptualized as a female lover, who needs to 'give herself up' to the male hunter out of sexual desire for him. For this reason, hunters' terminology is replete with symbolic parallels between hunting and sexual seduction. It is also for this reason that hunters' fur clothing should be carefully and beautifully made (see Chassonnet 1988). When imitating his prey, the hunter will then set in motion an ideal reflection of the animal, which in turn cannot resist submitting to such self-reflection. Hunters say that the animal is so pleased by what it sees that it throws itself at them. Similarly, the night before the hunt, the hunter's soul, *ayibii*, will leave the body during his nightly dreams and travel to the house of the animal master-spirit in the shape of an animal. The spirit will then perceive the *ayibii* as a harmless lover and a member of the family and the two will jump into bed. The feelings of sexual desire that the hunter's *ayibii* evokes in the spirit during their nightly intercourse is then extended to the spirit's physical counterpart: the animal prey. So, when the hunter locates it the next morning and starts imitating its bodily movements, smell, and appearance, the animal will, at least ideally, run towards him in the expectation of experience a climax of sexual excitement, and he can shoot it dead (Willerslev 2004). Thus, what we are dealing with is in principle two analogous hunts: the 'physical' hunt of the hunter seducing the animal, and preceding this, the 'symbolic' hunt in which the hunter's *ayibii* seduces the animal's spirit. Each is, so to speak, the shadow mirror image of the other.

Thus, among Yukaghirs - and I suspect among many other groups of hunter-gatherers too - the world is not seen in terms of an antinomy between technical know-how and symbolic know-how. Rather, the two are completely intertwined and not conceptually distinguished. It makes little sense, therefore, to separate the two analytically as do the optimal foraging theory, when it reduces hunting to its narrowly behavioural aspect.

This becomes even more apparent when we consider Yukaghir mythology. In Siberia, as elsewhere in the Arctic, it is a widely held belief that in mythical times, not only humans but also animals held

human form and lived and behaved like humans (see Bogoras 1904-1909: 283, Willerslev 2007b: 34-35). Indeed, this is why the Yukaghirs say that animals, when back in their own land and households, take on human appearances (Willerslev 2007a: 84). At some point in ancient times, certain humans died as a result of fighting, by which process they lost their human bodily attributes and became physically distinct as various animal species. However, hunters talk about their prey as having an innate desire to re-establish the original order of things by seducing the hunter into believing that what he sees is not an animal but a fellow human being. Thus, Yukaghir myths are full of stories in which hunters are at risk of being carried away by their animal prey and undergoing an irreversible metamorphosis (Willerslev 2007a: 89-94; Willerslev 2004). Such return to an initial state would effectively mean converting back into a mythical existence from which human beings have taken such great effort to break free. For this reason, hunters must kill the animal before it exposes its concealed human nature. Only in overcoming the animal before it retains its humanity can the existing order with its manifold species be sustained.

What we can conclude from this, then, is that the actual killing of the prey does more than simply providing the hunter with meat. In fact, the meat is less a measure of utility than it is a symbol of having secured the cosmos from totally collapsing. In this sense, the hunt's material pay-off is secondary to its symbolic pay-off. Hence, even during their seemingly most practical and subsistence-directed activity, the Yukaghirs pursue above all symbolically defined goals. The imposition of symbolic meaning on the natural world is the major end of Yukaghir hunting, something which is underscored by the fact that hunters often say that 'the honour of winning over the game is more important than the meat it provides'. What makes the hunt 'deep' in the Geertzian sense of the Balinese Cockfight (Geertz 1973: 433-53) is, therefore, not utility as such, but what hunting is made to represent symbolically, which is a theatrical re-enactment of the beginning of time, the instant the cosmos was created through inter-species fighting. Each hunt is in this sense a world unto itself, a particulate eruption of cosmological order, with all that this entails of human triumph and utter nonhuman defeat.

Hunting the elk by imitating the reindeer

All of this, however, constitutes only part of my argument, which I shall attempt to bring to an even more fundamental level of analysis. It happens that Yukaghir imitation of their primary prey, the elk, is in fact not modelled on the behaviour of this animal, but on the wild reindeer, which, as I have already described, dominated the peoples' subsistence economy until recently. The hunters used to dress themselves up for the reindeer, imitating its movements, sounds and smells in exactly same manner as they now do with the elk. For readers experienced in reindeer hunting, it might be known that this animal can be rather easily tricked by means of simple imitation. Richard Nelson, for example, cites a Koyukon Indian, recalling how, by means of a simple trick of mimicry, he made an entire herd of wild reindeer draw near to him:

[I walked] openly towards them, my arms upstretched like antlers. They saw me immediately but only stared in bewilderment ... By the same ploy I made them turn again, and again, each time drawing nearer, until less than fifty yards separated us. I had the entire herd corralled at one end of the expansive ridgetop. (Nelson 1993: 171)

Now while the reindeer is relatively small in size, not particularly wary and often foolishly unafraid, the elk is different. It is the largest northland deer, weighing more than 1,000 pounds. While the animal's hearing and sense of smell are exceptionally acute, its eyesight is extremely poor: it is most likely short-sighted and due to a shortage of cones which give colour sensitivity to vision, it is not aware of colour either. Thus, the elk is unlikely to get any acuity or sharpness of detail of the approaching hunter, mimicking its movements and appearance. And it certainly cannot detect any of his fur clothing's highly decorated details of bands and beadwork, which he has donned in its honour. Moreover, to approach an elk by means of mimicry can be extremely dangerous, especially during the mating season. I have recorded countless stories about elk that have seen through the hunter's trick of imitation and attacked him. The elk will flatten its ears as a sign of aggression and the hunter must slowly

withdraw. Otherwise, he will be trampled to death by the enormous animal.

It is beyond doubt that the elk is most effectively hunted with the help of dogs, which can surround the animal and keep it occupied until the hunter gets within shooting distance – something which is impossible in reindeer hunting, as the animal will simply run away. Yukaghirs do hunt elk with dogs, but regard it as an inferior form of hunting. In fact, hunters – like the Russians – who only hunt elk with the help of dogs are highly disparaged as amateurs who do not understand what hunting is all about and who simply miss the point of the game. So, despite its ineffectiveness and the high risk involved, Yukaghirs insist on killing elk by means of animal imitation. It is not that they are ignorant of the elk's particular behaviour and how it differs from that of the reindeer. Though they only express it in so many words, they claim to continue with their animal imitations because they have a persistent faith in and commitment to the ways of the past.

Now what are we to make of this apparently irrational hunting strategy, which Yukaghirs engage in passionately, despite the fact that their energy might be better spent hunting in different ways? Surely, the supporters of the optimal foraging theory would interpret this as a prime example of how cultural goals of hunters have a negative impact and 'may inhibit the achievement of optimality' (Foley 1985: 237). But despite the logical force of their scientism, I venture to claim that their interpretation is entirely mistaken. There are in fact very good reasons for why hunters do what they do, although this may not be easily visible to scholars enslaved to the alleged hard facts of science. What I have in mind is a so-called cultural explanation, which rather than situating rationality in the impersonal laws of evolution, situates it in the eye of the cultural actor.

The Yukaghir cosmos is in effect a hall of mirrors, as the various dimensions of reality are conceived as replicas or reflections of the others. For example, the world of the dead is conceived as a shadowy mirror image of the world of the living, populated with souls of people, animals, and objects found in this world. Likewise, the much feared evil spirits, the *Abasyilar*, are said to live in camps and villages,

travel about the country on sledges and go hunting for prey as do human beings. Only for them, the game to be hunted is the souls of men, whom they call their little 'elk' (Jochelson 1926: 302-3). From a human point of view, the *Abasyilar* have monstrous and terrifying features, such as hanging eyes, half bodies and large mouths full of teeth. Yet from the viewpoint of the *Abasyilar* themselves, they are the ones who are humans, while human shamans, who may attack and kill them, are regarded as *Abasyilar* – that is, as evil spirits. Also, humans and animals are locked in a pattern of mutual replication. Thus, as I have already noted, animals and their associated spiritual beings are said to take on human shapes and live lives analogous to those of humans when in their own land and households.

To sum up, the world of the Yukaghirs is by and large a mimeticized world: Everything is paired with an almost endless number of mimetic doubles of itself, which extend in all directions and continually mirror and echo one another. In semantic terms, this implies that the Yukaghir cosmos of representation is made up of a symbolic order of tightly interconnected signifiers that permeate most aspects of life. Most of these signifiers are cross-referentially linked in an inter-textual and inter-discursive way (Bakhtin 1981: 291; Kristeva 1986: 37). Hence, signifiers from different discourses, such as e.g. hunting and relations of gender, are meaningfully interconnected with each other. This means that an utterance, such as 'hunting is sex', which may appear among hunters in the forest, is semantically connected not only to other hunting slogans, but also to the entire symbolic order of interconnected signifiers. The tightness of this symbolic structure is secured by the fact that it is based on a very limited number of 'master-signifiers', which are surrounded with an aura of enlarged importance as they provide a meta-cultural commentary upon the whole matter of living in a 'hall-of-mirrors' world. One such master-signifier is the hunter's mimetic encounter with his prey, which, as we have seen, coordinates and brings into focus the mimetic principle of the whole Yukaghir cosmos, and which is reproduced over and over again in the different contexts of hunting.

Now, bearing the tightness of this cultural order of signification in mind, to radically alter one's hunting strategy and bring an end to the imitation of prey would have far-reaching consequences. It

would not simply mean a change in one's subsistence efforts, but would simultaneously imply contesting all the other signifiers, with which the master-signifier of hunting is inter-discursively linked, thus contesting the whole cultural order of representation. This could easily cause the entire symbolic system to collapse, with all that this entails regarding cultural instability and the possible development of maladaptive cultural practices that could hold the seeds of the people's own destruction.

Conclusion

The Yukaghir case underlines the oversimplification and danger of deeming indigenous hunting practices irrational or maladaptive, just because they do not live up to the scientists' criteria for optimality. But it also underscores the point that indigenous peoples do not necessarily adjust their cultural symbols to natural demands. The Yukaghirs, as we have clearly seen, organize their productive efforts around symbolically defined goals – not the reverse. Although they at first glance appear to be at one with their environment through animal imitation, it turns out that what they are in fact mimicking is not nature as such – that is, the behavioural features of their prey – but a symbolic image of the elk, which in turn is modelled on the long gone reindeer. The implication of this cannot be overemphasized, since it strikes at the very core of the evolutionary account of mimicry. Rather than being a useful strategy of Darwinian adaptation, mimicry is more like a 'symbolic excess' that exceeds any evolution-istic proposition of adjustment to ecological conditions or pure utility.

However, the Yukaghirs' continuation of what in a narrowly utilitarian sense is an 'outdated' hunting technique that no longer mirrors the ecological features of their natural world also poses important criticisms to the concept of 'resilience' – the overall topic of this volume. The concept comes from landscape ecology and characterizes ecosystems that maintain themselves in the face of external disturbances. Recently, Neil Adger (2000) has suggested expanding the concept to include social forms as well, so that what he denotes 'social resilience' should refer to the ability of communities to cope

with external stresses and disturbances as a result of social, political, and above all environmental change. Ecological and social resilience, he suggests, are often linked through the local communities' economic dependency on ecosystems, thus making them less socially resilient to ecological pressures. This, he continues, 'is most clearly exhibited within social systems that are dependent on a single ecosystem or single resource' (Adger 2000: 350).

However, as we have clearly seen, this does not apply to the Yukaghirs. They have shown a great deal of so-called 'social resilience', despite the fact that they are almost fully dependent on a single animal species for their survival and have experienced the extreme instability of shifting animal resources along with other changes in recent times, including the collapse of the Soviet state farm system, which has made them ever more dependent on subsistence hunting. The trouble is that we cannot easily analyze social systems by using concepts developed within the natural sciences. As Adger (2000: 350) himself acknowledges, 'simply taking the concept of resilience from ecological sciences and applying it to social systems assumes that there are no essential differences in behaviour and structure between socialised institutions and ecological systems'. This is clearly contested by the Yukaghir ethnography. Not only has it been quite clearly shown that the production of cultural forms is not causally derived from ecological conditions, but even more importantly, it also shows that there is no simplified referential relation between symbolic forms and physical reality. As already argued, indigenous cultural symbols do not provide a translucent window to what goes on in the objective physical reality out there. Quite the opposite: Any cultural system of signification - including those of small-scale indigenous societies, like the Yukaghirs - acquires its meaning by means of the relationship of its signifiers to the whole chain of other signifiers in which they are entangled and these signifiers have no obvious reference to the physical environment they represent. Thus, the difference between the two domains of symbolic form and physical reality is not one of degree, but of kind, as they operate on different logical levels. What this points to then, is that the concept of 'resilience' with all its connotations of so-called 'hard' scientific facts is of little or no use to social anthropology in much the same way as

the concept of 'adaption', at least in its ordinary Darwinian meaning, makes no sense, when applied to the cultural worlds of human beings.

It also follows quite logically from all of this that it is inherently misguided to rely on TEK as a kind of corrective to scientific knowledge about climate change. Such anthropological usage is often woven out of codes that appear to represent reality not because it actually reflects the minds of indigenous peoples but because it matches our common-sense expectations about the state of the planet. As such, it gives the public what it wants, flatters its conventionality by mirroring a familiar world, but thereby impoverishes serious scholarly attempts at coming to grips with indigenous peoples' lives and modes of thinking.

I am not denying that climate change is real or that it can in extreme cases pose a threat to indigenous peoples' cultural survival. Although Arctic societies have through history shown significant adaptive capacity, there may come a point when the rate of environmental change crosses a critical line for keeping one's cultural heritage alive. Perhaps this is what Piers Vitebsky (1006: 10) points to when he quotes from his highly adaptable Siberian reindeer herders that 'if it gets too hot, they'll simply turn to camel herding'. Crate is not fond of this seemingly light-hearted statement and calls people like this for 'misinformed critics who deny the urgency to act on global climate change'. However, this urgency, I venture to suggest, is not essentially about cultural survival, since climate and other ecological kinds of pressures do not appear to produce cultural forms – that is, the physical environment never seems to determine symbolic structures, meanings and values and are, therefore, unlikely to be the prime mover in the production of culture. Rather, the symbolic content of cultural forms, such as the animal mimicry of Yukaghir hunters, is in some significant way both their means and their end.

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CHAPTER 14

The Resilience of Indigenous Intelligence

Laura Rival

Abstract

This chapter examines some of the reasons why resilience has become such an important concept for scientists interested in developing sustainability science on a planetary scale. On the basis of two ethnographic projects, one documenting the resilience of Makushi manioc cultivation to weather extremes, the other exploring the built-in resilience of landscape restoration work, I show how local knowledge – or indigenous intelligence – fundamentally depends on learning how to learn in living environments. I conclude with a reflection on the contribution anthropology should aim at making to the development of the new science of integrated social-ecological systems. This task requires that we continue to document ethnographically and compare analytically cultures of resilience and sustainability all around the world. We also need to rethink a number of key concepts (in particular ‘value,’ ‘human agency,’ ‘intentionality,’ ‘life’ and ‘materiality’) in the light of practices and modes of living aimed at protecting the evolving maintenance of integrated social and ecological systems, as these practices both raise and attempt to answer questions which are profoundly anthropological.

