

## Multi-level governance and adaptive capacity in West Africa

Maria Brockhaus  
CIFOR, Bogor, Indonesia  
[m.brockhaus@cgiar.org](mailto:m.brockhaus@cgiar.org)

Houria Djoudi  
CIFOR, Bogor, Indonesia

Hermann Kambire  
CIFOR, Ougadougou, Burkina Faso

**Abstract:** In most regions in West Africa, livelihoods depend heavily on forest ecosystem goods and services, often in interplay with agricultural and livestock production systems. Numerous drivers of change are creating a range of fundamental economic, ecological, social and political challenges for the governance of forest commons. Climate change and its impacts on countries' and regions' development add a new dimension to an already challenging situation. Governance systems are challenged to set a frame for formulating, financing and implementing adaptation strategies at multiple layers, often in a context of ongoing institutional changes such as decentralisation. A deeper understanding of actors, institutions and networks is needed to overcome barriers in socio-ecological systems to adaptation and enable or enhance adaptive capacity. In this paper, we explore the relationship between governance and adaptive capacity, and characterise and assess the effects of a set of variables and indicators related to two core variables: Institutional flexibility, and individual and organisational understandings and perceptions. We present a comparative analysis with multiple methods based on a number of case studies undertaken at different levels in Burkina Faso and Mali. One of the key findings indicates the importance and influence of discourses and narratives, and how they affect adaptive capacity at different levels. Revealing the ideological character of discourses can help to enable adaptive capacity, as it would break the influence of the actors that employ these narratives to pursue their own interests.

**Keywords:** Adaptation, adaptive capacity, climate change, decentralisation, discourse, forest ecosystem, multi-level governance, networks, perception, West Africa.

**Acknowledgements:** The authors thank all participants and interviewees in the local communities, at the district, provincial and national levels in Burkina Faso and Mali. We also thank Bruno Locatelli for his useful comments on earlier versions of this paper. This document was produced within the framework of the “Tropical Forests and Climate Change Adaptation” (TroFCCA) project executed by CATIE and CIFOR and funded by the European Commission under contract EuropeAid/ENV/2004-81719. The contents of this document are the sole responsibility of the authors and can under no circumstances be regarded as reflecting the position of the European Union.

## 1. Introduction

In most regions in West Africa, livelihoods depend heavily on forest ecosystem goods and services, often in interplay with agricultural and livestock production systems. Numerous drivers of change are creating a range of fundamental economic, ecological, social and political challenges for the governance of forest commons. Climate change and its impacts on countries’ and regions’ development add a new dimension to an already challenging situation. According to the Intergovernmental Panel on Climate Change (IPCC), dependence on natural resources can heighten a population’s vulnerability to climate change, and mitigating the associated risks requires technical but also societal adaptation (IPCC 2007).

Although adaptation is inherently local, an enabling framework of rules, regulations, mechanisms and institutions is necessary to allow for a shift from mere reactive responses to climate change and extreme events towards strategic and sustainable action in socio-ecological systems (Adger et al. 2005a; Füssel 2007; Agrawal 2008). These systems are characterised by a complexity of a multitude of actors, interactions and processes, what Poteete (this issue) called multidimensional linkages, incorporating multiple levels and multiple scales.<sup>1</sup> Cross-sectoral, cross-level and cross-scale efforts are needed to respond to climate change and to reduce vulnerability or enhance resilience (Osborne et al. 2010).

As Engle (2011) pointed out, adaptive capacity of a system is a key concept in vulnerability as well as in resilience literature, and supports the achievement of desirable system states and outcomes. Governance, defined as the structures and processes by which societies share power, shapes individual and collective actions (Young 1992), and is a key determinant of adaptive capacity (Brooks

---

<sup>1</sup> In the context of this paper, we define scales as ‘the spatial, temporal, quantitative or analytical dimensions used to measure and study any phenomenon’ and levels as ‘the units of analysis that are located at the same position on a scale’ (Gibson et al. 2000, p. 218).

et al. 2005; Eakin and Lemos 2006; Lebel et al. 2006; Engle and Lemos 2010; Eakin et al. 2011; Engle 2011). Actors, institutions, networks, and their interlinks, are considered core elements of environmental governance in the context of adaptation to climate change and key to solve problems of collective action (Armitage 2008; Biermann et al. 2010). Polycentric governance, even so not seen as a panacea, can be part of the solution, because it enables users and managers to relate to the multiple dimensions which characterise, in particular, the forest commons (Nagendra and Ostrom, this issue; Ostrom 2010). The corresponding core question, then, asks what features of those core elements of governance hinder or enable adaptive capacity of the system to ensure desired outcomes are achieved.

In this paper, we want to explore how governance and adaptive capacity are related, and contribute to attempts to further ‘unpack’ governance and how it affects adaptive capacity by analysing two systems in Mali and Burkina Faso, in which livelihoods benefit from the forest commons. Following the emphasis given by a number of scholars, we will explore two core variables of governance and adaptive capacity: Individual and organisational understandings and institutional flexibility, as they serve as determinants for the space in which people, groups or societies can respond to, change, or negotiate a set of possible adaptation measures (Nelson et al. 2007; Engle and Lemos 2010; Otto-Banaszak et al. 2011). Knowledge is a key factor for maximising the use of this space (Armitage et al. 2008, 2009; Brockhaus and Kambire 2009; Keskitalo 2009; Pahl-Wostl 2009).

After a brief theoretical overview, we present an analytical framework how governance *can* affect adaptive capacity and provide insights from a number of case studies on *how*. We present shared context variables such as the ongoing decentralisation process, the existence of National Action Plans for Adaptation (NAPA), and differing variables such as the degree of experience with extreme climatic events in the two countries, and elaborate on the role of forests as well as different actors in the adaptation arena. The case studies used in this paper were undertaken between 2007 and 2009 in Mali and Burkina Faso at the community, municipality, district, province and national levels. Finally we assess how the identified governance variables and indicators influence adaptive capacity in Mali and Burkina Faso, by shedding light on aspects such as networks of influence and conflicting discourses at different levels.

Characterising and assessing governance aspects of adaptive capacity in dryland forest ecosystems requires an interdisciplinary and mixed methods approach, and we conclude with the identification of possible trajectories to enhance or enable adaptive capacity and some methodological reflections to strengthen such assessments.

## 2. Theoretical background

As growing numbers of academics, policymakers and practitioners come to recognise the importance of governance issues for the success or failure of

adaptation efforts, an urgent need has arisen for a holistic understanding of politico- and socio-economic systems and the resources and users within them (Young et al. 2006; Ostrom 2007; Armitage 2008; Berkes 2008; Pahl-Wostl 2009; Plummer 2009, Plummer and Armitage 2010; Ostrom 2009; Engle 2011). In this section we focus on attributes of governance that have been highlighted in resilience and vulnerability literature as affecting adaptive capacity.

### **2.1. Adaptive capacity and governance**

Following the IPCC definition, adaptive capacity can be understood as the ability of a system to adjust to climate change (including climate variability and extremes), to contain potential damage, to take advantage of opportunities, or to cope with the consequences (IPCC 2007). The literature proposes several approaches for determining adaptive capacity and the various concepts used to measure or assess it. Although governance is an integral determinant of adaptive capacity, it remains difficult to capture (Brooks et al. 2005; Adger et al. 2005a; Engle and Lemos 2010). Scale, however, determines the applicable indicators (Adger et al. 2005b; Mukheibir and Ziervogel 2007; Vincent 2007) as does the analytical perspective. Plummer and Armitage (2010, 6) defined adaptive capacity from a governance perspective as “The capability of a social–ecological system to be robust to disturbance, and to adapt to actual or anticipated changes [whether exogenous or endogenous]”. Based on a review of the institutional and governance literature, they identified the following key determinants: (a) Technical, financial, social, institutional and political resources; and (b) Social processes and the mechanisms and structures through which they are employed and mediated. Participation in governance structures for adaptation requires that actors at all levels are sufficiently informed and knowledgeable to be able to participate in effective decision-making (Engle and Lemos 2010; Poteete and Ribot 2011).

### **2.2. Actors, perceptions, individual and organisational understandings**

For actors, being entitled to and endowed with specific resources in the adaptation arena shapes not only their capacity to adapt, but also what they perceive as a possible adaptation response. Knowledge and historical experience with external and internal stressors can enable the application of specific responses and enhance the adaptive capacity (Engle and Lemos 2010). However, the individual or collective understanding of risk, and differentiated perceptions of what is a desirable adaptation pathway based on highly differentiated interests or knowledge bases, must be taken into account when considering adaptive capacity (Otto-Banaszak et al. 2011). Adaptive governance of socio-ecological systems to address climate impacts needs informed and connected individuals and organisations at multiple levels and layers that are able to respond to drivers of change (Folke et al. 2005; Lemos and Agrawal 2006; Armitage and Plummer 2010). Boykoff (2008, 550), for example, sees the mass media as an “influential and heterogeneous set of non-nation state actors” that not only reflect existing social perceptions of an issue and

the power structures involved but can also influence or change them. But facts are selected and interpreted, and emerging discourses and narratives are often framed in support of individual or organised interests, and may be used to frame what is perceived as possible or desired, and legitimise specific policies or measures (Hajer and Versteeg 2005; Armitage 2008). In Table 1 we present indicators and possible ways on how these understandings affect adaptive capacity.

