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## Climate Change as an Adaptive Challenge

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*How do we adapt to changes for which we ourselves are responsible?* This question is philosophical and personal – as well as deeply political – and it is critical to current discussions and debates about human responses to climate change. As climate change adaptation moves to the forefront of policy debates, there is increasing interest in how societies can respond to rapid and unprecedented environmental changes. This includes adapting to what some scientists refer to as nonanalogue ecosystems in a nonanalogue climate (Fox 2007; Williams and Jackson 2007). Although a growing literature on adaptation explores the factors, capacities, and processes that can contribute to successful adaptation, there remains a significant mismatch between the strategies and actions that are being discussed (and to a lesser extent implemented) and the full scope of the problem.

The full scope of the problem is not limited to changes in climate parameters. It is about multiple, interacting processes that can amplify or dampen the social and biophysical impacts of climate change at different spatial and temporal scales and influence the capacity to perceive and respond to change (Leichenko and O'Brien 2008; Hovelsrud and Smit 2010). Biodiversity loss, increasing demands for water, changes in the terms of international trade, urbanization, and other trends create both the foreground and background in which climate change adaptation will occur, both now and in the future. The potential consequences of climate change depend not only on the rate and magnitude of changes in the climate system but also on concurrent transformations in environmental, economic, social, technological, institutional, and political systems (Denton et al. 2014; Pelling 2011).

It can be argued that climate change also calls for deeper transformations, including adapting to the *idea* that humans are responsible for the conditions that will be experienced in the future. This is not trivial, for acknowledging the reality that the dynamics of the climate system are not random or influenced by external sources alone but rather the outcome of human activities and decisions is challenging to many belief systems.

Climate variability and change have thus transcended their meteorological and ecological boundaries to become political issues opened to debate, dispute, contestation, and transformation (Manuel-Navarrete 2010; Manuel-Navarrete and Buzinde 2010). The recognition of a collective capacity to shape global environmental and social conditions implies a fundamental redefinition of the meaning of “climate change adaptation,” to include not only responses to the observed and anticipated impacts but also broader and deeper transformations to an equitable and sustainable world (O'Brien 2012).

Such a redefinition is, however, largely absent in the climate change adaptation literature. Adaptation research, policy, and practice to date have been mostly about identifying what to do about climate change impacts, who will do it, how much it will cost, and so on, often with direct reference to the specific parameters that will be influenced by climate change (e.g., temperature, precipitation, sea levels, crop yields) based on different greenhouse gas emissions scenarios (Ford and Berrang-Ford 2011; Biagini et al. 2014). This to-do-list approach is practical; it considers adaptation as a technical problem that can be addressed through expertise, innovation, know-how, skills, and resources (Wise et al. 2014). This may involve changes in management and planning, development of new technologies, institutional reforms, and behavioral changes. Examples include raising bridges, changing building specifications, improving irrigation systems, developing new insurance products, and modifying agricultural practices. This type of response to the direct impacts of climate change can be effective. The to-do-list approach, however, seldom addresses conflicting values, interests, understandings, and approaches to change. Moreover, it turns adaptation into a double-edged sword, for although these measures may be important, they rarely address the wider and deeper systems and structures that are contributing to risk and vulnerability in the first place (Bassett and Fogelman 2013; Eriksen et al. 2015).

This book offers a different perspective on climate change adaptation. Our starting point is that climate change introduces a new type of adaptation challenge for humanity – one that touches on deeper issues related to individual and collective beliefs, values, worldviews, and paradigms, as well as to questions of interests, identities, and power. The particular combinations and constellations of these deeper “adaptive” elements influence and are influenced by sociopolitical processes, and they shape how different people or groups relate not only to the climate system but to each other. These adaptive elements affect current social organization and practices and underlie both collaboration and conflict.

