Local Institutions, Collective Action, and Divergent Adaptation: Case from Agro-Pastoral Niger

104

Julie Snorek

Contents

Introduction	2118
Institutions, Adaptive Capacity, and Divergent Adaptation	2118
Niger's Institutions Relevant to Divergent Adaptation	2120
Adaptation Without Mobility	2122
Multiple Sub-National Governance Arrangements	2125
Conflict in the North: The Agro-Pastoral Keita Department	2127
"Trapping" Livestock in Keita's Divergent Adaptation Arena	2131
Cooperation and Customary Chiefs: The Heavily Cultivated Madaoua Department	2133
Communication Promotes Collective Action in Madaoua's Divergent Adaptation Arena	2134
"Democracy as Problem"?	2136
Conclusion	2137
References	2139

Abstract

Adaptation is a highly contextual process, framed by institutions. When one group's adaptation to climate hazards reduces another's adaptive capacity, this is called divergent adaptation. The nuances of divergent adaptation are revealed in how institutions influence divergent adaptation outcomes, either to exacerbate conflict or to bring about greater peace and cooperation. By examining the sometimes conflicting adaptations of pastoralists and agro-pastoralists in Niger,

This chapter was previously published non-open access with exclusive rights reserved by the Publisher. It has been changed retrospectively to open access under a CC BY 4.0 license and the copyright holder is "The Author(s)". For further details, please see the license information at the end of the chapter.

J. Snorek (✉)

United Nations University Institute for Environment and Human Security (UNU-EHS), UN Campus, Bonn, Germany

Dartmouth College, Hanover, NH, USA

© The Author(s) 2021

W. Leal Filho et al. (eds.), *African Handbook of Climate Change Adaptation*,
https://doi.org/10.1007/978-3-030-45106-6_186

2117

this chapter describes the process of divergent adaptation through an institutional analysis from multiple scales. At the national scale, climate change adaptation policies and perspectives are entrenched in sedentarization politics vis-à-vis pastoral livelihoods. At the local scale, pastoralists take a defensive position as an adaptation pathway, to ensure secure passage with their livestock to water and pasture. However, in localities where local institutional actors have enhanced collective action arenas in which pastoral and agro-pastoral groups are represented, conflict dynamics are abated. Climate adaptation is not without conflict; however, local and sub-national institutions are critical to providing opportunities for collective action, cooperation, and peace in the context of divergent adaptation. Based on these findings, it is recommended that conflict and adaptation management and planning be integrated at multiple scales.

Keywords

Climate change · Divergent adaptation · Local institutions · Conflict · Cooperation · Collective action · Pastoralist · Niger

Introduction

Institutions, Adaptive Capacity, and Divergent Adaptation

Climate change impacts are contributing to human insecurity of complex, social ecological systems (SES) (Adger et al. 2014). These complex systems are sometimes able to enhance their resilience through adaptation (Gunderson and Holling 2002; Lebel et al. 2006; Adger et al. 2007). However, in other cases, adaptation devolves into maladaptation (Barnett and O'Neill 2010; Magnan et al. 2016) and/or divergent adaptation (Snorek et al. 2014a). Divergent adaptation is the process by which one group's adaptation to climate hazards reduces another's adaptive capacity and may result in coupled conflict-cooperation dynamics or exacerbate inequities (Hoque et al. 2018; Sovacool et al. 2015; Snorek et al. 2017; Sovacool 2018). Building adaptive capacity for *all* and avoiding divergent adaptation are related to institutions, which have been shown to have a direct influence on adaptive capacity (Olsson and Folke 2004; Adger et al. 2006; Hill 2013; Gupta et al. 2010; Berman and Paavola 2012). Institutions are the informal and formal rules, values, norms, and cognitive processes that constrain individual and collective behavior as well as access to resources and information (Dennett 2013).

Adaptive capacity is dependent upon the inherent and prescribed elements that make up institutions, including those that empower social actors to respond to short- and long-term impacts either through planned measures or through allowing and encouraging creative responses from society both *ex ante* and *ex post* a hazard event (Gupta et al. 2010). By enabling or denying a user or groups' ability to obtain entitlements, access resources, and garner information necessary to their adaptive capacity, institutions, thus, create the conditions for or *frame* divergent adaptation

(Snorek et al. 2017; Adger and Kelly 1999; Berman and Paavola 2012). While some paradigms for adaptation and disaster risk management are dominated by top-down hierarchical approaches (Allen et al. 2010), the institutions that empower stakeholders to participate and make decisions to support adaptation demonstrate bottom-up, equitable, and democratic processes (Cleaver 2002; Olsson and Folke 2004; Ostrom 1999; Engle and Lemos 2010; Eriksen et al. 2011). Understanding how institutions foster cooperation through divergent adaptations has implications for the development of institutions (Gupta et al. 2010; Adger 2001; Ostrom 2005). In light of increasing human insecurities and the prevalence of divergent adaptation (Snorek et al. 2014, 2017), it has become critical to understand *how* institutions are shaping adaptive capacity, *for whom* (Adger et al. 2014; Magnan et al. 2016; Eriksen et al. 2011; Ruiz-Mallén et al. 2015), and with *what consequences* (Snorek et al. 2014a, 2017).

This chapter highlights these questions by examining farmer (agro-pastoral – sedentary pastoralism mixed with cultivation) and herder (pastoral) conflict in Niger (Snorek et al. 2014a). Pastoral and agro-pastoral societies typically live in marginal lands, which are vulnerable to the impacts of climate change such as rainfall variability (Adger et al. 2014; Snorek et al. 2012; Herrero et al. 2016) and also have been shown to be highly adaptable. It has been found (Snorek et al. 2014a) that when pastoralists and farmers engage in conflict, these are not caused by drought conditions and resulting adaptations directly, but rather by the institutional and structural conditions shaping adaptation. As Sovacool et al. (2015; 2018) and Snorek et al. (2017) highlight, the conditions leading to divergent adaptation include land tenure shifts from common to private property regimes or enclosures, the marginalization and exclusion of “the other” (defined here as the individual or communities not involved in the said adaptation efforts), encroachments from actors or groups that imperil the healthy functioning of a commonly shared resource (e.g., visiting herders not aware of grazing practices prompting degraded pastures), or the entrenchment of an institutional system in which social inequalities are permitted to pervade (e.g., laws that support agro-pastoralism and usurp pastoral livelihood needs). In turn, these institutional dynamics shape divergent adaptation and lead to conflict dynamics including land alienation, access refusals or exclusion, political marginalization, and violent instability (Snorek et al. 2014a; Alemu 2018).

Niger’s rainfall (average 150–500 mm per annum) and climatic conditions (Bruggeman et al. 2010) are highly suited for dryland-adapted, pastoral, and agro-pastoral livelihoods (Mortimore 1989; Niamir-Fuller 1998). Reflecting this, more than 20% of Niger’s export earnings are generated by livestock, produced upon rangelands and through transhumant pastoralism (Zakara and Abarchi 2007). Farming or agro-pastoralism is considered to be the principal rural activity (Lund 1998). The country’s population grows at rates of 4% per annum (World Bank Data 2016), for which the majority subsists on rain-fed agro-pastoral activities. There is a high level of confidence that Niger’s Tahoua Region will experience an increase in temperature by 2 °C by 2050 and a slightly less confident prediction of an overall increase in annual rainfall (+7%) with decreasing rainfall during the typical rainy season (–4 and – 6%, respectively) (Bruggeman et al. 2010). These data, along with

other reports on rainfall projections for the Sahel (Biasutti et al. 2008; Shanahan 2009), point to increasing rainfall variability as a result of climate change, which has consequences for institutions relevant to divergent adaptation (Snorek et al. 2014a).