Journalist Lisa Chase’s piece “Do Worry, Be Happy” in a recent issue of *Elle Magazine*¹ is a good example of how the term ‘resilience’ is starting to capture popular imagination:

What attracted me to Transition, as the movement is called, was the word *resilience*, with its implications of being skilled, being ready, being confident, and therefore being optimistic about The Day After Tomorrow. The word is all over Transition's literature, all over its YouTube clips. It seemed such a superior word to *green* and *sustainable* and *eco*—once hot, now almost clichés, and subject to corruption by the market. But resilience, you can't fake. A resilient person is who I want to be. And if I'm not inherently resilient, can I learn to be? [...] Transition is about communities—in particular "relocalizing" them, and this you probably know something about: eating local and buying local, but also manufacturing local. It's also about "reskilling"—learning to do the things our great-grandparents knew how to do, such as growing food and building things. Most importantly, Transition is about resiliency, [that is] "a culture based on its ability to function indefinitely and to live within its limits, and to be able to thrive for having done so."

My goal in this chapter is to explore some of the reasons why resilience has become such a powerful word in the last few years, and why, despite the obvious problems linked to its popularity and its cooptation in the development discourse, resilience is a useful concept that helps us overcome dichotomous thinking when we attempt to theorize the intractable linkages between the natural world and the social world. I do so through two ethnographic accounts. The first one discusses the resilience of Makushi manioc cultivation to weather extremes, and the second presents the work of activists who consciously build resilience in their landscape restoration projects. I end with a discussion of how anthropology could contribute to the emerging sustainability science.

1. <http://www.elle.com/Beauty/Health-Fitness/Do-Worry.-Be-Happy>
Accessed on July 1, 2009

2. Recorded during the international conference held in April 2008 at the Stockholm Resilience Centre, available at <http://www.stockholmresilience.org/research/whatisresilience.4.aceea46911a3127427980004249.html>.

The varied and changing meanings of resilience

Resilience has become an important concept for scientists interested in developing sustainability science on a planetary scale. These scientists stress the inseparability of social and ecological worlds, seen as forming integrated, complex, and adaptive systems “characterized by historical dependency, complex dynamics, inherent uncertainty, multiple scales, and multiple equilibria. Such complex systems do not divide along disciplinary lines; they are integrated social-ecological systems” (Holling 2001: 390).

Most authors currently writing on resilience note that the concept derives from ecology. In fact, the term resilience was coined by Holling (1973) in a seminal paper that radically broke away from mainstream ecology by addressing ecosystem dynamics and incorporating human actions as key components of ecosystems (Folke 2006: 262). Folke (2006) offers a fascinating account of the origin of the resilience perspective, including a history of how Holling progressively elaborated the concept as his research interests shifted from empirical studies of prey-predator interactions to the analysis of wider systemic processes and population models. Holling initially conceptualized resilience as the “capacity of a system to absorb or utilize or even benefit from the perturbations and changes that attain it, and so to persist without a qualitative change in the system’s structure (Young et al. 2006: 305).” More recently, he has coined a new term, *panarchy*, to characterize the resilience of coupled natural and human systems that interact dynamically across temporal and spatial scales (Gunderson and Holling 2002). While panarchy results from a two-way interaction between a hierarchy of adaptive cycles, social-ecological systems remain resilient through diversity, variability, modularity, and feedbacks. Events and processes, either small, big, fast, or slow can transform ecosystems and organisms through evolution, or humans and their societies through learning – or the chance to learn. For Holling, “change that is important is not gradual but sudden and transformative.” Resilience is to biological evolution what sustainability is to societal development: both involve processes that simultaneously ‘conserve’ and ‘create.’²

As the term resilience is increasingly used to refer to social and

socio-ecological – rather than purely ecological – processes, its meaning is shifting³ towards related concepts such as vulnerability, robustness and adaptability. The need for epistemological clarity, therefore, is pressing (Gallopín 2006).

Discussions about resilience and the epistemological status of SES, as socio-ecological systems are increasingly referred to (Young et al. 2006, Gallopín 2006), are akin to the old tradition of thinking about the cultural and the social in terms of the biological and the ecological, and it is this common characteristic above all that makes them so fascinating for the social anthropologist. If we are not very far, at times, from the naturalist sociology of Spencer, the values being expressed, however, are very different. Resilience becomes a way of talking about positive change. Hornborg (2009) is right to question resilience theorists for a lack of attention to power relations, politics, and culture,⁴ but there are more ways of engaging the resilience perspective than his polemical and caricatural dismissal. This chapter hopes to engage critically, yet constructively, with some of the epistemological problems raised by the theory of resilience, and more generally, of sustainability.

The most intriguing fact for an anthropologist encountering the resilience literature is, arguably, the idea that resilience comes from ecology, for any quick survey of dictionary definitions reveals that the term's history is more complex and more interesting than the simple popularization of a scientific word. In fact, ecology borrowed the term resilience from physics. According to OED, the English word *resilient* comes from the Latin word *resiliens*, which derives from the verb *resilire* (to rebound or to recoil), a compound of *re-* (back)

3. See for instance the definition offered by Young and co-authors, for whom resilience refers to “the structural and other properties of a system that allow it to withstand the influence of disturbances without changing structure or dynamics” (Young et al 2006: 305).

4. The work of Tim Ingold, cited with praise by Hornborg (2009: 253) as a good example of how anthropologists engage with the intermingling of the social and the ecological without falling in the traps of systems ecology, suffers, in my view, from an even worse lack of attention to issues of power and conflict than the resilience theorists under discussion.

and *salire* (to jump, to leap). The word, first used in English by Bacon in 1626, was formally defined in 1656 as meaning “a leaping or skipping back, a rebounding; a going from ones word.”⁵ From 1824 onwards, physicists used the word to refer to “the physical property of a material that can return to its original shape or position after deformation that does not exceed its elastic limit.” Resilience (or resiliency) in this scientific context is a synonym of elasticity, that is, the “ability of matter to spring back quickly into shape after being bent, stretched or deformed” as well as “the energy per unit volume absorbed by a material when it is subjected to strain, or the maximum value of this when the elastic limit is not exceeded.” The French borrowed the word *résilience* from the English in 1911, as part of their effort to develop the technical and scientific language of physics. At the time, the word was exclusively used to define “the relationship between the needed kinetic energy and the breaking up point of a metal.”⁶ The French word *résilient* was borrowed a generation after (in 1932) to express the state of what “resists more or less to shocks.”⁷

Although more etymological and historical research is needed on this intriguing issue, common French and English dictionary definitions never mention resilience in the context of ecology. Apart from physics (and the extension of its vocabulary to medicine, with, in the early part of the 19th century, phrases such as “the natural elasticity or resilience of the lungs”⁸), two other scientific disciplines seem to be concerned, namely psychology and economics. English dictionaries clearly separate definitions that apply to substances,

5. The verb to resile (to retract, to draw back on one’s word) was used almost a century earlier (1529) to describe Henry VIII’s attempt to terminate legally his marriage to Catherine of Aragon (OED’s quotations for resilience).

6. “*Le rapport de l’énergie cinétique absorbée nécessaire pour provoquer la rupture d’un métal, à la surface de la section brisée. La résilience, exprimée en kgm par cm², caractérise la résilience au choc.*” Petit Robert.

7. “*Qui résiste plus ou moins au choc, est caractérisé par une résilience plus ou moins grande.*” Petit Robert.

8. And other bodily organs such as in “the power of the heart [...] materially reinforced by the resilient structure which composes the parietes of the aortic bulb,” “the fibrils of the resilient part of the nerve,” or “the skin giving a sensation of the loss of all elasticity or resilience.”

such as metals and plastics,⁹ from those that apply to persons, including their spirit, mind, conscience, and emotions. Human resilience is sometimes divided into 'physical' and 'mental' properties. Many synonyms (such as buoyancy, lightness, carefreeness, airiness, cheerfulness, liveliness, jauntiness, light-heartedness, breeziness, perkiness, and so forth) are associated with the capacity of buoyant persons to recover readily from shock or depression. When applied to economy, resilience refers to the faculty of taking up again (in French, *la faculté de reprise*). Further research would indicate whether resilience is really a scientific word in the vocabulary of economics, or whether it is just a journalistic term widely used by politicians and news commentators.¹⁰ Further work is also needed to establish whether Latin speakers, like their European descendants, applied the term *resiliens* indiscriminately to substances, matter and physical and mental properties of persons, and whether they used it to refer to the properties of landscapes.¹¹

Finally, there is no work – as far as I know – on how the concept of resilience passed from physics to ecology. Such knowledge is however crucial if we are to disambiguate some of the epistemological issues evoked earlier. It would also help us understand why the inclusion of humans in ecosystem research was seen as so heterodox thirty years ago, and why it has become the dominant view in recent years. As the brief journey through the varied and changing meanings of resilience has shown, persons, their surroundings, the communities

9. The word resilient is now also used in the context of computer technology, and may be applied to hardware, software or data, to speak of the ability to recover from a failure. See http://www.wordinfo.info/words/index/info/view_unit/1883/2/?spage=1&letter=S Accessed on July 1, 2009.

10. Although bordering on the anecdotal, and may be more revealing of library acquisition policies than of the varied and changing meanings of resilience, the list of resilience books held in the Bodleian library at the University of Oxford reveals that there are 56 titles starting with the words 'resilience,' 'resilient' or 'resiliency,' of which 3 deal with physics and engineering; 7 with ecological systems; 12 with psychology; 19 with families, communities (including institutions such as churches and schools) and culture; and 14 with political and economic systems.

11. See Glacken (1967: 116-149) for a discussion of natural resources in the Greek, Egyptian and Roman worlds.

and institutions they create, and the systems of exchange they develop form webs of signification so intricate that they may defy rigorous SES modelling. SES research is developing as a systems science aimed to address the underlying forces driving contemporary environmental change at the global scale. Although resilience researchers aspire to link the physical, ecological, and social domains in effective ways, they may be neglecting dimensions of the human-environment interface that anthropologists are particularly well placed to examine. Ethnographic accounts, with their power to capture social action and evoke cultural renderings in all their creativity and openness to the world, have thus an important role to play in documenting, for instance, different cultural perspectives on human nature, the bio-physical world, society and individual rights, as well as how these may influence behaviour towards the environment.

Taming the weather in the northern savannahs of Guyana

I worked for some years with a multi-disciplinary research team that looked at agrobiodiversity and its relationship with genetic diversity from the perspective of a single plant, manioc (*Manihot esculenta*). This work has shown that human and natural selection jointly shape manioc diversity through (1) the overall cultivation system, which is highly adapted to environmental pressures; (2) the knowledge, categorization and valorization of phenotypically expressed varietal differences; and (3) the incorporation, in this clonally propagated crop, of sexually reproduced plants, which encourages intra-varietal diversity and occasionally leads to the creation of new varieties, i.e. new categories that are phenotypically distinct and receive a new name before being multiplied (Rival & McKey 2008). With its focus on the evolution of manioc under domestication, the research has thus contributed to scientific efforts aimed at documenting forms of environmental management, local knowledge systems and cultural practices that enhance genetic diversity. In this sense, it has provided “deeper understanding of the role of biological diversity in ecosystem dynamics” (Folke 2006: 257-258), and, as such, has contributed to the development of resilience theory. I outline here aspects of

the research that are relevant to a discussion of the role of indigenous knowledge systems in adaptation to climate variability and climate change.

In Guyana, where manioc fields are regularly flooded during the rainy season and parched under a scorching sun during the dry season, indigenous manioc cultivators such as the Makushi have long learnt to adapt to weather extremes. The weather may be getting more erratic because of climate change, but severe drought and flooding are recurring climatic conditions to which indigenous peoples of the Guiana shield have learnt to live with.

The rainy season usually starts in April and lasts until September, with torrential rains falling in July and August. The El Niño weather phenomenon causes dry conditions with subnormal, low rainfall levels, as well as the premature ending of the rainy season. My second field visit to the northern Rupununi took place in 1998,¹² a particularly bad El Niño year.¹³ By April, drought and fires had already devastated many fields. I visited families who had lost their entire crops of manioc, pumpkin, watermelon, and fruit trees, and were suffering from food shortages. In the savannah community of Massara, for instance, almost every household was short of manioc tubers. Women had discontinued the preparation of *cassava* bread and *cassiri* drink – two Makushi favourites – and restricted the use of tubers to *farinha* making. The dried granules of pulped manioc tuber called *farinha* keep for months – if not years. *Farinha* is also easy to exchange or trade, and it can be taken on long treks. Scarce *cassava* bread was supplemented by rice, acquired through monetary exchanges or reciprocity. Fishing, facilitated by low water levels in rivers and creeks,

12. This study was part of a large research programme funded by the European Commission (DGVIII, Programme Avenir des Peuples des Forêts Tropicales). Institutional support was generously offered by the National Agronomic Research Institute in Georgetown, Guyana; the Ministry of Amerindian Affairs; the Environmental Protection Agency; the Amerindian Research Unit at the University of Guyana; the Conselho Indígena do Roraima; and Iwokrama Park. I will never forget the wonderful days and evenings spent with villagers in Rewa, Massara, Annai and Toka, to whom I am greatly indebted.

13. For a discussion of the impact of 1998 El Niño in Southeast Asia, see various contributions in Ellen (2007).

was intensified, both for consumption (people were therefore eating more fish than usual) and for sale (to obtain the cash necessary to buy rice). Whenever they could, families were leaving their savannah dwellings for less hot and smoky places, travelling to their '*high bush farms*' in forest areas on hilltops or along rivers, trekking to distant hunting territories, or visiting relatives living in more propitious and moister regions. When not fishing or visiting relatives, Makushi cultivators were busy preparing new '*farms*.'¹⁴ What struck me most during these difficult weeks was that people, who did not seem too concerned about the loss of crops as a source of food, were putting all their energy in saving planting materials and preparing new areas for planting. This is what I wrote in my field diary:

Whenever there is a drought, the main concern of Makushi farmers is to prevent manioc stems from drying out. Their priority is not to save harvestable tubers, but to preserve cuttings as 'seed banks.' Cultivators prioritise the long-term reproductive cycle over the short-term productive one. For this, they look for swampy areas, which are, under normal circumstances, flooded, and transport their best stems—sometimes over great distances— from their farms to the swamps, to stock them in large bunches there, until the time when the rains make their replanting possible. The farmer's greatest problem in time of drought is, more than food shortage, the lack of manioc stems to replant and the sudden drop in varietal diversity.