### **2.3. Institutions, networks**

Other variables that are important in understanding adaptive capacity are institutions and networks. Engle and Lemos (2010) identify and ‘unpack’ indicators such as the capacity to network and the flexibility of institutions “to bend, but not break” under external stressors”. Folke et al. (2005) stress the need to develop adaptive, flexible, and learning institutions at all levels to respond to the non-linear dynamics of natural resource and human systems. Henry and Dietz (2011) and Carlsson and Sandstroem (2008) emphasise the need for a deeper understanding of network governance in the commons, and how networks contribute to a more effective and sustainable management. Networks can exist among community members or interest groups, and can build, for example, advocacy coalitions for specific interests or discourse coalitions around a specific interpretation of a problem (and its solution). Tompkins and Adger (2004) argue that building social resilience is a key activity for sustainable ecological management under climate change, and that networks can increase a community’s adaptive capacity. However, social networks do not automatically lead to enhanced adaptive capacity; they can also have negative effects, for example, if they are exclusive and rigid, if they reinforce the power of the networking elite and marginalise non-members, or if they leave conventional wisdom unchallenged and do not enable learning (Newman and Dale 2005; Wolf et al. 2010). A more in-depth analysis of the nature of the relationships and resources exchanged in such networks is required to assess how they affect the adaptive capacity of a socio-ecological system. There is a growing body of evidence that policymaking is also organised in network structures between global and local levels, and lies outside the hierarchy of the state. Nevertheless, it can be assumed that the state still plays a crucial role in the adaptation arena, as it provides (and enforces) regulations and a frame for cross-level planning processes (Pahl-Wostl 2009; Plummer 2009; Plummer and Armitage 2010).

Knowledge that combines a range of sources and that is under constant review and criticism is the factor common to all the governance variables as explored above. Attributes of governance including individual and organisational capacity for adaptation determine the success of adaptation to climate change, and learning and flexibility are seen as key features for adaptation (Pelling and High 2005; Pelling et al. 2008; Tschakert and Dietrich 2010). Table 1 gives an explanation of how governance variables and indicators can play out in the context of adaptation in dryland forests in Mali and Burkina Faso.

### 3. Analytical frame and methods

#### 3.1. Analytical frame

To contribute to a deeper understanding of how governance of dryland forest commons affect the adaptive capacity of socio-ecological systems, this paper draws on a range of interdisciplinary studies on adaptation in forest-based ecosystems and livelihoods. We used mixed methods at different levels in Mali and Burkina Faso, and conducted the case studies over three years (from early 2007 to the end of 2009) in different research sites (Figure 1).

As part of a larger research project on mainstreaming adaptation and forests into policymaking in West Africa, the focus, research design and the methods applied in these individual case studies vary between the two countries and specific study sites. However, each case study provided insights in or highlighted specific aspects of governance, institutions and management, and how these are affected:

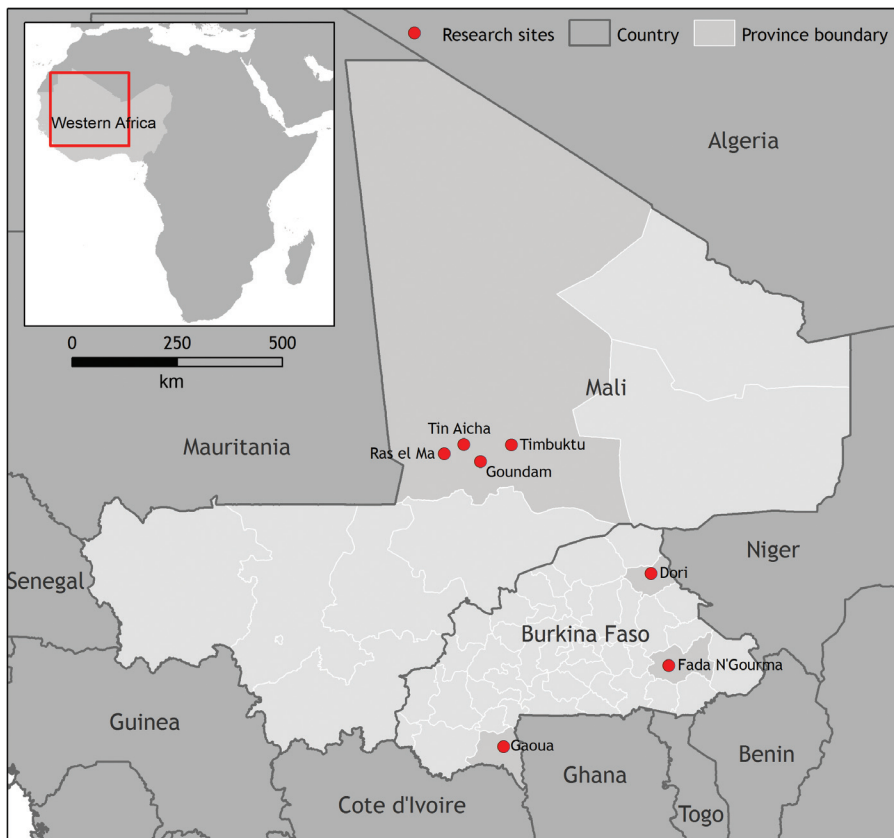


Figure 1: Map of Mali and Burkina Faso.

a) vulnerability (Brockhaus and Djoudi 2008; Djoudi et al. 2011), b) the choice of adaptive strategies (Djoudi and Brockhaus 2011; Brockhaus et al. forthcoming), and c) adaptive capacity in the context of decentralisation (Brockhaus and Kambire 2009).

Among other scholars, Engle (2011) calls for mixed and novel methods to be able to characterise and finally to assess adaptive capacity, drawing thereby on both frameworks, vulnerability and resilience. Building on this, the following Table 1 summarises the governance variables we will explore further in this paper based on findings of our individual case studies and literature review. We provide an attempt to show how these variables and indicators can positively affect the system's capability to produce desired adaptation outcomes, e.g. the ability to produce or maintain forest goods and services as a base for livelihoods in the case study sites. Table 1 indicates also which methods and analyses have been used to investigate these variables and indicators.

### **3.2. Detailed description of methods**

*In-depth interviews at national and subnational level to examine roles, perceptions and networks at the subnational and national level:*

In Burkina, we carried out comparative pilot research focusing on governance, forests and adaptive capacity. We began in 2007 in two municipalities in the southwest of Burkina Faso (Gaoua and Batier). In 2009, we extended this research to two other municipalities, one in the northeast (Fada N'Gourma) of the country and the other in the north (Dori), in order to cover a longer climate gradient. We interviewed a total of 45 actors from government agencies, municipalities, and environmental, agricultural and animal production extension services, as well as representatives of development projects active in four municipalities (11 in Fada N'Gourma, 18 in Dori, 6 in Batier, 10 in Gaoua). The questionnaires covered role and contribution of FEGS for livelihoods. Focus was on: Energy; water; and non-timber forest products and the use and management of trees and forests; perception/experience of climate change and extreme events and needed adaptive responses, and the envisaged challenges/threats under ongoing climate change/extreme events pressure; the roles and responsibilities for adaptation of the different actors in the arena; and qualities of a "good adaptor" at the individual and organisational level as well as actors' networks of information and influence.

In Mali, we conducted a total of 53 interviews at the national, regional and district levels in 2008. At the national level, we interviewed 14 NGO representatives and 12 government representatives from institutions related to climate change, pastoralism and forests. At the regional level, we interviewed three representatives of government institutions (regional offices for forests, livestock and planning) and six NGOs related to development, aid and livestock. At the district level, we interviewed 18 representatives of decentralised and administrative structures, as well as NGOs.

*Table 1: Governance variables, indicators, and how they can enhance adaptive capacity, including methods applied to operationalise them (derived from literature and the original case studies Mali and Burkina Faso)*

Governance and adaptive capacity variable	Lower level variables and indicators:	Description of how these variables/indicators can enhance adaptive capacity to ensure availability of forest ecosystem goods and services (based on literature and own individual case studies)	Method(s) applied to characterize (and assess)
Individual and organisational understandings	<ul style="list-style-type: none"> <li>– Experience with past extreme events (climate change/ extreme events among other drivers of deforestation)</li> </ul>	<p>In resilient systems, past stressors and system's responses to these have generated knowledge about success and failure of different adaptation strategies, and have generated innovation. These experiences provide useful lessons, which lead to adjusted management systems. The more experiences are shared among different groups inside the system, the higher the adaptive capacity.</p>	<ul style="list-style-type: none"> <li>– Participatory tools (historical timelines, resource maps, ranking of importance of past and current adaptive strategies, assessments of the role of forests) in community level workshops</li> <li>– In-depth interviews at national and subnational level</li> <li>– qualitative analysis</li> </ul>
	<ul style="list-style-type: none"> <li>– Risk and problem perception (stances on adaptation, beliefs in controllability of problem; complexity understandings)</li> </ul>	<p>Presented by specific interests or beliefs, facts are not objective, but selected and interpreted. They shape what is perceived by actors in socio-ecological system as a necessary, feasible, or desirable solution or response, and differ between genders, levels and sectors. Beliefs in controllability of climate change and techno-fix solutions can take away light for institutional adaptation responses, at the resource base or in national policy making arenas, especially if these are driven by few, powerful actors. The more decision-making is transparent, evidence-based and scientific sources as well as other independent sources are available, accessible and used, the higher the adaptive capacity.</p>	<ul style="list-style-type: none"> <li>– In-depth interviews with 26 national actors, including a set of prepared stances on adaptation with whom the interviewee could agree or disagree</li> <li>– In-depth interviews with journalists in Burkina Faso</li> <li>– qualitative analysis, policy network analysis, media-based discourse analysis</li> </ul>



(Table 1 continued)