From this perspective, climate change is much more than a technical problem; it represents what Heifetz et al. (2009) refer to as an “adaptive challenge” – a challenge that draws attention to mind-sets, including the assumptions and beliefs that underpin individual and shared attitudes and understandings of change itself. Adaptive challenges are not only personal; they are political, for policies and actions often involve hegemonic and entrenched ways of thinking and acting that may serve certain

interests, actors, and priorities over others (Manuel-Navarrete et al. 2011; Pelling 2011; Swyngedouw 2010a, 2010b). Indeed, climate change is not a neutral process. Approaching climate change as an adaptive challenge raises critical questions: Who decides what is “acceptable” versus “dangerous” climate change, and for whom? Who determines which adaptations are good ones and should be pursued? Why is the reduction of greenhouse gas emissions considered political and controversial, whereas adaptation to climate change is viewed as acceptable and desirable? What types of adaptation are equitable, ethical, and sustainable?

The chapters in this book present important insights into the adaptive challenge of climate change and its implications for climate change adaptation. Drawing on diverse methodologies, the contributors approach adaptation as a social, political, cultural, and human process. Many of the chapters point to the significance of differing values, which can make it challenging to identify and agree on the best way forward. Some of the contributions emphasize the political nature of adaptation, including issues of equity and justice that need to be recognized and addressed. Others show examples of the many openings that exist for alternative approaches to adaptation, including participatory approaches and dialogues that acknowledge the adaptive elements. Taken together, the chapters show that climate change adaptation involves much more than adapting to the impacts of climate change. The book concludes by considering how the adaptive challenge can be used as an entry point for much broader and deeper social transformations.

In this introductory chapter, we consider what it means to approach climate change as an adaptive challenge. We first discuss adaptation from an evolutionary perspective, recognizing that not all strategies and measures are likely to have long-term adaptive effects. In looking at adaptation from a broader and deeper perspective, we make an important distinction between adapting to climate change impacts and adapting to the *idea* that humans are changing the global climate system and hence are capable of transforming global systems. We then relate this to the distinction between technical problems and adaptive challenges and discuss why adaptive challenges are inherently both personal and political. Finally, we extract some of the key messages coming out of the contributions to this book, emphasizing the implications for climate change adaptation.

### **What Is Adaptation?**

Adaptation is a response to changing conditions. Whether it is autonomous or planned, reactive or anticipatory, or unconscious or deliberate, adaptation recognizes the reality of change. Although changes are always occurring, human responses to change vary dramatically. In most dictionaries, to adapt is to change to suit different conditions, which can include anything from environmental to political, social, economic, cultural, technological, psychological, or even emotional conditions. Within the climate

change literature, adaptation is defined more specifically as “the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects” (IPCC WGII Glossary 2014, 1).

It is often pointed out that humans have adapted to changes in the past, including environmental changes. Indeed, as a species, *Homo sapiens* has been remarkably adaptable over time. Archaeological records show that we have lived in diverse environmental conditions, surviving and adapting to climate variations and fluctuations (Orlove 2009). Examining the relationship between climate change and modern human evolution, Hetherington and Reid (2010) trace the migrations and global expansion of humans to the last glacial cycle that began 135,000 years ago. This period was characterized by significant global climate change, and it created the conditions for humans to emerge as the dominant mammalian species during the last 10,000 years.

What, then, is adaptation to climate change? Hetherington and Reid (2010, 7) argue that adaptation represents something novel, new, or radical: “for humans, the disruption of a stable climate puts a premium on physiological and behavioural adaptability, leading to the application of novel behaviors and new ideas that might have been obstructed as ‘too revolutionary’ or too much of a change from traditional practices in previously stable social groups.” Ellen (1982) provides examples of four types of novel adaptations in biological organisms: phylogenetic (e.g., sweat gland distribution), physiological (e.g., oxygen uptake in high altitudes), learning (e.g., escaping from a predator), and cultural (e.g., wearing warmer clothes). Both learning and cultural modifications represent behavioral changes that require participation of the central nervous system; with these types of adaptation, the responses of individuals can be transmitted to others independently of genes (Ellen 1982). Adaptation is thus not only a biological process but also a social, cultural, and human one.