Other members of our research team collected similar data in other field locations, and throughout the duration of El Niño. Had we not started our study of indigenous management of manioc varietal diversity during a period of bad drought, we might have taken longer to understand the general evolutionary ecological characteristics underpinning Amerindian traditional manioc cultivation, and, in particular, the crucial role played by seed bank dynamics (Elias, Rival & McKey 2000; Pujol et al. 2007; Rival & McKey 2008).

In the following weeks, I learnt from Makushi villagers how to

14. Guyana is the only English-speaking country in South America, and this is what they call their manioc fields under slash-and-burn management.

anticipate subtle changes in the weather by observing the flowering and fruiting of certain plant species, the feeding and nesting behaviour of certain bird species, or changes in the behaviour of amphibious animals – in particular alligators. Although systematic research on this topic has yet to be carried out, there is little doubt that the Makushi use a complex system of ecological indicators to predict changes in weather patterns.

The oral histories collected during these weeks of intense drought also taught me that the Makushi, like so many other indigenous peoples, used to be more mobile in the past; their primary response to a severe drought was to leave the savannahs altogether. They would intern themselves in the forest and travel up river until the start of the rainy season. With no manioc products left to eat, they would live on fish, game and forest food, including numerous fruits, roots, young shoots, seeds, and honey. They would process the fruit and pith of certain palms, as well as other forest plants and seeds to produce a type of meal used to prepare ersatz manioc bread. Some of these forest foods are still known today, but no longer used. I was not able to visit the Rupununi during times of flooding, but conversations with villagers and research collaborators suggested that the Makushi are as well adapted to flooding as they are to drought, and moreover, that they know their environment in its – often dramatic – succession of more or less dry to more or less flooded state. I strongly suspect that further ethnographic research would show that, for the Makushi, the best way to deal with weather vagaries is not so different from the way one ‘cultures’ the land so that manioc can grow, or tames wild spirits, so that the ill can be cured (Rival 2001).

If Makushi manioc cultivation systems are so well adapted to environmental pressures and Makushi environmental knowledge so superbly tuned in with extreme weather conditions, why did the people suffer hardship during the 1998 El Niño? Part of the answer lies with the forces of “development and progress,” to which indigenous peoples have had to adjust, and whose “pernicious effects” are far from easy to tame (Anchorage Declaration 2009; Kimberley Declaration 2002; Ginzburg 2005; Mander & Tauli-Corpuz 2005).

If Makushi contact with the forces of ‘market’ and ‘progress’ is

several centuries old, it was, until the last thirty years or so, rather intermittent and fairly unobtrusive. My older informants worked for large ranches or companies specializing in the extraction of balata latex, but the cash and trade goods they obtained through selling their labour did not impinge on the domestic economy or endanger its autonomous reproduction. For complex historical reasons linked to the consolidation of the international border between Guyana and Brazil, the formation of national political identities (privileging coastal areas in both countries), and the political and economic consequences of the Rupununi Uprising in 1969 (Farage 1991, 1997; Santilli 1994), the Makushi of Guyana have been more economically isolated than other indigenous peoples of the Guiana shield. This has allowed them to maintain traditional hunting, fishing, and cultivation techniques to a degree I have not seen elsewhere in lowland South America.

Today, people live on the savannah, where they own houses and plots of land. As savannah soils are not propitious for cultivation, villagers farm miles away from where they live, on forested hills or in forest galleries along riverbanks, often on land to which they have no legal title, or in conservation forests in which it is actually illegal to cultivate. The schools to which they send their children are all located in savannah sedentary settlements, and operate according to a national calendar which cannot – will not – accommodate traditional seasonal migration. Like in so many other regions, broader cultural, social and political influences have eroded people's confidence in traditional knowledge and people's valorisation of economic self-sufficiency. Young couples who had given up fishing and manioc cultivation were particularly hit during the 1998 El Niño drought, and it is perhaps with such families in mind that the government planned its food aid programmes. These programmes, designed to assist environmental refugees in urgent need of food and water, show that ecological sense and state rationality are not easily reconcilable (Rival 2002).

When a state of national emergency was declared at the end of March 1998, the Civil Defence Commission was asked to coordinate disaster relief efforts with UNDP, who drew up plans to procure and distribute food (rice, flour, sugar, farine, oil) and water to Amerin-

dian communities in Guyana's affected regions. A UNDP official was assigned the task of buying large quantities of cuttings of an improved sweet manioc variety from an agricultural research centre in Brazil. My interview with him clearly established that he had no knowledge of indigenous cultivation systems. He did not know that the Makushi mainly cultivate bitter – not sweet – manioc varieties, or that they regenerate germplasm from soil seed banks. UNDP short-term humanitarian relief policies seemed to be based on the same government ignorance of indigenous knowledge as the autarkic development policies promoted by the postcolonial regime in the early 1970s. These policies were aimed at boosting national self-sufficiency in basic foods by massively increasing the production of manioc flour throughout Guayana. The plan was abandoned after just a few years, however, because of the alarmingly high number of people who had been taken ill to hospital, some dying of poisoning. The intoxication was caused by the consumption of incompletely detoxified manioc flour. The 'coastlanders' (i.e. non-Amerindian Guayanese) involved in producing manioc flour industrially had never mastered the Amerindian art of manioc processing.¹⁵

Becoming hydroliterate through Brock's water tales and on Marsha's farm

"The world is made of watersheds. Water is life. Without water, there is no life. Earth, like our body, is made of water. Water is the blood of the globe. On Planet Water, the average global rainfall is approximately 15 inches (40 cm) in a year. There is no activity on earth which is not lubricated, in one way or another, by the liquid of life. For me, the only true source of water is precipitation. The quantity of fresh water, like that of oil, is finite. But the difference between water and oil is that water is cyclic. The hydrological cycle is extraordinary. It's linked to the sun, you see, to sunlight: solar distillation. With climate

15. This story was told to me in August 1997 by an academic of the University of Guyana. No manioc cultivar is completely devoid of cyanogenic glycosides. While bitter varieties, with high acid content, need to be detoxified prior to consumption, sweet varieties, with low acid content, can be readily eaten without processing.

change, we are changing the hydrological cycle. Planet Water has had a 1° F (0.6° C) temperature in the last 100 years; it will soon rise to a 4 to 6° F fever. When you have a fever, you sweat. The glaciers are melting because Planet Water does what your body does when it's got a fever: it sweats."

"Rainwater is a source, not a supply. Rainfall is like an 'income' and storage like a 'savings' account.' Planet Water gives me an allowance during the winter months. I can let it run to the oceans, i.e. spend it all, or I can put it on my savings' account, naturally stored in soils and watersheds. Nature holds water in plants, air, and soil. Water is cleansed and recycled in wetlands, breathed into the air by trees, collected and channelled by landforms. If you work with nature, you can use your house and your garden to capture, hold and recycle water."

"Water exists in landscapes, and it moves. There is dead water, and there is living water. When water moves, it gets regenerated. In rivers, water moves, it's vitalized, livened up. As water spirals, it forms flows, which support oxygenation. Mineral salts are created. With the rhythm, toxic wastes are removed. Biological purification is part of life processes. This is why wherever I can I create channels filled with rocks and growing plants on which I run the water."

"The techniques I use are not different from those traditionally used in China, Mexico, Hawaii, and in many other parts of the world. All over the world, people have managed productive river and watershed systems. In some places, there were specialized plant systems to treat sewage water... There's something magical in creating these simple cycles, as if nature recognizes the services and showers us with her gifts in return. If we think of a garden as a living being, then a grey water system acts as one of its organs, a sort of liver and kidneys that process waste and liquid."

I have met many enthusiastic activists in Brazil in the last three-four years, but Brock is by far the most passionate when it comes to water, and the most knowledgeable as well. After a first degree in biology and many jobs down the line, including working as an engineer for oil companies in the Amazon region, Brock joined an ecology centre in California, where he established the Water Institute, also known as the Institute for Watershed Advocacy, Training, Education and

Research,¹⁶ which he directs. One of the institute's achievements has been to help reintroduce the Coho salmon in one of the most polluted and intervened watersheds in the world. This was accomplished through observing the river to know it and experience it as a salmon would, and then convince decision makers that restoring the salmon run would be good for the Coho species, and also for the whole of society. If you go to the Institute's website and click his name, you'll see a picture of Brock in his shirt submerged in water, with a broad smile on his face. His smiling face reminds me of the drawing he gave me that day in São Paulo, of the sad versus happy (magic) Mickey Mouse H₂O molecule. "H₂O is a bipolar, in fact, a tripolar, molecule," he told me, "... it changes from gas to solid to liquid. Water as solid (ice) floats on its liquid self. This makes life possible." "Water drives the shape of life," he added, "the forms of life. Water follows the path of least resistance, which is not a straight line, but vortexes." He showed me a map of the Amazon River, the largest river on earth.

"Look, this is form following function... Look at these branching fractals. Water is the driver at every scale. Water goes from concentration to dispersion. Those who build canals (straight lines) are hydro-illiterates. I'm trying to promote hydro-literacy." Brock has perfected his teaching on water, over the months; it is instructive to listen to the various recorded talks available on the web, but none has the freshness and direct engagement of his one-to-one conversations.¹⁷

Listening to Brock has made me *think* about water, an element I was – like so many of us – simply taking for granted. In this sense, and as far as I am concerned, Brock has partly fulfilled his objective: he has made me more hydro-literate, even if just a little bit so. At

16. <http://www.oaecwater.org/about/water-institute> accessed on February 7, 2009.

17. You can hear a few of his talks on: http://www.ipcon.org/index.php?option=com_content&task=view&id=148&Itemid=1 and <http://www.sdnhm.org/webcasts/lectures/brockdolman.htm> accessed on February 7, 2009

least, I am now deeply aware of my ignorance. I still do not pay sufficient attention to water in my home; I often fail to attend to what I now know about water; and my surroundings are still shaped by the ignorance borne out of this taken-for-grantedness. However, Brock's water tales, with their mix of western science, esoteric knowledge, and poetic – almost religious – vision have awoken my anthropological imagination.

I met someone else in Brazil who knows about water in a similarly intelligent way. Marsha bought a piece of land in the *certão*, one of the poorest and driest regions of the northeast, a piece of land totally devoid of nutrients because of large-scale deforestation followed by eighty years of repeated bad management. The soil was as white as sand is on a tropical beach; no crop could grow, not even manioc. The *certão* has been made famous as a land of hunger, utter poverty, drought, desertification, and mass out-migration by writers such as Jorge Amado and anthropologists such as Nancy Scheper-Hughes. Rains are highly erratic, but there is good ground water, as indicated by the girth of the native cashew nut trees, which can reach ten metres, or more. Marsha's project to transform this bit of *certão* into a productive homestead involves restoring the land to its natural fertility, re-establishing the natural forest on part of the property, and creating dense networks of crops, animals, and people on and around the farm. It is there, in fact, that I received my first lesson in hydro-literacy. Marsha simply asked me to walk through the water-retaining landscape, and to execute very small, basic, low-skill tasks she knew I could perform without endangering the restoration work. She never explained much, and I did not dare disturb her with endless, naïve questions. But as I drunk the cool and fresh rainwater stored in the traditionally built earth tank; gathered small tomatoes covered in dew; and stumbled over big toads at night on my way to the bathing area, I learnt that water can be made abundant by working with the rain cycle, even in dryland areas.¹⁸

18. See the report *Rain: The neglected resource* for a policy-oriented discussion of rain as "the ultimate water resource" ("the supply is in the sky") at <http://www.siwi.org> Accessed on April 29, 2009.

Marsha moved to the *certaõ* with thirty-five years of experience in agroforestry and rural development. She is liked by the poor villagers who live around the farm. They get jobs on the farm (there's so much to do!) and, perhaps more importantly, feel part of the restoration project. Cultivation techniques are shared and tried out on various fields around the village. Notes are compared. The children come to Marsha's farm every day after school to play music and sing. As one of Marsha's friends told me, she does "repair work." "She rebuilds forests, water systems and communities," he added. There is absolutely no difference for people like Marsha between "caring for the earth," "caring for people," and "caring for the self." It's all part of the same ethics, all part of the same challenge.

Living well for Brock, Marsha, and like-minded people means thinking and acting in a world where built environments are not severed from wilderness, as all spaces need to be meshed within a web of relationships that unfolds into seamless socio-ecological spaces of dwelling. They see themselves as 'practical designers' who create value by applying ecological principles. "With the application of ecological principles, people are able to integrate themselves, their buildings and their landscape through beneficial association; these living systems are capable of supporting and regenerating themselves" says one of Brock's friends. "Our designs are applicable to any scale, from window box to region or to any system, from household through industry to economy. These principles are generic, they can be used in any climatic or cultural context" adds another. For Brock and Marsha, sustainability or resilience (they use the two words as synonyms) comes from understanding human physical presence on earth in terms of relative intensity. At one end of the continuum, we find the houses and buildings where people live, work, and make intensive use of resources; at the other, the spaces where people refrain from going or intervening, and where nature is left alone to organize things. All aspects of human life are linked. Firstly, food, water, and shelter, including the flows of energy and waste that make a home a home; then, transport, education, and models of decision making, or the web of relations that link homes together over time and space; finally, spirit or soul, or what links home dwellers to other sentient beings. This is how people and nature are linked up

in a total socio-ecological fact, through actions aimed at regaining some control over the production and consumption of energy.

Through the socio-ecological worlds enacted in the integrated living landscapes designed by people like Brock and Marsha, development is envisioned as wellbeing, and sustainability valued in terms of a political economy which starts with the conscious, practical, and relational self, to then flow and radiate outward in concentric circles that embrace, through the awakening of awareness, imagination and empathy, the whole world. Landscape restorers and holders of local knowledge such as Brock and Marsha are living examples of the power and capacity of people to build resilience through collective action (Folke 2006: 262).

The resilience of indigenous intelligence

As theorizing the interface between society and the environment has always been a central concern of anthropology, anthropologists should be particularly interested in new concepts such as social-ecological systems, resilience and sustainability. However, the discipline has yet to reflect on sustainability as a newly emerging aspect of the co-evolving history of humans and environments (Rival ms). We currently lack a synthetic and integrated picture of anthropological thinking on nature, the environment, the economy, and development. One way of remedying the situation is by focusing on the anthropological questions raised by those who have gained or preserved some kind of indigenous intelligence.

Times of crisis are times when societies must choose between distinct historical directions. “The greatest resource that people have is their ability to innovate, and that ability is shared with all groups of humans who live or have lived on the Earth” (Kaua’i Declaration 2007: 1). Throughout the world, a new community of small holders is developing around people who use their rich knowledge of nature to increase food production sustainably and restore ecosystems. In the savannahs of the Guiana shield, in the Brazilian *cercaõ* and in California, land is being restored through ecological practices. People like Marina, Brock and the communities in which they work are demonstrating in very concrete and physical ways how innova-

tion can revert environmental degradation, and restore the natural quality of the air we breathe; the water we drink; the topsoil upon which our agriculture depends; the diversity of biological life and cultural ways; and even climate stability.