Governance and adaptive capacity variable	<p>Lower level variables and indicators:</p> <ul style="list-style-type: none"> <li>– Policy preferences and understandings of responsibilities for action</li> </ul>	<p>Description of how these variables/indicators can enhance adaptive capacity to ensure availability of forest ecosystem goods and services (based on literature and own individual case studies)</p> <p>Bottom-up and integrative policy approaches, using information and incentive based instruments over top-down coercion, mobilise wider societal participation. Transfer of decision making power and resources to local level, as well as capacity to fulfil those new roles and responsibilities, allows for context specific, selective planning and implementation of adaptive strategies. Hence, the more involved resource users together with local governments in planning and implementation, the higher is the adaptive capacity in the system.</p>	Method(s) applied to characterize (and assess)
	<ul style="list-style-type: none"> <li>– Qualities of a “good” adapter (individual/organisational)</li> </ul>	<p>Curiosity, learning, and exposure to new situations or new knowledge help forest resource users, managers and other relevant decision makers and their organisations to deal with change. The greater the ability to generate new knowledge and experiment with new ideas, the greater the adaptive capacity of the individual or the organisation.</p>	<ul style="list-style-type: none"> <li>– In-depth interviews in Burkina Faso at district level</li> <li>– qualitative analysis</li> </ul>
Institutional Flexibility	<ul style="list-style-type: none"> <li>– Networks of information (inside communities, across communities, across levels of government and society)</li> </ul>	<p>Effective and equitable adaptation for forest-based livelihoods requires knowledge exchange and information flows between the different levels of decision makers, and resource users. Alternatives to existing discourses and narratives or paradigms, and information on alternative or new management practices of forests and trees can lead to more sustainable resource use. The higher the connectivity and heterogeneity in networks, and the more intense the exchange of knowledge, the higher the adaptive capacity.</p>	<ul style="list-style-type: none"> <li>– In-depth interviews in Mali and Burkina Faso at national and subnational level</li> <li>– Complemented by open discussions during participatory workshops in Mali and Burkina Faso) at district and community level</li> <li>– qualitative analysis, social and policy network analysis</li> </ul>

(Table 1 continued)

Governance and adaptive capacity variable	Lower level variables and indicators:	Description of how these variables/indicators can enhance adaptive capacity to ensure availability of forest ecosystem goods and services (based on literature and own individual case studies)	Method(s) applied to characterize (and assess)
	<ul style="list-style-type: none"> <li>– Networks of influence and representation (inside communities, across communities, across levels of government and society)</li> </ul>	<p>Rigidity, monopolisation and elite capture of networks can limit the effectiveness and equity of adaptation and marginalise forest resource users that cannot participate in these networks. Hence, the more heterogeneous social networks are and the more different groups of resource users are represented, the higher the adaptive capacity.</p>	<ul style="list-style-type: none"> <li>– In-depth interviews in Mali and Burkina Faso at national and subnational level</li> <li>– Complemented by open discussions during participatory workshops in Mali and Burkina Faso) at district and community level</li> <li>– qualitative analysis, social and policy network analysis</li> </ul>
	<ul style="list-style-type: none"> <li>– Access to information on global and national adaptation programs and policies</li> </ul>	<p>Self-organisation and strengthening of local efforts of adaptation requires information on opportunities for financial and technical support. The greater the access to such programs the higher the adaptive capacity.</p>	<ul style="list-style-type: none"> <li>– In-depth interviews in Mali and Burkina Faso at national and subnational level</li> <li>– Complemented by discussions during participatory workshops in Mali and Burkina Faso</li> <li>– qualitative analysis</li> </ul>

We also conducted a study with journalists in Burkina Faso (2009) to get a better understanding of the role of the media in shaping the public discourse on adaptation (or in being shaped by influential interests and actors) and the reflection of public views of adaptation needs via national media (print and broadcasting). The original objective of this research was to conduct a review of press articles produced in the previous three years as a way of analysing the discourse in the media on issues of adaptation and climate change. However, the review stalled at the first step – consulting the print media archives – because of the small number of items produced and the total lack of digital archives. Given the context, therefore, we recast the methodology as semi-structured interviews with key players in the media sphere. To this end, we developed an interview guide and conducted interviews with the journalists addressing environmental concerns. In total, 17 media representatives were involved in these in-depth interviews.

In addition to these country case studies we carried out in-depth interviews for a study on policy networks simultaneously in Mali and Burkina Faso. We conducted interviews (mainly in November/December 2009) with 23 key actors in the adaptation decision-making arenas. We identified these actors through an iterative process, based on their formal and informal roles and engagement in the policy domain, as well as earlier research results, with our selection supported by an expert panel that verified the lists, adding or deleting actors. We attempted to interview all identified actors on the list to analyse their understanding of adaptation, their positions on climate mitigation and adaptation, and their actor coalitions and information networks. To identify actors' perceptions with regard to adaptation and adaptation policies and strategies, we developed stances (position statements) that we tested with an expert panel. We tested an early version of the questionnaire, adapted from COMPON,<sup>2</sup> in Burkina Faso, and revised it based on stakeholder feedback. However, the response rate and final number of interviewees was too small (26 actors out of 78) to undertake a reliable analysis of network measures. The low response rate can be explained by poor timing on our side (most actors were travelling), but there is also indication for a general disinterest or perceived lack of expertise on the side of the identified actors. For the purpose of analysis in this paper we focused therefore on the qualitative results of the conducted in-depth interviews, as well as the stances.

*District and municipality level workshops to conduct vulnerability assessments and identify and assess adaptive strategies:*

In Northern Mali, at the district level in Goundam, we held two workshops, one with representatives of decentralised and devolved structures and development projects, and one with local representatives of communities (mayors, representatives of herders and farmers). In the first workshop, the “local” representatives comprised

---

<sup>2</sup> COMPON, ‘Comparing Climate Change Policy Networks’, led by Jeffrey Broadbent at the University of Minnesota, is a network of scientists working on comparative analysis of mitigation policy networks in Annex I and non-Annex I countries.

12 participants from six local communities in the areas around the lake. In the second workshop, the representatives included 14 participants such as state officials active at the district level e.g. in outreach services (on agriculture, forests, and livestock), and from decentralised structures, as well as development organisations. Participants identified livelihoods based on the use of forest goods and services, and developed a matrix of dependence on natural resources for different livelihoods. Then they identified different climate risks and impacts, and built a matrix of impacts on the different livelihoods. They ranked how the different livelihoods are affected by these impacts and their relative importance for the identified livelihoods. Adaptive strategies for responding to climate impacts and vulnerabilities were proposed and ranked. Finally, the participants openly discussed and assessed the strategies with regard to costs, benefits, conflict risk, feasibility and sustainability. We chose this set of criteria to facilitate discussions that moved beyond a presentation of ‘wish-lists’ but allowed for insights on how these factors interact and what factors hinder or enable, in participants’ views, to put into practice these strategies. The scorings and rankings were consensus-based.

We repeated this workshop design in the two northern districts/municipalities in Burkina Faso, even though we only held one workshop per district. Participants included representatives from the decentralised and deconcentrated structures in the communities, as well as from development projects and civil society organisations active in the communities (e.g. livestock organisations, hunters’ association, youth groups, a local women’s organisation, representative of a non-timber forest product users’ association). Also participating were a representative from the national climate change agency and a representative from a civil society organisation working on adaptation issues. The workshops in Dori and Fada N’Gourma employed some of the same elements and tools applied in the district-level workshops in Mali, namely vulnerability assessments and the evaluation of proposed adaptive responses. These workshops were preceded by a pilot workshop in Gaoua in the South West of Burkina in 2008, with a similar set of participants but with a focus on roles and responsibilities of different actors of state and civil society in the context of climate change and extreme events.

*Community level workshops to explore the role of forests, historical experiences with extreme events such as droughts and vulnerability, as well as past and present practice and preferences of adaptive strategies:*

We selected two sites in the area of the former Lake Faguibine in Northern Mali. Site selection was based on interviews at the national level to ensure our research was integrated with ongoing national activities, and complemented these with scoping field visits. At the community level in the two selected sites, we held six workshops. We adopted a participatory approach, worked in two communities (Tin Aicha and R’az El Mar) with separated groups (adult men, adult women, and young people), and used visualisation tools such as a historical axis, fodder calendar, resource maps and problem trees. Participant observation occurred

throughout all the research. Governance aspects relevant to adaptation emerged during all discussions, both individual conversations and workshops.

This was also the case in Burkina Faso, where we conducted three local-level workshops in two communities (men and women separate in one community, only men in one community), using parts of the methodology applied in our community-level studies in Mali, namely historical axis, fodder calendar, resource maps and problem trees.

We partially transcribed and analysed the data collected using a set of standard descriptive statistical methods and UCINET 6 social network analysis software (Borgatti et al. 2002). Most of the results have been published earlier in the individual case studies, and are aggregated for the purpose of this paper. In the following sections, we will highlight some results of the original case studies that shed light on the governance variables and indicators discussed in this paper.

## 4. The context for governance and adaptive capacity in Mali and Burkina Faso

### 4.1. Shared and differentiated formal and informal institutions, experience, and the role of forests

Mali and Burkina Faso, both land-locked countries in West Africa, are characterised by high economic dependence on natural resources, with most livelihoods based on livestock and agriculture (Figure 1). The two are among the world's least developed countries, ranked 160 and 161, respectively, out of 169 countries (UNDP 2011). Mali and Burkina Faso have both ratified the Kyoto Protocol and are parties to the UN Convention to Combat Desertification, among other international agreements, and to the UN Framework Convention on Climate Change. Both countries have developed a framework for adaptation, and have submitted National Communications and National Adaptation Programmes of Action (NAPA), the latter in December 2007 (see UNFCCC NAPA database). Burkina Faso submitted a project plan for NAPA activities in April 2011 (Ministry of Environment 2011). Both countries express in their national adaptation programmes and projects the urgent need for adaptation, and indicate a lack of financing potential and human and institutional capacity. However, in 2011 the proposed projects in both countries have been implemented only partly.