The country's adaptive capacity, which is among the lowest in the world (Vincent 2007), is exacerbated by chronic poverty (55% of rural population), widespread illiteracy (84% of those older than 15), and frequent droughts that devastate the rural economy (IFAD 2016). High levels of rainfall variability coupled with overgrazing, poor soil management, the enclosure of land and water resources (Snorek et al. 2017), precarious pasture spatial and temporal availability (Bode 2011), and decreasing agricultural production yields (Snorek et al. 2014a) result in degradation feedback loops, which further impact the local-scale climate system.

Understanding how divergent adaptation, pastoral-agro-pastoral conflict, and institutional processes play out in Niger is important to developing adaptation policies that reduce the prevalence of divergent adaptation. Institutions governing adaptation must seek out the ways that they are producing divergent adaptations, understand which actors in a social ecological system are the “winners,” and create systems to lessen the consequences for the “losers.” The following chapter highlights how these processes take place through a case study. The aims of this chapter is to specifically examine how more adaptive and inclusive institutional models relate to divergent adaptation processes and if they might bring about more sustainable, peaceful modes of adaptation (Magnan et al. 2016; Eriksen et al. 2011) for groups facing livelihood insecurities, social and climate vulnerability, and marginalization.

Niger's Institutions Relevant to Divergent Adaptation

National legislation relevant to climate change and adaptation provides an overarching framework for how adaptation functions as a process. In the Nigerien context, the implementation of national legislation is filtered through multiple layers of decentralization. For the most part, very few lower-tier institutions in Niger understand specific elements of the Rural Code (Lund 1998; Benjaminsen et al. 2009; Snorek et al. 2011). At the sub-national scale, it is the members of the commissions foncières (COFOs) or land commissions, court officials, administrators, and experts from governmental and nongovernmental associations that support processes of implementation of this legislation through multiple methods and means. While documentation of infractions is scarce, *Procès Verbaux* (PVs) represent the main legal documents filed for litigation related to land and water access and use and cattle theft at the time of data collection (2011). A thorough review of PVs provides deep insight into how legislation is being implemented and what conflicts are occurring.

The sparseness of documentation in Niger, however, translates to only a fragmented understanding of conflict resolution mechanisms. In turn, most conflict is resolved outside of the formal system through the canton and group (customary) leadership. These institutions reside at the local scale, where they have perhaps a strong influence on the adaptive capacity of pastoralist and agro-pastoralists in the

country (Kpadonou et al. 2012). Customary chiefs represent both the traditionally pastoral (Fulani and KelGeres and Ouilimiden Tuareg) and traditionally agricultural (Hausa) groups. The pastoral counterparts of these local-scale institutional actors (group chiefs) are often on the move to visit their mobile constituents, scattered across the region. Often, group chiefs travel to places where they might influence decision-making processes in the village sites, along pastoral corridors, and in the camps of more affluent pastoralists.

In the water-stressed, administrative region of Tahoua, Niger, one finds large transhumant livestock herds migrating along the North-South axis between Nigeria and Niger's pastoral zone (Fig. 1), villages and nomadic camps empty of young male residents during the dry season due to high rural-to-urban migration, and a chronic dependence on drought relief due to frequent dry spells. In Tahoua, conflict breaks out most often along in vulnerable areas where pastoral corridors snake through croplands. As a result, local agriculturalists plant in pastoral resting areas to "herd" livestock elsewhere and away from croplands. Security in this region is tenuous not only due to a lack of infrastructure and policing but also due to the growing presence of clandestine and sometimes jihadist activities.

Tahoua, in turn, represents a North-South, low to high rainfall gradient that consists of the northern pastoral zone, the southern agro-pastoral zone, and the high cash crop production areas (Fig. 1). Residents in Locale P are majority pastoral households, a region receiving 187 mm rainfall per annum and possessing common

Fig. 1 Map depicting the Tahoua Region – a thin, black outline – and the three locales (Locale P or pastoral, Locale AP or agro-pastoral, and Locale A or agricultural)

pastoral areas, governed by local customs. Locale AP is populated by a majority of agro-pastoral households and receives 337 mm per annum. In Locale A, the majority takes part in multiple agricultural activities including dry and irrigated cultivation and also some localized and mobile livestock production, receiving 386 mm of rainfall per annum (Fig. 1).

There is high institutional diversity across the different scales and localities, resulting in variable levels of adaptive capacities between users. Cultural groups include both traditional sedentary and nomadic groups from the Hausa, Fulani, KelGeres Tuareg, and Ouillimiden Tuareg at both the local and sub-national scales. Users were aggregated by their activities and status as a local (strong place connection) or nonlocal to the zone – local pastoralists (seminomadic, livestock as their primary capital), local agro-pastoralists (sedentary, land and livestock as capital), and nonlocal, visiting pastoralists (mobile, sometimes serving as shepherds).

According to 43 pastoral and 34 sedentary households as well as customary, administrative, and technical leaders, there are three key conflict-triggering events in this region of Niger: the spreading of cultivated fields (also an adaptation), crop damage (a response to adaptation), and livestock theft (a response to adaptation). Conflict is related to hydro-climate hazards, the ways in which groups control access to resources like water, pasture, croplands, the mode of common pool resource management, and historical institutional arrangements such as placing boundary markers for a pastoral corridor or declaring a certain plateau for pastoral purposes. These multiple dynamics are key to understanding the relationship between institutions and divergent adaptations.

Adaptation Without Mobility

In 2011, a group of multiple experts on pastoralism and agro-pastoralism in Niger came to a consensus that in light of future scenarios of climate change for the country, mobile pastoralists would eventually cede to a sedentary, agro-pastoral livelihood. The main element contributing to this determination was the rapid transition of pastoral commons to semiprivatized, cultivated land, even within the northern, official pastoral zone (Snorek et al. 2017). What fuels this transition are an utter lack of political will to support pastoral livelihoods and multiple institutional arrangements supportive of sedentarization (Snorek et al. 2012). An unwritten but widely shared *de facto* policy that “land belongs to the cultivator” originated in the Former President Kuncé’s post-drought radio address to the nation and was meant as a way to lift up the peasant and give him/her land rights and food security. This movement shifting a pastoral nation to a sedentary farming landbase has roots in the precolonial and colonial frameworks, which shaped the modern national and sub-national institutions in Niger and, in turn, have framed how entitlements to common land and water are distributed at the local scale. These policies, while not specifically titled “adaptation policies” in word, were enacted in response to the key climate change impact on the Sahel – drought.

In 1961, as Nigeriens watched the high rainfall periods of the 1950s fall in a downward spiral of rainfall deficit years, the fledgling Nigerian government

established Law N°61–05, which effectively divided the country into two sections. Supporting the burgeoning southern populations with new land tenure, the far northerly edge of the Sahara was designated for pastoralism, while new parts of his “new” South were earmarked for cultivation (Fig. 1). This was heralded as an effort to strengthen the pastoral system; however, this demarcation served, rather, to enclose the pastoral population and restrict their mobility while concurrently expanding cultivation. Concurrently, due to disputes about the exact location of this zone, cultivation continues to creep northward with impunity.

In the years following the two great Sahelian droughts, a 1987 decree designated the South as a semi-commons, affirming the rights of agro-pastoralists to forbid livestock from grazing within cultivated areas during the growing and harvest periods and collect sanctions from offending pastoralists. While this political move strengthened political support of newly decentralized governments by providing greater land tenure security, it was stated in the aftermath of Kountché’s remarks to “clear the fields” and cultivate to gain land tenure, a statement made in direct consequence to the famine stemming from the great droughts. What occurred on the ground as a result of the 1987 decree is that the southern zone shifts seasonally to a full pastoral space after department officials declare the *libération des champs* or “freeing of the fields.” The date is determined by a department-scale committee made up of individuals from the government administration and customary authorities as well as the technical representatives from the ministries of livestock and agriculture. Prior to the *libération des champs*, livestock are only permitted to graze in designated pastureland (Niger Decree N° 87-077 1987). This also established the very lucrative framework, which then permitted agro-pastoralists (cultivators) to collect compensation if crops or residues are damaged prior to the liberation, at a rate determined by local and sub-national institutions (Table 1). These two legislative acts alone were sufficient to provide several alternative sources of income to rain-fed agriculture, in the case of a drought. In turn, these policies stripped pastoralists of their rights to mobility, effectively limiting their greatest drought adaptation mechanism.

