CONSERVATION LEGACIES: GOVERNING BIODIVERSITY AND LIVELIHOODS AROUND THE W NATIONAL PARKS OF BENIN AND NIGER

by

Daniel Charles Miller

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Doctoral Committee:

Professor Arun Agrawal, Chair
Associate Professor Rebecca Hardin
Professor Maria Carmen de Mello Lemos
Kent H. Redford, Archipelago Consulting
Professor Brice A. Sinsin, University of Abomey-Calavi, Benin

DEDICATION

To Mom, Dad, and Bea

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ABBREVIATIONS AND ACRONYMS

AFD	*Agence Française pour le Développement* (French Agency for Development)
AOF	*Afrique Occidentale Française* (French West Africa)
AQIM	Al-Qaeda in the Islamic Maghreb
AVIGREF	*Associations Villageoises de Gestion de Réserves de Faune* (Village Associations for Wildlife Reserve Management)
BACI	Before-after-control-impact
CBD	Convention on Biological Diversity
CBNRM	Community-Based Natural Resource Management
CIRAD	*Centre de Coopération Internationale en Recherche Agronomique pour le Développement* (Center for International Cooperation and Agricultural Research for Development)
CENAGREF	*Centre National de Gestion des Réserves de Faune* (National Centre for Wildlife Reserve Management)
COFO	Commission Foncière (Land Commission)
DFPP	*Direction de la Faune, la Pêche et la Pisciculture (*Department of Wildlife, Fishing, and Fish Farming)
DGEEF	*Direction Générale de l'Environnement et des Eaux et Forêts (Department of Environment and Water and Forests)*
ECOPAS	*Ecosystèmes Protégés en Afrique Soudano-Sahélienne* (Protected Ecosystems in Sudano-Sahelian Africa)
EC	European Commission
EU	European Union
FCFA	*Franc Communauté Financière Africaine (West African Franc)*
FCBE	*Forces Cauris pour un Bénin Emergent* (Cowrie Forces for an Emerging Benin)
GEF	Global Environment Facility
GIS	Geographic Information Systems
ICDP	Integrated Conservation and Development Project
IUCN	International Union for Conservation of Nature
LASDEL	*Laboratoire d'études et recherches sur les dynamiques sociales et le développement local* (Research lab on social dynamics and local development)
MAEP	*Ministère de l'Agriculture, de l'Elevage et de la Pêche*
MEHU	*Ministère de L'Environnement, de l'Habitat, et de l'Urbanisme*
MHED	Le Ministère de l'Hydraulique, de l'Environnement et de la Lutte Contre la Désertification (Ministry of Water Resources, Environment, and the Struggle Against Desertification)
NGO	Non-Governmental Organization
PA	Protected Area
TBPA	Transboundary Protected Area

UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WNP	W National Park

ABSTRACT

This dissertation advances theoretical and empirical knowledge at an especially challenging research frontier: that of the social and ecological impacts of international aid within and around national parks and other protected areas in low-income tropical countries. Systematic knowledge of these impacts, the relationships among them, and the causal pathways through which they are generated remains limited. This study addresses these research gaps through detailed assessment of the European Union-funded ECOPAS project (*Ecosystèmes Protégés en Afrique Soudano-Sahélienne*) implemented in the W National Parks (WNPs) of Benin and Niger from 2001-2008. Variation in these two national political contexts provides an ideal opportunity to explore how governance shapes the impacts of protected area-related aid. Using a mix of qualitative and quantitative evidence collected during 15 months of fieldwork among 430 households in 12 villages, I develop and test hypotheses about the influence of key governance variables, including enforcement and property rights, on the biodiversity and livelihoods effects of ECOPAS.

I find that ECOPAS generally improved the state of biodiversity in the WNPs of Benin and Niger. However, livelihoods impacts varied spatially and socially within and between the two countries. The poorest social groups and households in villages where enforcement increases were greatest experienced up to a 15% decrease in incomes as a result of ECOPAS. National political context strongly moderated the effect of increasing protected area enforcement. State protected area enforcement had more positive biodiversity and less negative livelihoods

impacts in Benin than Niger owing to better national governance quality and more advanced decentralization reforms. However, the failure of ECOPAS to adequately engage with decentralized local political processes in Benin led to uncertainty over property rights in the Park periphery, threatening sustainable conservation.

Research findings demonstrate heterogeneity in protected area impacts and the importance of effective governance arrangements at multiple scales for improved outcomes. Scholars and decision makers interested in the social-ecological impacts of conservation must attend more carefully to national and local-level political arenas to better understand the multi-stranded legacies of protected areas interventions, particularly given that such efforts remain at the forefront of biodiversity conservation across the tropical world.

Chapter 1

Introduction

1.1 A Tale of Two Villages

Dressed in a long green *boubou* and a colorful knitted *kufi* cap, Amadou Idrissa sat in the shade of a neem tree just outside the mudbrick walls of his family compound near the village center of Boumba.[1] It was a market day early in the 2011 rainy season and this community along the banks of the Niger River buzzed with activity. On such days Amadou entertained many guests. A village leader and traditional healer, his wise council and curative powers attracted people from near and far. But it was his knowledge of W National Park (WNP) and its history that had drawn me to visit him.

Boumba is one of the oldest settlements of the famed W region, which lies at the wildlife-rich intersection of the contemporary nations of Benin, Burkina Faso, and Niger (Hauzeur and Pelle 1993; Rouch 1950). Here, the Niger River begins to straighten out again after twisting and turning to carve a giant "W" into the landscape on its long arcing journey through West Africa to the Atlantic Ocean (Fig. 1.1). This double meander resonated with European explorers in the 19th century who first gave the name W to this part of the River and, eventually, to one of the largest National Parks in West Africa (Faisson 1946). Given its location immediately downriver from the W, Boumba has been a focal point of conservation efforts in the Park since the French colonial era.

[1] To protect individual identities in this introduction I use pseudonyms. Unless otherwise noted, the rest of this dissertation uses general social positions (e.g. farmer, park guard, local politician, etc.) to refer to people I interviewed. I also limit reference to specific villages as an additional measure to protect my sources.

Figure 1.1. The W region

I had come to Amadou's home to learn more about this history but especially about the most recent conservation intervention implemented in the W region, the *Ecosystèmes Protégés en Afrique Soudano-Sahélienne* (ECOPAS) project.[2] This European Union (EU) aid initiative comprised the most extensive external intervention in the region since the colonial era. It had come to a close in 2008, three years prior to my visit, and I sought to better understand the social and ecological legacy it had left behind in communities like Boumba on the periphery of WNP.

We sat talking together for several hours as the heat of the afternoon sun slowly faded and he took an occasional break to prescribe medicine, settle a dispute, or simply greet a visitor.

[2] Protected Ecosystems in Sudano-Sahelian Africa.

One such visitor was Moussa Marebu, the village chief from Petchinga just across the wide muddy waters of the Niger. I was surprised and pleased to see him. It had been months since he hosted me during my research stay in his village on the other side of the River in Benin. He had been a very generous host and I learned a great deal about local perceptions and practices relating to WNP during the weeks I spent in Petchinga (Photo 1). I soon discovered that these two men were old friends and Moussa joined our conversation.

"It is good on this side of the river," Moussa declared.[3] "In Petchinga, our people must bury their cows," he continued. "If we do not take them into the Park, they die from starvation. But if we take them into the Park and are caught grazing there we must pay a large fine. It is a risk, but we must take it." He went on to describe how herders from Petchinga used to graze their cattle in the Park and its buffer zone, which encompasses all of the village lands, but that after the arrival of the ECOPAS project they had much less ability to do so due to new land use regulations and increased surveillance by Park authorities. He lamented that property rights for both herders and farmers were no longer clear so that, as he put it, "we are never in peace."

Moussa's story contrasted sharply what Amadou had been telling me about his experience of ECOPAS in Boumba. "Before the Park was a nuisance, but now we don't want anyone to touch a leaf in it," he declared. "We thought the Park was for white people and the foresters, but now with ECOPAS activities and outreach we have understood that it is for us." He explained how ECOPAS built a camp in the village to host tourists visiting the Park, set up women's enterprise groups, and helped alleviate land disputes by creating corridors for the seasonal movement of cattle in search of pasture. In contrast to perceptions in Petchinga, Amadou described ECOPAS as playing an important role in clarifying local property rights and

[3] Our conversation took place in a mix of French and Zarma. I thank Ibrachi Gouda for his assistance translating Zarma to French.

natural resource access. "It was as if ECOPAS knew the illnesses of the village and prescribed the right treatment to cure them," concluded this adept of indigenous medicine, as therapeutic practice and metaphor for wider political and environmental processes.

The divergent narratives of these two men puzzled me. After all, the ECOPAS project targeted both Boumba and Petchinga and the two villages are alike in many other respects. They have a similar population size and ethnic group composition, they lie within the same bioclimatic zone, and they are both are located on the banks of the Niger River, immediately adjacent to the Park. The people in both villages are largely reliant on a mix of natural resource-based livelihood activities, including farming, fishing, and animal husbandry. Both villages are even said to share the same founder, a *marabout*-warrior named Kada, who first arrived to the area of Boumba in the late 16th century and then crossed the River to what is now Petchinga (village elders, interview, July 2011, Boumba; Mueller 2009). Despite these similarities, however, ECOPAS appears to have had very different impacts in the two villages. In this "tale of two villages," why does it seem, to adapt the opening lines from Dickens' famous novel (1999),[4] that ECOPAS brought "the best of times" in Boumba and "the worst of times" in Petchinga?

My dissertation responds to this question. It seeks to explain variation in the impacts of the ECOPAS project not only in the specific case of these two villages, however, but also in the broader region around the transboundary W National Parks of Benin and Niger. To do so it draws on views of ECOPAS from under the neem tree, as it were, in villages throughout the W region as well as from remote Park guard posts, newly constructed local government offices, and sleek donor headquarters in European capitals. Through detailed assessment of the social-ecological impacts of ECOPAS I also develop the concept of *conservation legacies* to describe a

[4] Originally published in 1859.

range of effects aid-funded conservation projects implemented in protected areas across the tropical world may have across space and over time.

ECOPAS forms part of a broader universe of efforts in developing countries around the globe to address the complex challenge of conserving the earth's biological diversity while improving the well-being of some of its poorest peoples. These projects and the national parks and other protected areas (PAs) on which they are often focused have had mixed success (Brooks et al. 2012; McShane and Wells 2004; Naughton-Treves et al. 2005) and their impact on rural communities represents one of the most controversial issues in international conservation research and policy (Agrawal and Redford 2009; Sutherland et al. 2009). With the highest proportion of rural residents (70%) and the most land area (more than 25%) under some form of protection of any continent (IUCN and UNEP 2012; World Bank 2007), debate is especially contentious in Africa. But the issue of how to balance biodiversity conservation with human welfare concerns, crystallized in debates over the impacts of PAs and externally-driven conservation projects, is salient across the globe.

The stakes in this debate could scarcely be higher. The acceleration of global biodiversity loss (Butchart et al. 2010) brings with it potentially grave consequences for humanity (Cardinale et al. 2012; Rockström et al. 2009). To stem the tide, the international community has committed to increasing the amount of land under some form of protection for conservation to 17% of the earth's terrestrial surface by 2020 (CBD 2010). However, many of the highest priority conservation areas are located in some of the world's poorest regions (Brooks et al. 2006; Sachs et al. 2009). About 1.2 billion people globally lived in extreme poverty in 2010 (subsisting on less than $1.25 a day), three-quarters of whom reside in rural areas of the developing world (World Bank and IMF 2013). Poverty alleviation and biodiversity

conservation remain central to international and national policy agendas (Garnett et al. 2007; Roe and Elliott 2010; World Bank 2013d), but considerable debate exists about the relationship between these two goals and the priority that should be given to each (Adams et al. 2004; Roe et al. 2012). This debate is hampered by oversimplified conceptual understandings (Agrawal and Redford 2006) and limited knowledge of the spatial overlap between poverty and biodiversity. Broad statements exist, but they are poorly substantiated and do not include information necessary for an accurate global picture, national and regional comparison, or assessment of change over time. For example, Chomitz et al. (2007) conclude that nearly 70 million people live in remote areas of closed tropical forests and another 735 million rural people live in or near tropical forests and savannas, relying on them for much of their fuel, food, and income; the World Bank (2004, 1) states that "forest resources directly contribute to the livelihoods of 90 percent of the 1.2 billion people living in extreme poverty and indirectly support the natural environment that nourishes agriculture and the food supplies of nearly half the population of the developing world." The basis for these claims, however, is unclear and data that might substantiate them while enabling analysis of the spatial distribution of these populations with biodiversity is currently unavailable.

Although the extent to which poverty, protected areas, and biodiversity are conceptually and spatially linked remains an open question, it is clear that, together, the needs of rural people in low-income tropical countries along with unsustainable consumption patterns in industrialized countries and a growing middle class in emerging economies is leading to unprecedented competition for land (Borras and Franco 2012; Lambin and Meyfroidt 2011). In some cases, this competition has led to the degazettement of existing PAs (Mascia and Pailler 2011). Uncertainty

over the impacts of and responses to global climate change (Oppenheimer 2012) only heightens the stakes involved in efforts to conserve biodiversity while benefitting local populations.

These issues underscore the importance of rigorous yet nuanced understanding of the social-ecological impacts of PAs and the international aid projects focused on them and the pathways through which they generate impacts. This study therefore addresses the following overarching research question: *what social and ecological impacts did ECOPAS generate and why?* In answering this question, I focus on the critical role of politics and governance at multiple levels, from the village to the municipality to the nation. Given their similarities, the comparison of Boumba and Petchinga casts the importance of governance into sharp relief. More than the ruddy brown waters of the Niger River separate the two villages: they also lie on either side of the political boundary between Benin and Niger. This boundary, I argue, has been decisive in terms of ECOPAS impacts on local livelihoods. In this dissertation, I show how political boundaries and different governance factors were pivotal in shaping biodiversity conservation and livelihoods outcomes in these two villages and more generally across the W region.

My analysis focuses on the intermediate impacts of ECOPAS (2-5 years post-project). I also briefly consider the more immediate, near-term impacts of the project (up to 1 year after it ended) and its potential impacts over the longer term (6-20 or more years). Through archival, field and desk-based research, I develop the idea of conservation legacies to encompass these impacts, but more generally to capture the temporal range over which such impacts may endure, fade, or change.