The institutional landscape in both Mali and Burkina Faso is shifting, although at different paces, because of current processes of economic and political change. Administration and local governance are reorganising under a process of decentralisation, and a transfer of resources to the local municipalities is ongoing (Dembélé 2009). Elections have been introduced at municipality level and both decentralised and deconcentrated structures have been created at multiple levels. In both countries, government technical services for agriculture, livestock and forests/environment are present at district, provincial and regional levels. Local planning authorities are not yet fully functioning, in terms of either

resources or capacity. In this context, it is necessary to note that the process of decentralisation has undergone various mutations leading to the present political and administrative situation. In Burkina Faso, this process is based on Law No. 055-2004 AN, which sets out the general code for local authorities. As such, this law determines the orientation of decentralisation, the skills and means of action, the agency and the local authorities. The code also states that the decentralisation must be accompanied by devolution (deconcentration) of state services to enhance communities' capacity to act. The process of decentralisation in both countries may offer new opportunities to integrate adaptation into local and national development policies but could also present obstacles, for example due to regulatory gaps or lack of capacity in different sections of the reorganised governance structures (Brockhaus 2005).

Forests and trees are often managed at the local level under customary agreements, particularly as trees and tree ownership are strong indicators of land ownership. However, in both countries, the state is officially the guardian or the owner of the forest. For example, Mali's 1995 Forest Code stipulates that the state owns all "vacant" land, including forests and fallows older than 10 years. The forest administration is responsible for implementing statutory forest laws and management, most of which were introduced by the French colonial regime (which was – and its legacy is – present in both countries).

In terms of experience with extreme climatic events, the research sites in Mali at the northern fringe of the former Lake Faguibine have witnessed the transformation of the former lake area into a forest-based ecosystem. This drastic change occurred because Lake Faguibine dried out during extreme droughts in the 1970s and 1980s, combined with removed human and animal pressure during the period of armed political rebellion and the highly fertile soil in the former lake, which enabled rapid growth of the emerging forest ecosystem. *Prosopis* forest, which was introduced as part of development projects in the 1980s, covers the northern parts of the former lake area and a natural *Acacia* regrowth dominates the eastern fringes. Livestock production systems (mobile and sedentary) are prevalent in the area.

The droughts of the 1970s and 1980s also put great pressure on local livelihoods in the northern and the northeastern sites in Burkina Faso. Dry forest constitutes much of the area of Burkina Faso; vegetation is mainly composed of savannah woodlands with gallery forests along the rivers, and precipitation varies greatly between the sites in the north, east and southwest (the average annual rainfall is 800–1200 mm in the southwest, compared with 200–600 mm further north). In the northern and eastern research sites, livestock husbandry comprises the dominant household activity, while livelihoods in the sites in the southwest are based mainly on agricultural production, often in combination with livestock activities. The area has also seen in-migration of herders (mainly Fulani), who have partially settled in the Gaoua region, as well as other ongoing transhumance activities (Brockhaus 2005). In this way, droughts have had indirect impacts on the southwestern research site, with immigrants moving to this area because of

the higher rainfall. Transhumant herds also appear to be visiting the area more frequently, although there is no quantitative evidence to support this observation (Brockhaus et al. 2003). In Burkina Faso, conflicts in rural areas occur between farmers and herders; in northern Mali, political conflicts between the government and Tamacheq groups during the past two decades have been an additional driver of change.

Forests play an essential role in adaptation and coping with extreme events at the local level, functioning as a safety net in particular for herders, as a source of additional income and food (charcoal in Tin Aicha, hunting in Gaoua), or for cultural purposes (Brockhaus and Djoudi 2008; Brockhaus and Kambire 2009). Table 2 provides examples for forest-based strategies and their importance from two communities in Northern Mali.

All the research sites in the two countries are characterised by ongoing spontaneous and reactive adaptation or coping with climatic stressors, but steps to move towards planning and anticipatory adaptation to ensure sustainable provision with forest ecosystem goods and services have not been observed (Brockhaus and Djoudi 2008; Djoudi et al. 2011; Brockhaus et al. forthcoming). Decentralisation as a political process, as studied in Burkina Faso, has not yet involved locally planned adaptation and sustainable management of forest resources (Brockhaus and Kambire 2009), and neither has the economic potential of the *Prosopis* forest in Mali, which uncontrolled and unmanaged can be rather a ‘curse’ than a ‘blessing’, enabled planning and management in these study sites (Djoudi et al. 2011). This is despite the fact that participants in Mali highlighted the emerging and changing role of forests in supporting livelihoods and the transition from forests as a safety net to a daily subsistence base as a fundamental part of adaptive strategies (Djoudi and Brockhaus 2011; Brockhaus et al. forthcoming).

*Table 2: Examples for forest-based strategies and their importance from two communities in Northern Mali (as expressed in participatory workshops by women, adult men, and young men in pastoral and farmer communities. The number of plus signs indicates the importance of realised strategies as ranked by the groups) (adapted from Brockhaus et al. forthcoming)*

Realized strategies	Pastoral community (Ras El Ma)			Farmer community (Tin Aicha)		
	Women	Adult men	Young men	Women	Adult men	Young men
Livestock (transhumant)		+++				
Livestock (sedentary)	+++	+++	++++	+	++	
Livestock (with remittances from migrants)			+++			+++
Charcoal				++		
Handicrafts (partially not based on forest goods)	(+)	+		(+)	+	

Figure 2 provides a schematic overview of the different past and potential future trajectories and some of the drivers of change in the forest commons in Burkina and Mali, exemplified with the two most northern sites in Mali and the two most southern sites in Burkina Faso. We identify as a desired outcome for both systems, the ability of the system to deliver forest goods and services to support livelihoods on a sustainable base under the risk of further climatic stressors (e.g. extreme events such as inundations, droughts, as mentioned in all district level workshops, as well as in the in-depth interviews at these levels in both countries). These desired states can be reached through enhanced adaptive capacity of the systems (see Figure 2).

#### 4.2. Actors and their roles

Policy decisions and governance structures at multiple levels affect local realities. The adaptation arena spans all levels – local to global – and in both countries, we could identify a multitude of actors with specific roles (Table 3). In both countries, relevant coordinating agencies come under the Ministry of Environment. Donors and UN organisations such as the UN Development Programme (UNDP) are channelling finance, and are also in the process of mainstreaming adaptation into their ongoing activities. Civil society organisations such as Mali-Folkecenter

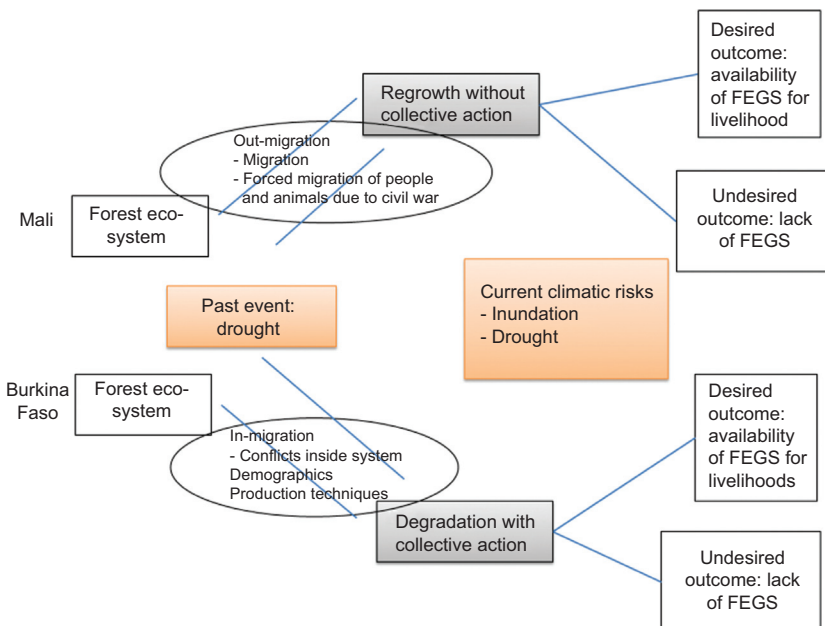


Figure 2: Trajectories of forest ecosystem in Northern Mali (regrowth in former lake area) and south West Burkina Faso (degradation).



or international environmental NGOs such as the International Union for the Conservation of Nature (IUCN) and development projects described their role as being to gather and channel information; they also reported having started adaptation actions and capacity building at the subnational level in both countries. As part of civil society, the media are expected to report on climate events and provide information on ongoing adaptation efforts, even though this happened only to a very limited degree as our findings showed. At the subnational level, actors in decentralised structures, such as mayors and members of local councils, government officials, or development projects, are becoming involved, or could become involved, in adaptation, whether by actively mainstreaming adaptation into their planning or development efforts, or by providing or accumulating information on adaptation needs. However, in a manner that is rather disconnected from such global and national efforts, in both Mali and Burkina Faso, adaptation is occurring locally, as local pastoralists, farmers and users of non-timber forest products cope with and respond to climate change and extreme events for centuries.

## 5. Characterisation and assessment of governance variables and indicators affecting adaptive capacity

In this section, we will present and discuss findings relevant to the variables and indicators in Table 1. We assess how these governance variables and indicators in their current performance affect adaptive capacity compared to the ideal state as described in Table 1, and also indicate limitations in either the variables/indicators and our assumptions about them, or in the data we gathered.

*Experience with past extreme events (climate change/extreme events among other drivers of deforestation)*

As explained above, the experiences with extreme events such as droughts differed strongly among the two research sites in Mali, the research sites in

Table 3: The adaptation arena in Mali and Burkina Faso

Level	Actors	Roles
National (regional, global)	Coordinating agencies, donor community, UN agencies, development projects, research institutes, civil society organisations and other NGOs, media	Coordinating, financing, linking global climate change processes to national processes, providing information
Subnational	Decentralised structures, technical service agencies, statistic/planning governmental organisations, development projects, civil society organisations	Planning, implementation, providing information
Local	Pastoralists, silvo-pastoralists, agro-pastoralists, farmers, non-timber forest product users, representatives of local organisations	Responding to climatic and other stressors, planning and implementing adaptation

Northern Burkina (all three faced extreme droughts), in North East Burkina, and the two sites in the South West of Burkina (intermediary experiences by in-migration). Hence the applied strategies are also very different, ranging from conflict management to intense use of forest and trees as fodder resources, or long-term out-migration). The drying out of the lake has rendered past experience and strategies regarding agriculture and fishery irrelevant, because the communities have already experienced a shift in ecosystems and their skills as farmers or fishers are not applicable for forest management.

