The place of the Fula:

Intersections of political and environmental change in western Mali

By

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Abstract

In dryland sub-Saharan Africa, local democratic institutions will play a critical role in climate change adaptation yet little is known about how they mediate issues relating to resource access, competition, and conflict in vulnerable areas. The objective of this dissertation is to examine the connections between local democracy in the Republic of Mali and these issues by answering three interrelated questions. These questions focus on the influence of decentralization on shared resource access arrangements between settled farmers and mobile herders, the impact of land cover and rainfall change on livestock movements, and how these institutional and environmental changes are affecting farmer-herder relations. In order to answer these questions, this project utilized in-depth qualitative analysis of several Malian municipalities that are on contrasting institutional trajectories vis-à-vis resource access and land use planning. The second is a multi-scale land use and cover change (LUCC) analysis that focuses on broad scale agricultural expansion linked to village-level changes in the spatial patterning of cropped fields. The last component focuses on the measurement and interpretation of inter-annual trends in precipitation, which play a key role in determining livestock mobility patterns.

The results of this research are presented in seven chapters. The first chapter provides historic context for governance and land tenure in the study area. The second chapter provides a detailed methodological overview of the subsequent analytical chapters. Chapter three provides an analysis of crop damage by mobile herders and how geographic scale can be used to understand where and why damage and associated farmer-herder conflicts occur in the study area. Chapter four focuses on the ways in which struggles between farmers and herders over mobility and settlement are shaping the democratic decentralization process through local conventions. Chapter five sheds light on migration by farmers, the ensuing proliferation of informal settlements, and their impact on local government capacity. Chapter six focuses on the specific challenge of designating land for pastoral livestock corridors and the ways in which the corridors enter into struggles over resource access and local citizenship. Chapter seven provides a conclusion that brings the previous chapters together and offers insights in the context of the political crisis that began in Mali in 2012.

Key words: West Africa, decentralization, resource tenure, climate change adaptation, agro-pastoral landscapes.

Chapter one: the place of the Fula

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Introduction to the Fuladougou

In 1863, when French colonial lieutenant M. E. Mage arrived at the town of Bankassi, located in present-day western Mali, he described the place as “nothing more than a ruin (Mage 1868: 103).” This was a noteworthy observation because the explorer’s instructions had indicated Bankassi as the only stop between the town of Kita and the strategically located middle Niger River. These instructions had been informed by the diary of famous explorer Mungo Park, who, in 1805, had passed several days in Bankassi as guest of Sérénummo, the King of the Fuladougou (ibid: 1868). The ruinous state of the Fuladougou at the time reflected the tumult and violence that characterized a vast portion of West Africa during the latter half of the 19th Century. When Lieutenant Mage arrived, the Fuladougou had already succumbed, as did many West African kingdoms, to the jihad conquest of El-Hadji Omar Tall, a Toucouleur Fulani who originated from the Foutatooro region of Senegal. El-Hadji Tall’s forces overthrew the Fuladougou capital Bankassi in 1859 (Robinson 1985), killing its population death or causing them to flee to more isolated locations, often mountainous areas that could be more easily protected against raiders. A colonial census conducted in 1933 vividly describes how the people of the Fuladougou had been enjoying a brief period of peace and prosperity “where villages were multiplying. But then, coming from the west, bands of Toucouleurs appeared, victorious and fanatical (Delmond 1933: 17).”

Fuladougou means “land of the Fula” in the Bambara language and refers to an area in western Mali of approximately 4000 km^2 between the Bakhoy River to the west, the Baoulé River to the north and east, and the Manding Mountains to the south (figure 1). The area derives its name from the group of Fulani who migrated to the area and conquered it in the 18th Century.

Although the Fulani, an ethnic group associated with livestock in the region, were politically dominant in the area, they assimilated into the local Malinké language and took up farming. Geographically, the Fuladougou was flanked on either side by rival groups of ethnic Malinkés to the west and Bambara to the east. Violent skirmishes took place in the area even before the jihad of El Hadji Omar.

When Scottish explorer Mungo Park passed through on his second expedition (1805-06), the Fuladougou was a kingdom under the loose control of the Segou Empire and reflected the same hierarchical political economic organization based on slave-raiding that was found throughout the West African savanna belt during the 18th and 19th Centuries (ibid). For example, Park described a specific instance of "plundering and stealing" (Marsters 2000: 259) in which the son of the Fuladougou King crossed the Baoulé River to stage a successful raid in the neighboring Bélédougou. The inhabitants of the Fuladougou were subject to the same kinds of hostile incursions so it is no surprise that Park as well as the British explorer William Gray, who passed through the same territory two decades later, described the importance of moving through the Fuladougou under the explicit protection of its ruler up to the kingdom's territorial limits (Gray 1825: 315). Joseph Simon Galliéni, an early military governor of French Soudan describes the Fuladougou, in his own 1885 French Sudan travelogue, as under the constant threat of attack from Moorish elements and the Kaarta kingdom to the north as well as the Bélédougou to the west. According to Galliéni, inhabitants across the savanna belt who had been dislocated by El Hadji Tall's jihad only began moving out of their defensive hillside settlements at the turn of the 20th Century, following French pacification (Galliéni 1885). These population movements were not without precedent, however, given the Fuladougou's geographic proximity to the Upper

Senegal River, which historically has been an unstable political frontier as described by Raynaut (1997: 67):

> [T]he Upper Senegal River Basin, following the decline of the empire of Ghana, continued to constitute a confrontational zone between two rival powers, where no stable, enduring power established itself (with the short-lived exception of the Bambara state of Kaarta, where we again see the demographic 'line' from Kayes to Nioro). The ephemeral and turbulent existence of the Toucouleur Empire of El Hadji Omar did not, for its part, create large population concentrations. In the end, the current demographic void in this region is certainly related to the insecure situation which reigned for many centuries and to the role the region played as a supplier of slaves for the states along the Senegalese coast.

The French conquest of the West African interior at the turn of the 20th Century put an end to the period of warfare that had played an important role in depressing the region's population. Areas that had once been prosperous and densely populated in the early 19th Century had been denuded, not just by warfare and slave raiding, but also by ecological dislocations and epidemics of disease (Mabogunje and Richards 1985). As one such area where people have moved back into sparsely inhabited frontiers, the Fuladougou reflects many of the principal political and environmental changes that people across rural West Africa are experiencing today. Landscapes have become more crowded and livelihoods have been adjusted accordingly. Environmental conditions have change in other ways as well: certain resources have become more difficult to access and rainfall patterns have become more erratic.

Project objectives

Using the Fuladougou as an in-depth case study, this dissertation project has two overarching objectives: (1) to shed light on how new local institutions in agrarian West Africa fit within these broad patterns of regional environmental change and (2) to answer larger scholarly questions about people-environment interactions by incorporating land change science and remote sensing more constructively into the field of political ecology. Both of these scholarly objectives serve the larger goal of better informing policy interventions that focus on rural resource governance, poverty reduction, and climate change adaptation in the West African region.

This chapter provides an introduction to this project in three sections: 1) a brief overview of the continuities and changes within the Fuladougou's long historical arc, 2) a theoretical and conceptual framework through which the research objectives will be engaged, and 3) a description of the principal systems of production in the Fuladougou and the threats they face from climate change.

Fuladougou: an early history

Although the early history of interior West Africa is not well documented, the 'blank slate' or 'no man's lands' that was depicted by many 19th Century European explorers was as much imaginary as it was an accident of history. In the Fuladougou, Neolithic traces date from 1st century BC (Geerling and Diakité 1988). Trans-Saharan caravan history goes back to the 2nd Century AD via the Adrar region of Mauritania and commercial exchange existed between Sudanian West Africa and the Maghreb for wool, copper, pearls, gold, and slaves (ibid: 1988, see also Manchuelle (1997). The Ghana Empire was founded in the late 8th Century by ancestors of

the Sarakollé people, who still inhabit the northern and eastern fringes of the Fuladougou and almost certainly travelled through and may have once settled in the area. The French ethnographer Maurice Delafosse, as summarized in a colonial census report dating from 1933, proposed the following genealogical history of the Fuladougou (Delmond 1933: 14):

> Beginning in the 11th Century, a certain number of Fulani, commanded by an 'ardo' of the Diallo clan left the Guidimakha and Galam areas, under pressure from Lemtouna Berbers, arrived in the Upper Senegal [River] by traversing the Kaarta, and by uniting with the Malinké who lived there, formed one of the first groups of that new race: the Fula or Fulankés. We then know that, in the 13th Century, two sons of [Malian emperor] Sunjdata Keita, Massire and Kouakourou, settled on the left bank of the Upper Baoulé [situated in the northern Fuladougou], reaching the north of the Malinké Empire.

Although its historical accuracy cannot be easily verified, this statement has heuristic value in several ways: it supports the notion that the Fuladougou has long been a zone of interaction between groups descending from the northern desert regions and others coming up from the forest-savanna. Secondly, it supports speculation that the area may have been densely populated several centuries ago (Geerling and Diakité 1988). Finally, it sheds some light on the name 'Fuladougou' itself and the history of Fulani settlement in the area. Robinson (1985) reiterated Tellier's 1898 account of the El Hadji Omar campaign in western Mali:

> Alfa Uthman [a deputy of Tall] conquered the areas of Betea, Farimbula, Gangaran, Banyakadugu, and Gadugu between the Bafing and the Bakhoy; Fuladougou, Kita, and Birgo between the Bakhoy and the Baoulé; all of these were Mandinka except Fuladougou, where Fulfulde was spoken.

The Fulfulde being spoken during Tellier's time may have been that of the members of the Diakité clan who had left the Inland Niger Delta area for Bougouni, to the south, before

conquering the Fuladougou, although other colonial accounts such as the letter written in 1899 by Lieutenant Chievnin describe that the Diakité clan had already assimilated into the Malinké culture. By the mid-19th Century, Bambara refugees from the Kaarta Empire (1633-1854), which itself was born out of a fraternal split in the royal family of Segou, had begun crossing the Baoulé River and forming settlements in what would become and still is the Fuladougou's borderland (Boureima 2006).

The continuity of customary claims: the Diakité clan

It is noteworthy that, despite this history of tumult and violence, the Fuladougou is located on contemporary maps in the same location and largely with the same frontiers as indicated by 19th Century explorers (figure 1). It reflects a high degree of historic continuity as it remains a viable and legitimate political entity whose customary leaders can trace their lineages back to the pre-colonial kingdom described by Mungo Park. This continuity, particularly as it pertains to the Diakité clan, has played an important role in shaping the political decentralization process current underway in Mali and the rest of West Africa. By doing so, it also influences how different actors, pastoral herders as well as farmers, adapt to environmental changes through shifts in their mobility and settlement patterns.

Local narratives claim that the Diakité clan of Fulani, originating from the Maacina region, conquered the area and governed the Fuladougou as a kingdom until its capitol Bankassi was sacked by the army of El Hadji Omar Tall, who was moving west from the Futa Toro region of Senegal. Because Tall did not seek to control the Fuladougou's territory and therefore left no loyal occupants, the area remained under the nominal control of the extended Djakité clan and their allies. Several examples of Diakité historic allies include the village of Diguila, which is

comprised of Malinké hunters from the Camara lineage, Sangarébougou from another Fulani lineage originally from the Birgo, and the village of Banakoro, inhabited by a group from the Senoufo ethnolinguistic group who are allegedly former captives, likely dating back to warfare between the pre-colonial kingdoms of Segou, a wartime ally, and Kénédougou.

French pacification stabilized the Djakité's political power as the latter, seeking to accommodate the new colonial government, signing a treaty of protectorate with Lieutenant Galliéni on April 16th 1879 (Kanya-Forstner 1969: 75). As a result, the Fuladougou was reproduced as a colonial political territory and, though it has been sub-divided into smaller administrative units since then, it remains subject to the customary authority of the Djakité clan to this day. The Diakité's hegemony has endured over a century, as reflected in a colonial report dated June 1899, in which an official declared: "I believe we will be interested in designating Toumani Diakité, the Koundou village chief, [..] whose family has always been the source of chiefs in the Fuladougou-Arbala area (Delmond 1933: 14)."

The founding father of the Diakité clan was Sedi Bemba, whose four sons established control over the area. According to local sources, Sedi himself was not involved in exploration or conquest. Instead, he stayed in Kolifilo, the original Diakité village located in the southeast of the Fuladougou—with his first son Sounfin Jigui. Three of Sedi Bemba's other sons left home to establish three other founding villages. The eldest son Sambu established Torolo, on the clan territory's southern flank, Malik established Banakoro, and Rabala Danfin headed west to create

Bankassi. Balla, the bravest of the sons, went north to establish Bassala-Nafaji, which was strategically located to the north in order to block incursions from the Kaarta (figure 2).[1]

These four villages, their founders, and the founders' ancestors went on to create the network of settlements and village territories that would comprise the Fuladougou as it was recognized and formalized by the French colonial administration. The descendants of each of the sons became members of different clans, related but distinct, with independent villages and separate but often overlapping territories. The clans' settlements would later become the Fuladougou's officially recognized villages, due largely to the Diakité's alliance with the French. Members of Rabala-Bankassi clan founded the villages of Bonboti, Farala, Madina, and Soritabougou while Bassala-Nafaji members created the villages of Barakoroji, Kotouba, and Sijian.

French formalization and exploitation of the Diakité's customary power positioned its clans well for post-Independence politics.[2] In addition to controlling its administrative villages, the Diakités shaped the decentralization process when the national government made the decision in the 1990s to divide the colonial-era sous-prefectures into democratically governed municipalities, which aimed to reflect the will of different people to live together in their own self-identified communities (Idelman 2009). In the northern Fuladougou, this led members of the Rabala clan to form their own municipality, Madina, rather than join their cousins in the municipality of Kotouba, which was largely populated by members of the Bassala clan.

[1] The 1933 census recognized this remote area as the historic corridor connecting the northern Bélédougou and Kaarta-Bakono, through Samakulu and Koutouba to the southern Fuladougou, where it intersected with the main Bamako road and Thies-Niger railway.

[2] In his study of decentralization in Senegal, Galvan (2004: 167) calls the reliance of West African post-Independence governments' reliance on traditional local political elites one of "the most carefully constructed Rube Goldberg devices of colonialism."

Decisions such as this one, which reflects the longstanding practice of patrilineal clan fissioning, was carried out in many other parts of Mali as well and often led to the creation of municipalities with very small populations (ibid: 2009). This process of municipal demarcation has had important consequences for local politics, which are explored in chapter three, although these were only felt significantly in the early 21st Century. As the next section describes, the Fuladougou remained a relatively isolated backwater for the rest of the 20th Century. French official Marzin remarked in 1918 that the Fuladougou had experienced a "marked loss of population that he attributed to soldiers heading to Europe [for World War I] and numerous captives returning to their homelands following their emancipation (Delmond: 1933: 10).'[3]

Population rebound in rural Mali

A robust but geographically uneven demographic recovery began taking place across rural West Africa in the second half of the 20th Century. The *paix coloniale* had ended internal slave raiding, spurred long-distance migrations and stimulated important demographic shifts in the region (Breusers 2001) but low population densities in many parts of the savanna belt persisted for decades due, in part, to disease vectors such as river blindness (onchocerciasis). This rendered large areas largely uninhabitable (McMillan 1995) and rural populations only began growing in the second half of the 20th Century as birth rates increased and new lands were opened to settlement following large-scale disease eradication campaigns. Even as the full-fledged demographic boom began in the 1960s, the Fuladougou and the rest of western Mali had fewer people than many other savanna regions due to the high rates of labor migration (Raynaut

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[3] See G. Mann 'Native Sons: West African veterans and France in the twentieth century' (Mann 2006).

1997) from the area and the lack of transportation infrastructure, which led to conditions of economic isolation (Koenig and Diarra 1998).

In1933, census takers noted that the area along the old Kita-Bamako road was completely depopulated since the construction of the Thies-Niger railway and that even Koundou, the site of the only French fort between the two cities had been abandoned. Although the train passes through the area, the Fuladougou largely lacked tertiary roads, which cut much of it off from colonial era transportation flows. The 1933 census takers observed as much:

> The last census was done fifteen years ago; since then, the canton of the Fuladougou-Arbala was very rarely visited and those visits were limited to its southern portion where the train passes. Many itineraries have never been followed; numerous indigenes had never seen a European (Delmond 1933: 7).

Colonial forest reserves

Another historic factor that has shaped settlement, mobility, and resource access in the Fuladougou is the large number of protected forest reserves. The existence of isolated and mostly uninhabited areas facilitated the French establishment of these reserves, which were later bequeathed to post-Independence governments (figure 3). The principal reason so many reserves were created in the Fuladougou and the rest of western Mali was the train, which originally ran on wood fuel and was one of the only transportation links from Mali to the Atlantic coast.[4] Forest management for the train was therefore a high priority for the colonial administration,

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[4] The train followed the path of French penetration into the interior and served as the principal transport link during the colonial era. Following the breakup of the post-Independence Mali-Senegal federation, Malian President Modibo Keita began focusing on Cote d'Ivoire to maintain access to ports on the Atlantic coast . Cote d'Ivoire remained the principal transport rout from Mali to the coast until civil unrest in Cote d'Ivoire began in 1999 and split the country in 2002. This prompted then Malian President Amadou Toumani Touré to redirect transportation investment towards routes to Senegal, which lead to the construction in the mid-2000s of the first paved road that passes through the Fuladougou.

which feared that deforestation, already being observed in Senegal, would likely lead to fuel shortages (Gouverneur General de l'Afrique Occidentale Francaise 1924). This view was shared by colonial forester Mangin who reported that “the production of charcoal threatens to destroy completely the forest stands of Tivaouane along the Dakar-St. Louis [railroad] (Ribot 1999: 292).”[5]

In addition to relatively small land reserves created for rational forest resource use along the Thies-Niger line, the colonial administration established a vast reserve in the northern portion of the Fuladougou in 1954 (Mankoto M'Baelele et al. 2000),[6] which at the turn of the 20th Century had been nearly devoid of settlements (Delmond: 1933) and thus contained sizeable remnant wildlife populations. As Mali’s largest protected forest, the Boucle du Baoulé would eventually become a national park and, later, an international biosphere reserve. As the Fuladougou’s population grew steadily following independence, the Baoulé reserve prevented agriculturalists from re-settling the frontiers of several pre-colonial kingdoms that had in recent times, become the hunting grounds for local groups. Even as the local population grew, the lack of roads, communication infrastructure, and economic opportunities meant that frontier conditions persisted in much of the Fuladougou for the rest of the 20th Century.[7]

The Fuladougou as a reflection of agro-pastoral West Africa

[5] Colonial forest management policy broadly reflected the widely shared but erroneous view among colonial scientists such as Stebbing (1937) and Aubréville (1949) that linked indigenous land use and progressive ecological degradation in dryland West Africa.

[6] In French West Africa (AOF) wildlife reserves were created by decree in November 1947. Four of these reserves, including the Boucle du Baoulé were designated as national parks in 1954.

[7] Anecdotes describe a lack of basic supplies (e.g. bread, sugar) due to unreliable train service and a road to Bamako that was both dangerous and exhausting up until it was paved in the early 2000s.

Beginning in the mid-1990s, the growth of the Fuladougou's population accelerated and local livelihoods changed in response to new opportunities provided by the arrival of the cotton supply chain to the area. Among other changes, this led to a steady flow of migrants from heavily populated neighboring areas like the Bélédougou, which was not included in the cotton sector's expansion because of its lack of arable land. Even as farmers moved in to the Fuladougou, pastoral livestock herders who had been spending the dry season in the area since at least the 1950s began lengthening their stays. These herders, ethnic Fulani like the Diakité, have nonetheless maintained the Fulfulde language and political loyalties in their home areas to the north of the Fuladougou, which has important implications for how resource access is being renegotiated in the area. These negotiations, taking place within new local institutions, are addressing competition for resource access that is driven by the increasing overlap of farming and mobile livestock herding in the Fuladougou over the last two decades.

In light of these demographic, economic, and political trends, the Fuladougou is a microcosm of many of the important social and environmental changes that are currently reshaping agrarian West Africa. As the inhabitants of the Fuladougou expand their fields into the forest-savanna and new settlers arrive every year, this small corner of West Africa illuminates how history shapes present-day human-environment relations and influences their potential future trajectories in the West African savanna belt. In addition to history, the Fuladougou also shows how place matters. The colonial imprint on local governance, the structure of commodity chains, and changes in environmental conditions intersect in a geographic conjuncture that shapes the processes that are the focus of this project. The following section outlines the conceptual and theoretical framework through which I attempt to shed light on these changes as they are occurring in the Fuladougou.

Dimensions of mobility

An overarching concept that serves to unify the dimensions of this study is geographic mobility. Mobility, as a socio-ecological phenomenon, continues in the Fuladougou, albeit in changing and sometimes novel forms. This project closely considers mobility, in its past, current and future forms, as a critical factor for future institutions, livelihoods, and landscapes. Subsequent chapters consider various aspects of mobility in the Fuladougou: the geographically scaled nature of livestock mobility and its role in farmer-herder conflict in chapter three, the institutional consequences of mobile land-seeking agriculturalists in chapter four, and the negotiations over terms of a *reduction* in mobility by once semi-nomadic pastoralists in chapters five and six.

Political shifts are taking place vis-à-vis pastoral mobility as well as the migratory movements of land seeking farmers. Pastoralists have historically stayed on the margins of local institutions in the places where they temporarily reside, relying instead on friendships and alliances to maintain resource access (Bassett and Koné 2006). Farmers, on other hand, typically hold principal land rights and participate more directly in local governance. Current political trends in the Fuladougou are diverging from these traditional arrangements of herder as "outsider" and farmer as "host." Local governments are making concerted efforts to formally support pastoral mobility, which is necessary for environmentally sustainable dryland livestock production (Scoones 1994), through the formalization of livestock passage corridors and, in some cases, the integration of herders into local jurisdictions.

Yet, even as these new mobility patterns and livelihood patterns among pastoralists and farmers reshape local institutions, these changes represent as much of a continuation with West African history as they do a break from it. West Africa has always been characterized by

population mobility and demographic flux (Ajayi and Crowder 1985). Throughout history, West Africans have moved with the seasons, temporarily in search of urban employment, or permanently as migrants into new areas of settlement or even new continents (Manchuelle 1997). The terms "sedentary" farmer, "customary" or "traditional" leader, and even "pastoral" herder, which are used here out of convenience, must be understood in a highly qualified manner. All groups claiming "traditional" land rights or "autochthonous" authority came from somewhere else and displaced another group to do so.[8] This is an especially important point considering that most "traditional" systems of authority and tenure that exist today were established in the wake of the violent upheavals of the 19th Century and the ensuing colonial conquest. Furthermore, people continue to move—not just those who are known to do so, like pastoralists—but farmers as well, in search of fertile land, markets, or any number of other livelihood-driven factors.

Critical environmental histories: bridging to the present

These movements and patterns of settlement have interacted with cycles of drought and other environmental factors to shape West African landscapes over the course of millennia. Various scholars have critically engaged with the dominant understandings of human-environment interactions in West Africa, particularly vis-à-vis claims that humans are the cause of resource degradation during the last century (Fairhead and Leach 1996, 1998, Richards 1985, Duvall 2007, Turner 1993). Several of these works have fundamentally altered assumptions about human agency in forest cover change (Bassett and Zuéli 2000, Fairhead and Leach 1996), wildlife habitat alteration (Duvall 2007) and rangeland degradation (Turner 2003). This wave of

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[8] A corollary from East Africa is the testimony from a woman delegate to the Kenyan National Constitutional Conference during May of 2003: "If we go back to all these places, we know the Maasai were there. How far back can we go?" (Shipton 2009: 207)

critical research discredited “declensionist” narratives (Cronon 1996) that were born from colonial science and ideology. By doing so, these studies have made important contributions to the policy shift towards including local people in the governance of the natural resources on which their livelihoods depend (c.f. Agrawal and Gibson 1999).

Despite its crucial contributions, critical scholarship that has leaned heavily on qualitative approaches and discourse analysis has not always been able to generate traction within larger environmental policy discussions. This is partly due to an emphasis on crisis narratives that lack sufficient empirical evidence or engagement and thus fail to bridge the gap with disciplines that rely on quantitative methodologies (Turner and Robbins 2008). As a result, important critical scholarship is vulnerable to methodological criticism and often becomes marginalized in debates about environmental change (c.f. Walker 2005). For example, Nyerges and Green (2000) use Fairhead and Leach (1996) as a point of departure in their study of forest cover change in Sierra Leone. The authors utilize remote-sensing tools on a broader scale and conclude that the model proposed by Fairhead and Leach is not necessarily applicable to all localities in the region. By testing the anthropogenic forest gain hypothesis of *Misreading the landscape* in a different place and using different methodological tools, Nyerges and Green refute the possibility of its generalizability across the West African sub-region. Their study nonetheless confirms Fairhead and Leach’s argument (1996: 186) that forest and land cover more generally are the result of “continuous transformations influenced by multiple factors” that combine within unique pathways. Certain critical accounts of regional deforestation such as Bertrand, Ribot, and Montagne (2005), however, misuse this argument by privileging certain factors, such as colonial forestry policy, without providing adequate support evidence.

In order to engage more fully with land change science and other disciplines that focus on environmental change, critical scholars must open up more space for common ground in terms of method and engagement with key drivers of change such as population growth and changing livelihoods associated with increased monetization. This does not imply abandoning a critical stance: scholars can acknowledge that agriculture has expanded by 25% in Sudanian West Africa in the last 25 years (Brink and Eva 2009) and there is a correlation between this expansion and population growth at certain scales (Ouedraogo et al. 2010) while critically engaging with the types of categories employed (e.g. 'intact' or 'pristine' forest) and the conclusions drawn (e.g. need for private land titles). Moreover, critical scholars can bring their attentiveness to scale issues (Gray 1999, Laris 2005, Walters and Vayda 2009), and power relations (Bassett 1988) while engaging in the kind of synoptic, quantitative work that more conventional environmental change researchers conduct. In short, the potential for synergy between different analytical domains is substantial.

These issues imply the need for a multi-scale mixed methods approach that is driven by questions grounded in specific places (Walters and Vayda 2009). Although geographers and researchers in other fields have long called for this type of research, its application remains limited. In West Africa, few studies have combined a political ecology framework with quantitative tools for measuring and understanding contemporary environmental change (but see Wardell, Reenberg, and Tøttrup 2003). This project attempts to accomplish some of this work. As a point of departure, it considers the period since the 1970s as one of dramatic change: devastating droughts permanently altered livelihoods and social relations, particularly among pastoralists. Yet, even as new vulnerabilities have emerged in recent decades, inhabitants of rural West Africa continue to adapt to changing conditions as they always have. Herders find

new grazing areas or forage resources for their animals and farmers find new ways to bring in harvests or other remunerative activities to meet grain budgets.

If the 1970s marked the beginning of a decrease in rainfall compared to previous decades, the 1990s were the beginning of a new political era in rural West Africa. Across the region, authoritarian governments and their often repressive forestry services (Benjaminsen 2000, Laris and Wardell 2006) were stripped of power and, in most cases, replaced by democratic local governments. While this transition is far from complete (Ribot, Agrawal, and Larson 2006), the era is largely over when entire villages would be severely fined for bush fires they had not set. Local communities are increasingly setting and enforcing their own rules over land and natural resources.

This project is situated at the intersection of these changes in power relations and institutions, their historic context, as well as changes in rainfall and land use patterns that impact the resources on which agrarian inhabitants still critically depend. A premise of this project is that targeting this overlapping area of complex phenomena is necessary not only to break new scholarly ground but also to produce useful insights into the opportunities and limitations for rural development and adaptation to climate change in the region. Through its grounding in the field of political ecology, this project emphasizes the continuous *interactions* between human populations and their environments rather than privileging or assigning causality to either the social or biophysical realms. In its focus on the contemporary challenge of environmental change, this project is also informed by the complex adaptive systems (CAS) framework (Gunderson and Holling 2002). However, it also seeks address certain deficiencies the CAS approach; namely its inattention to power relations and path dependencies that are rooted in history and social structure.

Rainfall, climate change, and rural livelihoods

This project focuses on climate, and rainfall specifically, not only due to the biophysical importance of moisture in dryland ecosystems but also because of the related role precipitation patterns play in shaping rural livelihoods. Semi-arid West Africa is characterized by a unimodal rainfall regime with the vast majority falling during the period of late May until early November. Seasonal precipitation is the limiting ecological factor in the semi-arid northern portion of this project's study area (Keech McIntosh 2006, Penning de Vries and Djitèye 1982). For example, it continues to play a key role in southward pastoral livestock movements at the end of the annual rainy season. The rhythm and timing of these movements are impacted by changing patterns of seasonal precipitation, which is the focus of chapter three, and agricultural expansion, which is addressed in chapter four. Hastened departures, accelerated movements, and blocked livestock corridors are among the factors that cause the farmer-herder conflicts that are shaping new local institutions in rural areas and are a major focal area of this project.

Rainfall in dryland West Africa varies at several temporal scales. In addition to inter-annual changes in late season rainfall, regional precipitation has historically oscillated at the scale of decades to centuries. The decline in rainfall across the West African Sahel over the course of the 20th Century was the largest in recorded history (Mahé and Paturel 2009). Drawing from the work of Keech McIntosh (2006), Nicholson (1979), Brooks (1993), and Webb (1995), the following is a brief overview of the precipitation regime changes that have occurred in West Africa since the Pleistocene and discuss the socio-political changes that accompanied these shifts during the past millennium. This historic perspective is necessary to understand the potentially devastating impacts of, and how people may adapt to contemporary anthropogenic climatic

change in rural West Africa. Policy-oriented research on climate change adaptation lack this historic perspective because it often relies on the decontextualized stimulus-response model of human-environment interactions (Bassett 2012). The best example of this is the concern that climate change will create a surge of migration that will result in environmental refugees and the potential for political instability (UNEP 2011). This project emphasizes that such waves of migration have occurred throughout West African history and have resulted in as much political assimilation as conflict. Migration will continue to be a deeply ingrained part of life in the region irrespective of global climate change. Moreover, as the environmental security literature increasingly demonstrates, it is exceedingly difficult to pinpoint the exact causal relationships between environmental change, human response, and social conflict (Derman, Odgaard, and Sjaastad 2007, Hendrix and Salehyan 2010). Nonetheless, it is necessary to understand and engage with the dramatic changes in precipitation that have occurred in dryland West Africa throughout recorded history.

Climate in history

Estimates of historic rainfall estimates, like population change, relies on indirect and partial sources. In terms of ancient history, the fossil record in West Africa is very sparse (Keech McIntosh 2006) and even for the period of the past several centuries, detailed written records are relatively few (Nicholson 1979). Scholars have, nonetheless, sketched out a regional climatic history that dates back thousands of years. Fossil records indicate that the edge of the Sahara desert has fluctuated hundreds of kilometers since the Pleistocene era (1.7 million to 10,000 years ago). During the last glacial maximum (20,000 to 10,000 BP), West Africa was a substantially drier and cooler place than it is now, the desert edge was 500 kilometers south of its

current position, and small bands of hunter gatherers were limited to the southern portion of the region (Keech McIntosh 2006). Approximately 12,500 years ago, a rapid onset of rainier conditions took place, which caused the humid forest to surge northwards and the desert to "effectively disappear from West Africa. (ibid: 15)."

The early Holocene period that ensued was characterized by the development of pastoralism as a livelihood strategy based on mobility that was not yet constrained by agriculture as mobility-based livestock herders are today (Smith 1992). Precipitation conditions continued to fluctuate during mid-Holocene and livestock herders shifted their movements in response to water availability and tsetse fly prevalence in much the same way as they do in the contemporary era. Changing weather patterns compelled pastoralists to diversify their livelihood strategies and, during the late Holocene (4000 to 3500 BP), pearl millet (*Pennisetum glaucum*) was domesticated in what is now Mauritania (Keech Macintosh 2006: 20). Recurrent spikes in arid conditions throughout the rest of the Holocene, up to the present, have caused West Africans to adapt, innovate, and move around. In short, weather conditions have shaped, but not determined, human socioeconomic dynamics in the region.

Beginning around 1100 A.D. scholars begin having a clearer sense of how these climate-society interactions probably unfolded. Three studies, conducted by Nicholson (1979), Brooks (1993), and Webb (1995), provide the most detailed accounts of West African climate-society interactions over the last millennium. Relying largely on qualitative observations found in travel chronicles, Nicholson (1979) outlines two periods of *relatively* wet conditions in semi-arid West Africa: between the 8th and 14th Centuries as well as between the 16th and 18th Centuries. Brooks (1993) differs in his description of 16th-18th Century climate, claiming that from 1630 to 1860, a drying trend caused increased drought and famine, which contributed to increased political

corruption and warfare.[9] Webb (1995: 8) asserts that the difference between the two authors' claims can be understood in terms of *relative* changes in long-term rainfall:

> The evidence [..] on Sahelian and savanna climate in the seventeenth and eighteenth centuries does suggest that these centuries were more humid than the nineteenth or twentieth century. But the evidence also strongly suggests that a long-term trend toward increasing aridity, or desertification, began in the late sixteenth or early seventeenth century and continued through our period of study.

The important implication for this study is that there evidence for linkages between these climate shifts and the population movements that drove some of the most important political developments in West African history. The first was the spread of Mandé culture and language between 1100 and 1500 to the south and west in what is now Sierra Leone and Liberia due to increasingly dry conditions further north (Brooks 1993). Webb (1995), in turn, argues that desertification during the period of 1600 to 1850 was responsible for a growth in regional exchange across the Sahara that was accompanied by violent political readjustment. These observations beg the question: are the political and demographic changes that are associated with the more recent drying trend, beginning in the 1960s, part of the same historic patterns described in these studies? It is compelling that pastoralists are adapting to current environmental changes through many of the same strategies as their ancestors did thousands of years ago, including modifying their mobility and cropping patterns often after settling in new places. Furthermore, political adjustments and conflict, now as then, accompanied these changing patterns of mobility and settlement.

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[9] Environmental changes were not the sole causes of these effects as increasing European demand for slaves is also acknowledged as a key factor.

A major challenge remains how to understand the relationship between shifting environmental conditions, political change, and conflict without reducing it to a simple cause and effect relationship without dismissing the relationship outright. Chapter two sheds light on certain dimensions of this issue, as it pertains to the farmer-herder relationship, through the prism of geographical scale. First, the most recent shift of pastoral herder movements must be contextualized in terms of other changes taking place in the sub-humid landscapes of West Africa: namely land use change, population growth, and institutional changes in places like the Fuladougou.

Land use change, mobility, and institutions

Agricultural expansion in the sub-humid belt

Proportions of closed canopy forest, mixed savanna, and grassland have dramatically varied over time but the current trend in regional land cover is a relatively rapid conversion of savanna and forest to agricultural fields that are cultivated with increasing intensity (Brink and Eva 2009). Land use change studies that are limited to remote sensing-based methodologies should, ideally, situate their conclusions within a critical and historicized theoretical framework but rarely do so (but see Laris 2011). Trajectories of land use change in sub-humid West Africa[10] highlight the need for careful attention to spatial and temporal scale in ways in ways that elaborate on historic political relationships and patterns of movement (Guyer et al. 2007). As Wardell, Reenberg, and Tøttrup (2003) emphasize, land change in the region is the result of a complex set of social,

[10] Ruthenberg (1980) provides the following bioclimatic definitions: Semi-humid (wet and dry) climates are those with 4.5-7 humid months and specific rainfalls distributions (months with 100-200 mm, climates with unimodal or bimodal patterns of rainfall). Semi-arid climates are those with 2-4.5 humid months. In this project ‘sub-humid’ refers to a combination of the southern portion of the semi-arid belt and the northern portion of the semi-humid zone, as defined by Ruthenberg.

economic, and ecological processes that interact in different ways over time. These changes must also be considered in relation to the movements of people and ecological flows that connect different ecoregions with one and other.

The expansion of settlement and cultivation in low lying areas across the region reflects another critical factor: the eradication of onchocerciasis from most of the region's infected river valleys by the World Health Organization (WHO) over a twenty year period between 1974 and 1994. Inhabitants of these areas had historically moved between higher and low lying areas as a function of disease risk and soil fertility (Hunter 1967). Eradication made possible a large-scale, organized resettlement project in Burkina Faso (McMillan 1995) as well as countless other spontaneous demographic shifts to low lying agriculture frontiers. These shifts represented at once a continuity of agrarian mobility in West Africa (De Bruijn and van Dijk 2003, McMillan 1995, Augusseau and Pare 2004), and a major expansion of agriculture across the region (Brink and Eva 2009). Although farming settlements have always moved around, they are increasingly *permanent,* due to land scarcity, in areas where they would have previously have been temporary, due to land scarcity. In western Mali, an important aspect of land cover change is the role of farmers who have migrated from other parts of the country, particularly the neighboring Bélédougou, the hostile neighbor that played such a critical role in the Fuladougou's military history (figure 4). Migration and cash cropping have been identified as drivers of land use change in West Africa (Ouedraogo et al. 2010, Augusseau and Pare 2004) but important historical, geographic, and political dimensions of this process remain under investigated and are the focus of chapter three.

Downward settlement shifts

Current changes in land use in West Africa are linked to the widespread shift in elevation and dispersal of settlements that began taking place in the 20th Century. During 19th Century settlements were often placed around cliffs as a defensive measure during an era of warfare, insecurity and displacement (Jansen 2005). Settlement proximity to cliffs also reflected the imperative of water access, whether areas at the base of rock outcroppings provided well digging opportunities or less risk of inundation than low lying areas.

Several scholars have investigated what Stone (1996: 79) calls a "series of downhill movements" of settlements in West Africa. In a thorough study of settlement ecology of the Kofyar region, Stone cites colonial pacification as a principal cause for these movements but draws on earlier studies (Gleave 1966; see also von Kaufmann, Chater, and Blench 1986, Duvall 2008, Azarya et al. 1999, Boutrais 1986, Bassett 1994, Waters-Beyer and Bayer 1994, Blench 1994, Raynaut 1997, Benoit 1982, Gallais and Boudet 1980) for other factors such as land pressure, disease, government policy, and broader economic changes. In another study from Nigeria, Von Kaufman *et al.* (1986: 40) describe the same shift from hills to plains:

> Indigenous population of sub-humid zone consists of a variety of small, fragmented ethnic groups [..] nucleated and often fortified settlements were the rule before pacification was enforced by the British at the beginning of this century. The settlement form within ethnic areas has also become more diffuse. Many hill settlements with terraced gardens have been abandoned for more accessible and productive sites on the plains, where hamlets have sprung up with only a few compounds as a nucleus to which several isolated compounds each surrounded by farm land, regard themselves as linked.

In his study of landscape ecology in Mali's Bafing area, Duvall (2008) describes 19th Century defensively oriented settlements located on rock outcrops that were abandoned due to poor soil and inaccessible water. Current settlements are dispersed on low lying areas where

cultivation is possible and wells can be easily dug. Augusseau (2004) investigated connections between in-migration and changing patterns of agriculture in part of southern Burkina Faso that was largely "devoid of inhabitants" as recently as the mid-1970s. Autochthonous groups that did live in the area were clustered in higher elevation settlements and remained there as migrants have rapidly expanded into the fertile low lying areas.

Sahel—subhumid interactions

This expansion of human settlement and cultivated area have contributed to a decline in trypanosomiasis, which helped stimulate a subsequent southward spread of livestock into sub-humid and even humid areas (Azarya et al. 1999; Boutrais 1986, Bassett 1994; Waters-Bayer and Bayer 1994; Blench 1994). Historically, trypanosomiasis kept the zebu breed of cattle (*Bos indicus*) away from the southernmost regions of Sudanian climate, at least during the rainy season. The clearing of agricultural lands has reduced the habitat of *Glossina spp.* flies, which transmit the disease, and, in other areas, chemical eradication programs have eliminated the flies from their riverine habitat. In 1991, the FAO reported that population of 500,000 cattle in the formerly infested extreme south of Mali (Raynaut 1997).

It is tempting to imagine that the penetration of pastoral livestock herds into historically inhospitable southern areas is both unprecedented and solely the result of environmental change or disease eradication. In certain cases, such as along the Black Volta River and in southwest Burkina Faso, this is a fair characterization as livestock have only been present since the 1960s or 1970s (Benoit 1982). However, the southward shift in livestock movements must be historicized with particular attention to the socioeconomic factors that have interacted with new ecological conditions, and, in some cases, have been the principal drivers of pastoral southern

migration. Chapters two and four describe shifting pastoral movements into the sub-humid portion of western Mali that date back to the colonial era, which was a period of relatively abundant rainfall. Although transhumance is a sensible strategy from a dryland ecology standpoint, it is also shaped by social history and even stochastic events such as disease outbreaks. Boutrais and Boudet (1980: 6) argue that changes in herd management in the Inland Niger Delta were tied up with the 'political and cultural revolution' that took place there in the 19th Century. In the Fuladougou, pastoral transhumance has a cyclical boom and bust history. It is currently rebounding from the droughts of 1970s and 80s; before that, its livestock herds had to recover from the devastating rinderpest epidemic of the colonial era.

Agricultural livelihoods

Rainfall, land cover, and the institutions that mediate access to available resources matter critically because the vast majority of West Africans continue to rely heavily on farming and livestock to make ends meet. Despite some livelihood diversification, the lack of secondary employment opportunities means that people in rural areas must grow their own food, trade or sell their milk, and produce crops for the market. When those activities are not enough, households depend on cash remittances to cover grain shortages or send male members of the family in search of work during the dry season, a longstanding practice known as circular migration (Rain 1999, Raynaut 1997). Despite the continued presence of traditional non-agricultural vocations such as metalsmithing and leatherworking, agriculture remains the principal agrarian economic activity.

Local farming systems

Local inhabitants of the Fuladougou practice semi-intensive agriculture that is based on a crop and fallow rotation. A typical smallholder production system consists of peanuts, cotton, corn, as well as several varieties of millet and sorghum. Peanuts have long been a dietary staple for inhabitants of western Mali. It provides the base of the protein rich sauce known as *tikadegena* in the Bambara language and continues to be an important source of cash due to urban demand for the crop. Peanuts are typically the first crop planted in the fallow cycle give their nitrogen-fixing properties and ability to grow in unplowed soil. Peanuts are also advantageous because they require little or no inputs and less labor than cotton, which makes the crop particularly appealing to women. Women in the Fuladougou also traditionally grow rice, tend small garden plots, and collect non-timber forest products such as *shea*, *néré*, baobab leaves and fruit, and others for household consumption or sale. Cotton has been the most important cash crop in western Mali since its introduction in the region in 1995 (Koenig 2008). In addition to providing household income, cotton production enables smallholder farmers to access inputs such as fertilizer, pesticides, and insecticides as well as implements such as plows and input applicators. Farmers move in and out of cotton production depending on the price at which they are able to sell their crop and the larger vicissitudes of a commodity chain that has been in flux for at least ten years. Following a few years of very low production levels, Malian farmers returned to cotton in 2011 due to a high price and assurances from the national government that the sector would remain stable throughout the season.

Corn also plays an important role in household agricultural production. It is generally planted on a short cycle and is therefore harvested early, at the end of September during a period

in which food security is often low for agrarian households.[11] Corn requires sufficient rainfall and nutrients so farmers often plant corn immediately after cotton in order to benefit from residual fertilizer nutrients. The need for corn to receive adequate rainfall, especially during September, also makes it a risky crop: in 2011, when rainfall was insufficient during the latter half of the rainy season, many farmers in western Mali lost their entire corn crop, which dried on the stalk before developing mature grains. An advantage of corn is that, unlike millet, its harvest potential responds well to fertilizer application. For this reason, farmers also typically apply animal manure to their cornfields if it is available.

Millet and sorghum are among the ancient crops of sub-Saharan Africa (National Research 1996). The ensemble of varieties planted in western Mali remains the staple grain for agrarian inhabitants. While most Malians, urban and rural alike, will proudly express their love for pounded millet, known as *too*, its popularity as a crop stems largely from its tolerance of intermittent drought and marginal soil conditions, which sets it apart from corn in the highly variable rainfed farming systems of dryland West Africa. Different varieties of millet have varying cycles of maturity and several decades of reduced rainfall have led to a broad shift away from four month millet to varieties of three months or less.

Livestock husbandry

Crop production in dryland West Africa is tightly integrated with livestock husbandry. Cattle manure provides crucial soil amendments for farming, especially in areas of sandy soil. In recent decades, farmers have begun using animal traction to plow fields, which has become both an incentive to own livestock and another economic strand tying farmers and livestock herders

[11] This is regular part of the agricultural calendar in West Africa known as the *soudure* or “hungry season.”

together through loans and entrustment of animals. Livestock production based on mobility opportunistically exploits water and forage resources that tend to be ephemeral in dryland regions (Scoones et al. 1994). Long distance mobility (>100 km) is required to access highly productive semi-arid rangelands to the north where agricultural pressure is lower during the rainy season; crop residue and, during the dry season, aerial forage (trees) and permanent water sources to the south. Short distance mobility (<25 km) is utilized to move herds away from cropped areas to reduce the risk of crop damages, away from riverine habitats that host livestock sicknesses such as trypanosomiaisis, and to exploit local-scale grazing opportunities and ecological niches (Bassett 1986). Dryland livestock mobility is more of a continuum than this schematic represents, with herds traveling varying distances and to different locations.

Pastoralists in West Africa keep a variety of livestock breeds to suit different production systems and agroecological conditions. Semi-nomadic herders who practice long distance transhumance tend to keep zebu (*Bos indicus*) cattle, which is also a preferable breed for traction plowing. Zebu cattle are not naturally trypanotolerant so they must either move out of susceptible areas during the rainy season or receive medical treatment for the parasite. By contrast, the members of the family of indigenous African breeds know commonly as taurin resists trypanosomiasis and therefore remain year-round in sub-humid areas, generally comprising farmers' own herds. As described by Bassett and Turner (2007), a large amount of traditional cross-breeding is carried out, including between zebu and taurin as a way to combine the desirable characteristics of each cattle race. Both pastoralists and farmers compliment their cattle herds with small ruminants (goats and sheep), which serve an important role as "liquid" that can be used to cover cash expenses on short notice.

Cattle herding depends on labor that was traditionally provided by the sons and younger brothers of the livestock owning heads of households. While family labor is still important, socioeconomic changes in the region have given rise to a labor market for livestock herding and wage earning shepherds who are responsible for herds of hundreds of animals, usually far from their owners. In the Fuladougou, most livestock owners rely on family labor but certain livestock owners will often pay a shepherd to extend the movements of some or all of their animals to better pastures further north in Mauritania during the rainy season and then further south during the dry season. Chapter three engages with these different geographic scales of herd movements and their implications for crop damage and farmer-herder conflict. Herding labor shortages often compel pastoralists to reduce their herd size or redistribute their animals. The problem becomes especially acute when pastoralists settle and face new labor demands from agriculture or other livelihood activities. Once pastoralists begin cultivating in addition to raising animals, they must perform a balancing act of household resources, labor allocations, and tradeoffs involving different sources of income. It is common to hear stories about settled pastoralists who 'used to have many animals but now have very few.'

Predicted climate change impacts in the 21st Century

Climate change is expected to have substantial impacts on the livelihoods of both farmers and pastoralists in West Africa. As pastoral resource and cropping conditions change, different combinations of agriculture and pastoralism will be essential for households to manage risks and earn income given the uncertainties and constraints they inevitably will face. A major premise of all the chapters in this project is that peoples' ability to ensure their livelihoods through changes in mobility, settlement and resource access are mediated by local institutions. An open question

is how capable these institutions will be to prepare their constituents for the impacts expected from climate change.

West African climate models have not reached a consensus on the likely medium term (25-100 years) changes in the region (Boko et al. 2007, Wilby et al. 2009). However, many models predict diminished peak August rainfall (Lebel and Ali 2009, Nicholson 2005) and increased frequency of rainy season "mini-droughts" and intense rainfall episodes, which are already reflected in local observations of climate change in the region (West, Roncoli, and Ouattara 2008, Roncoli, Ingram, and Kirshen 2002). Intra-season changes in precipitation have important impacts on crop production, which will also affect livestock production through pricing and availability of fodder as well as for the potential for continued extensification of cropped areas (Mazzucato and Niemeijer 2002). Intra-season precipitation changes also impact pastoralism directly by accelerating transhumance movements, which increases the likelihood of crop damage when late season rainfall falls off abruptly. It will also affect the distribution and end of season availability of ephemeral water sources, which could potentially increase the importance of permanent deep wells. Another likely impact of climate change is an increased frequency of drought. A study conducted in East Africa (Herrero et al. 2010) found that increased drought frequency to every three years would substantially and possibly permanently reduces livestock densities in Kenya. Livestock densities have always varied with climate fluctuations in dryland areas. Lesnoff, Corniaux, and Hiernaux (2012) find that recovery time following droughts is much more variable than Herrero et al. (2010) assume, which has implications for the impacts of droughts across different socioeconomic groups as more well-off livestock keepers will be able to expend capital to rebuild their herders more easily than poor

ones. Livestock recovery following drought will be a critical component of climate change adaptation given the likelihood that many farmers in semi-arid parts of the region will likely have to shift more of their resources to livestock production due to persistent, unfavorable conditions for cropping (Jones and Thornton 2009).

Thornton et al.(2009) and Lohmann et al. (2012) emphasize the decisive importance of precipitation regimes on future changes in vegetation resources. Increased CO_2 levels and temperature, *ceteris paribus*, increases plant productivity (Thornton et al. 2009) but coupled with reductions in rainfall, the opposite takes place. Length of growing season will be affected by the interactive changes in rainfall and vegetation with potential negative impacts on crop and livestock production (Ericksen et al. 2012). In terms of vegetation productivity, Butt et al. (2005) reports that a predicted hotter and drier climate in Mali (2010-2030) will cause crop and forage yields to decline substantially and livestock weights will be reduced by 14 to 16% as a result. These predictions are largely generalizable to other parts of semi-arid and sub-humid West Africa. According to another study (Stige et al. 2006), climate changes will impact vegetation types in different ways: competition between C3 and C4 plant types will change, affecting the balance between grazing and browse rangelands resources. This will likely have impact livestock herd composition (cattle versus small ruminants) as well as livestock nutrition as C4 plants are less nutritious in terms of crude protein than C3 varieties (Thornton et al. 2009).

Adaptation, mobility and local institutions

Despite the clear risks associated with climate change in the 21st Century, it is worth highlighting that West African drylands and their inhabitants have proven to be highly resilient over the past several decades. In a long-term field study of Sahelian rangelands in the Gourma district of Mali,

Hiernaux et al. (2009) have shown how vegetation returned following the devastating 1984 drought: first through pioneer woody plant recruitment, followed by some diversification since the mid-1990s and, over the long-term, a potential return to previous composition. Moreover, following the catastrophic droughts of the 1960s and 1970s, many predicted the demise of pastoralism as a livelihood in the Sahel yet it continues to rebound from ecological shocks and persisted for decades when government policies were outright hostile to it as a livelihood and resource management strategy.

Mobility is now, thanks to decades of research that demonstrates its value, a cornerstone of development and adaptation policies throughout sub-Saharan drylands. Although donors, NGOs, and governments all view local institutions as the locus of good governance and an ideal point of intervention, not enough is known, still, about how effective these institutions are at implementing policies. For example, although livestock corridors are commonly cited as an important strategy to promote pastoral mobility, the dynamics surrounding their implementation has yet to be studied. This project seeks to address this specific issue as well as several others concerning the interactions between changing livelihoods, institutions, and environments in a particular place in West Africa.

Outline of chapters

The following chapters, except for the second, are written as stand-alone articles. Although each chapter engages with a different dimension of the project, this implies some overlap in terms of scholarly themes and empirical material. Although the chapters are written as stand-alone

pieces, but considerable attention was paid to ensuring a level of coherence and narrative thread among them.

Chapter 2: Methodological overview

Chapter 3: Geographic scale, crop damage, and farmer-herder conflict.

Chapter 4: Governing mobility and pastoral settlement

Chapter 5: Dig your own well: villages, hamlets, and local governance in West Africa

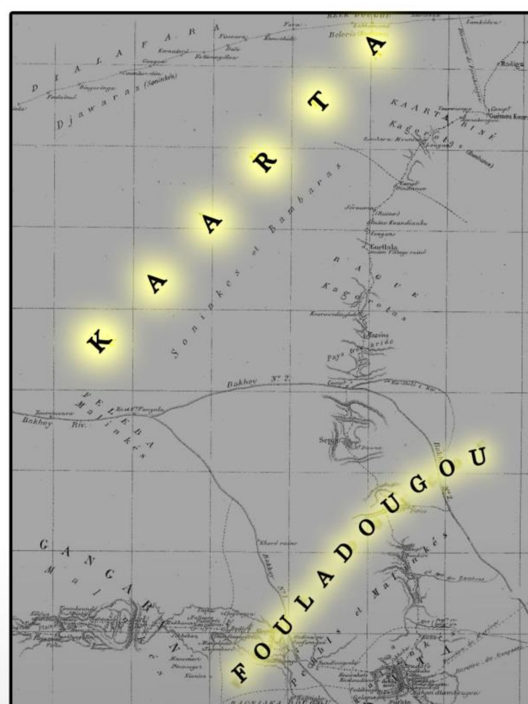
Chapter 6: This land is [not] your land: hosts, strangers and the politics of livestock corridors in Sudanian West Africa

Chapter 7: The Place of the Fula and the Future of Malian Democracy

Figures and Tables

Figure 1. Colonial maps indicating place names and boundaries of the Fuladougou. Adapted from Galliéni (1885: front matter) and Mage (1868: p77). Fuladougou boundary represents four municipalities (Madina, Kotouba, Sebecoro, Kassaro) that encompass the pre-colonial kingdom. Cartography by Masrudy Omri.

Gallieni (1885) | Fuladougou pre-colonial settlements



Mage (1868) | Fuladougou and Kaarta kingdoms

Figure 2. Pre-colonial village creation and genealogy of the Diakité clan. Village designations and population movements are based on field interviews conducted by the author. Cartography by Masrudy Omri.