Although adaptation is possible from an evolutionary perspective, Hetherington and Reid (2010) recognize constraints to adaptation, particularly if change is not recognized or understood, or if groups or societies are not open and willing to accept difference and change. They point out that “if the change required is too great for the individual, organism or society to manage, or alternatively if they are not willing to adjust, then decline and even extinction prevails” (Hetherington and Reid 2010, 300). Drawing on a comparative history of past adaptations, Orlove (2005) shows that human societies can be fragile and resistant to changing established patterns of action. Ellen (1982) emphasizes that adaptation is more than a passive effect in response to the presence of certain conditions but instead requires that the problem be properly recognized, diagnosed, and responded to effectively. Yet “because of the inadequacy of human sensory perception, cerebral coordination, cultural information and ability to respond, adaptations frequently fall short of a goal or have no adaptive effects at all” (Ellen 1982, 239).

The risk of pursuing adaptations that have no long-term adaptive effects at all is salient to current approaches to climate change, where risks are directly linked to human activities, social and economic policies, and development approaches. A high adaptive capacity, often associated with access to technology, high education levels, economic equity, and strong institutions (see Yohe and Tol 2002), may not always lead to successful adaptation and, in some cases, may contribute to complacency (O'Brien et al. 2007). Bassett and Fogelman (2013) point out that rather than adjusting to changes in the climate, addressing the social structural causes of vulnerability is essential. Eriksen et al. (2015) challenge “development as usual,” arguing that adaptation is as much a problem *of* development as *for* development. Indeed, the limits to adaptation are considered by Adger et al. (2009) to be endogenous to the system rather than a result of outside, uncontrollable forces. Although authors such as Diamond (2005) show that failure to adapt can lead to the collapse of societies, a common will to overcome adversity by revising or developing collective strategies for survival is the hallmark of societal resilience (Butzer and Enfield 2012).

In the past, adaptations to environmental changes were largely local, with some groups faring better than others (Ellen 1982; Orlove 2005). However, the scope of the issue is now global and long term, and the impacts of anthropogenic climate change are expected to continue for centuries, even after the rate and amount of greenhouse gas emissions decrease. The IPCC (2014, 17) warns that “without additional mitigation efforts beyond those in place today, and even with adaptation, warming by the end of the 21st century will lead to high to very high risk of severe, widespread, and irreversible impacts globally.” This places a premium on adaptation, but what kind of adaptation? What is common to most contemporary discussions and approaches to climate change adaptation is a focus on the challenges of adapting *to* a changing climate. Such adaptations usually start with observed or projected changes in climate parameters, then consider what can be done to minimize impacts (O'Brien et al. 2007). In reviewing the adaptation literature, Bassett and Fogelman (2013) found that 70 percent of the articles focused on adaptation as adjustment to climate stimuli. Importantly, Berrang-Ford et al. (2011) point out that adaptation in the real world is most often in response to multiple processes, including changing economic conditions, health threats, and social change. And this is where adaptation becomes more complicated.

Whether it is considered an adjustment to climate stimuli or multiple stressors, the normalization of climate change adaptation as a good and necessary response to both experienced and projected climate change impacts comes at a cost, for it can draw attention away from critically questioning the changes. In fact, the naturalized ways of thinking about adaptation often serve dominant or hegemonic powers or hide the influence, interests, and agendas of those who are invested in current systems and trajectories of change – and this includes those who are adapting. Following along current global greenhouse gas emissions trajectories, there is a risk that such

adaptations will have few long-term adaptive effects, particularly if the limits to adaptation are exceeded, that is, if adaptive actions to avoid intolerable risks are not possible or not currently available (IPCC 2014). For adaptation to be successful, a proper diagnosis of the problem is essential.