In the two communities in Mali, especially young men, indicated that their experiences in refugee camps during the rebellion has introduced them to new contacts and skill, even though skills for livelihood activities that are no longer based fully on ecosystems, such as handicraft. We did not find evidence for exchange of experience between the two communities in Northern Mali, but during the discussion about past events and responses to those the participants (mainly women and elder men) indicated exchange with aid and development projects. However, with the end of these projects also the management of the newly introduced Prosopis forest ended (originally introduced to stabilise the fringes of the former Lake), and what was left was an extremely dense, hence inaccessible, and uncontrolled spreading Prosopis forest in the former Lake area and meanwhile beyond. In addition, the growth of Prosopis in the former lake created the problem of land tenure because reforested areas are classified as fallows and thus their ownership reverts to the state.

In the South West of Burkina, we found that some experiences related to forest management were shared among the newly decentralised structures in different communities. According to our interviewees, in one municipality the transfer of control over forest resources situation has led to the ‘sell-off’ of a teak forest without considering any environmental and economic implications of this transaction. But informants from the neighbouring municipality used this as an example of ‘lessons learned’ for their own future decisions concerning forest resources with the environmental technical services in an advisory role.

In Table 1, we suggested that sharing of experiences among different users, groups and managers enhances adaptive capacity for management of forests. Even though the examples above indicate that experiences and knowledge enhance at the individual level adaptive capacity to current and future stressors, the potential of sharing experiences more systematically across users, communities, organisations and decentralised structures, and to build upon them for sustainable management of the forest resources in the long-term is not yet fully explored. In addition, past experiences have become useless in the case of Northern Mali, where the system itself has shifted and old skills are no longer required.

*Risk and problem perception (stances on adaptation, beliefs in controllability of problem; complexity understandings)*

All actors at the national level agreed in the interviews and in the analysis of their position statements that adaptation is necessary. But an engagement for

adaptation was limited in both Mali and Burkina Faso. In Mali, the national-level interviews revealed that, in addition to the three coordinating agencies, mainly donors and development projects showed interest in adaptation, but they did not treat it as a priority because of other pressing tasks or a lack of knowledge about adaptation and related needs. However, a comparison of interviews from June 2008 and December 2009 reveals a shift is occurring, with growing awareness and further coordination efforts especially among the donor community and the Ministry of Environment. With several major international and domestic events related to climate change, as well as the race towards the climate conference in Copenhagen in December 2009, more actors in both countries, both within and outside the government, became more aware and involved in the issues. Nevertheless, as a representative from a donor organisation said in the interview, “The debate on climate change is basically a global debate and oriented toward conferences of the parties (COP) under UNFCCC. Always shortly before the COP, several activities and committees are created but they are short lived and do not get support in the long-term.” The situation is similar in Burkina Faso, where in addition informants at both community and subnational levels pointed out that climate change/variability is only one of many stressors and drivers of change. Actors across all levels perceive climate change not as a major driver of change, but as part of a complex system of driving forces. Evidence of this observation is that all actors except one donor in the studies agreed with the stance: “Developing countries face so many problems that adaptation is just one issue among many other, more urgent issues”.

In Mali, some isolated or scattered actions related to adaptation have taken place at the national level, but other actors have not placed much value on them. For example, one organisation (donor) reported holding workshops, but other actors made no mention of them. Although, objectively, the organisation was highly active, having run adaptation workshops at the national level, governmental actors (and others) in the policy arena did not perceive the organisation as relevant. An analysis of the lists of the participants in the workshops in 2008 and 2009 reveals that most were from low-ranking sections of government and thus had limited power to spread the information gained through the workshop. In addition, we observed strong sectoral thinking among government actors, who did not see either forests’ adaptation to climate change nor the role of forests in adaptation as a priority. For example, in the adaptation arena in Mali, there was only limited recognition of the role of forests for the water sector at the national level. In Burkina Faso, sectoral thinking appeared specifically at the subnational level, where most interviews revealed the assumption that trade-offs existed between sectors in terms of the allocation of finance and capacity.

Most national state organisations, national and international NGOs, and national research organisations viewed adaptation actions as more important than mitigation. Donor organisations, cooperation agencies and international research centres did not reveal a clear preference for adaptation over mitigation (Figure 3).

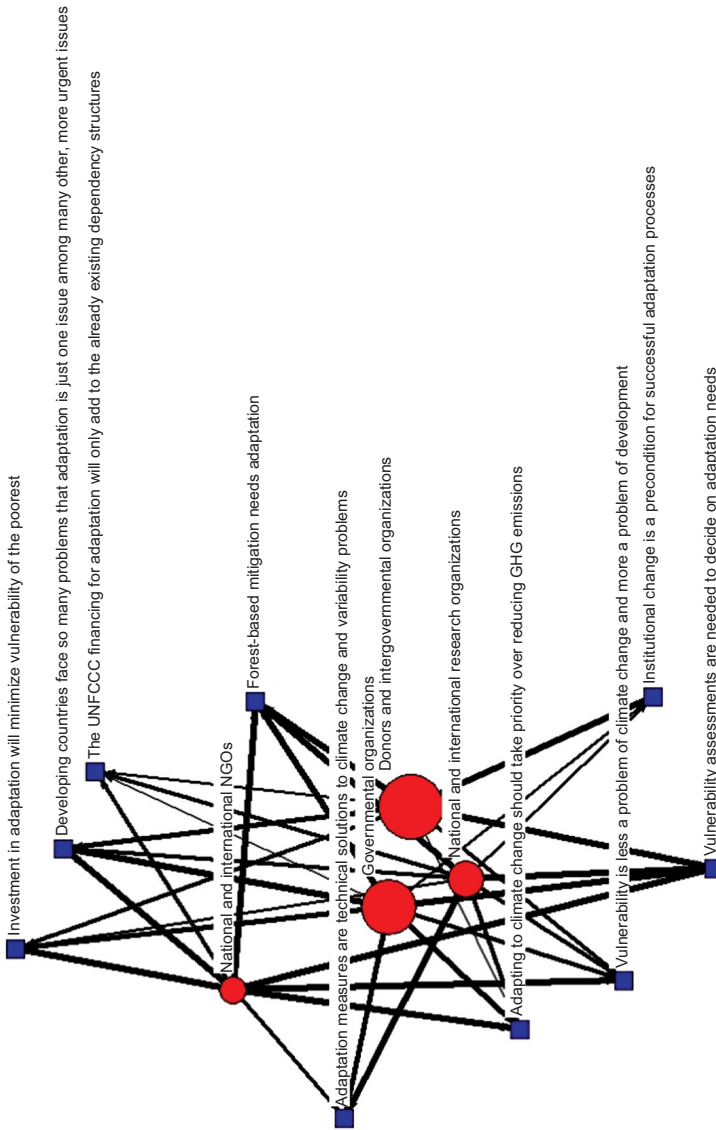


Figure 3: Agreement among 4 policy actor groups on specific stances (position statements in blue) in Mali and Burkina. (Node size reflects the number of interviewees in the group; size of the connecting line reflects the percentage of group agreement.)

The figure shows results of a stance (position statement) analysis of policy actors in Mali and Burkina in a two-mode network. We categorised the participants in different actor categories (red nodes), and the more similar the patterns of agreement or disagreement with the presented stances (blue boxes) among the organisations, the closer the actor groups (nodes) are in the figure. The node size reflects the number of interviewees in the actor group, and the size of the connecting line reflects the percentage of group agreement or disagreement.

In contrast to other state agencies, only the national forest administrations in both countries clearly prioritized mitigation over adaptation. However, when we asked more specifically about the adaptation of forest ecosystems to climate change, stakeholders unanimously answered that forest-related mitigation actions must be accompanied by adaptation actions for both ecosystems and communities.

Two distinct positions emerged with regard to the impact of investments in adaptation projects designed to reduce vulnerability. On the one hand, most members in the NGO and governmental groups agreed that investment in adaptation would reduce the vulnerability of the poorest. On the other hand, in particular two national research organisations did not agree. Half of the members in the donor group in both countries choose a neutral position and argued that the success or failure of investments in vulnerability reduction depends on transparency and accountability in the distribution of those funds and the portion of those funds that would actually reach the poorest. Given the recurrent question of elite capture in development funds, and newer concerns in the context of decentralisation in its early stages, concerns were raised in relation to efficient, effective, and equitable adaptation financing.

The question of causalities between climate change, development and vulnerabilities, was also one of the more controversial topics also within the different actor groups. In particular international and national NGOs (most of them engaged in development or conservation) argued strongly that vulnerability is more a problem of development than a direct result of climate change, while members of all other actor groups also disagreed on this position and put more emphasis on potential impact of climate change that need to be treated separately from the development agenda (Figure 4).