This dissertation responds to an increasing demand for more rigorous empirical evaluation of PAs and conservation projects "based on explicit recognition of conceptual

complexity, contextual variety, and, over time, evidence on impacts of specific types of programs" (Agrawal and Redford 2006, 3). It makes three primary contributions. First, it advances understanding of heterogeneity in the impacts of PAs and associated conservation aid projects. I examine the impacts of ECOPAS on the livelihoods of those living near the WNPs of Benin and Niger, focusing on income and access to natural resources, and on biodiversity as indicated by changes in mammal species abundance in and around the two contiguous National Parks. This assessment looks not only at the aggregate level, but explores variation in these impacts geographically around the Parks, socially among poorer and wealthier groups, and temporally during ECOPAS implementation and three years after its conclusion. My study makes a second contribution by shedding light on the causal pathways through which PAs and related interventions create impacts, highlighting the pivotal role of governance factors and social-ecological contexts at multiple scales in shaping outcomes. Finally, this dissertation makes a methodological contribution to research in this area by demonstrating the value of combining qualitative and quantitative methods in a comparative research design.

In the next section I review the literature on social and ecological impacts of PAs in the developing world and the conservation aid projects centered on them. I identify the key gaps in knowledge that this dissertation addresses, highlighting the importance of research on the role of governance in shaping outcomes. The third and fourth sections of this introductory chapter provide background information on the W region and the ECOPAS project. In the fifth section I describe my research methods, including case selection and data collection and analysis. Finally, I conclude by providing an overview of each of the individual chapter of this dissertation.

1.2 Theorizing the Impacts of Protected Areas and Conservation Aid

This dissertation advances empirical and theoretical understanding in interdisciplinary environmental studies. It draws from and seeks to contribute to scholarship in two main areas: 1) the social and ecological impacts of conservation and development interventions, and 2) institutions and environmental governance. I thus engage with writings in well-established crosscutting fields like common property and political ecology, emerging fields like comparative environmental politics (Steinberg and VanDeveer 2012) and conservation social science (Mascia forthcoming), as well as more-regionally focused scholarship on social and environmental change in Africa, particularly dryland and Francophone West Africa.

Here I review the literature on the social-ecological impacts of PAs and related aid projects and then highlight three key gaps in current understanding that this dissertation addresses. These relate to: 1) the *causal pathways* by which impacts are generated; 2) the *mediating context* of impacts; and 3) the *spatial, social, and temporal heterogeneity* of impacts. Governance comprises a crucial element of the first two of these dimensions, and its variations affect the third. My review thus integrates scholarship on environmental and natural resource governance. Individual chapters of this dissertation deepen this theoretical overview by grappling in more detail with relevant theory from the areas of research described above and developing specific hypotheses that I test empirically.

1.2.1 Overview of the Literature on the Social-Ecological Impacts of Conservation

Conservation interventions in national parks and other PAs aim to improve the status of wildlife and biodiversity more generally. But such efforts also invariably have social effects, the nature, variety, and intensity of which remain relatively poorly understood (Sutherland et al. 2009; West et al. 2006). A rapidly growing body of literature seeks to better understand the

social impacts of these interventions in various settings across the globe (Adams and Hutton 2007; Coad et al. 2008; Pullin et al. forthcoming; West et al. 2006), but particularly in developing countries where high levels of biodiversity and poverty converge (Balmford et al. 2001; Sachs et al. 2009). Investigations have typically focused on how PAs affect the livelihoods of people who live in or adjacent to them. Many of these studies are drawn from the fields of political ecology and environmental anthropology and have employed ethnographic and qualitative methods to offer detailed analysis of the impacts of specific PAs or interventions in specific places, usually focusing at the village or PA level (Brockington et al. 2008; Orlove and Brush 1996; West et al. 2006). This strand of the literature, typified by a series of monographs on cases in Africa (e.g. Brockington 2002; McDermott Hughes 2006; Neumann 1998; Shetler 2007; Sodikoff 2012), is especially valuable for directing attention to the nature of power and role of history in shaping conservation's social impacts in developing country settings.

Although this scholarship offers rich insight into the causes and consequences of PAs impacts in specific places, questions remain about the rigor and generalizability of its findings. Of primary concern to some scholars is that such studies have not typically considered counterfactuals—what outcomes in the study area might have been like in the absence of the PA or intervention—or confounding effects, such as other programs or policies implemented in the same area, historical trends, or social and environmental characteristics that were not observed but may nevertheless have influenced outcomes (Ferraro and Pattanayak 2006). In addition, the empirical limits of the arguments made in detailed case studies are not always clearly stated. These critiques apply not only to much of the qualitative literature reviewed above, but also more quantitatively oriented studies. For example, many "before-and-after" comparisons of conservation and development interventions assume that the biophysical and socio-economic

system in which they are implemented is static, but as the potential confounding factors listed above suggest, other temporally overlapping changes may also influence outcomes (Gertler et al. 2011). Similarly, research that uses "inside-outside" comparisons of PAs to non-PAs as a basis for causal inference is also vulnerable to bias due to the non-random location of conservation interventions across the landscape (Joppa and Pfaff 2011) and to uncertainty about social-ecological interaction between comparator groups (Oliveira et al. 2007).

In response to these perceived shortcomings, a series of recent studies have made use of GIS datasets and sophisticated statistical techniques in quasi-experimental research designs to offer more rigorous assessment of PA impacts (see review in Miteva et al. 2012; Ferraro et al. 2013; Miteva et al. 2012; Nolte et al. 2013b). This literature uses a "before-after-control-impact" (BACI) design based on data from before and after the intervention of interest and in sites where the intervention took place and matched control sites that are similar as possible to the intervention sites except that there was no intervention (Smith 2006). This design helps to rule out potentially confounding effects and to increase confidence that the outcome observed was due to the intervention.

In contrast to much of the qualitative literature on social impacts, which rarely considers the ecological impacts of PAs in any depth, quasi-experimental studies have more frequently examined biodiversity-related impacts. Partly for this reason, the ecological impacts of PAs, especially on habitat and species protection, are comparatively better understood than social impacts. There have been, for example, rigorous global studies of the impacts of PAs on natural land cover (Joppa and Pfaff 2011) and the incidence of fire (Nelson and Chomitz 2011). A recent systematic review identified 76 "high quality" studies (i.e. low susceptibility to bias based on BACI research designs) that evaluated PA impacts on habitat cover (Geldmann et al. 2013).

That same review found 42 such studies on species populations, 34 of which measured changes in species population abundance. By contrast, a separate review only found five studies of PA impacts on human well-being using a BACI design (Pullin et al. forthcoming). Even as the ecological impacts of a greater proportion of the world's PAs have been assessed and a larger number of studies have appeared on this topic, understanding of the extent to which PAs represent and maintain key biodiversity features still remains limited, however (Gaston et al. 2008; Geldmann et al. 2013).

A growing evidence base and advances in knowledge notwithstanding, systematic understanding of the ecological and especially the social impacts of PAs remains in its infancy (Geldmann et al. 2013; West et al. 2006). There are very few studies compared with the number of PAs globally. Recent estimates suggest that there are only about 300 articles examining the human well-being impacts of terrestrial PAs (Pullin et al. forthcoming), which represent the vast majority of the nearly 200,000 PAs currently dispersed across the globe (IUCN and UNEP 2012). Peer-reviewed impact studies of conservation and development aid projects, such as integrated conservation and development projects (ICDPs),[5] also remain rare (Gubbi et al. 2008; Linkie et al. 2008). Since 1980, when the *World Conservation Strategy* (IUCN et al. 1980) helped place conservation squarely on the international development agenda (Robinson 1993), some 3,500 such aid projects have been funded (Miller 2013 (in review)). However, a recent systematic review identified studies of only 136 community-based conservation projects such as ICDPs and the like that assess specific social-ecological outcomes (Brooks et al. 2012). As this and other reviews (e.g. Agrawal and Redford 2006; Ferraro and Pattanayak 2006; Sanderson and

[5] ICDPs are one variant in a range of approaches, including community-based conservation, community-based wildlife or natural resource management, and eco-development, that seek to simultaneously deliver biodiversity and local livelihoods goals. The term ICDP typically refers to international aid-funded conservation efforts in specific PAs with social and economic development in adjacent human communities (Wells & Brandon 1992; Naughton-Treves et al. 2005).

Redford 2004) show, the evidence base is even further limited by the variable quality of existing impact assessments.

1.2.2 Opening up the Black Box of Protected Area Impacts

PAs are dynamic, multifaceted institutions nested within different levels of governance. Their effects vary spatially, socially, and temporally. Yet most of the current generation of quasi-experimental literature treats PAs as undifferentiated entities that have impacts by virtue of their presence or absence in the landscape. Such studies have often focused on identifying aggregate *patterns* in the relationship between protection and impacts. However, this body of scholarship has not generally analyzed the causal *processes* through which PAs generate impacts or examined how the broader political context in which they are embedded may moderate their effects. There is, then, a need to open up the "black box" of PAs to examine the multiple pathways through which these conservation institutions may generate impacts, including donor-supported changes in how they are governed as examined in this dissertation.

Although quantitative program evaluation methods can shed light on causal mechanisms (Hanauer and Ferraro 2011; Imai et al. 2011), qualitative approaches are particularly well suited to this task. Qualitative methods can more readily describe key features of the context within which conservation interventions are implemented and these may prove decisive in shaping outcomes. By contrast, experimental and quasi-experimental strategies seek to isolate interventions from their context so as to control for confounding variables (Khagram and Thomas 2010). Further, because they can more readily attend to a broader range of factors and their interactions, process tracing and other qualitative methods can reveal links at various points on a causal chain linking intervention, context, and outcome (Brady and Collier 2004; George and Bennett 2005). For these reasons carefully designed qualitative approaches may be

especially appropriate for untangling complex causal pathways through which protected areas and conservation interventions more generally create social-ecological impacts.

There is, however, substantial scope for cross-fertilization between these two approaches to build theoretical and empirical understanding of conservation's effects. For example, theory building is particularly important for the specification of quasi-experimental designs. Without well-defined theory to guide such research, bias may arise through omitted variables and insufficient controls for pre-treatment trends (Greenstone and Gayer 2009). Through careful description of links in causal chains and contextual factors qualitative analysis can help develop theory to inform quantitative models. At the same time, quantitative studies can help illuminate the extent to which insights derived from qualitative research hold across a broader universe of cases. Despite potential synergies and the existence of reviews highlighting insights from both kinds of studies (e.g. Coad et al. 2008; Naughton-Treves et al. 2005), synthetic work using both qualitative and quantitative approaches to impact evaluation remains limited in this field.

Extant literature suggests that the pathways through which conservation interventions generate impacts are many and varied. In related work, my co-authors and I developed a typology of five pathways linking PAs and conservation efforts to social impacts (Glew et al. 2013). These include: delivery of ecosystem services; reallocation of property rights; changes through the apparatus of conservation; development of ancillary industry and infrastructure; and sharing of ideas and information.

The first of these pathways, ecosystem services, currently predominates in international policy discourse (Cardinale et al. 2012; Kumar 2012; MEA 2005). The logic of this pathway is that conservation will lead to the maintenance or improvement of ecosystem goods and services vital to human well-being. For example, watershed protection upstream may benefit farmers

downstream by regulating the availability of water for crops, or improved vegetation cover may have positive impacts on the livelihoods of herders due to better quality grazing. The second potential pathway is the reallocation of property rights, which determine resource access and thereby shapes human welfare. A review of the social impacts of property rights reallocation due to the creation and management of marine PAs illustrates this pathway (Mascia and Claus 2009). Using Schlager and Ostrom's (1992) property rights framework, this study found that the kinds of property rights affected exerted a strong influence on magnitude, extent, and distribution of positive and negative social impacts, including economic wealth, health, education, and social capital. The third pathway through which conservation interventions may affect outcomes is through the apparatus of conservation projects, that is, the personnel, equipment, and infrastructure directly linked to conservation management actions, including conservation staff, vehicles, building construction, roads, and, in some cases, guns. For example, in regions characterized by chronic insecurity, anti-poaching patrols in conservation areas may deter banditry and theft of valuable assets like cattle, thereby improving people's welfare (Glew et al. 2013). A fourth type of pathway is via industry and infrastructure ancillary to the PA or conservation intervention. This pathway includes impacts arising from any activity not directly related to conservation management but that is nevertheless contingent on effective conservation. Examples include tourism and scientific research. The final pathway in our typology is ideas and information. For instance, conservation interventions may enhance the reputation of the place where they are implemented leading to increased local pride and visitation by tourists, or conservation efforts may provide information on new agricultural or animal husbandry techniques that is used to increase yields.

Refining and employing this typology of pathways and gauging their effects across an array of social-ecological contexts constitutes an important research frontier for building theory as well as identifying potential leverage points for policy intervention (Miteva et al. 2012; Thomas and Koontz 2011). It will also be important to more systematically analyze the range of pathways connecting conservation to ecological impacts in order to assess overlaps and gaps among pathways producing social impacts.

This dissertation emphasizes the intersection the ECOPAS project with key governance factors at multiple levels, with a focus on enforcement, decentralization, and property rights at the household and subnational levels but as embedded in larger national political contexts. The first two of these factors influence the pathways described above, including through the reallocation of property rights. The specific literatures with which I engage, and hypotheses I test in relation to these dimensions of environmental governance, are detailed in the three core chapters of this dissertation. Here it is worth mentioning that, while concern with politics, power, and governance has been a defining feature of work on the social impacts of PAs in political ecology (e.g. Neumann 1998; Peluso 1993; West 2006), quantitative studies of conservation impact have devoted little attention to this topic. However, this is beginning to change and several recent studies have examined the effects of PAs under different governance regimes (i.e. from more to less strict protection) (Ferraro et al. 2013; Nelson and Chomitz 2011; Nolte et al. 2013b; Pfaff et al. 2013). But studies in this vein have only rarely considered other aspects of governance, including those I emphasize in this study.