As I have tried to show, the Makushi have been great innovators in their own ways, but they are suffering today from what some indigenous leaders have called the pernicious effects of development and progress (Kimberley Declaration 2002). The national society in which the Makushi live may now be more open to acknowledge their indigenous rights (a very recent recognition fraught with great tension), but they are still subjected to the symbolic violence exercised by those who cannot recognize the *value* (rather than just the right) of being different and living in a distinct human collectivity. Furthermore, dominant society has yet to accept that Makushi swidden horticulture is *wiser* than coastal agriculture, and that it could be used as a model to rethink Guyana's farming systems.

Whereas people like Brock and Marina *are becoming* indigenous, the Makushi *have been* indigenous. The indigenous intelligence deployed by the former is slowly being recognized, while that of the latter is rapidly being devalued and eroded. Weaker and smaller groups may internalize dominant values, and the hegemony of certain (non-sustainable) cultural modes of production and consumption may prevent creative forces to shape inter-community exchanges. 'Indigenous intelligence' fundamentally depends on learning how to learn in living environments. The extinction of experience is real enough (Atran & Medin 2008), but, as I have tried to show here, it can be reversed. The education of awareness can lead to change as (re-)discovery of what makes human life possible.

In his seminal *Problems in materialism and culture*, Raymond Williams (1980) said that we need different ideas of nature because we need different relationships. By ideas, I wish to claim, he really meant values. Anthropology may always have been troubled by the tension between knowledge and meaning, but there are today new twists to this tension. Science can tell us how the world is, but it cannot instruct us about meaning or values. Values will never be descriptive. Cultural values, as ideals, largely constitute standards against which people judge themselves and their neighbours. In keeping with Ray-

mond Williams' spirit, we need to ask: How do values shape the inter-relation between environmental change and development? Although often disparaged as an ambiguous, ideological and inoperable concept, 'Sustainable Development' has been remarkably enduring. Far from disappearing, as predicted, the oxymoron continues to inspire and mobilize energies. And despite its shameless exploitation by interest groups, a growing number of individuals, associations and communities all around the world have chosen not to reject, but to embrace sustainability as a core value, which they translate in a range of practices and modes of living that protect the evolving maintenance of integrated social and ecological systems.

I have started to document ethnographically the creation of spaces in Europe and in Latin America where the values of sustainability and resilience are being materialized and enacted, and have found that these practices both raise and attempt to answer questions which are profoundly anthropological. These anthropological questions and the concrete, material, and embodied answers they find in the projects I am researching can be used to engage with the politics of hope that such spaces embody, and to theorise sustainability from an anthropological perspective. By reflecting anthropologically on the anthropological projects of ethnographic collaborators, we will be in a stronger disciplinary position to approach the issue of resilience.

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CHAPTER 15

Climate Change = Discourse Change? Development and Relief Organizations' Use of the Concept of Resilience

Mette Fog Olwig

Abstract

Climate change impacts especially the Global South. Humanitarian/development organizations are therefore incorporating a climate change dimension into their work. New concepts are introduced and old concepts used in new ways, potentially changing organizational discourse and thus development issues and goals. To elucidate the possible direction of the new discourse, this chapter examines, on the basis of interviews with developers, concepts employed when discussing climate change, focusing on 'resilience.' Resilience has the potential of including a dimension of local agency, thus involving local communities that have been largely ignored in climate change mitigation initiatives. Many definitions of resilience in relation to climate change exist since it is a complex subject matter approached from different sectors and a politicized issue that has become a central concern only recently. Official definitions are still being negotiated and several organizations have not yet determined an operational definition of resilience. A discussion of definitions and their implications for local agency is therefore timely.

I was on a mission last week, and it was very interesting for me because I kind of took a step back intentionally for about half an hour and I just listened to the conversation. It was going like this [points in all directions]. There were people who were talking about disaster risk, who were confusing hazards and risks and vulnerabilities to the current climate... with things that had nothing to do with climate change. It gets totally muddled. (Interview with informant working on climate change, April 2009)

In the spring of 2009 I interviewed a number of officials in development/humanitarian organizations in order to examine how they approach climate change at a conceptual and practical level. Climate change has become an increasingly well-documented global problem in recent years and for this reason development/humanitarian organizations have begun to rethink their agendas and priorities in relation to external factors that are somewhat outside the bounds of their previous practice. This involves introducing new concepts and using old ones in new ways, which could potentially lead to a new organizational discourse. Such discourse has important implications for the ways in which local populations affected by climate change are perceived and approached by humanitarian and development organizations. I chose to focus on resilience because this concept has the potential of including a dimension of local agency thus involving local communities that have been somewhat ignored in many climate change mitigation initiatives so far. I wanted to gain an understanding of how the concept resilience is currently used by the development/humanitarian sector, in what direction its definition is moving and what influences this process. I found that different definitions of resilience flourished, but also that many organizations had not yet agreed on a definition. Some informants explained that it is a difficult concept to define in a way that can be easily operationalized in development/humanitarian work.

Several of the informants seemed frustrated, perhaps even resigned, with regard to the 'confusion' and disagreement that appear to penetrate discussions on climate change and disaster risk reduction, as illustrated by the introductory quote. This reflects the general uncertainty concerning what constitutes global warming, climate change and what are 'just' natural disasters – of the kind the

globe has witnessed for millennia. One reason for the confusion described by the informant quoted above may therefore be that climate change involves complex issues. This complexity and uncertainty is also reflected in differing definitions of resilience in relation to climate change. Some of the informants, however, likened the definitional confusion with regard to resilience to prior debates on the definition and operationalization of other concepts used within the development sector, such as 'gender', 'sustainability' and 'participation,' indicating that disagreement over the specifics of the definition of concepts is not an uncommon issue within the development/humanitarian sector. In a discussion of discourses of development, anthropologist Ralph Grillo points out that there is no such thing as *the* discourse within development '... there is as much diversity *within* the community of "professional developers" [...] as between them and other stakeholders or "players" [...]' (1997: 21).

Some practitioners did not believe that differing definitions and concepts posed a major problem, asking questions such as: 'Does it really matter what the definitions are, as long as we get our work done?' To them what was important was that there was work that needed to be carried out, and whether or not this work could be perceived as reducing vulnerability, building capacity, or giving humanitarian aid was not a central concern. As pointed out by Grillo, however, there are many examples of 'ways in which development discourse constructs the object of development' (1997: 19). Furthermore: 'In many contexts there does indeed seem to be present a "development gaze", or, to change the metaphor, an authoritative voice, which constructs problems and their solution by reference to a priori criteria, for example to "broad themes which buzz around development agencies: malnutrition, labour bottlenecks, soil degradation and so forth" (Gatter 1993: 168-9)'. Anthropologist Georgia Kaufmann provides empirical data to underscore this point. She carried out a study of 'the manner in which individual developers based in Britain think and conceive of development' (1997: 108) and found that: '[t]he choice of words reflects more than a predilection for vocabulary: it comes from a combination of background, politics and training. More significantly, it reflects the way in which the developer conceptualizes the task in hand' (*ibid*: 127).

An example of the significant implications definitions can have for the targets of interventions can be found in anthropologist Nancy Scheper-Hughes' analysis of post-traumatic stress disorder (PTSD). She argues that the PTSD diagnosis has become 'a free-floating signifier of danger, harm, vulnerability and woundedness' and that this results in depreciation of the agency of those diagnosed:

The PTSD model underestimates the human capacity not only to survive, but to thrive, during and following states of emergency, extreme adversity, and everyday as well as extraordinary violence [...] the medical-social science-psychiatric pendulum has swung in recent years toward a model of human vulnerability (Harris 1997) and human frailty (Buttle 2003) to the exclusion of the awesome ability of people - adults and children - to withstand, survive, and live with horrible events. (2008: 42)

In this chapter I discuss differing definitions and understandings of the concept of resilience with relation to climate change to highlight the concept's potential of including a dimension of local agency.¹ I start off by providing a short historical background of the development/humanitarian sector's involvement in climate change work, based on my interviews. This leads to a presentation of the concept of resilience and a discussion of how the differing definitions have come about and why it is so difficult to find an operational definition. I argue that reasons for the varying understandings and uses of resilience include that research and practice in relation to climate change is cross-sectoral and politicized and that official definitions such as those used by the COP² are still being negotiated with re-

1. The way in which concepts can be understood in many different contexts could be an interesting study in itself, but in this chapter I focus on definitions only within the development/humanitarian sector and not broader cultural definitions. Furthermore, I do not address how personal experience, political commitment, and technical training may have shaped my informants' responses, as Kaufmann did in her study of development workers (1997: 129), although I think this could be a very interesting topic for further study.

2. Conferences of the Parties under the United Nations' Climate Change Convention.

gards to the specifics of their meaning – a lengthy process that may never end. I then argue that a discourse of resilience has the potential of including a dimension of local agency. Disaster management, I show, has evolved from a discourse of technological solutions with little focus on social processes to a greater focus on including local communities in planning by, for example, looking at vulnerability. Resilience, it has been suggested within the context of disaster management, can further strengthen awareness of the potential of local agency, and not only the local community's vulnerability. Finally, I discuss the importance of including local cultural perceptions and agency in work on disaster management and climate change discourse. A definition of resilience that includes local agency could play a major role in stimulating such a discourse.

This chapter is based on formal interviews and a few 'coffee break' informal conversations with representatives from various organizations engaged with international development and humanitarian aid (see list of interviewees in appendix).³ The interviews took place in Copenhagen, Washington DC, and New York City in April and May 2009. I spoke to individuals in donor agencies and in organizations that focus on disaster risk reduction (DRR), climate change, environmental issues, human rights, advocacy, generic social development, and humanitarian relief. My questions revolved around the concept of resilience but the interview often branched out into more philosophical conversations on climate change, development and humanitarian aid, and the use of concepts in general.

Climate change triggers

It is only during the 2000s that the general development/humanitarian sector has begun the process of 'mainstreaming' climate change. To understand the processes by which climate change has become addressed by development/humanitarian organizations, and thus the context within which the language of climate change

3. Several of my informants requested that certain statements be off the record. I have therefore chosen to summarize the interviews without referring to specific people or organizations.

has developed, one of my first questions when conducting the interviews was ‘When did climate change begin to become a concern to your organization, and what was the trigger?’

In summary, the general answer I received was that at first climate change was considered to be a green issue, not a general development/humanitarian issue. There was also primarily a focus on mitigation, in the hope that it would still be possible to avoid severe impacts from climate change. It was considered to be a defeat to look at adaptation. Not until 2001 at COP 7⁴ did scientists move from making abstract studies to arguing that adaptation must be implemented in practice. Thereafter several high profile publications, such as the 2006 Stern Review and the 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC),⁵ made it clear, firstly, that there *were* going to be impacts, and secondly, that these impacts would have *economic* repercussions. This resulted in a shift from a strict focus on mitigation promulgated by green organizations to adaptation involving the development/humanitarian sector. To a great extent the planning of adaptation projects has therefore only begun and the first projects are in the early phases of implementation.

Some development/humanitarian organizations had prior to these milestone publications been looking at climate change as an important issue, but the attention generated by the publications helped persuade all partners and organization departments to unite on this topic. It may have taken longer otherwise. Funding and political goodwill, furthermore, became more prevalent, aiding any work done in this area. In fact, top-down pressure in the shape of donor requests to have an organizational focus on climate change was mentioned by some as a reason why climate change was becoming an established part of the organization’s activity field.

Some organizations have also felt bottom-up pressure to look at climate change issues. Several informants mentioned that their con-

4. The seventh Conference of the Parties under the United Nations’ Climate Change Convention.

5. A scientific intergovernmental body established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP).

stituency and country partners have become increasingly concerned with climate change due to changing local conditions as well as fear instigated by the global media. The milestone for human rights and indigenous people's organizations in terms of their involvement in climate change was the petition filed in 2005 by Canadian and Alaskan Inuit, led by Sheila Watt-Cloutier, to the Organization of American States' Inter-American Commission on Human Rights. The petition argued that:

The impacts of climate change – “caused by acts and omissions” – by the United States “...violate the Inuit's fundamental human rights protected by the American Declaration of the Rights and Duties of Man and other international instruments. These include their rights to the benefits of culture, to property, to the preservation of health, life, physical integrity, security, and a means of subsistence, and to residence, movement, and inviolability of the home.” (As cited in Crump 2008: 29)

Firmly linking climate change to human rights, the petition was key to making human rights and indigenous peoples' organizations important players in the climate change debates. The human rights dimension also includes a focus on the negative impacts of mitigation, as pointed out by Christina Nilsson, Asia Programme Coordinator, The International Work Group for Indigenous Affairs: ‘Increasingly, international and national climate change mitigation strategies pose an additional threat to indigenous peoples' territories and coping strategies’ (2008: 9). Examples include hydro-electricity, Reduced Emissions from Deforestation and Degradation (REDD) and agro-fuel where eviction of local communities or limited use of traditional resources may incur as part of the strategy. Historically similar issues have arisen in, for example, the establishment of natural parks. Organizations that are experienced in dealing with those types of issues are therefore increasingly finding themselves involved in work on securing the rights of local communities with regards to climate change mitigation projects.

As an effect of the above mentioned triggers, climate change is today broadly viewed as a development/humanitarian issue, but several of my informants indicated that the process of achieving this

recognition has been far from easy. One informant said it had at one point felt like ‘herding donkeys’ – things were moving along very slowly. Nowadays, the same informant said, it is like ‘herding cats’ – everybody is independent and moving in all directions. I found my interviews reflected this situation. In fact, commenting on my attempt to get an overview of what is going on with regard to climate change in the development/humanitarian sector, a few of my informants ruefully wished me ‘good luck’.

Gaining an understanding of the concepts being used, specifically the concept ‘resilience’ in relation to climate change, turned out to be equally challenging. Some organizations stressed that they have for some time done work relevant to climate change, but called it something else. CARE International, for example, used to have a ‘Poverty and Environment Network’ which is now called ‘Poverty, Environment and Climate Change Network’. During the rest of this chapter I will show, through a discussion of the history and current application of the concept ‘resilience,’ how concepts are being renegotiated in the light of climate change as well as the potential consequences of definitional specificities.

Resilience

A multitude of concepts such as vulnerability, resilience, coping capacity, climate proofing, enabling environment, and adaptation are used in documents discussing climate change. It became clear to me early in the process of interviewing that many of the concepts employed when discussing climate change have not yet been clearly defined by those using them. During a coffee break at the launch of a climate change report, I asked a senior economist about the different concepts that were prominent in the report. I received a response along the lines of: ‘I can’t answer that question. We have not sat down and discussed the definitions of concepts.’ Since concepts such as resilience appear to have a contested history, however, clear definitions could avoid some confusion as to, as Grillo and Kaufmann phrased it, what object is being ‘constructed’ and what is ‘the task in hand’.