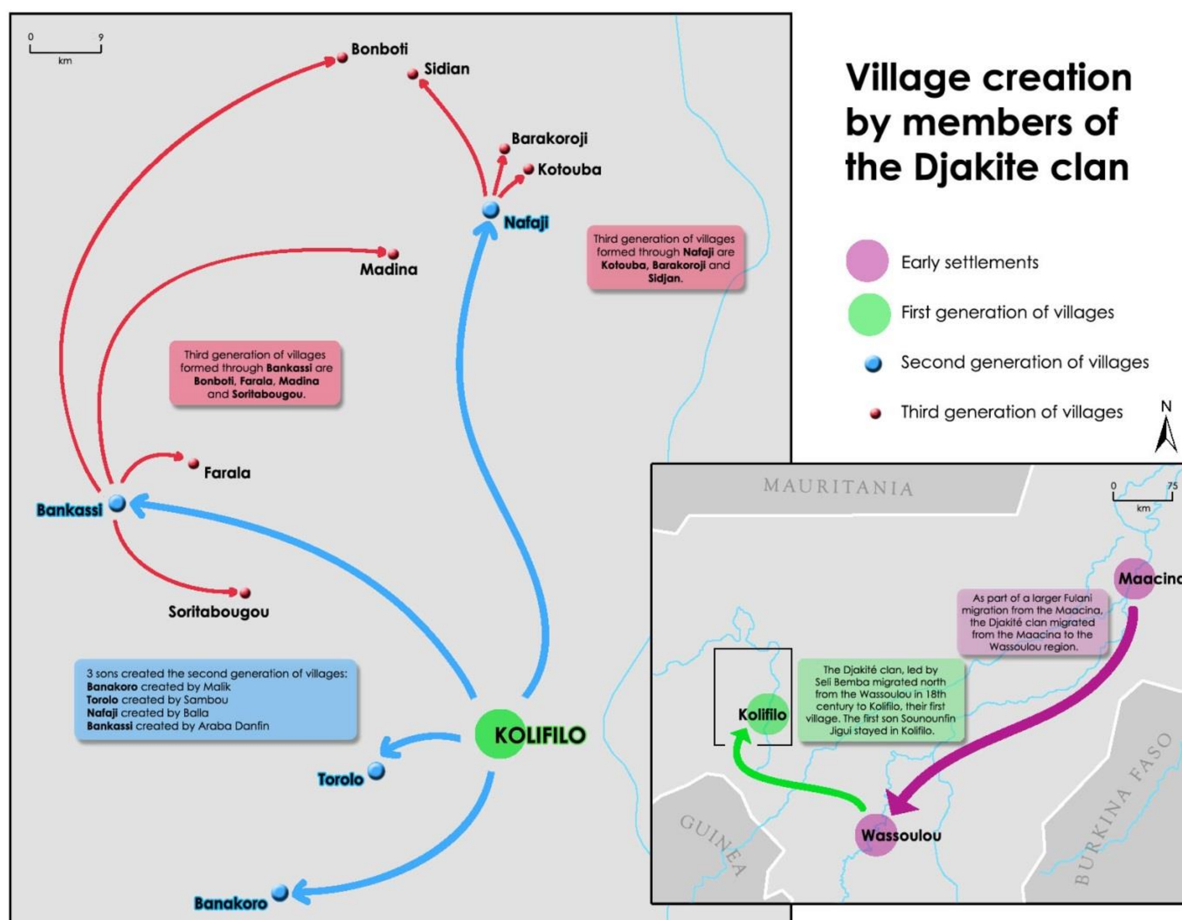


Figure 3: National forest reserves in western Mali. Forest reserve boundary data acquired at the Malian National Geographic Institute (IGM). Land cover categories from GLC 2000 dataset. Cartography by Masrudy Omri.

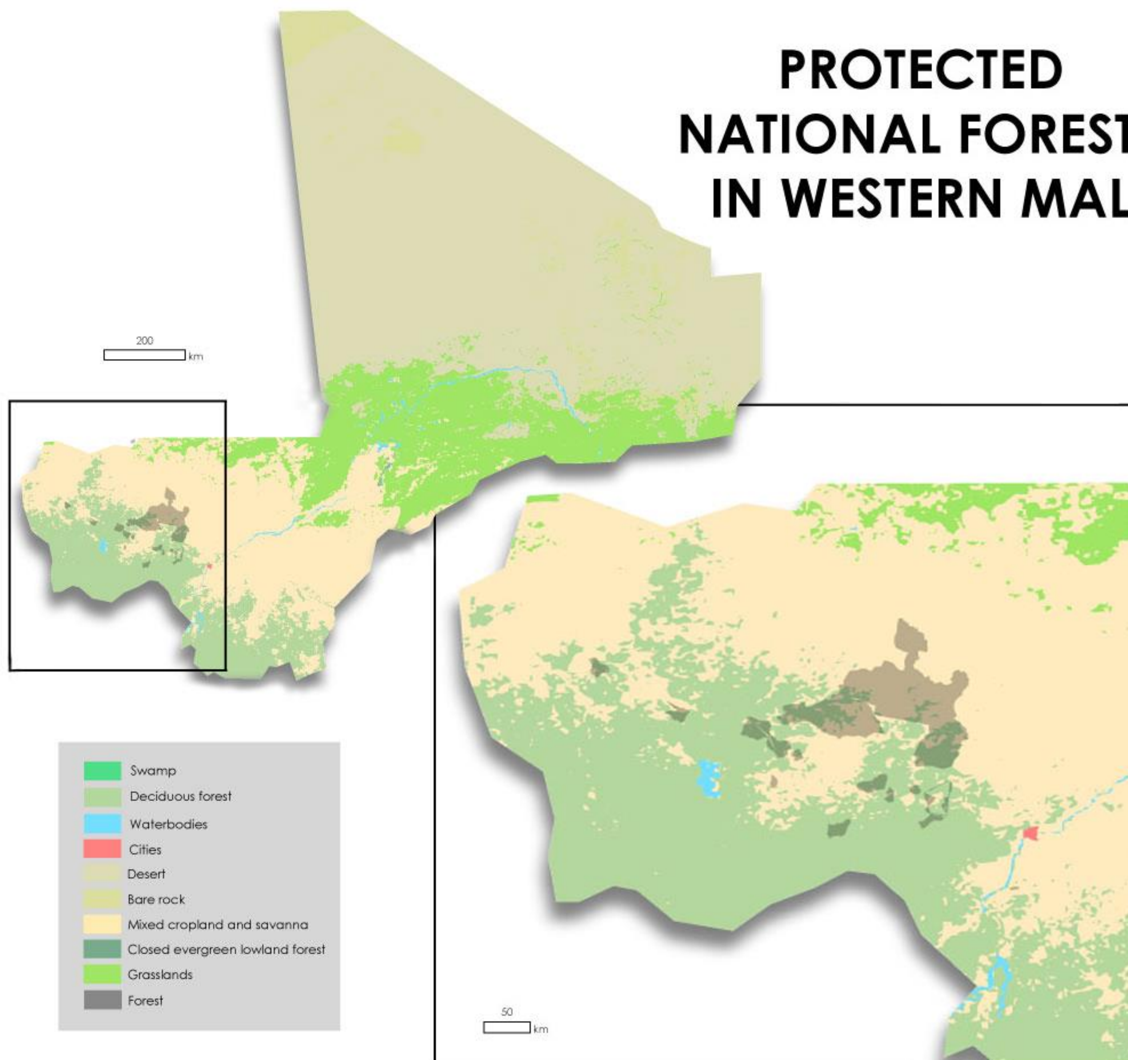
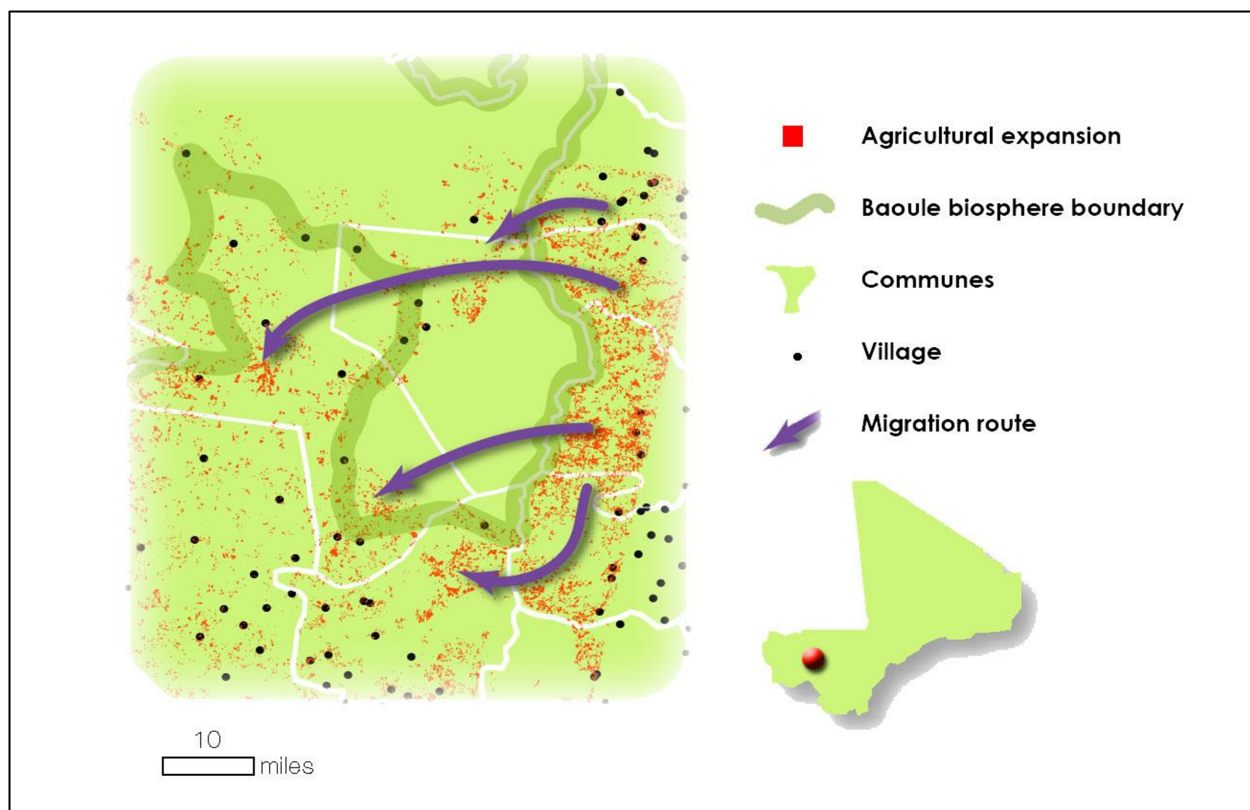


Figure 4. Migration from the Bélédougou to the Fuladougou and agricultural expansion (2001-2010). Agricultural data from Landsat imagery-based change analysis, migration data from field interviews conducted by the author, village locations and biosphere reserve boundary from Malian National Geographic Institute (IGM). Cartography by Masrudy Omri.



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Chapter two: methods

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Introduction

This dissertation project combines three methodological components in order to address the objectives outlined in the introduction. Following Walters and Vayda (2009), this project aims to provide scholarly insights that would be untenable through a single methodology.[1] This combination of methodologies also reflects the project's geographical approach to issues of resource access.

- **M1.** Mixed method analysis of local-level land use planning, resource access negotiation, and conflict resolution with a focus on livestock mobility.
    a. Qualitative assessment based on surveys, focus group discussions, and key informant interviews
    b. GIS-based spatial analysis of crop damage and farmer-herder conflict
    c. Historical, archive-based analysis of local social and environmental history

- **M2.** Land use and cover change (LUCC) analysis with particular attention to impacts on:
    a. Transhumant livestock movements
    b. Decentralization and local institutional development

- **M3.** Analysis of inter-annual variability of rainfall within a major livestock transhumance shed/corridor.

M1: Mixed method analysis

Component M1 broadly follows the Institutional Analysis and Development (IAD) conceptual framework (Ostrom 2005) by focusing on resource-related governance outcomes such as adherence to newly established land use plans and efficacy of conflict resolution mechanisms. However, it goes beyond the IAD framework by paying close attention to how institutions and the politics of resource access are deeply embedded in the social fabric of particular places and are therefore highly contextual and contingent (Bernard 2002). A strict focus on formal rules

[1] This component also reflects the 'thick' analysis of environmental decision making outlined by Adger et al. (2004).

and institutions is inadequate as it ignores the important interactions and negotiations that take place *outside* the formal sphere of politics (Cleaver 2007), particularly in relation to pastoral mobility and the informal networks on which it relies (Turner 1999). Taken together, these conditions demand the qualitative approach known as progressive contextualization, which I utilize in a comparative framework.

This project's study area is demarcated around the rough extent of a specific *transhumance shed*—a geographic area that encompasses the seasonal movements of semi-nomadic livestock herds (Figure 1). The study area shed is divided into three zones: the northern, where livestock spend the rainy season, as well as the central and southern zones, where different types of livestock herds spend the dry season. This division of the project study area allowed for two important types of inquiry: first, it provided for an engagement with pastoral herders in different political and geographic contexts (chapter three), and, secondly, it enabled a comparison in local resource governance politics that is the focus of chapter six.

This project follows progressive contextualization (Vayda 1983) in the sense that the research questions and theoretical framework of political ecology provided a point of departure but the specific lines of investigation and many of the questions asked were developed incrementally as the field work unfolded. Based on political ecology as an integrative framework of nature-society relations, this project utilized methods that would enable direct, empirical investigation of social and biophysical dynamics in the same geographic study area. More specifically, political ecology informed two methodological dimensions of this project. The first is its focus on the complex and often invisible social relations surrounding resource use and access, which are often left out of quantitative modes of social science inquiry. This required that a significant amount of time and energy be devoted to qualitative and open-ended

inquiry that focused on processes as well as careful triangulation of information. The focus on social relations is reflected in one of the major themes of the project—farmer herder conflict—but also specific lines of questions on land tenure, local governance, and household livelihood strategies. Secondly, political ecology influenced the selection of remote sensing-based methods as a way to measure and analyze different kinds of environmental changes—rainfall and land use—that are influencing people's livelihoods in the study area. This approach proved effective as it enabled the investigators, the doctoral research and two field assistants (one farmer, one herder), to respond and explore unexpected issues and dynamics. The best example of this is the identification of unofficial hamlets as an important factor influencing land use change and political decentralization.

The field work was conducted in stages over a four year period (2008-2011). Two seasons of preliminary field work during the months of June (2009) and July (2008) were followed by two relatively longer seasons (#1: January-July 2010, #2: September-December 2011). The reason the principal fieldwork was spread out over two years was to gain a longitudinal perspective on crop damage, farmer-herder conflict, and institutional development. Coincidentally, the first year (2010) was a particularly bad year for crop damage and tensions flared between the two groups. While crop damage diminished in 2011 in certain parts of the transhumance shed, it remained high in others, which revealed an important geographic dimension to the crop damage problem that is explored in chapter three.

The principal investigator (PI) was introduced to the communities in the study area by colleagues from the Swiss NGO Helvetas who work in the study area and had themselves been introduced in 2008 by a professor at the University of Bamako, the late Dr. Brehima Kassibo. During the first few weeks of the project, the PI participated in a 'culture day' that aimed to

promote exchange and interaction between transhumant herders and farmers in one of the communities. Dancing, eating, and chatting with people was a perfect icebreaker and the PI was also able to draw on his previous work in the region to demonstrate that he was familiar with life in rural West Africa (farming techniques, flora, and fauna, etc.). Returning the following summer further demonstrated to local people the PI's commitment to working in the area and established trust with its inhabitants. The following section provides an outline of the stages and components of the field research.

The Principal Investigator hired two local assistants based on the following criteria: one was a local farmer and the other a transhumant herder yet both were involved in the Helvetas project. Because of this involvement, they understood the project's objectives and were familiar with the residents of the villages involved. Each one offered a point of entry into the farming and pastoralist communities, respectively, and a valuable perspective on the data obtained through interviews. Interviews with farmers were conducted in Bambara and those with pastoralists in Fulfulde. The first assistant provided translation from Bambara into French and the second from Fulfulde into Bambara. Most interviews with officials and local leaders were conducted in French. The following section includes the timeline and general sequence of the research.

1. Preliminary investigations: 2008, 2009
    a. Key informant (N=23) and group (N=4) interviews to assess farmer-herder relations and local-level efforts to govern pastoral mobility
    b. Participation in livestock corridor planning meeting (June 2008)
    c. Corridor and water point mapping with two assistants (June 2009)
2. Field season one: January—June 2010

a. Preliminary crop damage survey (N=62) and mapping in villages along Fuladougou portion of corridor
    i. Villages of Sangarébougou, Ngagnou, Barakaya, Sikoroni, Mopti-ko, Plaaqui, and Nafaji

b. Qualitative investigation into major conflict episodes (Ngagnou and Nyebleni)
    i. Key informant group interviews (N=34)

c. Pastoral herder survey—Dioumara (north), Kotouba (south): practices, livelihoods, resource access (N=32)

d. Research at the Malian National Archives: social history of the Fuladougou, colonial resource governance policy in western Mali, pastoral movements and their governance (Koulouba, Bamako)

3. Field season two: September to December 2011

    a. Land use change ground truthing based on randomly selected GPS points

    b. Land tenure and settlement history (Fuladougou and Bélédougou areas, N=45)

    c. Research at the Malian National Archives: village administration, social history of the Fuladougou, colonial resource governance policy in western Mali (Koulouba, Bamako)

Although key informants provided rich, nuanced, and often detailed historic information about the study areas, these data were necessarily complimented by documents retrieved in the Malian national archives. The archival research strategy was two pronged: 1) an examination of all available documents concerning the Fuladougou area, and 2) a thematic investigation of forestry, agricultural (including livestock), and political reports for the entire Kayes region, which encompasses Mali's entire western region. Although the Fuladougou has long been a marginal part of the country, it was strategically important during the French conquest so colonial military reports and censuses conducted following pacification provided useful accounts and important details about the demography and local politics of the study area. Overall, the

archival data provided critical historic context for understanding the trajectories of social and environmental change in the area.

Components M2 and M3 address an important shortcoming of political ecology: its insufficient attention to the biophysical dimensions of resource access (Walker 2005). M2 is a multi-scale land use/cover change (LUCC) analysis that addresses the impact of agricultural expansion on changing patterns of herd mobility. M3 addresses precipitation and seasonal surface water availability, which are influenced by global climate change (Boko et al. 2007) and critically affect livestock mobility through their interactions with changing patterns of land cover. Overall, these components synergized in ways that allowed for a rigorous engagement with the overall research objectives by connecting changing institutions, environmental conditions, and resource access strategies.

M2. Land use and cover change analysis

Measuring the rates, spatial patterns, and drivers of agricultural expansion is essential to understanding the trajectories and prospects of resource governance in Sudanian West Africa. Despite the longstanding and growing concern about tropical land use change, semi-arid tropical regions have received relatively little attention from the land use and cover change (LUCC) research community (Wardell, Reenberg, and Tøttrup 2003). As a result, little is known about the biophysical context for the decentralization of resource governance in the region. The premise of the LUCC component of this project is that the long-term feasibility of pastoral mobility in dryland West Africa depends on local governments' capacity to *prevent* agricultural expansion in critical grazing and passage areas. By measuring the rates and spatial patterns of

agricultural expansion across a transhumance shed, this component of the project sheds light on how institutional change is impacting mobile herders' access to resources. This component expands on standard LUCC analyses by providing deeper context for agricultural expansion through local histories of land occupation based on key event chronologies. By doing so, it builds on the proposition of Reenberg (2001) that land tenure is a potential driver of land use change in certain West African social and ecological contexts.

LUCC methodology

The LUCC component of this project is involved the following steps: Landsat TM and ETM+ imagery was downloaded for free from the USGS data portal (www.glovis.usgs.gov) for three dates: 1985, 2000/2001, and 2010. Two Landsat scenes were needed to encompass the northern and southern zones of the project area over the three sample dates for a total of six scenes (see Table 1). The acquired imagery was already georectified and radiometric normalization was deemed not necessary because the radiometric variation between dates is much smaller than the change signal.

Imagery selection: time steps and calendar dates

1985, 2000, and 2010 were selected as time steps for the following reasons. 1985 represents an era when population and agriculture were very sparse in the area since cotton farming and animal traction had not yet been introduced. 1985 is also the first year that 30 meter Thematic Mapper (TM) imagery is available. 2000 was chose as an intermediary date that captures the introduction of cotton farming (1996) but precedes a substantial portion of frontier agricultural expansion along the edges of the Baoulé biosphere reserve. 2010 provides an approximate present-day reference point.

Imagery was chosen to be as cloud free as possible and all six scenes have less than 10% cloud obstruction. Given the mixed savanna-cropped landscape, attention was needed to select images after the rainy season but before natural vegetation dries to the point where no distinct spectral signature is detectable in the imagery (January-February). Imagery from either too early or too late in the season makes it nearly impossible to distinguish between the two land cover types without the use of higher temporal resolution imagery that captures crop phenology. Secondly, imagery dates were selected to be as synchronous as possible in terms of seasonal period.

Change detection process

The LUCC measurements were carried out in the software package ENVI 4.7 through univariate image differencing as described by Coppin et al. (2004) between each date (T_2-T_1, T_3- T_2). Since the project objective was to measure and identify areas of agricultural change, no other land cover classifications besides agriculture were created (e.g. riparian forest, deciduous woodland, mixed shrubland). Image differencing involves subtracting one imagery date from a second date that has been precisely registered to the first (ibid). Given the high degree of landscape patchiness as well as the spectral heterogeneity and overlap between savanna and cropland, each image was transformed using the K-T tasseled cap transformation (Kauth and Thomas 1976) that converts the seven spectral bands included in Landsat imagery into three indices representing brightness, greenness, and wetness. The third K-T band (wetness) accentuates the difference between the two land covers of interest (savanna and cropped land) and can therefore be used to identify pixels that are savanna at one time step (wetter) and agriculture (drier) at the other.

The result is a set of four images that represent changes in per pixel wetness between each date (T_2-T_1, T_3- T_2). The pixel values for each of the four were normally distributed and,

following Wardell, Reenberg, and Tøttrup (2003), it was assumed that the tails of the distribution represented true areas of change in either direction (savanna to agriculture and vice versa). A binary mask was then created for each tail based on pixel value standard deviations (SD). Mask creation was an iterative process that involved the use of density slices and pixel value histograms to determine the best SD values to use as the mask thresholds. With non-change pixels (>90% of total) masked out, unsupervised classification was carried out to separate actual agricultural fields from areas of bare ground that were not masked out yet are often distinguishable from fields by their brighter (higher reflectance) spectral signatures. Finally, once the change images were made, the previously masked 'non-change' pixels were classified as agriculture and non-agriculture for the 1985 image (T_1) using a supervised classification based on training data for agricultural fields selected through visual inspection.

Refinement of change maps and accuracy assessment

Image differencing provided a 'rough cut' of change versus non-change pixels. However, savanna landscapes are notoriously difficult to classify accurately given their spectral heterogeneity and the ease with which fields can be confounded with bare ground (Turner 2003). As a way to improve the accuracy of the change maps created in ENVI, the raster images were imported into Esri ARC-GIS 10.0 and converted to vector format. Based on field knowledge, a decision was made to eliminate all 'agriculture' polygons less than a half hectare in area due to the high likelihood that they were very small, misclassified patches of bare ground. Remaining polygons were then manually edited: either deleted or modified with Arc Editor tools.

Accuracy assessment was carried on the land cover polygons for new agriculture in 2001 and 2010 for both the northern and southern Landsat images. For each land cover, accuracy was visually assessed in Google Earth Pro for 100 randomly selected points with additional

information provided by historic aerial photographs, IKONOS imagery, and ground control points gathered in the field (Table 2). Ancillary data was not available for all points for the intermediate date of 2001. In those cases the random points were assessed using the original Landsat image itself. Accuracy is reported in the confusion matrix in Table 3. Overall accuracy was acceptable despite one noteworthy exception: Classification accuracy declined slightly for the second time step (2001-2010), probably because the 2010 images were taken earlier in the year (November 7th and 10th compared to January and February) when more green vegetation is present. This led to a slight over prediction of agriculture to non-agriculture land cover conversion.

Spatial analysis

Once the agricultural change maps were finalized, various kinds of spatial analyses were carried out in ARC-GIS 10.0. For example, distances from fields to villages, biosphere reserve boundaries, roads, pastoral resource areas, and streams were calculated for each agriculture map (i.e. 2001 versus 2010 agriculture). Village locations and stream data were collected in the field with a Magellan handheld GPS device. Streams were heads up digitized based on expert knowledge, Landsat imagery and Aster 30 meter elevation raster data, which were also used to assess the study site topography vis-à-vis the locations of agricultural fields. The significance of different spatial relationships, such as between streams and agriculture for each time step, was measured through the Kolmogorov-Smirnov test in the R statistical software platform.

M3: Analysis of inter-annual variability of rainfall within a major transhumance shed

In order to observe and map herd movements, the investigator traveled with a group of herders at the beginning of their descent from their rainy season rangelands to their dry season destination. The original intention was to measure the pace of their movements (kilometers/day) and duration of rest stops at water sources, as well as collect qualitative ground truth information on the key constraints on their seasonal movements (e.g. agricultural encroachment, loss of pasture or water). This proved to be logistically impossible due to risks involved and the reluctance of the herders themselves to take an inexperienced guest on a perilous journey through areas lacking potable water sources, tall grass where one can easily become lost, and potentially dangerous wildlife. The investigator accompanied the herders for several days but was unable to make the full trip. Instead, he relied on multiple individual and group interviews to develop a sense of how long the trip currently takes and how long it took before agriculture started expanding in the area. The results of these interviews are presented in chapter three.

TRMMS-based rainfall analysis (1999-2010)

As a compliment to the fieldwork concerning rainfall and herd movements, an analysis of remotes sensing-based precipitation estimates was conducted as well. Since inhabitants of the study area, particularly pastoralists, were particularly vocal about changes in end of season (EoS) rainfall over the past two decades, the project focused on inter-annual changes during the period of August 15th to October 15th. This temporal window corresponds to the EoS period as determined phenologically by another recent study by Butt et al. (2011). The data used were from the Tropical Rainfall Measuring Mission (TRMM 3B42 V7 derived) daily precipitation

estimates with a spatial resolution of .25*.25 degrees. Field collected rain gauge data from the town of Dioumara, located in the center of the area of interest (AOI), provided some ancillary support to the analysis. The RS-based rainfall estimates were aggregated according to the following steps:

1. An AOI was selected for data acquisition that approximately matched the northern portion of the transhumance shed, where herds typically pass the rainy season.
2. Data were downloaded for the August 15th – October 15th window for the years 1999-2010 and converted from the original .hdf to .tif format in order to process them in a GIS environment.
3. Raster grids (.tif) were then stacked using the raster calculator function in ESRI ARC 10.0 into seven day periods in order to reduce the temporal variability of the precipitation values.
4. The data were then exported to MS Excel and .25 degree row precipitation totals were calculated to reduce spatial variability and facilitate regression analysis based on latitude and year.

Analysis of Variance (ANOVA) regression

An analysis of variance (ANOVA) was carried out to assess changes in EoS rainfall between the years and determine whether there was a trend in changing rainfall over the period of 1999-2010 in the R statistical platform. First, residuals were plotted to test the temporal autocorrelation of each year's data set for all the latitude bands in 2005 and the all years for latitude bands 13.375 and 15.375 (Appendix 1). Secondly, standardized residuals were plotted against theoretical quantiles (QQ plot) in order to test the distribution of the data (Appendix 2). In consultation with a statistician at the University of Wisconsin-Madison, the data were deemed to be sufficiently independent and normally distributed to perform an ANOVA regression analysis. Finally, an analysis of variance (ANOVA) test was performed on the latitude band data set, which measured

change in the week*year interaction term and thus changes in EoS rainfall from 1999 to 2010. ANOVA results are presented in Appendix 3 and in chapter three as well.

Data integration and analysis

The final section will explain how the Principal Investigator integrated the three methodologies (M1, M2, M3) to address the project's research objectives: (1) to shed light on how new local institutions in agrarian West Africa fit within broad patterns of regional environmental change and (2) to answer specific questions about people-environment interactions by incorporating land change science and remote sensing more constructively into the field of political ecology. The project's analytical framework focused on geographic scale, mobility, and place. The project broadly utilized a 'people-pixels' approach (Liverman et al. 1998) but with much more attention to the social dimensions of geographic scale than remote sensing-based studies typically provide. This is most evident in the use of the transhumance shed as both an analytical concept and point of reference for integrating the project's methodologies. For example, this project relied heavily on the remote sensing-based literature concerning rainfall in the West African Sahel (chapter three). This literature is almost exclusively coarse scale; with a focus on the whole region and biophysical variables (vegetation, water) that are integrate over entire seasons or years.

By taking the transhumance shed and the people who live within it as points of departure, this project tailored its use of remote sensing-based data to observations made in the field. This lead to the focus on end of season, as opposed to seasonally integrated rainfall as it changes across latitude, as a reflection of the importance of the transhumance shed's north-south resource gradient. By integrating these RS-based measurements of rainfall with a land change analysis in

the same geographic area, where mobility as well as resource use and access were studied through fieldwork, the project was able to partially accomplish some of its second objective. It became clear that mobility patterns were *influenced* but not *driven* by rainfall. Instead they are the result of *interactions* between biophysical and social factors yet specific aspects of *place* play a key role in how those interactions unfold in everyday life. In this project's transhumance shed, the Baoulé biosphere reserve plays a key role in both pastoral mobility patterns and local institutions, which would have a different character in places that lack such a geographic space and the resources it contains. Pastoralists in areas without large protected areas are compelled to adapt to environmental change in different ways compared to those who continue to rely on access to the biosphere reserve. Similarly, the recent and rapid surge of agricultural expansion, which itself is the result of geographic and historic factors, not only shapes mobility patterns but also the form and function of the local governments that are legally tasked with addressing pastoral resource access.

Overall, the project results validated its mixed-methods, place-based approach by interpreting certain changes in new ways that would not have been possible with one single methodological framework or if it had not employed a specific geographic unit of analysis. However, such an integrative approach also suffers from superficiality within the different methodological approaches it utilizes and the disciplines from which it draws. This is the peril that all inter-disciplinary research must confront and this project is no exception. A degree of superficiality is arguably worth the cost if important scholarly questions are answered and policy challenges are addressed.

Figures and Tables

Figure 1. Outline of transhumance shed with southerly end of rainy season livestock movements indicated over varying land cover classes (GLC 2000). Shed boundaries based on GPS and interview field data collected by author. Cartography by Masrudy Omri.

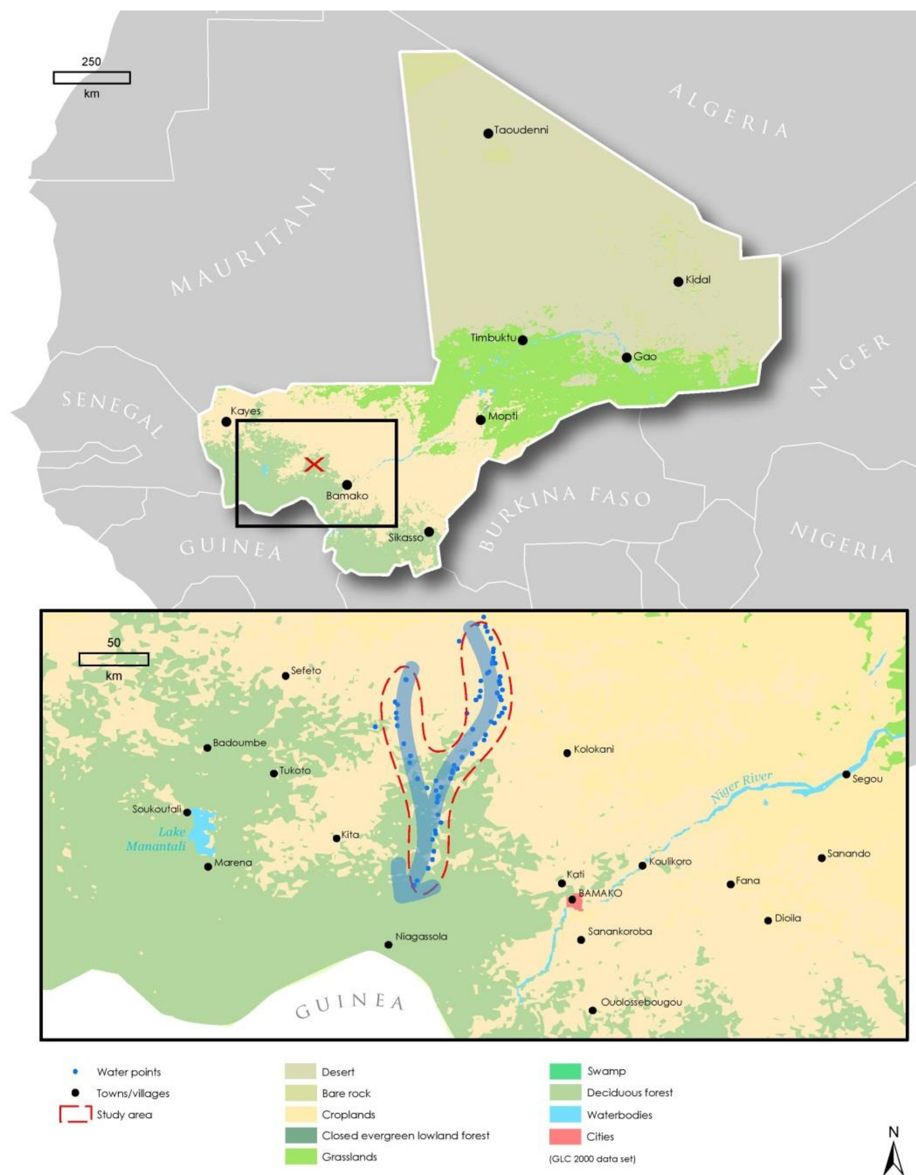

Table 1. Landsat imagery directory: Thematic Mapper [TM], (30 meter resolution, source: www.glovis.usgs.gov)

TM path200 row50 (northern)	TM path200 row51 (southern)
November 7 2010	November 10, 2010
February 21, 2000	January 22, 2001
February 3, 1985	February 3, 1985

Table 2. Ancillary remote sensing data sources

Aerial photographs (purchased from the Malian National Geographic Institute):
1. Kotouba, Nafaji, Plaqui, Samakoulou (4 images taken May 10, 1980) 2. Barakoroji, Kotouba, Nafaji, Madina (4 images taken June 17, 1952)
IKONOS images: 18 images from October 20, 2011 to March 2, 2012 for the following dates (purchased from Land Info International LLC. http://www.landinfo.com/):
1. October 30th 2. November 28th 3. December 1th 4. December 26th 5. January 30th 6. March 2nd

Table 3. Land cover change accuracy assessment (N=100 each class/each year)

Dioumara-northern scenes

1985-2000

actual \ **predicted**	ag	non-ag
ag	85	15
non-ag	10	90

2000-2010

actual \ **predicted**	ag	non-ag
ag	71	29
non-ag	11	89

Fuladougou-southern scenes

1985-2001

actual \ **predicted**	ag	non-ag
ag	85	15
non-ag	7	93

2001-2010

actual \ **predicted**	ag	non-ag
ag	86	14
non-ag	12	88

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Chapter three: geographic scale, crop damage and farmer-herder conflict

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Introduction

Conflicts between sedentary farmers and mobile livestock herders continue to be a major challenge in sub-Saharan Africa. Despite major initiatives to create channels for conflict prevention and mediation, headlines frequently describe acts of farmer-herder violence, fatalities, and cycles of retribution. Scholars have long been interested in these conflicts given their anthropological complexity (c.f. Barth 1969, Benoit 1982, Monod 1975) as well as their practical importance to rural development agendas (Mwangi and Dohrn 2008, Salih, Dietz, and Mohamed Ahmed 2001). More recently, researchers concerned with connections between environmental change and political security have turned their attention to farmer-herder conflict in sub-Saharan Africa as a likely manifestation of struggles over resource access (Raleigh 2010, Nordås and Gleditsch 2007). Despite the substantial scholarly literature on farmer-herder conflict in Africa (Bassett 1988, Turner 2004, Bernus 1974, Blench 1998, Breusers, Nederlof, and van Rheenen 1998, Thébaud and Batterbury 2001), the causes and dynamics of these conflicts remain insufficiently understood in important ways, including the ways in which everyday disputes escalate to bloody confrontations (Moritz 2010, Hagberg 1998, 2006). One reason for the lack of clarity is the diversity of the actors and settings involved in such conflicts, which offer researchers multiple conceptual and theoretical perspectives through which to offer explanations. A second and related factor is the sheer complexity of the interplay between the social and biophysical factors that shape farmer-herder relations.

The scholarly field of political ecology has long been working at the interface of the social and biophysical interactions, with particular attention to resource governance and conflict

(Bassett and Zimmerer 2003, Derman, Odgaard, and Sjaastad 2007, Neumann 2004). Analyses based on political ecology have successfully identified factors involved in farmer-herder conflicts, such as labor relations, which are easily obscured when proximate causes such as local resource scarcity are emphasized in an uncritical manner (Bassett 1994, Turner 2004). Although political ecology engages with social and ecological relations, scholarship in the field has tended to emphasize the former, in part, as a strategy to avoided environmental determinism and neo-Malthusian framings of resource scarcity and social change. This has resulted in criticism that the field is simply a form of political economy of the environment (Walker 2005) and that it unnecessarily privileges the political over other aspects of nature-society relations (Walters and Vayda 2009).

This chapter seeks to address this shortcoming through a case study of farmer-herder relations and conflict in western sub-Saharan Africa by incorporating geographic scale as a key analytical factor. It posits that geographic scale and patterns of spatio-temporal mobility must be accounted for in order to accurately explain where crop damage is most likely to take place and trigger conflicts between farmers and herders. By using geographic scale to analyze crop damage as a principal cause of farmer-herder conflict, it offers a way to bring environmental factors into farmer-herder conflict dynamics without resorting to simplistic notions of increasing scarcity or loss of resources. The chapter is comprised of the following sections: a targeted review of scholarly research on farmer-herder conflict in sub-Saharan Africa, a theorization of how scale applies to these conflicts, a case study that demonstrates scalar dependence of crop damage and conflict in a specific part of West Africa, and a conclusion that offers implications for future research. Methodologically, the case study is supported by three years of survey data concerning crop damage episodes across multiple villages in the study area, qualitative data

concerning herd mobility and conflict in the area, as well as remote sensing-based measurements of rainfall and fire patterns, which represent two key environmental drivers of livestock movements in the region.

Perspectives on farmer-herder conflict

The following section provides an overview of the research done on farmer-herder conflict in West Africa. It is limited to research that incorporates or focuses on the aspects of resource competition, tenure relations, legal dimensions of agropastoral resource governance, herder labor relations, and environmental changes that have impacted the region over the past four decades. Disputes between farmers and herders fit the definition of social conflict, defined by Mitchell (1981), cited in Moritz (2010), as “any situation in which two or more social entities or ‘parties’ perceive that they possess mutually incompatible goals.” Across sub-Saharan Africa, this mutual incompatibility often lies with farmers’ need to bring in a crop harvest without damage by livestock and herders’ need to provide access to water and pasture to their animals at certain times of the year. This is increasingly difficult in the West African agropastoral zone because the period when crops are maturing in fields and roaming livestock are juxtaposed in the same geographic area has stretched to several months due to changing environmental and livelihood conditions. In many places, blocked resource access and crop damage have become the norm rather than the exception for herders and farmers, respectively. The *latent* social conflict is therefore over one group’s ability to pursue its livelihood without obstruction from the other.[1] These latent conflicts episodically escalate into more *acute* and *direct* confrontations when one

[1] Farmers tend to discursively frame their relationship with herders in these terms (Benoit 1979) as reflected in their local conventions that dictate when pastoral herds can legitimately enter their village territories (see chapter four).

group perceives a lack of justice or respect from the other. For farmers, this typically occurs when crop damage is not adequately compensated financially or is perceived as an intentional act. On the other hand, herders see the steady expansion of agricultural fields into their grazing areas and around their water points as an equally unjust practice (Traoré 2002).

Political ecologists have long emphasized that although crop damage and field encroachment serve as *proximate* causes of conflict, they are intricately connected to webs of underlying causes and mediating factors (Bassett 1988). It follows that focusing too narrowly on proximate causes can lead to erroneous analysis and obscure the underlying drivers of such conflicts (Turner 2004). Moritz (2010) argues that by focusing on the webs of proximate and underlying causal factors, political ecologists have tended to provide overly structural explanations of the conflicts between the two groups without attending to the *processes* through which latent conflicts escalate into violent confrontations between larger groups or communities divided along ethnic or clan lines. Both perspectives shed valuable light on farmer-herder conflicts but neither pays adequate attention to geographic context and the scaled environmental dimensions of such conflicts. This chapter asserts that such conflicts can and do escalate many situations but they have a higher probability of doing so in certain places due to factors that are geographically scaled in ways that can be identified and understood.

Resource competition

A substantial amount of research has focused on increasing competition between farmers and herders over access to productive natural resources as a proximate cause of conflict. Population in rural West Africa grew substantially during the 20th century and this demographic growth in rural areas combined with the colonial era focus on cash crop agriculture (Blench 1998)

significantly increased competition for land across much of West Africa's agro-pastoral zone. For example, the population of the Kita district, where this study is located, grew thirteen fold from 33,800 to 434,379 between the years 1899 and 2009. Local-level resource scarcity in these areas has been compounded over the past three decades by the introduction of animal traction and mechanized agriculture, which enable farmers to cultivate much larger areas of land, often substantially encroaching on areas relied up by livestock herders (Bernadet 1984, Landais and Lloste 1990).

The importance of resource scarcity and competition is widely acknowledged but its role as a causal factor in farmer-herder conflict remains disputed. Researchers who employ the environmental security paradigm (e.g. Homer-Dixon 1999) view resource scarcity, broadly defined, as inducing economic shocks and patterns of migration that can lead to the kinds of violent conflict seen between farmers and herders (Derman, Odgaard, and Sjaastad 2007). Critics of the scarcity-conflict hypothesis have pointed out that farmer-herder conflict frequently occur even in areas of *abundant* resources (Boutrais 1986). Others have emphasized that resource scarcity can lead to *cooperation*, rather than conflict (Bogale and Korf 2007) and that resource competition is geographically scaled in ways that discredit the relatively simple concept of scarcity (Turner 2004). Political ecologists have also questioned the *directionality* between conflict and resource scarcity, arguing that the environment is a "theatre in which [other] conflicts or claims over property, assets, labor, and the politics of recognition play themselves out (Peluso and Watts 2001: 25)."

Resource tenure

A common focus among different scholarly approaches to farmer-herder conflict is the important mediating role of institutions, particularly resource tenure arrangements. Resource tenure can broadly be defined as the "social organization of agrarian space" (Le Bris, Le Roy, and Leimdorfer 1982: 14) that includes defensible claims to the benefits derived from specific resources (Bromley 1992). Pastoral herders in many parts of agro-pastoral West Africa typically gain access to water sources, grazing land, and other necessary resources by establishing friendly relationships with specific individuals in communities to which they will return each year.

Customary resource tenure arrangements have undergone dramatic changes in the modern era with implications for farmer-herder conflict dynamics. Beginning in the colonial era, legal reforms across West Africa nationalized virtually all lands within a given country's borders and decreed "land to the tiller" policies that favored agriculture over pastoralism and eroded the customary resources rights on which livestock herders had relied (Lane 1998). In many parts of the region, ex-slaves who had been liberated under French colonial rule were able to access land more easily without going through their former masters. Colonial and post-Independence governments also favored visual evidence of productive land use, which further favored agriculture over pastoralism across the region. In addition to the heightened resource competition that ensued, these changes also create situations of legal pluralism, defined as: "the coexistence and interaction of multiple legal orders such as state [and] customary laws, all of which provide bases for claiming property rights (Meinzen-Dick and Pradhan 2001: 10)." Since most national governments could not effectively nationalize land in many rural areas, legal pluralism and the

uncertainty it created came to characterize most of the regional agro-pastoral zone. Since pastoral herders typically lacked legal recourse for the disappearance of their grazing areas under the plow, pastoralists began relying on extra-legal strategies such as bribery to gain protection and favorable judgments from higher-level authorities in ways that exacerbate conflicts with farmers (Benjaminsen and Ba 2009).[2]

Legal and political ambiguities contribute to farmer-herder conflict in another important way. As Moritz (2010) describes from a case in Cameroon, corruption among rural actors and authorities is rarely a clear-cut quid pro quo that leads to clear-cut benefits for one side or the other. More often than not, authorities will play different groups off one and other as part of a larger "politics of the belly' (Bayart 1993) through which they enrich themselves by taking bribes, making false promises, and exploiting the legal uncertainty in countless other ways, which Moritz (2010) describes this as a principal cause of farmer-herder conflict escalation. As Davidheiser and Luna (2008: 83) further emphasize: "The legal rational and bureaucratic state" has replaced traditional conflict resolution mechanisms with ineffective courts of law that utilize adversarial, zero-sum methods of adjudication.

Livelihood convergence

As resource competition has grown more acute across dryland West Africa over the last half century, agrarian livelihood strategies have changed in ways that contribute to farmer-herder conflicts. Farmers and herders alike have become more closely tied to markets, monetary trade, and urban economies as land scarcity and new demands for cash have driven livelihood

[2] In Francophone West Africa, this is most typically the district officer or *sous-prefet* who, until decentralization, possessed significant statutory authority in provincial areas. This allows local people to build clientelist relationships with them. When conflicts escalate beyond the level of the *sous-prefet*, it is not uncommon for district and regional judges to receive bribes as well.

diversification and intensification of farming and livestock production (Kossoumna, Dugué, and Torquebiau 2010). These and other changes have incited many farmers to invest in livestock and herders to begin farming (Toulmin 1985). As these historic specializations have broken down, important forms of reciprocity, such as the manure contract have eroded.[3] As this mutually beneficial agreement has become obsolete, it has lost its effectiveness as a mitigating factor in latent farmer-herder conflicts over productive resources. However, such manure contracts are largely limited to areas of sandy soils and across West Africa's southern sub-humid belt, many farmers do not benefit from such relationships and often see little material benefit in the presence of livestock herders (c.f. Bassett 1988). Thus, the breakdown of specific contracts may contribute to conflicts in certain areas but it does not represent a precondition for conflict that is geographically generalizable to the entire agro-pastoral zone. Tonah (2006) explains farmer-herder conflict dynamics resulting from migration and farmer-herder economic interdependence. The study reveals that only local elites, namely stock owning farmers and traditional chiefs, obtain benefits from the presence of livestock herders. Other, less powerful groups such as younger and less well-off farmers see no benefit, which creates hostility towards herders, especially if the latter damage their the fields. Intra-community social inequalities therefore have as much or more to do with farmer-herder conflict than changing livelihoods or even resource availability (Breusers, Nederlof, and van Rheenen 1998).

The issue of inequalities *within* communities became even starker as wealthier and politically powerful individuals began investing their capital in livestock and hiring wage-earning shepherds to manage their herds (Turner 2009). If herders working for absentee

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[3] Manure contracts are agreements between farmers and herders through which the former hosts the latter's animals in his or her field after the cropping season and, in doing so, benefits from the fertilizing effects of the animals' manure.

livestock owners violate social norms or laws with impunity, farmers will often perceive this as an abuse of power by the livestock owners and political elites themselves. This can incite them to rebel with violent force as they did in a recent case in Yanfolila Mali in 2010 (see chapter four).[4] The emergence of wage earning herders is linked to crop damage and farmer-herder conflict in another way as well. Labor scarcity as well as an interest in keeping their production costs down has led the owners to exploit their herders by paying them inadequately while demanding that they look after unreasonably large herds. Crop damage occurs easily in cultivated areas when the exhausted herders cannot adequately control all of the animals. Adding to the problem is the temptation for hired herders to rebel against low wages and poor working conditions by intentionally allowing cattle into farmers' fields.

Pastoral labor scarcity and even everyday resistance (Scott 1987) by shepherds is not, however, limited to wage-based livestock herding. It also includes situations where labor is controlled through kinship relationships, most typically between fathers and sons or older and younger brothers. Moreover, virtually all herders, whether they are exploited or not, are tempted to allow their livestock, particularly weak or sick individuals, to eat cut grain lying in fields because it will increase the likelihood that the animal will survive the long dry season. In the geographic area described in this paper, wage-earning herders are, in fact, less frequently involved in crop damage and conflict episodes than those operating in kinship-based labor arrangements due to their respective geographic mobility patterns.

Bassett (1994) and Davidheiser and Luna (2008) point to cash cropping and the increased monetization of agriculture as factors that increase the financial stakes of crop damage

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[4] May 25, 2012, the Reuters News Service reported another violent farmer-herder conflict resulting in 30 fatalities at the Mali-Burkina Faso border (http://af.reuters.com/article/topNews/idAFJOE84O00B20120525 Last accessed July 31, 2012)

and thus the potential for conflict. However, like the hypothesis about wage labor relations, this does not hold up to counter-factual evidence: locations where cotton farming is not very prevalent can suffer equally serious episodes of conflict. Evidence presented from this case study suggests that damage caused to millet fields, which is more prevalent than cotton due to the time of year it is harvested, is frequently an underlying cause of conflict.

Geographic scale and farmer-herder conflict

The studies reviewed here have revealed crucial political and economic dimensions of farmer-herder conflicts. Yet by focusing on the social and discounting the biophysical dimensions, they overlook the ways in which geographic scale can be used to understand the relationship between crop damage and conflict dynamics. In the studies where scale is utilized, it is largely brought in as a contextual factor for explaining specific social dimensions of conflict such as local political or resource tenure institutions. Biophysical factors, such as rainfall and land cover, are framed at *fixed* scales: total annual rainfall across a region or a village's mosaic of agricultural land use. The land cover of a village's territory or it's system of customary land rights contribute to the *local-scale* constraints to livestock resource access, which provides a partial but incomplete explanation of certain instances of farmer-herder conflict. Studies that employ larger spatial scales tend to focus on regional trends and dynamics (Blench 1998, Raynaut 1997). Temporal scales, when considered, range from decades to centuries, are used descriptively to elucidate how pastoral and agricultural economies have historically evolved in West Africa (c.f. Webb 1995). Given the dynamic spatio-temporal nature of livestock mobility and its role in crop damage, both small and large extents employed in these studies represent an inadequate use of scale as a way to understand the specific geographies of farmer-herder conflict.

Instead, analytical advancement requires moving beyond the "constant demarcation of ecological and social versions of scale" (Sneddon 2003: 2235), which constrain "more incisive and politically salient investigations of environmental conflicts (ibid)." Conflicts between mobile herders and sedentary farmers are linked to *interactions* and *relationships* between several social and ecological factors that are discernible at specific scales. Pinpointing how these relationships are scaled requires careful theorization. Although a complete review of the scale concept is beyond the scope of this paper, the following section will highlight certain conceptual principles as a way to outline how *scaled* social-ecological interactions act as an overlooked factor in farmer-herder conflicts in West Africa. (Zimmerer 2006: 6) refers to scale as the "spatial patterning of environmental processes and human-environment interaction." Beyond this definition, it is important to account for the temporal dimensions of livestock mobility; specifically, the pace and timing of herd movements across certain geographic extents. However, the human-environment binary that is reflected in these accounts of scale, is problematic from an analytical standpoint and has been duly critiqued within actor-network theory (Latour 2005), which posits the role of non-human agency and co-production of nature-society relations. Without fully engaging with all of the ontological implications of co-production, this paper uses it as point of departure to answer the call made by Sneddon (2003: 2233) for "symmetrical investigation" into "the relations of actors enmeshed in a [social-ecological] network." In this case study, farmers, herders, authorities of many stripes, gazetted forest boundaries, grassland species abundance and composition, seasonally shifting landscape patterns, as well as unpredictable rainfall regimes comprise a partial list of the relevant network actors and actants that are involved in these conflicts.

The crux of this argument is that the processes and interactions that bind these actors and actants together are geographically scaled in ways that have been under-investigated. Sayre (2005) provides a robust set of theoretical tools to use scale towards the elusive objective of fusing the social and biophysical (Zimmerer and Bassett 2003) as it applies to crop damage and farmer-herder conflict. Social-ecological systems are multi-process and multi-scale but, as Sayre (2008) and others (c.f. Ahl and Allen 1996) point out, substantial scientific evidence indicates that specific processes are "determinative at different spatial scales (Sayre 2008: 279)." It follows that specific social-ecological relationships can also be characterized through an "epistemological moment": the spatial grain or extent that "captures the processes through which these relations are revealed over time (ibid: 281)." Sayre (2008: 282) further argues for an "ontological moment," which means that a given set of scaled relationships are *objectively real*, as opposed to subjectively interpreted, with the implication that scale is 'internally related to basic natural processes.' In other words, natural processes, and by extension, social-ecological processes, do not exist outside of scale.

Sayre (2008) also acknowledges that the notion of an ontological moment of scale implies a relatively stable organization of social-ecological phenomena. In terms of livestock mobility and farmer-herder conflict, a certain level of stability can be observed as a function of larger scale relationships that change over time. Geographic organization of livestock mobility and farmer-herder relations achieve stability for periods of time in certain places but they will eventually be subject to change. Such changes can be sudden or gradual, making them both difficult to predict and path dependent, as herder livelihood strategies evolve, institutions change, and catastrophic events (e.g. droughts) occur. However, during a time span of several years or

decades, mobile livestock herders and their relationships to farmers do achieve a level of stability that is discernible, as Sayre (2008) would argue, in terms of geographic scale.

Acknowledging that farmer-herder conflicts are pervasive across a diversity of geographic contexts and scales, the following section outlines a specific epistemological and ontological moment of scale for conflicts between sedentary farmers and seasonally mobile herders that are linked to crop damage. This analysis is limited to seasonally mobile as opposed to sedentary livestock because, although sedentary herds can and do cause crop damage, villagers in the study describe being able to more effectively and peacefully resolve them through community social norms compared to damage caused by mobile herds that originate from outside the local area.

Ontological and epistemological moments

Herders prefer to return to the same communities each year, graze their animals in the same places, and attempt to match the timing of their movements to the needs of farmers who host them during the dry season. It is well known that livestock movements tend to follow such regular patterns (Bassett and Koné 2006), which take the form of a pastoral movement "shed" that encompasses the geographic extent of the movements of specific herds or pastoral groups (Brottem, Turner, Butt, and Singh in review). What has yet to be investigated is the way in which herd movements interact geographically with various factors to produce patterns of crop damage and conflict potential *at the scale* of the transhumance shed.

