

Climate Adaptation

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Abstract

Climate adaptation tends to be conceived narrowly as a question of technology and biophysical change, yet social and political dimensions provide a deeper understanding on how societies respond to climate change. The uneven distribution of climate impacts across the developing world call for a new form of governance in which vulnerable communities are at the center of the development they seek to affect. Three key insights emerge from such a perspective. First, adaptation entails re-engineering of institutions and organizations to better enable local level experimentation. Second, governance shapes the opportunities for adaptation in practice, facilitating communication and coordination between local and national-level action. Third, reversing climate change is essentially about empowering vulnerable communities. Taking adaptation seriously means paying more attention to local efforts; it is not something that can be done for people, but rather a set of actions that they do for themselves.

Keywords: climate adaptation, governance, vulnerability, resilience, international development, deliberation, Africa

Introduction

Climate change has been described as the “greatest and widest ranging market failure ever seen” (Stern 2006). While adaptation has focused predominantly on biophysical processes and how they impact on lives and livelihoods, it will be equally important for developing countries to make a transition toward strong governance and institutional arrangements to blunt the negative impacts of climate change. The potential for sustainable development will be realized if certain opportunities in climate sensitive sectors can be ‘exploited’ to accelerate adaptation action. Currently, institutional weaknesses disqualify many countries, particularly in Africa, from taking advantage of opportunities to access new monies available for adaptation. As financing for adaptation grows, institutional vulnerability is an impediment.

Climate change presents developing countries with a ‘wicked’ problem made more difficult by weak institutions and governance (Brown et al 2010). These two fundamental ingredients are necessary for the transition to a transformative development that will make adaptation more sustainable. This chapter unpacks the concept of adaptation and vulnerability, and links this to governance as the hook that enables adaptation. Climate change is shrouded in many of the complex governance and institutional matters that are necessary to manage environmental change. This tendency does not augur well for countries where governance systems and institutional arrangements are already relatively fragile and largely in transition.

Adaptation should go beyond discrete projects designed to reduce vulnerability, to instead bring governments and people to the center of the action. African countries in particular need ‘new’ governance models that take into account local realities. Participatory processes that favor deliberative decision making have the potential of making adaptation action more sustainable and bringing diverse social groups together. This aspiration needs transparent governance systems and robust institutions to adopt a sustainable development pathway. In short, adaptation is enabled, coordinated and sustained within a governance regime that respects a plurality of actors.

Even with strong governance and institutional arrangements, adaptation is the logical response that allows vulnerable groups to re-think new strategies and thus ‘insulate’ themselves from climate threats. This chapter argues that reversing the negative trends of climate change is essentially about deploying useable knowledge and empowering vulnerable communities. Deliberative processes, in which different stakeholders are able to bring their perspective to bare, provide the much needed ‘glue’ for sustainability. Focusing on the biophysical implications alone ignores the societal and cultural implications that provide a deeper understanding on how societies respond to, and their willingness to participate in, different climate strategies. It also draws from experience in Africa to reinforce the point that institutions are essential to making adaptation work in practice.

Thus this chapter points to a strong governance regime as a pre-condition for adaptation, one that thrives on resilience. It begins with short histories of adaptation; one focused on the concept itself and another on how it has been put into practice. Three key insights are then discussed: that adaptation can entail re-engineering of institutions and organizations to better enable local level experimentation; how governance shapes the opportunities for adaptation in practice; and the need for deliberation among diverse stakeholders to reduce vulnerability

Two short histories

Thinking on adaptation

The concept of ‘adaptation’ can be traced to the influence of Charles Darwin and its use within evolutionary biology. As originally employed, adaptation refers to the relation between an organism and its habitat. Over time, genetic variability gives rise to a variety of traits in new generations of plants and animals, some of which prove more useful for obtaining food, avoiding predators and surviving in harsh climates. In evolutionary biology, adaptation is an unintentional and accidental process of natural selection, over multiple generations, which shapes the physical and genetic structure of species.

In contrast, human ‘adaptation’ to environmental change is concerned not with the physical ability of people to live in a different climate, but with changes in human behavior and the ability of societies to cope with such change. Dewey (1929) saw adaptation as the capacity of an individual to adjust to changing circumstances, as well as the process where an individual draws on knowledge of the environment to modify it to meet their needs. Such an understanding of adaptation resonates with anthropology and the study of how people coped with changing climate and resource availability over time through changes in technology, behavior and social structure. Adaptation also carries with it the notion of a certain degree of self-reliance, of people relying on their own agency.