In 1993, the Rural Code established formal rules to land and water access and tenure. The ensuing privatization of territory culminated a national development plan to enhance the rural sphere for agribusiness opportunities, including large-scale irrigation, livestock fattening, and agroforestry. Land began to be more formally appropriated via a process that began with permission from customary authorities (canton chiefs handle all land claims in southern Tahoua) and moved into the realm of newly established land commissions. It was relatively easy for sedentary populations to garner land claims based on verbal reference from two separate individuals. Many pastoral communal areas, thus, were cultivated. Protecting commons required a more complex and costly collective action process, engaging multiple administrative actors including land commissions (Fig. 2) and customary authorities in the South; thus, pastoral territories have been often ignored (Touré 2015).

The 2010 Pastoral Code seemed to provide the possibility of reinforcing mobility to disenfranchised pastoralists. The Code’s aim was to fill the gaps, define, and specify the rules and principles concerning pastoralism and what the 1993 Rural Code had previously established (Snorek et al. 2011). The Pastoral Code mandates

Table 1 Description of Niger's pastoral and agro-pastoral legislation. (Adapted from a similar table in Snorek et al. 2014a)

Legislation relevant to divergent adaptation in Tahoua		
Name	Description	Relevance to divergent adaptation
Law N°61-05, 1961	Sets the geographical limits to cultivation (with the exception of small gardens)	Pastoralists lost territory to cultivation, as the limit moves northward annually
Decree N°87-077, 1987	Permits pastoralists to graze in southern agricultural zone after harvest or in designated areas	Concurrently permits the sanctioning of pastoralists by land-holding agro-pastoralists
Ordinance N°93-15, "Rural Code," 1993	Recognition that natural resources are shared by all equally, supported creation of livestock corridors and pasture areas	Organizes rural sphere (commons and semi-commons), yet many administrators have no understanding of its content
Law N°93-14, 1993	Private and public water sources (ponds, wells, boreholes) must be accessible to pastoralists, provided the load capacity of the infrastructure allows for this	This has not been implemented in the South, resulting in exclusion of pastoralists from water points
Decree N°97-007/PRN/MAG/EL, 1997	Establishes home territories (<i>terroir d'attache</i>) in which pastoralists have priority rights over natural resources, but cannot limit others' access	Home territories remain an enigma due to the legislation's vague treatment of this important historical pastoral territorial tenure practice
Decree N°97-008/PRN/MAG/EL, 1997	Sets the organization, attribution, and functioning of institutions implementing the principles of the Rural Code	Established weak land commissions (<i>commission foncières</i> (COFOs)) without decision-making power, resulting in corruption
Decree N°97-368/PRN/MHE, 1997	Sets attributes and modalities for COFOs of communes, villages, and indigenous groups	Poorly implemented village COFOs with few pastoral representatives
Law N°2001-23, 2001	Established democratic, decentralized administrative constituencies and local authorities	Land tenure decisions devolved from customary authority to multiple authorities, "democracy" to blame for land tenure disputes
Ordinance n° 2010-029, "Pastoral Code," 2010	Codifies a pastoralist's right to mobility	Protects pastoral territories and enhanced open-access property regimes void of local institutional norms
Ordinance n° 2010-09, "Water Code," 2010	Management of Niger's water resources	Established open-access property regimes on northern pastoral territories, permitting pay-for-use, private wells

livestock safety of passage and access to water points and areas of pasture in the zone of cultivation. It creates a legal framework for interaction between people whose livelihood is based on animal husbandry and other groups such as agriculturalists, mining companies, or commercial livestock production on ranches (ibid.). While these developments were heralded as important advances in the recognition of

Fig. 2 Niger's Rural Code System presents a decentralized manner to disseminate, communicate, and implement rural legislation (bold text more relevant to conflict dynamics). COFO = *commission foncière* or land commission. (Snorek et al. 2014b)

pastoralists' rights, the Code further erodes customary control, which was considered to be a messy form of pastoral governance (Oxby 2011).

Multiple Sub-National Governance Arrangements

The reality for pastoralists, however, is that their main advocates were customary pastoral leaders. Under the colonial regime, the sub-national sphere was arranged into sedentary (farming) communities and mobile (pastoral) communities. *Cantons* (Fig. 3), headed by sedentary chiefs, are defined by territories that were arranged based on colonial interests, whereas the *groupements* (groups headed by pastoral chiefs) were based on ethnic groups linked to pastoralist actors (Fulani and Tuareg) and do not control territory. To encourage acceptance of these conditions, pastoralists were told that their territory was essentially "everywhere," but these chiefs were only permitted de jure jurisdiction over individuals, remnants of which have had broader implications in the protection of pastoral lands in modern day. Despite that the colonial period ended in 1960 with the election of Hamani Diori, the system of cantons and groups (generally referred to as customary authorities) remains in place (Fig. 3).

Beginning in 2002, the power of customary authorities began to erode through a process of state or administrative decentralization, which established municipal administrative units (commune mayors, departmental *préfets*, and regional governors, Fig. 3). Decentralization has contributed to a gradual shift of jurisdiction over land holdings from customary chiefs to democratically elected leaders, which have included land formalization processes (Hammel 2005). Perspectives on

Fig. 3 Colonial remnants (left) and decentralized (right) regional administrative units in Tahoua, arranged hierarchically. Democratically elected governors, *préfets*, and mayors replaced the upper scales of regional governance, leaving in place the colonial institutions at the local scale. These colonial structures include *cercles* (now called “regions”), managed by commanders; *sectors* (now departments and communes), managed by military lieutenants; and *canton* and *groupement* (maintained same name), managed by local chiefs appointed by colonial administrators. *Chef du canton/groupement* or *canton/group* chief is the unit of rural leadership serving as the administration, justice, and police for rural peoples. (Source: author)

decentralization are highly variable and have been explained in more details in other texts (Mohamadou 2009; Olivier de Sardan 2011), though two viewpoints contextualize the responses from expert and household interviews. Firstly, state officials argue that customary officials are not democratically elected and thus become more easily corrupt and entrenched in the past. Contrariwise, the fragmentation of knowledge of short-term elected leaders is not favorable to the build continuity in relation to land arrangements and decisions, due especially to poor documentation and corruption. At the local scale, perspectives on decentralization are largely conflated with what people call “democratization.” The results of democratization to local-scale users include local problems such as confusing land-holding arrangements, political alliances linked to campaigns and parties, and significant political bargaining related to land tenure.

While group chiefs have strong commitment to maintaining pastoral rights to pasture and water, they must interact effectively with other governance actors (*préfets* and mayors) to enforce pastoral rights, due especially to colonial legacies that established pastoralists as mobile and landless. Pastoral territories are mostly lost to cultivation, due to beliefs that the land belongs to those who cultivate

it. Moreover, group chief distribution across administrative departments is not equal; Keita has only one group chief, whereas Madaoua possesses seven (Fig. 3). Despite the established procedures under decentralization, we found that in situ, land tenure is managed informally by group and canton chiefs and hand-written records (*Procès Verbal* (PV)) were often lost or unavailable (Table 2). The most common complaints are related to heritage claims, crop damage, and disputes over the location of pastoral commons. When actors were dissatisfied with a customary chief's decision, they turn to elected officials to find different outcomes. For example, a case that had been dealt with by a Fulani chef du *groupement* whom we were interviewing was usurped by a newly elected official 1 year later, causing the issuance of a land title for what had been declared the year prior as a pastoral area. Implementation often proves to be much more complex due to uncoordinated, multiple layers of governance.