Siambabala Bernard Manyena notes that the history of the ap-

plication of resilience ‘is not rosy; it is full of contestations, especially regarding its affinity with and lucid usage by a multiplicity of disciplines’ (2006: 433). There is not even a consensus with regard to the origin of the concept. According to Manyena, ‘some say ecology (Batabyal, 1998), while others say physics (Van der Leeuw and Leygonie, 2000) [...] Most of the literature, however, states that the study of resilience evolved from the disciplines of psychology and psychiatry in the 1940s [...]’ (2006: 433). According to Valerie Nelson, social development specialist at the Natural Resources Institute, University of Greenwich, and Tanya Stathers, post-harvest, integrated pest-management specialist at the University of Greenwich, ‘Resilience thinking, an important new direction in climate-change research, emerged in the 1980s, with antecedents in the “systems thinking” of the 1970s’ (2009: 88).

In the current climate debate, resilience appears to not only have many definitions, but also to be used without *any* explicit definition. When asking my informants how they would define resilience I thus received different reactions. One person quoted Humpty Dumpty, who, in Lewis Carroll’s *Through the Looking-Glass*, says to Alice: ‘When I use a word, it means just what I choose it to mean – neither more nor less,’ elaborating that resilience has become a catch-all phrase ‘that is really hiding true communication about what people mean’. Several replied, ‘that’s a good question.’ Another informant, however, felt, ‘it’s a kind of self-explanatory definition. It is how to make development more climate resilient. So it is development that reduces the impacts of climate change to the extent possible related to the local conditions. So it is a flexible definition.’ Another informant told me, ‘it’s the coping capacity.’

The many uses and definitions, or non-definitions, of resilience were, according to my informants, a product of the cross-sectoral nature and politicization of climate change. In the following I will discuss these factors further.

Institutional cultural dissonance

Climate change is a cross-sectoral concern. This was mentioned by my informants as having positive and negative consequences and to

have affected concept definitions. Some of my informants alluded to 'competing camps' between the climate adaptation and the disaster management sectors. The disaster management sector is well established and has its own conceptual approach. The climate adaptation sector is relatively new, however, and is still establishing its conceptual approach. Disaster and climate change are becoming increasingly linked as illustrated in a recent publication prepared as part of the IPCC: 'various extreme events are very likely to change in magnitude and/or frequency and location with global warming' (Schneider et al. 2007:795). The executive summary asserts, furthermore, that some of these changes are already happening: 'There is new evidence that observed climate change is likely to have already increased the risk of certain extreme events such as heatwaves, and it is more likely than not that warming has contributed to the intensification of some tropical cyclones, with increasing levels of adverse impacts as temperatures increase (very high confidence)' (ibid: 781).

According to one of my informants, 'the disaster management community' and 'the climate adaptation community' have not had an easy time communicating. Apparently there has been a tendency for 'the climate adaptation community' to view DRR as merely part of climate adaptation, whereas 'the disaster management community' has argued that DRR is much more than merely disasters related to climate change. Disasters can occur for many reasons including earthquakes, volcanoes, and poor infrastructure such as a lack of proper drainage in case of rain. This debate has also resulted in discussions concerning definitions. One informant based in the 'climate change community' gave me the following account:

There are misunderstanding barriers, but sometimes there are ownership barriers. There is one between the disaster risk community and the climate change community. Every time I go to a disaster risk meeting or whatever, I know I am going to spend a lot of my time hearing, "the climate change community got the term mitigation completely wrong, this is a real barrier, etc., etc., etc, they don't understand what they are talking about." It's true that the climate change community use mitigation in a sense which is incompatible with the way the disaster risk community use it. And the disaster risk community were using it a lot earlier than the climate change community were using it

and therefore, you know, why would they do something as silly as that. This happened, you can't do anything about it. It came about not because of the broader science climate change community, although they were part of it, but because the negotiations suddenly put these two terms, mitigation and adaptation, into the negotiations, meaning defined it in a certain way, and that's that, you can't change it.

In terms of resilience, part of the confusion concerns what or who is being made resilient in relation to what. The UNISDR (UN – International Strategy for Disaster Reduction) provides the following definition of resilience:

The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures. (<http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm>)

The climate adaptation sector, however, appears to define resilience as the successor to the term 'climate proofing' of development projects, that is 'proofing' development projects towards climate change, as illustrated by the following quote from one of my informants discussing the COP meetings:

At the beginning they started talking about climate proofing, stand-alone adaption. At the beginning people didn't know very well how to refine their language. They talked about, you know, reducing vulnerability, increasing adaptive capacity, implementing concrete adaptation. And then they figured out, we all figured out, that the most appropriate term was building resilience. Because that was the word that was encompassing all these terms, it was also more appropriate, because it was the more modest. It was an approximation of improving everything. Climate proofing was the extreme term. Because you cannot climate proof really anything, while resilience is "I'll do my best!" to improve the situation. It was more scientifically solid and more realistic. So there was a consensus that it was the most appropriate term.

Thus, the disaster management focus seems to be on building the capacity of a community to recover from a disaster, whereas the climate adaptation sector appears to be concerned with making sure that development initiatives are not adversely affected by climate change.

The 'competition' between climate change adaptation and DRR could be indicative of more general competition between humanitarian relief and development. DRR is typically linked to humanitarian relief organizations and climate adaptation to development organizations. However, some of my informants felt that climate change gave the two camps a chance to collaborate more. In several countries climate change action groups, including both humanitarian and development organizations, are being coordinated. A common vocabulary and shared definitions might further enhance opportunities for cross-sectoral cooperation. However, according to one informant, even with a common vocabulary cross-sectoral communication is difficult:

[Sighs] You would think it should actually improve communication, but... I guess it does, we know we are talking about something vaguely similar, but that also becomes part of the communication barrier, because we are using it in different ways and we are often not aware of the subtleties. So that causes real miscommunication.

The cross-sectoral nature of climate change thus offers both possibilities and limitations. For example, the term 'resilience' is now well known both within natural science and social science. Therefore scholars from these two fields may have an easier time communicating. Yet, subtleties are lost, potentially causing more confusion than what has been gained from using the same vocabulary.

Politicization

Climate change has gone from being primarily a concern of the Green parties to being a ubiquitous term in political discourse generally. Such politicization has a great impact on how concepts are used and officially defined. One informant explained to me that an aspect of negotiations such as COP 15 is to establish common defi-

nitions of terms. Until the terms have been defined in these high profile negotiations, or other important meetings such as those by the G8 or the IPCC, it is politically strategic to keep definitions vague. Meanwhile, it is in the interest of different organizations to ensure through advocacy that the final official definitions are the most functional for their particular causes. For example, as explained by the informant, the concept 'enabling environment' is used by the US and the EU to mean primarily trade liberalization. Countries in the Global South are also beginning to use the term, but include a broader socio-cultural dimension. Definitions of these kinds of terms are thus very political with wide implications as to which countries will support what initiatives. The informant further explained that for these reasons definitions often end up remaining vague. The importance of which definitions end up being settled on during the official negotiations is well illustrated by the earlier discussion of the term 'mitigation'. The disaster management sector was upset about the way in which mitigation was being used by the climate change sector, but my informant said there was nothing to do about it once a term has been defined in a certain way in 'the negotiations' (e.g. the COP negotiations).

The debate over whether the concept 'enabling environment' should include a broader socio-cultural dimension can be paralleled to the discussion of whether an official definition of resilience should include a focus on local communities and their agency. Within disaster management it appears that the link between disaster reduction, resilience, and local communities has been negotiated with the Hyogo Framework for Action 2005-2015. The Hyogo Framework for Action was mentioned by several informants as an important milestone in terms of looking at the root causes of disasters. According to a brochure on the Hyogo Framework published by the United Nations International Strategy for Disaster Reduction, the Hyogo Framework is: 'the key instrument for implementing disaster risk reduction, adopted by the Member States of the United Nations. Its overarching goal is to build resilience of nations and communities to disasters, by achieving substantive reduction of disaster losses by 2015 - in lives, and in the social, economic, an environmental assets of communities and countries' (United Nations 2007: 2). Since its

adoption, according to Manyena, the 'intimate connections between disaster recovery by and the resilience of affected communities have become common features of disaster risk reduction programmes [...] (2006: 433). In the following section I will provide a brief outline of how a discourse of resilience can be used to integrate agency and local communities in disaster management. Historically, the process of including local communities involved an acknowledgement of the importance of social dimensions of disaster management.

Social dimensions of disaster management

Until the 1970s natural disasters were generally viewed as naturally occurring physical hazards that could be objectively measured and compared by looking at the likelihood and severity of their occurrence. Intervention was focused on inventing the technology to predict the hazards early enough to get people into safety and to minimize the resulting structural damage through, for example, the erection of physical barriers (Hilhorst and Bankoff 2004: 1-2; Delica-Willison and Willison 2004: 148). This approach was challenged with the argument that social processes are of central importance in determining the outcome of natural disasters. In a 1994 article Blaikie et al. stated that:

The crucial point about understanding why disasters occur is that it is not only natural events that cause them. They are also the product of the social, political and economic environment (as distinct from the natural environment) because of the way it structures the lives of different groups of people. (Blaike et al. 1994: 3)

This social approach thus argues that natural disasters cannot be reduced to natural factors and that social processes are crucial to understanding why the same hazards may have different impacts. Blaikie et al. explain: 'The 'natural' and the 'human' are so inextricably bound together in almost all disaster situations, especially when viewed in an enlarged time and space framework, that disasters cannot be understood to be 'natural' in any straightforward way' (ibid: 5).

A key concept in the original social approach is 'vulnerability.'

In 1994, Blaikie et al. offered the following working definition of vulnerability: ‘the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard’ (Blaikie et al.: 8-9). Vulnerability, however, like resilience, is a contested term: ‘There are more than two dozen definitions of vulnerability’ (Manyena 2006: 440). It has been argued that the concept of vulnerability offers an improved understanding of social processes, because, as explained by the anthropologist Anthony Oliver-Smith, it provides ‘the conceptual nexus that links the relationship that people have with their environment to social forces and institutions and the cultural values that sustain or contest them’ (2004: 10). However, according to Manyena, there is a ‘need for a change in the disaster risk reduction work culture, with stronger emphasis being put on resilience rather than just need or vulnerability’ (2006: 433). In his conclusion, he explains:

First, vulnerability reduction strategies are often orientated towards the creation of a human coping environment. Yet we have learnt that people want more than simply to attain the minimum standards associated with coping, meaning that there is a need to adopt resilience thinking that goes beyond vulnerability reduction. Second, development practitioners increasingly recognize that interventions are more likely to be successful, leading to genuinely positive impacts on human well-being, when the emphasis is on building local knowledge and augmenting existing capacity. This entails the identification of the essential and non-essential elements of communities and building on affirmative action rather than endless risk assessments and reactions to negatives. Third, project planning can learn from resilience discourse in that it encourages us to prepare for resilience that is likely to be more than the sum of individual development activities and go beyond simply reducing aspects of vulnerability that may or may not have been possible to pinpoint. (Manyena 2006: 446)

Thus, according to Manyena, the use of the concept of resilience could potentially lead to an evolution in disaster management towards not only reducing vulnerability, but building on local knowledge and capacities. As the next section will show, there are many parallels between the history of disaster management and that of climate change. Climate change has also started out with a focus on

technological solutions, but there is now a call for a change to include a focus on the social dimension in acknowledgement of its importance. As is the case with disaster management, resilience could ensure that this change also includes a focus on local agency.

Social dimensions of climate change

According to Nelson and Stathers, the history of climate change appears to be developing along similar lines as the history of disaster management, as discussed above: '[T]echnological responses to climate change have been at the fore, with little thought given initially to the ways in which climate change affects human relations or its impact on equality' (2009: 88). The World Bank in its publication *Environment Matters* points out that more knowledge about the social dimensions of climate change is essential: 'Typically, the biophysical and economic causes of vulnerability to climate change receive the greatest attention, yet social dynamics can be decisive in determining the susceptibility to harm and level of resilience of different social groups' (Duarte et al., July 2006-June 2007 (FY07): 24). The IPCC publication referenced earlier acknowledges that the social dimension is still little understood: 'the understanding of impacts, adaptive capacity, and the costs of adaptation is weaker in social systems than in biological systems, and the uncertainties are high' (Schneider et al. 2007: 798). It therefore calls for more social science research in this area such as 'assessments of vulnerability and adaptation that combine top-down climate models with bottom-up social vulnerability assessments' (ibid: 804). As was shown in the above discussion on disaster management, however, the social dimension of natural disasters not only involves the social processes that influence whether a hazard becomes a disaster, but also the agency of a local community that enables its adaptation to, or mitigation of, the disaster. To avoid only thinking of local populations as vulnerable it is necessary to have some knowledge of how members of a local society understand and deal with the climate change and to build on this. In other words, what do *they* perceive as the problem and what do *they* believe they need to build resilience against. As Nelson and Stathers argue:

Following through the principles of resilience requires a change in environmental governance from the traditional, “managerialist”, “command-and-control” methods (optimizing efficiency in particular parts of the system and failing to consider the bigger system), to managing for uncertainty and building adaptive capacity. However, this may mean trade-offs, for example between reducing vulnerabilities now to specific perceived risks (as much adaptation currently aims to do), and developing sources of resilience and maintaining sufficient flexibility in the management system to cope with sudden surprises and shocks (Nelson *et al.* 2007). Resilience thinking does provide space for the agency of actors (*ibid.*), as “desired outcomes” (the state in which a socio-ecological system is or should be) can be deliberated upon and worked towards. Yet who has a say in this process is clearly an important matter: “Who decides what should be made resilient to what, for whom resilience is managed, and to what purpose?” (Lebel *et al.* 2006, cited in Nelson *et al.* 2007). (Nelson and Stathers 2009: 87)

Several studies have shown that cultural perceptions may be of fundamental importance when addressing natural disasters and climate change. One informant thought of the way in which climate change may impact local culture as a ‘sleeping problem,’ that is, a problem that is going to wake up soon and start worrying us. In a study of glacier hazard zones set up as a result of avalanches in the 1970s in Peru, the environmental historian Mark Carey found that the local population, the Yungay, while conscious of the physical dangers posed by glaciers, considered their cultural survival more important: ‘To many, and especially to the Yungay elite, recovery from these multiple disasters meant rebuilding their lives and their societies in the hazard zone. The risks of further losses of social status, economic security, political power, and cultural beliefs were far more pressing and important than the risk of a glacier avalanche or an outburst flood’ (2008: 237). In a study of a more recent natural disaster anthropologist Frida Hastrup found that two post-tsunami rehabilitation projects in India fell short because they ignored local perceptions of everyday life. The projects focused on physical survival of the fishing community – one provided the fishermen with safety kits, while the other built a physical barrier against the sea. The fishermen thought the projects would be very useful in the case of

another tsunami, but they did not use the safety kit in their every day work and moved out of the way of the barrier to gain better access to the sea. If they protected themselves against the sea in their daily work, she concludes, they would implicitly agree with the presupposition of the rehabilitation projects that their work as fishermen was inordinately dangerous. As a fisherman proclaimed: 'If we thought it was too dangerous what would we eat and how would we make a living?' (F. Hastrup 2008: 145).