Modern thinking on ecology relates adaptation to the idea of resilience, or the capacity of ecosystems to persist in their original state following a disturbance such as fire, disease, or drought. Resilience is maintaining stability in certain aspects of ecosystem structure or function, such as the mix of animal and plant species, and denotes both an ability to withstand change and to recover afterwards. Holling (1986) describes an iterative four-stage process including release, renewal, growth and conservation. For example, fire can devastate a forest in the short-term¹, while the burned material releases nutrients previously tied up in old growth vegetation. Grasses

quickly re-establish plant life in the enriched soil, to be succeeded later by trees and their canopies which capture sunlight before it hits the ground, to out-compete shorter plants for this resource. In time, the forest can regain and conserve an ecosystem similar to conditions prior to the fire. Forests thus both experience short-term catastrophe and maintain themselves over longer term.

It is axiomatic to state that to human societies and their physical environment are interconnected, that people can alter the environment and must adapt to changes in it. As our understanding of the natural world is incomplete, we are limited in our ability to predict future conditions and face uncertainty regarding the effect human actions have on the environment. Embracing this limitation, Holling (1978) coined the term 'adaptive management' to describe an approach in which efforts to manage the environment are treated as experiments to be learned from. Studying communities of people dependent on natural resources, Ostrom (1990) found that local people can and do devise norms and institutions to safeguard common property. Folke et al. (2003) incorporate these concepts to argue that human societies and their physical environment co-evolve as joint social-ecological systems. Akin to the forest described above, society must be resilient by learning to live with change and uncertainty, nurturing diversity for reorganization and renewal.

Young (2002) identifies a need for human institutions to ‘fit’ the scale of environmental dynamics. Institutions are seen as collective action based on economics and public choice, which focuses on utility and game theory, or as social practice based on anthropology and sociology, which focused on the role of culture, norms, and habits. These two schools of thought make different assumptions regarding actor rationality, source of behavior, and constraints. A potential mismatch can derive from differences in spatial boundaries or jurisdiction, for example certain fish species, such as salmon, pass through multiple jurisdictions during its lifecycle from upstream spawning grounds, to the open ocean, and back again. As no single institution can encompass all aspects of the environment, society requires ‘interplay’ among different institutions at different levels. Similarly there can be diverse institutional configurations at the same level that are useful for managing common property resources. Dietz et al (2003) argue that such interplay requires complex, redundant, and layered institutions; a mix of institutional types; and designs that facilitate experimentation, learning, and change.

The ability of human society to adapt to environmental change is thus tied to governance, or how power and responsibilities are exercised. Dietz et al (2003) note that governance “conveys the difficulty of control, the need to proceed in the face of substantial uncertainty, and the

importance of dealing with diversity and reconciling among people and groups who differ in values, interests, perspectives, power, and the kinds of information they bring to situations."

Fabricius et al. (2007) distinguish between the capacity to 'adapt' and to 'govern'. The former is an ability to detect and respond to environmental change, while the latter is ability to lead, plan and act; akin to the public policy skills of developing policies, negotiating among interests, and implementing actions. These authors use the capacities to adapt and govern to describe a typology of 'powerless spectators' (weak-weak), 'coping actors' (strong-weak) and 'adaptive managers' (strong-strong). Thus, beyond a technical ability to cope with change, adaptation is tied to the location of power and influence within society. Pahl-Wostl (2009) argues that climate change and variability reveal the 'vulnerability' of current environmental resource regimes. Governance sets a context within which adaptation policies are pursued, yet the imperative to adapt can prompt rethinking of how society governs itself and the development path it chooses to pursue (Pelling 2011). The connection between adaptation and governance is explored further below.

Much of the literature on climate adaptation focuses on case studies of national-level plans or community-level case studies in preparing for hotter, drier or more variable conditions. The negative consequences of climate change is a public bad, the opposite of a public good, that

affects people differently depending on their location and their ability to marshal entitlements to cope with the stress, not unlike Sen's thinking (1981) on how poor people are able to survive famine. According to Sen, a person can acquire food through production, exchange or donation; acquiring different commodities through various legal channels of acquisitions. Adger et al. (2009) address the issue of fairness in distributing costs between the emitters responsible for climate change and those required to adapt. It is now a widely accepted view that those societies least able to cope with climate impacts will have to contend with the worse vagaries of climate impacts. Those individuals and groups most able to control resources within society, can use them to enhance their own adaptation and impose the cost involved onto others. At the same time, the most vulnerable people and places tend to be those already excluded from decision making. Tropical and subtropical agricultural systems in the developing world will bear the overwhelming brunt of coping with the adverse effects of the climate system (Thomas et al. 2005). These aspects of thinking on adaptation connect with Rawls' concepts of distributional and procedural justice, and draw attention to the political economy of who is vulnerable and why they are so.