1.2.3 Context and Impacts

Scholarship on PA and conservation project impacts frequently acknowledges that impacts are highly context dependent (Adams and Hutton 2007; Brooks et al. 2012). For at least

a decade, scholars of resource governance on the commons and state PAs alike have urged that research be conducted into how national political context affects local level sustainability (Agrawal 2003; Sanderson and Bird 1998). Despite such calls, however, the existing evidence base is insufficient to identify patterns that may exist across countries to explain how context moderates PA impact and with what effect (Mascia and Claus 2009; Pullin et al. forthcoming). This research gap exists in part because the relevant literature tends to treat the effect of factors, like enforcement, that shape social-ecological outcomes as context invariant (Agrawal et al. 2013). As a result, there is little available theory about the moderating effect of context. Limited theory, in turn, diminishes capacity to understand the range of causal processes linking policy interventions to conservation outcomes and the sustainability of results. More systematic knowledge is therefore needed on how national political and other contexts moderate the factors generating outcomes. Synthetic work drawing together insights from a growing collection of conservation monographs, ranging from ethnographies of marine conservation off the Tanzanian coast (Walley 2004) and in an Indonesian archipelago (Lowe 2003) to detailed studies of forest management in the Indian Himalaya (Chhatre and Saberwal 2006) and the mountains of the southwestern United States (Kosek 2006), may reveal patterns about how and why context matters within and across different geopolitical and ecological regions. Such knowledge is especially important given that extra-local influences on local resource governance may be those most amendable to effective change through policy (Dietz and Henry 2008).

1.2.4 Conservation Legacies: Assessing the Diversity and Durability of Impacts

A final research gap in the literature on PA-based conservation aid concerns differentiation of impacts. Here I discuss research needs relating to three aspects of this gap: joint analysis of different types of impact, heterogeneity of impact, and temporal durability of

impacts.

Like the vast majority of research at the intersection of environment and society (Agrawal and Chhatre 2011; Barrett et al. 2011), the scientific literature on PA impacts has focused largely on either social or ecological dimensions, rarely both simultaneously. Thus, while there is now widespread recognition that trade-offs often characterize the relation between these outcomes in social-ecological systems (Leader-Williams et al. 2010; McShane et al. 2010; Persha et al. 2011), there is little empirically-supported theory about the nature of such trade-offs and the conditions under which trade-offs or synergies are more or less likely.

The literature suggests that the costs and benefits of PAs are distributed differently based on wealth, ethnicity, age, gender, and other characteristics within and across local communities (Coad et al. 2008) and at different spatial scales (Kremen et al. 2000). Despite this variation, analysis of the heterogeneity of PA impacts remains rare (Ferraro and Hanauer 2011; Nagendra et al. 2010). Carefully designed research examining the multiple outcomes PAs produce, and variation in these outcomes among different subpopulations, enables identification of potential synergies and trade-offs between biodiversity and local livelihoods. The development of more systematic knowledge of the relationship between these two outcomes, and the processes that drive them, promises to enhance understanding of environmental sustainability and to inform more effective conservation practice and policy (Agrawal and Redford 2006; Ferraro and Pattanayak 2006).

If few studies examine social and ecological impacts together or consider their spatial or social heterogeneity, fewer still consider the temporality of impacts, particularly over the longer term. International conservation and development projects often include a final evaluation either in the last year of the project or a year or so after its completion. These evaluations are often

done relatively quickly by paid consultants, who, like the project "beneficiaries" from whom they glean information for their assessments, may have little incentive to report unfavorable results (Gibson et al. 2005a; Sayer and Wells 2004). Understandably, such consultants usually consider the project in its own terms and their analysis may focus on outputs from the project as opposed to its impacts. These evaluations, such as implementation completion reports prepared by World Bank project managers and available publicly (documents.worldbank.org), are ubiquitous but remain largely confined to the gray literature.

A second type of evaluation, usually undertaken by academic researchers and increasingly common in the published literature as discussed above, seeks to rigorously assess the impacts of a given intervention. These evaluations aim to understand the proportion of a given outcome—say, change in deforestation or household income—due to the intervention as opposed to other factors. This proportion is commonly defined as the impact (Rossi et al. 2004). This type of evaluation is typically concerned with near-term or intermediate impacts, that is, those taking place from two to five years post-intervention.

Finally, assessment of the longer-term legacies of PAs and the projects centered on them is the least common form of impact evaluation. There are several reasons why such studies are rare. First, the further an intervention recedes in the past the more difficult it is to account for potentially confounding influences and isolate its effects. With time, the intervention becomes something else; it may no longer be feasible or even sensible to try to separate it from the context in which it was implemented. This is likely to be especially true in countries, like those of the W region, where foreign aid comprises the major part of national budgets for conservation. In such circumstances, aid agencies and international foreign interests become so enmeshed in the everyday functioning of the state through projects that they simultaneously shape and are shaped

by the encounter. Given the tendency of projects to become embedded in state institutions and the social-ecological realities of the places they are implemented (Bierschenk et al. 2000; Lewis and Mosse 2006), it becomes difficult to trace the causes of specific impacts, particularly over time as other projects and institutions accrete in the same locations. In view of this difficulty, detailed ethnographic and historical analyses are likely best positioned to illuminate the complex causal pathways connecting interventions to longer-term outcomes.

Such studies take time, however, and this leads to a second reason why evaluation of longer-term impacts remains rare: donor interest. There are many incentives that work against such assessment. Some of these include agency staff turnover, a kind of serial faddism that quickly makes "old" ideas and interventions unfashionable, lack of budget support for such evaluations, the short-time scale of most projects, and uncertainty about the continued relevance of information from earlier periods (Redford et al. 2013; Sayer and Wells 2004).

This dissertation focuses on the legacy of the ECOPAS project in the intermediate term but nods to its nearer term impacts (revealed through fieldwork during the last year of its operation and a final evaluation of the project commissioned by the EU) and considers what its longer-term impacts may be. The conclusion in particular delves more deeply into this latter type of impact as I develop the concept of conservation legacies to capture the temporal dimensions and ultimate durability of PA-related impacts.

The foregoing has identified key gaps in the literature on the social and ecological effects of PAs and conservation aid interventions centered on them. The core chapters of this dissertation address these lacunae through investigation of ECOPAS impacts in the different political contexts of the W region. Before summarizing the specific contribution of each of these

chapters, I first provide background information on the W region, the ECOPAS project, and the methods I used in this dissertation.

1.3 Study Area: The W Region of West Africa

1.3.1 Geographical Setting and the Development of Conservation Interest

During its 4,180 km (2,600 mi) journey across West Africa, the Niger River courses through the southern portion of Niger where it forms a natural boundary with neighboring Benin. Here, along red ochre banks and rose-colored rocks, *Issa Beri*, or "Great River" as it is known in Songhay-Zarma language, cannot seem to make up its mind. It first flows southeasterly then turns abruptly to the northeast and repeats this motion before finally proceeding in its original southeastern direction. Locally, the wildlife-rich area around this double meander in the River is known as "Bumba Gandyi" or "Spirits of the Bush" (Rouch 1950). It is from this Zarma phrase that the village of Boumba described above derives its name.

As briefly mentioned above, early European explorers to the region, including Mungo Park, Hugh Clapperton and Heinrich Barth, remarked on its abundant wildlife, but they also found a certain logic in the River's apparent indecisiveness: it had scrawled the letter "W" across the savanna landscape. In the wake of these proto-colonial ventures and after contest with other European colonial powers and considerable resistance by local populations, France gained control of the W region by the turn of the 20th century (Fugelstad 1983; Obichere 1971).

Some two decades later, a French Veterinarian, Dr. Faisson, led an expedition to the region to prospect for a new state PA. This began a classic cycle of concessionary politics in which the colonial state began searching for potential new conservation areas, delimited them and finally negotiated, often forcibly, control over newly defined territories (Hardin 2011). Competition between France and England to identify and declare conservation areas within the

territories they controlled in Africa had intensified during this period (Adams 2004; Ford 2012). Based on his expedition, Dr. Faisson found support for earlier arguments that the W region was a sparsely populated "no man's land" (Benoit 1999; Urvoy 1936) exceptionally abundant in wildlife. He thus surveyed the potential boundaries of a new reserve and recommended that it be created (Faisson 1946). In 1926, the colonial government in French West Africa (*Afrique Occidentale Française*) established the W Reserve, which encompassed territory in the colonies of Niger and Haute-Volta (now Burkina Faso) and, eventually, Dahomey (now Benin) (Aubréville 1937). As part of a broader wave of PA declaration across its colonial holdings in Africa (Ford 2004, 2012), the government changed the status of the reserve to the Réserve du "Parc National du W" in 1937. During this period, the "negotiation" phase in Hardin's concessionary politics framework (2011), colonial authorities forcibly removed people in several villages located within the boundaries of the new state territory (Benoit 1999; ECOPAS 2005).[6] The last people living within these limits were evicted in 1954 when the Reserve's conservation status changed again and it officially became a French National Park.

When Dahomey, Niger, and Upper Volta (now Burkina Faso) gained independence in 1960, WNP was divided among them following the former colonial boundaries (Fig. 1.1). Niger's W Park, which includes the famous double meander, is the most well-known of the three W Parks while the Park in Benin is the largest, covering more than half of this transboundary protected area (5,630 km^2). These national parks, located between 11° 20' and 12° 30' N and 2° and 3° E, are contiguous with two IUCN category IV PAs in Niger, the Tamou Wildlife Reserve and the Dosso Partial Wildlife Reserve, and two IUCN category VI PAs in Benin, the Djona and

[6] There are no available estimates of the number of people evicted in the three countries, but more than ten settlements in Niger alone were cleared from the Park (Benoit 1999) and my fieldwork in Benin indicates the number is similar for Benin.

Mekrou Hunting Zones.[7] Along with WNP and two smaller adjacent PAs in Burkina Faso, this large conservation complex (totaling 18,000 km^2) was declared Africa's first Transboundary Biosphere Reserve in 2002 (UNESCO 2007). The three contiguous national parks at the core of the Reserve cover more than 10,000 km^2, an area somewhat larger than Yellowstone National Park in the United States (8,983 km^2).

In the post-colonial era, the W region has continued to attract national and international biodiversity conservation interest due to its wide range of flora and fauna from the Sudano-Sahelian biogeographic zone (Grettenberger 1984; IUCN 1996; Lamarque 2004; Sinsin and Kampmann 2012). With extensive dry savanna woodland along with lakes, rivers, marshes, gallery forests, and grassy plains, the area contains all the major habitat types of the West African savanna belt. The W National Parks are home to the largest populations of elephants (*Loxodonta africana*) and ungulates in West Africa as well as rare species, such as the western topi (*Damaliscus lunatus korrigum*), the cheetah (*Acinonyx jubatus*), the African hunting dog (*Lycaon pictus*) and the West African manatee (*Trichecus senegalensis*) (Lamarque 2004). More than 450 bird species (Balança et al. 2007) and at least 670 plant species (Clerici et al. 2007) have been identified in the W region.

1.3.2 People and Livelihoods in the W Region

More than 400,000 people live in the W region today. Approximately 150,000 people live in some 60 villages and numerous other small settlements within 20 km of WNP in Benin, with 13,000 living within a 5 km "buffer zone" that rings the Park and much of the adjacent

[7] IUCN category IV denotes "Habitat/Species Management Areas" that "aim to protect particular species or habitats and management reflects this priority." IUCN Category VI represents "Protected Areas with Sustainable Use of Natural Resources," which are "generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area" (IUCN 2013).

Djona Hunting Zone (ECOPAS 2005; Photo 2). In Niger, an estimated 125,000 people live in 143 villages and other settlements in the three *communes* (municipalities) adjacent to the Park (Commune Rurale de Falmey 2006; Commune Rurale de Kirtachi 2007; Commune Rurale de Tamou 2009). The annual population growth rate in the W region is estimated at 3.4% in Benin and 2.8% in Niger, but population densities in the periphery of the Park vary widely (ECOPAS 2005).

Competition among West African empires such as the Songhay and Borgu along with disease, especially trypanosomiasis, shaped pre-colonial settlement patterns in the W region (Turner 1999). Many of the people living around the Park today were evicted from the Park or have parents or grandparents who were evicted during the colonial and in some cases, post-colonial period (Benoit 1999; ECOPAS 2005). Major ethnic groups on the Benin side of the border include Baatonu (Bariba) to the south, Mokollé to the east, and Dendi/Zarma to the east and north. In Niger, the major ethnic groups are Gulmanceba (Gourmanché), Haussa, and Zarma, with a few Tuareg migrants dispersed around the Park. Gulmanceba and Zarma predominate in Burkina Faso. Fulbe (Fulani) live throughout the W region in all three countries.

The vast majority of the population in the region makes a living primarily from agricultural and pastoral activities, although hunting, fishing, and collection of forest products are also important natural resource-based livelihoods activities for many households. People in this dryland region must cope with extreme variations in seasonal and inter-annual precipitation, resulting in recurrent droughts and floods. Precipitation varies not only temporally but also spatially across this extensive area. Average annual rainfall ranges from 1000mm in the southern part of the region in Benin to 600mm to the north in Niger. The region has seen periodic droughts in recent decades, notably in the late 1970s and early 1980s when annual

rainfall in some years did not reach 200mm. The W region, especially in Niger, has also seen droughts more recently in 2006 as well as extreme flooding in 2010. Like other societies across the Sudano-Sahelian region (Mortimore and Adams 1999; Tschakert 2007), rural communities have developed inventive strategies for coping strategies with climate variation. However, the preponderance of households is characterized by subsistence vulnerability and insecurity in face of this variation and increasing environmental degradation.

1.3.3 Governance of the Transboundary W National Parks

Since independence, the boundaries, laws and institutions developed to govern the WNPs and their adjacent PAs in the colonial era have largely remained in place. However, central state presence in the region has varied, with involvement in conservation by the government of Benin the weakest of the three countries prior to the start of the ECOPAS project in 2001. Of the three countries responsible for governing the W region, the state in Niger historically devoted the most resources to its WNP. Burkina Faso represents an intermediate case. Benin and Niger provide the greatest variation in governance more generally among the three countries. They pose contrasting cases not only in terms of central state emphasis on the WNP, but also in terms of on-going decentralization processes, and overall national-level governance quality. As described in more detail below, this dissertation thus focuses primarily on Benin and Niger.[8] Key aspects of PA governance are summarized below (Table 1.1).

In Benin, the WNP, its Hunting Zones, and the buffer zone surrounding these PAs have been governed through the National Center for Wildlife Reserves Management (CENAGREF) since 1996, when it was created with financing from the World Bank, UNDP, German Aid, and

[8] For excellent recent work on the historical unfolding of conservation in the W region of Burkina Faso see Poppe 2010, 2012, and forthcoming.

AFD (*Agence Française pour le Développement*). Until that time, legal authority for these areas rested with the Forest Service (*Direction des Forêts et Ressources Naturelles*). CENAGREF works in a co-management arrangement with the Village Association for Wildlife Reserve Management (AVIGREF), which was also created with donor funds in the late 1990s. AVIGREF members, many of whom have a background as hunters with deep familiarity with the WNP, work as auxiliaries to park guards, tour guides, and seasonal labor, among other roles. By law, AVIGREF is designated to receive 30% of the receipts from hunting receipts and fines levied for illegal activities to undertake "eco-development" activities in communities around the Park. AVIGREF in the W region includes 83 separate village-level member associations as well as a regional coordination body (Tchabi 2004).