Even though actors in both countries agreed strongly that understanding and analysing differences in the state of vulnerability is a precondition for identifying adaptation needs and options, techno-fix beliefs were prevalent at the national and subnational levels in Mali. Most actors – especially coordinating agencies and state technical services – perceived adaptation as a technical challenge. In Burkina Faso also, this belief in technical solutions and the controllability of climate impacts was prevalent at both levels, mainly among governmental actors at the subnational level, independently of the climate gradient. Results from the stance analysis confirm this belief in technology among governmental and research organisations; mainly representatives from the donor community disagreed strongly with the statement that “Adaptation measures are technical solutions”,

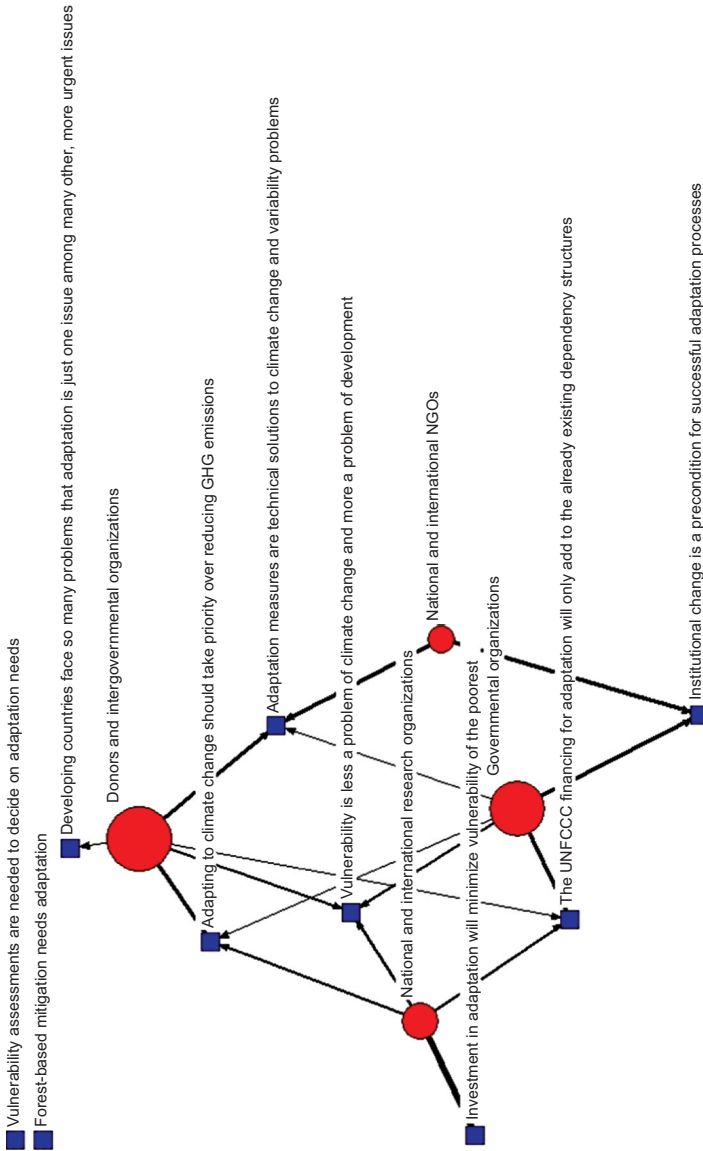


Figure 4: Disagreement among 4 policy actor groups on specific stances (position statements in blue) in Mali and Burkina (node size reflects the number of interviewees in the group; size of the connecting line reflects the percentage of group agreement). Two of the here presented stances found no disagreement, and these stances remained as “Isolates” in the top left corner.

instead highlighting the institutional side of adaptation in the interviews (Figures 3, 4). This technical conceptualisation of adaptation by state and research actors clashed with perceptions of vulnerability and adaptation needs at the community level, which were much more differentiated. In Mali, we found that whereas community actors and their representatives at the district level incorporated institutional and social changes into their proposals, the technical and state representatives tended to ignore these issues, instead focusing on technical issues such as improving herd productivity or restricting herd mobility and introducing sedentarisation policies. In debates in the two workshops at the district level in Northern Mali, we found that representatives of pastoralists described mobility as a key strategy in the response to drought, whereas technical agents and other governmental representatives perceive mobility as a root cause of vulnerability, an argument that serves to justify sedentarisation.

Responses during the six community workshops in Mali also revealed strongly divergent perceptions between genders, as well as between neighbouring communities that have different socio-ethnic backgrounds and livelihood bases (one mostly based on livestock, the other mostly based on mixed activities). For women, the most important responses are those that support food security, health and education; in particular, women tended to prioritise long-term change, whereas men tended to focus on foregone activities and continued to reinvest capital in more climate-sensitive livestock (cattle) despite recurrent losses due to drought (Table 2).

We found that, with the new decentralised system featuring elections at the subnational levels, political interests were hampering local adaptation, by issuing promises that Lake Faguibine and the previous associated livelihood base would return if only there were sufficient technical investment. Such promises reinforced what seem to be psychological barriers, particularly among older men in one of the two communities. By constantly refreshing the dream of the “good old times”, such political promises ignore both ongoing local adaptation and these psychological barriers to deal with change. This phenomenon emerged both during workshops at community and district levels (e.g. “we want the lake back”) and in interviews, for example with elected at the district level and development project leaders in charge of reorganising the former lake system.

The results of the media analysis in Burkina Faso do not support, for this context, the widely held assumption that the media functions as a critical intermediary to distribute new knowledge because of its capacity to not only present and reflect, but also shape public discourses and perceptions. Rather, journalists described themselves as merely reflecting current events, with coverage generally dependent on payments by organisers. The media have not picked up the issue of adaptation, with most interviewees citing lack of knowledge as the main cause. However, most interviewees suggested as an activity engagement with and capacity building of the media to enhance public awareness in the short-term and capacity across all levels in the long-term (which is reflected now in the Burkina Faso national communication (Ministry of Environment 2011)).

If we put these results in the context of our assumptions in Table 1, we find that most perceptions and proposed solutions to the problem of climate change and the need for adaptations across all levels of governance are influenced to a high degree by specific narratives and discourses, e.g. the sedentarisation versus mobilisation discourse, the techno-fix discourse, and the discourse around the “return of the lake”. The results show that decision-making based on such narratives and discourses affect adaptive capacity currently in a negative way, as they either lead to inaction in national policy arenas (technology will solve it), or conflicting strategies among community members (waiting for the lake or learning and managing newly emerged forest resources, which only managed can lose their invasive threat) or between state agencies and communities, when the state plans for sedentarisation but herders need support for mobilisation to adapt in an ecosystem with high climatic variability. However, the divergence in positions in and between actor groups at national level, as well as the existence and growing awareness for counter-discourses (e.g. in the mobility debate) across levels and communities indicate new and more open debates.

*Policy preferences and understandings of responsibilities for action*

During the interviews in the 4 municipalities/districts in Burkina Faso we asked specifically for policy preferences that would secure forest ecosystem goods and services. The proposals for policy instruments most often included information, awareness raising, and changes in economic incentives, for example through payments for environmental services. In particular the environmental technical service emphasised these over coercion, due to limited success of these measures in the past. Even though national government and the international community was seen as the main responsible to provide a policy framework to finance and regulate adaptation actions, decentralised structures were seen as responsible for identification of adaptation needs and measures and prioritisation of action as well as planning and implementation. Emphasis was put on the need for participation of all actors involved in use and management of ecosystem goods and services in these processes. The ongoing decentralisation was seen by nearly all informants from the different actor groups as a strong opportunity to enable participation and adaptive capacity, given that the process seemed to offer new institutional flexibilities and ‘short distances’ to local realities, which should result in adapted and highly responsive planning (Brockhaus and Kambire 2009). This strong emphasis on institutions and the opportunities that institutional change would deliver was not reflected at the national level. Interestingly, mainly government actors and one NGO saw no need for institutional change (Figure 3 and Figure 4). Even though actors in decentralised structures could potentially act as “agents of change”, decentralisation has not yet fulfilled expectations, as interviewees mentioned in most interviews at the subnational level in Burkina Faso, independent of their own organisational function. Respondents explained that such structures lack the necessary capacity to respond to new opportunities. An exception was the environmental technical service in one of the communities in the South West of Burkina Faso, which



reoriented its approach towards greater engagement with civil society actors, both to ensure support for its actions and to create public awareness of environmental problems (Brockhaus and Kambire 2009). Furthermore, understandings of civil society as a future key player in decision-making at the local level varied widely, and some newly elected members in the decentralised structures indicated a rather paternalistic understanding of their own and civil societies role, described as being a passive actor for whom the elected take care: “The population needs to have trust, confidence and patience with its elected”. During our interviews with government representatives as well as the newly elected mayors in the communities in Northern Mali this portrayal of civil society and its passive role in the governance of the forest commons was reflected, too.

Translating these findings into our assessment of adaptive capacity, it seems that expectations in the potentialities for participatory and context specific planning to ensure sustainable use of forest resources is given, but that the assumed importance regarding its positive effect on adaptive capacity is not yet evident nor measurable.

*Qualities of a “good” adapter (individual/organisational)*

Perceptions of the qualities of a “good adaptor”, whether at the individual or organisational scale, tended to be similar among interviewees in the four sites in Burkina Faso and at the national level in both countries. Qualities cited included motivation, open-mindedness, curiosity, formal and informal communication, and knowledge, and they were named as being useful for the individual informant to respond to occurring changes or stressors particularly in the agricultural production, by having enabled the informants to experiment with new varieties, or applying new techniques. However, in relation to achieving organisational changes, obvious limitations appeared, with most interviewees at the subnational level mentioning a lack of communication pathways to the higher levels of the hierarchy for presenting ideas or suggestions (Brockhaus and Kambire 2009). Interestingly, in the context of this specific question a debate on the education system in Burkina Faso arised during or after two interviews, and the interviewees wondered how and if at all the above qualities were encouraged in the current system.

Generation of new knowledge and experiences, as we suggested in Table 1 for enhancing adaptive capacity inside the socio-ecological system, is happening at the individual level. Limitations for inter-organisational learning, however, hamper innovation and the experimentation with new ideas.

*Networks of information (inside communities, across communities, across and within levels of government and society)*

At the community level, participants in workshops in both countries did not mention specific networks to access information on forests, adaptation and climate change. However, especially women and also some older men mentioned during the workshops in Northern Mali the exchange and new information they gathered

during the presence of development and aid projects (e.g. a Japanese aid project and a Quaker relief organization) after the droughts in the 1980s, until the project ended in the 1990s. This helped to manage the emerging Prosopis forest at that time, but at the time of the workshops, no equipment (saws) was available nor management techniques (e.g. regular thinning) were applied.