The way in which developers perceive of cultural dimensions and local agency is important in determining how humanitarian/development projects are structured. In his book on HIV/AIDS in Africa, Hakan Seckinelgin, Department of Social Policy, London School of Economics, includes a chapter on the knowledge of policy makers versus local experience and how this affects policies to address 'non-action' by target groups with regards to HIV/AIDS interventions. He concludes that:

Most of the policies refer to culture as a reified category which is important, but which acts as a barrier to our efforts. In this way, people's agency for change in a particular context is removed and replaced by our categories, which are presented as the only way for change. [...] [T]he implications of this process within the policy implementation context is severe, as it reduces people's self-knowledge to a cultural externality that is considered to have marginal value for dealing with HIV/AIDS. Unless our knowledge (speculative knowledge, directing us to claim *we know*) is directly connected and rethought on the basis of people's knowledge of their lives (practical knowledge), the claim *we know* remains spurious: *we don't know what we think we do*. (2008: 124-125).

The anthropologist Mark Nuttall has similarly commented that perhaps adaptation 'should not be posed in terms of how people can adapt to climate change, but in terms of what prevents them from responding and adapting to climate change' (2008: 6). This transforms people from being objects to agents. This is not to say that the Global North does not have a moral obligation to address the impacts caused by emissions from the Global North, but that the local populations affected 'should play a key role in regional and

global dialogues that will determine the kind of responses to climate change and the social and economic changes that will take place in their homelands' (Nuttall 2008: 7). Or as Seckinelgin puts it: 'The argument here is not about whether we should help or not; it is about what the knowledge base is for this help' (2008: 100). All societies have some level of inherent resilience, as pointed out by the anthropologist Kirsten Hastrup: 'resilience is an emergent quality of all responsible social action; it is the rule and not the exception of social life, given that all societies must demonstrate a degree of flexibility to operate and ultimately survive' (2008: 3). If the definition of resilience includes this dimension, there is a real possibility for local populations to 'play a key role.'

Conclusion

The development/humanitarian sector is beginning to include a climate change dimension in their work, thus acknowledging that climate change has become a cross-sectoral and political global problem that has, and will continue to have, negative impacts on the Global South. Many new concepts are being introduced and old concepts are used in new ways; their meanings are being renegotiated to enable discussions about climate change in a humanitarian/development context potentially leading to a different organizational discourse. It has been argued, as noted, that development discourse and vocabulary 'constructs the object of development' (Grillo 1997: 19) as well as 'the task at hand' (Kaufmann 1997: 127). To illuminate in which direction the potentially new discourse is moving, this chapter examined the concepts employed when discussing climate change, focusing on the concept of 'resilience.'

It was found that many different definitions of resilience exist. Resilience in relation to climate change is a complex issue that is approached from a variety of sectors. As pointed out earlier, in the words of Grillo, there is no such thing as *the* discourse of development and thus one cannot speak of *the* definition of concepts (1997: 21). Furthermore, research and practice in relation to climate change is a highly politicized issue that has become a central concern only in recent years. Official definitions such as those used by the COPs

are therefore still being negotiated with regard to the specifics of their meaning. Several informants explained that their organization also has not yet determined a definition of resilience that can be operationalized.

So far there has been a largely technological response to climate change, and local communities appear to have been ignored in many climate change mitigation initiatives. There is, however, a growing recognition that social dimensions are also important, but it is crucial that social dimensions do not only refer to local vulnerabilities, but also the agency inherent in the local culture. Projects have historically been known to fail when local perceptions and abilities are ignored. Resilience has been shown in the disaster management sector to have the potential of including a dimension of local agency and involving local communities. If this dimension is incorporated into the concept of resilience in relation to climate change, this could greatly benefit the local communities and the viability of the projects. During a time when climate change discourse is still being formulated, it is therefore timely to discuss the potential of concepts such as resilience to include local cultural perceptions and local agency.

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APPENDIX

People interviewed:

- Bonizella Biagini, Cluster Coordinator, Senior Program Manager, Adaptation to Climate Change, Global Environment Facility.
- Gernot Brodnig, Senior Specialist, Social Dimensions of Climate Change, The World Bank.
- Lars Christiansen, JPO, Adaptation to Climate Change, Global Environment Facility.
- Knud Falk, Disaster Preparedness Adviser, Danish Red Cross, International Department.
- Saroj Kumar Jha, Program Manager, Global Facility for Disaster Reduction and Recovery, Sustainable Development Network, The World Bank.
- Pradeep Kurukulasuriya, Technical Advisor, Energy and Environment Group/Climate Change Adaptation, United Nations Development Programme.
- Ida Ljunggren, Project Manager, Global Trade.
- Ian Noble, Lead Climate Change Specialist, Environment Department, The World Bank.
- Mike Speirs, Senior technical advisor (Environment), Danish Ministry of Foreign Affairs (Danida).
- Sille Stidsen, Environment & Climate Change Programme Coordinator, IWGIA - The International Work Group for Indigenous Affairs.
- Mattias Söderberg, Head of the ecumenical climate secretariat, DanChurchAid.
- Birgitte Refslund Sørensen, Associate Professor, Department of Anthropology, Copenhagen University. Teaches Master of Disaster Management.
- Morten Fauerby Thomsen, Programme Coordinator with focus on climate adaptation, CARE Denmark.

CHAPTER 16
Planetary Resilience:
Codes, Climates and Cosmo-
science in Copenhagen¹

Martin Skrydstrup

Abstract

This chapter presents an ethnography of statements made by important actors at a major scientific congress on climate change in Copenhagen, March 2009, seen as a runner up to the climate summit in December 2009 (COP 15). The aim is to track an implicit notion of resilience of a planetary scale that parts company from the conventional usage in the social sciences. Zooming in on the actual debates and interactions at the congress and following the arguments back to their origin in scientific laboratories the chapter identifies an emergent paradox between science and politics: on the one hand they seem to be inextricably intertwined, while on the other they make claims to absolute purity.

In the past few years, the notion of “social resilience” has emerged as a key concept to unlock local responses to climate change and environmental disasters. Tacitly responding to the influential geographer Jared Diamond’s steadfast distinction between social and biological survival (Diamond 2005), the notion of resilience couples the

1. I would like to acknowledge my colleagues in the *Waterworlds* team at the Dept. of Anthropology, University of Copenhagen for valuable input and discussions. I owe a very special thank to Ph.D. Candidate Anders Blok, Dept. of Sociology, University of Copenhagen, who read and commented on a draft version of this paper.

social and the ecological in an integrative approach. This analytical interlocking promises to unpack the variability of adaptive responses found across social-ecological systems. Contrary to Diamond's comparative project of delineating input and output variables across such different societies as the Norse settlers in Greenland and the Anasazi of south-western North America – both exposed to the “input” of climate change and the “output” of environmental damage, according to Diamond – the notion of resilience brings home the point that pathways to sustainability are situated in social actualities embedded in specific localities, which are fairly incommensurable (Walker et al. 2006). Thus, studies of social resilience generally conceive the concept as linked to the small-scale (person, group or place) and being intrinsic to and a property of a particular sociability coupled with the environment (see e.g. Leach et al. 2007). Of late, resilience framings of sustainability and vulnerability have also entered managerial discourses and the disaster management programs of the IMF, the World Bank and USAID taking on normative implications, which also constitute an object of scholarly scrutiny (see Boyd et al. 2008). All these studies promise to provide substantial ethnographic insights to the flipsides and frictions of sweeping meta-narratives like the “Anthropocene”² or “global warming” and in so doing advance the conceptualization of social resilience. Thus, through the concept of social resilience we can anticipate to learn a great deal about the vulnerability and sustainability of societies facing environmental disasters across the world.

That being said, I want to do something quite different with the concept of social resilience in this chapter. In fact, I shall suggest a

2. The term *Anthropocene* was coined in 2000 by P. Crutzen & Stoermer, who consider humanity's interference with the Earth's climate system of such an order of magnitude, as to constitute a new geological period. According to conventional geological chronology, we are currently on *Holocene* time; a period which began approx. 11700 years ago, characterized by an interglacial warming. The *Anthropocene* has no fixed beginning, but is generally regarded to catch on with the emergence of the industrial revolution in the late 18th century, specifically with James Watt's invention of the steam engine in 1784. See Crutzen, P.J. & E. F. Stoermer 2000; Zalasiewicz, J. et al. 2008.

slightly alternative analytical route to the concept by way of an ethnography of the current state of scientific knowledge about climate change crafted by an assembly in Copenhagen in March 2009.³ Zooming in on the central podium of this significant event in the Bella Centre – cast as a forerunner to COP 15⁴ to be convened in the same locality – I shall follow the world’s leading climate scientists and see what sense these actors bring to bear on the notion of social resilience. By way of exposing social resilience to a quite different scaling exercise than what has been entertained in the standard social science literature, I shall show a radical different scope and coinage of the concept. I shall continue to follow these elite actors as they venture to the closing panel and see what happens when they encounter politics writ large, in the shape of the Prime Minister of Denmark. My key argument is that this encounter accentuates a paradox of some magnitude: On the one hand it stages an absolute hybridization and entanglement of science and politics; on the other it purifies and reinforces the absolute separation between science and politics.

My argument unfolds in three separate steps, linked by three fundamental questions. The first step revolves around how much the oceans will rise under the current conditions of global warming, where I attempt to follow the answer given by a leading climate scientist, back to his laboratory. The second step pivots on what we should do about global warming, where I capture a radical different scaling of the concept of social resilience than what is prevalent in the social science literature. The third step hinges on what the real

3. March 10-12 2009, the University of Copenhagen hosted the conference *Climate Change: Global Risks, Challenges & Decisions*, in collaboration with IARU (International Alliance of Research Universities), which took place in *Bella Center*, Copenhagen – the exact same venue where the negotiations of COP 15 will unfold in December 2009. In the course of three days, more than 1400 scientific presentations from the world’s leading climate scientists representing almost 80 countries provided an update to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC: 2007). I want to thank Prof. Hastrup, Director of the Research Centre *Waterworlds* for sponsoring my participation at the conference.

4. COP 15 is an acronym for the 15th Conference Of Parties to the United Nations Framework Convention on Climate Change (UNFCCC).

platform for politics is today, where I begin to unpack the grand paradox stated above. My hope is that this ethnographic itinerary may provide some directions *en route* for a possible destabilization and reassembling of the concept of social resilience.

In the laboratory of temperature

Just how much will the oceans rise under the current conditions of global warming? In the Bella Centre, this question was addressed by climate scientist Stefan Rahmstorf working at the renowned Potsdam Institute for Climate Impact Research (PIK). Trained in theoretical physics and physical oceanography in Germany and New Zealand, Rahmstorf raised to the public lime light, when he published a correlation between temperature and sea levels rise over the past 120 years, in the prestigious journal *Science* (Rahmstorf 2007). Entering the central podium in the wake of a popular video presentation by the Chairman of the IPCC, Rajendra Pachauri, Rahmstorf staged himself as a serious scientist: “My role here today is to lead over to the individual scientific themes of this conference. I will start by reminding you all that very big sea level changes have happened in the Earth’s history. At the height of the last ice age, sea level was 120 meters lower than it is today and temperatures globally were only about four to seven degrees lower then,”⁵ Rahmstorf said showing a slide of the planet illustrating what the globe looked like in the last ice age simulated by a model entitled “CLIMBER-2”. After a serious engagement with the infamous sceptical environmentalist Bjørn Lomborg’s interpretation of observable sea-level data as the “trick of fluctuations,” Rahmstorf said with authority: “Let’s get back to the real science.” His scientific performance elaborated on the correlation between major sea level changes and climate change plotted on an absolute time line. The crux of his presentation revolved

5. All quotes from the participants are drawn verbatim from my own recording and transcript at the conference *Climate Change – Global Risks, Challenges & Decisions*; Copenhagen, March 12th, 2009. The recording and transcript is on file with the author. The panel sessions from which I quote are available at: <http://climatecongress.ku.dk/presentations/congresspresentations/>

around the gaps, or the minuscule discrepancies if you will, between physics-based model predictions and observable data. Basically, the physics-based modelling of IPCC's Fourth Assessment Report (2007) – to which Rahmstorf was a lead author – had predicted a 1.2mm rise per year. However, the factual observations showed 1.8mm rise (1961-2003), leading to an estimated total sea level rise between 18 and 59 centimetres over the next 100 years. Rahmstorf explained that this prediction only included the thermal expansion of the oceans and did not include the full effects of the melting glaciers and continental ice sheets, because “a scientific basis in the published literature is not there yet.”

Rahmstorf proceeded by setting himself the task of explaining the gaps between scientific climate modelling and the observable out-there-ness: “I showed you that the sea level is rising much faster than the models, so we have to conclude that the physics based models are not yet up to the task of predicting sea level rise very well. So, there have been a number of approaches to try and look for alternatives to the physics based models. And the idea is basically to select an observable that the models can predict very well – for example the global mean temperature – and see whether we can find empirical links in the past data to the total sea level.” This was exactly the avenue Rahmstorf opted for in his influential and widely cited paper in *Science* (2007) where he had found an observable empirical link between two variables, which could be correlated with the new equation: $dH/dt = a (T-T_0)$.⁶ This was in 2007. However, most recently there had been an extension to this approach proposed by a climate scientist in Helsinki, who suggested adding a “rapid response term”⁷ to Rahmstorf's equation. The climate scientist at the podium then revealed that with this new equation, a number of successive experiments had been conducted, showing almost perfect correlation between model prediction and empirical observation:

6. In this equation, H is the global mean sea level; t is time; a is the proportionality constant; T is the global mean temperature; and T_0 is the previous equilibrium temperature value.

7. The addendum proposed by Martin Vermeer looked like this: $dH/dt = a (T-T_0) + b dT/dt$. At the time of the conference, this new formula was yet to be published.