From Benin's independence in 1960 to the start of the ECOPAS in 2001, WNP and the Djona and Mekrou Hunting Zones served as de facto resource commons despite their formal protected status. Surveys conducted in 2002 and 2003 showed nearly 20,000 cattle in the Park in Benin (Hibert et al. 2010). Besides grazing, hunting and the gathering of fuelwood, fodder, and other natural resources were all common activities in these PAs. For example, some 10,000 hectares of land were cultivated within the Park, largely along its southern border (Former WNP Director, interview, Cotonou, January 2011; ECOPAS 2005). Before ECOPAS, Benin's WNP complex had virtually no infrastructure and only 12 guards patrolled its vast territory. In these circumstances, the Park was largely denuded of large mammals and conservation interests began to question whether it could be maintained as a National Park (CENAGREF 1999; Monfort et al. 1994).

The management structure of Niger's WNP is more hierarchical and centralized than that of Benin. The Park is managed under the Protected Areas Division of the Department of

Wildlife, Fishing, and Fish Farming (DFPP), which in turn is under the Ministry of Water Resources, Environment, and the Struggle Against Desertification (MHED). A "Conservator" (who plays the same role as the Park Director in Benin) is directly responsible for management of the Park. Unlike Benin, there is no formal co-management institution like AVIGREF in Niger. Another important difference between the two countries is that hunting is illegal in Niger (except for scientific research purposes) and thus has no state-owned Hunting Zones. Further, while CENAGREF is responsible for WNP and its adjacent hunting and buffer zones in Benin, Nigerien Park authorities must coordinate their activities with the Forest Service, which is charged with management of the Reserves adjacent to the Park.

In contrast to Benin, there was relatively little evidence of cattle grazing in the core of the Park at the start of the ECOPAS project (Hibert et al. 2010), suggesting more effective enforcement by Nigerien authorities. The Park is close to the capital city of Niamey (150 km) and the state has maintained an interest in management of the Park for decades given its contribution to national coffers through tourism and related aid funds (see chapter 3). The central government has also maintained an interest in the region for security reasons given on-going tensions with neighboring Benin and Burkina Faso over the location of shared borders. Although revenues have been smaller in Niger's WNP than its counterpart in Benin, it is the country's only National Park and has stood as the sole PA to generate significant revenue directly for the central government (see chapter 3). Nevertheless, even as Niger's WNP was significantly better patrolled and managed than Benin's WNP prior to ECOPAS, these activities were still insufficient for effective protection (IUCN 1996).

Table 1.1. Summary of W region protected area governance attributes prior to ECOPAS

GOVERNANCE ATTRIBUTE	COUNTRY Benin	Niger
W National Park		
Year founded	1954	1954
Year boundaries delimited	1952	1953
Area (km^2)	563,000	220,000
Distance from capital city	750km (Cotonou/Porto Novo)	150km (Niamey)
IUCN category	Category II (National Park)	Category II (National Park)
Management authority	CENAGREF	Protected Areas Division, DFPP
Co-management partner	AVIGREF	None
Natural resource use restrictions	All direct use forbidden except for "scientific or management reasons"	All direct use forbidden except for "scientific or management reasons"
Hunting in adjacent reserves	Allowed	Not allowed
Number of guards	12 (1 for every 48,103 ha in WNP and for every 66,186 ha in WNP + 2 satellite Hunting Zones)	19 (1 for every 11,639 ha in WNP and for every 15,639 in WNP + Tamou Reserve
Guards per $100km^2$	0.15	0.7
Passable roads	70km	637km
Cattle grazing within Park limits	Extensive	Limited to peripheral zones
Farming within Park limits	Up to 10,000ha	Not present
Djona Hunting Zone		
Year founded	1959	
Area (km2)	225,000	
IUCN category	Category VI: PA with Sustainable Use of Natural Resources	
Management authority	CENAGREF	
Natural resource use restrictions	All direct use forbidden except for quota-based trophy hunting	
Mekrou Hunting Zone		
Year founded	1959	
Area (km2)	102,000	
IUCN category	Category VI: PA with Sustainable Use of Natural Resources	
Management authority	CENAGREF	
Natural resource use restrictions	All direct use forbidden except for quota-based trophy hunting	
Dosso Partial Wildlife Reserve		
Year founded		1962
Area (km2)		306,500
IUCN category		IUCN Category IV: Habitat/ Species Management Area
Management authority		DGEEF
Natural resource use restrictions		Direct use of resources permitted in certain areas, but restricted elsewhere to promote protection of key species
Tamou Total Wildlife Reserve		
Year founded		1962
Area (km2)		75,600

IUCN category	IUCN Category IV: Habitat/ Species Management Area
Management authority	DGEEF
Natural resource use restrictions	Direct use of resources permitted in certain areas, but restricted elsewhere to promote protection of key species

1.4 The ECOPAS Project

ECOPAS was implemented in the W region of Benin, Burkina Faso, and Niger from January 1, 2001- December 31, 2008. The overall goal of the project was: "to reverse the process of natural resources degradation and to preserve the biological diversity in the regional complex of PAs for the benefit of local populations" (ECOPAS 2005).[9] Specific outcomes anticipated at the country level included: improved operational capacity of PA agencies; strengthened PA monitoring and enforcement; engagement of neighboring populations in conservation and natural resources management; and locally beneficial conservation and sustainable development of the region's PAs and natural resources (Aveling et al. 2008; ECOPAS 2005).

ECOPAS comprised by far the largest conservation intervention in the region in the post-colonial period, with a total budget of approximately US$32 million.[10] The EU designated more than 60% of the budget (~US$18 million) for regional coordination activities, while each of the three countries of the W region received $3.5 million to carry out project activities within their borders (Aveling et al. 2008). Given that Benin's portion of the Park is twice as large as the other two countries, Benin was eventually given $3.5 million in supplemental funds (Former ECOPAS accountant, interview, Kandi, Benin, 2010).

[9] Author translation from the original French. Unless otherwise noted, all translations in this dissertation are mine.
[10] This and other relevant amounts converted from Euros based on the average exchange rate during the ECOAPS implementation period from Jan 2001 to Dec 2008. 1 Euro = 1.183 1USD.

To achieve project objectives ECOPAS adopted a biosphere reserve model. This model includes demarcation and management of a "core" PA with restricted natural resource use, a surrounding "buffer zone" allowing only activities compatible with conservation, and a "transition area" to promote and develop sustainable resource use practices (Batisse 1997; Hadley 2003). Despite criticism that it merely replicates earlier, more coercive forms of conservation while parading under a banner of community participation and socio-economic improvement (Neumann 1997), this model has diffused globally over the past 25 years. As of 2012, there were 610 biosphere reserves in 117 countries across all world regions (UNESCO 2012). The model has also been extended to encompass new transboundary conservation efforts, which have proliferated in the last decade (Brosius and Russell 2003; Büscher 2013; Zimmerer et al. 2004). There are now more than 225 transboundary protected areas (TBPAs) across the world (UNEP-WCMC 2007)), including the W Region Transboundary Biosphere Reserve.

The ECOPAS budget figures described above demonstrate the project's strong emphasis on fostering concerted transboundary action among the three countries responsible for governing the W region. The idea for such cross-border collaboration emerged in the mid-1980s through discussion among experts on African PAs (EU aid official, interview, Brussels, September 2010). The EU actively sought to bring this idea to fruition through negotiation with national government authorities and other actors, but it was not until 2002 that the PA complex was designated as a Transboundary Biosphere Reserve (UNESCO 2007). ECOPAS supported joint patrols and training among WNP guards in the three countries and sought to address the problem of cross-border transhumance in the Park among other transboundary project activities (ECOPAS 2005). ECOPAS also advocated for national level policy change relating to Park conservation. These efforts culminated in the "Agreement on the Concerted Management of the

W Transboundary Biosphere Reserve," which formalized an institutional architecture for cross-border PA management and was signed by the national governments of Benin, Burkina Faso, and Niger in 2008.

Despite the biosphere model's emphasis on a multi-use peripheral zone surrounding a more strictly protected core, most of the ECOPAS project efforts within the individual countries of the W region were directed toward management of core PAs. The main project activities thus concerned improving infrastructure, management, and enforcement capacities (ECOPAS 2005). Enforcement was identified as a major priority in Benin given that it was the largest of the three WNPs and the least well-controlled by state PA authorities. Benin's W Park is distant from the national political-economic center of Cotonou (750 km) and, compared to the country's other National Park, Pendjari, the central government devoted few resources to managing W before ECOPAS implementation began. An estimated 90% of ECOPAS funds were spent on enforcement-related activities in Benin thereby dramatically increasing resources available for enforcement and PA management.

The number of guards increased more than threefold from 12 prior to ECOPAS to 49 within the first two years of project implementation and continuing through 2011 when data for this study were collected. During the ECOPAS implementation period the number of kilometers of roads, which bolster enforcement capacity, also increased markedly in Benin. A mere 70 km of passable road traversed Benin's WNP in 2001, but this number increased more than 15 times to 985 km by 2008 (CENAGREF 2008). ECOPAS also supported other infrastructure and operating costs of enforcement, from supply of vehicles and uniforms to training and salaries for park guards.

ECOPAS-induced change in enforcement in Niger's WNP was less than in Benin given

the comparatively strong interest in the Park by the government of the former. There were 19 park guards responsible for enforcement in Niger's WNP in 2000. An additional 15 guards were hired under the ECOPAS project in 2002, leaving a total of 34 guards, a number that remained constant through my fieldwork in 2011. In addition to this increase in personnel, the number of kilometers of passable roads for enforcement increased 18% from 637 km to 750 km under the ECOPAS project. As in Benin, ECOPAS allocated funds for materials, infrastructure, salaries, and other activities necessary for effective enforcement and broader management of WNP.

Although much of the country-level funding under ECOPAS related directly to infrastructure, management, and enforcement, the project also sought to deliver community benefits. Tourism was anticipated as the primary mechanism through which local populations would benefit from and thereby support conservation activities. Direct spending on tourism development comprised only about 5% ($350,000) of the ECOPAS budget in Benin, but many of the project's other activities, including increased enforcement, ecological research, and improvement of Park infrastructure, were planned to support this objective. Other community-oriented project activities included environmental education, clarification of land rights, development of alternative agricultural practices, conflict resolution, and support for legal pastoralism and transhumance. In Benin, AVIGREF comprised the main vehicle through which ECOPAS sought to engage communities in conservation and natural resource management. By law, 30% of hunting tourism receipts were designated to AVIGREF to support conservation and development activities in villages around WNP.

Direct expenditures on tourism in Niger (about 9% or $315,000 of the total budget) were similar to those in Benin (ECOPAS 2005). Unlike Benin, there was no formal co-management institution like AVIGREF. However, government reforms in Niger led to a mechanism for

revenue sharing between the state and local communities at the municipal level. Prior to 2006, few, if any, funds found their way to the municipal level, but after the passage of a *décret* (decree)[11] issued under the umbrella of broader decentralization reforms 50% of park entrance fees were designated to the municipal government of Tamou, one of three municipalities adjacent to the Park and location of the main Park entrance. As of 2011, however, the other two eligible municipalities had not received funds (Former ECOPAS staff member, interview, W region, Niger, June 2011).

In the absence of a separate institutional structure like AVIGREF for co-management of the Park in Niger, ECOPAS sought to work with municipal- and village-level land commissions (COFO, or *Commission Foncière*) set up under a 1993 law intended to enhance the security of rural producers and facilitate joint management of natural resources at local levels in the rural areas of Niger (Kandine 2010; Lund 1998). In the communes bordering WNP there are 73 community-based COFO, each involving a mix of central government officials, local elected representatives, customary authorities, and rural producers (ECOPAS 2005).

During the last months of the ECOPAS project the EU commissioned a final evaluation (Aveling et al. 2008). This assessment noted several project weaknesses, but overall it rated ECOPAS "a remarkable success" in achieving its conservation objectives (17). Given that it was undertaken prior to the project's conclusion, this evaluation was not able to assess impacts in the post-project period. This dissertation, in effect, comprises such an assessment.

[11] In French law, which forms the basis for the legal systems of Niger and Benin, a décret clarifies or defines the application of a law. Décrets usually emanate from the relevant Government Ministry and have the support of all ministers. An arête (order) further defines the details of a law or decree.

1.5 Methods

To answer the overarching research question of how ECOPAS affected biodiversity and livelihoods in the W region and why it had the impacts that it did, my dissertation research combined qualitative and quantitative research methods. Here I describe my research design and this mix of methods. Individual chapters provide additional detail on the methods I employed.

1.5.1 Case Selection

The ECOPAS project in the W region presents an ideal opportunity to advance theoretical and empirical understanding of how national governance shapes the impacts of international aid for PAs. Benin, Burkina Faso, and Niger are similar in that, like many countries across the world (Lemos and Agrawal 2006), each has been undergoing simultaneous processes of decentralization and transnationalization of environmental governance. But, as described above, governance characteristics and practices differed substantially among them prior to and during the ECOPAS project. Variations in overall measures of governance quality, in central state enforcement of WNP, and in the extent of decentralization reform facilitate causal inference about the influence of national and sub-national governance institutions in shaping aid outcomes on the effects of a single conservation aid project. This dissertation focuses on dynamics in Benin and Niger, which vary the most on these dimensions, though on occasion I refer to evidence from Burkina Faso.

I also selected the W region because the ECOPAS was by far the most significant conservation project to be implemented in the region in the decades since independence and no other significant conservation project had replaced it up to the time of my fieldwork in

2010/11.[12] These circumstances minimize the potential confounding influence of other projects thereby facilitating identification of impacts due to ECOPAS. The case of ECOPAS in the W region thus enabled me to conduct not only cross-sectional comparison across national and sub-national contexts but also longitudinal analysis of biodiversity and livelihoods indicators before and after ECOPAS implementation.