Adaptive capacity is often seen as the antonym of vulnerability. The term often connotes agency—the ability of societies, individuals and households to reduce climate related

vulnerabilities, to moderate the inherent damages, cope with and recover from the consequences. The recovery potential of the exposed unit is a significant factor in understanding both the concept and reality of adaptive capacity. The term “adaptation” has been widely used to mean efforts undertaken to enable people to cope and reduce their vulnerability, and adaptation research is now a discipline in its own rights. Adaptation allows us to evaluate and assess the degree and potential outcomes of vulnerability. It also gives an opportunity to evaluate appropriate response options and their effectiveness following vulnerability assessment studies. It is intended to moderate the impacts of climate change, to cope with its consequences and to take advantages of new emerging opportunities as a result of these adjustments.

Adaptation is not entirely a new and discrete field, but offers a novel framing for a range of existing efforts, including urban planning, public health, and agricultural extension. In particular, adaptation policies tend to act in the realms of human geography or human ecology (Füssel 2007). Human geography offers a tradition of disaster risk reduction and seeks to identify and mitigate exposure to hazards. This can include modifications to physical infrastructure—such as housing, road networks, water storage and drainage systems—as well as land use planning to ensure that people live in safe conditions protected from flooding, disease or other disasters. Here vulnerability is defined as “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”

(Janssen et al. 2006).

The human ecology tradition emanates from economics and studies how people cope when change undermines the viability of their livelihood. For people reliant on ecosystems goods and services, the pace and severity of climate variability and change threatens their means of making a living. One approach is to spread risk through diversification, increasing the sources of income and reducing reliance on climatic conditions. More dramatic coping mechanisms include wholesale change of livelihood strategies, such as switching from farming to paid employment, or seasonal or permanent migration to a more favorable location. Agrawal and Perrin (2009) describes five classes of adaptation practices within rural communities, including: seasonal and permanent migration; storage of food, water and animals; diversifying assets, occupations and production; pooling of community resources; and exchange such as access to new markets, and purchase of insurance, seeds and other inputs. Livelihoods and options do not necessarily insulate vulnerable resource dependent societies from climate change impacts. Wealth and stable livelihoods can be an attribute of adaptive capacity, yet do not necessarily create a sufficient “buffer” potential.

Adaptation in practice

The term “adaptation” only entered climate change policy about two decades ago. The initial emphasis was on establishing the scientific basis of climate change: understanding how concentrations of carbon dioxide, methane and other gases affect the balance of solar energy retained within the atmosphere. The World Climate Conference in 1979 led to a number of working groups, including one focused on impacts. By 1985, while admitting that substantial uncertainty remained, the state of the science had progressed to the point that the World Meteorological Organization, United Nations’ Environment Programme and the International Council of Scientific Unions called for greater attention to the analysis of policy and economic options, considering a “range of social responses aimed at preventing or adapting to climate change” (Adger et al. 2009). Despite this early reference to “adapting,” the original 1986 structure of the Intergovernmental Panel on Climate Change (IPCC) continued a focus on anticipating impacts. It was not until 1995 when the IPCC renamed this Working Group II to specifically address adaptation, defined as “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.”

Thus the first decades of climate policy were framed around encouraging a global effort toward mitigating emissions. The focus was on establishing a limit, developing policy instruments to

meet it, and negotiating how to share the burden of costs involved. In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) established the goal of avoiding dangerous interference with the climate system, committing its parties to limit emissions with the aim of returning to 1990 levels. The original convention also includes language committing members to “cooperate in preparing for adaptation to the impacts of climate change” (Article 4.1e). Nonetheless climate negotiations largely focused on how to curb emissions rather than how to live within a hotter, drier or more variable world. Five years later, the Kyoto Protocol introduced a Clean Development Mechanism which allows countries to meet their national targets by investing in projects that reduced emissions in developing countries, such as changes in fuels, land-use or technology. Two percent of the proceeds from the sale of such reductions were directed to an Adaptation Fund to finance additional efforts in developing countries.

A key phrase in the UNFCCC and subsequent agreements is the “common but differentiated responsibility” of developed and developing countries. The early industrialization of developed countries means they are historically responsible for a larger share of past emissions which contributed to current climate change. At the same time, developing countries largely avoided limits to their own emissions. They looked to developed countries to provide them with access to cleaner technologies, and to assume the costs involved in implementing the convention. Finally,

the projected consequences of climate change, ranging from drought, flooding, and changes in crop yields, are expected to hit developing countries the hardest. The original convention calls upon parties to assist the developing countries “that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects” (Article 4.4).