The national and sub-national institutions presented here frame the outcomes from divergent adaptation in the local sphere in multiple ways. The next section describes how the institutional arrangements translate in the divergent adaptation arena in two case studies, one in the northern agro-pastoral zone (Keita) and one in the southern cultivation zone (Madaoua). Both of these cases are characterized by the dominance of agro-pastoral livelihoods, but the southern semiprivate property regime has a greater number of irrigated, enclosed gardens due to better water and soil conditions. Paradoxically, higher levels of natural resource-based conflicts were prevalent in the northern, more sparsely populated agro-pastoral zone compared to the highly concentrated, southern irrigated gardening and agricultural zone of Tahoua, contradicting neo-Malthusian assessments of scarcity and farmer-herder conflict in the Sahel (Bruggeman et al. 2010; Homer-Dixon 1999).

Conflict in the North: The Agro-Pastoral Keita Department

The agro-pastoral department of Keita (Fig. 1, Locale AP) sits in a precarious location with its northern border on the shifting and disputed edge of the pastoral zone and arid mountains and humid valleys to the South. The Keita Valley, which currently receives on average 337 mm of rainfall per annum (Fig. 1), unites four watersheds in the region of Tahoua, the Adouna, Tarka, Jangay, and Jaboyé valleys, and is surrounded by mountains and plateaus. Because of its potential for water management, the French colonial authorities built a dike in Keita in 1952, forming a large lake suitable for fishing, irrigation for wheat production, and bird-watching. Prior to this time, Keita was primarily inhabited by the Wodaabe (a subgroup of Fulani people) pastoralists and their cattle. The colonial investment brought migrant farmers, established two canton chiefs in Keita and Tamaske, and established wheat cultivation, developments which essentially pushed the Wodaabe northward in search of sufficient pasture. The KelGeres, a subgroup of the Tuareg, also had one group chief near the Akawal Plateau (Image 2), whose people migrated between Agadez and Keita up until the drought in 1974. This chief vehemently defends the Tuareg's historical land occupation of Keita and complains about how it has been overtaken by Hausa farmers, many of which he and his predecessors granted land

Table 2 Percentages of qualitative responses about specific social dynamics relevant to divergent adaptation. Codes for similar responses are listed on the left, and the percentage responses disaggregated by actor group are displayed

	Locale AP – Keita		Locale A – Madaoua	
Social and institutional dynamics	# of agro-pastoralists (N = 22)	# of pastoralists (N = 16)	# of agro-pastoralists (N = 9)	# of pastoralists (N = 10)
Conflict				
Existence of arms	9% (2)	13% (2)	0	10% (1)
Presence of livestock theft	41% (9)	38% (6)	22% (2)	30% (3)
Conflict on water access	5% (1)	13% (2)	0	30% (3)
Damaging crops	68% (15)	38% (6)	44% (4)	10% (1)
Violence	55% (12)	0	44% (4)	0
Rules, sanctions, enforcement				
Livestock corridors not protected	0	31% (5)	0	100% (10)
Locally derived enforcement	23% (5)	0	33% (3)	10% (1)
Payment for damaging crops	27% (6)	44% (7)	44% (4)	50% (5)
No payment for crop damage	27% (6)	6% (1)	11% (1)	0
Governance				
Trust in gendarmes	36% (8)	6% (1)	0	0
Trust in customary officials	18% (4)	6% (1)	44% (4)	30% (3)
No trust in elected officials	14% (3)	25% (4)	22% (2)	60% (6)
No trust in customary officials	4% (1)	12% (2)	11% (1)	10% (1)
All officials are corrupt	41% (9)	13% (2)	0	10% (1)
Elected officials favor cultivators	9% (2)	56% (9)	11% (1)	50% (5)
Social capital between groups				
Marriage of “other”	5% (1)	6% (1)	0	20% (2)
Other group as problem	55% (12)	63% (10)	22% (2)	50% (5)
Transactions between groups	14% (3)	4% (1)	66% (6)	20% (2)
Cooperation and acts of kindness	5% (1)	6% (1)	0	50% (5)

tenure. He is the only customary chief in Keita representing pastoral interests, and he was approximately 100 years old at the time of our visit.

In the 1950s, Keita's wetlands were abundant, nourishing low-lying areas with nearly year-round cultivation of millet, several strains of sorghum, and some vegetables; however, according to Keita's canton chief, when the dike of Keita broke for the first time in 1964, the valley became eroded and the water table lowered, leaving behind many dry wells and sediment-filled waterways. The loss of this infrastructure was followed by two periods of drought in 1974 and 1984, during which a burgeoning farming population cultivated much of the territory, removing trees and causing vast deforestation in the zone, promoting erosion, soil degradation, landslides, and property loss. Concurrently, soil loss and desiccation promoted that water run off the hillsides and across the valleys to lower ground, which formed into a lake in an adjacent commune, called Tabalak. Today, due to water shortages, a woman's dowry must consist of at least a donkey, to enable her to travel a sufficient distance in search of water (Image 1).

After the disastrous drought of 1984, the Italian-funded Ader Doutchi Majiya Project began a massive reforestation effort and concurrently built many water-retaining infrastructures throughout the department to increase food security in the region (Rossi 2002). More than \$88 million was invested in forest and soil regeneration in the region over the course of 25 years. Concurrently, Italian initiatives attracted migrants from around the region to Keita, due to promises of plots of land by the project, which prompted an expansion of cultivation and further displaced transhumant pastoralists (Image 2). Keita thus shifted from a sparsely populated pastoral zone to a burgeoning agro-pastoral livelihood zone in the span of 50 years.

Every year, transhumant pastoralists descend into Keita as the seasonal lakes dry in the Northern pastoral zone, typically in October and December. The official declaration of the *libération des champs* typically occurs in Keita during November or December. Pastoralists descending earlier than this typically remain on designated corridors and in pasture areas, when available. If the pastoral zone received less rain, this departure is earlier, often before the *libération des champs*. Pastoral infrastructure including transhumant routes, pastoral wells strategically located along these corridors, and pasture "rest" areas (*aires de pâturage*) have been installed throughout

Image 1 (Left) Denuded hillside shows extreme erosion of Keita, Niger (author). (Right) Women travel by donkey in search of water (author)

Image 2 Image of a pastoral well surrounded by recently planted fields (Keita, Niger, author)

Keita as part and parcel of the Ader Doutchi Majiya project's efforts to support pastoral and agro-pastoral development. During our field visit, a primary transhumant corridor was not being used due to water access problems, curtailing the southern transhumance through farmer's fields (Table 2). Also, upon inspection, many pastoral wells identified by respondents had been or were in the process of being enclosed by cultivated fields (Image 2).

Drought policies established in the 1990s promoted agro-pastoralism or animal husbandry in farming households as a form of investment in light of the vulnerability of rain-fed agriculture to rainfall variability. While policies were effective in bringing foreign aid and development programs supporting "animal fattening" for sedentary households, farming households in Tahoua complained about the lack of fodder for fattening. As a result, the governor promoted the cutting and stocking of farming residues, which before had been left in the fields to decay or be consumed by any of the livestock passing through after the *libération des champs*. This lengthened the timing of agro-pastoral work, as field residues must be fully dried in the field prior to stocking, and thus delays the date of the *libération des champs*. Such residues sometimes bring in more revenue than grain due to drought, though their removal has reduced soil fertility and increased agricultural vulnerability to climate hazards. Concurrently, these policies break the territorial continuity for pastoralists, greatly impacting their fodder source through commodification of fodder as well as broadening the range of what is considered "crop damage."