Finally, the location of the W region in Francophone West Africa makes it a compelling case. This region has received comparatively little attention from either conservation researchers or the international conservation community more generally, both of which have focused largely on Anglophone countries in southern and eastern Africa (Holmes et al. 2012). Unlike other PA landscapes in Africa, such as the Serengeti (Shetler 2007), Mount Meru (Neumann 1998), or Maloti-Drakensberg (Büscher 2013), little has been written on the social and environmental history of the W region, either in French or in English. Research in non-Anglophone contexts in Africa promises new theoretical and practical insights given that different colonial legacies shape contemporary conservation institutions, practices, and policy in different ways. Such research also becomes important in light of projected climatic changes (Boko et al. 2007). The reason is that changes in the distribution of biodiversity as well as migration and other human responses to global climate change will likely cut across political borders (Bellard et al. 2012; Heller and Zavaleta 2009; Oppenheimer 2012).

[12] The Italian government did fund some work in the periphery of the park after 2008 through three Italian NGOs, but the financing and scope of these projects was a fraction of ECOPAS. The Global Environment Facility (GEF) supported a project on protected area management across the protected areas of the broader region for US$ 5.6 million, launched in May 2010. However, on the ground implementation was just getting under way during the last months of my fieldwork in July-August 2011 and these funds did not focus on the transboundary WNP. Instead, EU funds for a follow-up project to ECOPAS called *Programme d'Appui aux Parcs de l'Entente* (PAPE or Support Program for Peace Parks) were designated for the W region. This project was launched in September 2012 after the completion of my fieldwork.

1.5.2 A Mixed Method Approach

In this dissertation I employed both qualitative and quantitative research methods to evaluate the differential impacts of ECOPAS, specify how key governance variables mediated project effects, and clarify the complex socio-political context of implementation. This mixed method approach is particularly appropriate for not only identifying ECOPAS impacts but also for testing hypotheses and developing explanations for them. I used a quasi-experimental (BACI or "difference in difference") design and regression analysis to account for potential confounding variables and isolate that portion of outcomes due to ECOPAS in Benin. To compare outcomes in Benin and Niger I used a cross-sectional or "difference" (Meyer 1995) approach and multi-level regression analysis. These quantitative approaches allowed me to make robust inferences about the effects of ECOPAS to the broader population of people living around the two WNPs. Qualitative research complemented these two approaches in several ways. First, it helped me refine my hypotheses and data collection. It was also critical in enabling me to purposively select study villages and to interpret results from quantitative analysis. Qualitative data helped me to triangulate and interpret quantitative results. Qualitative research among many different social actors furnished me with insights not possible through quantitative research in that it provided a window into people's perspectives and concerns rather than my own preconceived agenda. Finally, qualitative research was essential in enabling me to identify key causal mechanisms and pathways connecting the ECOPAS project to social-ecological outcomes. The complementarities and relative cost-effectiveness of the mixed methods-approach I developed mean that it might fruitfully be applied to contexts beyond the W region where primary data relating to PA and aid impacts is lacking and difficult to collect.

A household survey (n=431) comprised the main quantitative method I used. I also collected secondary data based on inventories of mammal species populations in the WNPs

carried out by the national parks agencies of Benin and Niger in partnership with ECOPAS. Individual and focus group interviews, participant observation, and archival research complemented the survey.

In each study village near WNP I conducted focus group interviews with elders and leaders, pastoralists, AVIGREF members, and women natural resource users (Photo 3). I also organized focus group interviews with guards stationed at the major guard posts in both Benin and Niger. I gleaned insights from dozens of individual interviews during my research, including with ECOPAS, EU, and W Park staff, tour guides, people who had been displaced from WNP, veterinarians, academic experts, traditional leaders, and local politicians. In the field, I engaged in various forms of participant observation. Among other activities, I went on patrol with WNP guards, attended public meetings on conservation in the region, accompanied news reporters to see the results of an eviction from the Park, and toured the buffer zone with farmers and herders. I also arranged a flyover of the Park and its peripheral zone to gain a different perspective on land use and conservation in the W region (Photo 4). Finally, I collected a range of materials from archives in Benin, Burkina Faso, and Niger and in France and Belgium (Appendix B). I consulted the "private archives" of many people in these countries who have kept copies of reports, meeting minutes, maps, letters, newspaper clippings, petitions, rare books, and other items relevant to my research.

1.5.3 Village and Household Selection

I conducted research in eight villages targeted by the ECOPAS project in the periphery of the WNPs of Benin and Niger. I also worked in four "control" villages in northern Benin that were as similar as possible to the study villages, but were distant from WNP and were not influenced by ECOPAS activities.

I originally aimed to identify and study control villages in Niger as well as Benin. Unfortunately, security concerns prevented research in rural areas in Niger distant from WNP, so I was not able to include control villages in that country. However, data from ECOPAS treatment and control villages in Benin in a quasi-experimental research design permits causal inference about the impact of ECOPAS while data from ECOPAS villages in Niger introduces variation on key explanatory variables that enriches understanding of ECOPAS effects. Theory-based comparison across the Benin-Niger border enabled investigation of causal mechanisms and processes that is not possible using within-country quasi-experimental design. At the same time, rigorous quantitative findings about the overall impact of ECOPAS in Benin can aid interpretation of results relating to its impact in Niger.

I used stratified purposive sampling (George and Bennett 2005) to select eight villages within 2 km of WNP in which the ECOPAS project was active (Fig. 1.1).[13] These villages were chosen because they were explicitly targeted for ECOPAS activities, but also to represent the ecological and political variation around the Park in both countries. They span a range of climatological zones (average annual rainfall of 600 to 950mm/year) and at least one village from each *commune* (municipality) around the Park was selected. The villages are similar in population size, distance to the nearest regional market, and multi-ethnic composition. I identified study villages based on ECOPAS reports, interviews with former ECOPAS staff, and exploratory visits to candidate villages.

In Benin, I matched ECOPAS treatment villages with control villages. Control villages were selected to be as similar as possible to ECOPAS villages except that they were remote from

[13] In Benin, two study villages were adjacent to the Djona Hunting Zone and in Niger one village was next to the Tamou Reserve. Selecting villages near these PAs was necessary to capture the range of ecological and political variation around the Park in the both countries and to adequately represent the kinds of villages targeted by ECOPAS. The effect of living near these PAs should be similar to living near the Park itself as they are governed by rules and enforcement regimes nearly identical to those of the Park.

the park (>25 km) and did not benefit from the project. In selecting control villages I sought a balance between maximizing their similarity with ECOPAS villages and minimizing potential spillover effects from the ECOPAS project within the constraints posed by the geography of village settlement and other PAs in northern Benin.

Within each study village, households were randomly selected based on probability proportional to size (PPS), using Bernard's (2006) map sampling method (Appendix C). In the absence of reliable census records, this method ensured a random sample that compensated for differences in housing density, potential irregularity in the spatial distribution of wealth in the community, and variation in livelihood strategies (Bernard 2006). I surveyed between 30 and 40 households or at least 10% of population in each village. In total, 431 households were surveyed, with 150 in ECOPAS villages and 131 in control villages in Benin, and 150 in ECOPAS villages in Niger.

1.5.4 Data Collection and Analysis

The information on which this dissertation is based was collected in multiple locations during different trips. In total, data were collected over all 15 months of fieldwork. I gained my first impression of the W region in 2004 during a visit when I worked as a grantmaker for conservation and sustainable development at the MacArthur Foundation. I returned for two months in the summer of 2008 (June-July) to conduct preliminary dissertation field research in Benin and Niger. This experience afforded me a broad overview of the W region's geography and history, allowed me to learn about the ECOPAS project during the tail end of its implementation, and enabled me to establish links with key individuals and institutions with whom I later collaborated. At this time, I gained familiarity with some of the geopolitical variation around the park in both countries, conducted several interviews, and collected a range

of relevant written materials. The primary period of data collection occurred from September 2010-August 2011 during which I conducted fieldwork over approximately seven months in Benin, three months in Niger, and one month in Burkina Faso, and carried out one month of primarily archival research in France and Belgium.

I began my longer-term fieldwork in Benin. Shortly after arriving I presented my research proposal to audiences at the National Universities of Benin at Abomey-Calavi and at Parakou. I also hired a lead research assistant, Ibrachi Gouda, a Master's level student who is from the W region and had previously conducted social-ecological research there. French was the working language for my research, but collaboration with field assistants like Ibrachi with knowledge of the languages and cultures of the W region was indispensable as the vast majority of residents had only a cursory knowledge of French or did not speak it at all. To ensure the survey research represented all groups present in study villages, I trained and worked with a team of research assistants that consisted of people from the region fluent in the relevant languages (Photo 5). Most were working on graduate or professional degrees at the time of our collaboration. In each village I worked with 2-3 research assistants. In all, my research team consisted of nine research assistants and a driver.

To build trust and assess the viability of research in each village, my lead research assistant and I made preliminary visits in which we introduced ourselves to village authorities and described the proposed research. This usually involved staying at least one night in the village to get a sense of it—and to have people get a sense of us. We explained that the first visit was preliminary to ask permission to carry out a study and that we would return with a larger team to conduct more in-depth research, including the household survey. This approach greatly facilitated the research task on return to the village as people were familiar with me and had a

sense of the research. I spent from one to three weeks in each ECOPAS study village.

Collection of household survey data through interviews with male or female household heads comprised the primary research activity in all villages. Prior to the administration of the survey, respondents were informed that the interview was part of an academic study that was not affiliated with Park authorities and that they would derive no financial benefits from their participation. All interviews were conducted with the full willingness of respondents, who were assured of the confidentiality of their responses. No household head declined to participate in the survey. Repeat visits were made in an effort to include all households identified through the sampling technique. When the household head or his or her spouse was not available the closest neighboring household was chosen. The survey instrument was piloted in a test village near WNP (Birni Lafia). Based on this experience, questions were modified to improve the clarity and efficiency of the survey. My collaborators and I administered the survey. The survey was conducted in a language comfortable to each respondent, and responses were entered in French and subsequently translated into English for analysis. The survey instrument is available as Appendix D.

The survey queried household demographics, livelihood activities, resource use and access patterns, and knowledge and perceptions of WNP and the ECOPAS project. It also included questions on climate change and adaptation practices. Because the study sought to make inferences about changes over time many questions were asked about conditions in the year 2000 (before the ECOPAS project began) and how conditions in 2000 compared to those at the time of the interview.

Through careful design I sought to address some important potential limitations of the survey methodology employed. First, to minimize recall bias due to respondents incorrectly

remembering information (Groves et al. 2004), respondents were given prompts before questions asking about the pre-ECOPAS period. For example, if there was a child who was around 10 years old living in the household, the household head was asked to recall the period when the child was born, which would have been just before ECOPAS began in 2001. Second, I took seriously criticisms that surveys in many African contexts risk reifying the household as a static unit in which residence, production, and consumption patterns do not fit the assumptions of a simple household model (Guyer and Peters 1987). Thus, for instance, membership in a household was defined broadly to encompass all those living in the house for at least six months of the year, including: the household head, his or her spouse or spouses, children, other family members, and people who did not have direct family ties but lived in the household.

I began analysis of my research results in the field. All survey data were entered into a database in French. Where necessary, I translated qualitative data from the survey as well as from interviews and written sources into English. At the end of my core field research, I shared preliminary findings with audiences at the National Universities of Benin at Abomey-Calavi and at Parakou, at WNP headquarters in Kandi, and in one study village (Alfakoara). Time and resources precluded sharing such results directly in Niger. However, I prepared a written report summarizing my research activities and early findings that I shared with my research sponsors in each country as well as with Park authorities. Feedback from these presentations increased my understanding of the social-ecological dynamics I studied and have enriched the analysis presented in this dissertation.

I analyzed qualitative, quantitative, and visual data in more depth on return from the field. Statistical analyses were conducted using Stata versions 11 and 12 (StataCorp, College Station, Texas, USA). I created the maps using Geocart and Adobe Illustrator (CS5.1) based on

data gathered from a variety of archival and on-line sources.

1.6 Dissertation Overview

This dissertation comprises three core chapters, bookended by an introduction and a conclusion. The core chapters complement each other and, together, build to a multi-faceted examination of the biodiversity and livelihoods impacts of the ECOPAS project and how these were mediated by governance factors at multiple levels. At the same time, I wrote each chapter to be modified into a separate published paper. Each core chapter therefore takes a form that is more or less amenable to journal submission. There is some overlap between the theory, case study background, and methods presented in this introduction with such information in the core chapters, but only as necessary to facilitate comprehension.

Chapter 2 jointly assesses the impact of ECOPAS on biodiversity and livelihoods outcomes in Benin. It uses a quasi-experimental approach to control for potentially confounding factors and isolate ECOPAS effects. The chapter devotes special attention to analysis of spatial and social heterogeneity of impacts. I find that ECOPAS successfully increased wildlife population numbers in the Park, particularly of species of international conservation and tourism interest (i.e. elephant, buffalo, and lion). At the same time, the project had largely negative impacts on access to natural resources among adjacent communities while its effect on household income varied. Average household income decreased in some villages and among the poorest social groups but increased among others according to benefits and enforcement supported under ECOPAS. This chapter demonstrates the importance of analyzing the social-ecological impacts of PAs jointly and among different subpopulations for improved PA theory, policy, and management.

Chapter 3 compares the impact of ECOPAS on biodiversity and livelihoods outcomes around the WNPs of Benin and Niger. It argues that theories of resource governance and conservation impact have devoted insufficient attention to the moderating influence of national political context on key governance factors at the local level that shape social-ecological outcomes in resource systems. The chapter uses multilevel regression analysis to analyze the variable effect of changing levels of enforcement at the household and village level within the national political contexts of Benin and Niger. I find that national political context crucially moderated the effects of enforcement. Increasing enforcement levels in Benin's WNP were associated with significant increases in mammal species abundance while having little average effect on the incomes of households around the Park. By contrast, greater levels of enforcement in Niger's WNP were associated with sharply decreasing income levels among Park neighbors but did not have a statistically significant effect on wildlife populations. These results suggest that state protected area enforcement will have more positive social-ecological impacts in better-governed, more decentralized countries, but that "one size fits all" policies that do not take key differences across national contexts into account may have limited success in achieving their objectives.

Chapter 4 complements the previous two chapters by using qualitative analysis to shed light on the importance of the meso-level, that is, the level between the village and the central state including municipalities, districts, or provinces, for understanding processes through which conservation and development aid projects like ECOPAS generate impacts. Despite the increasing importance of meso-level political arenas under natural resource decentralization across the developing world, research on PA-related impacts often overlooks this level of analysis. Focusing on the W region in Benin, the chapter examines how ECOPAS interacted

with CENAGREF and elite interests in competitive municipal political arenas to reshape property rights and livelihoods. I argue that increased uncertainty relating to property rights in the periphery of the Park was one of the most important impacts of ECOPAS. This uncertainty has been detrimental to local livelihoods as well as to sustainable conservation and natural resource governance in the region. By connecting project implementation with changing property relations and practices among local elites, Park authorities, and villagers living around the Park, the chapter shows how important meso-level politics—the "missing middle"—can be to shaping the social-ecological impacts of PAs and the aid projects centered on them.