In 2001, UNFCCC parties agreed to create two new funds under the Global Environmental Facility, one targeted to Least Developed Countries and another Special Climate Change Fund open to all developing countries. In 2009, the Copenhagen Accord included agreement “that developed countries shall provide adequate, predictable and sustainable financial resources, technology and capacity-building to support the implementation of adaptation action in developing countries” (Article 3). UNFCCC parties subsequently established a Green Climate Fund to serve as an independent financing instrument to support developing countries to mitigate their emissions and adapt to climate change. This Fund intends to raise up to US\$ 100 billion annually by 2020. By some estimates, in 2010, mitigation efforts attracted ninety-five percent of the almost US\$ 100 billion available in climate financing (Buchner et al. 2010), yet looking forward, one can anticipate a rebalancing with a greater share of investment going into adaptation.

The past decade has seen a growing acceptance that some degree of climate change is now unavoidable. All countries have been urged to facilitate adaptation through measures in energy, transport, industry, agriculture, forestry, waste management, and land use planning. Access to financing under the GEF Least Developed Countries Fund is contingent on these countries preparing a National Adaptation Program of Action (NAPA) which prioritizes among measures in agriculture, water and coastal management, early warning and disaster risk management, energy, health, and infrastructure. This diversity underlines how adaptation is not one sector, but the interaction of many sectors. Some adaptation plans included special efforts to integrate the voices and concerns of poor and vulnerable citizens in weighing potential investments, whereas others lack a solid base of evidence on which to assess the relative benefits and costs involved in different options. In this sense, the ability to prepare and implement an adaptation plan speaks to the strength of governance within each country.

In many ways, fostering adaptation is becoming synonymous with doing development. For example, Adger et al. (2009) describe the purpose of adaptation as protecting vulnerable populations, providing information for planning, and protecting public goods. These goals could easily fit within the development plans of many countries. Yet the impacts of climate change also threaten to reverse some of the progress realized over the past decades. The impacts of climate

change are likely to derail development processes, and much of the hard-won progress made toward realizing the Millennium Development Goals. Many development projects need to factor climate hazards in their planning, as failure to incorporate such risks can cause an increase in disasters, and extreme events can incur losses that will offset decades of development work (Kreimer and Arnold 2000). There is thus substantial attention to “climate proofing” development, investing in policies and programs that will work under a range of potential future conditions.

Conversely, development needs to avoid so-called “mal-adaptation” or investments that are dependent on climate stability. There is growing recognition that not every adaptation to climate change is good. This is most clearly illustrated in large capital investments, such as dams and bridges, which may be compromised if rivers dry up or severe storms become more frequent. Additionally, improving the productivity of certain crops may result in water demand for irrigation systems in dry land areas. This in turn might increase soil salinization or decrease the water availabilities for resource dependent communities who have little or no access to irrigation systems, thus increasing the vulnerability of affected farmers. In addition, some scholars see adaptation as the panacea for correcting mistakes made in social and economic pathways that have led to poverty, inequity and environmental problem (Eriksen et al. 2011).

The practice of development and adaptation also intermingle in terms of financial flows and the actors involved. Although funding for climate financing is supposed to be new and additional, many donors have pledged new funds for adaptation while flat-lining or cutting back on their aid budgets. Indeed, the estimated US\$ 100 billion dedicated to climate financing in 2010 rivaled the approximately US\$ 130 billion dedicated to official development assistance. Despite the attention garnered by the high profile of Global Environment Facility and World Bank, the majority of public financing for developing countries to address climate change has thus far been directed through bilateral channels. In many instances, aid agencies have assumed a key role in delivering on their countries' pledges. The advantage of this reality is that climate financing is building on the recent principles of development effectiveness, such as ownership and alignment, yet at the same times risks undermining the potential for more global platforms, such as the Green Climate Fund.

Taking adaptation seriously means paying more attention to local efforts. Whereas much of climate policy has focused on global negotiations, the practice of adaptation is rooted in local reality. What adaptation means is specific to the particular landscape and livelihoods of each place. For instance, in Bangladesh, it means local investments in shelters helped in reducing the force of cyclones (Adger et al. 2003). On the Moroccan coast it means dealing a scarcity of

freshwater, around Cape Town it involves modifying irrigation practices, and in northern Kenya it means reviving communal management of pasturelands. As in theory, adaptation practice links existing approaches into a novel way of dealing with the risks society now faces.

Looking forward, the practice of adaptation can be expected to evolve in two ways. First, local communities should not simply implement national plans, but engage in local experimentation. People need the freedom to identify local vulnerabilities and enhance their communities' resilience to changing conditions. Second, adaptation needs to go beyond incremental adjustments to the status quo. In many places, adaptation will prove to be more than simply doing the same under different conditions, but will instead prove to be tipping point for more radical rethinking of development, including the abandonment of previous livelihoods and old ways of doing things.