Following the definitions provided by Sayre (2008), the epistemological moment equals the spatial extent of livestock movements within a specific transhumance shed. The ontological moment involves various factors, including: rainfall, fire, vegetation, resource tenure

arrangements, livestock management strategies, and livelihood aspirations. The *interactions* between these factors comprise the ontological moment by influencing herd movements, the locations of reported episodes of crop damage, and the ensuing likelihood of conflict. Given the diversity of such livestock sheds and mobility patterns in dryland Africa, this paper uses Sayre's notion of scalar epistemology and ontology as a way to explain the geographic dimensions of crop damage and farmer-herder conflict in one specific livestock shed located in Mali West Africa (figure 1). Only by 'zooming out' from individual villages and 'zooming in' from the larger agro-pastoral belt (Frantz 1990), can one analytically capture the scalar dimensions of herd mobility, crop damage, and conflict. The transhumance shed represents the 'epistemological moment' that defines the geographic extent of movements while the ontological moments are reflected in the geographic patterns of crop damage as they relate to the social and ecological processes that drive them. An important caveat is that it is very difficult to *verify* specific instances of crop damage so this study, like most others, relies on episodes of damage that are *reported* by the victims and are therefore subject to a certain degree of uncertainty.

Figure 2 provides a conceptual model of the epistemological and ontological moments of this case study. In reference to the figure, the epistemological moment encompasses the entirety of the transhumance shed, including its northern, middle, and southern zones. The ontological moment encompasses the interactions between the previously mentioned factors and how they differentially influence livestock movements and reported episodes of crop damage within each zone of the shed. As subsequent sections will explain, the central zone suffers from higher levels of crop damage and is therefore more prone to farmer-herder conflict due to the specific geography of these interactions.

Western Mali corridor

The transhumance shed described in this chapter is located in the western region of Mali, a landlocked nation where agriculture and livestock represent the most important livelihood activities for the vast majority of the population. The shed spans an ecological gradient of approximately 300 kilometers from semi-arid Sahelian rangelands that span the international border with Mauritania to the sub-humid Sudano-Guinean forest savanna mosaic that spans the border with the Republic of Guinea. Ethnic Fulani livestock herders from home areas in the northern reaches of the shed practice transhumance—seasonal movements between rainy and dry season grazing areas—along the shed's north-south axis.

This chapter focuses on a portion of the shed known as the Fuladougou, which means 'place of the Fula' in the local Bambara language. The name refers to second group of sedentary Fulani who settled the area in pre-colonial times and have long practiced agriculture and speak the Malinké rather than Fulfulde (Fulani) language. The Fuladougou, which includes the central zone and the upper part of the southern zone depicted in figure 2, serves as a popular dry season destination for transhumant herds from the shed's northern zone. Over the past thirty years, herds have been coming in increasing numbers as herd sizes have recovered from the droughts of the mid 1980s while conditions for livestock in the central and southern zones improved due to a reduction in disease vectors. Livestock herds typically leave their rainy season grazing areas in September or early October and proceed south as slowly as possible, passing through the Boucle de Baoulé biosphere reserve, and stopping for a period of several weeks or months at the Baoulé River, the northern limit of the Fuladougou.

Moorish herders also practice transhumance in the area with sheep and goats, but, unlike the Fulani and their cattle, they do not go as far south as the Fuladougou. According to local farmers, crop damage was not a problem until 10-15 years ago when herds began arriving before crops are harvested in December and January. Due to early herd arrival and the proliferation of cropped fields, damage is increasingly a problem in the area and the principal cause of farmer-herder conflicts.

Environmental change

Mobile livestock herders are numerous in sub-humid zones such as southern Mali and northern Cote d'Ivoire in part because of the catastrophic droughts that hit semi-arid parts of West Africa during the 1970s and 80s. The droughts caused pastoralists to move their herds much further south in search of pasture and water, which, in many cases, caused them to settle in areas where they had previously only spent portions of the year (Bassett 1988, Tonah 2006). In what might be described as a counterpoint argument to the notion of a breakdown in livelihood interdependence, Davidheiser and Luna (2008) propose that these movements contribute to conflict because of an absence of the institutions that are needed to facilitate farmer-herder social integration, provide livestock resource access, and strengthen dispute resolution mechanisms. While it is true that many of these areas may have lacked customary farmer-herder relationships, Bassett and Turner (2007) point out that these southerly movements represent less of a 'sudden shift' in direct response to drought than a complex and gradual adaptation to a number of ecological and social factors. Historians such as (Webb 1995) and (Hanson 1999) present evidence that changes observed in the 1970s are not unprecedented as livestock herding groups have shifted north-south in response to changing climatic conditions several times throughout

recorded regional history (see chapter one).[5] In terms of this chapter's case study, Doutresolle (1952) notes that the early 1950s marked the first time Sahelian herders crossed the Baoulé River into the Fuladougou although colonial records indicate that it may have happened even earlier. In recent years, local inhabitants report that the number of herders and livestock spending the dry season in the area increased considerably following the droughts of the early 1970s and mid-1980s.

These droughts had a particularly severe impact on pastoralists and impacted the nature of livestock mobility patterns in ways that contribute to the geographic ontological moment of farmer-herder conflict. First, the droughts contributed to a shift in pasture species composition from perennial to annual grasses (see central zone in figure 2) across a sizeable portion of the study area (Le Houérou 1989). Secondly, rainfall conditions have partially recovered but remain less reliable than before the droughts (see northern zone in figure 2).

Land, water, and changing patterns of livestock mobility

Each of these changes has modified the spatial and temporal patterns of livestock movements without necessarily causing livestock to permanently shift into one area or out of another. Most studies tend to overlook the ways in which short-term events such as drought and long-term changes such as agricultural expansion impact livestock mobility by modifying the distances covered, paces of movement, and time spent en route by different transhumant herds. For example, agricultural expansion affects long-distance transhumance movements without necessarily stopping them. Studies such as Davidheiser and Luna (2008) invoke agricultural expansion as a 'push factor' that has forced herders into sub-humid areas where they previously

[5] See Nicholson (1979) for a historical reconstruction of rainfall fluctuations in Africa.

had not been without engaging with the effects of said land changes on the character of the movements and their geographically nuanced impacts on crop damage. By leaving these dimensions out, the study ends up relying on the "resource scarcity" concept criticized by Turner (2004).

Land use pressure in agro-pastoral West Africa is geographically uneven at several spatial scales. Even within limited areas of a few dozen kilometers, certain villages suffer from it much more than others due to historic settlement patterns and geomorphic conditions. At the regional scale, agricultural expansion (figure 5) is occurring throughout the agro-pastoral zone but most acutely in the Sudanian zone situated between the sub-humid Guinean savanna-forest belt, where agriculture is still relatively sparse due to unfavorable soil conditions, and the semi-arid Sudano-Sahel, where agriculture has expanded more gradually over the past century due to pre-colonial settlement patterns. Herders have not been 'pushed out' of the Sudanian zone but their herd movements and resource access on which they rely are increasingly shaped by agricultural expansion in ways that are geographically scaled.

Studies that engage with the causal connections between social conflict and rainfall tend to be equally simplistic in their attempts to refute the notion of scarcity-induced conflict. Benjaminsen and Ba (2009) present a comparison of conflicts adjudicated in court in the Malian region of Mopti and rainfall measured in the area, which shows no statistically valid connection between the two. Kevane and Gray (2008) conduct a similar analysis over a longer time scale for the Darfur conflict, also showing no connection between precipitation and recurrent flare-ups of civil conflict at the decadal scale. By not accounting for the complex and scaled interactions between social and ecological processes, these studies do little to advance the debate on what

drives environmental resource conflict beyond what is already known: factors such as rainfall are not *direct* drivers of conflict.[6]

Rather than dismissing the biophysical in order to focus on the social, what is needed is more careful consideration of both, particularly in terms of their scaled interactions within carefully defined areas. By focusing on the linkages between changing environmental conditions and the spatio-temporal characteristics of livestock movements, analytical space is created to consider the geographically scaled (epistemological and ontological) nature of farm-livestock interactions, crop damage, and conflict in agro-pastoral West Africa.

The Fuladougou: a case study in pastoral mobility

The principal reason that conflicts in the Fuladougou are increasing is that the period during which migratory livestock are in their dry season destination area *before* crops are harvested has stretched to three months. This is the ontological moment of scale: the increasingly intense juxtaposition of cropped fields and livestock in time and space due to the interactions of the social and biophysical factors described earlier and presented in figure 2. As a result of this juxtaposition, cropped fields in certain places, notably the shed's central zone, have a much higher exposure to livestock when they are most vulnerable: after they have dried and been cut but before they are transported to granaries.

The politics of livestock movements and crop damage reflect the geography of the transhumance shed. Farmers in the central zone perceive the issue in terms of scale: transhumant herds arrive too early to their own village territories and should be obliged to wait further north

[6] The debate does continue among economic modelers over connections between climate variables and violent conflict in Africa. See Burke et al. (2009) and Buhaug (2010).

until crop harvest is complete. What happens outside their village territories is out of their control and beyond their concern. Herders, on the other hand, see themselves as having a legitimate place in the communities of the Fuladougou *regardless* of the timing of their arrival. This sentiment is due to the number of years pastoral herders have been coming to the area and, especially, since they make substantial financial contributions to communities in the area.

Negotiating this discrepancy between farmers' and herders' views over the time period when herders can legitimately be present in the Fuladougou has become one of the most vexing political issues in the area. A local civil society group acknowledged that unpredictable rainfall in the Sahel makes a strict post-harvest transhumance calendar difficult, if not impossible, for herders to respect because water sources run dry and other herds begin moving into the northern zone (figure 2). The *Association pour le Developpement de la Fuladougou* (ADF) instead recently proposed the following: livestock can cross the Baoulé River into the Fuladougou before January but they must wait in the "empty zone" near the river, progress slowly, and increase surveillance of their herds. Yet, as the following sections explain, the 'empty zone' near the river is perilous for herders since it is now limited to the interior of the Baoulé biosphere reserve, where predators are found and foresters patrol periodically looking for trespassers. Slow progression to dry season destinations is made difficult or impossible by cropped fields outside the biosphere reserve and a lack of permanent water sources along transhumance pathways. The next section will look at several of the biophysical factors behind herders' early arrival followed by an explanation of how it is the ontological moment—the interactions between biophysical factors such as rainfall, pasture, and fire and social factors such as land tenure that explain early herd arrival, crop damage, and the farmer-herder conflicts that result.

Scaled biophysical dimensions of transhumance

A principal reason for herders' increasingly early arrival in their dry season destination is the desiccation of surface water sources around their rainy season camps and along their transhumance path. According to herders' accounts, the rainy season ends earlier and surface ponds dry faster than they did in times past. Ephemeral water sources are replenished by rainfall and desiccation begins as soon as the rainy season winds down. Local pastoralist Ibrahim Sow stated: "You head south once water starts to dry in Dioumara. If I wanted to stay, I could use my host's well after his cattle drink [but] I would probably dig my own well. Once these water points dry, you have to keep moving south until the next one—if there are too many cattle, you have to continue to the [Baoulé] river."

Rainfall

It is difficult to link multi-year trends in precipitation, which depend on the scale of measurement, and livestock movements, which are influenced by more than just rainfall. Anecdotally, virtually all herders and farmers interviewed for this case study assert that rainfall has noticeably declined in recent memory although such interpretations of rainfall quantity are of limited value since they are shaped by individual experience and memory. Such claims are also subjective because many herders who currently pass the rainy season in Dioumara previously spent it in Dilly, which is located further to the north, before the great drought. Although most herders shifted their movements south immediately after the drought, others waited several years before doing so. Not only do different herders have different frames of reference in terms of how they perceive local landscapes and resource availability, they also have different resource needs as well and this influences how they perceive the condition of a particular water source.

Declining rainfall is part of a broader local narrative of resource degradation that involves fewer trees, wildlife, and less productive landscapes. One local observation that appears consistent with other studies (Naess et al. 2009) (West, Roncoli, and Ouattara 2008) yet would not be detected by standard remote sensing-based measurements of rainfall is that it is not as well-spaced as before: even during peak rainy season, a torrential rainfall will be followed by an extended rain free period.

Nonetheless, scientific measurements of rainfall in the study area show a recovery of regional rainfall since the catastrophic 1984 droughts but not to the peak rainfall of the 1950s and 60s (Eklundh and Olsson 2003, Lebel and Ali 2009, Herrmann, Anyamba, and Tucker 2005, Nicholson 2005, Wang et al. 2004). Rainfall in the Sahel has declined overall when measured since the beginning of the 20th Century (Mahé and Paturel 2009). All of these studies measure total annual or monthly precipitation volume or rainy season length, either defined by a set number of months or mathematically as the days when rainfall or rain fed vegetation increases and declines at a maximum rate (Butt et al. 2011, Zhang et al. 2005).

Statistical analysis of seasonal rainfall

This study investigated whether a statistically measurable trend in rainfall decline could be found for the time period of 1999 to 2010 for the western Malian livestock corridor. This component of the study was based on the importance of end of the season (EoS) rainfall to pastoralists and their observations that the rains end earlier and more quickly than in times past. This analysis utilized Tropical Rainfall Measuring Mission (TRMM 3B42 V7 derived) daily precipitation estimates with a .25*.25 degree spatial resolution. The rainfall estimates were aggregated according to the following steps. The spatial extent was based on an area of interest (AOI) that

approximately matched the northern portion of the transhumance shed, where herds typically pass the rainy season. Daily estimates were then extracted for the period of August 15th to October 16th from 1999 through 2010. This EoS window captures both the substantial decline in rainfall at the end of the season as well the reported dates that the herds begin heading south. Gridded daily rainfall estimates were aggregated by .25 degree pixel rows and summed to weekly totals. These aggregations enabled latitude-based measurements and reduced some of the spatio-temporal variability inherent in regional rainfall patterns.

Following the preliminary statistical steps that are described in chapter two, an analysis of variance (ANOVA) was conducted on weekly rainfall declines (August 15th to October 15th) for each .25 degree of latitude from 15.375^{o} to 12.625^{o} North for the years 1999 to 2010. The ANOVA focused on the interaction term between the yearly and weekly values, which measured differences in the slopes of EoS rainfall decline among the different years (e.g. annual end of season rain at 14.125^{o} North 1999-2010). Only three latitude bands—15.125^{o}, 14.875^{o}, and 12.875^{o}—had significant differences in the 'year' variable while only one (12.875^{o}) had a *p* value of less than 0.05. Within the three latitude bands that had significant differences between years, the year that stood out with the most variance at the higher latitudes (15.125^{o}, 14.875^{o}) was 2010 (table 2). By looking at rainfall measured manually in Dioumara (figure 10), which is located at 14.3^{o} north in the shed's northern zone, it is possible to surmise that the variance detected for 2010 was due to the spike in September rains that year. 170 millimeters of rain were measured in Dioumara that year, compared to an 18 year average of just 114 millimeters.

Although the ANOVA test did not reveal a discernible trend in end of season rains for the period of 1999 to 2010, local people's observations of changing EoS rains are not necessarily incorrect. Rainfall in Dioumara, where most of the herders in the study pass the rainy season,

has declined since 1994. Declines have been particularly pronounced during the month of September, which is the most critical time for both transhumant herders and farmers. Further, the number of days with measurable precipitation declined during the same period, which may signal increasing intra-seasonal variability and intense rainfall episodes. The discrepancy between the TRMM-based and field-based measurements from Dioumara is likely due to scale. First, the Dioumara measurements began in 1994, five years before the TRMM data became available. Secondly, the latter are from a rain gauge and therefore measured precipitation at a single point whereas the TRMM measurements are aggregated to a scale of .25 degrees (approximately 27 kilometers).

The *differences* in EoS rainfall between the northern and central zones of the transhumance shed are also crucial. In 2009, Dioumara had poor rains in September while Kotouba, a popular central zone destination at 13.25 ^{o} north, had nearly 300mm that month, its highest total in several years. For most herders in 2009, the risk of damaging crops in Kotouba was well worth getting the animals in their charge to its relatively full water sources. The risk of crop damage is further exacerbated by increased rainfall in September because it delays the harvest of crops, which are then exposed to livestock for an even longer period of time. Although the difference in September rainfall was higher than usual in 20009, the length of the productive rainy season shortens as one moves north towards Dioumara, which means herders must negotiate a latitudinal gradient of diminishing rainfall and resource availability as they move south (Butt et al. 2011).

Herds pushing down from the north

Not only must pastoralists time their movements to the desiccation of ephemeral water sources in their rainy season rangelands, they must also pay close attention to the arrival of livestock from further north in the Sahel (figure 2), particularly the Mali-Mauritanian border and Mauritania itself. These herders and their livestock are subject to the shorter, even more variable rainfall regimes of the semi-arid Sahel. During drought years, such as 2011, these herds begin moving south towards Dioumara in early September and occupy the same grazing zones as herds that have spent the rainy season in the area. Herders must decide how long to continue camping near their hosts' villages as northern Sahelian herds begin arriving for the dry season. Typically herders who will spend the dry season in the Fuladougou will respond to the arrival of other herds by moving their own animals further south.

It is during this transitional period, during of the months of October and November, when the herds position themselves for the long dry season. Large areas devoid of agriculture become critical during this time (figure 3). The Dioumara herds cannot safely move very far because agricultural harvests in the Fuladougou are still at least two months away. Sahelian herds face the same problem, albeit for a shorter period of time. Water sources in these uncultivated grazing zones include ephemeral ponds that are rapidly drying at this point in the year or private wells where reciprocity exists but within a social hierarchy (see Fernandez-Gimenez 2002). At a certain point, both sets of herds move south towards the permanent water sources found in certain areas along the Baoulé River, a sizeable watercourse that forms part of the Upper Senegal watershed (figure 4). As surface water becomes scarce and Baoulé River becomes less appealing due to the growing number of livestock in the area, the paths of the Sahelian and Sudanian herds

begin to diverge. Sahelian herds will eventually turn around and head to Dioumara where they will begin relying on the wells to which they have access through their manure contracts with local farmers. Those moving further south on transhumance will begin following a series of natural water points, no more than fifteen kilometers apart, until they reach their dry season destination (figure 1).

Pasture

As herders begin to move south, pasture availability, in addition to water, becomes a critical factor in their movements. Ibrahim Sow, a senior Fulani herder, laments: "When we first began coming to Kotouba [in the mid-1980s], our cattle fell to illness. Now they die of starvation." The most probable reason for livestock dying is the lack of nutritious forage during the dry season. *Andropogon spp.* grasses were historically abundant in Kotouba but the combined effects of drought, fire, grazing pressure, and reduced fallow periods have largely eliminated these perennial species, whose early dry season sprouts are much higher in crude protein than annual savanna grasses (de Bie 1991). In their place, annual grasses that do not regenerate following the seasonal burning of the savanna (ibid) have come to dominate local landscapes.[7]

This has not always been the case along the Fuladougou corridor. In times past, rainfall, fire, and perennial grass regeneration interacted with herders' mobility decisions to pace them in a way that more effectively met the demand from farmers that herds arrive after crops are harvested. Perennial grasses have been disappearing across West Africa since severe, recurrent droughts began in 1969. Le Houérou (1989) reports that the 1969-73 drought period killed off

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[7] In a study of the middle portion of this livestock corridor, 95% of the savanna is reported to burn annually (de Bie and Kessler 1983) cited by de Bie (1991: 63)

most of the *Andropogon gayanus* within the 400-600mm precipitation isohyet and did not come back even under light or zero grazing.[8] Le Houérou goes on to explain (p87-88):

> One possible explanation of the rareness of perennial grasses in the Sahel *sensu stricto* and in the Sudano-Sahelian ecozones is that the Sudanian *Andropogoneae*, which are extremely fire-tolerant, are there at the dry limit of their geographical area of extension and therefore sensitive to the combination of drought and fire.

Sidi Sow, a herder who has practiced transhumance between Mauritania and Kotouba since his youth in the 1980s, recounted how water point desiccation was historically the factor that determined the pace of their southward movements. Herds had sufficient access to land surrounding water points for their livestock to graze so they served as 'stopping points,' which substantially lengthened the duration of their migration at the end of the rainy season. With much less pressure to avoid fields, herders could stay for extended periods at seasonal water sources—investing labor to dig deeper into the wetland if surface water became inadequate. Decisions to slow their movements also reflected herders' understanding that perennial grasses would re-sprout within two weeks of being burned by seasonal bush fires that begin in mid-October (De Bie 1991: 66).[9] Now they move south quickly knowing that, even if they can maintain access to water, fire will soon eliminate most of the annual grasses that have replaced the perennial species on which they historically relied. Transhumance in 2010 exemplified this dynamic. Although early herd arrival in 2009 was attributed to low Sahelian rainfall, rains recovered in 2010 yet herders still arrived early, explaining that there were inadequate grazing resources despite the presence of ephemeral surface water.

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[8] As a point of reference, Dioumara's average annual rainfall for the period of 1994-2011 was 555mm.

[9] Re-sprouting of perennial grass provides herders with highly nutritious fodder and an essential 'bridge' to the period when crop residue becomes available several months later.

Here we see that rainfall influences pastoral movements but only through its interactions with the broader landscape mosaic through which their herds move. The ontological moment of scale is now different: the influence of rainfall on herd movements in the Fuladougou corridor has qualitatively shifted as the ratio of available pastoral resources to livestock has crossed a threshold at which the landscape configuration—the mosaic of different resources and land cover—has shifted from *pacing* to *accelerating* southward herd movements. According to Sidi: "This [series of resting points], along with effective shepherding, enable us to fulfill our end of the bargain with local farmers—little to no crop damage." In-migration and agricultural expansion has eliminated a substantial portion of grazing areas surrounding the water points, which, as a result, can no longer serve as rest areas for livestock. Turner (2004) points out that scarcity of resources is not a problem or driver of conflict during this time but this misses an important point: field encroachment has caused herders to alter their decision making in ways that *impact their movements*:

Rather than invest time and energy into accessing water at intermediate stopping points where the risk of crop damage has become intolerably high and grazing resources are inadequate, herders increasingly choose to move more quickly to strategic wetlands where their resource tenure claims and social relations are stronger. This can counter intuitively lead to more crop damage in those places and undermine the very social relations on which herders rely. This contrasts with Bassett's analysis of crop damage in Cote d'Ivoire caused by hired herders who lack social ties and therefore an incentive to acknowledge their violation of local norms or rules (1994).

The loss of pasture resources has also led herders to rely more heavily on the lopping of tree branches (Gautier, Bonnerat, and Njoya 2005). Lopping does not provide sufficient forage,

it is illegal, resulting in the substantial fines that most herders must pay to foresters each year, and it further erodes herders' relationships with farmers. Branch lopping is insufficient because the zebu cattle breed (*Bos indicus*), which includes most of the livestock in the area, are pure grazers (Coppock, Ellis, and Swift 1986) so they prefer green grass and avoid dry grass as much as possible (de Bie 1991: 212). This explains why the preferred strategy of many herders is to travel into the shed's southern zone to seek out the perennial grass *Andropogon spp.*, which provides green sprouts when much of the rest of the landscape is burned over and dried out.[10] For herders who do not make this extended trip, the disappearance of *Andropogon spp.* compels them to turn to bamboo leaves as early as November, before relying on leftover crop residue and dry grass until the next rainy season begins.

The practice of felling entire stands of wild bamboo[11] as a means to ensure the survival of cattle has worsened farmer-herder relations and exacerbates conflict between the two groups. Farmers perceive bamboo lopping as a process of resource degradation that they blame on herders who allegedly do not "respect the environment" and farmers' customary rights over natural resources in the area.[12] The residents of the hamlet of Sangarébougou report a near total loss of local bamboo stands, which they attribute to the combined effects of passing herders and bush fires.[13] However, peasant farmers have no legal recourse to the cutting of bamboo

[10] *Andropogon guyanus* is known as *waga* in the Bambara language. Herders describe three varieties of *waga* called chakala, dansola, and wagajiema (best grazing resource) in the Fulfulde language.

[11] Observed by author (November 2011) and reported by local informants

[12] It is debatable whether farmers possess *a priori* tenure rights over these naturally occurring trees. This is example of the act of herders cutting the trees combined with their disappearance, real or perceived, that contributes to the sentiment among farmers that they do, in fact, hold such rights, that one would classify as customary or traditional.

[13] Villages agreed that bamboo cutting by transhumant herders was a much bigger problem than illegal logging in their village territory because, unlike with herders, they could at least receive some payment from loggers.

according to Article 28 of the 2001 pastoral charter (Gouvernement du Mali 2001).[14] Branch lopping is a longstanding question in Mali. Although the finalized pastoral charter legalized aerial forage harvesting, the document on which the pastoral charter is based (Gallais and Boudet 1980) describes community councils taking proactive measures to limit or ban the practice and officials aimed to formalize such a ban in national law. As far back as 1942, colonial officials in Mali's Sudano-Sahelian zone, described efforts to prevent Tuareg pastoralists from cutting branches for their herds (Douentza sous-division chef 1942). Conflict is caused less by the direct competition between the two groups for access to the resource than by the way it influences the attitudes of farmers vis-à-vis herders when crop damage takes place. When tensions arise, farmers are quick to refer to herders as "nomads from elsewhere" who do not care about the landscapes or what their livestock eat. This is often one of the first justifications for farmers' attempts to expel or exclude herders from their village or clan territories.

Mobility patterns of the 'bush' herd

Certain pastoralists who utilize the Fuladougou corridor will send some of their cattle all the way to the southern zone, comprised of Sudano-Guinean forest-savanna, situated in the southwest corner of Mali (figures 2 and 8). This zone roughly corresponds to an area known locally as the Birgo.[15] The principal reason to extend their livestock's transhumance this far south is to continue accessing perennial grasses (*Andropogon spp.*) that are no longer abundant, with the

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[14] Article 28 states: 'In the *unprotected* forest domain, access to pasture is free and is not subject to any tax or fee. Grass or aerial pasture can be exploited by all pastoralists on the condition of respecting all general laws on environmental protection and natural resource management.' However, Article 79 of the 1995 law on natural resources states: 'Pruning, lopping, cutting down of trees or removal of bark with the intention of feeding an animal is prohibited (Gouvernement du Mali 1995).'

[15] *Birgo* means 'thank you for this productive land' in the Bambara language

exception of the Baoulé biosphere resource, further to the north. According to informal discussions with local Fulani, livestock owners typically select their strongest and most valuable livestock to send to the Birgo since these animals benefit the most from the area's grazing resources and are most able to tolerate the exposure to the area's disease vectors, which are more prevalent than in drier areas to the north.

Since Fulani livestock owners will not bring their camps or milk herds all the way to the Birgo,[16] they must rely on young shepherds to manage Birgo-bound *garci* or bush herds throughout the dry season. It is these young herders, either working for their fathers, older brothers, or wage-paying bosses, who are often portrayed as lacking the social ties needed to prevent crop damage from occurring or compensate farmers when it does (c.f. Bernadet 1984). Indeed, these herders are young and on their own, often steering clear of villages and lacking the *tuteur* relationships that pastoralist households enjoy in the areas where they camp. In fact, Kotouba and the rest of the shed's central zone used to serve as the *garci* herd destination when more abundant resources and fewer cropped fields were located there. The Nafaji chief's comment that in times past they would hardly ever see the shepherds is characteristic of the current situation further south in the Birgo.

Yet the *garci* herds appear to cause far less damage in the central zone than the milk herds whose transhumant patterns are largely limited to the areas where their owners camp during the dry season. Although they often have spent the rainy hundreds of kilometers away in Mauritania, *garci* herds pass through the zone earlier and at a much faster pace than the milk herds that follow them. The timing of their movements are dictated less by desiccation in their

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[16] A clear line to the south of which no Fulani camps are located exists between the villages of Kassaro and Kojialan.

rainy season areas than by the bush fire calendar in their Birgo destination areas. These herds, often numbering several hundred cattle, typically leave the Sudan-Sahelian northern zone in early October in order to arrive in the Birgo before the first bush fires are lit so the animals are positioned to immediately begin grazing on the re-sprouting perennial grasses.

Although the *garci* herds pass through agricultural areas and even camp alongside cropped fields, they cause little damage primarily because grain crops have not been cut and peanuts have not been dug up and exposed to animals.[17] A second reason is that the *garci* herds move relatively quickly through these areas and thus the windows of time when crops are exposed are much more limited compared to when milk herds have weeks if not months to wait before crops are completely evacuated from fields in other destination areas. Villagers who observe *garci* herds camping next to their fields do not report experiencing much crop damage since they typically camp for such short durations. Finally, when the *garci* herds are moving through the mid zone of the transhumance shed, there is still surface water available in smaller seasonal streams and depressions, which enables to them to avoid certain agricultural areas. The Birgo-bound movements contrast markedly with those that come later in the year when herds rely on and remain in proximity to certain key wetlands, especially those located in Kotouba, for much longer periods of time.

Garci herds continue south during the month of October, relying on annual grasses and bamboo leaves until the first perennial re-sprouting occurs. These herds arrive in their destination areas[18] before crops have been harvested just as the milk herds do to the north.

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[17] Millet stalks at this time of year will be upwards of eight feet tall and still relatively green.

[18] Southern movements in this part of Mali are often constrained by the international border with Guinea, where Malian herders are highly vulnerable to theft, extortion, and general abuse by Guinean authorities.

However, Birgo farmers also report much less crop damage because of the far lower density of fields, which is due to lack of arable land, low levels of in-migration, and historically sparse populations. Fields are easier to avoid and "waiting areas" still exist in the Birgo. Residents of the Birgo village Balala reported that they had established a convention with herders three years ago to vacate their fields from one side of the local water course in order to create a passage corridor and a resting point for livestock. Again, relatively abundant land makes this collective action much more feasible than in areas to the north that are experiencing land scarcity.

Herds heading towards the Birgo (southern zone) and those that will stop in the upper part of the Fuladougou (central zone) are characterized by different ontological moments. The geographic scale and temporal pattern of the Birgo-bound *garci* movements,which begin earlier in the transhumance calendar, move rapidly through certain areas while slowing in others, are a critical factor in the low levels of reported crop damage in the southern parts of the transhumance shed. By contrast, Fuladougou-bound herds which move at a different scale are beset by resource access issues and consistently cause damage in the central zone of the shed. In addition to hosting important pastoral water points, another factor that increases that zone's vulnerability to damage is its proximity to the Baoulé biosphere reserve, which serves as an illegal but important source of dry season pastoral resources.

Protected areas as pastoral resource areas

As agriculture has expanded throughout the West African agro-pastoral zone, protected areas throughout the region, including the Baoulé reserve have become important sources of resources for mobile livestock herders over the last forty years, despite the risks involved with entering them (Toutain, De Visscher, and Dulieu 2004). The relatively abundant perennial grass and

water sources located within the Baoulé reserve are attractive to livestock herders, especially for those who are Fuladougou-bound and must wait as long as possible before they arrive in their destination areas. The land cover and resource endowments of the landscapes inside and outside the biosphere reserve are different in important ways as shown through the following analysis of fire patterns that impact dry season pastoral resource availability. The importance of the biosphere reserve to herders reinforces the need to conceptualize pastoral resource access and mobility at the scale of geographically defined transhumance sheds, within which biophysical (e.g. fire, rainfall) and social (e.g. resource tenure) interact to influence herd mobility and farmer-herder interactions in important ways (figure 6).

Fire, grazing, and livestock

Local herders comment that the inside of the Baoulé is the last place where they can find sizeable areas of perennial grass without venturing much further south. A spatio-temporal analysis of bush fires conducted for this study indicates that those grasses are the fuel for large, annual burns that lead to the dry season regrowth so highly sought after by herders. This regrowth of fresh green shoots of pasture provides herders with a very good reason to venture illegally into the biosphere reserve at the beginning of the dry season. (Grégoire and Simonetti 2007) studied fire dynamics in and around the ‘W’ du Niger and Pendjari biospheres, which are located in Bénin and ecologically comparable to the Baoulé biosphere. Measuring the seasonality of fires during a single dry season (October to May), they found that the landscapes inside the park burned over much greater expanses than outside them. Outside the park, land is characterized as fragmented patchworks of fields and fallows that create fire breaks and, over time, reduce the amount of combustible biomass on the landscape. Under such conditions, early bush fires lit by farmers to

protect their fields or eliminate pasture for passing transhumant livestock, can lead to shrubby encroachment, which, from a livestock herder's standpoint, impoverishes the landscape.

For this study, daily fires inside the Baoulé biosphere and within a 25km buffer were measured during the dry season for each year from 2000 to 2011. Using the same broad methodology as Grégoire and Simonetti (2007), MODIS derived 500 m^2 resolution grids were used to calculate the seasonality and annual frequency of fire using spatial analysis tools in ARC 10.1 (methodological steps outlined in chapter two). As figure 6 illustrates, large areas within the biosphere burned nearly every year while areas outside it burned with much less frequency. This is likely the result of the reduced amount of combustible material in those areas, where agriculture expanded rapidly during the period of analysis. As Grégoire and Simonetti (2007) explain, fires in those areas are small, fragmented, and burn less intensely because of the reduction in vegetation cover from land clearance for agriculture. As a result, it is likely that many of them are not detected by satellite sensors

End of season risk-benefit analysis

Given the importance of dry season resources found within the reserve, herders must conduct a risk-benefit analysis between time spent inside and outside it. On the inside, they find high value resources but face predators as well as potentially costly fines or incarceration.[19] Outside the reserve, they find few resources, encounter fields they might damage, but face a lower risk for fines.

[19] In 2011, Ibrahim Sow described that his shepherds would spend some time in the park and he hoped they would not be caught but if they did, he hoped they would be released for less than a 200,000 CFA fine. In the Fuladougou corridor, herders tend to congregate specifically at the permanent water found at Siguiminji (figure 7).

Park managers and foresters have generally met these movements with a repressive stance towards transhumant pastoralists (c.f. Turner 1999), whom they see as causing the degradation of park resources, particularly in relation to local wildlife populations. Rangers use this as a pretext for excessively fining herders for any violation, fabricated or real, of protected area rules. However, there is also evidence that self-interested foresters strike deals with herders by allowing them to stay in exchange for cash payoffs. Survey results from this case study suggest that herders with larger numbers of animals who take advantage of such deals, which comprise a shadow political economy of protected area resource access (chapter four).[20] Typically, during this time of the transhumance calendar, groups of two to four young shepherds are alone with the animals that are owned by their employer or father. Since they are socially vulnerable, they will typically do everything possible to avoid damaging fields along the way, even if this means moving south more quickly.

Events during the 2010 transhumance season demonstrate the connection between the importance of pastoral resources in the reserve and crop damage in parts of the Fuladougou located in the shed's central zone. That year, a major roundup by foresters at Siguiminji, a permanent water source in the reserve, led to a substantial spike in crop damage throughout both the central and parts of the southern zone. Rainfall had been poor in the Sahel that year but fairly abundant towards the Baoulé River, which led to an especially large number of herds waiting at Siguiminji that year. The water source's legal status was highly ambiguous at the time. Although Siguiminji is located within the original boundaries of the Baoulé protected area, its managers had granted livestock herders access to it as part of the biosphere management plan

[20] Given the potential for the high cost involved in accessing water at the Baoulé, it is favored by pastoralists with large herds and Moors who tend flocks sheep and goat, which reproduce more quickly, which enables them to cover the cost of staying in the park more easily than a cattle herder with a limited number of animals.

elaborated a few years before (Fofana and Diallo 2005). However, by 2010, local foresters expressed regret that they had been obliged under international biosphere reserve policy to cede Siguiminji to herders since the water point was also critical to wildlife. Earlier in the year, biosphere reserve managers and guards accompanied the Malian Minister of the Environment to the Baoulé biosphere reserve, including a visit to Siguiminji where he observed wild animals drinking and proclaimed that protection for the area must be increased. Without going through any kind of public notification or policy review process, foresters seized this opportunity to conduct a major sweep of livestock herders in the area.

Fearing the worst, many herders abandoned their cattle that day and fled from the reserve. In such situations, livestock tend to flee as well, especially at the sight of unfamiliar people. Moreover, transhumant livestock will tend to continue moving south at that time of the year, even if they are untended. The result, according to reports from local villagers, was hundreds if not thousands of cattle moving through the transhumance shed and causing extensive damage along the way. Farmers in the area reacted vigorously and nearly reached a unanimous decision[21] to expel all the herders from the Fuladougou. It was only through the intervention of a local NGO and influential community members based in the capital city that a potentially violent confrontation was averted (chapter four).

This case reveals how, as ecological and land cover changes increasingly drive herders into core protected areas, the boundaries, legal status, and actions of management authorities will episodically and unpredictably influence livestock movements and cause spikes in crop damage in surrounding farming communities.

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[21] During moments of conflict, villages, clans or other affinity groups such as hunters will often reach a consensus-based decision to take a specific measure in response to an event or action by another group or individual.

Water source tenure

Tenure over water resources represents another important geographic and political factor that influences herd mobility patterns and contributes to patterns of reported crop damage in the central zone. Tenure rights, supported by law, over natural and man-made water sources over act as a geographically distributed set of *push* and *pull* factors that influence herders' early arrival in their Fuladougou destinations. Herders that have made the zone their dry season destination do not control wells or pumps anywhere along their transhumance route. According to Sambouro Sow, who began coming to the Fuladougou four years ago because of insufficient grazing resources further north, herders are largely forbidden from using village wells south of the Baoulé River so they dig their own wells in low lying areas where the water table is high. The pastoralists who spend the dry season in Kotouba typically have property rights to these wells, which, once surface water is gone, will provide water to livestock and people for the duration of the dry season. These rights have legal basis Malian water law, which states that rivers are communal property. According to law 96-050 article 28, access to natural water points as well as areas around water courses, ponds, lakes, and wetlands are defined by local municipalities in collaboration with the appropriate technical services. By contrast, wells are private property**:** Article 42 of a law enacted in 2001dictates that traditional wells, cement wells and forages are the property of those who construct them. Their management is assured by the proprietor and access to these infrastructures is subordinated to agreement by the proprietor (Helvetas Mali 2007). As a result, customary rights held by farmers prevents wells from being established in parts of the corridor to the north, which would *potentially* slow the herds movements while the

relatively secure rights herders hold over their own wells incentivize them to arrive and begin using them as soon as it becomes necessary.

Scale and crop damage

The rhythm, pace, and scale of livestock movements influence the geographic distribution of crop damage and conflict risk across large scale transhumance sheds. Certain village areas are more vulnerable than others due to their proximity to key wetlands, transhumance pathways, and historic ties with pastoralists. Crop damage occurs anywhere livestock and cultivation are practiced on the same landscape. However, measured at the scale of this specific transhumance shed, damage is clustered in certain locations, particularly within the shed's central zone. Evidence of this is found in the reports of crop damage presented in this section, which were collected during three periods: January-July 2010, September –December 2011, and February-March 2013. Residents of six villages answered survey questions each year on whether crop damage had occurred in any of their fields. If yes, investigators recorded the approximate date and time of day it occurred, the involved crop, the severity of the damage, and whether they had been compensated. Instances of crop damage were mapped by the author in five villages in 2010 and four villages in 2011. Investigators also carried out informal conversations with farmers and herders in each area to solicit their views on the causes and dynamics of local crop damage.

Table 1 presents the number of farmer households who reported non-negligible crop damage caused by transhumant herds in each village that was surveyed in 2010, 2011, and 2012. Interviewees were asked to distinguish between light damage that could be ignored and damage that would affect their household income or food security. Villages are ordered in the table from north to south according to their position within the transhumance shed. Exhaustive surveys

were conducted every year in each village except for Sikoroni in 2010. That year, only 6 out 16 household heads were available when the survey was conducted. The table reveals two important patterns: The first is that 2010 was an exceptional year for crop damage across most of the shed due to the unusually high number of stray livestock in the area during the month of November following the Siguiminji episode. The rates of crop damage across the six villages in 2010 are therefore somewhat anomalous yet differences between villages as well as certain geographic patterns can still be discerned. Although all the villages were affected, the villages of Plaaqui, Mopti-ko, and Nafaji reported at higher rates given their closer proximity to the biosphere and key wetland areas.[22] Although Sikoroni is designated as located in the central south, it is further south and more than fifteen kilometers from the wetlands and biosphere reserve. This helps to explain why in 2011 the village experienced a much lower level of damage than the other three in the central zone.

Overall, these patterns reflect significant changes in livestock mobility patterns, which has increased the pressure on villages in the central zone in particular to provide grazing and water resources to herds moving through the area as well as other herds that will remain in the area for the entire dry season. At the end of the rainy season in the central zone, there is a combination of transhumant pastoralists waiting for their hosts to harvest their crops further south, and herders who will stay there for the entire dry season (see figure 2). This congregation in the central zone is caused by a combination of factors: the presence of viable wetlands, tenure rights to specific water points, and a lack of safe places further north for livestock to slow down and wait for crops to be completely harvested. The high rates of crop damage in the central zone

[22] It is not known whether these episodes were the result of the Siguiminji episode or not.

calls into question the assumption that Fulani will do whatever possible to avoid crop damage where they want to settle as Bernadet (1984: 186) asserts:

> [W]hen a pastoralist has a vested interested in maintaining good relations with farmers, particularly when he aims to settle his camp in a more or less permanent fashion and practice agriculture more intensively. He does not hesitate to split his herd, even in the rainy season, in order to facilitate good herding and recruit a supplementary shepherd.

By contrast, in Kotouba there appears to be as much or more herder negligence among herders who will spend the entire dry season in the area as any other group passing through or otherwise. Herd management *is* a critical factor in damage but only relative to the locations of critical resources at the scale of the transhumance shed. In contrast with the central zone, villages in the southern zone appear to experience substantially less crop damage and tensions with pastoral herders.

Conclusion: changing rhythms of mobility require new institutions

It is a fallacy that crop damage and associated conflicts are merely a structural dimension of farmer-herder relations, either in a Malthusian sense, or as part of the everyday politics of the two groups, including the influence of meddling politicians and their divisive politics. The evidence presented in this chapter suggests that geographic scale influences the patterns of farmer-herder conflict in ways that have not yet been closely examined. Although the geographic scale of livestock mobility described in this case study suggests an identifiable extent, or, epistemological moment, it can only be identified and measured in the context of livelihoods and ecosystems that are constantly in flux. By extension, the same caveat applies to

the social-ecological processes and relationships that define the scalar ontological moment of recurrent crop damage and farmer-herder conflict in the shed's central zone.

This chapter has presented this conceptualization as a new way to understand farmer-herder conflict as a scaled process yet it also has practical implications for agrarian resource governance. The geographic boundaries through which we define and analyze a resource governance challenge will influence how we understand and implement solutions to it. A second and related implication for governance is that the connection that is assumed to exist between social capital and conflict mitigation may not hold in every situation or context. Perhaps more importantly, this chapter offers a way to bring in biophysical environmental factors back into agrarian conflict analysis without resorting to simplistic and erroneous environmental deterministic Malthusian conceptions of resource scarcity.

Meanwhile, in Kotouba, Ibrahim Sow has drastically rerouted his livestock as an attempt to arrive in the area as late as possible at the end of the rainy season. Beginning in 2010, his son, along with the shepherds of their extended family, began moving 25 kilometers to the southwest, before gradually following the Baoulé River back to the traditional line of descent, which runs in the north-south bearing that is typical of dryland transhumance (figure 9). This change is not without risks, however, as in 2011, lions killed three of Ibrahim's already small herd of cattle, which now must spend more time in areas that such predators inhabit. This also places greater demands on the herders, who must spend more time in isolated areas, and livestock owners, who are much less able to monitor the shepherds. According to Sow, not all herders are willing to make this change, which he is able to undertake because his son is 'well-educated and disciplined.' Despite the modified transhumance route and sacrifice on the part of Ibrahim Sow and his son, their livestock arrived in Kotouba at the end of November, over a month before

locals are even willing to discuss the presence of ‘nomadic’ livestock herds. Upon his arrival, Sow was soon enmeshed in the mediation of numerous farmer-herder conflicts, several of which were not resolved peacefully. As populations grow and climate conditions change in dryland West Africa, such conflicts are increasingly on the radar of policymakers and multi-lateral donors (Eriksen and Lind 2009). Future investments in conflict mediation and resource governance will be more effectively targeted if geographic scale is taken into account.

Figures and Tables

Figure 1. Outline of transhumance shed with southerly end of rainy season livestock movements indicated over varying land cover classes (GLC 2000). Shed boundaries based on GPS and interview field data collected by author. Cartography by Masrudy Omri.

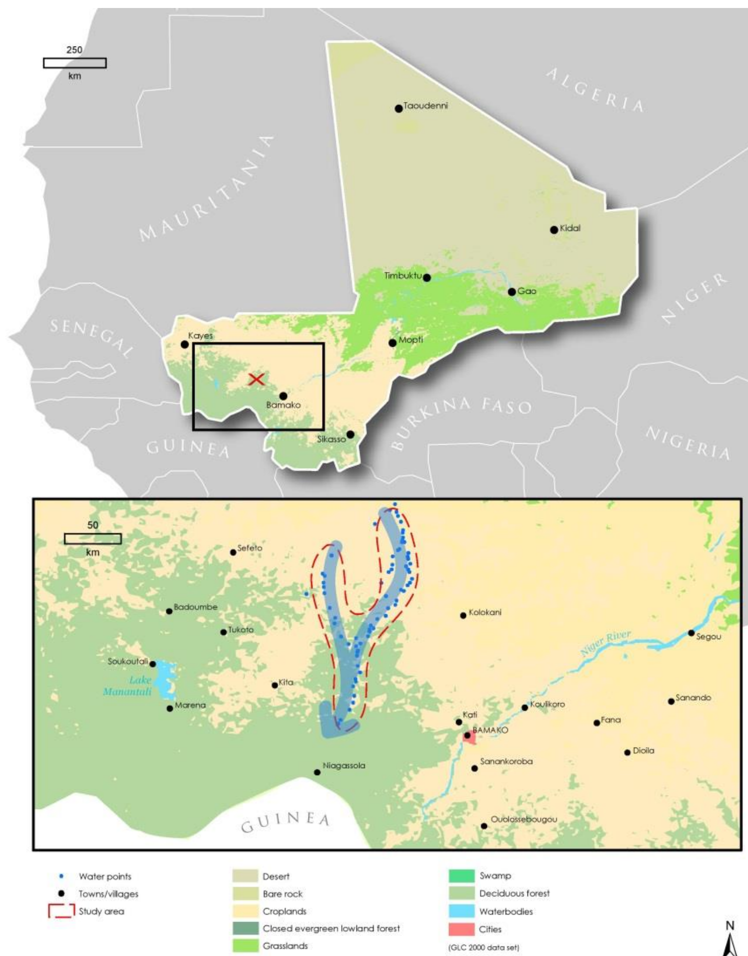


Figure 2. Epistemological and ontological moments of conflict with a Malian transhumance shed

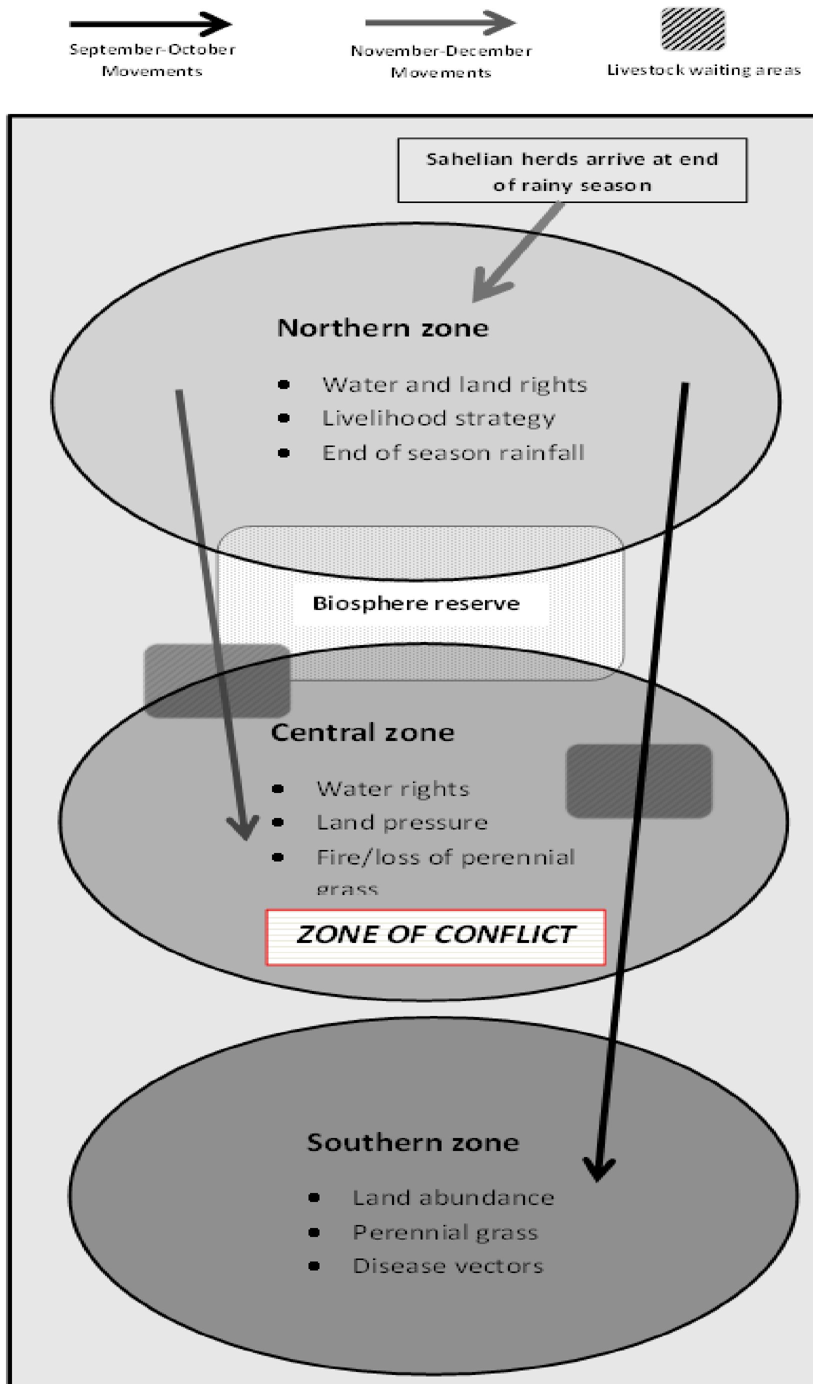


Figure 3. Zones of pastoral resources identified by NGO-led participatory mapping project in northern zone of transhumance shed. Data provided by ONG-ADISSA, October 15, 2011, cartography by Masrudy Omri.

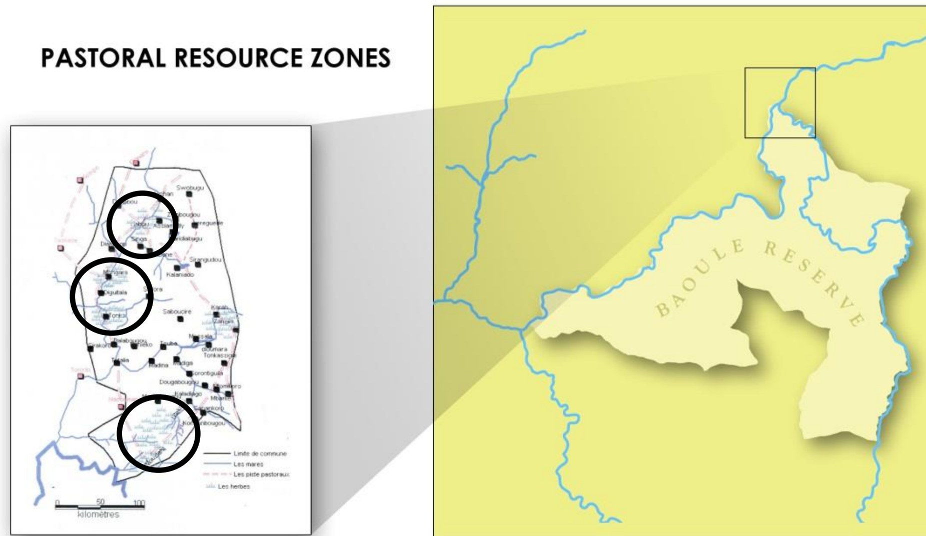


Figure 4. Upper Senegal River watershed. River network data from Malian National Geographic Institute, digital elevation model from Shuttle Radar Topographic Mission (SRTM), cartography by Masrudy Omri.

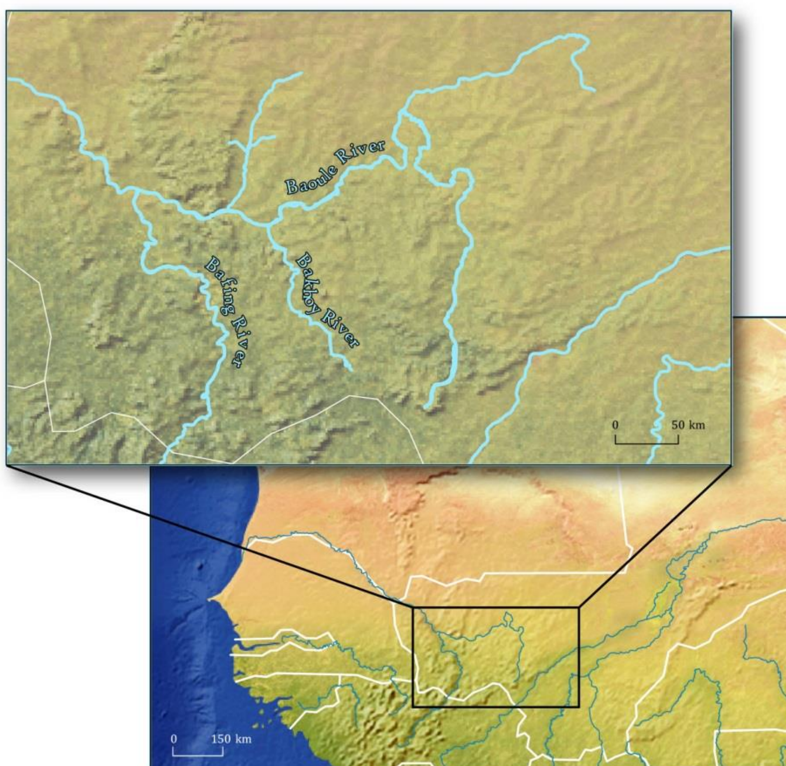


Figure 5. Migration from the Bélédougou to the Fuladougou and agricultural expansion (2001-2010). Agricultural data from Landsat imagery-based change analysis, migration data from field interviews conducted by the author, village locations and biosphere reserve boundary from Malian National Geographic Institute (IGM). Cartography by Masrudy Omri.