### Technical Problems versus Adaptive Challenges

To understand the difference between adapting *to* climate change and adapting to the *idea* that humans can influence global systems and future trajectories, it is necessary to step back and consider how people and organizations approach the process of change. According to Heifetz et al. (2009), there are two distinct approaches to any problem involving change. The first is to treat change as a technical problem, that is, one that can be diagnosed and solved by applying established know-how and expertise. Technical problems may call for improved skills, better procedures or management, increased allocation of resources to a problem, more innovation, or new types of governance. Working with a known set of tools and approaches, they often involve doing things better and more effectively. Improved early warning systems, more efficient energy systems, more effective governance across scales, and new institutional arrangements are just some of the important technical responses to climate change (Biagini et al. 2014; Wise et al. 2014). Although technical problems are often complicated and difficult to address, the required skills can be identified, developed, and applied (Kegan and Lahey 2009). It is usually not a lack of options that hinders solutions to technical problems but rather issues such as costs and political priorities. Humans have proven to be remarkably good at solving technical problems, and this would serve as reason for optimism regarding adaptation – if climate change were, in fact, only a technical problem.

The second approach is to see the problem as an “adaptive challenge.” Adaptive challenges are uncomfortable and often conflictual conditions or situations that have no predefined solutions and often require changes in mind-sets, priorities, habits, and loyalties (Heifetz et al. 2009). They call for new ways of perceiving systems, relationships, and interactions, often at new levels of mental complexity (Kegan and Lahey 2009). As such, the solutions to adaptive challenges do not follow clear, linear pathways, nor are they amenable to expertise-based management approaches. According to Heifetz et al. (2009, 70), “adaptive challenges are typically grounded in the complexity of values, beliefs, and loyalties rather than technical complexity and stir up intense emotions rather than dispassionate analysis.” Adaptive challenges may be experienced by individuals, households, organizations, communities, governing bodies, or institutions dealing with change at any scale.

Addressing an adaptive challenge may often be less about doing something and more about shedding entrenched ways of doing things, which Heifetz et al. (2009) consider to include tolerating losses while gaining new capacities. Adaptive challenges



thus require clarity over the values and conditions that are considered worth maintaining. In fact, they are challenges precisely because they draw attention to the individual and collective values, beliefs, and worldviews that often underlie disagreements and conflicts. As Wise et al. (2014) note, technical approaches to climate change adaptation seldom consider the dynamic interactions between values, knowledge, cultures, and institutions. These subjective aspects influence how both systems and change itself are perceived and approached and the types of responses that are prioritized or normalized.

A few specific examples can illustrate the distinction between technical problems and adaptive challenges. Developing panels and storage capacity for solar energy is a technical problem that can be solved through increased investments in research and development. However, producing and implementing solar energy technologies at a rate and scale that can replace fossil fuel energy sources is an adaptive challenge that confronts interests and assumptions related to investments in coal, gas, and oil; opens debates about centralized versus decentralized energy supplies; and introduces cultural issues related to the amount, timing, and accessibility of energy. Moving a population off an island that is vulnerable to sea level rise is a technical problem related to housing, livelihoods, immigration, and citizenship, but it is an adaptive challenge that affects cultural values, identities, and ideas about belonging and social justice (Adger et al. 2013; Barnett and Campbell 2010; Kuruppu and Liverman 2011). Although adaptive challenges often do have important technical aspects, focusing on the technical dimensions alone is considered a recipe for failure (Heifetz et al. 2009).

How can adaptive challenges be identified? Heifetz et al. (2009) describe five general characteristics that can be useful for distinguishing adaptive challenges from technical problems. First among these is a *persistent gap between aspirations and reality*. In relation to climate change, aspirations to avoid dangerous climate change, as stipulated in Article 2 of the UNFCCC, have been unmatched by international efforts to reduce greenhouse gas emissions. In fact, the level of CO<sub>2</sub> emissions from the burning of fossil fuel and cement production reached were the highest in human history in 2013 (Global Carbon Project 2014). Second, adaptive challenges are often revealed when *current responses are inadequate*. Globally, responses to both mitigation and adaptation are currently insufficient compared to what is considered necessary to respond effectively to climate change (IPCC 2014). Third, *adaptive challenges usually require difficult learning*. Although many problems are complex, climate change can be considered a hypercomplex problem that includes dynamic complexity (where cause and effect are distant in space and time), social complexity (where there are conflicting interests and priorities), emergent complexity (where nonlinear outcomes are likely to lead to surprises), and human complexity (including different perceptions and approaches to meaning making) (see Scharmer 2009). This challenges traditional approaches to both education and capacity building (O'Brien et al. 2013).