Shift from biophysical to social

Adaptation tends to be conceived of as a question of technology and biophysical changes. Both adaptation and mitigation require enabling fiscal environments, investment in public infrastructures, effective monitoring and the relevant research and development facilities to

deploy low-carbon technologies. Many countries in the developing world are not well prepared to put in place these kinds of requirements. Yet, by effectively targeting sectors such as agriculture and energy—two sensitive sectors hitherto considered as engines of growth—some opportunities can be exploited. For example, in the agricultural sector, carbon sequestration has the potential to enhance adaptation and sustainability of crop production by increasing carbon concentration in the soil through better management practices, which would yield multiple benefits for biodiversity, soil fertility and productivity, as well as soil water storage capacity. Also, integrated crop rotation and crop diversification, and zero or reduced tillage has potential to improve soil carbon sequestration and reduce greenhouse gas emissions. Equally, opportunities exist in carbon trading and Reducing Emissions from Deforestation and Forest Degradation (REDD) that would imply positive spinoffs in forestry and agriculture.

Some actions address adaptation and mitigation simultaneously. Adopting drought-resistant cultivars, such as *Jatropha*, can have several benefits. It can be used as a living hedge to prevent soil erosion. It is also used traditionally by women to make soap, thus constitute a source of livelihood. From an energy perspective, the promotion of efficient use of biomass, shells, peanuts, bagasse can both reduce the use of charcoal and wood-fuel as well as the likelihood of deforestation. Other sources of energy such as wind pumps can be used for crop processing, irrigation, water pumps and decrease dependence on biomass. Equally, the use of biogas plant

can mean the production of sludge for fertilizers, adapting to soil erosion while mitigating emissions. Similarly, conservation tillage can increase soil water retention in drought conditions while sequestering carbon below ground. There is also potential for small-scale irrigation facilities to conserve water and increase crop productivity and soil carbon.

Yet climate change is more than a manifestation of biophysical processes alone. The predominant question remains: how does society manage itself under a changing and uncertain future? Focusing on the biophysical implications alone ignores the societal and cultural implications that provide a deeper understanding on how societies respond to, and their willingness to participate in, different climate strategies. The pursuit of adaptation requires moving beyond narrowly focused, technical projects, to instead embrace the interplay of institutions and governance. Building climate resilience is largely contingent on creating and sustaining institutions with a credible governance regime that create incentives, influence policies and galvanize communities toward collective actions.

Three key insights emerge from such a perspective. First, adaptation can entail re-engineering of institutions and organizations to better enable local level experimentation. Second, governance shapes the opportunities for adaptation in practice, facilitating communication and coordination between local and national-level action. Third, deliberation among diverse stakeholders is a

means reducing vulnerability, in which different stakeholders are able to bring their perspective to bare, provide the much needed “glue” for sustainability.

Adaptation as re-engineering institutions

Institutional economics scholars argue that predictable and stable institutions are important for wealth creation and human well-being. The complexity of the climate system and the nature-society linkages calls for an “institutional renewal” that helps in moving toward a sustainable development pathway. Indeed, climate change has revealed the magnitude of the institutional challenge, and how unprepared many countries are in dealing with the reality of climate change. Jordan and O’Riordan (1997) argue that organizations are more tangible than institutions, with specific remits, resources, staff, and they have a more observable capacity to influence events. Organizations are therefore more physical while institutions tend to be more intangible. Although the definition of institution as “behavior” has been criticized (Hodgson 2006), it remains the predominant definition—in short, rules that influence behavior, encompass values, and norms that are held by individuals and organizations (O’Riordan and Jordan 1999).

In many parts of Africa the relatively high susceptibility to climate variability and impacts is

largely attributed to the quality of institutions. Climate related perturbations may substantially reduce production patterns and crop yields due to the high dependence on rain-fed agriculture in many countries. Frequent floods and experiences of extreme events, droughts, and heat waves are altering the patterns of disease. Hence, some diseases are spreading to areas where they were relatively few incidences, placing further burdens on a health system that is already under much pressure.

Institutions play a critical role in natural resource management. Managing natural resources is often rooted in issues revolving around entitlements, land tenure and use and access, ownership and control of resources. Adaptation is closely linked to the management of resources that are considered common property, not least, pastures, water and energy. However, because of the complexity that underpins the management of natural resources, and the commensurate problems of doing so across scales and sectors, adaptation requires an institutional basis to hold the different “players” accountable and to guide the rules of the game. Pelling and Hugh (2005) argue that stakeholders can perceive an institutional architecture as having the authority to influence adaptation. Communities that exhibit a high degree of adaptive capacity are able to do so as a result of the strength of their governance system, institutional support base, entitlements, social network, technology, human resource and the relevant health infrastructure.