Finally, Chapter 5 concludes this dissertation. It begins by summarizing the main findings and then offers an extended discussion of the concept of conservation legacies based on consideration of the range of impacts ECOPAS and other similar aid projects may have. This discussion considers impacts over time and proposes the concept of conservation legacies as a way to capture the temporal dimension of the impacts of PA-based conservation and development projects. Finally, I lay out future research directions, including the need to analyze how projects like ECOPAS have affected the capacity of the rural people living around protected areas to adapt to climate change.

Chapter 2

Evaluating the Social-Ecological Legacy of Biodiversity Conservation around a Large West African Protected Area

2.1 Introduction

National parks and other protected areas continue to form the centerpiece of biodiversity conservation policy and practice across the globe (Chape et al. 2008; CBD 2010). As discussed in chapter 1, these areas can have profound effects on the status of species and ecosystems within their boundaries as well as on the livelihoods of local human populations. Impacts are particularly pronounced in the tropical world where both biodiversity and, in recent decades, the rate of expansion of the PA estate are greatest (IUCN and UNEP 2012). However, like the vast majority of research at the intersection of environment and society (Agrawal and Chhatre 2011; Barrett et al. 2011), the scientific literature on PA impacts has focused largely on either socio-economic or environmental dimensions, rarely both simultaneously. As a result, there is a paucity of theory and empirical evidence concerning the relationship among the different outcomes PAs may generate.

Studies of the ecological impacts of PAs reveal generally positive results while available evidence on social impacts is mixed. PAs have been found to maintain forest cover (Andam et al. 2008; Joppa and Pfaff 2011) and to reduce species extinction risk (Butchart et al. 2012). Their effect on species populations appears to be salutary, but is less well known given the challenges of collecting species-level data over time and finding adequate control populations, which has

limited the number of relevant impact evaluations (Geldmann et al. 2013). Reviews of PA impacts on the well-being of resident and neighboring human communities conclude that impacts are neither entirely positive or entirely negative, but rather a combination of both (Coad et al. 2008; West et al. 2006). This literature suggests that costs and benefits of PAs are distributed differently based on wealth, ethnicity, age, gender, and other characteristics within and across local communities (Coad et al. 2008) and at different spatial scales (Kremen et al. 2000).

Despite social and ecological variation in PA impacts, analysis of this heterogeneity remains rare (Ferraro and Hanauer 2011; Nagendra et al. 2010). Carefully designed research examining the multiple outcomes PAs produce, and variation in these outcomes among different subpopulations, enables identification of potential synergies and trade-offs between biodiversity and local livelihoods. The development of more systematic knowledge of the relationship between these two outcomes and the processes that drive them is necessary for more effective conservation practice and policy (Agrawal and Redford 2006; Ferraro and Pattanayak 2006). Such knowledge is particularly important given the ambition of international policy that PAs should "do no harm" (Agrawal and Redford 2009; World Parks Congress 2003). Empirical investigation of spatial heterogeneity in joint biodiversity and livelihoods outcomes thus promises richer understanding of the distribution of harm and benefit created by PAs and associated management activities.

This chapter responds to this research need by examining social *and* ecological legacies of the ECOPAS project on 1) the abundance of mammal species in the Park and, 2) the ability of households around the Park to access natural and financial capital. Based on a quasi-experimental research design (Ferraro and Pattanayak 2006), this study combines quantitative and qualitative methods to analyze how these biodiversity and livelihoods indicators changed

from the period immediately prior to ECOPAS implementation to the period three years after the project concluded. It examines these outcomes and the relationship between them when aggregated at the PA scale and disaggregated into individual communities.

Effective enforcement of rules governing resource management areas like parks and community-managed forests has been shown to be necessary for successful environmental outcomes (Bruner et al. 2001; Gibson et al. 2005b). I thus expect that increased enforcement supported by ECOPAS will have had a positive conservation impact in WNP by limiting natural resource use. Given the project's emphasis on increasing tourism, its efforts to limit poaching, grazing and other activities detrimental to wildlife should increase the abundance of "charismatic" mammal species such as elephants, buffalo, and lions. However, as studies of the impacts of forest (Coad et al. 2008) and marine (Mascia et al. 2010) PAs suggest, I hypothesize that restrictions on the use of natural resources enforced under the project will have had negative average effects on the livelihoods of households in neighboring communities, but that impacts will be socially and spatially differentiated according to enforcement level and benefits provision. I anticipate that these impacts will have affected poorer households more negatively as found in other African contexts (e.g. Ferraro 2002; Naughton-Treves et al. 2011). Trade-offs between conservation and livelihoods outcomes are thus likely.

Benin's WNP provides an ideal setting for studying joint biodiversity and livelihoods outcomes. The Park was virtually unmanaged from the end of the colonial era in 1960 until ECOPAS began in 2001 and, at the time of this study in 2011, no other conservation project had replaced ECOPAS after it ended in 2008. These circumstances present a rare opportunity for analysis of change in key outcomes resulting from a large, aid-supported conservation intervention. The Park's location in Francophone West Africa also makes it a compelling case.

This region has received comparatively little attention from either conservation researchers or the international conservation community more generally, both of which have focused largely on Anglophone countries in southern and eastern Africa (Holmes et al. 2012). Research in non-Anglophone contexts in Africa promises new theoretical and practical insights given that colonial legacies have shaped contemporary conservation institutions, practices, and policy in different ways. Such research acquires additional importance given that predicted changes in the distribution of biodiversity as well as migration and other human responses to global climate change will likely cut across political borders (Bellard et al. 2012; Heller and Zavaleta 2009; Oppenheimer 2012).

2.2 Study Area

2.2.1 *W National Park*

Benin's W National Park is the largest of the three WNPs, covering an area of 5,630 km^2 between 11°53'35"N and 02°42'32"E in the far northwest corner of the country (Fig. 2.1). It is adjacent to two IUCN Category IV PAs, the Djona and Mekrou Hunting Zones. Together, these PAs total 7,800 km^2. The W region has attracted national and international biodiversity conservation interest due to the wide range of flora and fauna from the Sudano-Sahelian biogeographic zone that it harbors. The area is home to the largest populations of elephants (*Loxodonta africana*) and ungulates in West Africa, as well as rare species, such as the western topi (*Damaliscus lunatus korrigum*), the cheetah (*Acinonyx jubatus*) and the African hunting dog (*Lycaon pictus*) (Lamarque 2004). The West African manatee (*Trichecus senegalensis*), the most threatened of all Sirenia species, can still be found in the Niger River at the Park's northern

border in Benin (Neuenschwander et al. 2011). More than 450 bird species (Balança et al. 2007) and at least 670 plant species (Clerici et al. 2007) have been identified in the W region.

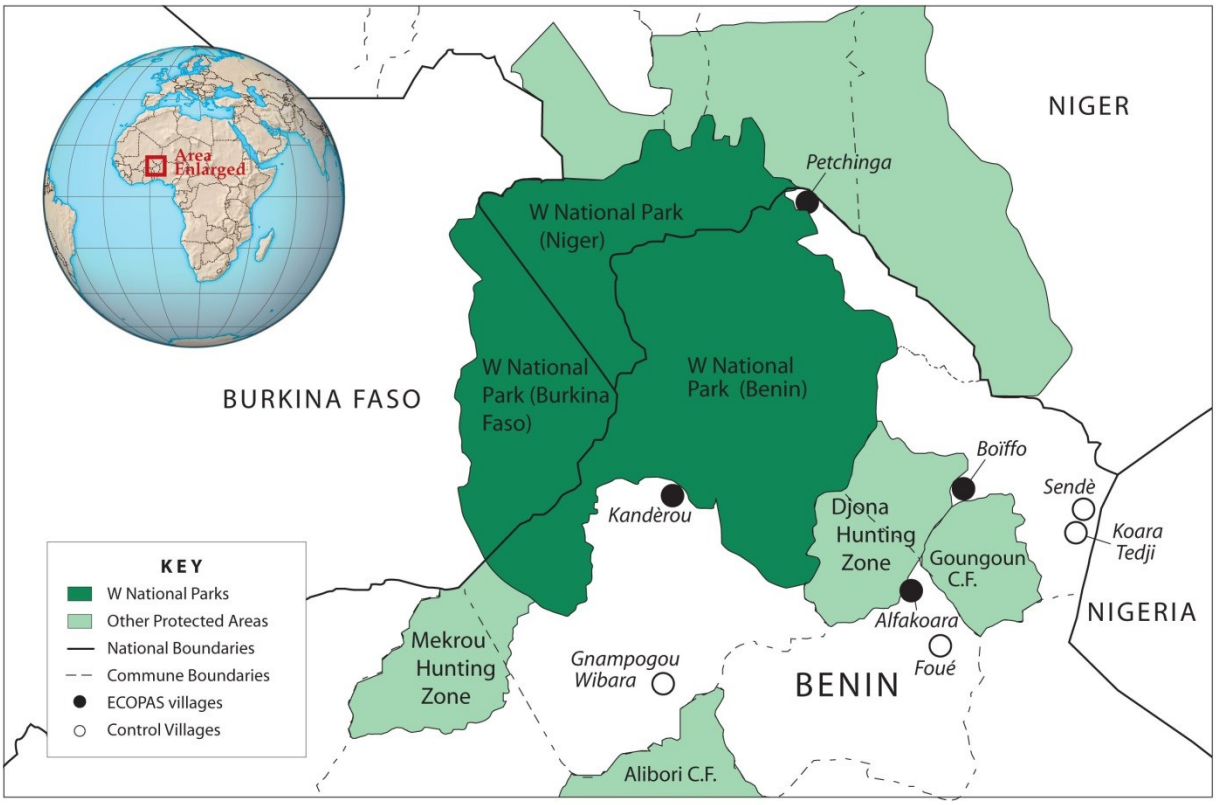


Figure 2.1. The W region of northern Benin

Approximately 150,000 people live in some 60 villages and numerous other small settlements within 20 km of the Park in Benin, with 13,000 living within the 5 km buffer zone that rings the Park and much of the adjacent Djona hunting zone (ECOPAS 2005). The historical evolution of competing West African empires and of disease, especially trypanosomiasis, led to only sparse human settlement in the W region during the pre-colonial period. Following the colonial era creation of the region's PAs, people living within their boundaries were forcibly removed (Benoit 1999). Today, the annual population growth rate in

Benin's portion of the W region is estimated to be 3.4%, but population densities in the Park periphery vary widely (ECOPAS 2005). The vast majority of the population (95%) makes a living primarily from agricultural and pastoral activities. Major ethnic groups include Baatonu (Bariba) in the south, Mokollé to the east, and Dendi/Zarma to the east and north, with Fulbe (Fulani) living throughout the region.

The Park and its Hunting Zones are managed by the Beninese government through the National Center for Wildlife Reserve Management (CENAGREF), which served as the primary vehicle for the implementation of ECOPAS activities. In Benin, National Parks are defined as areas of strict protection with no direct off-take of natural resources permitted except for "scientific or management reasons" (ECOPAS 2005). Hunting Zones operate under the same rules with the exception that trophy hunting is allowed.[14]

Despite their formal protected status, the WNP and the Djona and Mekrou Hunting Zones served as longstanding resource commons prior to ECOPAS. Aerial surveys conducted in 2002-2003 showed nearly 20,000 cattle in the Park (Hibert et al. 2010). Besides grazing, other common resource uses in WNP included hunting, fishing, and gathering of fuelwood, fodder, and other forest products. Benin's WNP had virtually no infrastructure before ECOPAS, and only 12 guards patrolled its vast territory. A 1994 IUCN report thus concluded that "the Park has been, in practice, abandoned for many years and the question that many would be right to pose is whether a re-conquest is possible." (Monfort et al. 1994, 25). In effect, ECOPAS took up the challenge of "reconquering" W Park in Benin for conservation.

[14] Given these shared rules and similar management priorities for the Park and its two Hunting Zones under ECOPAS support, my use of "WNP" refers to these protected areas types together unless otherwise noted.

2.2.2 The ECOPAS Conservation Project

ECOPAS was implemented in the transboundary W region from January 1, 2001-December 31, 2008. The project budget was approximately US$28.5 million, of which Benin received US$7.1 million (Aveling et al. 2008). In Benin, some 90% of project funds (~US$6.4 million) are estimated to have been spent on PA management activities, especially infrastructure improvement and enforcement (ECOPAS 2005). Although direct spending on tourism development comprised only about 5% of the ECOPAS budget in Benin, most of the project's other activities—including increased enforcement, ecological research, and improvement of Park infrastructure—were planned to support this objective. Wildlife safari and hunting tourism were designed to serve as the primary mechanism through which local populations would benefit from and thereby support conservation activities. Management plans thus emphasized actions to increase populations of species attractive to tourists, such as large ungulates and carnivores. Activities included the digging of watering holes at strategic locations within the Park and support for PA co-management by the Village Association for Wildlife Reserve Management (AVIGREF) in partnership with CENAGREF. By law, AVIGREF is designated to receive 30% of the receipts from trophy hunting to undertake "eco-development" activities in communities around the Park. ECOPAS also sought to improve local livelihoods through employment opportunities related to the Park and the construction of wells and schools in a number of adjacent villages.

The European Union (EU) commissioned a final evaluation during the last months of the project (Aveling et al. 2008). This assessment noted several project weaknesses, but overall it rated ECOPAS "a remarkable success" in achieving its conservation objectives (17). However, it did not use rigorous program evaluation design or methods and was not able to assess the

social-ecological legacy[15] of ECOPAS given that it was undertaken prior to the conclusion of the project.

2.3 Methods

2.3.1 Data Collection

Data were collected during fieldwork in Benin from June-July 2008 (during ECOPAS implementation) and from September 2010-August 2011 (after ECOPAS ended). I used mixed methods, including a household survey, individual and focus group interviews, participant observation, and archival research. Data on ecological outcomes were collated from the household survey as well as inventories of mammal populations in WNP carried out annually from 2002-2008 by CENAGREF and ECOPAS.