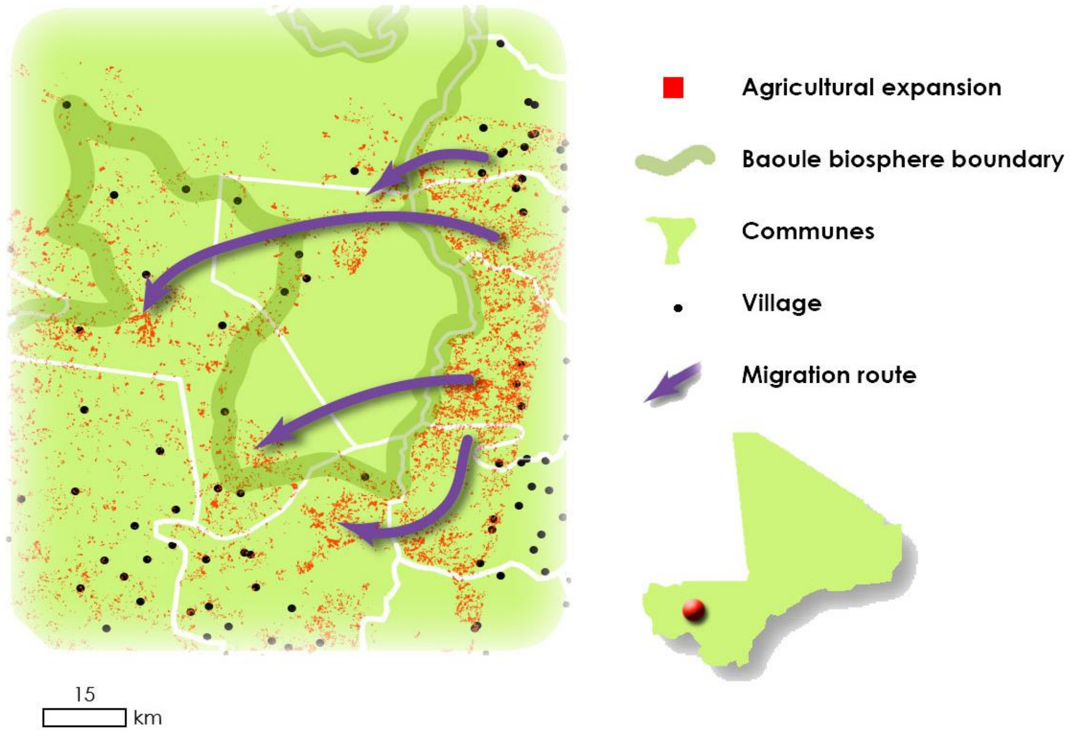


Figure 6. MODIS-derived annual bush fire frequency estimates inside the Boucle de Baoulé biosphere reserve and a 25 km buffer zone (2000-2011). Data acquired from European Union Joint Research Centre (JRC) ACP Observatory (http://acpobservatory.jrc.ec.europa.eu).

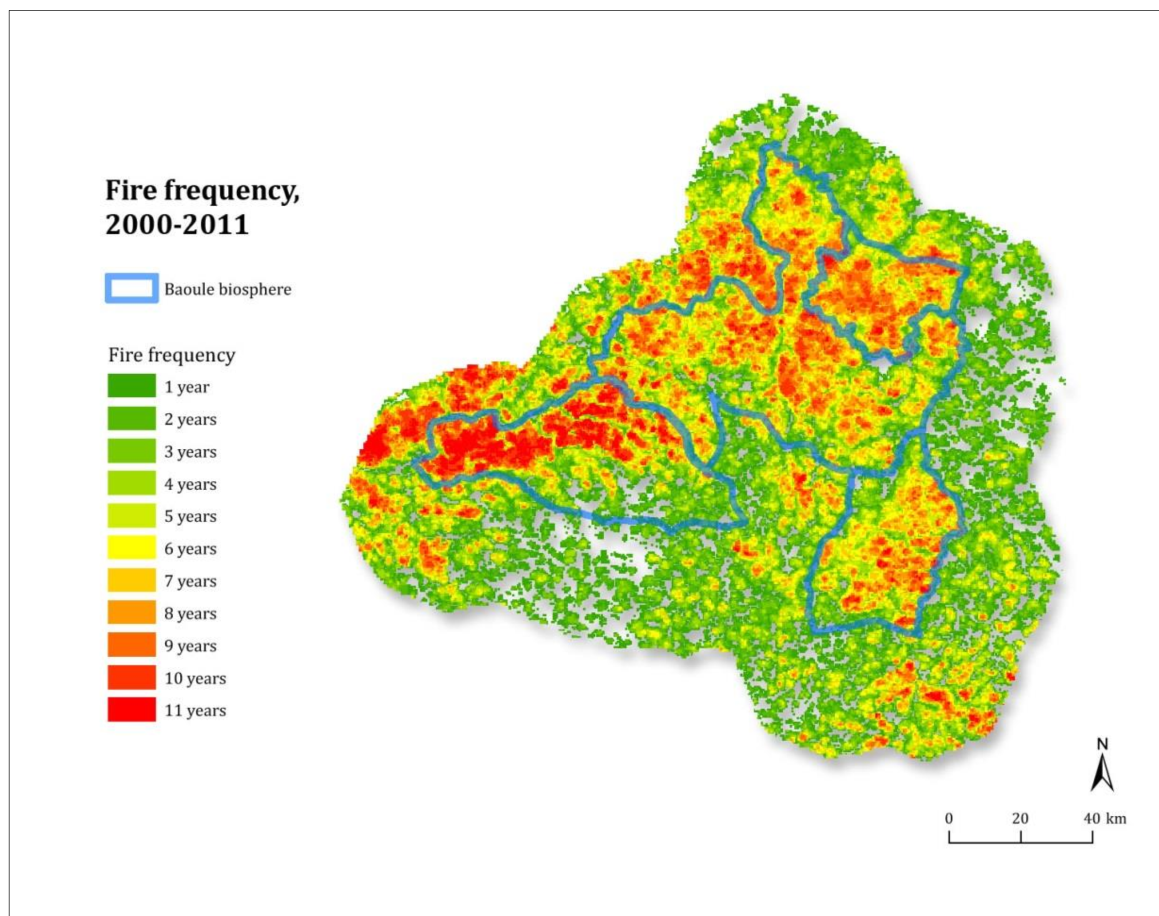


Figure 7. Transhumance detour to Siguiminji water point within the Baoulé biosphere reserve. Transhumance and water point data collected in the field by the author, reserve boundary data from Malian National Geographic Institute. Cartography by Masrudy Omri.

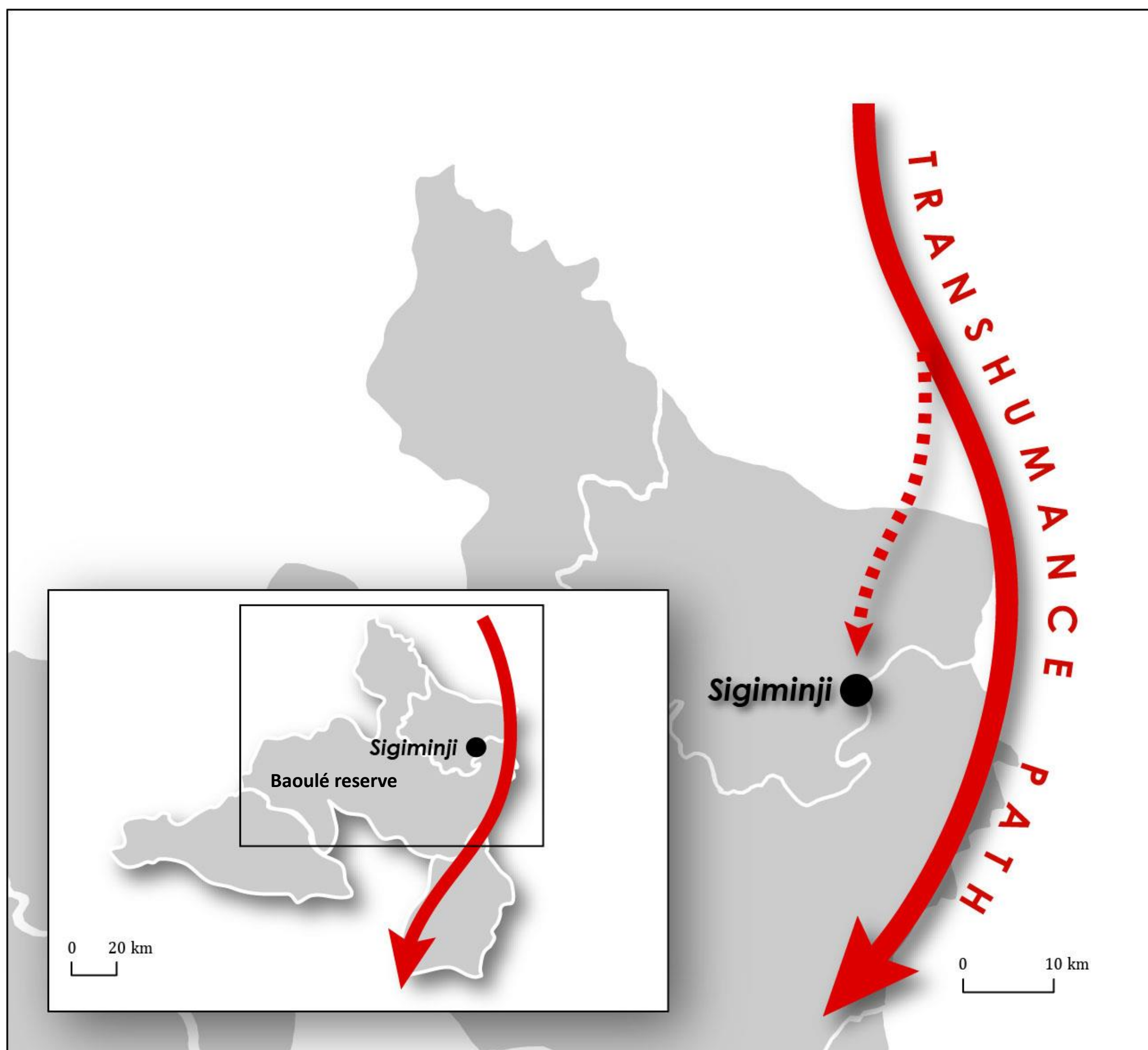


Figure 8: Birgo transhumance (southern zone). Transhumant movement pathways based on field interviews by author. Boundaries of Kotouba, Madina, Sebecoro, and Kassaro municipalities comprise the Fuladougou area and the Makono and Sirakoro municipalities comprise the Birgo area (all acquired from the Malian National Geographic Institute, including biosphere reserve boundary). Digital elevation model from Shuttle Radar Topographic Mission (SRTM). Cartography by Masrudy Omri.

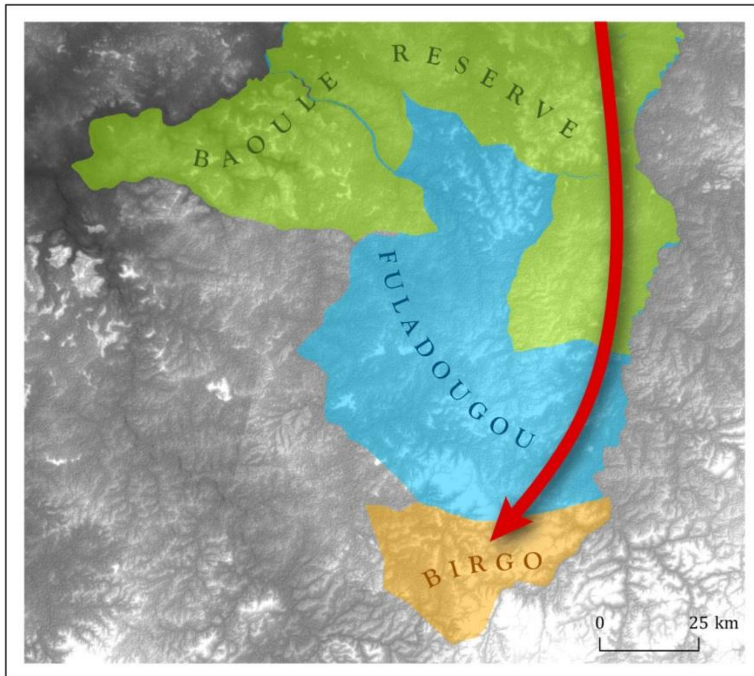


Figure 9: Ibrahim Sow's transhumance detour north of the Baoulé River. Path trajectories outlines based on field interviews conducted by the author. Biosphere reserve boundaries acquired from Malian National Geographic Institute. Cartography by Masrudy Omri.

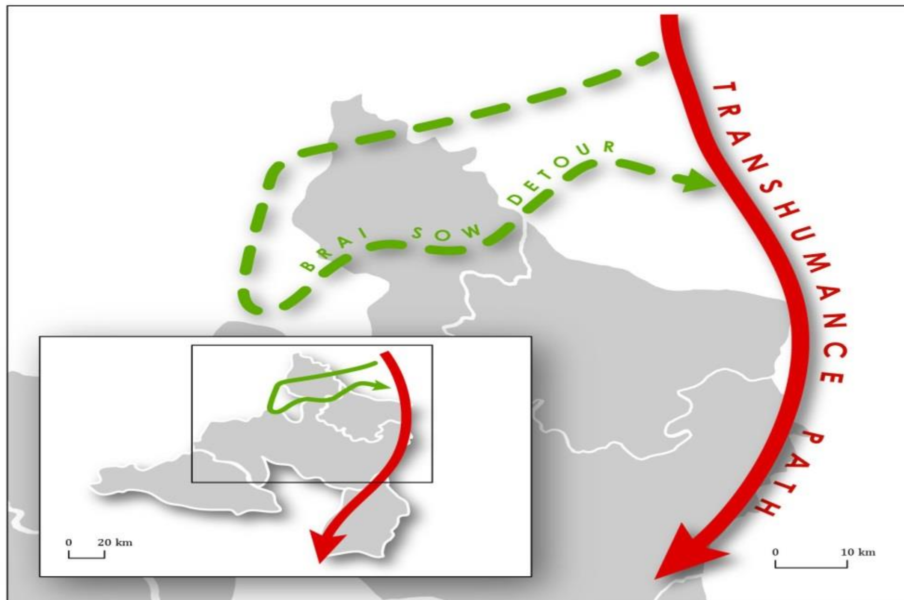


Figure 10: Precipitation measurements from rain gauge monitored by agricultural extension agent B. Sissoko in Dioumara, Mali (1994-2011)

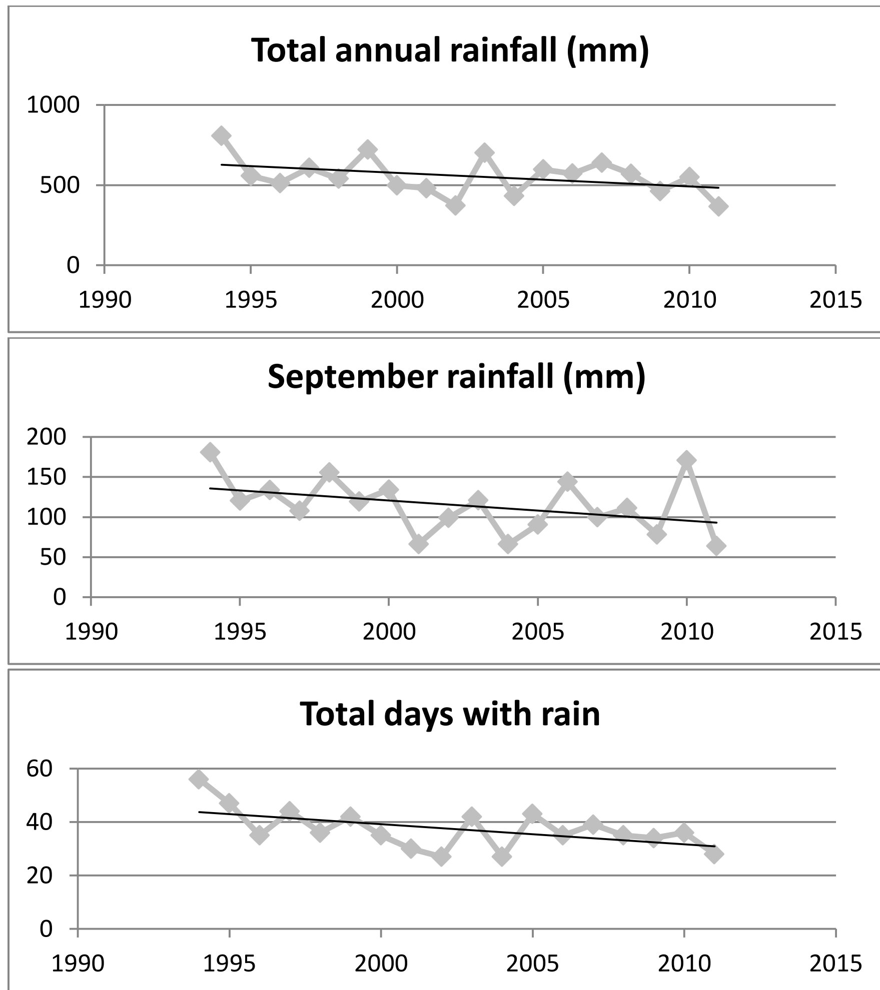
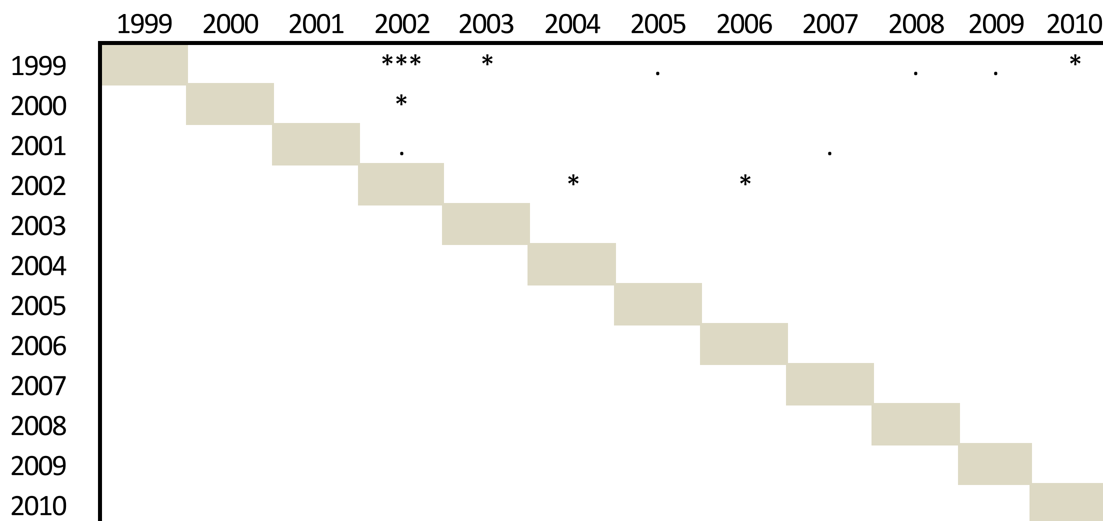


Table 1. Households impacted by non-negligible crop damage as reported during field surveys in central and southern zone villages: 2010-2012

Village	2010 Households Impacted	2010 Households Total	2010 %	2011 Households Impacted	2011 Households Total	2011 %	2012 Households Impacted	2012 Households Total	2012 %
Central									
Plaaqui	6	8	75	5	7	71	0	7	0
Mopti-ko	6	8	75	6	8	75	6	8	75
Nafaji	8	9	89	7	11	64	4	11	36
Sikoroni	5	6	83	4	16	25	12	16	75
Southern									
Barakaya	10	21	48	4	21	19	5	21	24
Ngangou	12	17	71	4	21	19	NA	NA	NA
Sangarébugu	15	21	71	6	21	29	0	21	0

Table 2. Analysis of variance (ANOVA) of NASA TRMM-derived precipitation estimates for latitude bands within northern portion of transhumance shed (1999-2010)

Significance of week*year interaction term in ANOVA of weekly rainfall (1999-2010) at 12.875

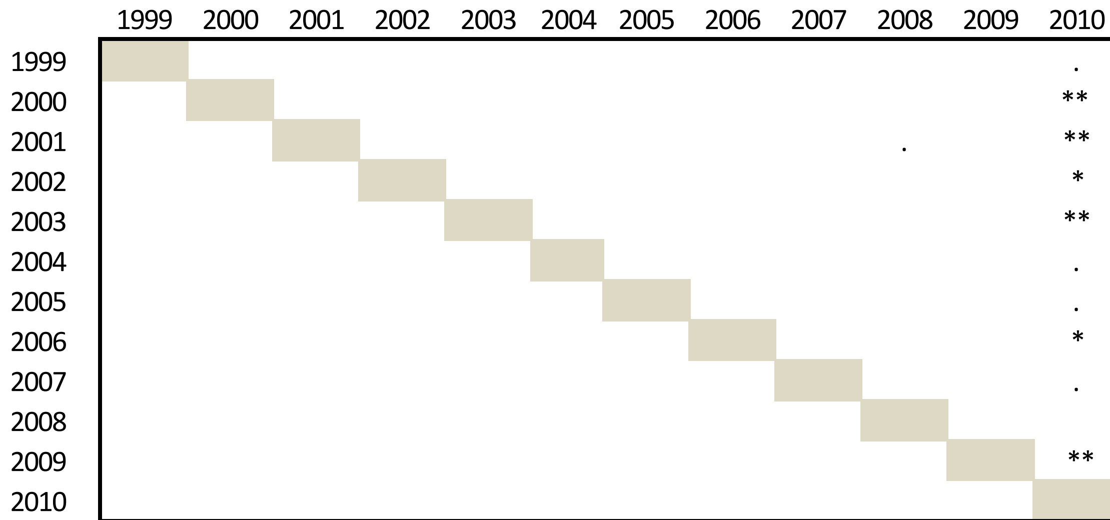


	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1999				***	*		.			.	.	*
2000				*								
2001				.					.			
2002						*		*				
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												

. P<.05 * P<.01 **P<.001 ***P<.0001

(column 'A' is ANOVA baseline)

ANOVA of weekly rainfall (1999-2010) at 14.875 latitude

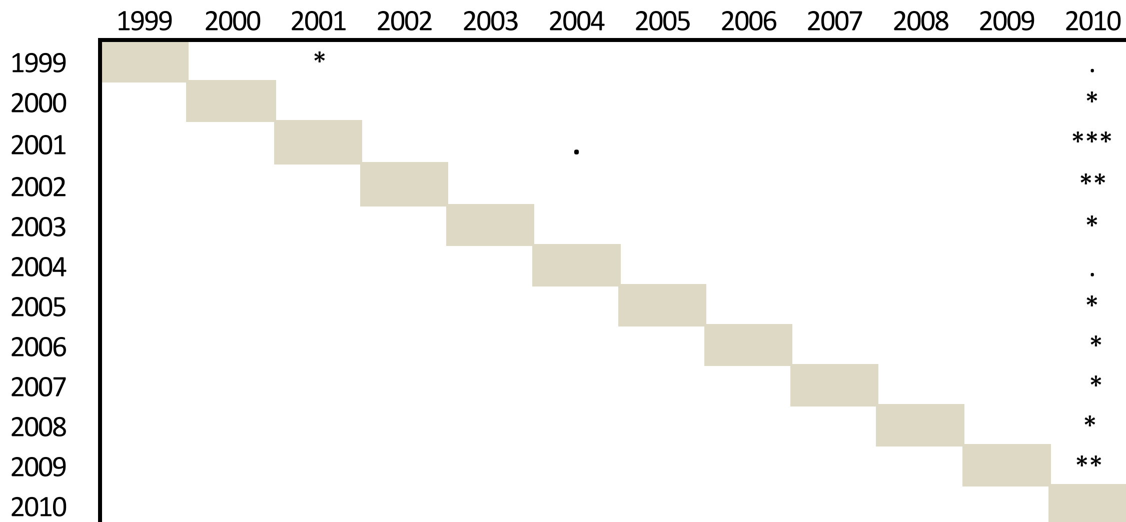


	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1999												.
2000												**
2001										.		**
2002												*
2003												**
2004												.
2005												.
2006												*
2007												.
2008												
2009												**
2010												

. P<.05   * P<.01   **P<.001   ***P<.0001

(column 'A' is ANOVA baseline)

ANOVA of weekly rainfall (1999-2010) at 15.125 latitude



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1999			*									.
2000												*
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2007												*
2008												*
2009												**
2010												

. P<.05   * P<.01   **P<.001   ***P<.0001

(column 'A' is ANOVA baseline)

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Chapter four: governing mobility and pastoral settlement

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Introduction

In July 2011, farmers in the Malian municipality of Kotouba were shocked when they discovered that five pastoralist families had not left the area for their northern rangelands at the onset of the rainy season. This was an unprecedented occurrence and violated the widely held understanding that pastoral herders would return to their northern "home" each year. This annual livestock movement, known as *transhumance*, was, in fact, the basis for the local convention through which land-holding farmers agreed to host the pastoralists when they first began arriving in the area over a half century ago. This convention, or agreement, between farmers and herders is straightforward: herders are welcome, even encouraged, to stay in Kotouba during the dry season, but they are forbidden from arriving before farmers harvest their fields. Secondly, once farmers begin sowing their crops at the beginning of the next rainy season, herders must begin sending their animals back up north. As long as herders "behave themselves" as good guests (no stealing, adultery, etc.), everything else, including dispute resolution, can be done through amicable negotiation. The periods of livestock arrival and departure are the most critical issue. The harvest period, mid-November through January, is when crops are most vulnerable to damage by livestock but this is also the period when the animals are beginning to arrive and shepherds struggle to find places to wait for farmers to clear their crops from the fields.

In 2011, it seemed as if this convention might be beginning to breakdown. The pastoralists had not initially notified locals that they had remained in Kotouba, a sparsely populated rural commune in Mali's western Kayes Region (figure 1). Their reasons for staying were justifiable: a member of one of the families had fallen ill and was unable to begin the arduous 100+ kilometer walk north. A substantial portion of a second family's herd had gone astray and they

were delayed by their search and recovery efforts. In both cases, crossing the Baoulé River, which by then had become swollen by the first of the monsoon rains, had become perilous for their animals and themselves. When local farmers discovered the families after the quasi-official date of departure,[1] they notified the municipal mayor who summoned the heads of the pastoral households. After a meeting in the village of Madina between customary authorities, the mayor, and other municipal officials, the decision was made to let the pastoralists stay this year on the condition that they *never stay for a rainy season again*. The farmers essentially granted the pastoralists a one-year exemption from their decades old convention. The herders agreed and passed the rainy season in Kotouba without any major incidents.[2] Presumably, they would once again return north in 2012 and in subsequent years but this is far from certain. On the surface, this incident is a relatively minor deviation from the livestock production system based on seasonal livestock mobility known as transhumance. However, it also points to profound changes effecting pastoralists and, more broadly, agrarian communities across dryland West Africa.

Conventions of pastoral mobility and settlement

The case of Kotouba reveals the aspirations of mobile pastoralists to settle in communities where they have historically been *seasonal* guests and the ways in which resident peasant farmers are resisting and subsequently trying to dictate the terms of such settlement. Although pastoralists in West Africa have been shifting between settled and semi-nomadic livelihoods for centuries (Olivier de Sardan 1984, Fabusoro 2009,) Frantz 1990, Kossoumna, Dugué, and Torquebiau

[1] Mali's Pastoral Law stipulates that communities allow for the entry and exit of transhumant livestock herders to and from their territories (Gouvernement du Mali 2001).
[2] Herders stayed in fallowed fields between Moptiko and Tourébougou (5-6 years old)—farmers will come back to these eventually. No incidents occurred because crop damage is less of a risk during the peak rainy season because crops are on the stock.

2010), little attention has been paid to the political dimensions of such shifts, particularly in the context of recent democratic decentralization. The principal argument of this chapter is that these struggles over residency are playing an instrumental role in shaping new democratic local institutions by strengthening their legitimacy and authority through their role as brokers of resource access and dispute resolution.

In Kotouba, the specific terrain of negotiation is the local convention between farmers and pastoral herders. Local conventions, as they operate in agrarian West Africa can be understood as a form of "consensus between two or more groups on a defined subject (Djiré 2003a: 3)." Local conventions between farmers and pastoralists dictate the terms of when the latter are allowed to enter a village territory following crop harvest, whether they have pasture and water rights, and other aspects of resource tenure. Beyond these resource-specific issues, local conventions also define individuals' legitimate place within their host community's social structure. Negotiations between farmers and pastoral herders over the terms of their convention reflect the notion that institutional change emerges through social interaction and dialogue (Hagberg 2007, Gledhill 2000). While most anthropological work on this subject has focused on informal institutions, this chapter instead considers how this process works between the customary and formal spheres within Mali's decentralized governance structure. At issue are the most important facets of political decentralization: legitimacy, authority, accountability, and governance outcomes.

The principal challenge that farmers and herders are currently confronting vis-à-vis the new political context of decentralization involves the acute shortcomings of their local convention and *tutorat* relationships. *Tutorat* refers to the relationship in which a local farmer

acts as a host to a pastoral livestock herder and facilitates their access to different kinds of resources (Chauveau, Jacob, and Leask 2006) according to the terms of their convention. In Kotouba, the existing convention is no longer tenable because of a lack of reliable water sources along their transhumance corridor, tenure arrangements for existing water points that constrain access, decreasing monsoon reliability, and agricultural expansion that accelerates the arrival of herds at the of the end of rainy season well before farmers are willing to accept them. Agricultural expansion is particularly salient to this issue because it is linked with changing land rights that influence the governance of pastoral resources as well as pastoral mobility patterns throughout the West African agro-pastoral zone. Further, pastoral livelihoods are fundamentally changing as they increasingly taking advantage of the modern services that villages like Kotouba have to offer, such as schools, health clinics, markets, and public administration.

Theoretical framework: relationships of governance

Governance reform in West Africa is typically carried out through highly codified rules that emanate from laws promulgated by the national government. However, as many scholars have emphasized, such legal measures tend to influence governance outcomes through the ways they modify *relationships* between individuals and social groups (Berry 1993). This characterization applies to many facets of governance, broadly defined as “interactions to solve societal problems and create societal opportunities” (Berkes 2010: 489) and “the formal and informal institutions through which authority and power are conceived and exercised” (Larson and Soto 2008: 214). The definition provided by Larson and Soto (2008) reflects a concern with process that is consistent with many other theoretical positions (Lund 2008; Moore 2000) and should include

contestation as another important dimension of governance and the institutions through which it is practiced.

While "the rules of the game" (North 1990) is a common starting point for conceptualizing institutions, Knight (1992: 19) puts contestation and conflict at the center of his definition of institutions as "as a product of efforts of some to constrain the actions of others with whom they interact." Indeed, as power is fragmented and unevenly distributed within communities and societies, certain individuals or groups of actors inevitably attempt to shape institutions, particularly during periods of reform, to maximize their own benefit or gain while others resist those efforts. As Agrawal and Yadama (1997: 457) argue, institutions are in dialectic relationship with the individuals and groups whom they influence:

> Institutions themselves are aggregates of specific practices and rules that on the one hand frame and guide user behavior but, over time, are an outcome of the actions of users, just as resource management outcomes are an aggregate of the activities of people.

Conflict and hostility

The atmosphere of suspicion, hostility, and conflict between farmers and herders in Kotouba complicates the tasks of negotiating a new convention and reforming local institutions. . The recurrent problem of crop damage and recent episodes of violent confrontation shape the subject positions of and interactions between all those involved. For farmers, the major issue is uncompensated crop damage. Intricate procedures for evaluating and determining the monetary value of crops damaged by livestock have existed for decades but, as any farmer will explain, unless you physically apprehend the animals *while they are in your field*, the chance of receiving compensation are slim to none. Most farmers do not receive compensation for damaged fields

and, over time, a sense of injustice builds up in their communities, especially when crop damage is seemingly intentional (see chapter three).

It is not just unknown herders passing in the night who damage fields. In Kotouba, it is much more likely to be familiar herders who will spend several months in the area and this does not necessarily translate into higher rates of compensation. One elder in Kotouba who is the host of many pastoralists who stay in the area: "You can know a Fulani [herder] for 100 years and he still will not pay you if he damages your crops." Lamine Diarra's field was damaged in 2010 by a herder who his family has hosted since he began coming over twenty years ago. Even though the herder acknowledged that he was at fault, he still had not paid despite, as Diarra pointed out: "He went on the Hadj [to the Mecca] last year." That specific incident encapsulates the sense of injustice that farmers feel towards herders and partially explains why they are unwilling, in most cases, to cede resource access rights to the pastoralist community. Even important political actors who are attempting to broker new conventions between farmers and herders, such as the Mayor of Sebecoro, express a need to stick up for farmers since "the Fulani are too powerful and rich. They will keep going to judges." The Mayor is referring to the common practice of affluent pastoral herders paying off judges to receive favorable judgments during disputes with farmers.

This sense of injustice boils over when altercations turn violent. In 2010, Yanfolila, a district in southern Mali, was the site of a mass expulsion of all the non-local Fulani[3] following a bloody farmer-herder encounter. A farmer was killed in his field during a dispute over crop

[3] The incident points to the ethnic complexity at work in such situations: most of the *autochthonous* farmers in Yanfolila are ethnic Fulani but in terms of kinship and power relations, are distinct from other Fulani who are not members of the autochthonous group.

damage and members of his community claimed to have identified the culprit, who was then detained by local authorities. According to the district judge in Yanfolila, the accused herder was later released due to a lack of evidence. But to the eyes of local farmers, this was the last straw: the pastoralist community and their allies in government had clearly paid off the judge and one of their own was dead.

The "revenge of the illiterates" began as the *donsoton* (hunters' association) gathered arms and gave every single non-local Fulani an ultimatum to leave the district and never come back. Virtually all of the Fulani, even many longtime residents with no obvious connections to the conflict, left without further incident. The expulsion elevated the dispute to the national level: the Interior Ministry sent a delegation to Yanfolila only to be firmly rejected by the farmers, who felt empowered by their actions to declare that the central government was never there for them and they had no reason to accommodate the government's desire for reconciliation. Even a former local elected official remarked that the only long-term solution to the problem was for the herders to stay away from Yanfolila. The expulsion lasted at least one year. According to Moussa Djiré, who has investigated the Yanfolila conflict, herders began cautiously trickling back into the area, albeit with more caution than before.

Yanfolila made headlines because of the bold stand taken by the farming community but rural communities across West Africa struggle with the same disputes, violent encounters, and injustices. In the Fuladougou, where Kotouba is located, several communities have also responded to violent episodes by using expulsion as a political tactic with herders and national authorities. A recent incident in the village of Nyebleni demonstrates that such conflicts involve notions of justice but also the complex, overlapping resource tenure rights that farmers and

herders share (c.f. (Turner 2004). In terms of governance, viable farmer-herder conventions will be informed by important events, including violent encounters and shaped by laws such as the Pastoral Charter (Law 01-004), but they will also inevitably represent continuities with past systems of customary tenure.[4]

Pastoral herders began spending time in Nyebleni, a small settlement situated next to an important seasonal wetland, following the droughts of the mid-1980s. As is often the case, local farmers welcomed the herders and allowed them to utilize the dry season wells they had dug along the wetland's edges. The herders established host-client *tutorat* relationships with a few villagers and continued coming back to Nyebleni, even as more farmers cultivated larger fields that gradually constricted the herds' seasonal movements. Following a dispute over tenure rights to a modern well that an NGO planned to construct in the area, a herder let his animals into the 1.5 hectare field of cotton belonging to Amadi Diakité. Diakité confronted the herder, who was still in the field but nonetheless denied that the animals belonged to him. According to farmers, the herder allegedly returned to the bush and injured himself with a machete before going to the gendarmerie to accuse Diakité of perpetrating the act. Diakité himself traveled to the district seat to inform the Mayor, who was considered sympathetic to farmers in such situations. He did not make it as the gendarmes arrested him on the road and jailed him for nine days.

The jailing prompted the six villages with clan-based ties to Nyebleni to take a strong stand against the herders. When Diakité was finally released following the payment of a large fine and the intervention of an influential relative in the capital city, the villages agreed on a new convention to bar transhumant herders from passing through their territories. Leaders called a

[4] This is consistent with the land tenure adaptation paradigm (Bruce and Migot-Adholla 1994).

meeting and obliged all the villages to confess to any debts they had with the herders, which would compromise their collective position. The herders' three hosts were obliged to take the side of the villagers in a "you're either with us or against us" dynamic that is typical of moments when conflicts are escalating. One reason the villages reacted so strongly was that in 2000, a similar altercation took place in the area where a herder was injured and farmers claim he did it himself as a pretext to have certain farmers arrested. Herders, in return, accused the same villagers of poisoning the wells they used and even physically blocking their livestock corridor with a gun. In that particular case, many arrests were made and this incited the entire *donsoton* of the Kita district to encircle the jail and demand that the authorities arrest all of them or release the accused farmers. Authorities relented in that case but the underlying causes of the conflict remained unaddressed. An NGO worker familiar with the incident commented that the damaged field in Nyebleni was a "trap" since it was positioned close to a well in order to provoke the herders into letting their cattle into it. One reason farmers resort to such tactics is short-term gain. Herders complain that if their livestock do stray into a field, "farmers demand 200,000 CFA even if [the cattle] only eat a little." The potential "win" for farmers is to extract money from a far wealthier individual. The potential 'loss' is conflict escalation, continued hostility, and jail time.

The convention to ban herders did not hold except in one village. Herders gradually filtered back in, just as they did in Yanfolila, through friendships and their own financial clout. In the village of Suunti, however, farmers continued to ban the passage of herders and they reaffirmed their own village stance that herders were only welcome if they settled and fully integrated into their community. This earned Suunti the moniker of 'rebel village' and brought

various kinds of political pressure on them, including exclusion from one of the only development NGOs working in the area. The village, however, did not relent with their singular demand on the transhumant herders.

Kotouba

Herders continue to arrive in the Fuladougou months before agricultural harvests are finished so crop damage is a recurrent problem and tensions are persistent. When herders lost control of several hundred cattle in 2010, which caused widespread damage, the local *donsoton* was assembled and ready to expel the herders in much the same was as others had in Yanfolila and Kita. Like a similar case in 1999, that confrontation was averted by more moderate political elements in the community but in 2011, when a farmer and herder came to blows in a field in Kotouba, herders were expelled from that village for one month.[5] In that particular case, the involved herder claimed that he had a large sum of cash stolen from him during the altercation, which, had gendarmes become involved, could have resulted in jailings and an inevitable escalation. But in that case, local authorities successfully mediated the conflict and diffused the situation without anyone calling the gendarmes or judges.

These conflicts and how they are resolved represent a preponderant factor in the process of how local authorities and other stakeholders, particularly farmers and herders, redefine their relationships through new conventions. Herders will continue to arrive earlier than farmers would like due to ecological factors beyond their control (see chapter two) and, for the foreseeable future, farmers will have no choice but to continue growing crops and expanding

[5] In only one month's time, according to an observer, economic impacts were felt among small businesses in the village.

their fields. At issue is not just how specific episodes of conflict are resolved but also the underlying issue of who controls access to water (wells and pumps) and land resources. Underlying the issue of resource access is the fundamental question of community belonging and local citizenship.

These issues are deeply intertwined, which implies that policy approaches to pastoral resource governance, despite their narrow techno-managerial focus, have the unintended effect of modifying the form and function of local political institutions. The point of departure for this process is the legal recognition and increased political support for pastoral mobility in West Africa. Although local and central governments have considerable difficulty projecting power and implementing policies in their hinterlands, Mali's pastoral charter, which was enacted in 2001, is doing what it is supposed to by structuring local governments' responses to the challenge of promoting livestock mobility. The implementation of the pastoral charter is, nonetheless, rooted in a broader discourse that the next section will review as necessary context for understanding questions of pastoral resource governance at the local scale.

The imperative of pastoral mobility in dryland West Africa

Mali's pastoral charter reflects the widespread acknowledgement that mobility is necessary for sustainable livestock husbandry in dryland areas (Niamir-Fuller 1999, Hesse 2011, Marty 2006). Marty (2006: 1) describes the function of mobility in terms of dryland ecological conditions: "In a risky and variable environment, mobility is [..] an advanced technique that permits access to resources that are essential to life in a pastoral environment." In semi-arid to arid environments, this refers to the need for cattle herders to access available grass and surface

water resources that are part of a landscape mosaic that shifts at different spatiotemporal scales (Vetter 2005). In these dryland environments livestock are healthier if they have access to semi-arid rangelands that provide more nutritious forage during the rainy season (Penning de Vries and Djitèye 1982). Livestock that are geographically constrained during the rainy season can also cause soil compaction and overgrazing, particularly in more sub-humid areas (Powell, Pearson, and Hiernaux 2004). Mobility is also employed as a strategy to move livestock away from agricultural areas when cropped fields are vulnerable to damage. Agrarian inhabitants utilize this strategy at various spatio-temporal scales, ranging from movements of a few kilometers within a village territory to transhumant movements that span several hundred kilometers between ecoregions (Bassett 1986, 1994). More broadly, mobility in all its forms, is also seen as a key strategy for climate change adaptation strategy (Agrawal and Perrin 2009), particularly in dryland environments.

Among the senior pastoralists in Kotouba who participated in a survey on mobility-related issues, the vast majority expressed the feeling that transhumance is still necessary despite livelihood changes that would suggest otherwise. The survey consisted of 32 heads of pastoral households,[6] which included all pastoralists who were in Kotouba in early November 2011 and willing to answer questions about their livelihoods. Among the 28 who responded affirmatively, 15 said it was for the health of their animals since not only is pasture more nutritious in the north but there was feeling among many that zebu cattle do not do well in the muddy, humid conditions during Kotouba's rainy season. 3 out of the 32 declared that there was no longer any

[6] Household is a complex concept in West Africa. In this instance, interviewees were the eldest males in patrilineal groups who shares cattle ownership. Such groups are polygamous and elder males typically have some control over the labor of their younger brothers, nephews, and children.

need to return seasonally to northern rangelands and communities. This included one herder who had settled and owned few livestock but another who still moved 150 cattle each year to the north but felt it was no longer necessary to do so. When asked about the importance of family and social relations in the north, 16 responded that they are still an important factor while 8 said they are not. A few commented on the elasticity of relationships and the opportunities they have to establish new ones in new places.

Concerns about these issues of kinship, group identity, and culture are emphasized in the new paradigm of mobility-based dryland pastoralism (Niamir-Fuller 1999). (Crane 2010) describes the negative cultural impacts resulting from the shift away from mobility-based pastoralism to settled *agro*-pastoralism among ethnic Fulani in central Mali. By doing so, the author highlights the importance of the normative dimensions of social-ecological changes that necessarily accompany technical changes to production systems and livelihoods. Other anthropological studies such as (De Bruijn and van Dijk 2003) emphasize that it is difficult to make generalizations about livelihood change as mobility takes various forms and the motivations behind mobility-based livelihoods vary considerably between social groups and individuals, even among pastoralists. Self-identified pastoralists move in and out of mobility-based strategies depending on the opportunities and constraints they face (Burnham 1999), especially in West Africa with its long history of farmer-herder interaction and integration (Ellis and Galvin 1994). Moreover, herd movements are not always motivated by considerations about natural resources as (Adriansen 2006) demonstrates in his study of mobile pastoralists in Senegal. That study found that herders also base many of their movement decisions on economic opportunities, particularly the high prices received for livestock during religious

festivals such as Tabaski. In short, livestock mobility is about more than just access to natural resources; it takes place within specific cultural, economic, and historical contexts.

Colonial observations of transhumance in western Mali

Colonial administrators in the 1930s observed as much with regard to pastoralists in Mali and exhibited the same urge to regulate pastoral mobility as current policymakers. A telegram dated May 31st, 1939 from the Nioro cercle district official (Commandant May 31, 1939), situated in the northwest of the Kayes Region, to the Governor of French Sudan read:

> The transhumance cycle that periodically sends the nomads into the sedentary zone is not, in the Nioro cercle, particularly determined by the search for water points and pasture, both of which are abundant in the Sahelian zone. If the water points are few and if those that do exist dry quickly after the rainy season, it is rare that digging a few meters does not reach an underground aquifer that is sufficient for the needs of animals and humans for most of the year. The Nioro Sahel is therefore not lacking water points and the Moorish inhabitants of the cercle can easily practice transhumance strictly within the nomadic zone without ever having the need to descend into the sedentary zone.

The correspondence goes on to describe the administrator's encounters with semi-nomadic Moors and Fulani as evidence that it is not 'water, nor pasture that certain nomads search for in the sedentary zones.' It is observed, instead, that:

> The reasons dictating these seasonal movements owe much more to the search for economic necessities than practical ones. The Moors, in effect, especially since the extension of peanut cultivation, make themselves transporters by putting their animals at the disposition of farmers to transport their products.

The colonial administrator's observations reflect the commerce-oriented, diversified livelihoods that pastoralists have long employed and continue to practice today. In sub-humid area parts of West Africa, which are important areas for pastoral herds during the annual dry season, resources such as pasture and water are less variable in space and time, which, in turn, enables mobile herders to follow relatively predictable pathways each year and develop relationships with host farmers in areas where they will stay temporarily with their livestock (Bassett and Koné 2006). These movements and the social relationships that facilitate them are enmeshed in the need for water and pasture but play an equally important role in generating opportunities to earn cash and build the political alliances that were deployed following the conflicts in Yanfolila, Nyebleni, and Kotouba.

Modern mobility and conceptions of pastoral resource governance

Mobility therefore remains an essential dimension to dryland livelihoods, even in the context of modern political economies (de Jode 2010, Nori, Taylor, and Sensi 2008, Turner 2009). Mali's pastoral charter as well as legislation passed by other West African governments reflect this importance and, by doing so, have begun to reverse a long history of political antipathy towards pastoral transhumance, nomadism, and the social groups that rely on them (Hesse 2011). Governing pastoral movements and access to critical resources represents an acute challenge for institutions at all scales, especially in the context of ongoing expansion of agriculture. As Galvin (2009 191) describes: "The paradox of pastoralism is that it needs security to protect its flexibility." Defining the problem in terms of boundaries, Fernandez-Gimenez (2002): 50) asks how "to define spatial and social boundaries around resources and user groups in situations

where spatial and social flexibility are intrinsic and essential characteristics of resource use patterns?"

Historically, certain pastoral groups in many African regions secured resource access by politically controlling those resources on which their livestock and livelihoods depended. Examples such as the Fulani pastoralists of the Inland Niger Delta (Lane 1998) and the Maasai of East Africa (Mwangi and Ostrom 2009), who governed resources in ways that resembled the principles outline in contemporary common property resource (CPR) theory such as group membership and clear rules of use (Ostrom 1990). These historic case studies have influenced the ways in which researchers conceptualize pastoral governance and, more specifically, pastoral resource tenure, with important implications for how mobility and resource access are currently being framed and addressed through law.

Traditional pastoral rights and attachment zones

Based on research conducted in the Inland Niger Delta, Lane (1998) asserts that pastoral lands in Africa are generally held under controlled access tenure regimes in which group membership dictates access to land and other resources. In that area, clan-based groups of Fulani pastoralists were forced by pre-colonial authorities to establish a complex system known as the Dina that governed the various aspects of pastoral livestock production such as which herds could access floodplain grazing areas, when they could access them, and for how long their livestock could utilize them. Similarly, the Maasai once possessed institutions that governed resource use based on flexible, multi-scaled, group-based control, which assured that resource users perceived rules as legitimate and respected them (Mwangi and Ostrom 2009). The Dina, traditional Maasai institutions, and innumerable other customary systems have since been eroded or replaced, which

has had deleterious effects on pastoral landscapes and peoples, especially in terms of mobility and flexible resource access (Fernandez-Gimenez and Le Febre 2006).

Policymakers have been trying to mitigate this downward trend in mobility-based pastoralism by returning some decision making authority to “traditional” local users and promoting several other measures identified as conducive to flexible resource access. CPR theory and its focus on group-based control of resources are shaping these policy approaches through concepts such as traditional grazing or pastoral ‘attachment’ zones, livestock corridors, and formalized mechanisms for dispute resolution. These concepts permeate laws and legislation that aim to promote pastoral mobility yet they are not necessarily well-suited to all the settings in which it is practiced, particularly in sub-humid areas, where pastoralists are relatively recent inhabitants.

The presumption that CPR institutions, whether restored from historic systems or built from scratch, are the most appropriate institutional form ignores the historic arrangements and current political dynamics across large areas where pastoral mobility is practiced and in need of protection. While such approaches may be effective in Maasailand or where pre-colonial systems still hold influence such as the inland Niger Delta, these concepts are problematic in areas where pastoralists rely on secondary rights that are maintained through informal friendships and alliances. Such mismatches between CPR-based rules and historically grounded customary arrangements between certain social groups are made even more complicated by the uncertain politics of decentralization.

The pastoral attachment zone represents one such mismatch. The attachment zone can be defined as a home area to which transhumant pastoralists return periodically to renew social ties, carry out various cultural practices, and access grazing and water resources to which they possess tenure rights (Bonnett 2011). Although attachment zones are perceived as essential to mobility-based pastoralism, the concept has not been critically examined by scholars. Uncritical use of the attachment or pastoral zone concept in resource policy and project planning tends to lead to a conflation of its productive and political dimensions. It is important to instead define attachment zones in terms of their distinct geographic, political, and environmental characteristics. In the West African context, this includes whether such a zone is beyond the cropping zone and free of agricultural fields. If not, it is important to clarify whether the zone refers to a contiguous area that includes presently cultivated and/or arable land. In such cases, attachment zones must be defined in the context of historic and current patterns of land use and tenure.

Key questions concerning these issues include: Is the zone a traditional grazing area that is being fragmented by agriculture as a result of dispossessed pastoral land rights as in the case of East Africa (Galvin 2009)? Or, are smallholder farmers who possess customary tenure rights legitimately expanding their fields into ‘land reserves’ that simultaneously serve as seasonal pastoral zones? This is a process occurring throughout West Africa and, while such expansions are not always legitimate, the overall trend of agricultural expansion in West Africa points to the difficulty in delineating specific territories where productive pastoral resources are located and where pastoral tenure rights are separable from those of agriculturalists. As chapter five explains, NGO efforts to improve pastoral resource governance in the areas to the north of

Kotouba, where its transhumant pastoralist spend the rainy season, failed largely due to this fundamental issue of overlapping resource tenure.

In short, there are frequent geographic mismatches between the productive characteristics of agro-pastoral landscapes on one hand and their political characteristics on the other. These mismatches partly result from the substantial southern shift in pastoral livestock production in West Africa following the Sahelian droughts of the 1970s and 80s. For many of the pastoralists who have migrated into southern sub-humid areas over the past half century, attachment zones or any such area where they possess residency-based tenure rights are no longer part of their everyday livelihoods. The Kotouba cases demonstrates how these areas may remain politically and culturally important but lose their productive value when pastoralists begin focusing their livestock mobility strategies on areas further to the south. One pastoralist who sends his livestock with a hired herder to a pastoral area in Mauritania has not been back to his clan's attachment zone in over forty years. Although he still leaves Kotouba each rainy season with his livestock, his affinity for 'the place where he has stayed since he was a teenager' is stronger than it is for his clan's original home area, even as tensions with local residents in his new 'home' have continued to increase.

Pastoral herders in such situations have relied less on group membership and rule-based access to clearly defined resources, as described in CPR theory, than on their *tutorat* relationships with patrons or hosts in certain strategic locations. These relationships historically have facilitated migration and integration among all kinds of social groups throughout the region (Kopytoff 1987). However, a key characteristic of the *tutorat*, as pointed out by (Chauveau 2006) is that it can act to maintain the "outsider" status of certain social groups such as herders,

which, in turn, reinforces primary land and resource rights that are based on autochthony and held by farmers. This explains why local farmers in Kotouba are attempting to maintain the existing *tutorat*-based convention: it empowers them vis-à-vis pastoralists. However, it does so only through customary, autochthony-based rights, which are only part of the political calculus at work within Kotouba's local government, which must also accommodate the pastoral charter, other legal statutes, and numerous other political considerations. Moreover, as the next section explains, the convention to which farmers are attempting to cling does not reflect pastoralists' current livelihood needs.

Historically, this "outsider" status served mobile herders well because they could rely on usufruct pasture rights and the scarcely used peripheries of village territories, which provided sufficient resources for their cattle while farmers finished harvesting their crops. This is no longer possible for most mobile herders in Kotouba due to a combination of environmental and socioeconomic changes. These factors are leading pastoralists to spend up to ten months in their 'seasonal' destination of Kotouba. Their *tutorat* relationships and the existing convention, which farmers want to maintain, is based on the premise that they can still functionally depend on "outsider" political status and usufruct of resource access, which require them to be out in the bush for many more months than they are currently able or willing to do. Yet, as the next section describes, Malian pastoralists now have more legal rights to practice pastoralism than they ever have in the modern era. However, Malian pastoral law does not exist in a vacuum and its impact in local areas such as Kotouba depends on numerous factors such as its initial design and the actors who are responsible for its implementation.

Mali's pastoral charter

The pastoral charter is the principal legal measure that aims to support herd mobility. At the time of its enactment, the charter was an unprecedented piece of legislation in a region where governments have historically been hostile to nomadic pastoralists. The charter frames herd mobility in terms of legal rights of movement and resource access. Since the ECOWAS decision of 1998,[7] it is legal for pastoralists to cross international borders between member states with their livestock (Hesse 2011). Article five of the Malian law codified pastoralists' legal right to *move unhindered* within the national territory with the exception of protected areas. Several other articles within the charter define pastoral resources in terms of grass, fodder producing trees, salt licks, and water sources to which legal access rights are attached.