Fourth, *adaptive challenges require the engagement of new stakeholders*, including people who have not been traditionally associated with the solution. Climate change

impacts affect all sectors and groups, and responses call for a plurality of voices and perspectives. Important stakeholders include religious leaders, youths, artists, labor unions, nongovernmental organizations, communities, and many others. Fifth, *adaptive challenges often involve long-term issues* that cannot be addressed by quick fixes. Unlike the ozone hole, climate change is not a problem that can be addressed through scientific expertise leading to a comprehensive international regime (Keohane and Victor 2011). Responding to the causes and consequences of climate change will require adaptive responses for decades to come (IPCC 2014). Finally, adaptive challenges become most clear when *disequilibrium or a sense of crisis is experienced*, marking recognition that technical solutions may be insufficient to address the problem. This last point is clear to many, as climate change is already experienced as a crisis among some groups in many parts of the world (Doherty and Clayton 2011).

Adaptive challenges involve questioning what is natural, common sense, or self-evident, and they often open up for possibilities that were either not articulated, silenced, or dismissed as impossible. As Heifetz et al. (2009) point out, adaptive challenges can be quite tough because they require that people modify the stories they have been telling themselves and others about what they believe in, stand for, and represent. This may involve acknowledging that traditional hierarchies have benefited some much more than others, leaving many people and groups socially vulnerable to current climate variability and change. It may involve recognizing that the successes and accomplishments that define modernity have incurred significant ecological, social, and cultural costs. Moreover, it may involve acknowledging that postmodern values of equity, justice, and fairness are not prioritized by everyone, nor do such values change easily (O'Brien and Wolf 2010). Climate change brings out the limitations of many contemporary approaches to dealing with complex issues, underscoring the dangers of treating it as a technical problem (Kegan and Lahey 2009).

### Adaptive Challenges Are Personal

Adaptive challenges are fundamentally about change, and the role of beliefs, values, and worldviews in influencing approaches to climate change cannot be underestimated. Worldviews, which combine beliefs, assumptions, attitudes, values, and ideas into a model of reality, are particularly significant because they filter human perceptions and influence every aspect of how people understand and interact with the world around them (Schlitz et al. 2010). Worldviews influence perceptions of human–environment relationships, including how individuals perceive particular ecological issues and their solutions. They also tend to influence how willing people are to engage with environmental issues through politics (Hedlund-de Witt 2012). In short, adaptive challenges are personal because they call for people to confront the ways that they individually and collectively view the world.



It is well understood in the social sciences and humanities that people view and perceive systems, structures, and knowledge in general through filters influenced by interests, identities, habits, loyalties, and motivations, and not the least by emotions (Bourdieu 1977, 1990, 1998; Norgaard 2011). The positioned and embodied vision of an individual is also conditioned by the historical context and social setting (see Haraway 1996; Rose 1997). Such partial and situated knowledge contributes to a subjective view of the world rather than of the world as an absolute, objective truth. It provides conscious and unconscious justifications for some strategies or outcomes over others, and it often underlies attitudes toward equity and fairness. Adaptive elements affect human relationships at every scale, and they are critical to understanding the adaptive challenge of climate change.