“you can see this simple new equation does an almost perfect match of the rate of sea level rise over the past 120 years as compared to the real observed data.” Thus, the audience – and not to forget the global media coverage – was left with the impression that the golden formula for predicting planetary sea level rise with approx. 98% scientific certainty had been freshly established almost *en route* to Copenhagen.⁸

How would this actor retrospectively account for the move from uncertain scientific knowledge in 2007, to settled scientific fact in 2009? Rahmstorf did so by way of a short detour to belief: “Now, do I believe those results? When you look at my earlier paper from 2007, with this very simplistic approach, I did not conclude that we can reliably predict sea level rise with this. I merely concluded that the uncertainty about sea level rise is probably larger than we expected. Now, in the mean time, I find the statistical results to fit so good that I am afraid I am starting to believe this and the bad news is that even for a low emission scenario like the B1 scenario – the best estimate here is above one meter in 2100.” Then, Rahmstorf tackled the question of scientific progress head on: “I want to answer the question: Why are these values higher than my paper in *Science* in 2007? ... The main reason is that we included an additional adjustment to the sea level data, namely accounting for the amount of water stored in reservoirs on land ... with this adjustment, the statistical fit to the simple temperature equation gets a lot better. That is reassuring because we know this is a physics based adjustment and you have to take that reservoir water out if you want to find the link to climate – that is the climate driven part of the sea level rise. And this adjustment leads to 2/3 of the increase in values⁹ that we have over the earlier paper.” Rahmstorf closed his performance with a heading, which made front page news in many major newspapers across the world: “Sea level rise may well exceed one meter by 2100 if emissions con-

8. At the time of Rahmstorf’s performance in Copenhagen (March 11, 2009), this new formula was yet to be published.

9. By “values” Rahmstorf here refers to the numerical increase in sea-level projected in Copenhagen, vis-à-vis the rise predicted in the 2007 *Science* publication.

tinue unabated.” The audience had just witnessed the reality of “real science” unfold as a kind of quest for the perfect correspondence between scientific modelling and the observable out-there-ness.

Now, I want to shift the ethnographic focal point from the central podium in the Bella Centre, to the practice of science, in order to make Rahmstorf’s laboratory visible. To do that, I need to introduce the leading figure of science studies, the French anthropologist Bruno Latour. In October 1975, Latour ventured to the Salk Institute in San Diego to conduct a two-year long ethnographic study of endocrinologists. He arrived to explore the simple question of what a scientific fact is and how it is made. Through the ethnographic study of routine practices and the logistics of laboratory life in the Salk Institute, Latour found that: “the artificial reality, which participants describe in terms of an objective entity, has in fact been constructed by the use of inscription devices” (Latour & Woolgar 1986: 64). The implication was that scientific facts are made by such inscription devices (instruments, computer programs, notations, calibration codes, models, communication technologies, etc.) in the laboratory, which translates and mediates them. By tracking inscriptions they learned that these are distributed between laboratories, publications and new technologies in an ever increasing network that we call science. The original monograph entitled *Laboratory Life* (1986[1979]) that came out of this fieldwork shaped the interdisciplinary field today known as science studies. It marked an important shift in focus from the theory of science to the practice of science, or from the logic of epistemology to the logistics of the laboratory.

I now want to draw out the implications of *Laboratory Life* for the podium in the Bella Centre and like Rahmstorf did in Copenhagen, I also want to add an extension to Latour’s original formula, namely the concept of “circulating reference” which shall enlighten us about the truth of climate science; but first things first. What did *Laboratory Life* demonstrate about the epistemological principle of correspondence, which Rahmstorf practised at the podium in the Bella Centre? Latour and Woolgar argued that: “the thing and the statement correspond for the simple reason that they come from the same source. Their separation is only the final stage in the process of their construction” (Latour & Woolgar 1986: 183). This line of reasoning

led to a constructivist argument setting out that scientific fact was an accomplishment, rather than reflective of an independent, anterior, definite and singular reality out there: “Our point is that the ‘out-there-ness’ is the *consequence* of scientific work rather than its *cause*” (ibid.:182). Ultimately, “scientific activity is not ‘about nature,’ it is a fierce fight to *construct* reality. The *laboratory* is the workplace and the set of productive forces, which makes construction possible” (ibid.: 243).

Why might this argument be unsettling to Rahmstorf and other natural scientists? Why might scientists in the business of physics-based climate modeling of the fact of global warming draw the worrying implication that Latour’s program for the ethnographic study of science would somehow undermine their authority and claims to realism? How has Latour responded to the critique leveled at his argument in *Laboratory Life*? A critique asserting that Latour should be engaged in “social constructivism” and that his enterprise amounts to an imposturous reduction of science to specific contexts coupled with political agendas, obscured and mystified by post-modern relativism? A rather absurd critique constructing him to assert that there is no reality out there, that everything goes, that everything is political anyways and that scientific truth is a matter of allies. This grave misunderstanding and (mis-)construction partly rests on what Latour calls the “modernist settlement,” developed in *We Have Never Been Modern* (1993) and brought home in *Pandora’s Hope* (1999),¹⁰ where he forcefully responds to his critics:

Science studies does not say that facts are “socially constructed”; it does not spur the masses to smash their way through the laboratories; it does not claim that humans are forever cut off from the outside world and locked in the cells of their own viewpoints; it does not wish to go back to the rich, authentic, and humane premodern past. What is most bizarre to the eyes of the social scientists is that science studies is not even critical, debunking, or provocative. By shifting attention from the theory of science to its practice, it has simply happened, by chance, upon the frame that held together the modernist settlement. (Latour 1999: 293-4)

10. Significantly subtitled “Essays on the Reality of Science Studies”.

Thus, the rationale for the ethnographic study of science was never to “deconstruct” science, rather science served as the window, or as Latour’s laboratory if you will, to a much larger conceptual project about the modern constitution. Most of the critique of Latour’s work rest on this modernist settlement, tacitly assuming that if something is fabricated it is false; or that if observable data are achieved rather than found, they do somehow not correspond to reality. Nothing could be further removed from the truth.

One might ask why Rahmstorf in a highly technical argument carried by algebra and theoretical physics projected in modeling, bothered to use a chunk of his brief time at the podium in the Bella Centre, to argue against media comments in *The Guardian* put forward by a locally embedded skeptical environmentalist. Surprisingly, there was apparently sufficiently reason for science to take climate change skeptics seriously enough to spend scientific time on them. The obvious reason for this seems to be the trajectory of climate science from a relative domestic life of predicting the weather to a top global policy issue with Babylonian stakes. Today, the projections and predictions of climate science intersect with debates about renewable energy vs. nuclear power, as well as the policy instruments of carbon trade, targets and timetables, which will be tabled during COP 15. In fact, the intent behind the whole event in the Bella Centre in March 2009 was to provide global decision makers at COP 15 with a scientific update on the IPCC Fourth Assessment Report. Where science directly feeds decision makers, the constructivism of Science and Technology Studies may easily be construed as a banal and mundane political question about “whose side are you on”.

In such a climate, the anthropology of science needs to stick with the principle of symmetry, as not to end up with strange bedfellows. Moreover, the anthropology of science should stick with the ethnography of scientific practices and follow the achievements of scientific *sublata*¹¹ from the most inaccessible parts of our planetary system, be that the upper stratosphere, the abyss of oceans, or the drilling

11. Latour writes: “One should never speak of “data” – what is given – but rather of sublata, that is, of “achievements.” (Latour 1999: 42)

of the deepest ice cores in Greenland, where purportedly no social facts exists. In our current climate, there is more reason than ever for the anthropology of science to pay heed to practitioners' modeling communities, be that MAGICC, CHAMMP, BUGS¹² or CLIMBER-2, which actors such as Rahmstorf practise. Finally, the anthropology of science should convince climatologists that there is neither correspondence nor gaps between physics based modeling and observable data; rather according to Latour the principle of "circulating reference" is operating, which will change "our understanding of the connections between a scientific discipline and the rest of its world" (Latour 1999: 80). The point is that the success of Rahmstorf's experiment rested on an alignment operator – the "black box"¹³ of $dH/dt = a(T-T_0) + b dT/dt$ – which allowed for *passage* through a long chain of mediations and translations, reaching an indisputable, although equivocal, end point: "by 2100 sea level rise may well exceed one meter." The black box aligned what preceded it and what followed it in a long assembly line. The essential property of this long chain is that it must remain reversible: "The succession of stages must be traceable, allowing for travel in both directions. If the chain is interrupted at any point, it ceases to transport truth – ceases, that is, to produce, to construct, to trace, and to conduct it" (ibid.: 69).

Thus, scientific *sublata* about climate change circulate through long chains of intermediaries and mediations¹⁴ in trans-local net-

12. These are acronyms for various climate models simulating and predicting the climate (e.g. BUGS is short for BeaUtiful General circulation modeling System). Such acronyms as CHAMMP and MAGICC makes one associate to the "professional dreamers" depicted in Werner Herzog's Oscar nominated documentary *Encounters at the End of the World*. (2007).

13. Blackboxing is an expression from Latour's conceptual apparatus which refer to the way science and its technical formula are made invisible by its own success. The equation: $dH/dt = a(T-T_0) + b dT/dt$, proposed by Rahmstorf and Vermeer would qualify for candidacy here.

14. Importantly, Latour distinguishes between "intermediaries" and "mediators". An intermediary transports meaning or force without transformation (e.g. the equation $dH/dt = a(T-T_0) + b dT/dt$), whereas mediators transform, translate, distort and modify the meaning they are supposed to carry.

works distributed in wider assemblages of semiotic and material connections, which stabilize them and enable claims to universality. Rather than undermining the authority of climate science, this lateral insight could rightly understood operate in tandem with the work of climatologists contributing to a new division of academic labor. Through such a new social contract between science and anthropology, the latter discipline would be able to contribute a sense of realism to climate science, raising professional authority and integrity. After all, nobody can experience or directly observe the amount of CO₂ in the atmosphere, in the oceans or in ice cores. Only techno-science can mediate what we as a human collective can know about the fact of global warming.

In the parliament of cosmoscience

What should we then do about global warming? At the central podium in the Bella Centre, Professor John Schellnhuber took on this question about the relation between knowledge and action. Schellnhuber is the founding director of the renowned Potsdam Institute for Climate Impact Research, a colleague to Rahmstorf and possibly part of the same scientific modelling community. The Professor was dressed all in black at the grand podium and had deep wrinkles in his high forehead, which somehow radiated a profound concern about the state of the planet. Contrary to Rahmstorf, Schellnhuber seemed to carry a certain humbleness and detachment from the worldly, which gave him the aura of a Buddhist monk. In the 1980s, he worked in California with the best minds in the field of theoretical physics on fractal geometrics, chaos theory and complex systems. This knowledge came in handy when he began to model climate predictions under conditions of global warming from 1992 and onward in Potsdam. Today, he is one of the most recognized climatologists in the world and in that capacity he will serve as a Chief Advisor to the German Government during the COP 15 negotiations in Copenhagen.

Schellnhuber opened his performance by revealing that he wanted to “share in the intimacy of this small room” what was “too strong for the delicate nerves of the German *Kanzler* Angela Merkel, a few

weeks ago". Drawing on "hundred of thousands of scientific papers" he informed the audience that the latest news from science was that "the two degrees target is a fairly *faul* (lazy) compromise." Schellhuber then asked the plus 2000 scientists in the audience: "who in this room knows what Russian roulette is, please raise your arm...[*a forest of arms appeared*]...Who has ever played Russian roulette, please raise your arm...[*every single arm was lowered*]...hmm...as a matter of fact, we all do!" Borrowing from Al Gore, he called his next slide for "the inconvenient truth" depicting what will happen if we stick to the EU target of two degrees: humanity will play Russian roulette with a 5/6 chance of surviving in the next century. Schellnhuber then proceeded to the imaginary of a five degree world in which we would release different tipping elements, such as the melting of the ice cap of Greenland and the melting of "the Achilles heel of this planet; the Tibetan plateau". These tipping points would reinforce each other, creating domino effects. The "good news of a five degrees world," Schellnhuber said, "is that science can predict the carrying capacity of planet Earth with certainty; what a triumph!" he exclaimed with a twist of irony.

Thinking at this planetary scale and order of magnitude about how to meet what he called the "MAD challenge,"¹⁵ Schellnhuber urged the audience "to think the unthinkable." His critical argument was that to meet the challenge humanity had to transform the land-use pattern of the planet and turn the most fertile areas of the world into "global agricultural commons."¹⁶ Moreover, he suggested that the allocation of climate refugees should be allocated according to a global distributional justice: "The United States is responsible for 25% of global CO₂ emissions; now isn't it fair that they take 25% of the refugees," Schellnhuber asked the audience. What stood in the way of such drastic and transformative measures was a form of "social resilience," which Schellnhuber understood as inertia and stamina. He likened this form of "social resilience" with the "lock-

15. An acronym for Mitigation-Adaptation-Development (MAD) and a subtle wink to the nuclear first strike scenarios during the Cold War.

16. Which by the way are located in central Europe and the eastern part of the United States.

in of technological cultures,” illustrated by recourse to the so-called “QWERTY phenomenon.” The point is that most commonly used strokes on a keyboard are not the most accessible ones (Q-W-E-R-T-Y), which implies as Schellnhuber said that “it is certainly not optimal, nevertheless we use it. Can we transform this? Probably not! This means that we remain deeply locked in a sub-optimal situation. The same is true of the land-use of this planet.”

Thus, according to Schellnhuber, the greatest threat to the survival of humanity in the next century was “social resilience” in the form of the inertia and sub-optimal techno-folkways of the Occident. Thus, Schellnhuber casted “social resilience” as the enemy of transformation and as the adversary of the necessary leaps of imagination, which it would take to meet the MAD challenge. At the scale of the planet, “social resilience” locked the imaginative potential for breaking out of existing socio-technical-cultures such as the contemporary carbon based fossil-fuel economy of the Occident, existing knowledge regimes and established national political orders. To put it bluntly; in Schellnhuber’s mind game, the Occidental ways of living and thinking was conjured up as the boundary to be transgressed if survival at the planetary scale was to be secured in the next century. Here was a leading climate scientist with the charisma of a Buddhist monk playing “wild cards”¹⁷ and in so doing explicitly addressing the “social resilience” of the Occident as the Achilles heel of the planet.

The crucial analytical point here is scaling: the concept of “social resilience” is here deployed in a radical different sense than in the standard social science literature by one of the world’s leading and most influential climatologists. Schellnhuber would agree with Diamond that societies collapse from suicide, rather than from murder, if they fail to break out of their persistent techno-folkways and meet the challenges of their times. Thus, if we follow the knowledge practices of actors in the Bella Centre, we learn that at the planetary level of scaling, “social resilience” represents inertia, stamina, con-

17. Schellnhuber called his last three slides in his podium performance for “wild cards”.

servatism and a cognitive impasse, which threatens humanity to make it into the 21st century. Keeping this in mind, we shall continue to follow the concept and later see where it surfaces at the final session of the assembly.