Despite outlining a robust legal framework for mobility-based livestock production, Mali's pastoral charter has several shortcomings. The foremost issue is that it does not address the issue of *land* tenure (Diarma 2004). The law explicitly defines pastoral *resource* tenure in terms of user (usufruct) rights that do not involve the transfer of ownership rights or title (Article 50). Pastoral rights have traditionally been use rights since they involve grazing post-harvest crop residue and fallowed fields that are controlled by farmers or, in semi-arid environments, patchy grasslands that are of variable productivity and therefore not worth claiming strict rights over. However, agricultural expansion and other environmental changes are rendering mobility that is based solely on secondary use rights inadequate because cropping rights always take precedent over grazing usufruct. This is reflected in the pastoral charter's measure (Article 48) that calls for local governments to establish and protect "pastoral zones" although the charter does not explicitly define what these zones should include. Certain zones in the north may

[7] ECOWAS stands for Economic Community of West African States

reflect the traditional attachment zones described earlier, but in sub-humid areas, they will represent new projects of land territorialization (chapter five). Pastoral zones presumably include any geographic area that contains pastoral resources but their establishment and spatial delimitation immediately raises questions about *land* tenure and ownership, particularly given the legal flux associated with decentralization. In fact, one of the most far reaching decentralization laws, passed in 1995, defines the local pastoral *domain* as including these undefined zones, along with livestock passage corridors, water points, and agricultural fields that have been fallowed for longer than ten years (Gouvernement du Mali 1995).[8] The stipulation on fallowed fields raises important issues regarding land tenure. In reality, the national government remains the legal owner of virtually all land in the country. Customary land tenure, like pastoral tenure, is recognized only as a use right and not through legal ownership. The 1995 law represented an incremental shift towards local control although full legal transfer remains hindered by the central government. By defining ten year old fallows as part of the local pastoral domain, the national government effectively grants local governments the discretionary power to establish pastoral zones in their territories. These zones are needed in sub-humid parts of Mali and other parts of West Africa but they are politically difficult for local leaders to implement. The New Agricultural Orientation Law of 2006 made this even more difficult by strengthening the customary land rights that are typically held by smallholder farmers who vigorously resist any measure that resembles a transfer to the pastoral domain (Gouvernment du Mali 2006).[9] The 2006 law represents an important step towards the legal transfer of land from the central

[8] The law regarding length of fallow is found in other parts of the world (c.f. Roth 2007) and has been used by central governments as an instrument for expropriating smallholders of their land.

[9] In this way, the 2006 law resembles the case of Ghana described by Boone (2007).

government to local municipalities but risks marginalizing the pastoral charter through this emphasis on *customary* rights. Ironically, article 76 of the pastoral charter calls for "broader-scale resource governance coherent local, municipal, and regional land management plans." However, such plans administratively onerous, beyond the capacity of most local and even regional institutions, the latter which suffer from a deep lack of capacity and legitimacy in the eyes of most rural inhabitants..

For example, the pastoral charter declares that livestock corridors should be established and delimited by local municipalities. Given that the pathways taken by most pastoralists cross several municipalities, it is questionable whether the municipal government represents the best institutional scale to govern corridors yet there are no viable alternatives. As a result, some municipalities are attempting to work cooperatively on corridors that cross their jurisdictions but are having limited success. The issue is even more important in light of Article 15, which states that herd movements should or must take place *within* these corridors. The establishment of these corridors is problematic due to the same factors that complicate the delimitation of local pastoral zones: customary land rights holders do not want to cede any territory to pastoralists, even if legally it does not represent a transfer of ownership (see chapter five).

Decentralized governance

Political decentralization implies that local governments are legally responsible for implementing the pastoral charter as well as the other laws and measures that will affect it in practice As the dominant political paradigm in Mali and much of the rest of West Africa, decentralization reflects the theory that locally elected institutions will be more responsive to their constituents

and therefore deliver services more efficiently and with less corruption than the central government (Smoke 2003).[10] In terms of natural resource governance, decentralization works to bring local actors into the process of decision making (Berkes 2010). These notions reflect a widely held notion that effective institutions provide a way for rational actors to work collectively to resolve dilemmas and establish norms such as sustainable or equitable governance of shared resources (Manger 2005, Ostrom 1990, van Laerhoven and Andersson 2006). Empirical research has provided strong evidence that decentralized institutions that empower local resource users lead to such outcomes for forest resource governance (Chatre and Agrawal 2009,; Andersson, Gibson, and Lehoucq 2006).

By extension, policy reforms that aim to improve agro-pastoral resource governance assume that democratically elected *local* governments are most suitable for fostering effective collective action by competing groups such as farmers and herders. A challenge facing communities across West Africa is the question of who qualifies to be a member or citizen of the local community or decision making group, particularly in terms of land resource governance (Berry 2009). Ribot (2004) asserts that local citizenship and the right to participate in decision making should be based on residency but this policy risks further marginalizing mobile groups such as pastoralists and migrant farmers.[11] Notions of local residency belie the geographic complexity of local livelihoods and politics as (Painter, Sumberg, and Price 1994) point out in their criticism of the spatially bounded concept of local community. The authors propose the idea of a broader 'action space' as a more fitting description of the much larger socio-spatial

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[10] Decentralization was emphasized as an important component of environmental sustainability in the landmark Agenda 21 framework developed at the Rio UNCED meeting in 1992.

[11] Ribot's argument draws on analysis of the forest product sector, particularly charcoal production, which is characterized by powerful outside interests exploiting the political weakness of local residents in rural communities.

scales at which rural West Africans reproduce their livelihoods.[12] The Malian pastoral charter, the statutes that enacted decentralization (e.g. Laws 96-050; 06-436) and even the Malian Constitution of 1991 itself reflect the fact that people throughout the region are constantly on the move.[13]

Naïve views of decentralized resource governance assume that it policy reforms will lead to coherent outcomes that reflect homogenous community preferences or, at least, that groups with competing preferences will negotiate their differences through a relatively transparent decision making process (Agrawal and Gibson 1999). It is the hope of many scholars and donors that such a process, carried out entirely through the downwardly accountable channels of empowered[14] elected local councils will create a virtuous cycle that builds the legitimacy and authority of local democracy. Unaccountable customary or undemocratic formal institutions will, in turn, wither away. The reality is that, even in cases where decentralization is being implemented, it often incomplete or partial (Bartley et al. 2008, Mearns 2004)[15] and its impacts depend on local context (Colfer and Capistrano 2005, Lejano et al. 2007, Meynen and Doornbos 2004) and the intentions of implementing bodies, especially national governments (Poteete 2003). Intent is a crucial dimension in the case of Mali, where the decentralization process began in the early 1990s primarily in response to two factors: the collapse of the central

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[12] It is well recognized that rural households often depend heavily on remittances from family members who have permanently settled abroad or migrate seasonally in search of work, practice known as “circular migration” (Rain 1999).

[13] Citizens of members of the Economic Community of West African States (ECOWAS) can travel in community member states without a passport.

[14] Financial and political empowerment: the means to implement policy and lack of outside manipulation while doing so.

government led by autocratic leader Moussa Traoré and the Tuareg rebellion in the north of the country.

Sustainable and equitable resource governance was therefore an afterthought in Mali's decentralization process. Donors such as the World Bank have nonetheless placed substantial hope in the process through community-based natural resource management programs, which include pastoral resources as a principal focus.[16] . Yet the uneven and slow implementation of reform reflects not only the central government's interest in maintaining control over lucrative markets such as forest products (Pulhin and Dressler 2009) but also a lack of strong political commitment to making decentralization work effectively in rural areas, which are a low priority to the central government.

Political context and culture of decentralization

On a more fundamental level, it has been questioned whether decentralization can succeed without a broader "culture of transparency and civic engagement"(Francis and James 2003: 325) that is not well developed in rural West Africa following decades of top-down rule and neglected social development. A lack of transparency and civic engagement can lead to situations where decentralization benefits local elites, other privileged community members (Agrawal and Gupta 2005) or even enables central governments to strengthen their control over local resources (Ribot, Agrawal, and Larson 2006). Yet the problem with how resource governance and institutions fit into rural life in West Africa goes beyond a lack of administrative capacity or regressive political culture.

[16] The program's more commonly known French name is *Projet de Gestion des Ressources Naturelles* (PGRN)

In her criticism of rational choice theory, (Peters 1987, 1993) argues that institutions and even the resources themselves cannot be separated from the power relations and structures of social meaning in which they are embedded (see also (Cleaver 2003). A critical implication of this is that the distinction between formal and neo-traditional institutions is not clear-cut (Hetland 2008), especially in countries such as Mali. Although the decentralization reforms in West Africa have made it easier for ordinary people to influence local decision-making, participation in politics is still channeled through clientelistic networks that reflect deeply rooted social relations and blur the distinction between the categories of formal and customary (Bratton 2010) (Leonard et al. 2010). Democratically elected leaders who operate in the "formal" sphere, such as municipal mayors, still derive considerable authority from customary sources such as lineage or sorcery (Geschiere 2003) (Soudan 2012), and customary leaders such as village chiefs or religious leaders are still deeply important to local and even national politics. These overlapping, mutually constitutive spheres of authority reflect the processual paradigm that institutions are not "things" but what people do and they are continually reproduced through social interactions (Moore 2000, Lund 2008).

Territorial practices and decentralization

This anthropological perspective on power, relationships, and institutions is valuable for understanding how inhabitants of rural West African communities are responding to the new opportunities and constraints imposed by decentralization in their everyday practices of resource use and governance. It also allows for the integration of territorial and spatial practices as productive dimensions of local institutional development, including the negotiation of new conventions. Scholars have already shown how the territorializing effects of schemes to draw

boundaries around resources can disrupt land tenure relations and cause conflict in West Africa (Gray 2002, Ouedraogo et al. 2010) Le Meur 2006). More recently, (Gautier, Bonnerat, and Njoya 2005, Gautier, Hautdidier, and Gazull 2011) explain that woodcutting is employed in the context of decentralization as a practice that reconfigures and re-legitimizes the claims held by different groups over areas where forest resources are located.

The decentralization process thus leads to new processes of political subject formation that are both spatialized and relational. Writing about Mali, Lima (2003) describes decentralization as a shift from "relational space to institutional territory." Yet, as the author and Idelman (2009) point out, this shift is far from complete as "spatial forms [such as resource management boundaries] interact with social forms that are themselves shifting." (Djiré 2003b) adds directionality to this shift by arguing that decentralization necessarily implies a scaling up from "village space" to "municipal space" in terms of resource governance.[17] In light of these and other analyses, it is useful to consider this upward movement from the village to municipal scale as a corollary of Idelman's shift from relational to territorial within the realm local governance.

It is then necessary to engage with two related dimensions of this shift in the context of local conventions. The first dimension includes the ways in which local actors discursively frame pastoral mobility and settlement as they negotiate in a context of institutional flux. The second dimension, which requires reversing Gautier's (2011) framework, involves how political subjectivities that are shaped by decentralization can, in turn, influence important spatial

[17] The commune is the basic administrative unit created through Mali's decentralization process. It is akin to a county or district in the United States and, on average, includes 10 to 15 villages within its jurisdiction.

practices such as livestock mobility patterns. Each of these issues requires engagement with the *geographic* dimensions of livelihoods, which are often left out of social or anthropological modes of inquiry.

Framings of mobility and settlement

In terms of settlement, 14 out of 32 of the pastoralist survey participants responded affirmatively to the question "Would you like to permanently settle in Kotouba?" Although pastoralists often settle in new areas and continue to practice transhumance; in Kotouba, these ambitions reflect a significant livelihood shift that many are undertaking and many more plan for the future. This shift involves less mobility, a greater focus on commerce, and, necessarily, fewer livestock. In an informal conversation on the topic, Ibrahim Sow described the new strategy as involving holding 40-50 head of cattle, a secondary commercial activity (e.g. buying or selling cattle, renting draft animals, retail), and integration into the community. Compared to traditional, transhumance-based livelihoods, this strategy involves 'less suffering, more profits, relationships, and fewer risks.' Demba Sow added that "Owning a large number of livestock is nothing but problems. Peasants, foresters, and others prey on you." Samba Sow estimated that the trip from Dioumara's rainy season rangelands to the dry season pastures in the Birgo area can cost up to 400,000 CFA in crop damage and related costs.

In light of these and other difficulties, every young herder in the Fuladougou who was available for comment expressed disinterest in transhumance.[18] One simply stated that if he

[18] Younger herders are more difficult to interview, especially in November, because they are in the bush with livestock. Secondly, this does not imply that no young pastoralists want to practice transhumance; only that a sizeable number do not.

could find another shepherd to work on wage, he would stop *that day* and go into commerce. Another young herder expressed relief that he had convinced his father to sell at least a few of their animals in order to purchase land and build a house in the town of Dioumara. A sentiment exists that the large herds of several hundred cattle are a habit of the older generation. One young herder expressed this view through this statement: 'Give me the forest [for my livestock], there are too many [agricultural] hamlets. This is the perspective of the older guys.' These comments suggest that sedentarization and herder reduction will accompany the generational shift that is beginning among pastoralists in Kotouba. A study conducted in Cameroon, Kossoumna, Dugué, and Torquebiau (2010) revealed the same generational shift and demonstrated that the 'new strategy'—focusing on markets and diversification-- makes a good deal of economic sense but it involves important labor tradeoffs. As pastoralists settle [19] in order to farm or begin another economic activity, they tend to guard fewer animals than a traditional pastoralist lifestyle would require. The herds of settled agropastoralists tend to move shorter distances, either due to labor constraints or the owner's desire to keep his animals close to his place of residence (Little 1984).

Settled pastoralists who retain larger numbers of animals must send their animals on long distance transhumance due to forage limitations in cultivated areas (Kossoumna, Dugué, and Torquebiau 2010). This creates a labor tradeoff between cultivation and livestock herding, which often leads livestock owners to begin employing salaried herders to tend their animals (Bassett 1994). Indeed, pastoralists in Kotouba observe that wage labor will gain in importance

[19] Similar trend in West Africa: Fratkin (2012) found that the Ariaal, Rendille, Borana, and Samburu of northern Kenya have increasingly settled in or near towns as pastoralists in Kotouba are doing (Galvin 2009).

in the future for the reasons described by Kossoumna, Dugué, and Torquebiau (2010). This trend favors more well-endowed households that can afford extra labor and leads to a bias towards individuals and families with larger herds to continue long distance transhumance while poorer households pursue more sedentary lifestyles.

Several studies have shown that the well-endowed households who can afford large herds are often not pastoralists at all but affluent urban residents (Turner 2009). This is a widespread phenomenon, but perhaps due to its remoteness, the northern Fuladougou is still something of a refuge for ethnic Fulani who possess large numbers of cattle. The household head survey revealed a compelling geographic trend at work in the area. The average herd size among the survey respondents who expressed an interest in settling was 200 head while those who do not intend to settle possess an average of 341 cattle, which represents a high level wealth for the region. Interestingly, the average age of 'settlers' is 53 while that of 'non-settlers' is 49, including the pastoralist with the largest herd (approximately 1500) who is a mere 35 years old. These herd size numbers potentially confirm the pastoralist divergence described earlier and, while the age difference is not sizeable, may indicate "settlement as retirement" is at work in Kotouba although the negative views of transhumance expressed by the younger generation complicate that picture.

The more compelling pattern among survey respondents is that the 'non-settlers' cluster in the far north of the Fuladougou—the former No Man's Land (c.f. Benoit 1999) on the southern edge of the Boucle de Baoulé biosphere reserve (figure 2). Agriculture is very sparse in the area, affording herders access to wide expanses of pasture and permanent water sources, many of which are located within the biosphere itself. The pastoralists who favor this area are

essentially sticking to the classic mobility-based livelihood that depends on access to extensive resources and 'outsider' political status. The area includes a few frontier hamlets but no sizeable markets or official villages, where the pastoralists would benefit from becoming tax paying citizens (see chapter three). Instead, these pastoralists utilize the last 'interstitial space' in the Fuladougou transhumance zone; their wealth allows them to pay off foresters to keep their large herds inside the biosphere reserve as needed and tolerate livestock mortality caused by the rebounding lion population. According to Ibrahim Sow, 'there will always be transhumance coming down from the Sahel' so measures that promote mobility such as the livestock corridor described in chapter five are necessary. Given the changes at work in the Fuladougou's pastoralist community, it appears that the corridor and other measures concerning resource governance will differentially affect different households. Over the long-term the corridor itself may benefit wealthier herders while its political consequences affect those who are attempting to integrate and may eventually have no need for the corridor at all. In any case, such attempts to reform or improve pastoral resource governance are deeply intertwined with the struggle over a new convention, which itself is a constitutive element of political decentralization.

Establishing new local conventions

Studies of decentralization and rural livelihoods have paid inadequate attention to local conventions and how they shape governance due in part to an overriding focus on formal institutions and a perceived need to circumvent customary institutions that may not be accountable to all stakeholders (Ribot 2004). According to the theory of institutional choice, accountability will come by recognizing local governments in a way that confers "power and legitimacy, and cultivates identities and forms of belonging (Ribot, Chatre, and Lankina 2008: :

7)." Local governments will gain strength through democratic elections, tax collection, and the provision of services but this process does fully account for exactly how authority will shift from the "customary" to the "formal" democratic sphere or whether such a distinction can even be made. Further complicating the issue of accountability is the fact that the overwhelming majority of mobile pastoralists in Kotouba, even those who seek to settle, do not pay taxes to local institutions that legally govern the resources their livestock need during critical times of the year. Authority plays a critical role in this institutional disconnect: local officials in herders' "attachment zones" do not want them to pay taxes in those localities because it would represent a major financial loss to their cash poor governments. Mobile herders are further constrained by the involvement of customary Islamic authorities residing in those areas who, in addition to providing spiritual support, are major actors in regional political patronage networks and exercise considerable authority over herders, even when they live hundreds of kilometers away. Accountability and authority are therefore entangled not just in votes and tax rolls but also less visible power relations that span the customary and formal spheres while influencing the process of farmer-herder convention negotiation.

Lavigne Delville (2002) argues that local conventions elaborated in the context of decentralization will often accompany a politics of exclusion by one group vis-à-vis another. In terms of governing resources such as timber or non-timber forest products, such exclusion may reflect local residents' legal right to enforce rules concerning their common property resources. Although there has been concern that measures of exclusion would be applied by farmers to mobile herders as a result of political decentralization (Turner 1999), the relationship between

the two groups has proven to be more complex, and in many ways, more resilient than previously thought.

Farmers' interest in maintaining the existing *tutorat*-based convention is a tacit form of exclusion, even as, one by one, certain pastoralists do settle in their communities. It is common to hear farmers complain that pastoralists 'cause too many problems,' 'they bring too many cattle,' or 'if you allow one to stay, his entire extended family shows up.' Farmers push for renewing or reinvigorating the local conventions that keep pastoral herders out for most of the year but their actions demonstrate that they are unable and, in some cases, unwilling to stand up for this position. One specific problem is that maintaining the existing convention would require physical exclusionary measures of herders during several months of the year, which is both illegal and risky, given that such actions, when carried out, often lead to violent confrontations between the two groups. Secondly, it is not in farmers' interest to maintain a hardline position given their financial dependence on pastoral herders in times of sickness, celebration, or other extraneous circumstances that farmers inevitably face. Farmers typically possess cash only one per year when they are paid for harvested crops. By contrast, herders in possession of livestock can quickly convert animals into cash when the need arises and make loans to farmers. As the events in Nyebleni demonstrated, pastoralist herders use their financial clout, not just in their dealings with high authorities, but as a political lever *within* peasant communities as well. As one herder in Kotouba put it: "They can kick us out if they want, but in a year or two, they will invite us back on their own."

There is also the physical impossibility of stopping the arrival of thousands of transhumant livestock. A young herder who aspires to stop moving seasonally with his family's

livestock exclaimed: “Even if I don’t come, the cattle would arrive because they were raised on the path of transhumance and don’t know anything else.” In this situation, actions speak louder than words: farmers who hold land tenure rights and increasing political power through the local ballot box are nonetheless constrained to accommodate the changing needs of pastoral herders because of the ways in which their livelihoods are intertwined financially and geographically with those of mobile pastoralists.

Farmers in the Kotouba have begun to acknowledge that they might be fighting a losing battle in their effort to keep the pastoralists out. Expats involved in lawmaking in the capital remind them of the pastoral charter’s legal weight and their own financial interest is inevitably leading to a recalculation of their position. Authorities in several local villages, including Galamado and Kolifilo, think back to when pastoralists asked to reside in their villages and they refused. In 2011, leaders of both villages stated that they would grant permission of residence and this might be a sentiment that is percolating up to the clan-based, inter-village organizations where customary authorities deliberate issues they have in common. In June of that year, members of local Diakité clans met in the village of Madina and decided that certain pastoralists could potentially stay in their communities but they reserved the right, rather than cede it to the municipality, to refuse the requests of individuals who do not behave as good community members. They were apparently thinking of one Fulani in particular, who has been accused of a great deal of crop damage and has notoriously flouted all attempts at mediation.[20] The decision taken at the Madina meeting reveals that, most of all, farmers do not want to lose what political

[20] Certain informants point out that this individual is a member of the hereditary elite among the local Fulani, which they feel contributes to a feeling of superiority and disinclination to cooperate with farmers.

control they have over the pastoralist Fulani, who, over time, may begin to dominate them politically as they already do economically.

Municipalities as terrains of negotiation

These developments in the Fuladougou reflect the fact that the local convention between farmers and herders and terms on which it is being renegotiated holds deeper meaning than a narrowly defined set of rules about resource access. As Djiré (2003a) explains, conventions establish the 'force relations' between the two groups in much the same way as peasants establish autochthony through covenants with land spirits and oppositional relationships with migrant groups (see also De Bruijn and van Dijk 2003). Contested and uneven attempts by municipalities to establish pastoral zones and corridors show that the shift from village to municipal space is not linear, predictable, and cannot be categorized as a binary between "relational" and "territorial." The municipalities of Kotouba and Sebecoro, despite serious farmer-herder conflicts in the last few years, have made real progress on the issue of pastoral resource governance. Dioumara, by contract, is at a standstill, despite the much longer history of agro-pastoralism and farmer-herder coexistence. Even as some municipalities successfully implement certain territorial rules laid out in the pastoral charter, relationships between farmers, herders, and local authorities will continue to be the most important aspect of resource governance. These relationships, as previously argued, will be articulated and increasingly codified through new local conventions that represent a bridge between customary and formal spheres of authority and law.

The most important institutional actors mediating this process are local Mayors who are emerging as the actors most able to bridge the formal-customary divide because of their legally

vested powers and social connections to village communities. This enables them to work as a point of negotiation between farmers and herders in a way that is seen as sufficiently legitimate by both parties. Mayors in Mali are democratically elected but, in one of the Fuladougou's municipalities, candidates are chosen exclusively from autochthonous lineages.[21] Nonetheless, suspicion of the Mayor, as a new political actor, has come from autochthonous farmers themselves—the consummate local citizens who should represent ideal democratic subjects. Yet peasant farmers often fear a further erosion of village-level authority, especially when municipal governments are in communities with whom they do not share customary ties (Idelman 2009). By contrast, herders, although they may not vote in local elections, tend to see the Mayor's office favorably since it is a new "forum" in which they can negotiate to promote their interests; especially vis-à-vis the goal of integration and settlement.

For example, the village of Ngagnou has responded to the Nyebleni incident much differently compared to the hard line taken by neighboring Suunti. Although initially the residents of Ngagnou also attempted to keep herders out, they have since begun a new strategy that has involved an expat member of the Malian military and the Mayor of Sebecoro. In the spring of 2011, two young Fulani pastoralists approached village leaders and asked if they could stay there for the year to do commerce and cultivate small fields. Members of the village were ambivalent at first but, coincidentally, a military officer happened to be there preparing for his retirement when the Fulani approached. The colonel, who was well aware of the crop damage and farmer-herder conflict in the village, made a proposition to both groups. He proposed that

[21] This is the case in Kassaro, a town comprised mainly of functionaries and other 'non-local' residents. Neighboring autochthonous villages agreed that Kassaro would become a municipality but on the condition that they Mayor always have autochthonous roots in the area.

the two be allowed to stay on the condition that they take responsibility for preventing crop damage from occurring and mediating compensation when it does. When the members of the village grudgingly agreed, the colonel took the proposition a step further and invited the mayor to come and draw up a contract that the two Fulani and the appropriate village authorities would sign. The mayor, eager as he was to begin integrating the Fulani into his municipality, readily agreed to do so.

Although the terms of the agreement are vague and will inevitably be subject to dispute, the involvement of the mayor in such effort to redefine village-level farmer-herder relations in a transparent and somewhat democratic fashion is a sign of institutional change. If that particular mayor stays in office, it is likely that he will promote this approach in other villages as well and give the agreements the full *legal* backing of the municipality. Although many farmers in Ngagnou are skeptical, the two Fulani, for their part, felt up to the task and expressed satisfaction at having a higher degree of security in the community than they would without the agreement in place. They claim that they will be able to avert crop damage because of their social ties with herders who pass through Ngagnou each year, which is revealing about the nature of crop damage in the area. Moreover, it illustrates the productive connection between village-level negotiations and municipal-level authority.

Perspectives on local government

In the 32 person pastoral household head survey, 20 respondents expressed positive feelings about decentralization and, specifically, the new municipal government.[22] Most of the comments

[22] 20 responded positively, 8 negatively, and 4 with mixed feelings to the question "How do feel about the communal [municipal] government?"

associated with the positive viewpoint reflected a sense that it was good to be ‘close to the administration,’ even among those without any intention of settling in a new place. This is a striking change from the traditional pastoral strategy of working at the margins of political systems and indicates how far the pastoralists in Kotouba have diverged from their existing convention with farmers, which effectively locks them in as non-citizens. Respondents had different reasons for wanting to reside in proximity to the local administration. Some referred to veterinary services, wells that had been dug, or being able to easily acquire birth certificates and deal with other official formalities. Others referred to more abstract interests such as “information passing more easily,” “entente,” and “each is close to the other.”

Yet, the picture regarding decentralization is not black or white. Samba Sow described the municipality as “a double edged sword. If you have problems, the power [administration] is there. You can even get to know the mayor personally. Before [decentralization], the government would not even try to resolve problems; they would just send a gendarme.” However, according to Sow, there are “too many [political] actors” because of decentralization. “Before, you only had to deal with village chiefs. Now, in addition to the chiefs, there are the Mayors and his councilmen.” Among those expressing negative or mixed feelings, three others also stated that there were too many players now on the local political scene. Some were even more trenchant in their criticism of decentralization, which has increased corruption, according to one respondent, and “has not changed anything” according to another.

These views represent an important contrast to the “local excludes outsider” dynamic that some had feared regarding decentralization and points to the complexity of farmer-herder relations in this new political context. Further, mayors are vested with formal power to

implement and enforce national laws. Although mayors derive some authority from customary relationships, their role as policymaker and law enforcement official is an equally if not more important source of influence. This compels mayors, to some degree, to respect laws such as the pastoral charter while accommodating the increasing legal stature of farmers' customary land rights (see chapter three).

In practical terms, this also means that Mayors can legitimately stand up to corruption involving actors at higher levels of government, which has significant consequences for the way in which herders seek patronage and protection.[23] Mayors are now able to short circuit established and corrupt patronage networks between authorities, particularly judges and district officials, and herders by taking legitimate stands for the "rule of law" during critical events. A risk here is a Mayor is tempted to participate in the widely feared exclusion scenario as a way to seek political gain. Yet, systematic exclusion of a social group requires concerted extra-judicial action and, potentially, force, in a way that fundamentally undermines a given Mayor's position as a defender of law and justice. A more likely "exclusion" scenario was seen in Yanfolila where the Mayor and municipal government became marginalized by the autochthonous population who articulated their own sense of justice and took it into their own hands because local elected authorities were unable or unwilling to do so. Events in Kotouba and the rest of the Fuladougou demonstrate a more incremental scenario for Malian and other West African localities addressing the farmer-herder issues described in this paper. Moreover, in contrast to the violent events of Yanfolila and Dogon country, it represents the potential of the Mayoral

[23] The argument here is not that Mayors will not participate in acts of corruption, only that they have a new capacity to stand up against *certain kinds* of corruption emanating from the central government

office to create a new political middle ground between farmers and herders that is based on confronting injustice and exclusion through negotiation. In other words, the democratic process channeled through a local convention.

One herder noted that many mayors *want* pastoralists to settle in their districts for the "riches," increased population, and larger tax rolls. Although herders sometimes use their money in ways that farmers see as unjust, they are also the financiers of many rural communities. In addition to innumerable emergency loans, they are responsible for "infusion[s] of capital," contributions to Kotouba's medical clinic, a local dam, political campaigns, and festivals. All of these give herders a sense of place in the community and the right to integrate. According to the Mayor of Kotouba, "total integration" which would be comparable to the herd reduction and diversification strategy described by Ibrahim Sow, is not a problem. "Fulani livestock will go with the village herd to the west of the village during the rainy season. But there is a total incomprehension. Many farmers do not support integration because of unresolved or uncompensated crop damage." In a fascinating and expressive response to a question about what local government can do about farmer-pastoral herder relations, the Mayor of neighboring Sebecoro, who faces stiff resistance from local farmers on the issue of pastoralist integration, expressed a similar sentiment as his colleague in Kotouba:

> What they (farmers) don't understand—Malian law gives herders the right of passage.' But the herders, 'they're obligated to be good citizens.' There is 'no law to prevent transhumance but peasants think it is my job to chase the Fulani but that's impossible. All we can do is our best to make them become contributing members of our commune. But given the level of education and civility, its impossible that the whole village will accept this. Pressure is needed. It's not like the US. Here it is violence; gerontocracy,

> not the law. The base isn't ripe, they're blind, illiterate, they do not travel. Our role is to educate them on the law and defend their interests for a feasible cohabitation.

Conclusion

Before decentralization, the national government appointed all legal authorities, such as foresters, in rural parts of Mali (c.f. Sanogo 1990). They abused their power and used natural resource laws to extract money from farmers while maintaining the state's firm grip on rural populations. Madou Diakité described one particularly egregious episode when a local forester lit a bush fire himself and then came to the village to demand a fine, since bush fires were illegal at the time. Decentralization, while not entirely erasing corruption or the abusive hand of the state, has set in motion an incremental but profound shift in power relations within local rural communities in Mali. While empirical evidence for this shift is still relatively scant, the cases of Kotouba and the rest of the Fuladougou suggest that decentralization has opened up political space for groups like farmers and herders to work out their differences in more effective ways than in times past.

Yet, this is not a seamless process or one that is limited to the standard, visible channels of government as many proponents of decentralization would like to see. Instead, it is being driven by a multi-dimensional process that is structured by national law (e.g. the pastoral charter) yet anchored in customary relations between farmers and herders. The convention, which is the principal manifestation of this process, has included a discourse of exclusion but, fundamentally, it is about integration and the renewed force relations that integration requires. Although the *donsoton* stand ready to respond to glaring injustices, farmers in the Fuladougou are gradually

accommodating the integration of pastoralists, in some cases because they want to, but, in others, because they have little choice. Ultimately, what is emerging through such acts as the sealed agreement in Ngagnou and the decision made at the Madina meeting is a convention that does not exclude herders but requires them to settle on the terms of local communities, just like all other migrant groups. For the growing number of herders pursuing the new agro-pastoral strategy, this will mean leaving their interstitial positions both in terms of their politics and geographic mobility, and becoming constituents in communities where they once only stayed seasonally.

Figures and Tables

Figure 1. Map of Kotouba area with GLC 2000 land cover categories and elevation. River network and settlement locations acquired from Malian National Geographic Institute, African continent and national boundaries acquired from GLC2000 data set, digital elevation model from Shuttle Radar Topographic Mission (SRTM), cartography by Masrudy Omri.

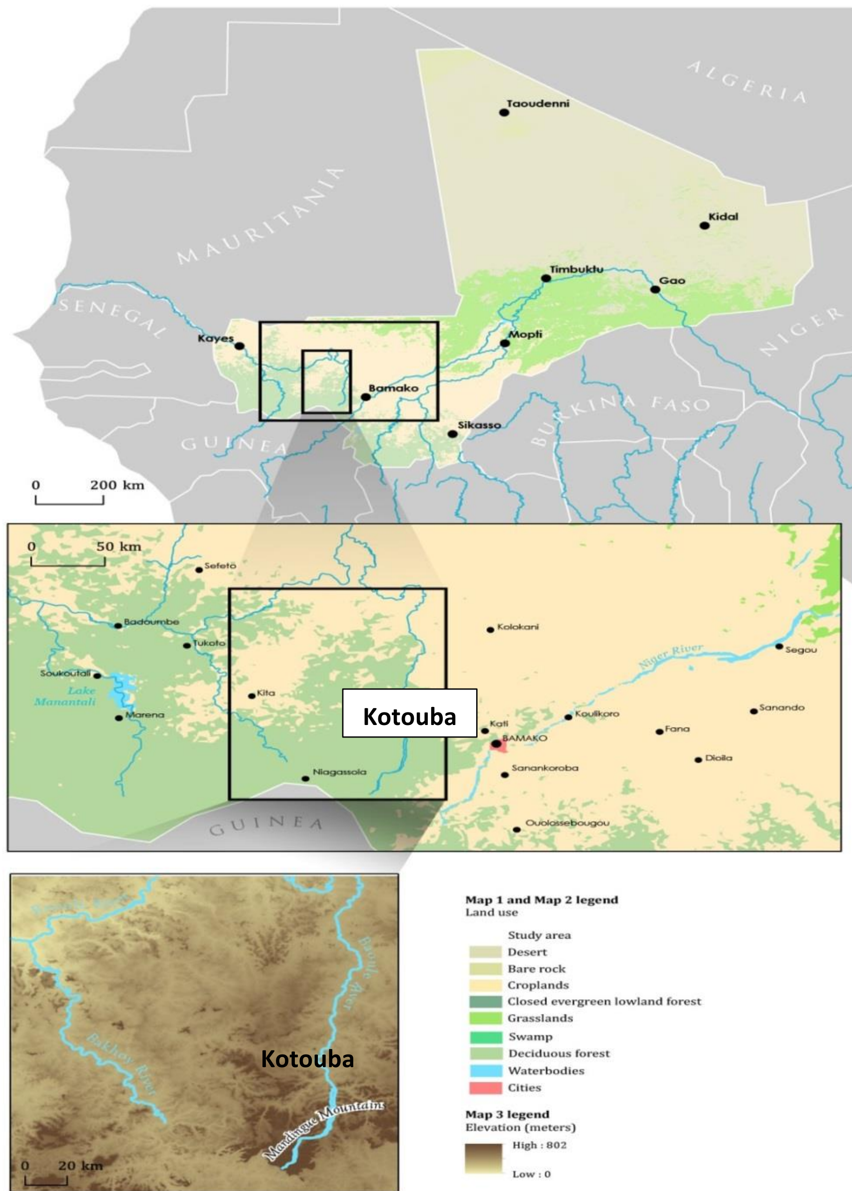
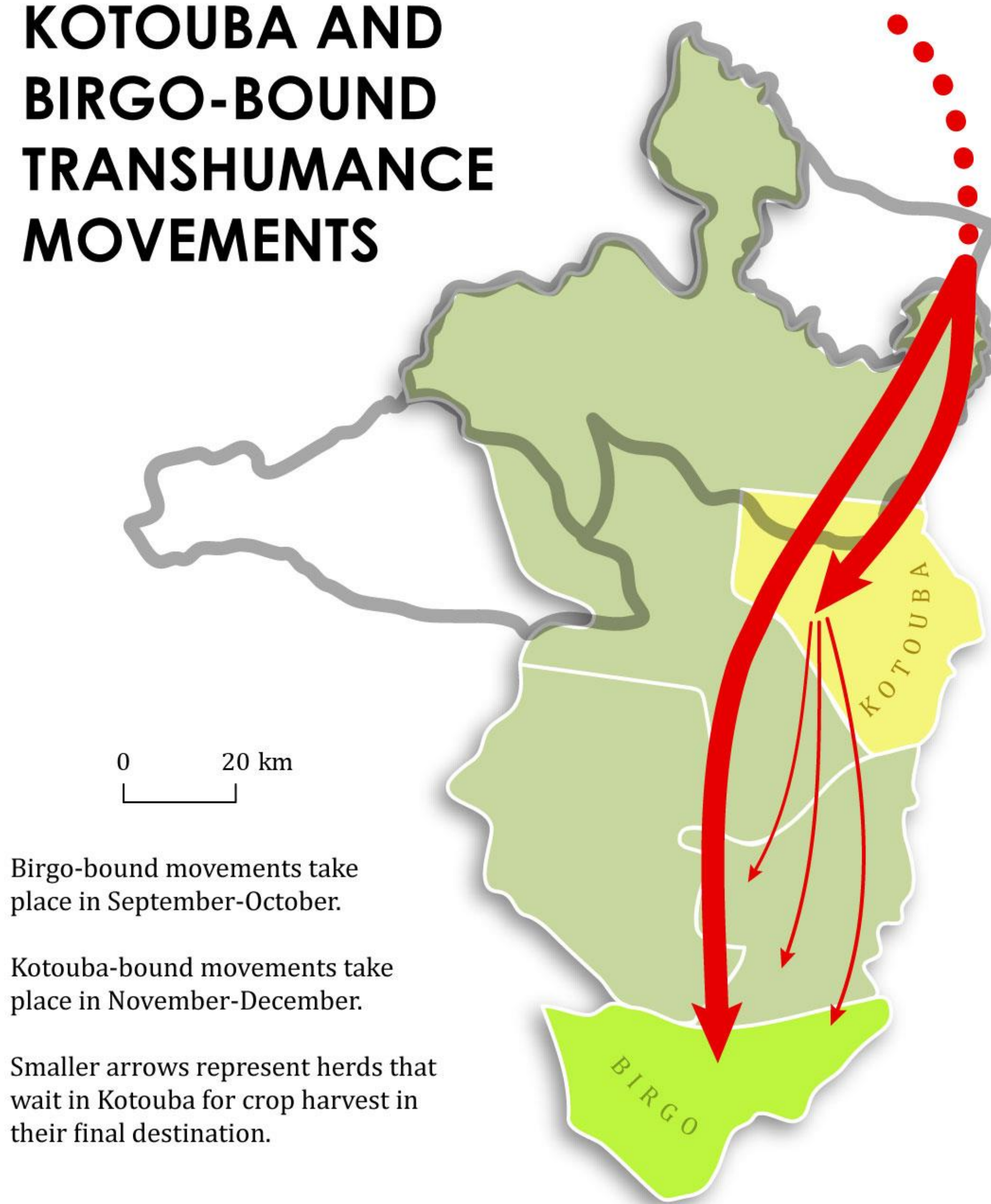


Figure 2. Pastoral movement patterns and waiting areas in the Fuladougou and Birgo. Transhumant movement pathways and calendars based on field interviews by author. Boundaries of Kotouba, Madina, Sebecoro, and Kassaro municipalities comprise the Fuladougou area and the Makono and Sirakoro municipalities comprise the Birgo area (all acquired from the Malian National Geographic Institute, including biosphere reserve boundary). Cartography by Masrudy Omri.



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Chapter five: Dig your own well: villages, hamlets, and local governance in West Africa

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Introduction

Poverty remains an overwhelmingly rural challenge in the world's least developed regions such as West Africa. Poverty incidence in the Republic of Mali is three times higher in rural areas than in urban centers, according to the World Bank's 2002 Poverty Reduction Strategy Paper for the country (Government of Mali 2002).[1] Multilateral development agencies have recently recognized that in order to make substantial progress on poverty reduction, more resources must be devoted to rural livelihoods; first and foremost agriculture.[2] Technical experts are carefully considering how to realize ambitious benchmarks such as the Millennium Development Goals (MDG) through comprehensive programs such as the Alliance for a Green Revolution in Africa (AGRA). As social scientists study their impacts on rural livelihoods but little or no attention has been given to how those livelihood changes are in turn shaping the process of political decentralization. This is a considerable gap given the important role that local institutions are expected to play in the delivery of local services such as micro-irrigation, credit access, and basic education, which are essential for the promotion of environmentally sustainable rural poverty reduction and climate change adaptation (Baez, Kronick, and Mason 2013).

This chapter examines a specific dimension of rural livelihoods in Mali, West Africa: the geographic and political division between official villages and unofficial hamlets and the impact of these divisions on emerging local governments. The increasing importance of cash cropping and agriculture, more generally, has accelerated the spread of hamlets as farmers seek new land

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[1] According to the 2002 PSRP, approximately 80 percent of Mali's population of almost 11 million lives in rural area and a 1998 survey found that an estimated 72 percent of total Mali's population lives below the poverty line (Government of Mali 2002).

[2] This policy shift is best represented by the 2008 World Development Report 'Agriculture for Development'(World Bank 2008).

to cultivate, particularly in sparsely populated frontier areas like western Mali. This trend is shaping local democratic institutions in divergent ways. First, hamlets in western Mali are often heavily populated with migrants who traditionally gain residency and land access through relationships with autochthonous residents. Local democracy is stimulating changes in this political arrangement. By residing and paying taxes in a municipality with democratically elected leaders who enforce national laws, migrants are strengthening their municipal governments, which, in turn, are strengthening migrants' own local citizenship rights. While municipal mayors typically defer to village authorities in decisions about whether to allow migrants to join their communities, once migrants have resided for six months, if and when conflict arises with their hosts, mayors defend their right to *stay* based on articles in the Malian Constitution as well as the sizeable economic contributions that migrants make to municipal coffers. This trend holds significant implications for Malian local institutions yet it is clashing with other politico-legal dimensions of the country's decentralization process. Although migrants are emerging as important local-level economic actors in many municipalities, land tenure reform has strengthened customary autochthonous land rights, which is creating a potential conflict that will test the legitimacy and authority of municipal governments. Another growing divide between villages and hamlets is the municipal development strategy, which compels governments to channel their meager financial resources into official villages at the expense of hamlets, which receive little or no local investment.

This chapter is comprised of two parts: the first examines the dynamics of these local-level divisions. The second investigates a specific hamlet as a case study of how conflicting interests within the state touch down in specific places, intersect with political decentralization, and create opportunities that smallholder farmers can exploit for their own gain.

Theoretical framework

At the heart of this paper's argument are the issues of state power, local institutions, and livelihoods in rural Africa. It is tempting and, in some cases, highly useful to draw a distinction between the central state regime and the rest of society comprised of urban dwellers and a rural peasantry. Certainly, African governments that lord over their citizens through appointed agents of force fit this characterization. Many studies of African agrarian resource access tend to employ this lens without adequately theorizing the state in terms of the topography of its power in particular places (Boone 2003). In addition to its uneven geography, the notion of unified state power has proven to be theoretically untenable in at least three ways: First, the state cannot reasonably be conceived of as a unified entity that acts according to a coherent set of interests or principles. Secondly, the state-society distinction itself is false. Theorists of power, as derived from state institutions or otherwise, understood it as diffuse and productive, influencing citizens as political subjects in myriad and unpredictable ways (Foucault 1978). Finally, the notion of societal groups such as "the peasantry" as homogenous and like-minded has been criticized for the assumption that farmers and others will necessarily act with the same set of interests vis-à-vis the central state.

For the purposes of this paper, two innovations of state theory are particularly relevant: state institutions are never fully formed but are constantly being renegotiated and reproduced (Lund 2006). Institutions are hybrid; they are embedded not only in historical processes and social relations but also human-environment interactions, all of which result in institutional patchworks ("bricolage") at various scales (Cleaver 2003). Capturing this sense of indeterminacy and contingency is the notion of the state as an 'arena of negotiation' (Hagmann

and Péclard 2010) between public and private actors, informal and formal realms of activity that crisscross boundaries of legality. Not only is the state an arena of negotiation, its instruments of power, if and when deployed, are frequently at odds in ways that reflect the state's internal inconsistencies.

Land tenure relations represent one particularly relevant social sphere where internally fragmented state institutions become manifest in rural areas. Although the concept of 'property' has long been siloed as either 'private' or 'public' with the notion of common or collectively owned property more recently added. Scholars such as Vandergeest (1997) and Peters (1987) have challenged these basic assumptions about what property is, arguing that it is a much more ambiguous phenomenon that is 'a set of everyday practices, social relationships, and rules'. Like the state itself, property relations are constantly renegotiated by actors claiming and contesting rights with one another. Attempts to acquire or maintain control over land constitute a negotiating arena in which public authority is articulated, competed over, and exercised.

One particularly important fault line within the state in Mali is between the national forestry agency and the ministry of agriculture. The state forestry agency keeps substantial areas of land off limits to local inhabitants, who are often under pressure from agricultural ministries to increase cash crop production, which typically requires continuous access to new land. An important consequence of theorizing the state as negotiated and contingent is that organs of the state can continue to exist and exert influence even when its formal institutions outwardly appear to be failing. In sub-Saharan Africa, neo-liberal reforms have led to a major retrenchment of state-provided services, particularly in outlying areas. Even before structural adjustment, the capacity of African governments to project power into these hinterlands was weak (c.f. Herbst 2000) yet national governments nonetheless exert an invisible hand in the symbolic realm of

discourse (Bourdieu 1994 from Hagmann and Péclard 2010) but also through materially and productively structuring the opportunities and constraints facing inhabitants of even the most remote rural villages.

What is often missing from such accounts of state power, local institutions, and rural livelihoods is a sense of geography and spatial relations. According to Doreen Massey (2005) this implies that 'recognition of multiplicity and heterogeneity itself depends on a recognition of spatiality.' Space itself, humanized and politicized, is a 'product of interrelations, as constituted through interactions (ibid: 9).' Power relations themselves, emanating from the central state, its contradictory organs, as well as other sources, are all spatialized and intertwined with local geographies in ways that fundamentally shape processes of institutional development.

Geography and local institutions in rural Mali

Based on research conducted in Mali, this chapter focuses on this local geography of state power, as projected through law, customary institutions, and its interactions with agriculture-based rural livelihoods. The geography of agricultural settlement is not only shaping Mali's process of political decentralization; it is also influencing development outcomes through the distribution of resources (clinics, schools, water infrastructure) that are critical to improving rural economies, livelihoods, and poverty reduction. The principal issues at stake are the geographic and political divisions between rural settlements that are formally recognized by the national government and those that are not. Settlements that are *not* formally recognized are known as hamlets.

Hamlets

Hamlets, by definition, are seasonal camps located where farmers cultivate during the rainy

season and return to their "mother" villages, when the farming season is over. Hamlets are always politically attached to and dependent on a mother village that is typically ruled by an autochthonous lineage or clan. Although the push to establish hamlets comes principally from livelihood considerations, they also serve a political purpose for mother villages by demarcating territorial control; a process that will be considered later in the chapter. The temporary nature and politically subordinate status of hamlets explains why they were not given legal stature by the Malian state following independence from France. Although the term "village" is typically used in an uncritical manner, it has a very specific legal-administrative connotation in Mali. Although virtually all 'villages' were established as hamlets, their legal status means that villages represent the fundamental unit of local governance in rural areas (Djiré 2003) and hamlets are legally subsumed within those units. The hamlet-village relationship preoccupied the French colonial government as well. In a 1933 census of the former arrondissement of Sebecoro, which corresponded to the pre-colonial kingdom known as the Fuladougou, colonial officials stated:

> It was necessary to oblige the isolated inhabitants to return to their villages of origin once cultivation was finished. Their bush settlements should only serve as seasonal camps. If not, one ends up with a scattering that leads to auto-proclamation of chieftainships and soon thereafter impulses of emancipation (Delmond 1993: 4, author's translation).

An important aspect of the village-hamlet relationship is the demographic mobility that has characterized rural West Africa throughout its history (Ajayi and Crowder 1985). As many studies have demonstrated (c.f. Stone 1996, Duvall 2007), villages are not geographically fixed and hamlets are part of the dynamism of rural settlement, which itself drives demographic reproduction at various scales (Kopytoff 1987). The same 1933 colonial census describes:

> All village displacements, [..] must be signaled. It is not a question of preventing these

> demographic and economic phenomena; population movements to better land, towards roads, [market] centers, but the indigenes too often see it as a way to avoid taxes. Along the same lines, if the census is to consecrate longstanding states of affairs (including the disappearance of villages) by emancipating hamlets that have long been separated from their villages of origin—if their distance, their size, and incessant conflicts justify it—it is preferable, for the future, to prevent impulses towards independence from becoming too frequent (Delmond 1933: 8, author's translation).

Mali's post-Independence governments have faithfully followed this advice for over fifty years. The initial designation of villages with official status was carried out in the 1960s and currently they number over 11,000. Ever since, the Malian government has been highly reluctant to "emancipate" hamlets by giving them legal recognition. The principal reason for this stance is that settlements with official status have specific administrative and political rights vis-à-vis the national government. Villages are entitled to representation in local government and, equally important, are the sites of social service investment: schools, health clinics, improved water sources, and most NGO projects are located in 'official' villages but rarely in hamlets because they are officially seen as *seasonal*.

The logic of this policy is that, as seasonal settlements, hamlets do not require either social infrastructure or political representation since they have access to both through their 'mother' villages. Although the colonial census had already revealed in 1933 that this policy has limited applicability when hamlets grow too large or are too far from their mother villages, it has come under even more pressure from agrarian political and economic changes over the past three decades. The three primary factors that are reshaping the village-hamlet relationship are rural population growth, the growing importance of cash crop agriculture to rural livelihoods, and

political decentralization.

Population growth

Although population density is still relatively sparse in much of rural Mali, particularly in the western municipalities that are the focus of this chapter, their landscapes are characterized by increased crowding and demographic change. Between the censuses conducted in 1998 and 2009, the population grew substantially (Figure 1) with four out 14 of the municipalities studied for this chapter experiencing growth rates over 50% and eight out of 14 with rates over 25% (Table 1).[3] Not only has this led to increased scarcity of arable land, it has spurred important patterns of migration with the western sub-region (Figure 3). As rural populations have grown, cultivated areas have expanded outward from villages until now it is common for farmers like Ballan Jigui Sissoko of Samakoulu to declare that 'there is no more space between them.' Areas of suitable soil are either under cultivation or fallow, whose periods have shortened considerably, leading to a shift from a patchwork of different vegetation types to a more intensively used 'park-like' landscape already found in many parts of West Africa (Figure 3). This process of land use change can be interpreted as a process of century-long demographic recovery from the upheaval caused by Jihad invasions during the mid to late 1800s. The 1905 census (Cercle Commandant de Kita 1905) recorded only 33,800 inhabitants in the Kita district (Table 2) with a mere 6844 in the Fuladougou (Arbala: 4400, Saboula: 2000).[4] Even as early colonial officials encountered abandoned landscapes, they recognized that many uninhabited areas appeared to once have prosperous and well-populated settlements in times past (Geerling and Diakité 1988).

[3] Figure 2 and Table 2 present demographic growth going back more than a century to 1905.

[4] In a census conducted eleven years earlier in 1894, populations were slightly smaller: Fouladougu Saboula, Birgo, pays de Kita: 9961; Fuladougou-Arbala: 3266; Kaarta-bine: 11261 (Cercle Commandant de Kita 1895).

Land use change and demographic mobility

Recent intensification of land use shapes the village-hamlet relationship and the decentralization process in two important ways: the first is by shaping the shifts in settlements away from defensive positions near cliffs or rocky outcrops that provided protection during periods of warfare in the 19th Century or favorable camp sites for hunters who were typically the founders of contemporary settlements in western Mali. The Bélédouogu and, especially, the Fuladougou [5] exemplify this pattern in that their official villages are nearly all located in rocky areas that are sizeable distances from areas of agricultural expansion and new settlements (Figure 5). For example, Bonboti, one of the five official villages in the Fuladougou municipality of Kotouba, is described in the 1933 census as "a very old Fula village abandoned for over forty years [..] located away from the major invasion routes, [which] served as a refuge during the Toucouleur invasion [of Omar Tall] (Delmond 1933: 28)." Sidjian, a neighboring official village, possesses a similar history but also reflects the kind of settlement mobility described early. From the 1933 census: "Located in the mountains at the moment of conquest, it then shifted towards the Baoulé [River]. Since 1931, it has been back at its exact former location shown on the Borgnis-Desbordes mission maps (ibid 1933: 38)." On the other side of the Baoulé River, in the Bélédouogu, Daban occupies a similar position: a populous village and seat of municipal government but sited less for cultivation then for hunting and defense.

In both the Fuladougou and the Bélédougou, cultivation has expanded substantially on the flat, relatively fertile land that is located along seasonal streams and removed from the escarpments where "official" villages are situated. This is expansion is demonstrated in a

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[5] 'Land of the Fula people' and 'land of the gravel,' respectively, in the Bambara language.

statistical comparison of cultivated areas in the Fuladougou in 1985 and *new* areas of cultivation in 2010, which showed an increase in the distance from village to field from 7.1 kilometers to 11.4 kilometers (Table 3). As cultivation has become further away from official 'mother' villages, the need for hamlets has grown as well. Table 3 shows that these hamlets and their fields tend to be located in proximity to the Baoulé biosphere reserve, where arable land is still relatively abundant. The declassification of several parts of the biosphere reserve in the early 2000s has led to a spike in cultivation in those areas. The large percentage of cultivation in 1985 that was *within* the reserve is explained by the presence of a few original villages whose fields in the reserve were tolerated at that time. Following declassification, most of that cultivation shifted to new hamlets. . Numerous farming hamlets now dot the flat plains of both the Fuladougou and the Bélédougou with important consequences not only for the environment, which are well-studied, but also for local institutions, which have yet to be considered.[6] The scale of this expansion of hamlets and their importance to local agricultural expansion is shown in figure 6. In municipalities located along the boundaries of classified forest areas, hamlets are estimated to be responsible for over 75% of agricultural production. One Malian NGO worker familiar with the municipality of Kotouba described: 'If you need almost anything, you have to go get it in [the hamlet] Wanégébougou.'