Mind-sets are influenced by individual and shared beliefs, which can protect against risks but also perpetuate them, especially when they validate the systems and structures that contribute to risk and vulnerability. Kegan and Lahey (2009) point out that there is a mismatch between the challenges now facing individuals and groups and their capacities to deal with them, at least with current mind-sets. Interestingly, the suggestion that a problem such as climate change demands increased mental complexity often leads to the conclusion that everybody else must change *their* mind-sets, including their values, beliefs, and worldviews. This turns climate change into a technical problem, with the objective of nudging, manipulating, or changing people's beliefs and values and consequently their behaviors (Shove 2010). Although behavioral changes are an important part of many technical problems, imposing changes on individual and collective beliefs is not always considered a legitimate way of producing lasting change (Freire 1970; Schlitz et al. 2010; Rowson 2011). Beliefs, values, and worldviews have nonetheless been manipulated throughout history, whether through oppression, indoctrination, or "brainwashing" via constant messages received through various media. As Freire (1970) notes, values and worldviews are often imposed on others through cultural invasion rather than through cultural synthesis. This invasive approach often breeds resistance and resentment rather than cooperation and collaboration (Scott 1985).

Although research shows that it is difficult to change beliefs, values, and worldviews, there is substantial evidence that the mind-sets of individuals can and often do change over a lifetime, thus influencing meaning making and shared meanings (Kegan and Lahey 2009; Wilber 2001). Research on adult learning reveals that mental complexity can increase throughout adulthood in stages and over periods of time, giving rise to different ways of knowing the world (Kegan 1994; Kegan and Lahey 2009). Kegan and Lahey (2009) describe the expansion of mental complexity as a change in the relationship between subject and object, that is, between what one *looks through* and what one can *look at*. When an individual or group starts to question assumptions and relationships that have been taken for granted, meaning making shifts and

problems and solutions are viewed from a different perspective. Stepping back to reflect on one's own thought processes develops the capacity for self-reflexivity and "metacognitive awareness," which can stimulate worldview transformations (Schlitz et al. 2010).

The problem with change is not always the change itself but the anxiety that it can create, especially the feelings of fear, danger, or not being able to cope with the complexity of a challenge (Kegan and Lahey 2009). Addressing an adaptive challenge often involves engaging in difficult discussions, dialogues, or self-reflection that can potentially surface beliefs that are limiting, "facts" that are taken for granted, assumptions about others, and ideas about what is possible or impossible. Heifetz et al. (2009) recognize that adaptive work can be challenging and that most individuals and organizations avoid dealing with a problem until the sense of disequilibrium becomes so high that they have no other choice. This is indeed a common characteristic of climate change. Norgaard (2011), for example, found that discussions of climate change were associated with a significant degree of helplessness and powerlessness. She argues that silence and inaction on climate change are in most cases not a rejection of information "but the failure to integrate this knowledge into everyday life or to transform it into social action" (Norgaard 2011, 11). Transforming knowledge into action thus calls for political engagement. As we discuss, although adaptive challenges are personal, they are also political.

### **Adaptive Challenges Are Political**

The plurality and differences in individual and collective beliefs, values, and world-views discussed earlier underpin interests and influence what is considered desirable. They guide actions and shape interpretations and perceptions of both problems and solutions. Although seldom explicitly mentioned, these subjective interpretations of the world inform current responses to climate change, including adaptation. Decisions and actions that are presented as self-evident and inevitable (as though based on rational, objective, and neutral evaluations) often reflect the views and interests of dominant groups and help naturalize and legitimize their power and way of constructing the world (Bourdieu 1977, 1998). Adaptive challenges are political in that they surface differences, contradictions, and antagonisms, whether in relation to climate change or change in general, and they raise important questions about how to decide the types and timing of responses that will be taken, and who will decide them.

Current dominant and consensual or hegemonic approaches to climate change tend to maintain rather than challenge the status quo (Manuel-Navarrete 2010; Pelling 2011; Pelling and Manuel-Navarrete 2011; Pelling et al. 2012; Swyngedouw 2010a, 2010b, 2013). Swyngedouw (2010a) argues that the presentation of climate change as a global humanitarian cause produces a depoliticized imaginary that conceals the interests behind the choice of one trajectory over another. Not only is depoliticization