Thus, the divergent adaptations expressed in Keita include the commodification of farming residues and water due to the animal fattening project, the enclosure of pastoral wells and corridors via field expansion, and the sale of water from village wells when pastoral wells are not accessible or viable. Relative to these divergent

adaptations, pastoralists expressed a great deal of fear about passing through the Keita department, due to the outcomes of divergent adaptation and also due to their limited representation in the department by pastoral institutions or even other officials in the elected administration. The interactions and outcomes are described below.

“Trapping” Livestock in Keita’s Divergent Adaptation Arena

Agro-pastoralists in Keita see the need to expand their agricultural fields from the valleys to the traditionally pastoral plateaus, as this is the only way to “catch” spatially and temporally variable rainfall. Their legal ability to expand their land tenure has been established by multiple legal codes and verbal precedent. While the expanse of cultivation alone tends to increase agro-pastoralists’ adaptive capacity in the face of drought, the Decree N°87-077, 1987 (Table 1), allows the sanctioning of the owner of any livestock wandering into one’s field. These sanctions can be costly, charged by the head and type of animal. Payments to release livestock cost on average 8 USD for large and 5 USD for small ruminants per head, which adds up to a hefty sum for a herd of 20 cattle. As income from millet and sorghum production has become less reliable, crop damage payments extracted from pastoralists have proven to enhance livelihood security for those experiencing damages. Thus, expansion is a lucrative “trap” for rainfall and for livestock. As stated by an agro-pastoralist from Konni, “Each one who damages [crops], the Hausa [farmers] make him pay money. But [before] there was pasture and the camels could go where they wanted, but now there are people everywhere. And there are fields of onions everywhere.” Some villagers sleep in their fields to protect them from harm and also to “trap” pastoralists. To divert pastoralists, village residents living near pastoral corridors remove official markers and plant to claim the space.

Fear of “the other” shapes this conflict, which at times turns violent (Table 2). But leadership in Keita tends to be sympathetic toward agro-pastoralists while perceived that pastoralists damage crops with impunity. “[They believe] that if their cows spend 3 months grazing in that valley, they can withstand a drought,” said a Keita area vice mayor in reference to a sorghum-filled valley. Elected officials and customary canton chiefs have turned to enforcement officers to help manage the conflict. As cell service becomes more available in the zone, a pastoralist “descent” warning system has been established. Upon seeing the first pastoralists descending from the North, village chiefs immediately phone the *gendarmérie* (military police) to request their assistance. These gendarmes stay in villages to both prevent conflict and also (with the same motivation for payment) “catch” any livestock wandering into fields and damaging the harvest. Gendarmes were observed packing several sheep into the back of a government vehicle during the research team’s passage. These were the payment for the gendarme’s protection of a villager’s field from crop damage (Image 3).

The presence of gendarmes has not been welcomed by all. Agro-pastoralist respondents prefer localized forms of compensation and conflict resolution

Image 3 Gendarme vehicle with confiscated sheep (Keita, Niger, author)

(Table 2). When gendarmes profit from crop losses, this lessens the compensation paid to farmers. Moreover, this enforcement disrupts the long-standing cooperative system of negotiation between both groups. “Before, when the Fulani pastoralists put their livestock in our fields, we’d intervene ourselves to chase them away, but we noticed that when the gendarmes are here, it is us farmers who are punished for intervening, so since then, we do not intervene anymore ” (pastoralist in Keita).

Pastoralists, realizing that safe transhumance is dependent upon land tenure, have settled in several makeshift villages and begun cultivating to establish a resting area for their kin traveling along the transhumant routes. Yet for those pastoralists who depend upon mobility as their adaptation to climate variability, they often lack an alternative to entering cultivated fields. So, to avoid conflict, pastoralists in Keita travel through fields under the cover of night, escaping to the mountains before they can be detected, and their livestock confiscated as collateral.

As a form of solidarity to pastoralists, some Keita cultivators cleared their fields early when the pastoralists began to descend. These also preferred negotiating a token amount convivially for crop damage. Despite these examples of cooperation, pastoralists have resorted to protect themselves and their safe passage by shooting arrows at farmers and gendarmes. This has resulted in several severe injuries among local agro-pastoralists and enhances the fear and distrust between both groups. In Keita, when the problem cannot be resolved at the local level, violence replaces the endemic systems of livelihood protection including cooperation, negotiation, and discussion to maintain pastoral mobility in this department.

Despite the gendarme’s involvement in Keita, very few cases of crop damage are recorded in Keita. Only eight cases were registered between 1997 and 2011. No earlier records were available. The *Procès Verbaux* (PVs) averaged payments of 172 USD, and half included cases of violence. Three of the crop damage cases were handled by the gendarmes, and one was negotiated by the land commissions (COFO). Only one litigation was relevant to protection of pastoral space (see Table 2), and it was resolved in favor of pastoral rights.

Cooperation and Customary Chiefs: The Heavily Cultivated Madaoua Department

To the South, Madaoua is a mixed use zone with a high prevalence of irrigated (winter) cultivation and a series of livestock routes passing to the higher-value markets of Nigeria. One central exodus point is the commune capital of Bangui, where nearly four million FCFA (8,000 USD) in export taxes were collected in October and November 2011. Along with livestock exports, the region produces onions by the truckloads. Rainfall in Madaoua is slightly greater than Keita (386 mm, Fig. 1) which is evidenced by the many seasonal lakes in the department as well as a higher water table. Contrary to the rocky hillsides and deep valleys evidenced in Keita, Madaoua is a broad plain, met by a large dry riverbed along what is now the southern border of Niger.

The average farmer cultivates rain-fed crops like millet, sorghum, and cowpea in the summer (May–October), and those who have been lucky to obtain a coveted valley plot cultivate and sell onions or other vegetables in the winter (October–January/February). Irrigated cultivation is typically reserved for the valleys and low-lying areas where it is possible to dig a shallow well, and irrigation is derived by hand or with a diesel-powered pump. In Madaoua, these irrigated crops are often *not* protected by fencing, so that herding requires careful observation and guarding of livestock even after the *libération des champs*, to avoid the heavy fees charged to damage to this high-value irrigated agriculture. Every space appeared to be cultivated across this zone, saving a few pastoral corridors and pastoral rest areas.

In the precolonial period, Madaoua was occupied by Fulani herders and Hausa farmers, both of which used Sokoto, Nigeria, as their commercial and political capital. The Fulani herdsman who dominated the zone called the place Bangui after a large cow by that name that died in the location. Due to the abundance of water, residents cultivated rice in the valleys. Farmers tended to plant in the paths of their pastoral neighbors putting seeds in soil fertilized by the livestock. The reciprocity of this practice shifted with population growth, and land was organized into farming and livestock areas. The Fulani pastoralists considered that they had more rights “before the moment of democracy,” because “the customary chiefs [of today] have no protocol [for protection.]” “During the time of Ibrahim [a Fulani chief], there were never any problems. He would get on his horse, come, and say, ‘here it is the pastoral are,’ stating to pastoralists, ‘if the people plant this, just come and graze it anyway.’” Upon his death in 1999, cultivators overtook these zones.

Increasing temporal and spatial variability of rainfall as well as demographic growth shifted the patterns of cultivation and livestock rearing in this department. To adapt to rainfall variability, agriculturalists become agro-pastoralists, holding livestock as “drought insurance” and cutting the crop residues from their fields for fodder. Concurrently, many residents in Madaoua, to increase their chances of receiving rainfall, purchase fields in other villages, hoping to increase their chances of the rain falling on their crops. Bangui is located along an international livestock corridor established in 1968 and stretching for 90 kilometers from Nigeria to Keita (Image 4). However, as villages have grown, their populations have enclosed pastoral resources.