Migration from the Bélédougou

The expansion of hamlets is driven less by growth of the autochthonous population within local settlements than by a recent wave of sub-national migration. Bambara farmers from the

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[6] It is inaccurate to say these areas were never inhabited—they are likely part of the cyclical settlement movements described by (Hunter 1967) . The importance of current hamlets is that they are no longer seasonal but permanent with arguably no difference from 'villages' except their legal status.

Bélédouogu have been venturing through and occasionally settling in the Kita district since at least the colonial era when they worked as laborers on French peanut plantations in Senegal as part of the classic pattern of circular migration (Cordell, Gregory, and Piché 1996, Peterson 2005, Rain 1999). More recently, the Sahelian drought of 1984 triggered a wave of migration into the Kita district that continues to the present day. This migration was accelerated in the mid-1990s when the cotton supply chain was established in Kita but not in the neighboring Kolokani district, which includes the villages and lands of the Bélédouogu. Since this migration is driven primarily by the need to access productive agricultural resources, inputs, credit, and, most of all land, farmers settle overwhelmingly in hamlets. Figure six reveals the demographic superiority of Bambara migrants in the Fuladougou, where, even in certain well-established villages, they represent a large portion of the population. Moreover, the figure does not include numerous small hamlets of 3-6 families of which all are recent migrants.

The chief of one Bambara hamlet in the Fuladougou, called Plaaqui, explained what drives them to move to an area where they are considered "strangers" and traditionally received weak land rights. "Your harvest is better here with three hectares than more than six back in the Bélédougou."[7] This is consistent with the impulse that has always driven the creation of temporary bush settlements, as described by the Mayor of Dioumara: a farmer will declare "I will go to find food in a hamlet." Since hamlets by definition, are *part* of their "mother" village and were historically temporary, they are established without geographic boundaries and, instead, are granted access to access to vaguely defined areas of land within the territory historically controlled by the village. This process ensures political control for the mother village and

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[7] Others who remained in the Bélédougou did so because they bristled at the notion of living "under the command of the Fula."

impedes steps towards autonomy by the hamlet since one of the principal legal requirements for becoming an official village is the possession of its own spatially demarcated territory.

In western Mali, this traditional village-hamlet relationship is no longer tenable as many hamlets are *permanent* settlements, populated not by people who seasonally depart from their natal village to grow food but by migrants who have come to grow crops in order to earn money. In the context of political decentralization, hamlets are indelible features on the political landscapes of municipalities, which are struggling to become financially self-sufficient and operational. An important consequence of this new rural political geography is that even as hamlets generate substantial tax revenue for municipal governments through their agricultural production, they remain officially invisible and pay their taxes *through* their mother villages even if minimal social ties exist between the two settlements, which is typically the case when the hamlet is almost entirely inhabited by migrants. This situation is compounded by geographic distance, which can be substantial, and just as colonial tax collectors discovered 80 years ago, such distance can weaken the connection between local settlements.

Taxation and the politics of settlement officialdom

The need to limit the number of official villages as well as pressure from village chiefs to maintain at least nominal political control over hamlets explains the existing arrangement for tax collection. Moreover, as agricultural settlements steadily encroach on protected forest areas, it is much easier to expel them if they are an unrecognized hamlet. The Secretary General of Kotouba, a municipality surrounded by protected forests, noted that it is “a huge problem to evict an official village,” whereas hamlets are already illegal so authorities do not even need to stretch the law to evict them. The Mayor of Dioumara described the issue in terms of chiefs attempting

to retain an important source of their customary power although their stance is often cloaked in the discourse of kinship and affinity. Responding to a hamlet that wishes to become independent, a chief may retort "We were together before, why do you want to separate now?" The matter is also a historical legacy of when village chiefs were responsible for collecting taxes for the *Sous-Prefecture* under French colonial rule. However, it is increasingly out of step with exigencies of decentralized governance.

8 out of 13 municipal governments surveyed for this paper reported that they now collect taxes *directly* from hamlets rather than pass through their mother villages. For municipal officials trying to make their tax rolls, it is a pragmatic solution to tax evasion, a problem that has befuddled local officials for over 100 years. A political and military report from the district capital Kita dated July 1893, just after the French takeover of Western Sudan [Mali], described:

> The political situation in the cercle [district], which has not received a single observation in a very long time has been modified in a few villages north of Kondou. A few days ago, the village of Samakoulou gave [us] a cool reception. [..] The members of Dosomala, a village close to Samakoulou sent three captives to the son of the village chief, who sent them to Kita to pay taxes. The chef was expected at the post. I believe that the closure of the Kondou post is already being felt: those villages that are very far from Kita seem to want to escape the influence of the cercle (Cercle Commandant de Kita 1905, author's translation).[8]

A few decades later, the 1933 Census describing tax collection in the same area complained about the same problem: "Others easily evaded by waiting in the bush until the European passed (Delmond 1933:11)." Just like in colonial times, farmers can easily evade paying taxes, especially if they live in bush hamlets and only must face a customary chief who

[8] Koundou was a garrison that played a key role in the French penetration of the West African interior.

has no real statutory power to demand the payments. Officials from 2 out of 5 of the municipalities that still work through mother villages reported that they do so because village chiefs, who recognize the political importance of tax collection, insist on it. Given that tax payment rates in hamlets can sink below 10%, as in the case of the Sagabala municipality, most other local officials have little choice but to travel to hamlets, often accompanied by gendarmes, in search of municipal funds. Tax collection is a challenge for municipalities due to the involvement of other actors as well. The Mayor of Dioumara described the problem he faced with forestry agents:

> It is very difficult to collect taxes on gum arabic production. Even though there is a highly lucrative trade in the commune, the money does not even make it into the treasury. Generally, foresters will make deals with producers that allow them to exploit trees in exchange for a cut of the profits. If someone from the commune [municipality] tries to collect some for taxes, the forester tells the producers that we're trying to meddle in their livelihoods. The state needs to give communes total autonomy.

Peasant farmers' aversion to paying taxes in western Mali can be seen as part of a long lineage of rural suspicion of formal institutions and state power (c.f. Scott 2009), especially in light of the coercive roots of taxation itself in Mali. Peasant farmers are often highly in debt, unable to spare the cash needed to pay their taxes. Moreover, the Mali government has hardly been responsive or accountable to the needs of rural inhabitants, even after the country's successful democratic revolution of 1991. However, democratic decentralization, by design, is intended to create the channels of accountability and government responsiveness that centralized, top-down institutions lack (Smoke 2003, Ribot 2003). Conventional political theory states that taxation is essential to establishing this kind of accountable relationship and effective public

institution (Moss et al. 2006). Non-payment of taxes by autochthonous, legal residents of municipalities that are run by democratically elected leaders demonstrates that this might not necessarily take place so easily.

Taxation and migration

Evidence from municipalities in western Mali shows that, in spite of resistance to taxation among communities that have reason to resist the decentralization process (e.g. groups that rely on autochthonous power), migrants tend to pay their share to municipalities quite willingly. National law requires any citizen who is resident of a municipality for at least six months to pay local taxes. This law stems from the recognition that people are still on the move, perhaps more than ever, in Mali. Very low rates of tax collection, the fundamental basis for governance, demonstrate the inherently weak capacity of many rural municipalities and this raises the political stakes of the tax transaction itself. Actors who are willing to pay taxes, especially immigrants, have much more to gain than the meager services provided by local government.

By following the law and paying their taxes *directly* to municipal governments, migrants are securing their citizenship within those municipalities. The political importance of tax transactions is arguably greater than their administrative importance for two reasons: citizenship for migrants has always been contentious and precarious throughout West Africa. Migrants have been expelled at various times, by national governments in Cote d'Ivoire, Ghana, Nigeria and the Congo (Cooper 2002, Whitehouse 2012), to name a few examples, but also from innumerable *local* communities by groups claiming autochthonous political and land tenure rights. Local cases of expulsion often involve tensions and disputes over land access. A typical scenario and one that could easily transpire in western Mali is that village elders cede land to migrants when it

is abundant but, eventually, politically subordinate members of the community, such as young men, grow to resent such arrangements when land becomes scarce. Any kind of gesture of land rights by migrants is enough to spark bloody conflicts and expulsion by autochthonous villagers (c.f. Gray 1999).

Although the risk of this type of conflict has not disappeared entirely, tax payments and decentralization make them less likely to take place in the municipalities investigated for this chapter. This is due to the political relationship established between municipal officials and migrants when taxes are paid, reflected in the following statements: “Tax payments facilitate their [migrants] integration because they pay at a rate of more than 90% and are the first to make their payments.” According to the mayor, hamlets are “the levers of development [and their residents] are examples to be followed.” Officials from the municipality of Madina reported positively that migrants’ tax payments “facilitate their integration and permit them to resolve problems in the village or the municipality.” Not only are they “[G]ood about paying taxes, but they are great farmers, commercants, and they get involved in all the economic activities of the municipality.” Several other local officials reported the same observation about migrants’ economic contributions and the Secretary General of Kotouba further added that tax payments allow migrants to “benefit from rights and advantages such as access to land, vaccination campaigns, and other health services.” The Mayor of Kassaro declared that by becoming integrated through taxation, migrants are “under the protection of the municipality.”

The last two statements are especially revealing about migrants, political decentralization, and taxes. The Mayor of Kotouba mentioned land access as a right stemming from municipal citizenship yet this is a position that autochthonous residents would vehemently deny and oppose. Land allocation remains a village-level affair and such customary rights have tended to

legitimize the expulsion of migrants when land becomes scarce or other problems arise since migrants rarely if ever receive formal title to their ‘borrowed’ land. However, the statement by the official from Kassaro about protection suggests that the balance of power may be shifting to migrants under political decentralization.

The Malian Constitution states that all national citizens have the right to choose where they live. Paying taxes after six months of residency formalizes this right if local officials are willing to support it politically and when migrants living in hamlets are the economic engines of the municipality,[9] any rational official who seeks to have a viable government will likely do this. In contrast, it is *autochthonous* villages who are unhappy with the decentralization process (c.f. Idelman 2009) and who are almost always the culprits behind tax evasion, which increasingly looks like a short-sighted strategy for maintaining political power. Finally, local expulsion typically involves higher authorities, either gendarmes or judges, whose involvement is extremely costly for nearly all the parties involved. An early outcome of decentralization that has yet to be investigated is the tendency for local officials to use their power to *keep out* national authorities who demand exorbitant bribes and put people in jail without trial.

National agricultural land policy

State power is nevertheless at work in this shifting geography of rural populations, agricultural production, and local institutions. Local officials are not only attempting to build institutional capacity through tax collection, they are also increasingly responsible for implementing national

[9] This situation has a downside as well: officials in Bossofala report that migrants use their economic power to do “a lot of things” such as buying the complicity of higher-level officials when seeking village status for their hamlets.

legislation. At the local level, this translates into a context in which, despite ongoing devolution of power, local actors' decision making options are still constrained and even shaped by actions of the national government. This position reflects assertions made by Boone (2007: 558) that "In [African] agrarian society, to reform the rules of land tenure is to redefine relationships between and within communities, and between communities and the state." Further, '[L]and policy has worked to structure state-society relations and define the nature of state authority itself.' Boone (ibid) focuses on the constitutional-legal implications of land tenure reform as it is bifurcated between communal (i.e. autochthonous) and user (i.e. migrant) rights. Although the author acknowledges and thoroughly investigates the importance of local context in another volume (Boone 2003), both of these works pay inadequate attention to the local geographic dimensions of struggles over autochthonous versus migrant rights. A critical assumption of Boone (2007), which this chapter aims to confront, is that local institutions will emanate from *coherent* constitution-based land tenure regimes that uphold one set of rights or the other. Evidence from western Mali suggests that this will not necessarily be the case.

Following this chapter's theoretical focus on the *fragmented* ways in which local institutions and state power interact, the next section engages with the recent agricultural land law as well as several municipal development strategies, all of which reveal a certain geographic contradiction emanating from the village-hamlet relationship. This contradiction runs through the heart of decentralized rural governance in Mali and is linked to the previously discussed issue of local taxation: it involves the tenuous relationship between landed political rights and rural economic production.

Agricultural reform

The Malian National Assembly enacted the New Agricultural Orientation law in 2006 (06-45) as a way to stimulate specific reforms in its most important economic sector through the following policy orientations: 1) family farms (as opposed to large-scale plantations that are associated with the "land grabbing" phenomenon), 2) food security/sovereignty, 3) markets, and 4) a disengagement of the central government (CNOP 2005). Although there are clear internal tensions such as between the emphasis on food sovereign family farms and a liberalization of agriculture, less obvious are the *procedural* issues that are written into the law. Most importantly, chapter two of the law recognizes customary land rights. This represents an important break from the era of land nationalization although it creates a potential conflict with migrants' user rights, which are clearly weakened by the new law. Further, the 2006 law calls for customary tenure to be inventoried and materialized by municipal authorities at the level of the *village*.

If such measures are implemented, conflicts over land access and boundary formation, as seen during the World Bank *amenagement du terroir* projects during the 1990s (Le Meur 2006), are likely to occur again. The reason why this is not likely to happen any time soon in most rural municipalities is that the law maintains the onerous requirement of a local land management plan to be reviewed by a regional consultative committee and approved by the central government. In the name of regional policy coherence, the law disempowers municipalities (c.f. Olowu 2003, Ribot 2003) while creating a clear channel for corruption and policy stagnation. However, even if the law is never officially implemented, it will inform local political discourse and behavior in ways that could favor autochthonous groups who fear the growing importance and clout of

migrants. The dilemma for municipal Mayors is obvious: while they increasingly recognize the economic value and *constitutional* rights of migrants, the agricultural law beholdens them to the *customary* rights of autochthonous groups. It will be conflicts such as this one, infused with contradictory political forces, rather than blanket top-down legal structures (e.g. communal versus user rights) that will shape local institutions in rural areas where these demographic trends are present. The political advantage held by official villages over hamlets within these conflicts is exemplified in many of the economic and social development strategies elaborated by western Mali's municipalities.

Municipal development strategies

Municipal governments increasingly bear the responsibility for economic development and poverty reduction of their populations and virtually all of them have elaborated strategies, usually with the help of NGOs, to make progress on development goals during four year increments (e.g. 2010-2014). Decentralization in Mali is something of a stacked deck; only the most costly government functions of education, health, and water provision have been legally devolved to municipalities while those that have the potential to generate revenue, namely forest management, remain largely controlled by national authorities, despite a 1995 law (95-031) that ostensibly increased the participation of municipalities (Benjaminsen and Lund 2003). Multilateral donors such as the World Bank are, nonetheless, optimistic about decentralization. The 2002 PSRP emphasizes that an important aspect of improving basic rural water provision comes through decentralizing the decision-making process at all stages of the rural water supply and sanitation project cycles; requiring beneficiary commitment indicated by willingness to contribute to capital costs. In terms of taxation, the World Bank envisions growing local tax

bases by supporting rural private sector enterprises and businesses through micro-credit and other interventions:

> The availability of these financial resources at the communal [municipal] level will permit adequate expenditures on health, education, extension personnel expenses, communal social and socio-economic facilities and infrastructures operating costs and maintenance, and other items important for the rural population and make a positive contribution to economic growth and improve the quality of rural livelihoods.[10]

The development strategies (PDESC) of several municipalities in western Mali reflect a comparable level of optimism as the World Bank PRSP and a remarkably similar to one and other.[11] The following section analyzes a sample of PDESCs from municipalities in western Mali in terms of their planned projects, associated costs, and project locations. All of the strategies broadly focus on the areas of education, health, water provision, agriculture (crop cultivation and livestock husbandry), commerce, and infrastructure. The PDESC strategies reflect the influence of the Millennium Development Goals (MDG) through objectives such as the reduction of infant mortality, illiteracy rates, and the improvement of food security. The associated activities reflect the deep poverty of rural areas in western Mali. They revolve around building basic infrastructure such as school rooms, improved wells or water pumps, and electrifying municipal facilities like health clinics. Other activities listed in many of the strategies include the establishment of community grain banks, micro-irrigation dams needed for market gardening or rice production, and the construction of micro-dairy facilities.

The reality is that, in spite of the high rates of tax payments in unofficial hamlets, the lack

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[10] Internal World Bank policy document (2005). Mali's PSRP reflects the World Bank's comprehensive regional policy outlined in the 1989 document: *Sub-Saharan Africa: From Crisis to Sustainable Growth* (Shipton 2009).

[11] The information in this section is from municipal development strategies (PDESC) documents acquired during field work in 2010, 2011, and by assistants in 2012.

of local financial capacity among the municipalities in question is stark. This lack of financial resources can be seen through the comparison presented in the following financial figures. In 2011, the four municipalities of Madina, Kotouba, Kassaro, and Sebecoro collected an average of $10,645.[12] This total would not cover the cost of a single water pump as budgeted in development plans at $12,727 to $14,545. The mere rehabilitation of a pump, which is needed in many communities, costs upwards of $5,500. Municipalities need large numbers of pumps and forages. Madina's plan calls for installing seven new pumps and rehabilitating another nine. The larger municipality of Sagabala plans to expend nearly $400,000 on water infrastructure alone in its 2010-2014 development plan[13] yet, according to local officials, the municipality collected less than 10% of its taxes in 2012 due, in part, to the March 2012 coup d'état, which apparently caused even more uncertainty among local people about their relationship to the government. Madina, Kotouba, and Kassaro, meanwhile, collected 38%, 67%, and 59% of their tax rolls respectively in 2010.

Given the large gap between local financial resources and development needs, local governments must seek other sources of funding. This reliance on outside sources, such as donor partners and expatriates, has important implications for how development resources are distributed among municipalities but also municipalities' capacity to develop accountable local institutions that are inclusive of all their residents, including those living in hamlets. The Sagabala PDESC claims that donors have pledged $363,636 in assistance for 2010 through longstanding partnerships with international NGOs such as World Vision and Sahel 21. The other two sources of external funding for Malian municipalities such as Sagabala are the

[12] Converted from BCEAO CFA currency at a rate of 550 to $1.
[13] Most of this spending is for eleven large diameter wells at $32,743 each.

National Agency for Municipal Investment (ANICT) and migrant expatriates. ANICT, which itself depends on multilateral donors,[14] bases its subsidies on the percentage of local taxes collected, which would not bode well for Sagabala in 2012 and also explains why officials in municipalities like Dioumara bring gendarmes when collecting taxes in villages.

Expatriates make substantial contributions to the municipalities where their home villages are located. In the municipalities surveyed for this chapter, expats built clinics, schools, electrified Mayors' offices, and financed animal fattening enterprises, among other development activities. These measures do not include contributions made directly to their own households or villages. In Didieni, expats contributed $1636 to the municipal government but nearly $110,000 to their households.[15] This contrasts with Sebecoro 1, where expats financed over $180,000 of work in the municipality. This discrepancy is due largely to the geography of migration from Mali. The country has long been a major source of migrants, especially to France (see Manchuelle 1997). It is well known that the western region of Kayes has historically sent most of them out yet, even within western Mali, certain areas send many more migrants than others. Sebecoro 1 counts over 1000 expatriates around the world while Badia and Bendoubougouda each have less than 50. Given the inadequacy of local tax collection, whether or not a municipality has a large population of organized and generous expatriates will make an enormous difference to the development prospects of its citizens. Mayors interviewed for this study repeatedly cited the global financial crisis and the demise of the Spanish economy in

[14] A list of ANICT technical and financial partners include the Dutch NGO SNV, Swiss Cooperation, UNDP, German Cooperation, European Union, and the French Development Agency (AFD) (www.anict-mali.org, last accessed April 10, 2013).

[15] Cooper (2002: 98) claims that in certain semi-arid parts of the nearby Senegal River, remittances make up 20-50% of family budgets.

particular since that country had become a favorite destination for West Africa's during its construction boom of the 2000s. The same issue exists for NGO and sister city partnerships, which is another popular source of support for rural governments. Certain municipalities enjoy relationships with many different international NGOs while other, often more remote municipalities are marginalized by the donor-NGO community. For example five NGOs intervene in Dioumara and four in Sagabala while only one maintains a limited presence in Kotouba and none work in Gomitrabougou.

Uneven rural development

The potential long-term financial dependency and the divergent development pathways among rural municipalities due to differing levels of taxation, remittances, and NGO relationships are apparent. However, this problem of uneven rural development is even more striking at the sub-municipal scale due to the division between official villages and hamlets. Although hamlets are, in many rural areas, the economic engines of the municipalities, they are almost systematically excluded from municipal development strategies. The schools, clinics, wells, and other infrastructure are nearly all targeted for official villages. The reasons for this arrangement are, by now, clear enough, but their development implications should not be underestimated. Residents of hamlets can usually make use of the schools and clinics in official villages. This is not always the case and hamlets' attempts to build their own infrastructure, such as schools, can be politically contentious if autochthonous residents perceive it as an act of independence. Residents of Kotouba were initially opposed to the residents of the populous hamlet Wanégébougou building their own school for this reason. They eventually agreed, probably realizing how unjust their opposition was. Water infrastructure, however, must be in close

proximity to individual settlements for it to be of any use. It is possible that even as water provision slowly improves in villages through public investment, hamlets will continue relying on hand-dug wells and pond water for the foreseeable future.

The hamlets that make up a large part of the Bélédouogu's agricultural heartland, along the east bank of the Baoulé River, are a case in point. Dozens of unofficial settlements are situated on the plains west of their official villages, which are located in rockier areas, in order to cultivate the fertile land there. Many of their current sufferings are illustrative of the challenge involved with decentralized poverty reduction in Mali. The residents of the hamlet of Madigabougou first arrived in the early 1970s, following a drought, and settled permanently a few years later. The logic is clear: it is impossible to cultivate in the original village if there is no rain but they can grow at least "a little bit" in the hamlet. In Koulounikono, which was founded, 15 years ago, became permanent last year so its residents needed a well. They dug one but the sandy soil causes the wells to collapse fairly easily. Despite paying their taxes in the municipality where they reside, rather than through their village of origin, it is highly unlikely that public funds will be used to dig them an improved well. In Kongui, a hamlet established decades ago, has only two wells (out of eight) that retain water during the dry season.[16] Its residents are forced to travel to a neighboring village to fetch water. To make matters worse in Koulounikono, the flies that cause onchocerciasis (river blindness), which were eradicated 25 year ago, have been coming back for the past three years. Nevertheless, they will stay in their current location because drought conditions still affect their home village.

The problem of onchocerciasis-spreading flies coming back was reported in several

[16] These two modern wells, in fact, were built by the government as part of a plan to evict several hamlets from the Baoulé biosphere reserve. The plan was never carried out: the hamlets are still there and the residents of Kongui use the wells.

hamlets, including Dotilébougou, which has existed for 18 years. Its chief also complained about the 40 kilometer distance to the nearest health clinic; likely a factor in the high rate of infant mortality he described.[17] Its residents, divided in 38 households, would like to become an official village in hope of more effectively dealing with these serious development challenges. Given their dependence on crop cultivation, a resident of Kunbala asserted that 'everyone is in hamlets now' because of drought and land shortages in their villages of origin. Given the shortages of basic needs facing people living in hamlets, transforming them into official villages would represent good public policy. However, given how thinly stretched public and even donor resources are in Mali, this is also a deeply challenging and unlikely scenario.

The curious case of Soribougou

Despite paying their taxes promptly and in full, hamlets are usually left to their own devices. One of their most effective devices is cash earned from cotton farming. The next section describes the case of one hamlet in western Mali that used cotton cash very effectively to navigate the dangerous politics of insecure land tenure and national forest management laws until political changes eventually led to their eviction. The residents of the hamlet of Soribougou successfully formed an alliance with high government officials seeking to boost cotton production, and they developed quasi-private land rights within the legal limbo of the national forest that nonetheless fueled a cotton boom for more than ten years.

The case of Soribougou provides three valuable insights that support the preceding argument concerning the central state, local institutions, and agriculture-based rural livelihoods. First, it shows how local governments' reliance on unofficial hamlets for tax revenue can be

[17] All of these hamlets are located in an area in between two health clinics that are located 62 kilometers apart.

precarious when hamlets are illegally located within national forests. Secondly, it sheds light on how the inconsistencies of state power touch down in rural hinterlands in surprising ways. Finally, it reveals an overlooked way in which capital intensive commodity production affects smallholder land tenure relations. Soribougou is a large hamlet located a few kilometers from the Kita district's eastern border. As an unofficial hamlet, it is not shown on maps because it was essentially uninhabited during the colonial era and only settled by a scattering of households until the mid-1990s. The first settlers of Soribougou were men from the neighboring Bélédouogu district who had noticed its flat, fertile land from the train on their way to Senegal to work as agricultural laborers on peanut plantations during the 1960s.[18] Traditionally, most of these men would return home eventually and settle permanently but the 1984 Sahelian drought devastated rainfed agriculture in the Bélédouogu and spurred an exodus that continues to the present day. A few men who had traveled to Senegal decided to return and begin farming the plain they had seen years before. The settlement they established quickly acquired the name Soribougou.

Soribougou means Sori's village and refers to the brother of the chief of the neighboring village Nafaji-koro who was sent to the new settlement to establish autochthonous rights over the land the migrants were beginning to cultivate. Before the arrival of the farmers from the Bélédougou, Soribougou was a 'zone of contact' at the periphery of the pre-colonial kingdom of the Fuladougou, located on the eastside of the Baoulé River (see chapter one). The waterway separates the Fuladougou from Bambara-controlled territory on the east side of the river and provides a historically recognized border that enabled the Fulani leadership of Nafaji-koro to

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[18] Seasonally migrant farmers are known in Mali by the Wolof word *nawetan*, which means to work during the raining season and dates to this earlier era of plantation agriculture in Senegal (Peterson 2005).

establish autochthonous rights over land which they had never cultivated before. This is characteristic of land rights in other sparsely populated regions of West Africa, such as the forest zone of Cote d'Ivoire, where tenure as a recognizable institution does not precede such transactions between hosts and migrants but is produced through them (Fratani 2007). These land rights exist in relation to two other important institutions: the local municipality, which was created in 2000, and the national forest service, which is the legal manager of the land on which Soribougou is located. Forest service land management has been porous since the colonial era. Local foresters have tolerated small agricultural settlements in many protected areas, partly in recognition of farmers' need for arable land but also because they provide a source of rent when farmers are compelled to pay bribes in order to stay.

Farmers steadily migrated to Soribougou and 70 families resided there when the national cotton parastatal company arrived in 1995. The arrival of a commodity that plays such an important role in the national economy created a new institutional dynamic within the central government that would influence Soribougou's future occupation of forest service land and the land rights underpinning its agricultural production. Alarmed by the ongoing clearing of forest for a crop that is highly intensive in chemical use, the forest service increasingly called for the hamlet's expulsion. At the same time, the state-owned *Compagnie Malienne pour le Developpement des Textiles* (CMDT), desperate for fertile land for to cultivate cotton, negotiated with the forest service to allow the farmers to stay in a quasi-official yet unwritten agreement that placed limits on the land they were allowed to put into production.

The importance of cotton

This agreement was made possible by cotton's eminence in West African political economies.

Cotton is critical to the livelihoods of millions of farmers across West Africa (Oxfam 2002). It has become a principal source of hard currency, which is increasingly relied on for school payments, medical bills, marriage dowries, and other expenses that require cash. A second and equally important role of cotton in West African rural economies is that it provides loan security for farmers to acquire farm equipment such as plows and carts as well as inputs such as fertilizer and pesticides on credit. Fertilizer boosts the production of cotton but also grain crops such as millet and sorghum when they are planted on the same plot of land the following year (Koenig 2008). All of which form the building blocks for the kind of intensification needed by farmers in West Africa, as land becomes scarce.

Cotton is equally important to West African national economies. It is the second leading source of hard currency for the government of Mali (Hussein 2004) and has been justifiably referred to as the nation's "cash cow" (Moseley 2005). Moreover, tens of millions of smallholder farmers in West Africa depend on cotton for their livelihoods.[19] Cotton is not simply a significant source of tax revenue: it was historically a state-controlled industry throughout West Africa so its supply chain is still tightly integrated with national political institutions. Corporatist relationships between banks, input providers, cotton buyers, and government officials has meant that production levels are not determined merely by global pricing but are also influenced by political demands channeled through patronage networks that link national and local actors. The political economic weight of cotton production has therefore had important geographic and land use impacts in Mali. Although cotton can be considered an intensive crop due to the use of inputs in its production, the growth of cotton farming in Mali and neighboring countries has

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[19] Led by Oxfam International, a major advocacy campaign focused on reducing the subsidies received by cotton growers in rich countries such as the United States as a way to boost the incomes of West African farmers.

depended on continuing expansion of cultivated land (Bassett 2001). This applies as much to a household or village, which must bring new plots of land into production each year as it does to the Malian national government, which has focused on integrating Kita as a new production zone in the cotton supply chain as the 'old' cotton zone has begun to suffer declining yields (Moseley 2005).

Shadow policymaking on the frontier

In what could be construed as a type of homesteading policy, the forest service agreed to the CMDT's demand and allotted 1.75 hectares of land for every person in each of the 70 families who resided in Soribougou at the time of the deal. While the autochthonous village of Nafaji-koro exercised some customary rights over Soribougou's territory, despite its location within a national forest, these founding migrant families effectively became the hamlet's landlords as farmers continued to flood into the area to grow cotton.

Soribougou quickly became the largest producer of cotton in the Kita district. Although the hamlet remained illegal in the eyes of the national and communal government, it had formed an official agricultural cooperative that was supported by an extension agent who was based in Nafaji-koro. In a performative act that helped legitimize the hamlet's status as an important farming center, Soribougou hosted the CMDT's annual cotton festival in which the company's director general inaugurated the new growing season in the presence of national and local authorities. By the late 1990s, in-migration had doubled Soribougou's population. It had become larger than almost every other settlement in the municipality of Kassaro and continued to produce high levels of cotton. Across West Africa, boosting cotton production was and continues to be dependent on bringing new land into production for the following reasons: land under

customary control is essentially free, in financial terms, as the cost of clearing a new field equals the cost of labor plus any symbolic gifts to village chiefs or other authorities. Secondly, not only are inputs very expensive for most Malian farmers but uncertainty about payment by the semi-privatized CMDT make any monetary investment in agriculture risky and difficult. Lastly, many farmers cannot resist selling the fertilizer they acquired on village credit on the black market, which provides them with short-term cash but deprives them of a means to intensify their production on land they are already cultivating.[20]

By the early 2000s, agricultural expansion was beginning to pose an environmental problem in the frontier lands of Kita even as national officials called for a doubling of national cotton production in just a few years (Moseley 2005). As Soribougou's farmland continued to expand within the limits of the protected forest, local foresters took the step of planting hundreds of exotic eucalyptus trees as a boundary beyond which cultivation would not be tolerated. Foresters responded to subsequent attempts by farmers to clear land beyond this new boundary with immediate expulsion and punishment. The creation of this boundary was an important decision in light of the cultural significance of tree planting in West Africa and the specific politico-legal implications of the act occurring in Soribougou at that particular moment in time.

Although the line of trees served outwardly as a land *use* barrier, its symbolic meaning was perhaps more profound as it unintentionally created a new socio-spatial sphere of land *tenure* for Soribougou and its migrant residents. The presence of trees in fields, particularly those which have been planted by humans, have long carried a property rights claim in West Africa (Pélissier 1980). In his theorization of the 'evidence landscape,' Unruh (2006) presents

[20] Extension agents often complain about poor yields due to farmers using only part of their fertilizer or spreading it too thinly across all of their fields.

trees as one of the most important visible forms of proof of tenure that can link customary and formal systems in places like agrarian West Africa. Moreover, migrants planting trees themselves is generally seen by autochthones as a provocation and can lead to conflict between the two groups because the *act* of tree planting is construed as an attempt to establish a new property right (Gray 2002). The trees planted around Soribougou worked slightly differently since they were planted by public authorities but had the effect of strengthening the migrants' tenure rights within the emerging space of Soribougou's village territory.

This is not the type of local outcome envisioned by Unruh and other scholars of African land tenure (Lavigne-Delville 2002, Bruce and Migot-Adholla 1994). Scholarly literature on the subject is largely driven by the normative goals of improving land tenure security, adjudicating conflicts over land resources, and boosting agricultural production in Africa. It has therefore tended to seek general principles and necessarily overlook the types of surprising outcomes that are contingent on geography and place, as represented by the unsettled situation in Soribougou. This is an important oversight as land use in agrarian West Africa is changing most rapidly in peripheral areas where tenure relations are more similar to the fluid frontier characteristics of Soribougou than places where customary institutions are firmly established and stable.

The Eucalyptus fence planted in Soribougou is now less of a 'bridge' between customary and formal than a 'wedge' between not only autochthon and migrant but also national and local government. Nafaji-koro, the autochthon village, still holds socio-political control over Soribougou, its 'hamlet' whose 'chief' is from Nafaj-koro's founding family. However, the chief's family is the only one from the mother village out more than 200 households now permanently residing in Soribougou. Since Soribougou is a hamlet and not an administratively designated village, the chief has no legal status, he is not locally elected (or appointed), and has

no kinship relations with other elders in the hamlet who hold positions of authority. Moreover, the autochthonous chief has nearly lost the principal source of customary authority in agrarian West Africa: the right to allocate land. The chief had only retained authority over land to the extent that his presence in Soribougou legitimized, in customary terms, the ongoing occupation of the forest land by Bambara migrants. While this customary authority emerged only through the arrival of the first migrants from the Bélédouogou, it was significantly eroded by the foresters' decision to systematically allocate land to all the households present at the time in Soribougou. Buttressed by the erection of the Eucalyptus fence, the stated intention of this act was to end further settlement in the now populous but illegal hamlet. As settlers continued to arrive from the still drought-plagued Bélédougou, the families who had initially received land began subdividing their plots in order to provide for the new arrivals. In just a few years, an informal, cash-based land market developed**.** Although monetary transactions for land in agrarian West Africa are not unknown, the renting or sale of land by migrants with no claims of autochthony represents one of the most egregious violations of West African customary land tenure. Ironically, the chief of Nafaji-koro attempted to sell a parcel of village land to a non-autochthon urban resident and was swiftly repudiated by residents of the village for what was seen as a violation of their sacred ancestral covenant with the land. Skepticism about land monetization is summed up in this statement by a local farmer:

> It's a good thing [land titling] but it complicates as well. Take an example of three brothers with the heritage from their father. If one of the brothers has money, he can get a land title. Will it be in his name? Will his sons get the land? What about the brothers? This will put an end to customary land tenure.

Attempting to sell land can be grounds for expulsion from village communities, which is

one of the most severe punishments meted out in the area. No such strictures exist in Soribougou despite Nafaji-koro's customary claims over its territory. As land in the hamlet was increasingly monetized, the hamlet chief logically decided to accept a monetary share of the land transactions, both out of self-interest but also as a way to maintain good relations with the migrants and retain any semblance of authority he and his lineage still held over the settlement. Local foresters, always more interested in collecting taxes from the trucks carrying firewood to the capital, tolerated the transactions in exchange for their own share of the revenue. Eventually all the arable land within the delimited area was occupied by fields and farmers could no longer expand further into the forest. Cotton production began to decline in Soribougou, which lost its place as the leading producer in the district. A local extension agent blamed it on local residents' growing interest in less labor-intensive activities such as charcoal production, stating plainly that "they don't want to work anymore." Locals cited factors such as new fertilizer that was of poorer quality than in times past. Labor shortages caused by new economic opportunities and inferior inputs, along with many other factors, still prevent farmers in the area from intensifying their production enough to maintain production on existing fields.

Soribougou's delimited area continued to be entirely occupied, despite declining yields. The clandestine land market continued, with one hectare running approximately 10,000 CFA ($20) per season. According to one local, it is rare that a land 'owner' would rent a parcel of land for more than one season at a time—if the renter uses fertilizer, the owner rather than the renter would enjoy higher grain yields the following year, which acts as a disincentive to intensify production, especially in light of the rising price of chemical fertilizer. In a semblance of customary land tenure, the new owners also retain rights to the fruit and other products of native trees in the fields, such as shea nuts. But it is unlikely that landholders in Soribougou will

ever obtain the kind of tenure security that is the goal of recent national legislation.

One reason is the unofficial ‘contract’ that the CMDT had negotiated on Soribougou’s behalf expired in 2012. This will leave the villagers, once again, at the capricious hands of local foresters. The most pressing question is clearly whether the forester service will move to expel the settlement of several thousand strong from the interior of the forest. It was the foresters who delimited the settlement’s enclave with trees but that was in cooperation with the CMDT, which at the time, was another organ of the developmental state. The company is in the process of being privatized by geographic zone and lacks the political capital and the incentive to enter into such bargaining on behalf of smallholder producers. In early 2011, *Jeune Afrique*, a leading news magazine for Francophone Africa, reported that the Chinese company Yuemei was interested in purchasing the Kita portion of the CMDT, signaling the beginning of a new era of cotton politics in Mali (Ballong 2011).

The national forestry service continues to expel agricultural hamlets from protected forests when it is politically expedient for them to do so. This might be due to donor pressure to curb deforestation or even the whim of a powerful politician who, on a weekend visit to his home village, is alarmed at the ‘ecological destruction’ he sees in the bush he remembers from his childhood. Expulsion is a political threat that the government hangs over countless rural communities in Mali, even those established over a half-century ago, and it is part of local political discourse in areas where protected forests are located.

Without the backing of a national institution such as the CMDT the leaders of Soribougou were forced to change their strategy for maintaining their illegal yet partially legitimized land rights. Instead of seeking to renew the same sort of deal that would allow them to stay in the forest, they decided to seek official administrative ‘village’ status. This would be, however, a

difficult process at best. Other hamlets with much stronger cases for becoming 'villages' had been waiting twenty years and still had not received the official designation. Moreover, the 'mother' village authorities and the local Mayor were opposed to Soribougou's attempt at gaining such status. These are not necessarily insurmountable obstacles. Hamlets are occasionally able to become villages if they have enough money to pay bribes, strong political connections, and the right supporters. The Livestock Association President is doubtful that this will happen given the powerful opposition to the move. In 2010 a high-ranking forestry official sent a letter to all foresters and local officials in areas surrounding the nearby Baoulé biosphere to crack to on illegal resource extraction. At the mention of Soribougou, the Mayor simply states: 'They will [eventually] be expelled.' Yet Soribougou, like the hamlets described in an earlier section, diligently pay their municipal taxes in hopes that this will gain them some security of residence.

It appeared that Soribougou may spend twenty years, like the nearby hamlet Mian, waiting to become a village while, at the same time, growing as a tax generating commercial center of agriculture, transport, and trade. This is another source of legitimacy, albeit at the local rather than national scale, that temporarily stabilized Soribougou's property rights in a way that the cotton parastatal was no longer able to do. While still suspended in a condition of illegality, the hamlet nonetheless continues to acquire the trappings of a permanent village: it secured development projects and it took steps on its own to fund and build a clinic and primary school, something that the local government has not even considered given the hamlet's unofficial status. Nevertheless, in late 2012, the naysayers were proven correct when the forest service took steps to carry out a full-scale eviction of Soribougou's residents. Although such actions are always legal and backed by noble discourses of environmental conservation, it is unclear where the

hundreds of farming households will find new land to farm. Further, the commune of Kassaro lost one of its tax revenue powerhouses. According to the local treasurer, Soribougou represented 3 million CFA, or nearly $5,500 in revenue.

Conclusion

The eventual plight of Soribougou reveals the challenge and dilemma that the division between villages and hamlets, both in terms of geography and politics, represents for municipal governments. In the near term, it is unlikely that hamlets will lose their role as centers of agricultural production. It is equally unlikely that the Malian government will rush to make administrative reforms that account for that importance. In places like western Mali, where a substantial portion of arable land is located within national forest boundaries, more situations like Soribougou are likely to occur and will lead to political clashes as some authorities, especially at the municipal-level, will push back against hamlet marginalization and eviction. These clashes will represent a moment of opportunity for municipalities to strengthen their autonomy vis-à-vis the central government by taking strong stands for their citizens.

Soribougou is also instructive in terms of land tenure. Berry (2009) highlights the need to understand struggles over land at their intersections with political and economic dynamics at the local and national scales. Soribougou is a "curious" case because it forces a reconsideration of certain unquestioned assumptions about social relations surrounding land resources as well as how those relations are intersecting with state power and new local institutions in West Africa. Soribougou is a classic case that highlights the different spheres of power in which everyday actions are situated and how these spheres either enable or prevent actors like the farmers of Soribougou from realizing their interests. It is now clear, from this and other examples, that

neither national nor local institutions are hegemonic and the power they are able to exercise is geographically uneven, even at fine scales. As Soribougou demonstrates, “weaker” actors can exploit the internal inconsistencies of the state for their own gain, which is often overlooked in studies of state-local relations in Africa.

Soribougou brings the geographic dimension of these political realities into sharp relief. Studies of land tenure and group membership and identity rarely, if ever, fully account for the geographic variability of authority over land in agrarian West Africa. Customary authority at the village level is reified as host-stranger relations without accounting for how these relations are evolving within contemporary political contexts or even questioning whether these relationships are relevant in all cases. Further, the trope that “all land is owned by someone” in sub-Saharan Africa is deployed in discussions of customary land tenure without sufficient historic or geographic contextualization. By doing so, we are left with an overly narrow focus on customary hierarchies (Berry 2009) as persistent nodes of local power that perpetuate exclusionary politics against groups and individuals deemed “stranger” or “migrant.”

This obscures the new and surprising trajectory of local power and authority that is observable in Soribougou, which is part of the largely invisible pattern of hamlet-driven municipal development in western Mali and beyond. Hamlets currently exist in a tension between their illegality, political relevance, and economic importance in rural areas. This tension will eventually be resolved *if* municipalities in western Mali gain enough political traction to confront the contradictions between laws concerning land rights and citizenship. In the meantime, residents of hamlets will continue to be largely cut off from the meager public services that are offered by local governments.

Beyond these very real practical implications for rural development and poverty

reduction, the hamlets and municipalities considered in this chapter offer a conceptual insight as well. Namely, the process of political decentralization and the fragmentary state become spatialized in ways that work recursively to shape the desired institutional outcomes--in this case, functioning municipalities—in unexpected but important ways.

Figures and Tables

Figure 1: Population growth in Mali by municipality (1998-2009). Municipal (communal) boundary data acquired from Malian National Geographic Institute, 1998 and 2009 census data acquired from Malian National Statistical Institute (INSM). Cartography by Masrudy Omri.

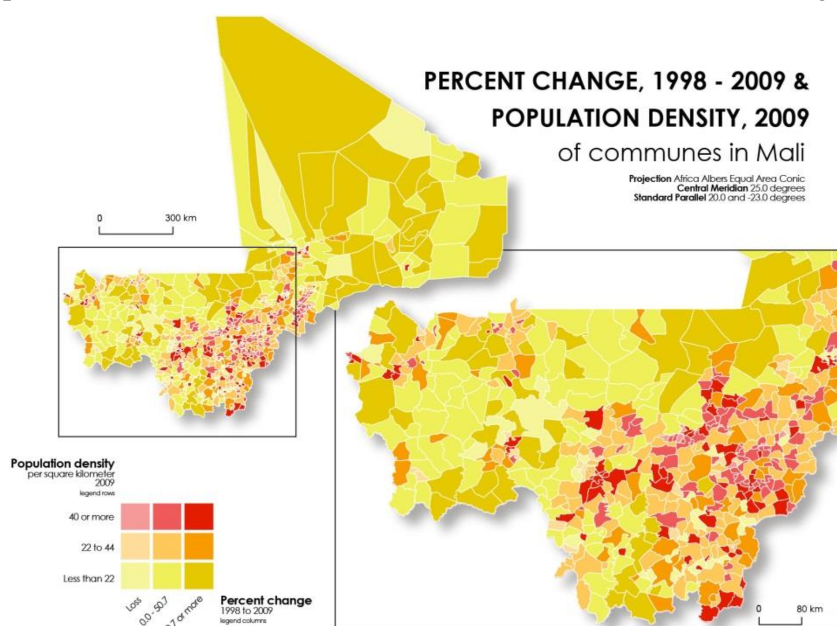
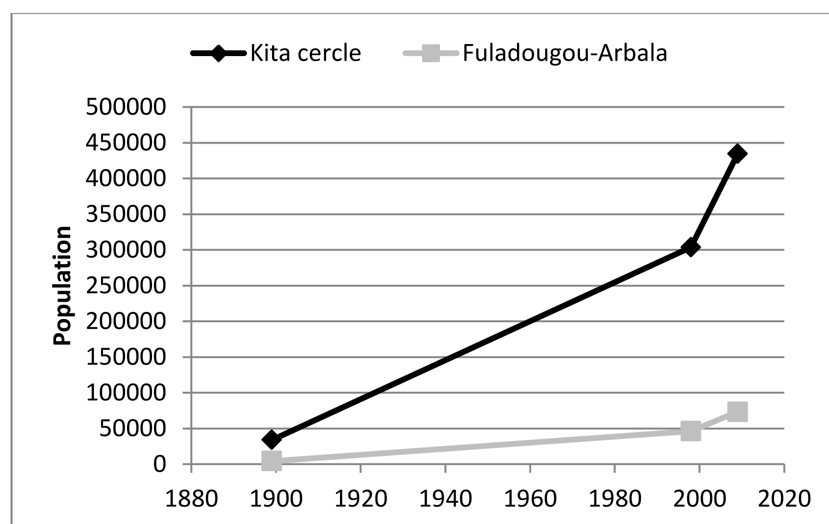


Figure 2. Population change 1899-2009 in Kita district (cercle) and the Fuladougou-Arbala*. 1899 census data acquired from 1905 district census, 1998 and 2009 census data acquired from the Malian National Statistical Institute.



(*Fuladougou-Arbala encompasses four municipalities: Kotouba, Madina, Sebecoro, and Kassaro)

Figure 3: Migration into the Fuladougou and agricultural expansion (2001-2010). Agricultural data from Landsat imagery-based change analysis, migration data from field interviews conducted by the author, village locations and biosphere reserve boundary from Malian National Geographic Institute (IGM). Cartography by Masrudy Omri

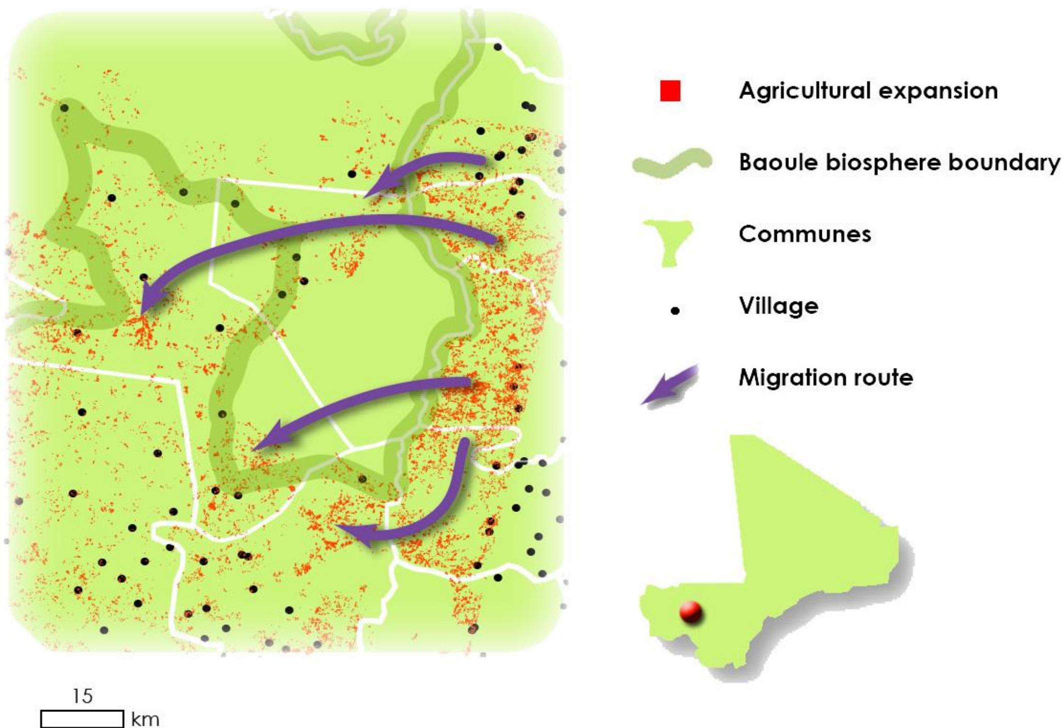


Figure 4: Typical Sudanian West African agricultural savanna parkland (author's photo)

Figure 5: Land use change and original settlements in the Fuladougou (2001-2010). Settlement locations collected with GPS in field by author, Fuladougou municipal boundaries and biosphere reserve boundaries acquired from Malian National Geographic Institute, agricultural land cover data derived from land change analysis conducted with Landsat TM imagery (see chapter two). Cartography by Masrudy Omri.

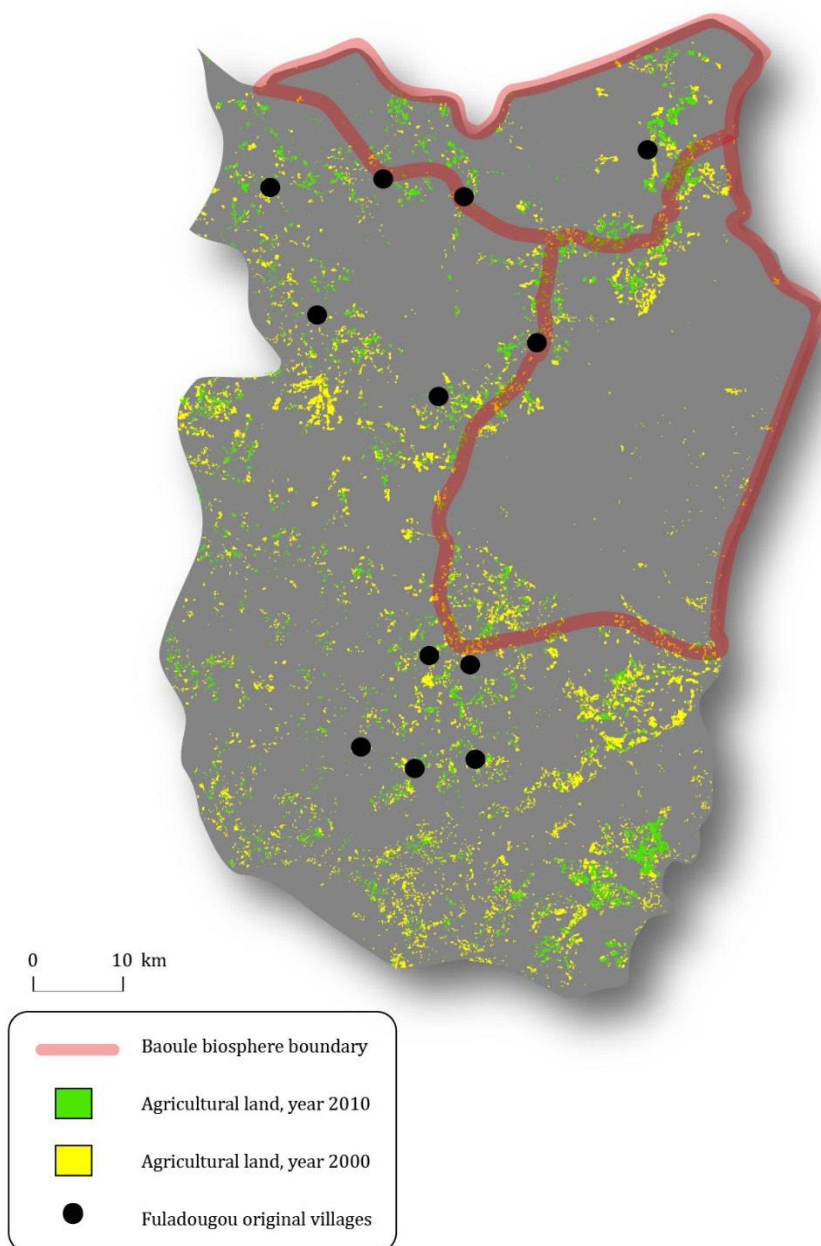


Figure 6: Estimated ranges of percentage of tax revenue and agricultural production from unofficial hamlets in the Fuladougou in 2011. Tax revenue and agricultural production data based on key informant interviews conducted by Lassine Ba in March 2012. Municipal boundary data acquired from Malian National Geographic Institute.

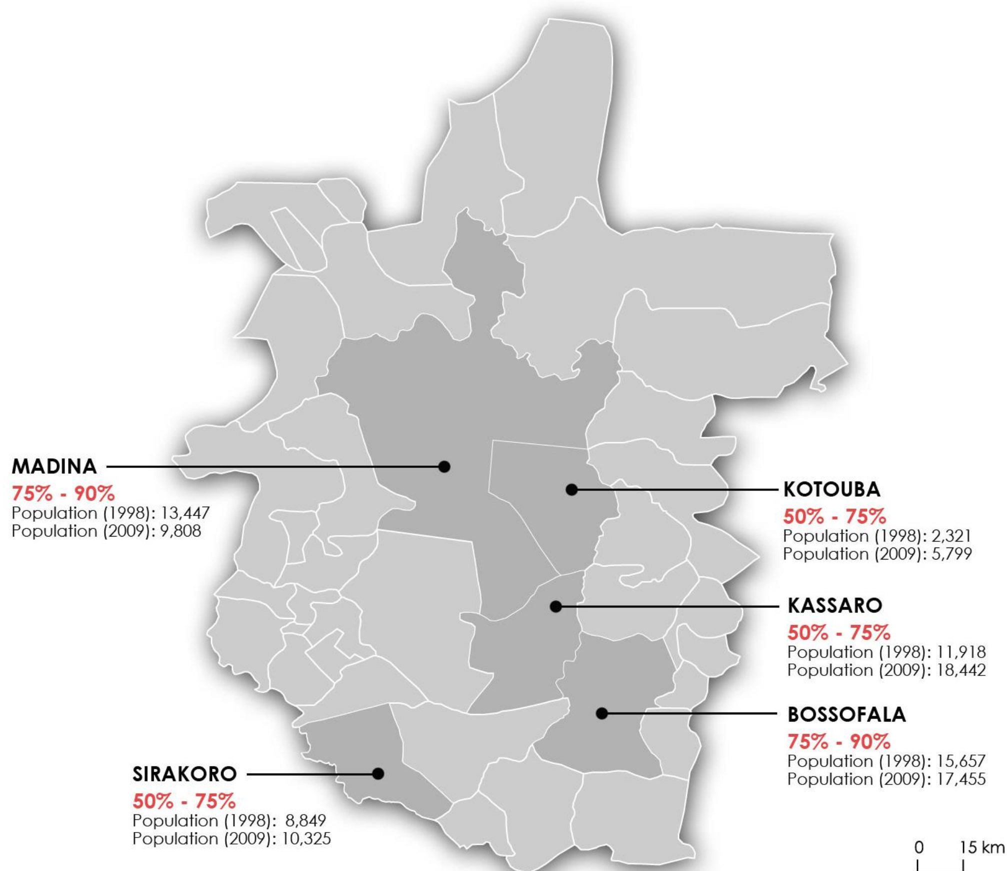


Table 1. Population growth in study area municipalities (1998-2009) (source: Malian National Statistical Institute)

Commune/municipality	Cercle	Region	pop_1998	pop_2009	pct_change
Kotouba	Kita	Kayes	2321	5799	149.9
Sebecoro	Kita	Kayes	18443	39030	111.6
Gomitrabougou	Diema	Kayes	4111	7287	77.3
Kassaro	Kita	Kayes	11918	18442	54.7
Dioumara Koussata	Diema	Kayes	10894	16218	48.9
Didieni	Kolokani	Koulikoro	25241	34915	38.3
Sebecoro 1	Kolokani	Koulikoro	15053	20471	36.0
Badia	Kita	Kayes	5895	7514	27.5
Senko	Kita	Kayes	7813	9701	24.2
Sirakoro	Kita	Kayes	8849	10325	16.7
Bossofala	Kita	Koulikoro	15657	17455	11.5
Sagabala	Kolokani	Koulikoro	15258	16011	4.9
Bendoubougouda	Kita	Kayes	11790	10752	-8.8
Madina	Kita	Kayes	13447	9808	-27.1

Table 2. Population change 1899-2009 in Kita cercle and the Fuladougou-Arbala.*1899 census data acquired from 1905 district census report, 1998 and 2009 census data acquired from the Malian National Statistical Institute.