Institutions are important in leveraging power and control and can influence the behavior of individuals and communities vis-à-vis the management of climate extremes and variability. In short, institutions can shape the way in which societies plan, prepare for and adapt to climate change impacts. Hence, institutions constitute a double-edged sword—either to disable or enable the process of adaptation. Institutions are not neutral—they distribute advantages to some and deny others similar advantages. In the climate change arena institutions through their management and control of natural resources will create winners and losers.

Insufficient institutional capacity can compromise the work conducted by local people on the ground. For instance, many institutions in Africa have been created to deal with single issues relating, for example, to agriculture, desertification, or food security. The complexity of working across scales and addressing multiple risks is quite challenging. Hence, institutional weakness can affect the ability of vulnerable groups to anticipate or plan for negative impacts of climate change. They react rather than initiate. Gupta et al. (2008) argue that climate change, compels institutions to enhance their adaptive capacity which may further compel them to go through a process of ‘renewal’ or change commensurate with the pace and speed of environmental change.

Informal institutions can be custodian of knowledge. Knowledge generation and processes can be a principle tool in adapting to climate change impacts. However, often in Africa, traditional

knowledge is not valued as a reference point for managing climate risks and emerging threats. In Kenya, the importance of indigenous knowledge under increased climate uncertainty created strong reciprocal alliances between the Kenyan Meteorological Agency and the indigenous communities commonly known as rainmakers. The Agency consequently decided to establish a center to sustain the heritage of the Nganyi community, following attempts to calibrate indigenous climate forecasts with scientific forecasts and the efficacy of the calibrated results in improving productivity (Ziervogel and Opere 2010).

Institutional discourse tends to ignore informal institutions and the role they play in enabling societies to adapt. Because local and national institutions have a key role to play in the management of natural resources, this role is extended to the way in which they enable or disable adaptation and the incentives structures they put in place to sustain adaptation activities.

Subsequently the governance mechanisms they oversee need to be relatively robust in order to deal with processes that are inherent in adaptation regimes. In Tanzania and Malawi, it was found that local institutions helped in shaping the effects of climate hazards in various important ways. They influence how urban and rural people define climatic risks and impacts, and how they shaped the ability of urban and rural people to respond to climate impacts and pursue different adaptation practices. Local institutions are important in leveraging support from

within—influencing knowledge flows, and acting as intermediaries in mediating external flows on adaptation and practices.

Governance shapes opportunities for adaptation

A viable institutional architecture together with sound governance system can determine the success or failure of adaptation process. Africa is largely cited as one of the most vulnerable continents in the world as a result of its limited capacity to offset the varied impacts of climate variability and change. While institutional vulnerability has been cited, it is often perceived as part of a mixed range of factors affecting Africa’s overall potential to fight climate impacts. In a continent where institutions are still relatively fragile and governance regimes invariably youthful, climate interventions will have a short shelf life if they are not part of an institutional and governance regime. In addition, the potential for transformative action is reduced in the absence of a credible governance model and viable institutional architecture.

Scholars and practitioners still remember the World Bank’s assessment of Africa’s development problems as largely attributable to a “governance crisis” (Brautigam and Knack 2004). Indeed, the continent showed little capacity to deal with many of its socio-economic development

challenges—many of which had their foundation, putatively or real, in the governance regime or lack of it. While the concept of good governance gained momentum since the 1980s, climate change has unmasked the complexity of governance regimes. Adaptation cannot be divorced from governance. African countries, due to difficulties in managing economic growth, face similar challenges in managing environmental change. Nonetheless, with the severity of climate variability, and the frequency and pace of change, countries in Africa are increasingly under pressure to cope with increased hazards and risks. The transition to a low-carbon pathway and mainstreaming of adaptation and mitigation in policy decisions necessitates good planning processes, regulatory and policy instruments to both enforce and oversee response strategies. Climate variability and change exacerbate weaknesses in the management of natural resources. The magnitude of impacts and possible response strategies are overwhelming for fragile institutions already weakened by structural difficulties and social and economic problems.

Governance is often perceived within the framework of policy, polity and political process. It tends to feed on political processes - and how choices are translated into decisions. The notion of governance has traditionally been conflated to a single unitary central decision making authority where the state assumes full control and sovereignty over of people. Yet the definition has gradually evolved to embrace multiple networks, actors, processes and a more transparent management. Governance approaches that fall under the political category perceive governance

as a system of rules that shape the action of actors. Pahl-Wostl (2009) argues that there are four dimensions of governance: institutions and the relationship between formal and informal institutions; actor networks with emphasis on the role and interactions of state and non-state actors; multi-level interactions across administrative boundaries and vertical integration; and governance modes, including bureaucratic hierarchies, markets, and networks.