Image 4 (Left) A village on the border of Nigeria (Bangui) has grown around the pastoral well on the international livestock corridor and (right), a disputed seasonal lake in northern Madaoua is forbidden to pastoralists by the village leaders. (Madaoua, Niger, author)

Near Bangui in Locale A, the valleys are moist nearly all year. As a result, the villagers grow high-value crops such as cowpea, sorghum, and some squashes. The residues are sold to livestock owners. On the dune behind the valley, the villagers grow millet in nutrient-poor soil, for which some pastoralists are contracted to “sit” in farmers’ fields with their livestock. These informal contracts are paid at a rate of approximately one sack of millet per month. Valleys are rarely penetrated by livestock, despite that they grow a desired food. Farmers bring field residues to the livestock sitting in fields, as another form of exchange. Livestock rarely damage crops, despite the fact that there is only one small route to water. Pastoralists pay higher rates to consume the cowpea vines; they are especially interested in fattening their animals to sell in Nigeria.

If there was a conflict, Madaoua has multiple customary chiefs – one canton and six group (five Tuareg, one Fulani) chiefs living in the commune (Fig. 3). They meet frequently, sometimes traveling long distances or hosting events or gatherings at their own expense or with the assistance of government and pastoral associations (see *Association pour la Redynamisation de l’Elevage au Niger* [AREN]) in order to meet with their constituents before, after, or during the biannual transhumance. During these face-to-face discussions, pastoralists are able to raise concerns about the route and access to water. Their efforts to control the territory have sometimes resulted in cooperation between sedentary and pastoral groups, yet dialogues also fail and devolve to nonviolent conflict. Based on the *Procès Verbal* (PV) from Madaoua, six cases of land and water conflicts were recorded from 1999 to 2010. Of these, three were handled and recorded by village chiefs, two for crop damage, and one related to the protection of a livestock corridor. The other litigation was managed by the canton chiefs (2), the group chief (1), and the Court of Appeals (1). Three of the recorded conflicts enforced the protection of pastoral commons.

Communication Promotes Collective Action in Madaoua’s Divergent Adaptation Arena

Despite large tax income from livestock, institutions do not do a sufficient job of protecting pastoral space. Respondents often blamed democracy or decentralization.

“[N]ow with the democratization, [protection of pasture] has become a problem. Even if you see someone planting in the *aire du pâturage*, they [the customary chiefs] will say that they are coming, but they never arrive.” Despite pastoralists’ complaints, elected officials do little to manage common pastoral spaces due to a desire to garner favor (votes) among the more populous Hausa people, who typically have large families and thus need land tenure for their children’s inheritance. All of the pastoralists in this area complained of the lack of safe corridors for their passage due to encroachment (Table 2). Cultivators often dispute ownership of pastoral space, declaring that it was cultivated by their ancestors. During one such dispute, the Fulani chief and Hausa cultivator argued about historical rights to the land without resolution (Image 5).

Average payment for crop damage is higher than in Keita. This forces pastoralists to be more vigilant. In turn, crop damage costs are frequently negotiated face-to-face between parties, with the support of customary officials. For rain-fed crop damage, the average cost per head for a large ruminant is 14 USD, and for a small ruminant, it is 6 USD. For garden damage, costs are higher, typically 215 USD. Some of the agro-pastoralists we interviewed tended to forgive crop damage, even for those pastoralists who were foreigners to the zone, but this practice of forgiveness was not common (Table 2). Other villagers in Locale A thought that damage was the fault of the field owner for not guarding his field properly (Table 2).

Along with the high-cost sanctions, these normative responses are also due to administrative support of peaceful resolution. Administrators, group, and canton chiefs in Madaoua (Fig. 3, Image 5) prefer face-to-face discussions to prevent conflict. At the beginning of the descent, Fulani and Tuareg chiefs from five groups travel with administrators to every commune in Tahoua to discuss conflict resolution measures including places to safely “rest” their livestock and how to manage conflict. When these visits are finished, the chiefs return to villages in Madaoua, some of which are along the pastoral corridors. Locale A is very strict about pastoralists entering the village, even along the international livestock corridor, which is just south of the moist valley. When the harvest is complete, village chiefs grant pastoralists entry, and if these rules are not followed, higher-level customary chiefs are quickly called in to negotiate. When describing one such occasion,

Image 5 Agro-pastoralist discussing crop encroachment into pasture area with Fulani group chief, during our community mapping of Bangui (author)

pastoralists may wait in already-harvested fields, which may concurrently serve as a “contract” for fertilization services.

Thus, crop damage is solved without violence and through conflict prevention. Locale A’s chief explained the first resort, to negotiate with offending pastoralists, and second resort, to call upon the administrators and customary chiefs in the commune capital Bangui (20 kilometers away). There was never a need to take any further action. Locale A experiences few violent conflicts (Table 2) but communicates frequently with both pastoralists and local and regional institutions. If local chiefs need assistance with a conflict, local officials engage both parties in face-to-face conversation about the problem, evoking discussion among multiple parties. When asked how they manage to maintain peace despite the descent of pastoralists into the village, an agro-pastoralist replied: “The pastoralists need to talk with the farmers. Otherwise, we don’t have many ideas. Calling the administrators is the best solution. . . . Yes, [sometimes the customary chiefs have discussions with the population], and it is valuable” (Madaoua pastoralist).

“Democracy as Problem”?

What some agro-pastoralists and pastoralists termed “democratization,” referring to the decentralization process in Niger, has created overlapping layers of governance (customary/elected official/COFO). In turn, this has produced a resounding accusation that “democracy is the problem,” referring to patterns of corruption that have been supporting the marginalization of pastoralists. Pastoral commons, which have in the past been identified and protected by group chiefs, have declared the property of sedentary groups as a way of garnering their votes in the democratic system. This outcome is synchronous with rent-seeking behaviors across these new layers of governance.

In the context of this nascent democratic system, the creation and distribution of entitlements are related to elite capture processes that subjugate the rural pastoral more than agro-pastoral systems. This is a key institutional factor contributing to divergent adaptations such as the expansion of cultivation into pastoral space and the commercialization of field residues. In Keita, multiple scales of institutional actors (gendarmes, local chiefs, administrators, etc.) induce an atmosphere of fear resulting from heavy enforcement of crop damages and rent-seeking from both rural actors (pastoralists and agro-pastoralists). The *gendarmerie* engages in sanctioning pastoralists, in some cases confiscating pastoral property with impunity. Thus, there are high perceptions of corruption in the zone and low levels of social capital between user groups (Table 2). Gendarmes, in turn, reinforce these biased accounts of the codes by failing to protect pastoral commons. These conditions have been found in similar case studies of farmer-herder conflict (Benjaminsen et al. 2012) and result in these groups seeking other means to defend their livelihood, including violence (Snorek et al. 2014a).

In Madaoua, actors in Locale A mentioned fewer conflict dynamics and more locally derived systems of collective action and enforcement (Table 2). Moreover, the behaviors mentioned during conversations with individuals at the local scale exemplify that actors are informed of how to seek help from leadership, are

empowered to solve their own problems (through dialogue with the chief), and understand planned measures and support systems (a step process of seeking support from local and external sources), which are elements that are reflected also in polycentric, adaptive institutions (Gupta et al. 2010; Ostrom 1999; Berman et al. 2012; Allen et al. 2010). Due to high levels of marginalization of pastoral actors, having a higher number of group chiefs living in Madaoua has helped to enhance opportunities for collective action due to the greater representation through these chiefs. Villagers in Locale A stated that they would ask the help of outside administrators or customary officials for the purpose of preventing conflict. Administrators and customary officials from sub-national scales participate in deliberation processes and negotiate solutions through face-to-face dialogues with multiple actors.