	1899	1998	2009
Kita cercle	33800	303638	434379
Fuladougou-Arbala	4400	46129	73079
percent	13.0	15.2	16.8

(*Fuladougou-Arbala is the customary name for the four municipalities of Kotouba, Madina, Sebecoro, and Kassaro)

Table 3. Changes in geographic characteristics of areas of contiguous cultivation in the Fuladougou. Data is derived from Landsat imagery-based change detection and GIS measurements.

	1985	2001	2010
no. of cultivated areas	1111	3318	4185
total area (hectares)	2090.0	12210.0	16776.0
average area (hectares)	1.9	3.7	4
average distance to village	7.1	10.6	11.4
% within 5km of reserve	25.3	27.5	28.5
% inside or within 1km of reserve	46.4	28.9	26.2
% in declassified areas	11.3	6.9	11

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Chapter six: This land is [not] your land: hosts, strangers and the politics of livestock corridors in Sudanian West Africa

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The historicity of politics in Africa is here, very classically, a history of terroirs.
(Bayart 1993: 265)

Introduction

The role of land in African agrarian societies is complex, contentious, and critical. Land continues to support the livelihoods of millions of people, power national economies, and hold deep symbolic power in rural as well as urban settings. One facet of land in Africa that is particularly sensitive is the process of geographic boundary formation. In West Africa, boundaries at many scales have historically been porous, vague, and of secondary political importance due largely to the region's sparse and shifting demographics, which rendered the control of people a much more pressing task for authorities than control of territory (Austin 2004, Raynaut 1997, Bayart 1993).

As a result, understanding the meaning, function, and even the form of geographic boundaries in West Africa can be challenging. Bohannan (1973): 106) describes the Tiv [of Nigeria] conception of space as a 'topological rubber sheet' where the 'Tiv map is constantly changing both in reference to itself and in its correlation with the earth.' Lentz (2006) similarly describes boundaries between areas controlled by different groups as overlapping zones of contact as opposed to fixed linear features on the landscape. Boundaries in this sense often acquire fixity and importance only when they are transgressed locally or reified through extra-local political processes such as colonial governance and post-colonial development interventions (c.f. Gray 2002). As competition for land has become a defining characteristic of agrarian West Africa (Raynaut 1997) and local territory-based governance has become entrenched in the region (Idelman 2009), processes of geographic boundary formation remain a critical aspect of local politics and social relations.

Geographic boundaries in West Africa derive much of their importance from the central role they play in defining the social groups through which rural people gain access to productive resources and participate in politics more generally (Berry 1993, Kuba and Lentz 2006). The connection between group identity and boundaries that create discrete territories gained importance through colonial state formation (Hickey 2007, Mamdani 1996) and has been strengthened during the post-Independence era (Kuba and Lentz 2006). Evocations of 'homeland' and 'indigeneity' tied to specific territories as well as related issues of land rights have been prominent factors in recent civil wars in the region (Fratani 2007, Richards 2005). These issues also play a less visible but increasingly important role in local disputes over access to land resources (Breusers 2001, Chauveau 2006, Hagberg 1998, Lavigne Delville 2002). In short, the relationship between territory and social identity is vital to West African political life.

This paper focuses on the role of boundary formation within this relationship. Following recent theoretical developments in human (Jones 2009) and political geography (Alatout 2006), it takes a processual and historicized stance to recent land use planning projects that are establishing new forms of boundaries in agrarian West Africa. Many scholars have focused on how these projects have imposed "fixed" boundaries on historically "unbounded areas" (Bassett, Blanc-Pamard, and Boutrais 2007, Le Meur 2006), a process that stokes intra-community competition over resource control and creates conflict (Gray 2002). This paper follows these accounts of boundary formation in agrarian West Africa, particularly in terms of how the process affects the politics of belonging between groups claiming 'autochthony' and those categorized as "strangers", such as migrant farmers. It argues, however, that a singular focus on the transition from "flexible" to "fixed" boundaries obscures how the power relations through which boundaries acquire meaning are historically and geographically contingent. More specifically,

the implications of boundary formation depend critically on how boundaries re-order the socio-spatial relationships between autochthonous hosts and strangers. In other studies that have focused on autochthonous and migrant farmers, such as chapter four of this project, spatially bounding migrant settlements and defining them as 'villages' was seriously antithetical to their political relationships so the boundaries inevitably contributed to conflict. However, as this case aims to demonstrate, boundary processes are contingent and therefore affect host-stranger relationships in different ways that contribute to divergent political outcomes.

The paper's argument is based on a detailed case study of a recent development project that proposed a bounded long-distance livestock migration corridor in western Mali. A critical factor in the same project's success in one location and failure in another was the presence or absence of independent pastoralist communities in proximity to agriculturalists who claim local autochthony. Farmers in one area rejected the project because they perceived its proposed boundaries as strengthening the land tenure rights of local herders, who had, over time, established rights *outside* of any host-stranger relationship. In that area, where farmers and herders coexist and compete in overlapping zones of contact, questions of political autonomy are uncertain and highly contested in ways that reflect the dynamics between autochthonous and migrant farmers. By contrast, farmers inhabiting and controlling an area where pastoralist herders are seasonal guests accepted the corridor because it provides them with a legitimate way to reinforce their spatio-temporally defined host-stranger relationship with the herders. The same corridor and its fixed boundaries essentially enabled farmers to *preempt* the sort of autonomous land rights that the project was seen to be reinforcing in the place where it failed.

The paper is comprised of five sections: a theoretical framework grounded in political ecology and the internal frontier hypothesis (Kopytoff 1987), a description of land tenure

systems in West Africa, a brief history of herd corridors and other boundary-formation projects in the region, and an account of the corridor project in question. It will conclude by discussing the implications of the case for our understanding of how livestock corridors fit within changing resource tenure regimes in the context of political decentralization and broader strategies of climate change adaptation in West Africa and other dryland regions.

Political ecology and resource tenure

This paper is concerned with the ways in which boundary formation, as a particular socio-spatial practice, plays a role in competition over access to resources. Informed by political ecology (Bassett and Zimmerer 2003), it treats these processes as embedded in multi-scale and uneven power relations that are influenced as much by discursive struggle as by material constraint (Fortmann 1995). It recognizes that society and land are in constant dialectic interaction with one another (Bassett and Crummey 1993). Spatial mobility, for example, is a livelihood adaptation to dryland ecological dynamics (Niamir-Fuller 1999) while the physical distributions of resources that mobile resource users seek are historic outcomes of social relations (Agrawal and Sivaramakrishnan 2000) and land use decisions (Laris 2002). This paper focuses on the dynamic process of boundary formation and its role within power relations in agrarian West Africa. This process can be understood through the concept of territoriality as a 'historically sensitive strategy to affect, influence, and control' (Sack 1986: 1). Alatout (2006) strengthens this concept by elaborating how territorial strategies and the creation of boundaries create distinct political subject groups, which, in this case, include local "hosts" and "strangers."

Decentralization in Mali and other West African countries has given rural inhabitants an opportunity to renegotiate political identities and the socio-spatial boundaries that define them.

In many cases, this process is strengthening discourses of autochthony and local instruments of power (Chauveau 2008, Hagmann and Péclard 2010, Nijenhuis 2003). For example, the Malian decentralization process established local municipalities that group together sets of villages under democratically elected councils, but, as Idelman (2009) points out, the process has sidestepped the issue of land tenure, which has reinforced the authority that sub-municipal village leaders hold over land issues.

This complicates resource governance at larger-scales as mandated by laws such as the Malian pastoral charter, which provides livestock herders with legal resource access rights throughout the national territory and includes bounded passage corridors as a provision. Mobile livestock herders have long accessed resources across broad scales through social networks (Bassett and Koné 2006, Turner 1999b). These networks and the movements they support are embedded in complex and unequal power relations that depend on local context. In many places, such as the inland Niger Delta, pastoral communities hold a great deal of political power based on pre-colonial claims. Further south, in sub-humid areas, autochthonous farming communities typically control customary institutions, including those concerning resource access. Decentralization is empowering these farming communities to redefine their relationships with and make new demands on the seasonal herders they host in the form of taxation, restrictions on the timing of herd arrival, and, in this case, the geographic boundaries of livestock passage corridors.

The implementation of Mali's national pastoral charter in the context of decentralization has therefore become inextricably linked to historic questions surrounding land tenure and group identity (Berry 2009) but also to the issue of how local authorities gain legitimacy through the processes of framing and resolving these questions (Cleaver 2007, Sikor and Muller 2009, Sikor

and Lund 2009). It is therefore necessary to contextualize authority, territory, and boundaries broadly within a framework of land tenure and specifically within the host-stranger relationship, which is a central organizing principle of agrarian polities in West Africa.

Land tenure

Land tenure, defined as the social organization of agrarian space (Le Bris, Le Roy, and Leimdorfer 1982: 14), is more than just control of productive land resources. It is fundamentally about peoples' relationships concerning land within a totality of cultural, political, and material processes (Bassett and Crummey 1993; Berry 1993). Certain fundamental principles of land tenure that are found throughout sub-Saharan Africa (Bruce and Migot-Adholla 1994) will be described here in order to contextualize the host-stranger relationship and its importance within processes of territorial boundary formation. Land is a principal *source* of political power throughout rural West Africa (Shipton and Goheen 1992) and is organized around the principal of first occupancy (Cotula et al. 2007).[1]

First-occupancy refers to the claims made by individuals or groups of settlers seeking cultivatable land, political escape (Kopytoff 1987) or wild game (Pélissier 1966) who would physically and symbolically gain control over vaguely bounded territories of land. The abundance of sparsely populated or uninhabited areas throughout the West African savanna belt made the recurrence of first-occupancy claims possible well into the 20th century (c.f. Jacob

[1] An important debate surrounding land politics in Africa focuses on the influence of colonial rule on notions of 'tradition' (c.f. Olivier de Sardan 1984), particularly concerning 'traditional' authority over land rights. This issue is beyond the scope of this paper, which follows Shipton and Goheen's assertion that colonial rules influenced but did not invent custom 'out of whole cloth, and have often exercised little real control over it' (1992: 308). See also Spear (2003) regarding this issue in British East Africa.

2003).[2] Settlers would typically create covenants with the spirits of the area, a process that established their first occupancy as a legitimate source of political authority. Physical control of territory was less important than creating a field of 'ritual power' Kuba and Lentz (2006: 9) that subsequent immigrants would acknowledge and respect. Murphy and Bledsoe (1987: 126) describe how legitimate first inhabitancy in Liberia depended on supportable claims of introducing social order in 'wild' and 'unordered' spaces. Using the example of the Serer of Senegal, Pélissier (1966) describes how hunters would light areas of unclaimed savanna on fire and the extent of burning after two days would fall under their control. Later generations claiming first occupancy status would possess customary land tenure and political power over the territory claimed by their ancestors.

Membership or affiliation with these land-controlling social groups, often taking the form of lineages or clans, provides specific "rights of access to land, other resources, their benefits, and the responsibilities related to these rights" (Evers, Spierenburg, and Wels 2005: 3). A complimentary strand of land tenure includes specific rights produced through labor (Bohannan 1973, Colson 1971): households generally possess secure rights to parcels of agricultural land they cultivate *within* territories controlled by first comer groups, creating "nested" systems of tenure. Secondary rights to trees in fields (Fortmann 1985) and post-harvest agricultural residue add further complexity to these arrangements, which are best characterized as 'bundles of rights' (Meek 1946) that are held by "bundles of owners" (Geisler and Daneker 2000). Mobile pastoralists depend on *secondary* rights to water, grazing areas, and passage acquired through relationships with members of the land-controlling group in a particular area. A critical issue

[2] The presence of diseases such as river blindness and displacements caused by warfare were principal reasons for the lack of settlement in many sub-humid savanna areas.

surrounding the livestock corridor in this case study is whether these groups perceived it as traditional secondary rights or as land rights existing *outside* of their own customary authority.

The internal frontier

Kopytoff (1987) describes the process of land conquest that produces customary authority and the way it has been reproduced over time as an "internal frontier", which has significantly influenced African agrarian history and social organization.[3] By providing flexible land access across these "internal frontiers", customary tenure systems have facilitated the spatial mobility and immigration that have characterized West Africa since the pre-colonial period (De Bruijn, Van Dijk, and Foeken 2001). As Kopytoff (1987) recounts, the need to attract new members to frontier settlements gave rise to the host-stranger relationships that still form the core of customary land tenure relations in West Africa. By serving as political sponsors or "hosts" for immigrants, commonly referred to as "strangers", autochthonous first-comer groups maintain legitimate control over land access and political supremacy through these patron-client relationships. "Stranger" groups, which typically include farmers who migrated during later periods and mobile livestock herders, gain access to productive resources, a recognized place within the local social hierarchy, and the possibility of upward mobility through marriage, patronage, and other channels.[4]

The "host-stranger" relationship acts as a mechanism for agrarian communities to control new entry while maintaining a level of permeability of their social boundaries that is critical to

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[3] Vansina (1966) describes low population density in the central African savanna as a consequence of swidden agriculture.

[4] The vagueness of first-comer claims and the fluidity of group membership in West African agrarian communities also provide ambitious immigrants opportunities to create parallel claims to primacy and political authority (c.f. Lentz 2006). The host-stranger relationship is commonly known in Francophone West Africa as the *tutorat* (Chauveau 2006).

their reproduction and growth.[5] The particular sense of belonging provided by the host-stranger relationship (Kuba and Lentz 2006, Dorman, Hammett, and Nugent 2007) also serves as a legitimate solution to the problem of providing relatively secure resource access for "strangers" while maintaining the inalienability of customary tenure domains controlled by first-comer "host" groups. The ease with which migrants can and do *leave* geographically dispersed communities and join others combined with labor scarcity as a limiting factor in agricultural production help to explain the political nature of land tenure arrangements in agrarian West Africa. The *flexible* land tenure system that accommodates the needs of all is as much about attracting and retaining political subjects as it is about assuring agricultural production. Colson (1971) noted as much in the observation that pre-colonial African communities did not distinguish between the economic and political value of land. The blurry division between the economic and political value of land has contributed to conflicts over the meaning and validity of land transactions in Cote d'Ivoire where 'strangers' have cultivated land for decades without receive secure land tenure rights (Chauveau 2006).[6] As land pressure and competition for land access in agrarian West Africa have heightened, the political importance of territorial land boundaries has increased.

Boundaries, territory, and power

Physical boundaries have long been an integral part of agrarian socio-spatial organization in West Africa (Kuba and Lentz 2006). Such boundaries were not cadastral before the imposition

[5] See Barth (1969) for a theorization of the construction and ascription of social group boundaries.

[6] Referred to as imperfect land privatization in several studies (c.f. Chauveau, Jacob, and Le Meur 2004, Chauveau 2006).

of colonial order but, instead, tended to follow natural features and derive importance in relation to neighboring groups (ibid: 9). Vague and often overlapping frontier zones typically separated organized settlements ranging from small villages to large, stratified kingdoms. This historic pattern found throughout West Africa raises an important question: to what degree do current efforts to delineate *fixed* territorial boundaries around settlements, land use zones or other socially organized spaces represent an unprecedented shift from historically flexible systems of land and social organization?

This section argues that although unbounded frontiers were the norm during the pre-colonial era in West Africa, many boundaries that were historically evident can be construed as fixed. The purpose of this section is *not* to deny the centrality of unfixed, frontier-type boundaries or the importance of their flexibility. It will, however, discuss a few examples of fixed boundaries in West African history in support of the argument that they are not necessarily unprecedented and their present day effects are part of a historic continuity that is contingent on *who*, *where,* and *how* they are formed. The notion of relational unfixed West African cartographic space is best represented by the image provided by (Nugent 1996: 37) of an Igbo peasant moving away from his or her home village through increasingly unfamiliar villages eventually into *terra incognita*. North of Igboland in present-day Nigeria, the Sokoto Empire of the 19th century established fortified settlements of subjected groups, such as slaves and Fulani pastoralists, in frontier areas that signified the limits of the territory under the Emir's control (ibid). Sokoto's rulers did not necessarily strictly enforce fixed boundaries but the inside and outside of its territory were distinctly demarcated through settlements that held religious allegiance to their leaders.

The Fuladougou area of western Mali, the location of part of this paper's case study, provides a pre-colonial example of a combination of fortified frontier area and natural boundary (the Baoulé River) that delimited the Fuladougou from Bambara-controlled areas to the east. This was militarily significant during the 18th and 19th centuries when those areas were under the control of the Segou Empire, which was based on raiding 'beyond its boundaries' (Nugent 1996: 38).[7] Mirroring the strategy found in Sokoto, settlements in the northeastern periphery of the Fuladougou still contain 'stranger' populations subject to its founding clan. The Baoulé not only provided a fixed territorial boundary but also a sharp ethnic one as well as its right bank was scattered with Bambara hunters' camps.

The Maacina Empire of Mali's inland Niger delta provides arguably the best example of fixed boundary formation in pre-colonial West Africa. Cissé (1982) describes how theocratic rulers terriorialized clan lands and land use zones, including livestock corridors, in the form of *leydi*. Izard (1985) also describes how rulers of the pre-colonial Mossi Kingdoms in present-day Burkina Faso also used territorial boundaries as a form of top-down political control. Fixed boundaries are found throughout other parts of Africa as well. Verkijika (1986) and Asiwaju (1983: 46) acknowledge that "frontier zones were the rule in pre-colonial Africa" but provide ample evidence that "concern for precisely demarcated territorial possession is not lacking." Pre-colonial rulers in the Congo would provide European explorers with an escort only up to a certain point that marked the boundary of their territory (ibid). Hunters and pastoralists also lay claim to well-defined territories in places like Tanzania, southern Africa, and Somalia. Verkijika

[7] See Jansen (2005) and Siddle (1968) for examples of how warfare and military defense considerations affected settlement patterns in 19th Century Mali and Sierra Leone.

(1986: 61) notes the use of "geometric lines" and "fixed points" used to define farmland boundaries in Cameroon, even in areas where political boundaries were vague.

In short, different forms of fixed boundaries existed in pre-colonial West Africa and Africans were "aware of their territorial limits and when they crossed ethnic boundaries" Verkijika (1986: 59). Although the concepts of territory and ethnicity are limited in their usefulness, this statement does reveal the intimate connection between spatial, social, and political boundaries in all their forms. The local socio-spatial boundaries found in western Mali today have been shaped by the seismic political and demographic impacts of Islamic Jihad, colonial conquest, Independence, and, currently, democratic decentralization. Remarkably, many of the area's pre-colonial territorial boundaries have persisted to this day and are organized around clans with origin narratives that date back centuries.[8]

Decentralization, terroir, and local socio-spatial boundaries

Idelman (2009) provides a vivid account of how these customary groups have shaped the decentralization process, which rural residents perceive as primarily about creating divisions and boundaries. As the author shows, host-stranger relationships are driving many of the concerns and disputes surrounding the limits of newly established local jurisdictions. A common issue has been the refusal by founding villages to be placed under the jurisdiction of 'stranger' villages that had become more populous than their own. The participatory approach taken by the Malian government combined with the desire to maintain customary social boundaries between clans, other affinity groups, and their allies led to the creation of over 700 local municipalities in Mali

[8] Even some African administrative boundaries, normally seen as artificial and European, were based on pre-colonial boundaries (Nugent 1996).

(ibid). The problems encountered during the creation of these municipalities are, in many ways, strikingly similar to the conflicts that arose through the local natural resource management projects described by Gray (2002) and Batterbury (1998). These projects, known as *gestion du terroir villageois* (GTV) in Francophone Africa, were similar to the one in this paper's case study and their effects are instructive, particularly in terms of the establishment of fixed land use boundaries.

GTV projects, largely funded by the Word Bank, represented a critical part of the decentralization process in Mali where development projects during the 1970s and 80s had been top-down and instrumentalized by the authoritarian national government.[9] The GTV program was part of a worldwide focus on community-led development (Agrawal and Gibson 1999, Brosius, Tsing, and Zerner 2005) and emphasized grassroots participation, including a strong emphasis on local-level land use planning and mapping. In certain cases, GTV focused on bounding individual agricultural land parcels in order to support private land titling, which was seen as a way to boost agricultural production and improve food security (Gray 2002).

The focus on local *terroir* as an effective scale of action in West Africa was part of a worldwide trend but also grounded in traditions within French academic geography (Landais and Lloste 1990, Sautter and Pélissier 1964). French agrarian geographers introduced to West Africa certain notions of rural spatiality that helped define *terroir* within an extensive research program that preceded and directly influenced the World Bank-led development initiative (Bassett, Blanc-Pamard, and Boutrais 2007). In their thorough genealogy of the *terroir* concept and its use in the region, (Bassett, Blanc-Pamard, and Boutrais 2007) argue that recent development interventions

[9] GTV projects were widely implement throughout West African and although the author is familiar with its activities in western Mali, its role and impacts in other parts of the country are not well known.

have changed the meaning and function of *terroir* in important ways. Historically, *terroir* represented "socio-natural heritage" through which local people maintain "historic and affective ties" while its current incarnation embodies territory, boundaries and a represents a mode of control (ibid: 104). Another specific point the authors emphasize is that the technocratic focus on establishing fixed cadastral boundaries obscures the 'social and biophysical processes' through which 'historically shifting' *terroir* are formed (p122).

The case study in this paper largely reflects the characterization of *terroir* provided in Bassett, Blanc-Pamard, and Boutrais (2007), particularly in terms of how 'neo-*terroir*' projects affect intra-community relations, primary versus secondary resource tenure arrangements, and produce risky 'formal' institutions to govern resource access. However, this paper challenges the notion that 'neo-terroir' projects necessarily produce territorial control where none existed before. The *terroir* of the Fuladougou and many others in West Africa emerged during the 19th Century as defensive arrangements and spatial 'containers' within which control was carried out through host-stranger relationships. Current politics surrounding land represent a continuity of these arrangements, which reflects the ongoing importance of land as a source of political power and authority in the region (Shipton and Goheen 1992). Fixed boundaries might have gained importance during periods of pre-colonial instability, become reified through colonial administration, 'neo-*terroir*' projects or decentralization. In all cases, the boundaries acquire their meaning through local power relations that are historically and spatially contingent.

Several studies have highlighted the peril of "defining village boundaries that were never specified before" (Le Meur 2006: 893). The risk of conflict is due to the fact that these boundaries destabilize land tenure arrangements based on host-stranger relationships. Customary land tenure systems based on the principle of autochthony typically group several

settlements that are subservient to a 'mother' village inhabited by the founding lineage group (Batterbury 1998). New boundaries around 'stranger' settlements can be construed as gestures of autonomy that open these socio-spatial arrangements to contestation, which can lead to exclusion and conflict. The volatile connection between boundary formation, power relations, and tenure has been most frequently seen in the struggles pitting local versus migrant farming groups in areas such as Cote d'Ivoire and Burkina Faso when land scarcity becomes a problem. However, as Painter, Sumberg, and Price (1994) and Turner (1999a) highlight, linking resource access to specific territories or bounded areas can adversely affect mobile pastoralists as well.

Turner (1999a) demonstrates that the fixed land use boundaries that accompanied *gestion du terroir* projects in the semi-arid Sahel work against mobility-based livelihoods that are adapted to the variability of rain and other productive resources. Livestock mobility is based on informal institutions that encourage hospitality, reciprocity and porosity of social boundaries. Turner (1999a: 652) describes: '[T]he advantage in a dryland situation is [the] responsiveness [of these institutions] to the high spatiotemporal variability of resource endowment.' Strengthening the exclusionary powers of sedentary groups through *terroir*-based land use planning can weaken informal agreements and undermine the position of mobile resource users vis-à-vis these groups. Farmers and mobile herders mutually benefited throughout history from arrangements of primary and secondary resource rights that facilitated reciprocal exchanges of manure for crop residue fodder and milk for grain. Secondary rights based on recognition of the primacy of sedentary land tenure enabled mobile herders to secure resource access without investments in capital or labor to clear land (von Kaufmann, Chater, and Blench 1986). Herders relied, and, in many cases, continue to rely on non-territorial political strategies, secondary property rights, and the previously described social networks. Such mobility-based non territorial strategies were,

however, significantly eroded during the 20th Century (Dorman, Hammett, and Nugent 2007) by agricultural expansion, government antagonism to nomadic groups (Azarya et al. 1999), the catastrophic droughts that began in the 1970s, as well as a growing interest among pastoralists to remain close to markets, health clinics, and other modern services.

These changes have prompted many herders to settle and begin pursuing primary rights to land and resources (Traoré 2002). These changes have created a major land use challenge in agrarian Africa: how to promote mobility and flexible resource access in the context of growing land pressure and growing political competition over control of resources such as water points and bottomlands (Cousins 2000). Corridors with fixed boundaries are the conventional approach to ensuring pastoral livestock mobility, yet, when implemented, they inevitably serve as instruments of territorial control at various scales. After briefly describing a few historic examples of bounded corridors in the region, the case study will demonstrate how these corridors and the formation of their boundaries served as a negotiating arena (Hagmann and Péclard 2010) for power struggles over resource tenure and access rights. It aims to show that the host-stranger relationship is central to how these struggles are discursively and spatially ordered. Finally, the case also explains how larger-scale boundary formation processes are inscribed and acquire meaning within local *terroir* landscapes, which represents an important source of contingency for these processes.

Pregesco's long-distance transhumance corridor

Livestock corridors are not new to West Africa. The land use system of Mali's Maacina Empire included livestock passage corridors known as *goumpi* that were managed in association with grazing areas within the inland Niger floodplain (Cissé 1982). In areas of northern Nigeria

inhabited by the Hausa and Fulani, grazing grounds known as *hurmi* and corridors known as *burtali* were allocated to transhumant herders during the pre-colonial era (Waters-Beyer and Bayer 1994).[10] Colonial governments attempted much of the same: in Niger, corridors were legally established in 1959, ostensibly to protect farmers from herd movements and crop damage (Bernus 1974). Corridors in the post-Independence era have most often been part of the previously described GTV resource management projects, which, as Hagberg (1998) shows, have had mixed results.

The livestock corridor that is the focus of this paper is part of a grassroots development project initiated by the Swiss NGO Helvetas in response to a series of violent clashes between farmers and herders in western Mali that occurred during the late 1990s (Beeler 2006). Although periodic violence between the two groups was nothing new to the region (c. f. Bassett 1988, Heasley 2005), the NGO saw political decentralization as an opportunity to address the problem in a more inclusive and therefore effective way. In many ways, the project *Prevention et Gestion des Conflits dans la Fuladougou* (Pregesco) was trying all the right things: common property scholars recognize the inevitability of conflict between different users struggling over rules and norms of resource access (van Laerhoven and Andersson 2006). Negotiated conflict management that includes underrepresented groups such as women and youth is therefore seen as a key element of effective resource governance in dryland Africa (Mwangi and Dohrn 2008, Toulmin 2009) and central to the Pregesco strategy.

The establishment of a livestock corridor that followed a traditional transhumance route became a major component of Pregesco's work. As an activity with significant implications for tenure relations between farmers and herders, the corridor was justified in a number of ways:

[10] In the inland Niger Delta, *Burtali* or *burtol* refers to livestock corridors outside the flood plain

Mali's pastoral charter of 2002 provided herders with the legal right to access critical resources across the entirety of the national territory and mandated corridors as a means to achieve this end.[11] Secondly, project managers as well as local stakeholders perceived the corridor as a way to reduce tensions between the groups by separating their respective principal land uses.

The impetus behind the proposal to spatially segregate farming and herding is twofold: the first is widespread agricultural expansion into areas of livestock movement and grazing. The second is the arrival of transhumant herds before the completion of the cropping season. Each factor contributes to recurrent crop damage and strained relations between farmers and herders: the first group complaining about negligence or even malicious intent of herders, who perceive field expansion as a lack of respect for their legitimate secondary rights to grazing land. These tensions over land use are related to the environmental changes occurring in the region. Transhumant herders only began using Fuladougou as a dry season destination on a large scale after the serious drought of 1973. Following these droughts, previous dry season grazing areas to the north, which lost water and fodder resources, no longer supported herds the way they once did. As a result, the Fuladougou, which had historically been too humid to support Sahelian livestock species, became an attractive dry season destination. Earlier forays by herders into the area were cut short by bovine maladies such as trypanosomiasis and generally favorable conditions in traditional rangelands. However, in the early 20th century, transhumant Fulani herders from the Sambourou clan of Dilly established a host-stranger relationship with the Djakité clan who had taken control of the area during the 19th century and secured their position as first-comers through French *pacification.*

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[11] The lack of legal protection for grazing lands has been cited as a reason for their disappearance to agricultural expansion in several examples (von Kaufmann, Chater, and Blench 1986, Hoffmann 2004, Traoré 2002).

The Sambourou-Djakité agreement has the broad contours of other host-stranger relationships involving autochthonous and immigrant farmers: transhumant herders were freely invited to come to the Fuladougou as seasonal guests on the condition that their animals did not damage crops or cause other problems for farmers. This covenant,[12] which still structures relations between the groups, was adequate until 10-15 years ago when early herd arrival started becoming a problem. The dry season desiccation that initially pushed herders towards the Fuladougou also began lengthening their seasonal stays from 3 to 4 months to upwards of ten months out of the year. According to herders, surface water resources are drying much more quickly along the transhumance route at the end of the rainy season, which accelerates their descent. At the beginning of the rainy season, the uncertainty of rainfall and grazing resources to the north were leading herders to delay their departure from the Fuladougou as long as possible.

Compounding the environmental changes to which herders must adapt is the presence of a protected area, the Parc National du Boucle de Baoulé, that herders the must traverse during their seasonal movements. Although the park includes a 'pastoral zone' that enables herders to pass through without trespassing in the wildlife reserve, relations between herders and park rangers are tense and unpredictable. The dynamics of herd movements through the park influences farmers' attitudes towards transhumance more generally: In October 2009, following a visit by the Minister of the Environment, park rangers cracked down on herds around a key water source whose protection status was contested and uncertain. Facing arrest, many herders fled and abandoned their animals, which caused them to continue moving uncontrolled towards

[12] See Toulmin, Lavigne Delville, and Traoré (2001) for a discussion of type of covenants relating to resource access.

the Fuladougou's settled and cultivated areas[13]. This resulted in a spike of crop damage cases and a hardening of the farmers' stance towards transhumant herders.

Devastated crops and the presence of untended cattle led many farmers to call for total expulsion of the herders: essentially a revocation of the covenant, which, in their eyes, had been flagrantly violated. Following negotiations between farmers, local authorities, herders, their 'hosts', and members of the Fuladougou diaspora living in the capital city of Bamako, a summit was convened in February 2010 by the *Association pour le Developpement du Fuladougou* (ADEF) to negotiate a solution. Expulsion, which could have led to open conflict, was averted but farmers had, by this time, united behind a common position: any formal transhumance corridor must be accompanied by a calendar that included a date of arrival before which transhumant presence would be unwelcome. These events also hardened the perception and discourse of local people that framed the herders as 'nomads' and 'outsiders'.

The events of 2009 complicated the establishment of the corridor, which, at that point, had been several years in the making. The corridor being proposed by Pregesco was, in fact, the most recent addition to a contested genealogy of measures that have attempted to address livestock movements in the area. Immediately preceding Pregesco was the UNESCO-led effort to integrate human land use into the park management plan, which involved the previously described pastoral zone that allowed for transhumance movements but did not create a smaller scale territorially bound corridor. Park staff tacitly acknowledged that transhumance movements could occur in between the western boundary of the wildlife reserve and cultivated village territories further to the west. As long as park rangers did not confiscate livestock, arrest herders, or excessively fine them, this arrangement suited transhumant interests.

[13] For an earlier account of the exact same occurrence in the Niger Delta, see Gallais (1984).

During the 1990s, prior to the biosphere planning process, *gestion du terroir* projects were active in the area implementing land use plans that included grazing zones and corridors. A result of the GTV fixation on the village scale, as described by Painter, Sumberg, and Price (1994), these projects focused on *local* herds. In the Fuladougou, several villages began clustering their fields on one side of their *terroir,* leaving the other side for their livestock. GTV projects did not, however, target every village and therefore corridors were geographically fragmented and did not result in the contiguity needed for long distance herd movements. Moreover, farmers tended to leave the park-side of their *terroir* free, which only increased the risk for transhumant herders that they would be caught and punished by zealous park rangers.

The 1990s marked the beginning of another, even more important driver of land use change in the Fuladougou: the arrival of the state-owned cotton company (CMDT) combined with the area's relative land abundance led to a surge of in-migration from the neighboring Bélédougou. The CMDT's provision of subsidized agricultural inputs attracted farmers who could easily gain access to land by entering into host-stranger relationships with autochthonous residents. As shown in other West African internal frontier areas, Bambara farmers from the Bélédougou were given old fallows to cultivate, typically in the peripheral areas of village *terroirs* (Mathieu and Laurent 1995). Hamlets and cultivated fields rapidly spread into the biosphere 'pastoral zone' and corridor, compounding the problem of early herd arrival and seasonal crop damage.

When Pregesco began its intervention in 2003, Bambara migrants substantially outnumbered their autochthonous hosts in many settlements. Although Pregesco was a model of participatory process, its local interlocutors necessarily excluded the more numerous Bambara from the deeply political work of defining a transhumance corridor. It did, however, include

representatives of the transhumant herder population, for whom a corridor that would promote *seasonal* movement meshed with their host-stranger relationship with autochthonous residents. Following a process of education that promoted the importance of herd mobility, Pregesco agents began facilitating the process of corridor delimitation.

Autochthonous farmers and transhumant herders differed immediately over the position of the corridor. Farmers wanted to formalize a corridor that would follow the western edge of the biosphere, which, herders complained, was covered in migrants' fields, offered little in the way of water and held the risk of punishment by park rangers. Herders proposed, instead, to formalize their traditional route, which connected to a series of large wetlands that lay much closer to autochthonous settlements. Settlements of sedentary herders are entirely absent from the Fuladougou, which leaves farmers' primary tenure rights uncontested and the process of corridor delimitation in their hands. Farmers unanimously opposed formally linking the corridor to the wetland areas, which had become surrounded by agricultural hamlets over the last fifteen years. Aside from this common position, however, attitudes towards the corridor varied between agricultural villages.

Representatives of Tourébougou, the northernmost village of the Fuladougou, immediately accepted that a corridor pass through the center of their territory for two reasons: the first is that very few herders stop in the area due to its lack of dry season resources; the corridor would truly be a *passage* that would facilitate herd movements in and out of Tourébougou's territory. Secondly, Tourébougou's acceptance of the corridor legitimized their agricultural expansion into the biosphere pastoral zone because the village had ceded arable land for its establishment. This situation is reflected in the village's attitude towards herders: the Chief's son described "good relations with the herders," shared social ceremonies, and mutual

respect.

This contrasts sharply with attitudes in the Bambara hamlet ten kilometers to the south where farmers feel the herders "do not respect" their fields, "bring nothing of value" to the area, and have virtually no contact with the herders, who tend to move through under the cover of night. Tourébougou's stance on the corridor posed problems for the autochthonous hamlet of Mopti-ko as well: Mopti-ko is located directly to the south of Tourébougou, on the banks of a key water source: the chief of this hamlet repeatedly evoked the previous corridor that passed along the biosphere boundary, directly through the recently established Bambara settlements. This position proved untenable at the level of the commune, however, and Mopti-ko along with several other hamlets, were obliged to accept that the corridor pass through their territories.

By the summer of 2010, the boundaries of a transhumance corridor of varying width (500m-2 km) running over 100 kilometers were identified and was in the process of being ratified by local governments. New fields were to be prohibited in the corridor, a rule that would be enforced by denying the legitimacy of crop damage claims within its boundaries. Despite, however, the corridor's remarkable success on some levels, it poses a number of unresolved spatio-temporal challenges: first is the issue of herd movements and crop damage *beyond* the corridor boundaries. As the Secretary General of an involved local government commented: "The corridor could make things worse: now farmers will look at problems that occur outside the corridor as evidence of the herders' bad intentions."

The large-scale of the corridor and its implication of *movement* led it to be designed as a linear feature that cuts *through* the landscape. This belies two important characteristics of transhumance: Herders establish their seasonal camps at various points in proximity to but not necessarily within corridors. Secondly, herd movements are highly variable in space and time,

which means livestock inevitably leave the corridors and traverse cultivated areas to access water and grazing resources, which are typically inadequate along or within corridors. This reflects a basic problem of resource availability: as one herder put it, "I'm not sure the corridor will work as it will not provide our animals with enough to eat."

The corridor was designed in such a way suited the interests of farmers who perceived it as a way to facilitate and even *ensure* the seasonal movement of transhumant livestock herds *out* of their village territories. They logically argue that they are benevolently ceding territory and recognizing the seasonal access rights of herders, who then, must reciprocate by acknowledging farmers' land rights and by staying out of the Fuladougou during the cropping and harvest seasons. Since the events of 2009, farmers have tied the legitimacy of the corridor to a proposed schedule of herd movements that corresponds to their agricultural calendar. A common refrain is: "We have no problem with the nomads, as long as they show up *after* January." But this position is deeply out of step with pastoral herders' perceptions and own livelihood aspirations considering that more than 60% of them would prefer to settle permanently in the Fuladougou as many have done in neighboring Dioumara.

The permanent settlement of herders and their tenure relations with farmers are the principal reasons for Pregesco's failure in Dioumara. This section will describe how certain geographic and historic factors in Dioumara led farmers to perceive the corridor project in very different terms from those of the Fuladougou: as a transfer of land rights to settled herders. Dioumara, located in the semi-arid Sudano-Sahelian zone, has agroecological and historical characteristics that differ from the more humid Fuladougou. Once the dry season destination for Malian herders who would pass the rainy season in Mauritania, Dioumara has, since the 1973 drought, hosted sedentary herders as well as those who leave for the Fuladougou during the dry

season. Dioumara is more ethnically diverse than the Fuladougou: sizeable populations of Bambara, Sarakolé, Kakolo, Moorish, and Fulani inhabit the area. Bambara and Sarakolé groups claim first-occupancy rights in different areas, although Dioumara's proximity to areas controlled by Fulani pastoralists is a critical factor in how the corridor project evolved.

Settled agropastoralists and the corridor in Dioumara

Dioumara has an even more complex and contentious history of corridor projects than the Fuladougou, which is indicative of its longstanding importance as a zone of agro-pastoralism. The *Operation de Developpement Integrée du Kaarta* (ODIK), one of many rural top-down organizations that worked throughout the country prior to democratization, was the first to implement a system of corridors and grazing zones. Although clearly an 'anti-politics machine' (Ferguson 1990) that brought Dioumara within the reach of the state, ODIK was also driven by the real concern that agriculture mechanization was putting pastoral resources at risk. The project established livestock corridors on two occasions: in 1982 and 1986 (Letheve and Dainro-Tadion 1996): delimiting the corridors each time with concrete markers.

The failure of the first attempt was attributed to a lack of stakeholder involvement.   The second corridor process involved pastoralists who nonetheless complained that they were "not given responsibility" and therefore "did not complain" when farmers tore out the markers and began cultivating within the corridors created by ODIK (ibid: 29). Once the project terminated, farmers denied that the corridors ever even existed. This is likely a reflection that farmers correctly sensed that pastoralists would try to use the corridor as part of their post-drought strategy to secure land rights in Dioumara, where, unlike their customary *terroir* to the north, they could cultivate crops.

ODIK did successfully build four pastoral wells in areas where transhumant traffic is high. Ironically, the wells were intended to *slow down* the southerly transhumant movements but instead fit within herders' strategy: they used the well as an opportunity to establish permanent settlements near two of the wells in the *terroir* of Zambougou. This settlement enabled herders to establish land rights autonomous from neighboring agriculturalists under conditions of 'silence' and opacity that is often characteristic of agropastoral tenure relations. The herders' presence was not a concern for farmers until the 1990s when they began to rely on the wells for their newly acquired livestock and their own drinking water needs. By this time, however, the herder settlements had established fairly strong rights over the well through the substantial investments they had made in their operation and their year-round presence.

Following the 1970s droughts, other herders gradually settled where they could invoke defensible claims that their new camps were located on *terroir* controlled by their clans or allies originating from the Dilly and Nara areas to the north. These claims were strengthened by the presence in Dilly of a powerful Islamic marabout and ethnic Fulani, Sidy Modibo Kahn, who is able to exert influence and moral authority concerning issues between farmers and herders. Meanwhile, as farmers began herding and vice versa (Toulmin 1985), competition for land resources grew rapidly. Crop damage increasingly became a problem that was easily resolved between farmers from related clans but highly politicized between farmers and herders (c.f. (Moritz 2006). A third wave of boundary demarcation came through GTV-initiated livestock corridors and grazing zones but, like the Fuladougou, these focused on sedentary villages and were not formally linked to the nascent local governments emerging through political decentralization. The corridor project initiated by Pregesco in 2003 carried more political weight than the GTV projects as it was legally backed by the pastoral charter of 2002 and slated to

become policy for the new local government. Dioumara had by this time, become a patchwork of agricultural and sedentary pastoral villages enmeshed in complex and conflict-ridden political relationships within which herders were not the "strangers" of local farmers. Farmers immediately perceived the corridor project in terms of land tenure and Pregesco as a "pro-herder" project. The attitude of the Mayor during the summer of 2010 was indicative of the general sentiment in Dioumara:

> We need a corridor. But it is false to say that the corridor is for everyone just because everyone has livestock. There are peasants and there are herders. It is the peasants who will lose land because of the corridor and that is unacceptable.

The Mayor is expressing a clear political position: he is a member of a sedentary lineage and was voted into office by and collects taxes largely from local farmers. Further, as local farmers have framed the corridor as an effective transfer of tenure, the Mayor is quick to recognize that land tenure is strictly a village affair: "The commune doesn't really meddle in tenure issues." By contrast, although tenure is a village-level concern in the Fuladougou as well, it played a much less significant role in discourse surrounding the corridor there. By discursively linking it to a calendar of herd movements, Fuladougou farmers ensured that the corridor *would not* become a tenure issue.

Ultimately, the traditional leaders of Dioumara's villages rejected the corridor. Although many residents had become accustomed to land tenure interventions, expressed by the following view: "We do not want it but we know that you will make the corridor anyways." Local people nonetheless exercised their relatively new political enfranchisement to block the establishment of the corridor, which had been several years in the making. Ordinary residents expressed themselves in other ways: during the cropping season of 2009, a farmer cleared a field in the

middle of a portion of the proposed corridor. While that individual evoked the standard narratives of ancestral domain and land scarcity, the act was an intentional gesture towards the corridor. The view of one Dioumara elder who had been heavily involved in the process captured the project's political undertones:

> Before herders used to go up to Mauritania and then down to the Fuladougou; we want them to continue doing this. It is the Fulani with few animals who want the corridor—they like conflict, they don't pay taxes; the corridor becomes a domain for them. They want to establish fields but most of all maximize their time here.

Conclusion

This quote reflects the concern among farmers that the corridor would become yet another avenue, like the wells before it, for herders to establish land rights *outside* of the host-stranger relationships that provide farmers with a modicum of control over their herding neighbors. Although power relations and their tenure-related dimensions in West Africa have long been fluid and legally plural, the host-stranger relationship provides a critical structuring framework, particularly in sub-humid areas that herders have only been penetrating in large numbers for the past forty years (Bassett and Turner 2007).

This paper has argued that boundary formation processes enter into these relationships in spatially and historically contingent ways that are critical to their outcomes. Whether a bounded corridor is perceived as a tenure claim or as a way to *preempt* potential tenure claims depended, in these cases, on the socio-spatial configurations of farmer-herder relations, which themselves are products of local and region histories. Projects to promote herd movements through bounded corridors are part of a long history in which pre-colonial rulers, post-Independence national governments,

and, currently village authorities have used land use zoning as a way to both manage resource access and control their populations.

Corridors are likely to play an important role in climate change adaptation strategies that are based on mobility, flexibility, and work across spatio-temporal scales (Berkes 2006, Young 2002). Struggles between sedentary herders and mobile herders represent a quintessential cross-scale interaction and fully reflect the assertion of Adger, Brown, and Tompkins (2006: 9) that such interactions are "always negotiated outcomes of power relations, reaffirming the hierarchies of institutions and actors." Institutionalist approaches to environmental change that do not look beyond formal rules and overlook the "unruly practices" (Gore 1993) of these power-laden negotiations do so at their peril.

In countries such as Mali, political decentralization is crucial to the ways in which bounded livestock corridors are being negotiated and this complicates their implementation at larger spatial scales. An important long-term impact of decentralization is likely to be how various actors reconfigure social and spatial boundaries within these new political spaces. As the ten-year civil conflict in Cote d'Ivoire demonstrates, the host-stranger relationship, which has defined negotiations over the corridor in this case study, can crystallize and mutate into a national-level ethnic struggle (Chauveau 2006). While this is very unlikely in Mali, local struggles defined in terms of insiders and outsiders will continue to affect the livelihoods of millions and pose a constant risk of escalation.

In the same way that this case study is instructive to mobility-based resource access, it has theoretical import within geography more generally. Following Jones (2009: 183), this case demonstrates the "crucial role categories and boundaries play in

how the world operates" as well as "how boundaries shift, fold, harden and soften over space/time." This paper has attempted to demonstrate how the spatio-temporal dimensions of power and identity can determine the shifts and folds that boundaries take in specific places.

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Chapter seven: The Place of the Fula and the Future of Malian Democracy

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Crisis

On March 21st 2012, a military putsch overthrew Malian President Amani Toumani Touré (ATT) and set in motion events that would put the entire Malian state apparatus in peril. Later that year, militant Tuareg separatists and elements from Al Qaeda in the Maghreb (AQMI) threatened to overrun the capital city of Bamako until French military forces intervened and began an occupation of the north of the country that continues to this day. Although the upheaval in Mali is partly attributable to forces beyond its borders, such as the revolution in Libya, Mali's own weakness as a democracy played an important role in the events of 2012. Mali had once been considered one of Africa's democratic "success stories" and it came as a shock when it was revealed after the coup d'état that the central government and ATT's Presidency in particular, were rotting from the inside out.

The failure of the Malian central government matters critically to the questions addressed by this project. Although a major theme of this project has been the relative remoteness of the central government and its inability to effectively project power in rural areas, a power vacuum at the top nonetheless permeates downward. This became abundantly clear when a farmer-herder conflict in Dogon country immediately after the coup turned particularly bloody, leaving at least thirty people dead. That fatal skirmish specifically involved livestock mobility corridors sponsored by the deposed Malian President that allowed pastoralists from Burkina Faso to access resources in Mali. Khalil Bara, the Burkinabe Governor of the neighboring region, stated: "The Dogons, who have always opposed the opening of these corridors, taking advantage of the crisis in Mali, have decided to solve the problem by attacking Fulani settlements (Reuters May 25, 2012)." Bara further added that the Fulani accounted for most of the death toll.

This project's study area has never experienced such levels of violence. However, as several of its chapters have demonstrated, similar latent conflicts over pastoral corridors, herd movements, and questions of authority exist there. If insecurity in Mali worsens and national authorities are unable to govern effectively, the likelihood of violent reprisals and vigilante justice will increase throughout the country. Even before the coup, vigilante justice was on the rise in the streets of Malian capital of Bamako because of the ineffectiveness of civilian police in stopping crime, despite their ubiquity in the city (Whitehouse March 25, 2013). However, if the people of Mali and their government resolve the current crisis, perhaps more determined than ever to consolidate their democracy, this project points to the follow policy areas that should be prioritized.

Moving policy forward

Land tenure

First and foremost, institutions at all levels must take seriously the inconsistencies and contradictions within the current land tenure legal framework. The passage of legislation that recognizes customary rights and calls for municipal land tenure commissions indicates that there is momentum to empower land users in a meaningful way. However, this project provided at least two ways in which the new land laws sow the seeds of future conflict: first, by not engaging sufficiently with pastoral resource issues and, secondly, by avoiding the issue of migrants' land use and need for tenure security. To address these issues the government and other actors must stay engaged with the issue and reconcile customary, pastoral, and migrant land rights.

Meaningful support for local governments

This is not a new or innovative policy recommendation. The lack of local level capacity is probably the single biggest weakness of political decentralization as a development platform. It is not just the problem of national authorities or elites maintaining control over profitable resources. The issue of "benign neglect" is also pervasive in the municipalities investigated in this project. Many municipalities face slim prospects for increasing their tax rolls, and other sources of revenue so they will be condemned to providing minimal services to their citizens unless a system of transfer payments is set up. This is unlikely to happen but until it does, inequalities between municipalities will increase as they continue to rely on NGO and expatriate funded services.

Strengthening the agricultural sector

Agriculture is, once again, the focus of international development efforts, particularly in sub-Saharan Africa. Long-term development strategies in countries such as Mali rely on agriculture as a principal livelihood activity and source of economic growth. Governments and donors are beginning to acknowledge and address the risk that climate change will undermine agriculture as a poverty reduction strategy. However, broad-based reform of agricultural extension and supply chains seems to be lagging, especially in comparison with efforts to create new crop varieties and agricultural biotechnologies. As a bundle of technical solutions, these efforts will fail unless the sector itself becomes more economically dynamic and politically robust. The government of Mali must also reduce its dependency on cotton and find other crops that have potential to generate hard currency and improve food security. As West Africa urbanizes, livestock's

economic potential will continue to grow but that sector also suffers from the same structural problems as cotton.

Resource stewardship

Environmental degradation in West Africa has long worried technical experts and governmental officials. This concern has generally translated into ill-conceived solutions such as reforestation or destocking of rangelands, which, in turn, generate even more controversy about the root causes of degradation or whether it is even occurring at all. The reality is that resource degradation is occurring and it deeply concerns local resources users themselves yet they often lack the means to deal with it effectively. The best example from this project is the loss of perennial grass species in sub-humid areas. Since these species are being lost due to a complex combination of factors: drought, grazing pressure, and agricultural expansion, no clear solution to the problem exists. However, the fact that virtually *nothing* is being done to address the problem—either through land rehabilitation or support for livestock herders to transition to other feed sources—suggests that environmental policy priorities, particularly among donors, should be reevaluated.

These four policy areas clearly rely on a stable and functioning system of government in Mali. Until the country moves beyond the politics of the post-coup transition, which could drag on for many years, these objectives will not only go unmet but progress that has been made may be lost. The next section reviews the state of Malian democracy during the nascent post-coup era and offers a few insights into how it relates to broad themes of this project.

Malian Democracy: 2013 onward

The question of democracy looms large as Mali and other members of the international community attempt to chart a course to return the country to stability and economic development. Although a transition government is in place and elections are tentatively scheduled for late 2013, the military coup leaders still hold a great deal of power and history has shown that once soldiers leave the barracks for the political arena, it can be difficult to oblige them to return. This risk is heightened by the lack of respect most Malians have for civilian authorities, at least at the national level.

A survey conducted in December 2012 by the Afrobarometer revealed that most Malians would not support prolonged military rule and that 62 percent still prefer democracy to other forms of political regimes (Coulibaly and Bratton 2013). Nonetheless, this figure represents a steep drop of ten percentage points from the previous survey conducted in 2008 (ibid). Malian confidence in democracy has been shaken by the perceived corruption and incompetence of their leaders rather than the democratic process itself: 82 percent of Malians expressed support for choosing their leaders through free elections (ibid). Perhaps most importantly for the purposes of this project, Malians were shown by the Afrobarometer survey to believe that democracy is very much a work in progress in the country. Democratic institutions at all levels are still getting off the ground over twenty years since democracy began in the country and must be understood as part of an incremental process of social and political change.

Decentralization and democracy

This process, if anything, is uneven and characterized by promises unmet and imperceptibly slow progress in many parts of the country. For example, in the municipality of Sagabala, residents became reluctant to pay their taxes following the March 2012 coup d'état. In a way, it is not surprising given farmers' lack of spare cash and the dearth of services they receive in exchange for their taxes. Yet, if they favor democracy, don't the residents of Sagabala have a vested interested in supporting the institution that embodies democratic governance? The resistance seen in Sagabala as well as many of the events described in the chapters of this project reveal that democratic decentralization is firmly embedded in context-specific trajectories that overlap with other change dynamics—social as well as biophysical—that can often lead to surprising and contradictory outcomes. Democracy is not just about free elections; people at all levels are building it through their own actions. Political decentralization has therefore increased the relevance of local politics in Mali and it may widen the gulf between national authorities and the inhabitants of many rural municipalities.