The complexity of climate change is such that governance at national and local level need to work in close collaboration. In addition, climate change raises unique challenges that will require new knowledge and modes of processing information useful for the benefit of vulnerable communities. Although knowledge remains an important resource in the management of climate change, it is this very knowledge that is in short supply in terms of the policy and governance regimes that will move vulnerable communities toward transformational development. Thus, while climate change has been hailed as the biggest threat to humanity, the ‘invisible’ threats relating to a weak knowledge base and a fragile or non-existent governance mechanism have been downplayed in the face of the seemingly ‘visible’ biophysical problems.

Governance and institutional arrangements can render climate change adaptation effective. There are many attributes of resilience that tend to mimic good governance. These include the ability to remain flexible, to self-organize, and to adapt. Although adaptation happens locally it is affected

by national institutions and the incentives they create. Local institutions can influence collective behavior toward climate change, and institutional arrangements can enhance or derail adaptation activities in a given context. Both the governance regime and the institutional architecture are important in shaping adaptation. Thus, building resilience is rooted in understanding the concept and how much it is linked to every aspect of climate policy, management and sustainable development. Good governance is important to enable societies to avoid mal-adaptation, while opaque systems of governance risk making climate action more problematic. It will mean the ability of societies to rely on robust institutions, mechanisms of checks and balances that are fully functional, and processes of decision making that are imperfect, complex, and non-linear.

Activities relevant to adaptation are essentially about distribution of resources and implementation of a fairer system that will benefit the most vulnerable. Addressing vulnerability is complex and messy and involves underlying issues of equity across scales, social groups, and over time. Governance needs to ‘retrofit’ and customize itself to deal with this messiness and current asymmetries. Changes in agro-ecological systems will influence food production systems and affect both agricultural production and growth (El Ashry 2009). Climate variability and change are forcing resource dependent communities to adopt robust and ingenious adaptation practices to resist the impacts of climate change.

Reducing vulnerability through deliberation

A strong, transparent and flexible governance regime will enable societies to test both national and decentralized mechanisms to enable adaptation processes. Experience in Africa demonstrates that participatory processes and deliberative forms of decision making are well suited to making adaptation work in practice. They enable governments to understand how development policies and planning can cause vulnerability and disenfranchise segments of society, which is critical to understanding both the physical processes of vulnerability and its underlying social undercurrents. Hence, governance is the “lubricant” of values, principles and practices that form part of the institutional architecture. Transparent governance mechanisms are essential to plan for adaptation action and avoid maladaptation.

Often vulnerability is used to describe the extent to which someone’s “life and livelihood is put at risk by a discrete and identifiable event in nature or in society” (Janssen et al. 2006). Nearly all societies have some inherent vulnerability to climate. This is largely due to the fact that climate tend to influence the places we choose to live or the income we rely on (Adger et al. 2003).

Nonetheless, vulnerability remains a contested term. Vulnerability refers to the susceptibility of people and systems to the adverse consequences of climate variability and extremes.

Understanding vulnerability – who is vulnerable, why, and under what circumstances – is mediated by institutions and governance regimes.

The IPCC identifies key vulnerabilities and attributes several associated criteria. These are inter alia, the importance of the system-at-risk, the magnitude of impacts, their persistence and reversibility, the potential for adaptation, and the distributional aspects of vulnerabilities, impacts, and adaptation. The IPCC (2007) defines vulnerability as “the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change.” Social vulnerability meanwhile, refers to the potential state of human society that can affect the way they experience natural hazards. Social vulnerability is associated with the sensitivity of human agency to the hazard, whereas natural vulnerability refers to the sensitivity of natural environmental processes to the hazards.

Factors affecting who is vulnerable, and to what degree and under what circumstances are invariably dependent on human and physical forces that tend to shape the distribution of assets in society (Pelling and Uitto 2001). According to Bohle et al. (1994) vulnerability has three key characteristics: risks of *exposure* to stress, shocks, and crises; risk of insufficient *capacity to cope* with them; risk of severe consequences of, and the attendant risk of inability or slow *potential to recover* from stress, shocks and crises.

Vulnerability tends to relate to political economy, class structure and reflecting social hierarchies on gender and class. Vulnerability can have a spatial interpretation—relating to space—local, transnational and regional and temporally referring to “long-term structural baseline and short-term conjectural conditions” (Bohle et al. 1994). Nonetheless, vulnerability is a composite and relatively fluid term. Populations across the world differ in their ability to organize themselves in a given context in the event of environmental disaster, and can draw upon their assets, entitlements, social safety nets and networks, insurance and livelihoods diversification to manage risks and adapt to given circumstances. Vulnerability can be perceived as a complex mix of exposure to risk, capacity to cope, and ability to recover.