Research was based on a before and after design with an untreated control group to facilitate inferences about the effect of the ECOPAS project on biodiversity and livelihoods outcomes. I used stratified purposive sampling (George and Bennett 2005) to select four villages immediately adjacent (<2 km) to WNP in which the ECOPAS project was actively involved (Fig. 2.1). These villages were chosen to represent the ecological and political variation around the Park: they span a range of climatological zones (average annual rainfall of 700 to 950mm), and one village from each of the four *communes* (municipalities) around the Park was selected. The villages are similar in other respects, including population size, distance to nearest regional market, and multi-ethnic composition. I identified study villages based on ECOPAS reports, interviews with former ECOPAS staff, and exploratory visits to candidate villages. These ECOPAS treatment villages were then matched with control villages. Control villages were

[15] The final chapter of this dissertation offers further reflections on the concept of conservation legacies.

selected to be as similar as possible to ECOPAS villages except that they were remote from the park (>25 km) and did not benefit from the project (Table S.1). The depauperate status of wildlife in Benin's WNP prior to ECOPAS (CENAGREF 1999) also suggests that differences in wildlife abundance in areas near treatment and control villages are likely to have been minimal. Generally, I sought a balance in selecting control villages between maximizing their similarity with ECOPAS villages and minimizing potential spillover effects from the ECOPAS project within the constraints posed by the geography of village settlements and other PAs in Northern Benin.

Within each study village, households were randomly selected using probability proportional to size (PPS) based on Bernard's (2006) map sampling method (Appendix C). In the absence of reliable census records, this method ensured a random sample that compensated for differences in housing density, potential irregularity in the spatial distribution of wealth in the community, and variation in livelihood strategies. The final survey included 281 household heads, with approximately half the respondents residing in ECOPAS villages (53%; n=150) and the other half in non-ECOPAS or control villages (47%; n=131).

Prior to the administration of the survey, respondents were informed that the interview was part of an academic study that was not affiliated with Park authorities and that they would derive no financial benefits from their participation. All interviews were conducted with the full willingness of respondents, who were assured of the confidentiality of their responses. No household head declined to participate in the survey. Repeat visits were made in an effort to include all households identified in the sample. When the household head or his or her spouse was not available the closest neighboring household was chosen. The survey instrument was piloted in a test village near WNP. Based on this experience, questions were modified to

improve clarity and efficiency of the survey. Seven trained researchers from the W region in Benin along with the author administered the survey. The survey was conducted in a language comfortable to the respondent, and responses were entered in French and subsequently translated into English for analysis. The survey instrument is available as Appendix D.

Because the study sought to make inferences not only about differences between ECOPAS and non-ECOPAS villages but also about changes over time many questions were asked about conditions in the year 2000 (before the ECOPAS project began) and how conditions in that year compared to those at the time of the interview (Table S.2). Such recall data may be inaccurate due to respondents misremembering information, though there is debate about the extent to which different kinds of retrospective data are likely to be reliable (Dex 1995; Groves et al. 2004). Recall bias that is systematically correlated with explanatory variables in regression models may bias coefficients. Though there is little reason to believe that households in either treatment or control villages are more biased than the other, I took several steps to minimize recall bias. Survey respondents were given prompts before questions of an historical nature and survey implementers were carefully trained to elicit responses that were as accurate as possible. I also collected independent information on change in the status of biodiversity and used qualitative data, including interviews, participant observation, and archival research, to triangulate survey results.

2.3.2 Biodiversity Analysis

Mammal species abundance is the primary indicator for the outcome of biodiversity conservation used in this study. This measure has been shown to be an effective indicator of biodiversity change (Collen et al. 2009) and was used by ECOPAS to assess progress toward the project's overall biodiversity conservation goal. The primary indicator in this study derives from

annual surveys of 18 different mammal species conducted by Park authorities using a consistent methodology from 2002, just as ECOPAS project activities began in the field, to 2008 as ECOPAS was winding to a close (CENAGREF and ECOPAS 2008). These 18 species comprise all large and small ungulates, primates, and carnivores observed during the course of the annual inventories (Table 2.1).

The measure of species abundance is the kilometric index, which expresses the ratio of the total number of individuals by species observed along a transect by the total length of each transect by zone covered (Maillard et al. 2001). Eight large zones, covering about one-third of WNP and its two adjacent hunting reserves, were selected to represent the geographic diversity within the PA complex (CENAGREF and ECOPAS 2008). Within these zones, a total of 102 transects, ranging from 9-17 km in length, were identified. A team of four Park Service staff walked each transect, counting each individual of the different mammal species they saw directly or the trace of which they recognized. Transects were spaced 3 km apart from one another to minimize the risk of double counting. Surveys were conducted at the end of the dry season (May) each year (CENAGREF and ECOPAS 2008).

This study also used household perceptions of change in conflict with wildlife from 2000-2011 as an alternative indicator of changes in species abundance(Peterson et al. 2010)(Peterson et al. 2010).[16] This indicator complements direct species counts by enabling comparison of changes in abundance in the area around WNP where ECOPAS intervened and around control villages. It also provides a measure of mammal species abundance for the post-ECOPAS period. The indicator ranged from 1 to 10 where 1 was the incidence of a given

[16] Some have argued that the term "human-wildlife conflict" is a misnomer (Peterson et al. 2010) and human-wildlife interaction or coexistence offer better framing for this phenomenon. I retain conflict here as it implies an incompatibility between interests, which appears to characterize, at least in part, the relationship between wildlife and many households around the W region. The alternative terms proposed gloss over the reality of competing interests.

household's conflict with wildlife "decreased greatly" and 10 was the incidence "increased greatly" from 2000-2011 (Table S.2). The survey question on which this measure is based (Appendix D) asked about changes in household experience with disturbance by wild animals through crop or livestock depredation or physical harm or even death.

Comparisons of local perceptions and direct on-farm assessments have shown that communities on the edges of PAs in Africa tend to over-report the incidence of wildlife damage to crops, livestock, and property (Gillingham and Lee 2003; Naughton-Treves 1997). However, these studies found greater congruence between reports by those respondents experiencing depredation by large mammals and more direct measures of damage. Local perceptions were driven by extreme damage events, which tended to be caused by large mammals, such as elephants, which are capable of destroying entire fields in a single raid. These results suggest that the household survey-based indicator used in this study provides a reasonable proxy for change in abundance of at least large mammal species. Given that ECOPAS sought to improve biodiversity through wildlife-based tourism, this indicator along with wildlife survey data are appropriate measures of change in biodiversity from before to after ECOPAS implementation.

An ordinary least squares (OLS) regression model was estimated to analyze the effect of the ECOPAS project on change in human-wildlife conflict while controlling for other factors (see below). Additional OLS models regressed kilometric index on year for each species to better understand abundance trends.

2.3.3 Social Impact Analysis

This study used a sustainable livelihoods framework (Ellis 2000; Scoones 1998) to assess the household livelihoods impacts of ECOPAS. In this framework access to different capital assets—"the stocks of capital that can be utilized directly and indirectly to generate the means of

survival of the household or to sustain its material well being at different levels above survival" (Ellis 2000, 31)—underlies poverty. Analysis focused on change in two indicators of poverty, access to financial and natural capital, from the period immediately prior to the start of the ECOPAS project to the period after the project's conclusion.

Access to financial and natural capital are among the capital assets in livelihoods frameworks most likely to be affected by externally-driven conservation interventions (Igoe 2006). Restricted access to natural capital, which includes land, water, and other biological resources and ecosystem services useful for livelihoods (Ellis 2000; Scoones 1998), is perhaps the most important immediate social impact of conservation activities. This impact can occur through physical displacement of human populations (eviction) from the areas they inhabited or through new laws, policies, and practices that effectively limit their ability to access natural resources in pursuit of a livelihood (Agrawal and Redford 2009; Brockington and Igoe 2006; Cernea and Schmidt-Soltau 2006). To offset this impact, many conservation aid projects, like ECOPAS, include a development component that seeks to provide benefits in terms of financial or physical capital (Brandon and Wells 1992; Igoe 2006). Financial capital comprises cash, credit, savings, and other easily liquefiable economic assets, such as livestock (Scoones 1998).

This study used change in household income from 2000-2011 as an indicator for financial capital. Income as used here means not only monetary capital, but "total revenue from livelihoods activities" which may include "on-farm" income such as the total value of harvest sold or used for household consumption, value of livestock sold, consumed and owned, value of forest products, the value of fish or game meat sold or consumed within the household, and "off-farm" income from wage labor or self-employment. Values for this variable range from 1 to 10, where 1 signifies that income "decreased greatly," and 10 that it "increased greatly" during the

study period. Natural capital indicators used this same scale to measure perceptions of change in access to four resource classes: agricultural land, resources for livestock, forest products (fuelwood and non-timber resources), and water.

I estimated separate ordinary least squares (OLS) regression models to analyze the effect of ECOPAS on financial and natural capital outcome variables while controlling for other factors. This modeling approach enables greater use of available information than alternative approaches and is appropriate given a range of responses for relatively large number of equally spaced categories (Gelman and Hill 2007). The main independent variable was household location in an ECOPAS or non-ECOPAS village. A second set of regression models specified a variable for each village to test for community-specific effects on outcomes. All regression models controlled for a series of household and respondent-level attributes that may also affect outcomes. These variables included: age and sex of the household head, the highest level of formal education received by a household member, the number of people living in the household, and the relative household wealth. Number of cattle owned served as an indicator of household wealth (Table S.2; Photo 6). In the W region, as in other parts of Africa, cattle are an especially important source of wealth (de Haan 1997; Mortimore and Adams 1999).

All models were adjusted for clustering at the village level to correct for correlation at that level (Angeles et al. 2005). A series of regression diagnostics were performed, which indicate that OLS assumptions are met and do not suggest model misspecification. The reference village in regression models that test for community-specific effects on outcomes is Foué, which was chosen because it is the match community for Alfakoara, location of the main Park entrance (Photo 7) and focal point for ECOPAS project activities. Foué lies in the same climatic zone as Alfakoara, is similarly close to a PA (Goungoun Forest Reserve), is

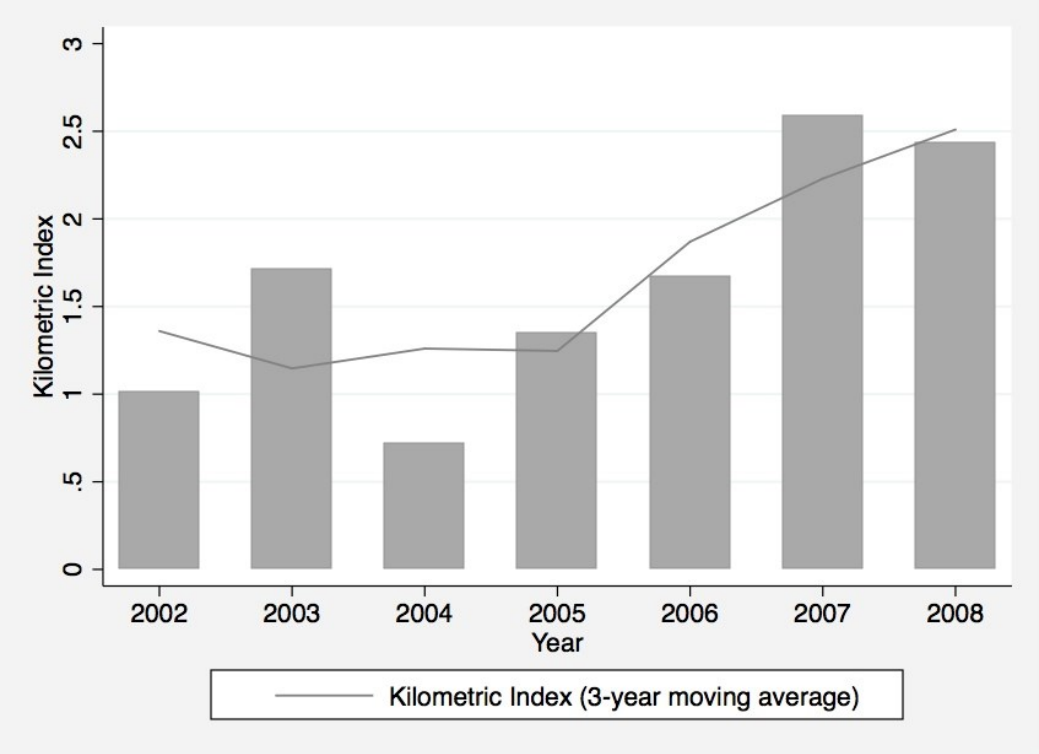
approximately the same distance to a major market, and has a similar ethnic group composition (Table S.1).

To explore the relationships between biodiversity and livelihoods outcomes I used spearman's rank correlations. Correlation coefficients were Bonferroni-adjusted to account for multiple comparisons. Statistical analyses were conducted using Stata 11.0 (StataCorp, College Station, Texas, USA).

2.4 Results

2.4.1 Biodiversity Impacts

Annual measures of species abundance of 18 mammal species found in WNP showed a clear positive trend from 2002 to 2008 (Fig. 2.2). Although there were inter-annual fluctuations, species abundance for the last two years of ECOPAS were more than two times higher than those from the year in which the project began. Results suggest increases in the abundance for 14 of 18 (78%) of the species surveyed (Table 2.1), including lions and all large ungulates, species targeted for improved management under ECOPAS (Appendix F). Species with the largest changes in abundance included elephant (from 0 to 196 individuals), West African buffalo (from 22 to 225 individuals), and roan antelope (from 79 to 563 individuals). Evidence indicates a decline in the abundance of four species: red-flanked duiker, Bohor reedbuck, patas, and side-striped jackal.



Data source: CENAGREF and ECOPAS, 2008.

Figure 2.2. Kilometric index of mammal species abundance in Benin's W National Park, 2002-2008

Survey results provide additional evidence for an increase in wildlife populations in and around the Park. Nearly 70% of households (n=103) in ECOPAS villages reported experiencing conflict with wildlife over the past ten years compared to 39% (n=37) in non-ECOPAS villages. Elephants, lions, warthogs, and red and green monkeys were among the species most frequently identified as causing damage to crops or livestock in ECOPAS communities. Results of mammal surveys indicate that each of these species increased within the Park with the exception of red monkeys (Table 2.1). When other factors were controlled for, the coefficient for change in human-wildlife conflict aligned with expectations that ECOPAS led to increases in mammal species abundance (of about 20%), though it was not statistically significant at conventional levels (p=0.157; Table 2.2).

Results from the village-level fixed effect model showed substantial variation in changes in reported human-wildlife conflict around the Park. Households in Alfakoara and Kandèrou experienced a decrease in conflict with wildlife while those in Boïffo and Petchinga experienced an increase (Table 2.3). More than 65% of households in Boïffo and Petchinga reported greater conflict, with nearly half of the households in Petchinga reporting the highest measure of 10.