At the district (or municipality) level we found a different picture. Actors in the four municipalities in Burkina Faso indicated limited but differentiated networks of information on adaptation in forest ecosystems. Government actors from the deconcentrated structures at province and district level rely mainly on higher level actors, such as SP/CONNED. Members of the decentralised governance structure mentioned lack of access to information, but indicated knowledge exchange within the district during meetings at district level and village level commission for development. Agents of the environmental technical services in the South West of Burkina Faso mentioned as a one-way source of information public media or newsletters provided mainly by their national level agencies, while most of their colleagues in the northern districts as well as agents from agriculture and animal production mentioned the absence of any particular source or network of information. One actor from a pastoral organisation in Dori indicated the regular use of the Internet to access scientific information provided by national and regional climate institutes (CILLS, AGRHYMET), with whom he also exchanged information.

In Mali, the in-depth interviews at national as well as at subnational levels revealed little evidence of vertical networks, for either coordination or information sharing. The exception was Mali's national weather bureau, which delivers and receives targeted information to and from farmers and links levels and research with decision-making at the local level. The informant from the weather bureau described this project as successful, based on the high demand by local users of this information, and the capacity building achieved in local observation stations.

The media has so far not shown strong ability to play an active role in informing civil society and policymakers. The absence of media coverage of adaptation seems to reflect the degree of society's lack of awareness of the issue and confirms assumptions that adaptation is not part of the public discourse but rather is perceived as a locally specific problem – that is, adaptation not as a political and societal responsibility but as a private or “club” (community, village, district) problem.

Mainly the examples from the South West of Burkina Faso as well as the earlier experiences in Northern Mali confirm the positive role networks of information play to enhance adaptive capacity. However, linkages especially between different bodies of information at different levels are not yet fully explored.

*Networks of influence and representation inside communities, across communities, across levels of government and society)*

We found quite different approaches and networking activities towards the new decentralised configuration in the established municipalities, in particular in

the South of Burkina. While the agricultural extension service, better equipped than other state agencies with human and technical resources, is seeking close connections to village level commissions for development, and acted as representatives in the municipality commission, the environmental agency reaches proactively out to civil society and environmental organisations in the respective districts and provinces.

Most interviewees across all levels reported horizontal and vertical coordination of adaptation activities as a key challenge, especially given that climate change adaptation is a cross-sectoral activity. Coordination also appears to be a challenge within certain actor groups, such as representatives of international organisations. In Mali, for example, the donor round-table for climate change tries to harmonise and coordinate its members' activities. However, as two informants from the donor community explained independently, competitive behaviour among individual donor agencies hampers such efforts. Individual donor activities create a short-term reaction (e.g. creation of new committees without clear tasks and objectives) and rent-seeking behaviour among national structures. Furthermore, such organisations fail to reach out fully to existing governmental coordinating structures – although, with regard to these, interviewees noted that integrating national coordination structures represents a further challenge. They reported lack of leadership for climate change adaptation among national organisations (“Whom to approach”), lack of vision for adaptation and climate change policies in general in the Malian policy arena (“for what content”), and weak communication structures between governmental and other actor groups. Nevertheless, during the policy network interviews towards the end of 2009, actors highlighted efforts in the national policy arena to reorganise governmental actors around a decision-making centre (either by creating a new institution or via an existing structure.). However, as one governmental actor argued, the absence of a voice in the Prime Minister's office meant there could be no effective enforcement of climate change mitigation and adaptation strategies that mainstream forests. A new structure called “Alliance Global contre le Changement Climatique” was created in Mali in 2010, but it is hosted by the Ministry of Environment and has little proximity to neither the Prime Minister nor the President.

Similarly to financially motivated discourses at the international–national interface, paradigms and discourses at the national–subnational–local interfaces may also hinder change and adaptation. One example observed in Mali is the discourse around sedentarisation versus mobility (Djouidi et al. 2011). The absence of representatives of pastoralists from even decentralized decision-making arenas has led to a total lack of policies or measures to enable mobility, consequently limiting adaptation at the local level. The absence of women from the same decision-making arenas may have similar consequences (Djouidi and Brockhaus 2011).

To link our results back to the assumptions made in Table 1, our observations in both countries indicate that the bureaucratic or dominant nature of the state has been retained. New actors in decentralised subnational governance continue to act and make decisions in an exclusionary way, and the assumption that it is ideal for many actors across a range of institutional settings to contribute to

policymaking does not receive full support. Nevertheless, the examples from the two municipalities in the southwest of Burkina Faso suggest also that institutional change is occurring and new strategies are emerging between governmental and non-governmental actors. At the national level, the emergence of a more network-like governance is observable, but at the time of the research in 2009 most new actors in the adaptation arena are international actors negotiating with an established set of formalised governmental state actors.

#### *Access to information on global and national adaptation programs and policies*

Nearly all non-governmental actors and some governmental actors across all levels and scales in both countries reported lack of awareness of the national adaptation programme and the existence of an inflexible top-down approach in its implementation. At the time of the research (until the end of 2009), the NAPA was unknown at the subnational and local levels, as evident in informants' responses to explicit questions on the process. Even in NAPA project sites in Burkina Faso, we found that although at least two technical agencies were aware of the NAPA programme, nobody knew about vulnerability assessments, despite their importance for the preparation and implementation of adaptation projects. Indeed, informants explained that the first NAPA projects implemented at the local level had involved no vulnerability assessment; local communities perceived them as "business as usual afforestation projects" without further reference to climate change or adaptation.

Since awareness on national and global adaptation program was not given at the time of the research in none of our field sites, at least not at the time of our research, the indicator cannot be assessed. A comparison with a site in which this access was available would be necessary to explore what enabled such an access and how in turn did this access affect the adaptive capacity.

## 6. Conclusion

The purpose of this paper was to bring together insights from a series of case studies at different levels (national, districts, municipalities and communities) and explore possible effects of governance variables on adaptive capacity in the forest commons in Burkina Faso and Mali. To identify the governance variables and possible indicators we were drawing on two bodies of literature, resilience and vulnerability. To describe and frame governance effects on adaptive capacity, we build on this literature, as well as on earlier published results from our case studies. We presented a mix of methods how to operationalize the assessment of the effects on adaptive capacity, combining analysis of historic events and system's responses with an analysis of current developments in the adaptation arenas in Mali and Burkina Faso.

The results revealed that our choice of variables and the indicators, as well as the methods applied to test them, can only be considered a first step, and will require further refinement. Engle's and Lemos (2010) work on a river management

system in Brazil can be considered as exemplary in analysing a wider set of governance variables and operationalized indicators.

However, our comparative analysis brought forward a number of interesting patterns, that could serve as examples for possible ways forward to enable adaptation, or that can be considered as key barriers that will need much more attention, by the research community to provide further insight how this obstacles can be conceptualised, as well as by actors inside inside the system that need to deal with them.

One example of interesting patterns is the context of ongoing processes of decentralisation in both countries, which have triggered divergent strategic responses in how to approach these new structures and engage with civil society by exploring new networks of information and refining role understandings, and which have also triggered cross-municipality learning in an example from Burkina Faso, where “naming and shaming” lead to growing awareness for sustainable (and unsustainable) management of the newly transferred forest resources to the local level. Exploring existing linkages, as well as using current opportunities with decentralisation for building new ones seems to be one key factor in gaining access to new knowledge, but also for sharing experiences and enable learning in these multi-dimensional settings. Diversity of content and context is valuable for change and adaptive capacity as long as this diversity is known and is discussed by the heterogenous actors involved in adaptation from the global to the local level. Simple but efficient tools that are gender, scale and level sensitive are required to understand divergence and diversity around adaptation. Breaking up of hierarchical one-way flows of information can allow for a more effective use and building of the necessary inter-linkages and relations in a newly configured decentralised setting.

Another interesting pattern however was the importance and influence of discourses and narratives and the effects of those on decision making over forest resources. Examples in our findings (the sedentarisation versus mobilisation discourse, the techno-fix discourse, and the discourse around the “return of the lake”) show that they affect adaptive capacity at different levels, for example, either lead to inaction in national policy arenas, paralyse initiatives for self-organisation and the exploration of new opportunities in a shifting eco-system at community level, or lead to a mismatch between state planning and the required strategies for an ecosystem with high climatic variability, hampering adaptive capacity of specific user groups. Revealing the ideological character of discourses can help enable adaptive capacity, as it would break the influence of the actors that employ these narratives to pursuit their own interests.

## Literature cited

Adger, W. N., N. W. Arnell, and E. L. Tompkins. 2005a. Adapting to climate change: perspectives across scales. *Global Environmental Change—human and Policy Dimensions* 15(2):75–76.