Neo-Malthusian concepts of scarcity induced by concentrated land use and demographic growth would state that Madaoua is a more likely case for scarcity-induced conflict. Yet despite the divergent adaptations, coupled with factors of exclusion (due to expanding cultivation) and marginalization (represented by ignorance of the need to protect pastoral spaces) present in both case study areas, Keita faces greater conflict. Crop damage is present in Madaoua, and sanctions are justifiable means of reducing crop damage. Yet unlike in Keita, sanctions are not used for elite capture, nor do they serve as a means of marginalizing pastoral actors. Rather, face-to-face conversation (Ostrom 1999) is a means to support collective action over common pool resources. As a result, both actor groups perceive communication as essential to the annual transhumance and shifting of land tenure regimes through the *liberation des champs*. Furthermore, social innovations such as “livestock waiting areas” in agro-pastoral villages enhance agency and provide spaces for social learning to take place in safety and security. This local mechanism for preventing both damage and conflict is possible both because of the history of communication between actors, the presence of physical pastoral enclaves or waiting areas, and the open and transparent sharing of information in Locale A, Madaoua.

To overcome marginalization and spatial exclusion, institutional actors at the local scale need to have more support from government officials including access to land, fodder, and water to support pastoralists during their passage. While some efforts to maintain pastoral water access remain entrenched in age-old systems that profess that pastoral commons cannot be enforced (Hardin 1968), there is a greater concentration and historical presence of charismatic leadership among pastoral customary leaders in Madaoua to negotiate and overcome these challenges (Ostrom 1999; Gupta 2010). This emphasizes the importance of representation by customary officials who, in turn, interact closely with their constituents and speak on their behalf to defend livelihood access rights and support other complex and uncertain livelihood trials stemming from divergent adaptations.

Conclusion

This chapter illustrates how institutions, especially those at the local scale, shape divergent adaptation. Analyzing responses from pastoralists, agro-pastoralists, and multiple customary and administrative officials in Niger identified two divergent

adaptations prevalent in the case study areas: (1) the closing of pastoral spaces by cultivation, which is related to crop damage payments, and (2) limited water and fodder access and availability due to agro-pastoralism and cutting of field residues. For both of these, the adaptive capacity of pastoralists is reduced. Yet, despite the similar typology of the divergent adaptations, the in situ institutions produced different outcomes in each locale.

The violence experienced between pastoralists and agro-pastoralists in Keita, exemplified by the presence of arms, livestock theft, and land and water access, was in contradistinction to the way that conflict was experienced in Madaoua, where informants did not negate the presence of conflict, but identified more preventative and cooperative behaviors including transparent information and itinerary sharing, availability and support from multiple institutional scales, transactions such as farmer-herder “contracts,” expressions of cooperation and kindness to the other group, and trust of local, customary officials. These outcomes contradict neo-Malthusian logic that posits that increased human concentrations lead to scarcity dynamics (Homer-Dixon 1999) and support the idea that conflict is relevant to how institutions frame adaptation (Snorek et al. 2014a). Reflecting these and other findings (Kpadonou et al. 2012), local-scale, collective action institutions are more capable of promoting trust, cooperation, and reciprocity through face-to-face discussion of rule and expectations (Gupta et al. 2010; Ostrom 1999).

Integrating adaptation planning and institutional capacity building across administrative jurisdictions is essential to sustainable, peaceful adaptation outcomes in Niger. The adaptation needs of mobile pastoralists demand uninterrupted and well-stocked pastoral corridors and resting areas. Yet when their needs are not met, suppression of conflict equates to greater conflict. As other research has shown (Snorek et al. 2014a, 2017), institutions that encourage expressions of conflict by direct confrontations, dialogue, and discussion may better promote sustainable adaptation than the top-down, conflict-suppressing institutions exemplified in Keita, as the latter tend to reinforce unequal power relations and promote marginalization. By enhancing institutional models that provide space and time for collective action, multiple users can express and discuss their adaptive capacity needs, which have greater potential to bring about more sustainable, peaceful adaptation (Eriksen et al. 2011), especially for groups facing livelihood insecurities, social and climate vulnerability, and marginalization. Furthermore, as was demonstrated in the cases and in other research (Niamir-Fuller 1998), flexibility in resting points and enclaves as well as more transparent information about timing and spatial constraints related to the clearing of fields is essential to peaceful adaptation and will require more locally mediated and managed models of governance.

This chapter shows that local institutions that support engagement of multiple groups in collective action processes tend to lessen the tensions relevant to divergent adaptation. This research further elaborates (Snorek et al. 2014a, 2017) how divergent adaptation is a process that can change institutions *through* conflict or cooperation dynamic and should be applied to other social, ecological, and political contexts, to further examine how to bring about more peaceful and sustainable adaptation.

Acknowledgments The research was funded as part of the 3-year European Commission Seventh Framework Program CLICO (Climate Change, Hydro-Conflict, and Human Security), devoted to the study of climate change.

References

- Adger WN (2001) Scales of governance and environmental justice for adaptation and mitigation of climate change. *J Int Dev* 13:921–931. <https://doi.org/10.1002/jid.833>
- Adger WN, Kelly PM (1999) Social vulnerability to climate change and the architecture of entitlements. *Mitig Adapt Strateg Glob Chang* 4:253–266
- Adger WN, Paavola J, Huq S, Mace MJ (2006) Fairness in adaptation to climate change. MIT Press, Cambridge, MA
- Adger WN, Agrawala S, Mirza MMQ, Conde C, O'Brien K, Pulhin J, Pulwarty R, Smit B, Takahashi K (2007) Assessment of adaptation practices, options, constraints and capacity. Climate Change. Impacts, Adaptation and vulnerability. Contribution of working group II to the fourth assessment report of the intergovernmental panel on climate change, Parry ML, Canziani OF, Palutikof JP, van der Linden PJ, Hanson CE, eds, Cambridge University Press, Cambridge, UK, pp 717–743
- Adger WN, Pulhin JM, Barnett J, Dabelko GD, Hovelsrud GK, Levy M, Oswald Spring Ú, Vogel CH (2014) Human security. In: Field CB, Barros VR, Dokken DJ, Mach KJ, Mastrandrea MD, Bilir TE, Chatterjee M, Ebi KL, Estrada YO, Genova RC, Girma B, Kissel ES, Levy AN, MacCracken S, Mastrandrea PR, White LL (eds) Climate change 2014: impacts, adaptation, and vulnerability. Part A: global and sectoral aspects. Contribution of Working Group II to the fifth assessment report of the intergovernmental panel on climate change. Cambridge University Press, Cambridge, UK/New York, pp 755–791
- Alemu MG (2018) Insecurity, and marginality in pastoral spaces: the horn of Africa and the Sahel regions. *Strat Rev Southern Afr* 40(2):82–95
- Allen CR, Fontaine JJ, Pope KL, Garmestani AS (2010) Adaptive management for a turbulent future. *J Environ Manage* 92(2011):1339–1345. <https://doi.org/10.1016/j.jenvman.2010.11.019>
- Barnett J, O'Neill S (2010) Editorial: maladaptation. *Glob Environ Chang* 20:211–213
- Benjaminsen TA, Holden S, Lund C, Sjaastad E (2009) Formalisation of land rights: some empirical evidence from Mali, Niger, and South Africa. *Land Use Policy* 26(1):28–35
- Benjaminsen TA, Alinon K, Buhaug H, Buseeth JT (2012) Does climate change drive land-use conflicts in the Sahel? *J Peace Res* 49(1):97–111
- Berman R, Quinn C, Paavola J (2012) The role of institutions in the transformation of coping capacity to sustainable adaptive capacity. *Environ Dev* 2:86–100
- Biasutti M, Held IM, Sobel AH, Giannini A (2008) SST Forcings and Sahel rainfall variability in simulations of the twentieth and twenty-first centuries. *J Clim* 21:3471–3486
- Bode S (2011) Mobilité et mutations: cas de la communauté de pasteurs Wodaabe du lignage des Suudu Suka'el de Tanout (Niger Centre-Est). Doctoral Thesis for the Department of Geography. University Abdou Moumouni de Niamey
- Bruggeman A, Hadjinicolaou P, Lange M (2010) Climate outlooks for CLICO case study sites. Cyprus Institute, Accessed online on 8 Mar 2013. http://www.cyi.ac.cy/system/files/Bruggeman_et_al_Climate_Outlooks_CLICO_D2_1_Sep2010.pdf
- Cleaver F (2002) Reinventing institutions: bricolage and the social embeddedness of natural resource management. *Eur J Dev Res* 14(2):11. 20p
- Dennett D (2013) Intuition pumps and other tools for thinking. W.W. Norton and Company, New York
- Engle NL, Lemos MC (2010) Unpacking governance: building adaptive capacity to climate change of river basins in Brazil. *Glob Environ Chang* 20:4–13. <https://doi.org/10.1016/j.gloenvcha.2009.07.001>