Another poll recently conducted in Bamako revealed that more than three quarters of respondents could not name their representative in parliament (Whitehouse March 25, 2013). This figure would at least be as high in most rural areas. An informant in one part of this project's study area (Kotouba) claimed that their representative, who is responsible for a large part of western Mali, had never set foot there. On the other hand, people in rural areas are likely to be related by blood or at least on friendly terms with customary authorities, who in many cases, compete with elected leaders for power and influence. Customary authorities still retain

considerable control over important issues such as land tenure and their power was enhanced by the new agriculture law of 2006, which gave legal precedent to customary land rights. Yet this study has revealed that the political and geographic context of land and resource access prevents easy implementation of such laws. Many rural areas are dominated by migrants who *do not* hold customary rights and are therefore potentially marginalized by the 2006 agriculture law. However, chapter four demonstrates that they have a strong interest in supporting democratic decentralization as a way to protect their interests and, in doing so, make an important contribution to local institutional development. Not only does decentralization conflict with national laws in surprising ways but it also accentuates the specificities of the local political arena. In this case, the demographic weight of migrants is influencing the legal-political course that municipality is taking. Chapter four also demonstrates the limitations of relying on official statistics to perform analysis and reach conclusions about political change. Hamlets, where many migrants live, are officially illegal so important behaviors such as tax payments are effectively invisible until they are revealed through careful field work.

The 2006 new agriculture law also conflicts with other legal measures that support mobility-based pastoral livelihoods. Laws concerning water access support private use rights for man-made sources (e.g. wells) and free access for all users of natural water bodies such as streams and wetlands. Chapter three demonstrates how these rights, backed by law, influence pastoral herd movements and contribute to friction between herders and sedentary farmers. Even as the national and local governments attempt to support pastoral mobility through other laws, such as the 2001 pastoral charter, this friction is playing a preeminent role in shaping governance outcomes in local areas. Formal laws, projects run by NGOs, and local democratic institutions

themselves are just three factors among many others that interact in these processes of resource governance. In terms of governing pastoral mobility and resource access, customary authorities in Dioumara demonstrated their power when they flatly rejected the transhumance corridor that came out of a multi-year participatory process that aimed to improve resource governance and reduce farmer-herder conflict. Although local leaders in the Fuladougou supported the same measure, it was nonetheless fundamentally shaped by a politics of exclusion carried out by sedentary farmers vis-à-vis pastoralist herders. These politics of exclusion are tied up in the longer term struggle between customary sources of authority and new local-level democratic institutions, whose leaders typically see pastoral herders as tax payers who will help fill the local treasury. Moreover, as administrative officials, local government authorities are mandated to uphold national laws, among which include pastoral herders' rights to go where they wish and everyone's right to live where they wish. Local mayors are therefore in a delicate situation when their constituents want to carry out extra-judicial actions such as expelling pastoral herders or migrant farmers. In Yanfolila, local authorities became marginalized and were powerless to stop such an expulsion from taking place during one particularly intense episode of farmer-herder conflict in 2010. It would erroneous, however, to assume that this outcome and others reveal an inherent weakness of democratic decentralization. National authorities, including well-armed gendarmes, were also proven to be powerless in Yanfolila. Evidence from this project suggests that local democratic institutions more effectively prevent the latent tensions between farmers and herders from reaching the point of outright hostilities and, when conflicts do erupt, they manage them much more effectively than national authorities.

Land use and livelihood change

If democratic decentralization is unfolding in a shifting and uneven political landscape, the biophysical landscape is an equally dynamic force acting on local institutions. The ways in which changing landscapes shape processes of institutional development remain misunderstood or even ignored in a great deal of social science scholarship on the topic. This impedes clear understanding of the local institutions in which so many actors are placing their hopes for socially equitable and environmentally sustainable development. Across Mali and the rest of West Africa, increasingly crowded agrarian landscapes and growing competition over resources over the past few decades are also leaving their imprints on democratic decentralization. Although West Africa is perceived as a land abundant region, the reality is that many areas are running short of arable land given the fact that most farmers cannot afford the inputs, especially fertilizer needed to compensate for shortening fallow periods. Shortening fallows plus ongoing extensification of cultivated land are reducing pastoral resource availability and quality while constraining livestock mobility, which is increasingly the focus of the bitter political struggles investigated in chapter six. Although struggles over pastoral mobility are deeply embedded in competition over resource control and land tenure, chapter three reveals that the scale and patterns of livestock movements, which are partially driven by biophysical factors operating at much broader scales, do much to influence the character of farmer-herder conflicts. These conflicts permeate the issues under investigation in this project and they are proving to be a defining factor in democratic decentralization through their impacts on local decision making and policy implementation.

A conclusion that cuts across all of the chapters is that crowded landscapes with less resources available to both farmers and herders are revealing the inadequacies of customary systems of resource access that were built on frontier conditions of relative resource abundance. Livestock corridors, grazing zones, contracts that dictate the timing of transhumant herd movements all signal the emergence of territory and rule-based resource governance that municipal rather than customary authorities will implement. These institutions and the forms the eventually take will matter critically as a buffer against the increasingly intense impacts of climate change in West Africa.

Final thoughts

Renowned development economic Amartya Sen famously declared that a democracy has never suffered from a large-scale famine because democratic institutions ensure people's access to basic entitlements such as adequate food. This claim includes famines induced by droughts, which are frequently transformed into catastrophes by authoritarian regimes. Unfortunately, the risk of droughts and famines persists in sub-Saharan Africa. The western Sahel itself has experienced drought and famine risk in two of the past three years (2010 and 2012), even in fledgling democracies such as Mali.

Global climate change is likely to create hotter conditions and more erratic weather patterns in Mali that will have negative impacts on food security and rural development prospects more generally. These conditions represent a major test for local democracies in particular, which are effective in terms of participatory problem solving (e.g. conflict mediation) yet acutely weak in terms of financial and administrative capacity. This weakness will undercut

many initiatives that aim to improve the lives of rural people, including their abilities to adapt to climate change. The risks associated with climate change are compounded by dependence in rural areas on the livelihood activity on which it will have the greatest impact: agriculture. As local inhabitants attempt to diversify away from agriculture, they will depend on access to markets, infrastructure, schools, credit institutions, and other services that local institutions will be instrumental in providing.

The local financial and administrative capacity or lack thereof, to provide these services is geographically uneven. As this study has shown, certain municipalities receive high levels of remittances from expatriates or are well connected to the NGO and donor communities who are able to provide many services in place of public institutions. Others still are blessed (or cursed) with gold mining rents and or high level political relationships that are able to channel resources that the municipalities would otherwise lack. If certain climate change scenarios prove to be accurate and life in resource-dependent rural communities becomes more difficult than it already is, these geographic discrepancies could prove to be critical determinants of livelihood outcomes. New patterns of migration may be driven, not be climate shocks, but by unequal opportunities in different places: capital cities but also secondary urban areas and even certain rural areas where resources are available.

It will be difficult to distinguish these movements from those that have always characterized life in agrarian West Africa. Dislocations caused by droughts will be comparable to those that followed the droughts of the early 1970s, mid 1980s, and times past. Even if local democratic institutions continue to grow and gain strength, local inhabitants will claim rights based on autochthony and occasionally engage in exclusionary politics. Such politics will

continue to be impacted by geographic contexts in surprising ways: hamlet residents, as tax paying citizens, may begin demanding more services from their local governments. In other cases, the lack of services in hamlets may begin to outweigh the benefits of land access they provide. Just as pastoral herders adjust their seasonal movements according to their livelihood needs and aspirations, land seeking farmers will find new opportunities, in and out of agriculture, in different places. Even if parts of Mali become hotter than they are today and as crowded as Nigeria, which is projected by some estimates (Kristjanson et al. 2004), people will continue to be on the move, finding solutions and devising new strategies to meet their needs.

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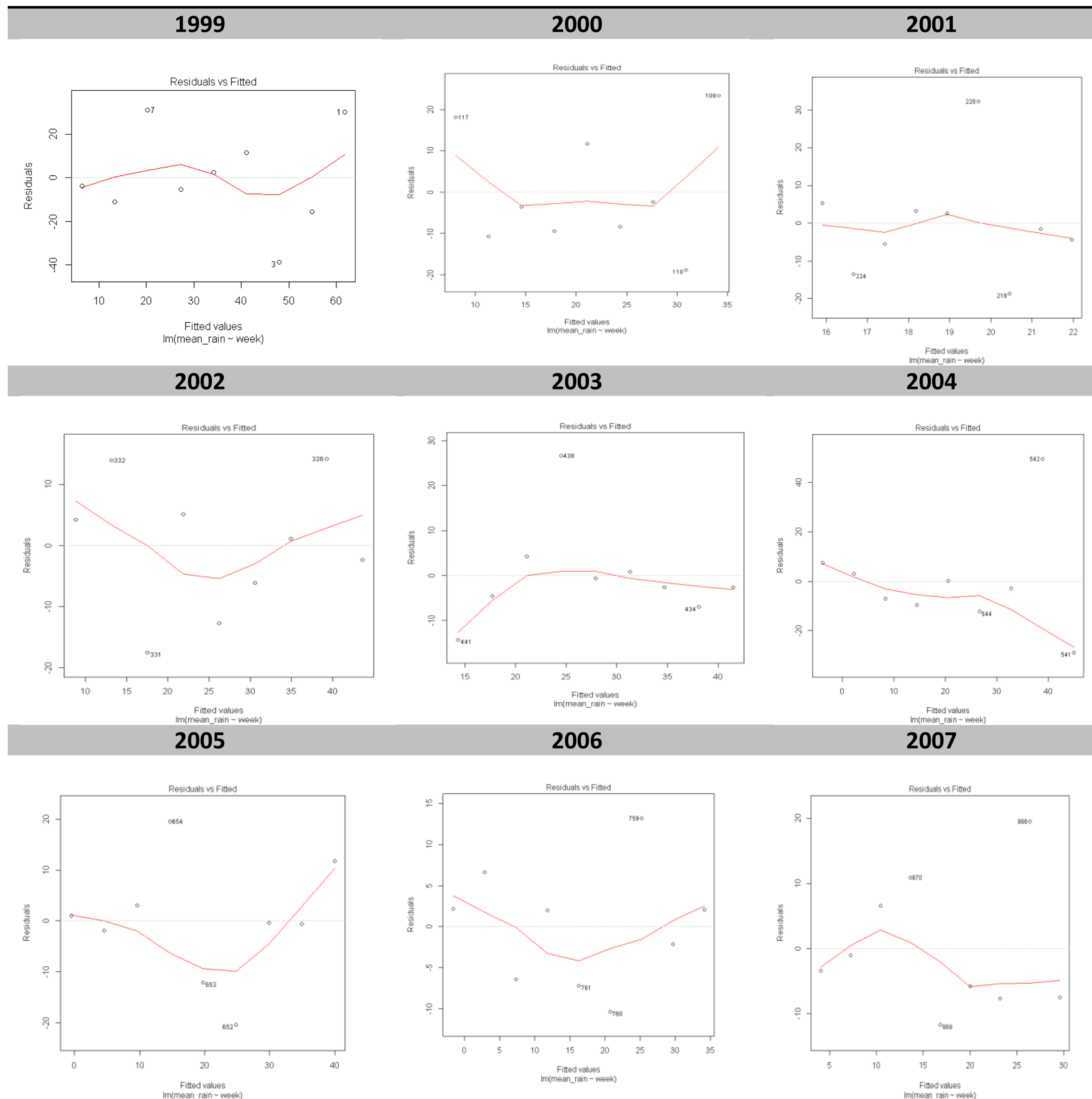
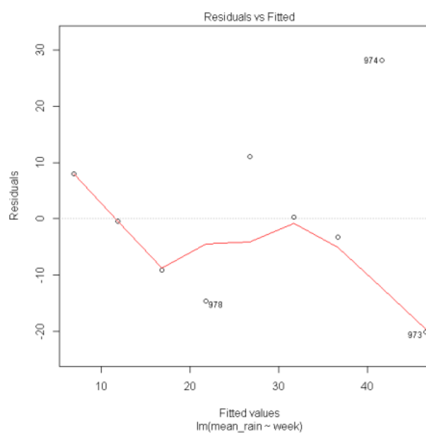
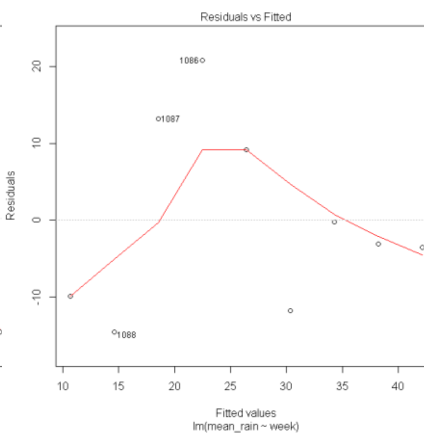
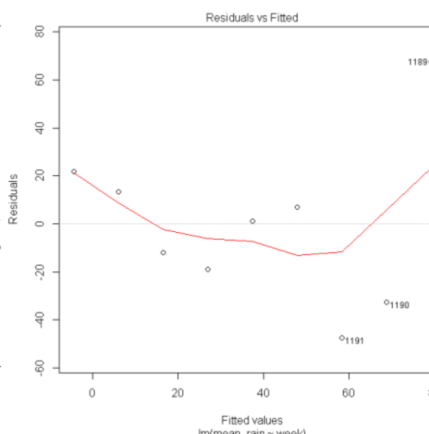
Appendices

Appendix 1. Rainfall residual plots for latitude 15.375 and latitude 13.375



2008	2009	2010
		

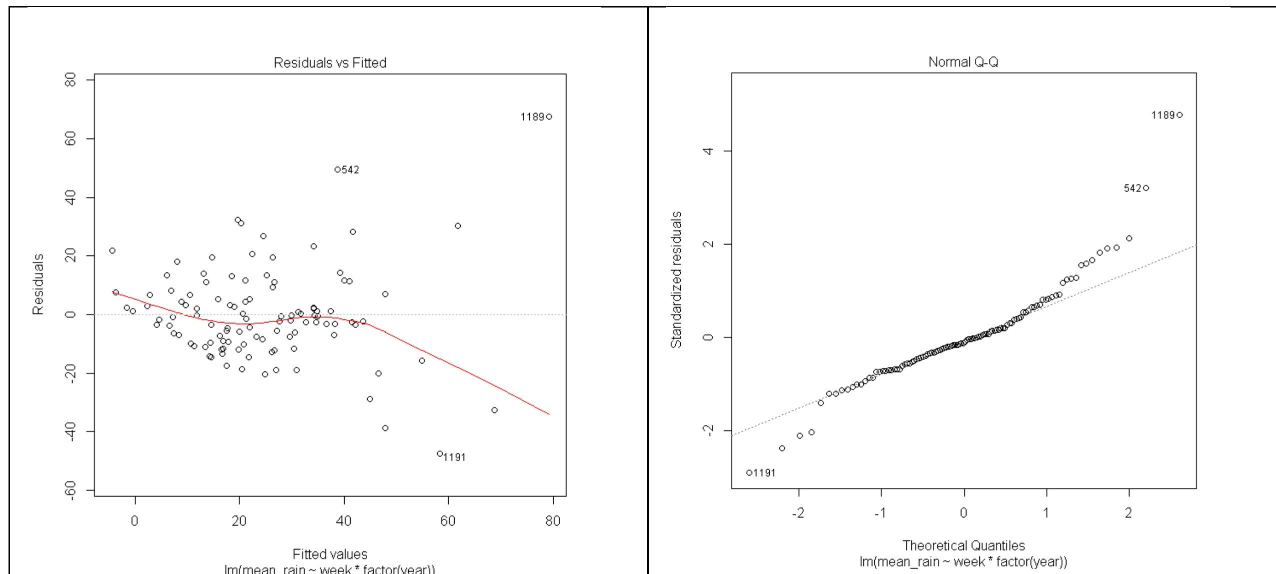
13.375

1999	2000	2001
2002	2003	2004
2005	2006	2007

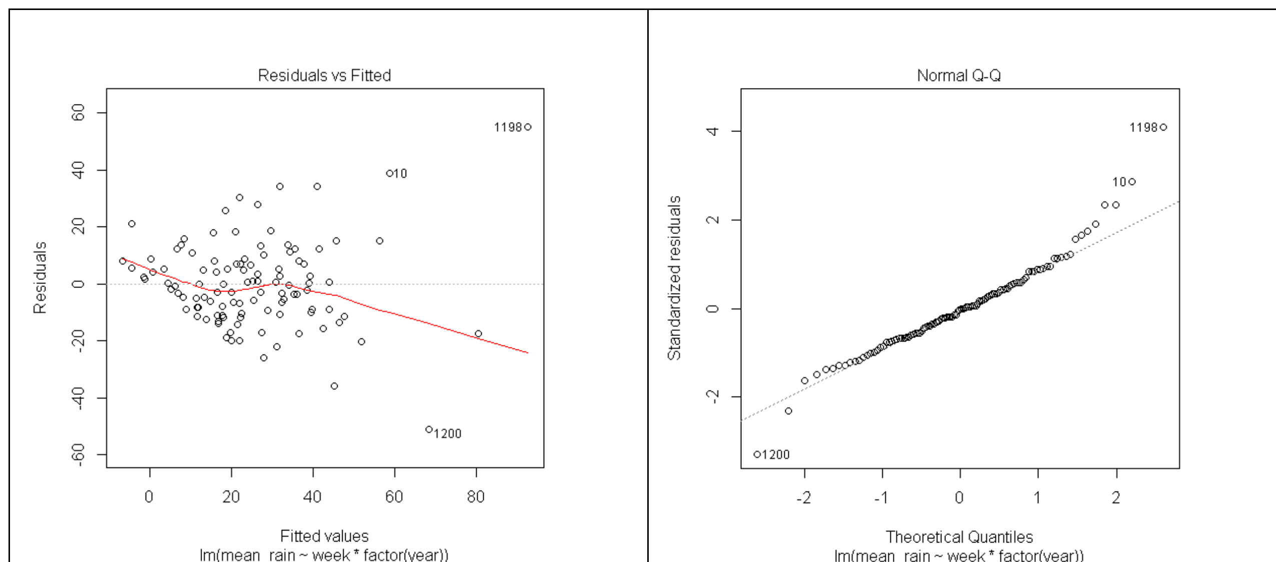
2008	2009	2010
Residuals vs Fitted Residuals Fitted values lm(mean_rain ~ week)	Residuals vs Fitted Residuals Fitted values lm(mean_rain ~ week)	Residuals vs Fitted Residuals Fitted values lm(mean_rain ~ week)

Appendix 2. Regression QQ plots by latitude band

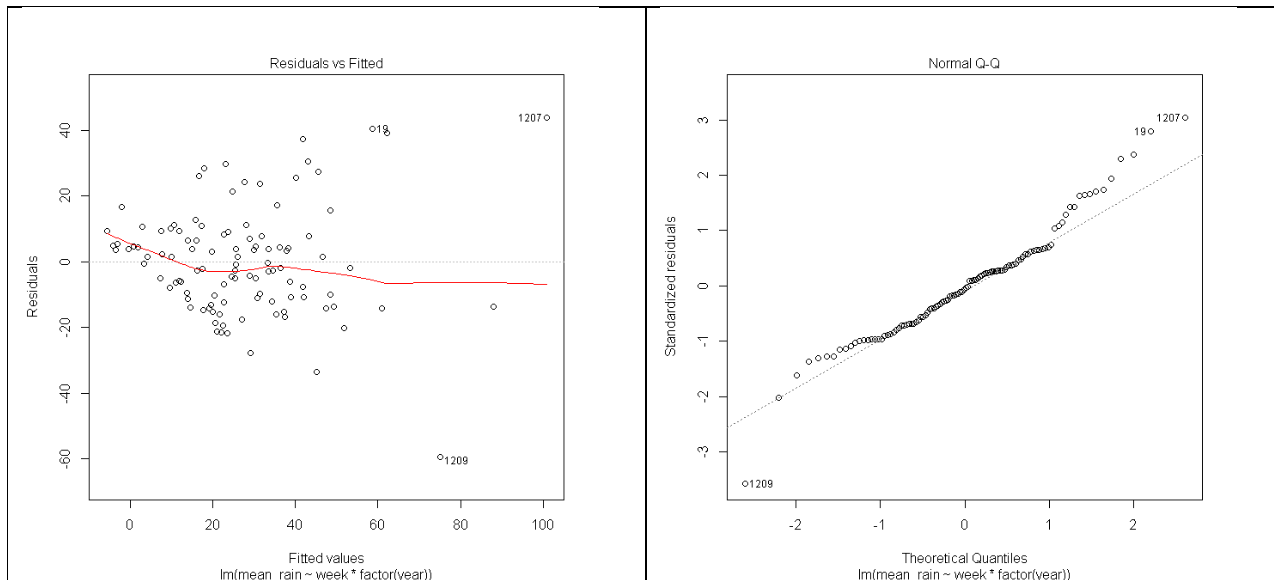
15.375



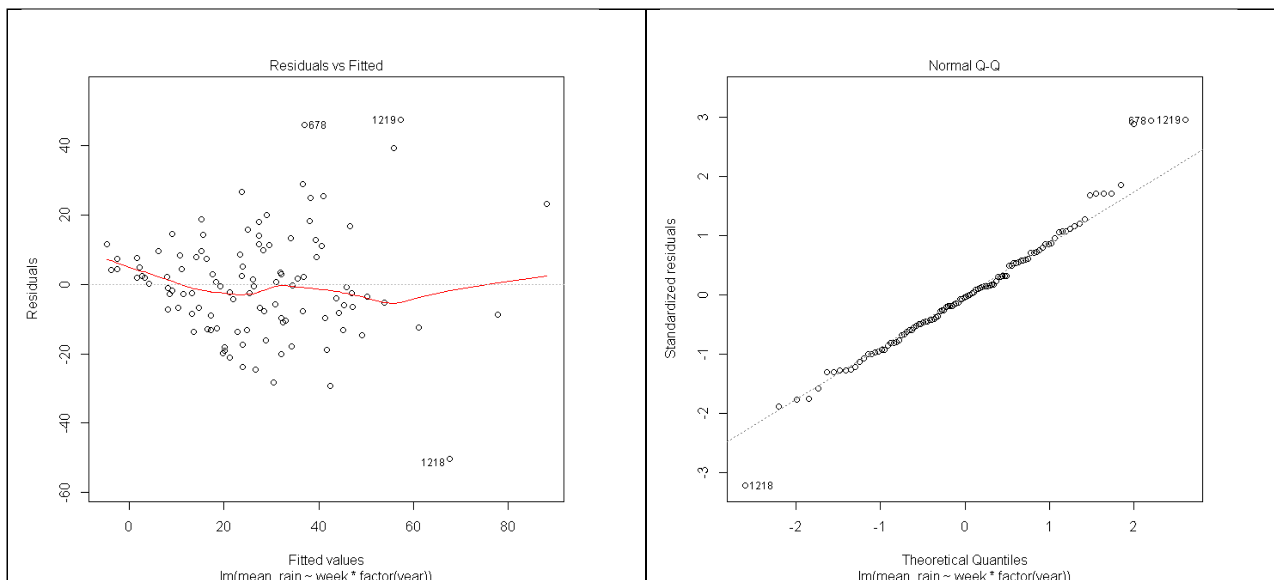
15.125



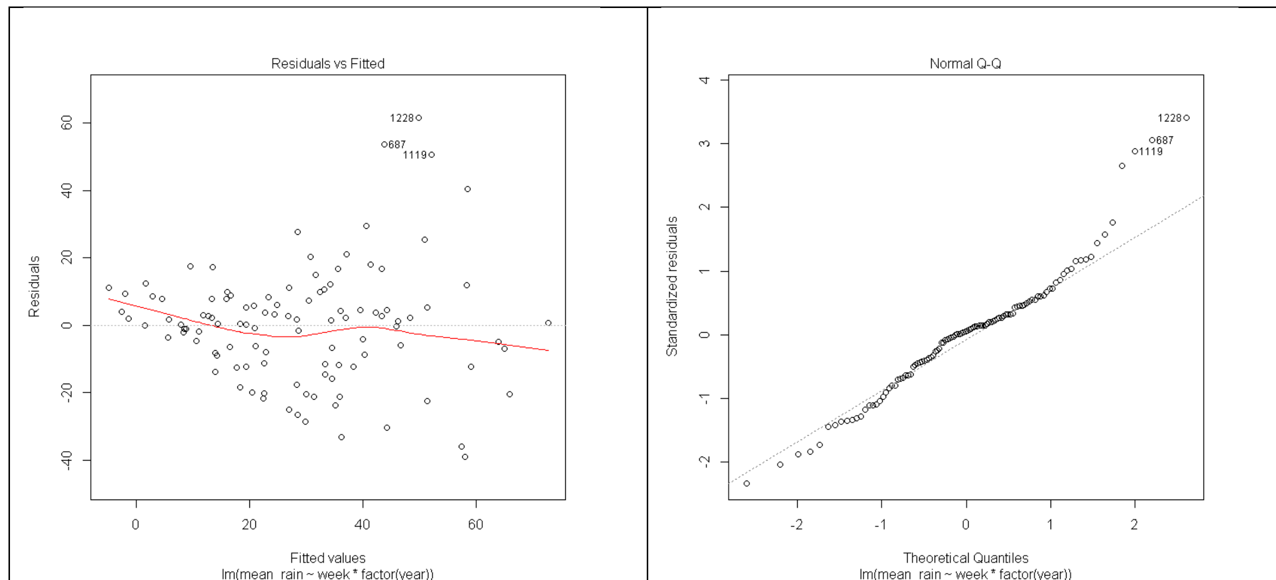
14.875



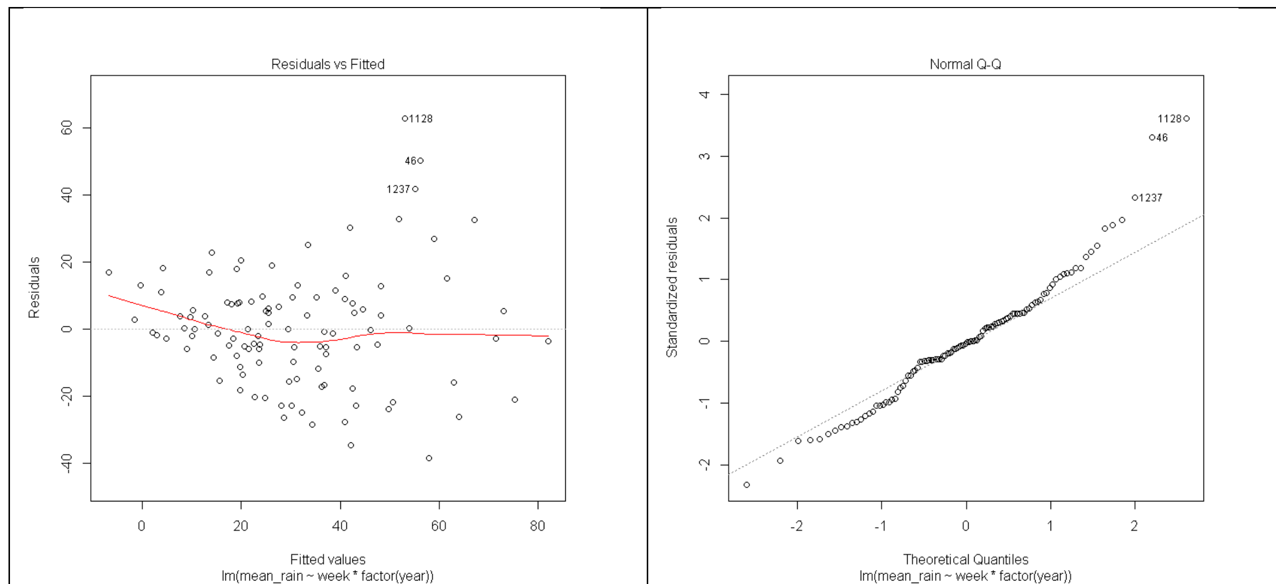
14.625



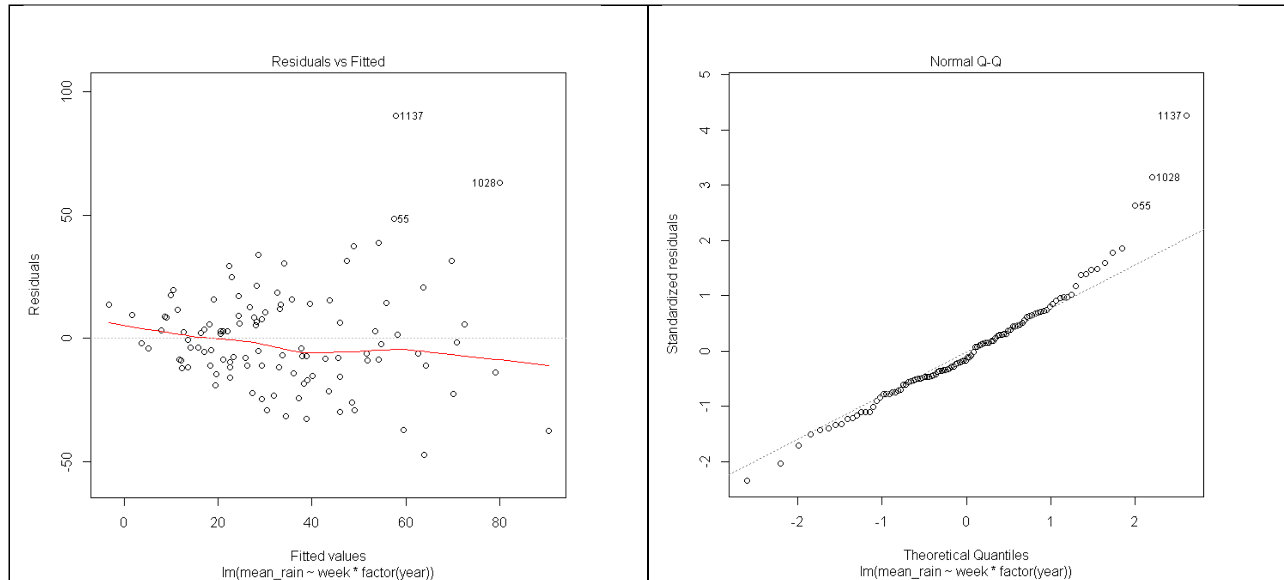
14.375



14.125



13.875



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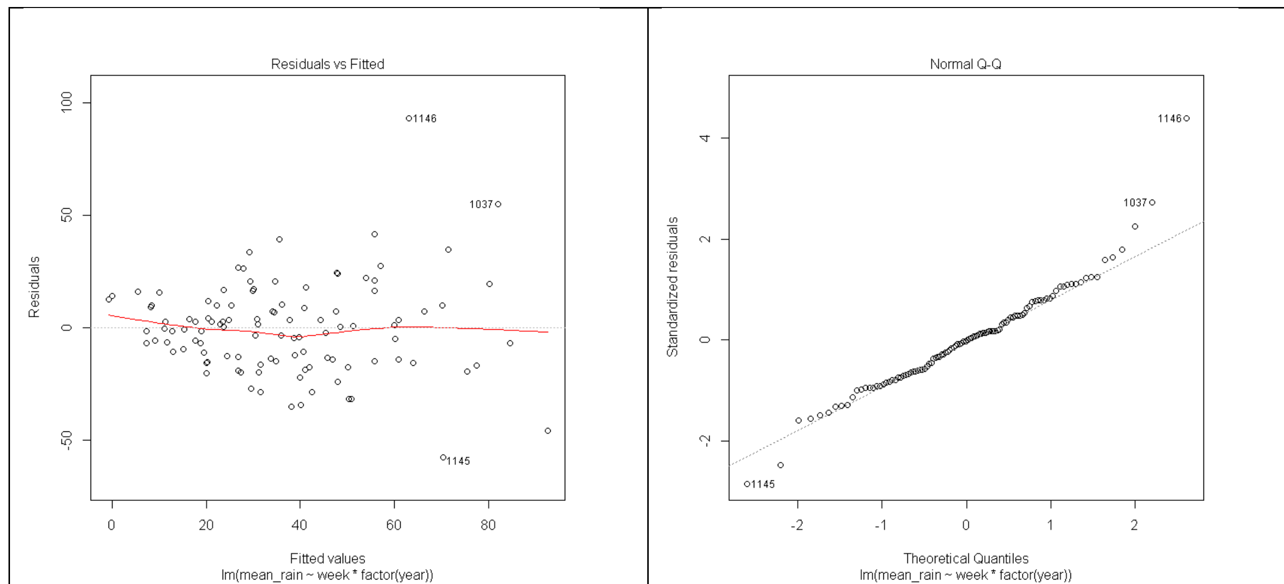
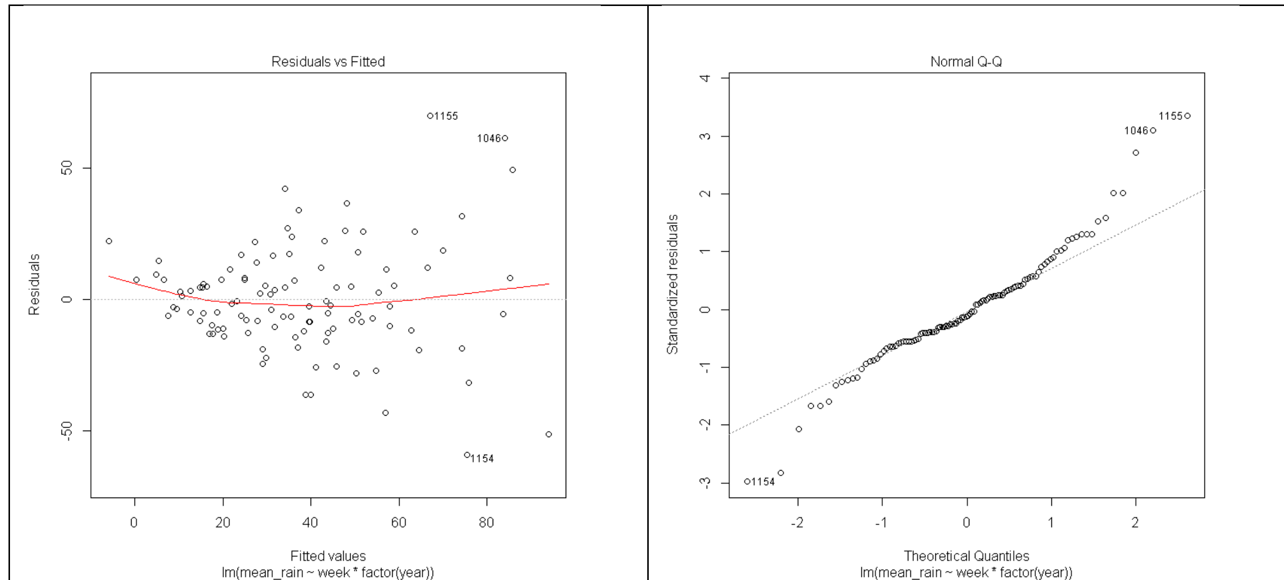
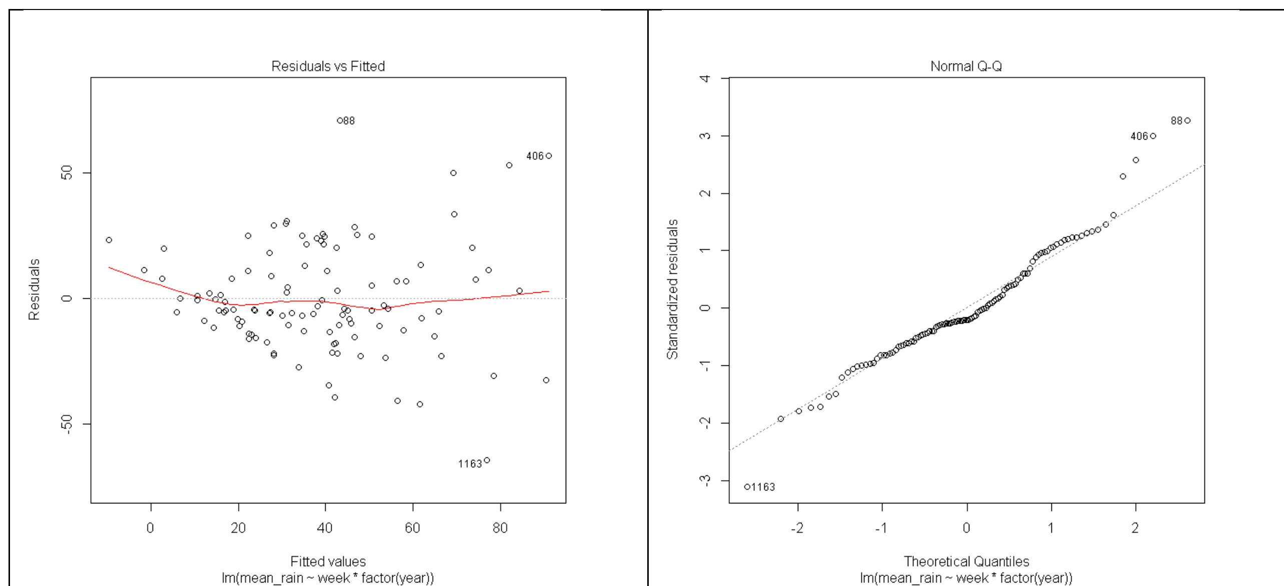


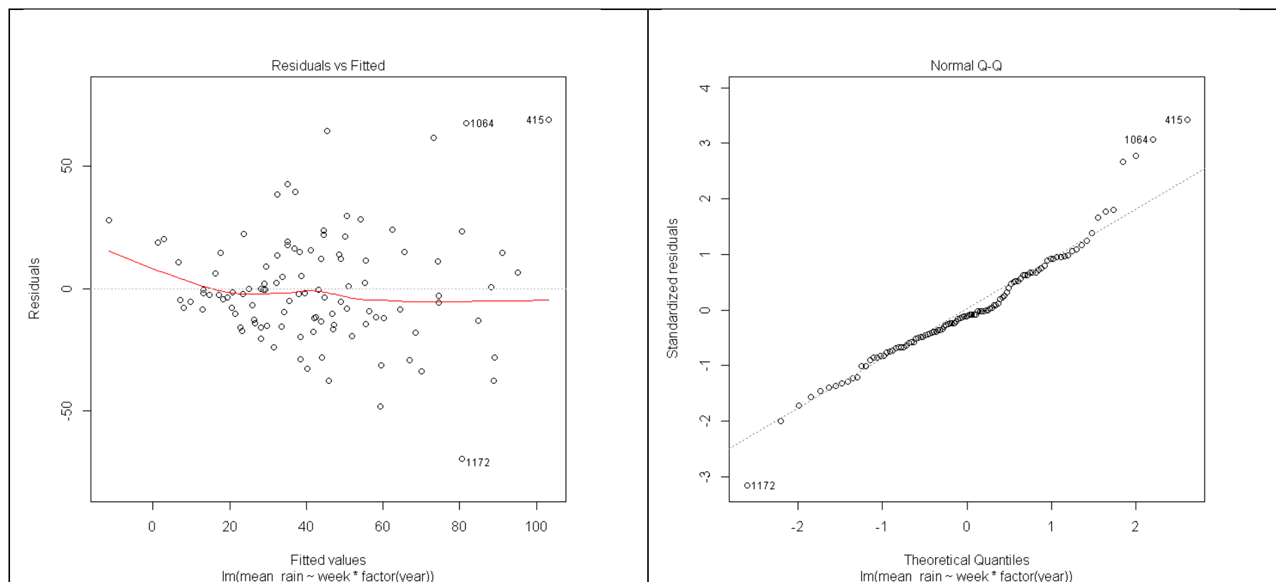
13.375



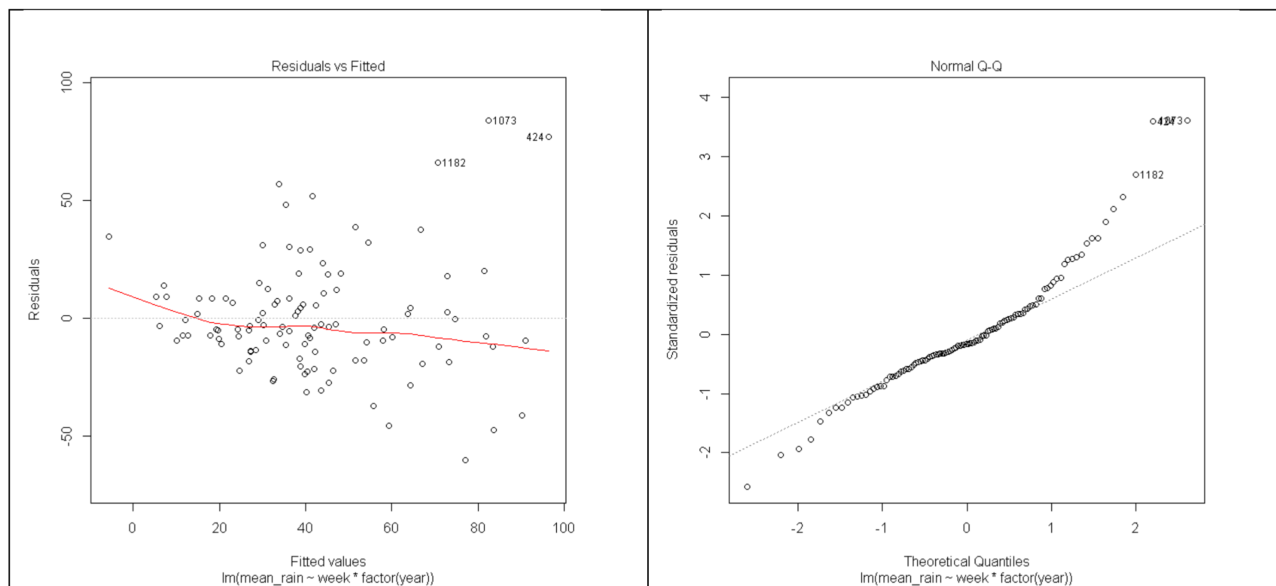
13.125



12.875

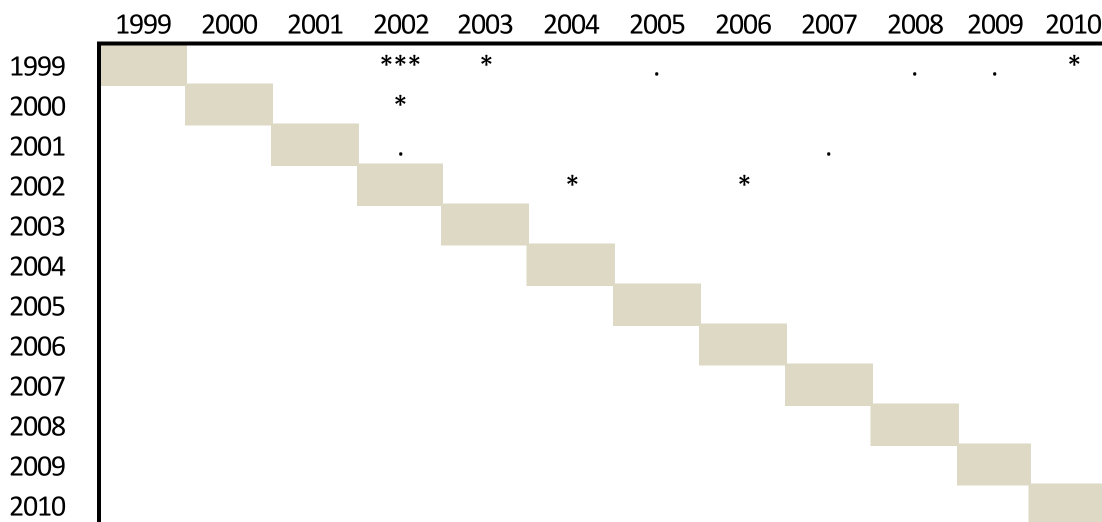


12.625



Appendix 3. Analysis of Variance (ANOVA) results

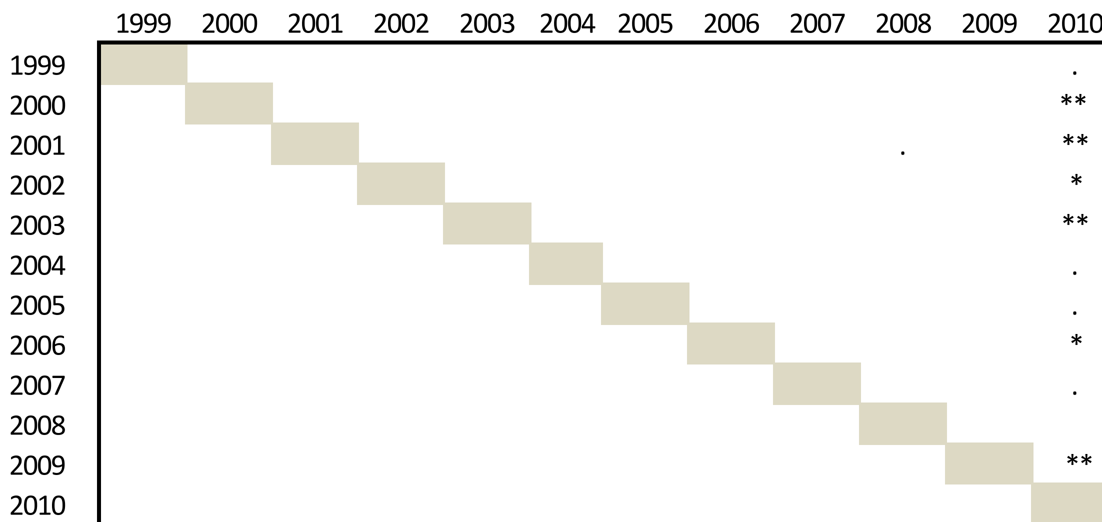
Significance of week*year interaction term in ANOVA of weekly rainfall (1999-2010) at 12.875



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1999				***	*		.			.	.	*
2000				*								
2001				.					.			
2002						*		*				
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												

. P<.05 * P<.01 **P<.001 ***P<.0001
(column 'A' is ANOVA baseline)

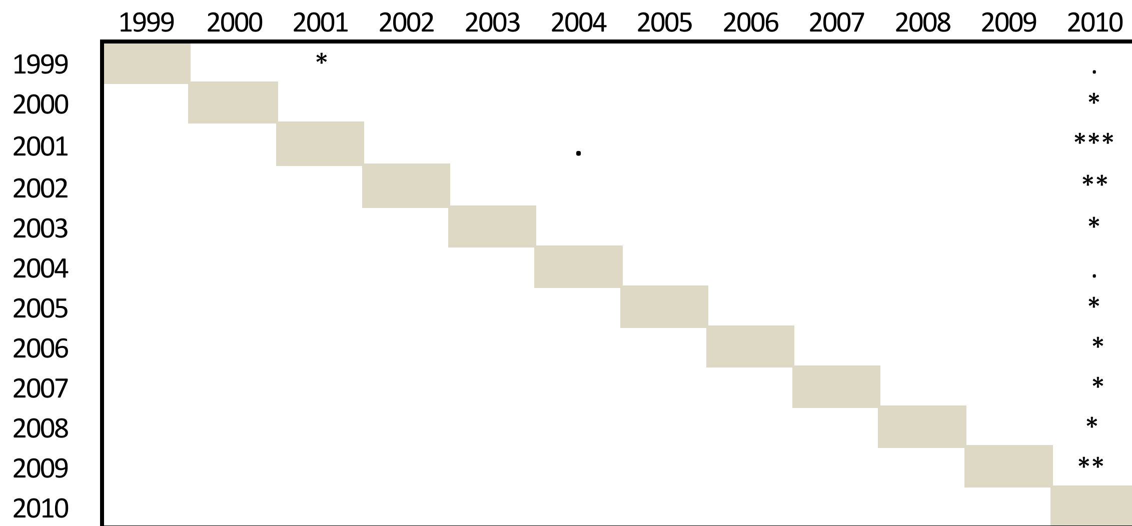
ANOVA of weekly rainfall (1999-2010) at 14.875 latitude



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1999												.
2000												**
2001										.		**
2002												*
2003												**
2004												.
2005												.
2006												*
2007												.
2008												
2009												**
2010												

. P<.05 * P<.01 **P<.001 ***P<.0001
(column 'A' is ANOVA baseline)

ANOVA of weekly rainfall (1999-2010) at 15.125 latitude



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1999			*									.
2000												*
2001						.						***
2002												**
2003												*
2004												.
2005												*
2006												*
2007												*
2008												*
2009												**
2010												

. P<.05 *** P<.01** ****P<.001** *****P<.0001**

(column 'A' is ANOVA baseline)

Appendix 4. Pastoralist survey questions

code	question
Q1	Is transhumance necessary?
Q2	Why? Code: 1) health of animals, 2) avoid fields, 3) habit, 4) all factors, 5) avoid cattle, 6) other
Q3	Number of cattle
Q4	Do you practice transhumance?
Q5	Do you send your cattle to Mauritania?
Q6	How many of your sons are shepherds?
Q7	How many shepherds do you hire?
Q8	How do you feel about the municipal government?
Q9	Are social relations an important reason for practicing transhumance?
Q10	Would you like to settle in the Fuladougou?
Q11	Do you have a second income generating occupation?

Appendix 5. Transhumant pastoralist survey (questions 1-5)

		Is transhumance necessary?						
ID	**age**	**Q1**	**Y**	**N**	**Q2_why**	**Q3_#_cattle**	**Q4_transhum**	**Q5_Maur**
P1	60			1		350	1	2
P2	70		1		1	20	1	2
P3	75		1		2	14	0	2
P4	45			1		3	0	2
P5	45		1		2	17	1	2
P6	45		1		1	230	1	1
P7	35		1		4	70	1	2
P8	50		1			186	1	2
P9	60		1		5	356	1	2
P10	50		1		2	130	1	2
P11	60		1		1	170	1	1
P12	60		1		1	257	1	2
P13	45		1		1	2	1	1
P14	65		1		1	115	1	2
P15	55		1		1	67	1	2
P16	60		1		1	600	1	2
P17	55		1			40	1	1
P18	45					60	1	2
P19	45		1		6	125	1	2

P20	65	1		600	1	2
P21	50	1	1	400	1	2
P22	35	1	1	100	1	2
P23	50	1		800	1	1
P24	35	1	1	1500	1	1
P25	35	1	1	900	1	1
P26	45	1		250	1	2
P27	65	1	1	200	1	2
P28	50	1	1	130	1	2
P29	45	1	2	150	1	2
P30	25	1		200	1	1
P31	25	1		400	1	1
P32	60	1		500	1	2
	50.3 avg	28 Y 3N		**279.4 avg**	30 Y	9 Y
				320.1 SD	2 N	23 N

Appendix 6. Transhumant pastoralist survey (questions 6-11)

ID	Q6_sons	Q7_hired	Q8_munic	Q9_relats	Q10_sed	Q11_ex_job
P1	1	2	2	2	1	2
P2	3	0	3		2	
P3	2	0	2		1	1
P4	0	0	1		1	1
P5	0	0	3		1	2
P6	1	1	2		1	2
P7	0	0	2		2	1
P8	4	0	1	2	2	1
P9	4		2	1	2	2
P10	2	0	2	1	2	2
P11	4	0	3	1	2	2
P12	3		1	2	1	2
P13	2		1	1	1	1
P14	3	0	1	2	1	2
P15	4		1	1	1	
P16	1		1	1	2	2
P17	3		1	1	1	
P18	1		1	1	1	2
P19	3	0	1	2	2	2

P20	3	0	1	2	2	2
P21	4		2	1	2	2
P22	6		2	2	2	2
P23	1	1	1	1	2	1
P24	1	1	1	1	2	
P25	2	1	1	1	1	
P26	4		1	1	1	
P27	3		1		2	2
P28	3		1	2	2	2
P29	3		3	1	2	1
P30	0		1		2	2
P31	0	1	1	1	2	2
P32	8		1	1	1	
avg	**2.5**	5	20 Y	16 Y	14 Y	7 Y
			8 N	8 N	18 N	18 N

Appendix 7. Pastoralist survey extra comments

ID	comments
P1	relationships are elastic; no need to go up north
P2	it all depends on the comportment of individuals
P3	commune has made corruption worse; second job is village shepherd
P4	was village shepherd for 20 yrs in Beledougou
P5	younger brother tends animals
P6	commune hasn't changed anything--hamlets, etc. when father died, animals were shared between sons
P7	father; other, younger brother ALL go on transhumance; one younger brother is a livestock commercant; animals return on their own; avoid harvest; eat/drink well
P8	no plans to settle BUT says 'inevitable: modernization; demographic change' ; one son who does livestock commerce
P9	4 sons; would stay in Jikouna if he was going to sedentarize
P10	now goes to Moribougou for two years--where he dug a well; used to stop at Plaaqui
P11	too many actors; played important role in piste
P12	in case of accusation, go straight to the Mayor's office; bought a parcel in Guenikoro--aided with Mosque; clinic
P13	he is village shepherd; the municipality (commune) is a place to go and complain/be heard
P14	close to the power and the health clinic
P15	was refused in Plaaqui (cannot give permission)--has to go to Kotouba

P16	health clinic; school; transhumance for only six years; decentralization is good: you don't need to go to Kita anymore; lack of pasture in Mustafa
P17	municipality (commune)-better at conflict resolution
P18	commune good--veterinary services; good conditions for animals in the Fuladougou
P19	close to administration; problem resolution; it is zebu race of cattle that displaces
P20	each is close to the other'; came to Mian before hamlet to be close to river
P21	too many actors
P22	not effective problem resolution
P23	admin is close; livestock commerce; dad is alive; 8 sons
P24	admin is close; cescom (health clinic)
P25	admin is close --herders have helped with pol campaigns, 'capital infusions': cescom, dam, livestock loans; wants residence in fuladougou but dilly is blocking
P26	admin is close--birth certificates; hopes to reside in Madina
P27	only practices transhumance for last 20 yrs
P28	admin is close; information passes easily
P29	good and bad; problems are resolved but too many actors; practices transhumance because of social relations
P30	information, entente, liberty of movement,
P31	its good--large well in Dilly thanks to the Mayor; fewer expenses, salt if you go to Mauritania
P32	