- Adger, W. N., N. W. Arnell, and E. L. Tompkins. 2005b. Successful adaptation to climate change across scales. *Global Environmental Change: Human and Policy Dimensions* 15(2):77–86.
- Agrawal, A. 2008. *The Role of Local Institutions in Adaptation to Climate Change*. IFRI Working Paper. International Forestry Resources and Institutions Program.
- Armitage, D. 2008. Governance and the commons in a multi-level world. *International Journal of the Commons* 2(1):7–32.
- Armitage, D. and R. Plummer. 2010. Adapting and transforming: governance for navigating change. In *Adaptive Capacity and Environmental Governance*, ed. D. Armitage, and R. Plummer, 287–302. Heidelberg: Springer.
- Armitage, D., M. Marschke, and R. Plummer. 2008. Adaptive co-management and the paradox of learning. *Global Environmental Change: Human and Policy Dimensions* 18(1):86–98.
- Armitage, D. R., R. Plummer, F. Berkes, R. I. Arthur, A. T. Charles, I. J. Davidson-Hunt, A. P. Diduck, N. C. Doubleday, D. S. Johnson, M. Marschke, P. McConney, E. W. Pinkerton, and E. K. Wollenberg. 2009. Adaptive co-management for social–ecological complexity. *Frontiers in Ecology and the Environment* 7(2):95–102.
- Berkes, F. 2008. Commons in a Multi-level World. *International Journal of the Commons* 2(1):1–6.
- Biermann, F., M. M. Betsill, J. Gupta, N. Kanie, L. Lebel, D. Liverman, H. Schroeder, B. Siebenhuner, and R. Zondervan. 2010. Earth system governance: a research framework. *International Environmental Agreements: Politics, Law and Economics* 10(4):277–298.
- Borgatti, S. P., M. G. Everett, and L. C. Freeman. 2002. *Ucinet for Windows: Software for Social Network Analysis*. Harvard, MA: Analytic Technologies.
- Boykoff, M. T. 2008. The cultural politics of climate change discourse in UK tabloids. *Political Geography* 27(5):549–569.
- Brockhaus, M. 2005. *Potentials and Obstacles in the Arena of Conflict and Natural Resource Management: A Case Study on Conflicts, Institutions and Policy Networks in Burkina Faso*. Göttingen: Cuvillier Verlag.
- Brockhaus, M. and H. Djoudi. 2008. *Adaptation at the Interface of Forest Ecosystem Goods and Services and Livestock Production Systems in Northern Mali*. Center for International Forestry Research (CIFOR) Information Brief No. 19. Bogor: CIFOR.
- Brockhaus, M., H. Djoudi, and B. Locatelli. forthcoming. Envisioning the future and learning from the past: Adapting to a changing environment in Northern Mali. *Environmental Science and Policy*. In press.
- Brockhaus, M. and H. Kambire. 2009. Decentralization: window of opportunity for successful adaptation. In *Adapting to Climate Change: Thresholds, Values, Governance*, ed. N. W. Adger, I. Lorenzoni, and K. L. O'Brien. Cambridge: Cambridge University Press.

- Brockhaus, M., T. Pickardt, and B. Rischkowsky. 2003. Mediation in a changing landscape: success and failure in managing conflicts over natural resources in Southwest Burkina Faso. London: International Institute for Environment and Development (IIED).
- Brooks, N., W. N. Adger, and P. M. Kelly. 2005. The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation. *Global Environmental Change: Human and Policy Dimensions* 15(2): 151–163.
- Carlsson, L. G. and A. C. Sandström. 2008. Network governance of the commons. *International Journal of the Commons* 2(1):33–54.
- Dembélé, C. 2009. La décentralisation et les réformes de tenure forestière au Sahel: Mali, Niger et Burkina Faso. Paper read at Forest Tenure, Governance and Enterprise – New Opportunities for Central and West Africa. 25–29 May, Yaoundé, Cameroon.
- Djoudi, H. and M. Brockhaus. 2011. Is adaptation to climate change gender neutral? Lessons from communities dependent on livestock and forest in Northern Mali. *International Forestry Review* 13(2):123–135.
- Djoudi, H., M. Brockhaus, and B. Locatelli. 2011. Once there was a lake: vulnerability to environmental changes in Northern Mali. *Regional Environmental Change* (DOI 10.1007/s10113-011-0262-5).
- Eakin, H. and M. C. Lemos. 2006. Adaptation and the state: Latin America and the challenge of capacity-building under globalization. *Global Environmental Change: Human and Policy Dimensions* 16(1):7–18.
- Eakin, H., S. Eriksen, P. O. Eikeland, and C. Oyen. 2011. Public sector reform and governance for adaptation: implications of new public management for adaptive capacity in Mexico and Norway. *Environmental Management* 47(3):338–351.
- Engle, N. L. 2011. Adaptive capacity and its assessment. *Global Environmental Change* 21(2):647–656.
- Engle, N. L. and M. C. Lemos. 2010. Unpacking governance: building adaptive capacity to climate change of river basins in Brazil. *Global Environmental Change: Human and Policy Dimensions* 20(1):4–13.
- Folke, C., T. Hahn, P. Olsson, and J. Norberg. 2005. Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources* 30:441–473.
- Füssel, H. M. 2007. Vulnerability: a generally applicable conceptual framework for climate change research. *Global Environmental Change: Human and Policy Dimensions* 17(2):155–167.
- Gibson, C. C., E. Ostrom, and T. K. Ahn. 2000. The concept of scale and the human dimensions of global change: a survey. *Ecological Economics* 32(2):217–239.
- Hajer, M. and W. Versteeg. 2005. A decade of discourse analysis of environmental politics: achievements, challenges, perspectives. *Journal of Environmental Policy and Planning* 7(3):175–184.
- Henry, A. D. and T. Dietz. 2011. Information, networks, and the complexity of trust in commons governance. *International Journal of the Commons* 5(2):188–212.

- Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability. Summary for Policymakers. Fourth Assessment Report*. Geneva: IPCC Secretariat.
- Keskitalo, E. C. H. 2009. Governance in vulnerability assessment: the role of globalising decision-making networks in determining local vulnerability and adaptive capacity. *Mitigation and Adaptation Strategies for Global Change* 14(2):185–201.
- Lebel, L., J. M. Anderies, B. Campbell, C. Folke, S. Hatfield-Dodds, T. P. Hughes, and J. Wilson. 2006. Governance and the capacity to manage resilience in regional social-ecological systems. *Ecology and Society* 11(1):19. [online]
- Lemos, M. C. and A. Agrawal. 2006. Environmental governance. *Annual Review of Environment and Resources* 31:297–325.
- Ministry of Environment. 2011. *Programme d'Activités et Budgets 2011–2012 des Projets du Programme d'Action National d'Adaptation (PANA) à la Variabilité et aux Changements Climatiques du Burkina Faso*.
- Mukheibir, P. and G. Ziervogel. 2007. Developing a Municipal Adaptation Plan (MAP) for climate change: the city of Cape Town. *Environment and Urbanization* 19(1):143–158.
- Nagendra, H. and E. Ostrom. 2012. Polycentric governance of multifunctional forested landscapes. *International Journal of the Commons* 6(2).
- Nelson, D. R., W. N. Adger, and K. Brown. 2007. Adaptation to environmental change: contributions of a resilience framework. *Annual Review of Environment and Resources* 32:395–419.
- Newman, L. and A. Dale. 2005. Network structure, diversity, and proactive resilience building: a response to Tompkins and Adger. *Ecology and Society* 10(1):r2. [online]
- Osbaahr, H., C. Twyman, W. N. Adger, and D. S. G. Thomas. 2010. Evaluating successful livelihood adaptation to climate variability and change in Southern Africa. *Ecology and Society* 15(2):27. [online]
- Ostrom, E. 2007. A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences of the United States of America* 104:15181–15187.
- Ostrom, E. 2009. A general framework for analyzing sustainability of social-ecological systems. *Science* 325(5939):419–422.
- Ostrom, E. 2010. Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change* 20(4):550–557.
- Otto-Banaszak, I., P. Matczak, J. Wesseler, and F. Wechsung. 2011. Different perceptions of adaptation to climate change: a mental model approach applied to the evidence from expert interviews. *Regional Environmental Change* 11(2):217–228.
- Pahl-Wostl, C. 2009. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change: Human and Policy Dimensions* 19(3):354–365.



- Pelling, M. and C. High. 2005. *Social Learning and Adaptation to Climate Change*. Benfield Hazard Research Centre, Disaster Studies Working Paper 11:1–19.
- Pelling, M., C. High, J. Dearing, and D. Smith. 2008. Shadow spaces for social learning: a relational understanding of adaptive capacity to climate change within organisations. *Environment and Planning* 40(4):867–884.
- Plummer, R. 2009. The adaptive co-management process: An initial synthesis of representative models and influential variables. *Ecology and Society* 14(2):24.
- Plummer, R. and D. Armitage. 2010. Integrating perspectives on adaptive capacity and environmental governance. In *Adaptive Capacity and Environmental Governance*, ed. D. Armitage, and R. Plummer, 1–19. Heidelberg: Springer.
- Poteete, A. R. (2012). Levels, Scales, Linkages, and Other ‘Multiples’ affecting Natural Resources. *International Journal of the Commons* 6(2).
- Poteete, A. R. and J. C. Ribot. 2011. Repertoires of Domination: Decentralization as Process in Botswana and Senegal. *World Development* 39(3):439–449.
- Tompkins, E. L. and W. N. Adger. 2004. Does adaptive management of natural resources enhance resilience to climate change? *Ecology and Society* 9(2):10. [online]
- Tschakert, P. and K. A. Dietrich. 2010. Anticipatory learning for climate change adaptation and resilience. *Ecology and Society* 15(2):11. [online]
- United Nations Development Programme (UNDP). 2011. *Human Development Report 2010 – The Real Wealth of Nations: Pathways to Human Development*.
- United Nations Framework Convention on Climate Change (UNFCCC). NAPA database: [http://unfccc.int/cooperation\\_support/least\\_developed\\_countries\\_portal/submitted\\_napas/items/4585.php](http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php) (accessed 12 September 2011).
- Vincent, K. 2007. Uncertainty in adaptive capacity and the importance of scale. *Global Environmental Change: Human and Policy Dimensions* 17(1):12–24.
- Wolf, J., W. N. Adger, I. Lorenzoni, V. Abrahamson, and R. Raine. 2010. Social capital, individual responses to heat waves and climate change adaptation: An empirical study of two UK cities. *Global Environmental Change: Human and Policy Dimensions* 20(1):44–52.
- Young, O. R. 1992. The effectiveness of international institutions: hard cases and critical variables. Pages 160–194 In J. N. Rosenau, and E.-O. Czempiel, eds. *Governance without government: order and change in world politics*. Cambridge, UK: Cambridge University Press.
- Young, O. R., E. F. Lambin, F. Alcock, H. Haberl, S. I. Karlsson, W. J. McConnell, T. Myint, C. Pahl-Wostl, C. Polsky, and P. S. Ramakrishnan. 2006. A portfolio approach to analyzing complex human-environment interactions: institutions and land change. *Ecology and Society* 11(2):31.