What is then the relation between science and politics in this wild mind game? Surprisingly, here was a climate scientist who apparently did not confirm to the modernist distinction between scientific and political representations, between facts and norms, between nature and society. Schellnhuber seemed tacitly to recognize that the science conducted in Potsdam and society was part of the same constitution, which entailed a complex entanglement of nature, society, eco-systems, technologies and politics. In fact, the last term should be put in brackets, in so far Schellnhuber substituted politics with a form of optimal practice at the planetary level, which seemed to do away with the concept of the political as most moderns know it. By way of posing two fundamental questions, Schellnhuber directed and staged an alternative to the modernist settlement. The first question was “how many people can the planet carry in the Anthropocene?” The second question was “what transformative sacrifice does it take for people to live the good life together in the Anthropocene?” Building on the concept of “cosmopolitics” envisaged by Isabelle Stengers (1996), Latour argues that exactly these two questions collect us all in “the parliament of things”. Latour further argues that these two questions have been posed by many brilliant minds, but “for *humans only* without the nonhumans that make them up” (Latour 1999: 297).

Extensively drawing on the QWERTY phenomena of Occidental techno-folkways, wind mills, solar thermal power plants, hydro, biomass and geothermal energy sources in trans-local power grids, earthquakes and tropical hurricanes, we might say that Schellnhuber came close to the parliament of things at the podium in the Bella Centre. He transcended the modernist settlement of science and politics, nature and society as separate domains and avoided to slide into the purifying practices of his modern colleague in Potsdam. He eliminated the distinction between nature and scientific representations of nature and by implication merged the mental compartments of nature and society – the bicameral political model – and stepped

forward as the saviour of public action and humanity. In his mind game, the sciences and the politics had ceased to be concerned with nature and interests, respectively. Schellnhuber's mind game seemed a "proposition" in Latour's sense of "engagement of a certain type of world in a certain kind of collective" (Latour 1997). He was basically concerned with installing a more realistic sense of possibility in the minds of the inhabitants of Planet Earth and in so doing he built what we may call "cosmoscience" at the podium. But did Schellnhuber arrive to the "parliament of things"? Well, he posed the critical two questions, but in answering them Schellnhuber's deferred to the optimal practice for humanity as a form of rational politics carried by omniscient knowledge about the planet, which is far away from Latour's "parliament of things" and Stengers' notion of "cosmopolitics," however that would take another chapter to develop.

A Sovereign in the modernist settlement

What is then the real platform for politics? At the final session of the conference in the Bella Centre, the Danish Prime Minister Anders Fogh Rasmussen – now former Prime Minister – told the two climate scientists from Potsdam and a packed Bella Centre: "You point to the political, economical and social constraints that prevent us from taking the right decisions. A global agreement in Copenhagen is not just about tackling climate change. It will constitute a new era in multilateral relations. It will be a unique occasion to construct a global solution based on mutual responsibility to act and to assist. People demand action. Government must realize that it is in their best interest to act. Government will fall if they fail. Politics must not be in the way of necessary solutions. The world needs better governance." Rasmussen then summed up the real platform for politics: "So in conclusion let me repeat the key messages: Urgency – we must come to an agreement here in Copenhagen in December; Direction – we must set a long term target; Action – we must commit to short term efforts; Fairness – the rich must assist the poor; Opportunity – green growth is the future; Governance – if we fail to act, we fall; Thank you!"

Swiftly and eloquently like a talk show hostess, the Chair of the



The keynote podium in Bella Center, Copenhagen, during the final session at the conference *Climate-Change: Global Risks, Challenges & Decisions* (March 10-12, 2009), organized by the University of Copenhagen in collaboration with IARU (International Alliance of Research Universities). From left to right: Conference Chair Prof. Katherine Richardson; Prof. Will Steffen; Prof. Stefan Rahmsdorf; Prof. Daniel M. Kammen; Lord Nicholas Stern, and Danish Prime Minister Anders Fogh Rasmussen. (Photograph by the author)

conference Katherine Richardson – herself a climatologist and like Rahmstorf professor in oceanography – picked up the seamless lead, provided by the Prime Minister: “Now we have the scientists and the politicians saying exactly the same thing – I think – here at the podium. Why don’t we try to get a scientific response?” Rahmstorf picked up the microphone and directly addressed the Prime Minister: “I want to just express a concern that I have; that when politicians talk about the ambitions of two degrees – as you just did – that is considered an ambition and in the end if all goes reasonable well we actually end up with three degrees of warming. I want to emphasize that when we as scientists talk about two degrees that is an upper limit we really should not cross. Personally, as a climate scientist, I really could not go and tell the public that two degrees warming is safe. We are already seeing a lot of impact of the 0.7 degrees warm-

ing that we have had so far. So, I consider two degrees not safe. This morning John Schellnhuber asked the question: Is Russian roulette dangerous? In Russian roulette you have a one-in-a-sixth change of something terrible happening. I think, when we go to two degrees we probably have more than a one-in-a-sixth change of really bad impact occurring.”

With a twinkle in his ice blue eyes picking up the color of the ice bergs behind him at the podium [see illustration on page 351], the Prime Minister responded to science with a certain sense of urgency and wit: “Well, I need some concrete advice now. Stefan Rahmstorf said two degrees; that the two degrees target is not safe. So now I need to know from the scientific panel: Can we as politicians still rely on the IPCC recommendations or not? Are you telling me that we should set the bar even higher? I need to know that. And I will tell you why – we have had a very hard battle within the EU and finally, finally we decided on the two degree target. It has been a real challenge to reach that point. And now you are telling me that it is not enough. Now I need to know, and I need to know today! Is it enough or...do we have to change this target, because it is fundamental. We have now nine months left before a very, very important meeting in this room. It will be a real challenge. And now I think it is time for the scientific world to come to an agreement with itself: what is the real platform for politicians?” Hard pressed for fixed degrees, certainties and expeditious yes-or-no answers Rahmstorf responded: “There is uncertainty in our science and the uncertainty often works in the direction that things turn out somewhat worse. We have underestimated climate effects in the past so the larger the safety margin we can build into this the better it is, in my view.” With this response, science retreated and deployed what is commonly known as the “precautionary principle.”¹⁸ Not quite convinced by the precautionary principle, the Prime Minister shifted tactics and instead of cunningly asking science for certainties, he instead began to advise the scientific panel: “At the end of the day here in Copenhagen we have as politicians to make the final decision and to decide on exact figures, I hope. This is the reason why I would give you one piece of advice: not to provide us with too many moving targets. Because it is already a very, very complicated process and I need your

assistance to push this process in the right direction. And in that respect, I need fixed targets and certain figures and not too many considerations on uncertainties and risks and things like that.”

By casting himself as the ultimate decisionist, the Prime Minister had forced the world’s leading climate scientists to retreat to the precautionary principle, instead of the mind game of Russian roulette. This cunning decisionism reinstated and enforced the modern borders between science and politics, which Schellnhuber had unsettled in the morning by way of his wild cards of cosmoscience. This afternoon the actors staged themselves as belonging to separate worlds and realms of discourse. The scientific panel was trading in knowledge about nature; the Prime Minister was acting upon nature. The scientific panel construed the truth as out there and the task as the discovery of it. The Prime Minister construed truth as expedient to support the objective of two degrees. The scientific panel staged itself as being in the business of uncertainty. For the Prime Minister uncertainty was taken to mean that there was no problem at all. But there was a clear difference between science and politics. At the podium in the Bella Centre, the Prime Minister appeared as the Sovereign in Carl Schmitt’s sense (Schmitt 2005); that is the one and only in a position to and capable of effectively responding to the challenges posed by a state of exception imposed by the Anthropocene. Performing as a Sovereign, who urgently needed to make decisions within hours, the Prime Minister shaped the grand paradox of purifying and hybridizing science and politics at the same time. His

18. The “precautionary principle” (*Vorsorgeprinzip*) emerged as a concept within environmental science in the 1970s, when German scientists and policy-makers attempted to tackle *Waldsterben* (forest death), before a heavy burden of scientific proof could be established relating the phenomenon to air pollution. This work culminated in the German Clean Air Act of 1974. The general rule of the precautionary principle is that in situations of potentially serious or irreversible threats to human health or the environment potential risks should be reduced *before* there is strong evidence or scientific proof of harm. Thus, the rationale for action should not be the preponderance of evidence, but rather foresight or precaution (*Vorsorge*). See Paul Harremoës, D. G., Malcolm MacGarvin et al. 2001. *Late lessons from early warnings: the precautionary principle 1896-2000*. Luxembourg: European Environment Agency.

sovereign performance instated the modernist settlement of separate domains and at the same time he engaged a podium discourse, where science and politics folded into each other and became entangled in commonsense conversation.

To accommodate and guide the Prime Minister, the Chair handed a dossier over to Anders Fogh Rasmussen listing “six key messages” representing the cutting edge of scientific knowledge about planet Earth’s climate in the face of global warming. In these six messages the scientific community had come to an agreement with itself about what could be said to constitute unequivocal scientific facts. The first message addressed the fact of global warming: “Temperature rises above 2C will be difficult for contemporary societies to cope with, and are likely to cause major societal and environmental disruptions through the rest of the century and beyond” (Richardson et al. 2009: 6). The sixth message was about what to do about it: “If the societal transformation required to meet the climate change challenge is to be achieved, then a number of significant constraints must be overcome and critical opportunities seized. These include reducing inertia in social and economic systems; building on a growing public desire for governments to act on climate change; reducing activities that increase greenhouse gas emissions and reduce *resilience* (e.g. subsidies)” (ibid. italics added). Here the notion of “social resilience” surfaces again; although its long chain of intermediaries and translations at the conference have not distorted its coinage. We may assert that for the world’s leading climate scientists the concept of “social resilience” is cast negatively as inertia, stamina, and conservatism, which locks society in inaction and threatens a planet faced with the fact of global warming. Thus, we have a conceptualization by the key actors in Copenhagen, which runs against the grain of social science literature on “social resilience.”

Upon receipt of the unambiguous six scientific messages, the Prime Minister said: “I think science should be the basis of decision making in this field. Politicians can only act on what we know and therefore your contribution is central. And you have given me the results from your hard work. I will carry your paper with me when I engage with other world leaders to let them know what science says. You have delivered the facts. Now it is up to others to carry it on.”

With the paper dossier from science under his arm, the Prime Minister left the podium to standing audience ovations and applause. His podium performance was deemed victorious, boosting his legitimacy as a political leader. Anders Fogh Rasmussen had succeeded in staging himself as a true Sovereign and came across as a tough decisionist and a hard realist, compared with the scientific panel, who deferred to risks, uncertainties and the precautionary principle. But what was missing at the podium during this close encounter? Science had silenced what was obvious to all, who witnessed the transaction of the portfolio with the six key messages, namely that climate scientists performatively feed decision makers with facts that will shape the trajectory of the biosphere and planet Earth and thus feed back to the hybrid phenomenon of climate change, which scientists are modeling in their laboratories – and vice versa. Latour does not speak of “feed back loops,” because this connotes a single system, but of “oscillations”. Following the non-human actant in the shape of the dossier that was transacted between the scientific panel and the Prime Minister at the podium, we may ask: is the fact of 2C degrees the product of pure scientific practices? Why has it emerged as a magical number? Who came up with it in the first place? How is it carried on and what happens if we cannot meet it?

From a latourian perspective the two degree problem is a new hybrid. The project of the anthropology of science is to make these hybridizations explicit and in so doing legitimate, because they are hidden as long as we work under the aegis and separate compartments of the Modern Constitution. The anthropology of science is about the rethinking of the relationship between the two representations staged at the podium as radical different spheres and ontological separate parts of the world. The assembly in the Bella Centre in March and the next one in December 2009 bear witness of a new global imaginary of climate shaping new institutions, where actors from science and politics sit at the same table. In these new assemblies, climate scientists and politicians share what Latour calls “matters of concern,” but with very different means and resources. The anthropology of science is about exploring the role of non-human actants in these new hybrid assemblies. Bringing such a project to conclusion here is far beyond the scope of this chapter. Rather, to

round up let us look at some of the analytical implications of such a project for the concept of “social resilience.”

Revisiting resilience

My ethnographic itinerary shadowing the climate scientists at the Bella Centre brings home two analytical implications for the concept of “social resilience”. The first has to do with “resilience,” the latter with the “social.” We may argue that resilience can be found at all levels of society in the knowledge practices of actors. At the level of the “person,” our faculty for resilience may determine the degree of success and failure we experience in life. At the level of the “social,” the capacity of societies to learn from the past and reinvent themselves in the present forging relationships anew to their world may determine their future existence. However, by following the framings and imaginations of leading climate scientists from the podium in the Bella Centre to the transactional dossier at the final session of the conference and letting their conceptual mappings be as strong as that of the anthropologist, we have arrived at a radical different understanding of “social resilience”. We have come to see that in the knowledge practices of climate scientists “social resilience” is cast negatively as inertia, stamina, and the lock-in of Occidental technofolkways, which threaten the survival of humanity in the Anthropocene. Thus, at the planetary level of climate scientists, “social resilience” amounts to a vehicle for a trenchant critique of the carbon fuelled economies and the socio-techno-folkways of Occidental heart lands.

What can be learned from such an exercise is that ethnographic surprises are not only to be found in the social actualities of remote places impressively exposed in this volume; they can also be achieved by following the scale jumps of climate scientists in more familiar places *en route* to their laboratories. Thus, if we let the actors do the job of mapping “social resilience,” rather than applying the concept to any given coupled social-ecological niche, we might stumble upon – by pure accident – new registers and modern settlements. The point to take home here is that scale is what actors do by scaling and contextualizing each other.

The studies in this volume brilliantly exhume social resilience by way of focusing on the ways in which social-ecological systems are coupled and interlocked. Their authors advance the concept of “social resilience,” by way of refining and reconfiguring our received modes of thinking about the first term in the compounded concept. These studies go beyond conceiving “social resilience” as an endogenous equilibrium exposed to exogenous forcing, such as climate change, environmental disaster, polluting, population pressure and globalization. However, with the French revisit of “social resilience” practised in this chapter, I hope to have shown that we do possess an alternative analytical route to the first term in the conceptual compound. If we shift our attention from “social resilience” to the three fundamental domains of inquiry delineated by Kirsten Hastrup (2007) in her recent chart for the anthropology of the 21st century – *realism*, *entanglement* and *measurement*¹⁹ – we might find that there is no apparent reason to separate “social resilience” from other associations. Mapping how actors navigate these three fundamental domains with a little help from Latour, it might turn out that “social resilience” is largely a mediator in an assemblage of relations embedded in much larger networks. To regain some sense of order, we could then track the connections between controversies about resilience; that is mapping the many contradictory ways in which social aggregates are constantly evoked, erased, distributed, and reallocated at different scales. Or to put it in plain words: Social resilience is not necessarily endogenous; resilient societies are not alone and never have been. Today they are connected in new global imaginaries and collectives of climate change, which ultimately beg a re-conceptualization of both the “social” and “resilience.”

19. My translation from the Danish: ”realisme, sammenfiltrering og måling”.

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