- Eriksen S, Aldunce P, Bahinipati CS, Martins RA, Molefe JI, Nhemachena C, O'Brien K, Olorunfemi F, Park J, Sygna L, Ulsrud K (2011) When not every response to climate change is a good one: identifying principles for sustainable adaptation. *Clim Dev* 3(1):7–20. <https://doi.org/10.3763/cdev.2010.0060>
- Gunderson LH, Holling CS (eds) (2002) *Panarchy: understanding transformations in human and natural systems*. Island Press, Washington, DC
- Gupta J, Termeer C, Klostermann J, Meijerink S, van den Brink M, Jong P, Nooteboom S, Bergsma E (2010) The adaptive capacity wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environ Sci Policy* 13:459–471
- Hammel R (2005) *Politiques de développement pastoral au Sahel. Les ambitions de développement de la coopération internationale et la dynamique du système pastoral nigérien. Analyses comparative et historique. Mémoire de Recherche soumis à l'Institut Universitaire d'études du développement, IUED. Genève*
- Hardin G (1968) The tragedy of the commons. *Science* 162:1243–1248
- Herrero M, Addison J, Bedelian C, Carabine E, Havlik P, Henderson B, van de Steeg J, Thornton PK (2016) Climate change and pastoralism: impacts, consequences and adaptation. *Rev Sci Tech Off Int Epiz* 35:417–433. <https://doi.org/10.20506/rst/35.2.2533>
- Hill M (2013) Adaptive capacity, adaptive governance, and resilience. *Adv Global Change Res* 54:29–51
- Homer-Dixon TF (1999) *Environment, scarcity, and violence*. Princeton University Press, Princeton
- Hoque SF, Quinn C, Sallu S (2018) Differential livelihood adaptation to social-ecological change in coastal Bangladesh. *Reg Environ Chang* 18:451–463. <https://doi.org/10.1007/s10113-017-1213-6>
- IFAD (2016) Rural poverty portal. Accessed 26 May 2016. <http://www.ruralpovertyportal.org/country/statistics/tags/niger>
- Kpadonou RAB, Adégbola PY, Tovignan SD (2012) Local knowledge and adaptation to climate change in Ouémé Valley, Benin. *Afr Crop Sci J* 20(s2):181–192
- Lebel L, Anderies JM, Campbell B, Folke C, Hatfield-Dodds S, Hughes TP, Wilson J (2006) Governance and the Capacity to Manage Resilience in Regional Social-Ecological Systems. Marine Sciences Faculty Scholarship. Paper 52. http://digitalcommons.library.umaine.edu/sms_facpub/52
- Lund C (1998) *Law power, and politics in Niger*. Transaction Publishers, New York
- Magnan AK, Schipper ELF, Burkett M, Bharwani S, Eriksen S, Gemenne F, Schaar J, Ziervogel G (2016) Addressing the risk of maladaptation to climate change. *Wires Clim Change* 7(5): 646–665
- Mohamadou A (2009) *Decentralisation and local power in Niger*, IIED. Russel Press, Nottingham
- Mortimore M (1989) *Adapting to Drought. Farmers, Famines and desertification in West Africa*. Cambridge University Press, Cambridge, UK
- Niamir-Fuller M (1998) The resilience of pastoral herding in Sahelian Africa. In: Berkes F, Folke C (eds) *Linking social and ecological systems: management practices and social mechanisms for building resilience*. Cambridge University Press, Cambridge, UK, pp 250–284
- Olivier de Sardan J-P (2011) The eight modes of local governance in West Africa. *IDS Bulletin* 42(2):22–31
- Olsson P, Folke C (2004) Adaptive co-management for building resilience in social-ecological systems. *Environ Manag* 34(1):75–90
- Ostrom E (1999) Coping with tragedies of the commons. *Annu Rev Polit Sci* 2:493–535
- Ostrom E (2005) *Understanding institutional diversity*. Princeton University Press, Princeton
- Oxby C (2011) Will the 2010 'code pastoral' help herders in Central Niger? Land rights and land use strategies in the grasslands of Abalak and Dakoro departments. *Nomadic People* 15(2):53–81
- Rossi B (2002) *The Keita project: an anthropological study of international development discourses and practices in Niger*. Thesis submitted for the degree of Doctor of Philosophy in Social Anthropology, London School of Economics and Political Science. University of London

- Ruiz-Mallén I, Corbera E, Calvo-Boyero D, Reyes-Garcia V (2015) Participatory scenarios to explore local adaptation to global change in biosphere reserves: experiences from Bolivia and Mexico. *Environ Sci Policy* 54:398–408. <https://doi.org/10.1016/j.envsci.2015.07.027>.
- Shanahan TM (2009) Atlantic forcing of persistent drought in West Africa. *Science* 324:377–380
- Snorek J, Rosenfeld T, Wirkus L, Renaud FG (2011) In-Depth assessment of selected policies in Niger. Climate Change, Hydroconflicts, and Human Security (CLICO) Project, Seventh Framework Programme, Brussels
- Snorek J, Renaud FG, Kloos J (2012) Case study protocol: Niger case study. A deliverable for the Climate Change, Hydro-conflict, and Human Security (CLICO) project
- Snorek J, Renaud F, Kloos J (2014a) Divergent adaptation to climate variability: an agro-pastoral case study from Niger. *Glob Environ Chang* 29:371–386
- Snorek J, Stark J, Terasawa K (2014b) Climate change and conflict in the Sahel: a policy brief on findings from Niger and Burkina Faso. U.S. Agency for International Development (USAID). January 2014
- Snorek J, Moser L, Renaud FG (2017) The production of contested landscapes: enclosing the pastoral commons in Niger. *J Rural Stud* 51:125–140. <https://doi.org/10.1016/j.jrurstud.2017.01.015>.
- Sovacool BK (2018) Bamboo beating bandits: conflict, inequality, and vulnerability in the political ecology of climate change adaptation in Bangladesh. *World Dev* 102:183–194. <https://doi.org/10.1016/j.worlddev.2017.10.014>
- Sovacool BK, Linnér B-O, Goodsite ME (2015) The political economy of climate adaptation. *Nat Clim Chang* 5:616–618
- The World Bank Group (2016) World Bank Data – Niger. Accessed 19 Aug 2015. <http://data.worldbank.org/country/niger>
- Touré O (2015) At the crossroads: analysing the impact of pastoral policies upon pastoralists based in Abalak, Niger. Tear fund Report. Accessed 1 Apr 2016. <https://landportal.info/news/2015/04/crossroads-analysing-impact-pastoral-policies-upon-pastoralists-based-abalak-niger>
- Vincent K (2007) Uncertainty in adaptive capacity and the importance of scale. *Glob Environ Chang* 17:12–24
- Zakara G, Abarchi H (2007) Assessment of the impacts of pastoral policies in Niger: Niger's experience in terms of national legislation enforcement for pastoralists' mobility and cattle circulation rights. World Initiative or Sustainable Pastoralism

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.