Vulnerability varies between individuals and social groups as well as over time and space. Climate impacts will exact a much heavier toll on some social groups, especially women, in developing countries tend to shoulder a greater share of the household and community based incoming earning activities. Adaptation process may become disabled or skewed based on the perception of main power brokers who may willingly exclude certain social groups based on their own perceptions of what different members bring to the table. Hence, in Southern Madagascar women voices were not heard as the governance process in place was weighted toward social groups that wielded power and authority. Climate change is creating and will cause further inequalities between water rich and water poor societies. Pastoralists, foresters and other

types of livelihoods will suffer when one adds increased climate variability to current stressors. For instance, pastoralists across Africa have remained largely at the periphery of development. Environmental stress mediates the much deeper political, economic and social forms of marginalization they face.

Adaptation is a process involving multiple actors and multiple vulnerabilities in different social contexts – hence there is an implicit co-ordination problem in bringing stakeholders to work together. Deliberative democracy seeks to bring different perspectives together and lays a good foundation for a governance models that can progressively lead to sustainable adaptation outcomes. In Africa, the creation of platforms constitutes important institutional levers which allowed vulnerable communities to define their own adaptation agenda and response strategies. Participatory Action Research became a clearing house for information—information in Madagascar on crop varieties and how to use these to guard against climate related hazards, information on making strategic choices in Ethiopia and expand farmers’ choices. In Benin, associative groups displayed a tremendous role in recovery potential, and played a deliberate and efficient role in helping vulnerable groups recover from climate hazards relating to floods and droughts. Hence, what started as a research method became an institutional innovation through structured platforms, associative groups with rules and a culture of sharing information that

allows communities to adapt. Thus, the identification of climate risks and relevant response strategies became important levers for social transformation and collective action.

Conclusion

Climate change has unmasked numerous challenges with implications for governance and institutions. Climate change will continue to challenge governments and people across the developed and developing world as they struggle to adapt. The challenge is that both local and global governance need to revisit and perhaps “retrofit” current governance mechanism to deal with the scale, severity and pace of change. Hence, in many ways, across several sectors and scales, climate change compels governance to rethink its business model in which ‘institutional renewal’ can help put in place a strong and viable mechanism that can incorporate risks.

Climate change will continue to peripheralize vulnerable communities and test their coping strategies due to several asymmetries and the uneven distribution of risks. Hence, a governance mechanism that seeks ‘fair adaptation’ becomes a critical model for sustainable development. Indeed, sustainable development because of its links with institutional capacity and social equity has strong underpinning for distributive and procedural justice to ensure that both current and

future generations do not become short changed in a climate regime that compensates “winners” and marginalizes “losers.” Hence, both good governance and supporting institutions are conduits to drive the process of social transformation. Hence, the transformative change will come full circle if vulnerable communities become more resilient and have greater adaptive capacity, but equally if governance regimes become more adaptable to absorb the complexity that comes with climate change and variability.

Some actors find it difficult to “stagger” into this process of social transformation. It requires a deeper consciousness and resolve, and the relevant institutional and governance architecture to foster such changes. However for a truly transformational change—the challenge and opportunity are not to invest solely in discrete activities—but to use these as a platform for broader, more sustained responses. The transition to a transformative pathway will need political will and a degree of social organization to help vulnerable groups translate adaptation options into climate related win-wins. Nonetheless, a number of adaptation response strategies tend to deal with targeted short-term problems—and do not cater for long term radical changes. This means building the capacity of vulnerable communities and testing adaptation options to determine their efficacy. It will also mean placing emphasis on the quality of process rather than

an outcome-oriented set of responses. Equally, the complexity of the climate regime, the uneven distribution of climate impacts and the asymmetries in adaptive capacities across the developing world call for a new form of governance in which vulnerable communities are at the center of the development they seek to affect.

Adaptation is not something that can be done for people, but rather a set of actions that they do for themselves to offset climate impacts and hazards. Living with a changing climate may need more than incremental adaptation within infrastructure, livelihoods and sectors, to instead require more transformative development based on understanding people's experiences of vulnerability, response strategies, and recovery potential. Hence, the test is to identify win-win options in key climate sensitive sectors and to ensure that informal institutions through the wealth of knowledge amassed over the years are in a position where they can steer societies to a less insecure future. They will be able to use their knowledge and experiences as departure points and will equally be in a position where they can test their knowledge against critical climate change and vulnerability thresholds.

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¹ A few tree species are able to survive periodic burning, or indeed require it for activating their seeds.