Although mammal census and household survey-based measures indicated that species populations in and adjacent to the WNP and its satellite hunting zones have increased, population sizes outside these areas suggested a negative change. Compared to the reference village, the other control villages all saw a significant decrease in reported conflict with wildlife (Table 2.3).

Table 2.1. Change in mammal species abundance in Benin's W National Park and Hunting Zones, 2002-2008[a]

English Name	Latin Name	Mean KI[a]	Change in Abundance	Coeff.	Std. Error	*P* value
Large Ungulates						
African Elephant	*Loxodonta Africana*	0.095	I**	0.036	0.009	0.010
West African Buffalo	*Syncerus caffer*	0.198	I*	0.058	0.017	0.019
Roan Antelope	*Hippotragus equinus*	0.404	I*	0.118	0.043	0.039
Defassa Waterbuck	*Cobus defassa*	0.011	I*	0.004	0.001	0.032
Western Hartebeest	*Alcelaphus buselaphus*	0.073	I	0.007	0.008	0.407
Small Ungulates						
Common Warthog	*Phacochoerus aethiopicus (africanus)*	0.134	I+	0.017	0.007	0.064
Western Buffon's Kob	*Kobus kob*	0.038	I	0.005	0.004	0.281
Bushbuck	*Tragelaphus scriptus*	0.031	I	0.001	0.002	0.535
Bohor Reedbuck	*Redunca redunca*	0.009	D	-0.002	0.001	0.181
Oribi	*Ourebia ourebi*	0.036	I*	0.005	0.002	0.036
Gray (Common) Duiker	*Sylvicapra grimmia*	0.073	I	0.004	0.004	0.376
Red-flanked Duiker	*Cephalophus rufilatus*	0.023	D+	-0.011	0.005	0.055
Primates						
Olive Baboon	*Papio anubis*	0.330	I	0.014	0.018	0.463
Patas (Red Monkey)	*Erytrocebus patas*	0.112	D	-0.019	0.015	0.243
Green Monkey	*Cercopithecus aethiopicus*	0.043	I	0.007	0.006	0.255
Carnivores						
Lion	*Panthera leo*	0.006	I+	0.002	0.001	0.060
African Civet	*Civettictis civetta*	0.001	I	0.000	0.000	0.540
Side-striped Jackal	*Canis adustus*	0.016	D	-0.001	0.001	0.332

Sources: CENAGREF and ECOPAS 2008 and Lamarque 2004.

[a] Abbreviations and symbols: KI: Kilometric Index; I: Increase in species abundance; D: Decrease in species abundance; n=7; ** $p<0.01$, * $p<0.05$, $^{+}$ $p<0.10$.

2.4.2 Livelihoods Impacts

Household location in an ECOPAS or non-ECOPAS village was a statistically significant predictor of change in access to natural capital (Table 2.2). The association was negative for three of the four resource categories examined. On average, households in ECOPAS villages

experienced decreases of approximately 20% in their ability to access land for agriculture and forest products and about 10% in their ability to access resources for animal husbandry. Two such villages, Kandèrou and Petchinga, experienced the most pronounced loss of access to natural resources during the study period (Table 2.3). All respondents in these villages who reported visiting WNP stated that their "ability to use" the Park had decreased, with more than 85% in Kandèrou and 97% in Petchinga reporting it had "decreased greatly." Results were mixed for Alfakoara and Boïffo. Living in either of those villages was associated with a decrease in access to agricultural land and forest products, but change in access to animal husbandry resources was not statistically significant.

In contrast to other natural resources, living in an ECOPAS village was positively and strongly associated with increased access to water (Table 2.2). Capacity to access water increased about 30% on average across ECOPAS villages. This finding holds when ECOPAS villages are examined individually, with Boïffo and Alfakoara experiencing the largest increases in access to water (Table 2.3).

Socio-demographic variability affected access to some natural resources. Formal education at the high school level or above was associated with greater access to all resources except water (Table 2.2). Respondent status as a migrant was associated with a positive change in access to forest products (n=36), with migrants comprising 7% of households surveyed in ECOPAS villages and 19% in control villages. There was no differentiation among wealth groups in terms of access to resources.

Table 2.2. Results for OLS regression models where location in ECOPAS or control village is the key predictor

	Biodiversity Indicator	*Natural Capital Indicators*				*Financial Capital Indicator*
Variable	**Conflict with Wildlife**	**Agricultural Land Access**	**Livestock Resource Access**	**Forest Product Access**	**Water Access**	**Income Change**
ECOPAS Dummy	2.084	-1.813*	-0.866**	-1.865***	2.928**	-0.463
	(1.315)	(0.531)	(0.245)	(0.325)	(0.73)	(0.597)
Age	0.048	0.021	-0.013	-0.016	0.005	-0.030*
	(0.032)	(0.014)	(0.015)	(0.009)	(0.015)	(0.011)
Sex	0.199	-0.027	-0.804	-1.005+	0.302	-0.351
	(0.433)	(0.434)	(0.586)	(0.456)	(0.661)	(0.481)
Migrant	0.93	0.0766	0.607	1.692**	0.0307	1.273*
	(1.053)	(0.531)	(0.640)	(0.394)	(0.839)	(0.444)
Education1	1.241	0.377	0.172	-0.304	-0.388	0.721
	(1.633)	(0.533)	(0.459)	(0.323)	(0.467)	(0.724)
Education2	0.062	1.488+	1.787*	1.382*	-0.230	1.816*
	(1.822)	(0.758)	(0.529)	(0.570)	(0.377)	(0.598)
Economic Status0	3.037	0.182	-0.97	-0.589	0.312	-1.406*
	(1.798)	(0.521)	(0.788)	(0.979)	(0.291)	(0.529)
Economic Status1	2.591+	-0.467	0.092	-0.526	0.375	-1.002
	(1.362)	(0.704)	(0.698)	(0.796)	(0.413)	(0.611)
Economic Status2	1.549	-0.392	-0.495	-0.541	0.530	-0.106
	(0.889)	(0.449)	(0.496)	(0.822)	(0.579)	(0.384)
Household Members	0.704	-0.484	-0.292	0.141	0.266	-0.621+
	(0.385)	(0.372)	(0.198)	(0.185)	(0.242)	(0.320)
Constant	-1.38	4.603**	4.409*	4.914**	3.158**	7.838***
	(3.687)	(1.144)	(1.266)	(1.231)	(0.723)	(1.066)
Observations	138	272	214	252	277	275
R-squared	0.191	0.195	0.147	0.278	0.263	0.138

Reference categories are high school education or above and household owns seven or more cattle.
The household members variable was (natural) log transformed. Robust standard errors in parentheses; *** $p<0.001$, ** $p<0.01$, * $p<0.05$, $^{+}p<0.10$.

The effect of ECOPAS on financial capital was spatially and socially heterogeneous. Results comparing ECOPAS to non-ECOPAS villages in the aggregate suggest that ECOPAS did not affect household income (Table 2.2). However, analysis of individual village effects

revealed variation among communities in treatment and control groups (Table 2.3). Contrasting changes in two pairs of ECOPAS villages effectively cancelled out the aggregate effect of ECOPAS on income. Households living in Alfakoara and Boïffo experienced an increase in household income during the study period compared to the reference village whereas those living in Petchinga and Kandèrou experienced a decrease in income. On average, households in Boïffo experienced a 21% increase ($p<0.001$) in income during the study period in relation to the reference village, while households in Kandèrou experienced a 13% decrease in income ($p<0.001$).

Migrant status of the household head and status in poorer wealth groups were significantly associated with income change in both models. Migrant status was associated with a 12% increase in household income ($p<0.1$), while being in the poorest group, those who owned no cattle, was associated with a 16% decrease in income ($p<0.01$).

Table 2.3. Results for OLS regression models where village is the key predictor

	Biodiversity Indicator	*Natural Capital Indicators*				*Financial Capital Indicator*
Variable	**Conflict with Wildlife**	**Agricultural Land Access**	**Livestock Resource Access**	**Forest Product Access**	**Water Access**	**Income Change**
Age	0.009	0.004	-0.022	-0.020	-0.003	-0.040***
	(0.027)	(0.012)	(0.014)	(0.011)	(0.017)	(0.008)
Sex	0.358	-0.096	-0.776	-0.721	0.718	-0.021
	(0.463)	(0.411)	(0.615)	(0.474)	(0.535)	(0.371)
Migrant	2.091	0.442	0.850	1.502**	-0.580	1.213+
	(1.165)	(0.336)	(0.749)	(0.373)	(0.726)	(0.546)
Education1	0.902	0.004	-0.180	-0.618	-0.814	0.162
	(1.396)	(0.424)	(0.426)	(0.377)	(0.499)	(0.600)
Education2	0.472	0.876	1.189+	0.708	-1.289+	0.659
	(1.402)	(0.586)	(0.548)	(0.565)	(0.571)	(0.571)
Economic	1.404	-0.047	-1.076	-0.641	0.22	-1.620**
Status0	(1.475)	(0.457)	(0.822)	(1.074)	(0.268)	(0.446)
Economic	1.258	-0.808	-0.104	-0.543	0.354	-1.248*
Status1	(0.990)	(0.681)	(0.748)	(0.822)	(0.273)	(0.519)
Economic	0.992	-0.786	-0.683	-0.624	0.377	-0.449
Status2	(0.572)	(0.431)	(0.518)	(0.870)	(0.440)	(0.356)
Household	1.091*	-0.202	-0.13	0.0921	0.126	-0.538
Members	(0.374)	(0.324)	(0.206)	(0.274)	(0.204)	(0.406)
Alfakoara	-0.717+	-1.323***	-0.034	-1.504**	3.38***	0.690**
	(0.351)	(0.215)	(0.186)	(0.365)	(0.222)	(0.132)
Boïffo	1.875**	-1.177**	-0.026	-0.504+	5.32***	2.129***
	(0.443)	(0.295)	(0.214)	(0.262)	(0.265)	(0.307)
Kandèrou	-2.095*	-3.544***	-1.513***	-2.131***	2.27***	-1.29***
	(0.670)	(0.259)	(0.272)	(0.266)	(0.183)	(0.190)
Petchinga	2.950***	-2.424***	-0.706**	-1.727***	2.85***	-0.310*
	(0.432)	(0.117)	(0.157)	(0.233)	(0.210)	(0.125)
Koara Tédji	-2.625***	-0.414*	0.344*	0.151	-1.2***	-0.0152
	(0.374)	(0.119)	(0.127)	(0.183)	(0.150)	(0.251)
Gnampogou	-4.490**	-1.510***	0.026	1.129**	2.11***	1.201***
Wibara	(0.862)	(0.198)	(0.251)	(0.223)	(0.218)	(0.193)
Sendé	-0.632	0.154	0.428+	0.123	0.69***	1.167***
	(0.389)	(0.118)	(0.221)	(0.183)	(0.119)	(0.105)
Constant	1.673	5.613***	4.617**	5.140**	3.861**	8.279***
	(2.361)	(0.975)	(1.206)	(1.143)	(1.034)	(1.124)
Observations	138	272	214	252	277	275
R-squared	0.455	0.291	0.179	0.314	0.391	0.239

Reference categories are the village of Foué, high school education or above, and household owns seven or more cattle. The household members variable was (natural) log transformed. Robust standard errors in parentheses; *** p<0.001, ** p<0.01, * p<0.05, $^{+}$p<0.10.

2.4.3 Trade-offs and Synergies among Outcomes

Change in access to resources for livestock raising was negatively associated with change in the frequency in wildlife depredation in ECOPAS villages (Table 2.4). This relationship was especially strong in Boïffo (Spearman's rho = -0.7713; p = 0.0002) and Petchinga (Spearman's rho = -0.6455; p = 0.0236). Change in household income was strongly and positively associated with change in access to water among ECOPAS villages. Change in access to land for agriculture was negatively correlated with change in access to water and change in access to resources for livestock raising was positively associated with change in access to forest products, including fodder (Table 2.4).

Table 2.4. Spearman's correlations among outcomes within ECOPAS villages

	Biodiversity Indicator	***Financial Capital Indicator***	***Natural Capital Indicators***			
	Conflict with Wildlife	**Income Change**	**Agricultural Land Access**	**Livestock Resource Access**	**Forest Product Access**	**Water Access**
Conflict with Wildlife	1.000					
Income Change	0.287	1.000				
Agricultural Land Access	-0.095	-0.1268	1.000			
Livestock Resource Access	-0.697***	-0.3670	0.2565	1.000		
Forest Product Access	-0.224	-0.1470	0.1659	0.4853*	1.000	
Water Access	0.374	0.4849*	-0.4699 *	-0.4052	-0.0163	1.000

n = 42; *** p<0.001, ** p<0.01, * p<0.05.

2.5 Discussion

2.5.1 Biodiversity Outcomes

Results indicate that the ECOPAS project successfully increased wildlife population numbers in and around Benin's W National Park. This finding corroborates the conclusion of the EU's final evaluation that the biodiversity conservation goal of ECOPAS was "perfectly attained" (Aveling et al. 2008, 10) and suggests that conservation gains have persisted at least three years after the project concluded. Increased levels of enforcement within the Park and other management activities designed to boost the populations of species of interest for tourism, such as digging water holes, are likely responsible for these results by creating an environment favorable to the survival, reproduction, and migration of mammal species.

The generally positive change in wildlife abundance found in this study contrasts to declines in mammal species populations in PAs across Africa (Craigie et al. 2010) and indicators of deteriorating reserve health in many parts of the tropical world (Laurance et al. 2012). However, like most Parks in the tropics (DeFries et al. 2005), WNP and its adjacent Hunting Zones comprise an increasingly isolated store of species richness (Clerici et al. 2007). Biodiversity in the two Forest Reserves near control villages (Fig. 2.1) has declined dramatically in recent years, with the Alibori Forest Reserve decimated by illegal logging and the state of ecosystems in Goungoun Forest Reserve judged to be among the worst of nine such PAs throughout Benin (Djogbenou 2010).

Spatial variation in wildlife population distribution around the Park based on household survey results shows the importance of examining change not only in the aggregate, but also among subpopulations. Although there was some evidence that aggregate population numbers for mammal species around WNP were different from such changes in similar areas far from the

Park, analysis of village-level subpopulations reveals strongly divergent patterns among study villages. Human-wildlife conflict increased substantially in two villages (Boïffo and especially Petchinga) while it decreased significantly in the other two villages (Alfakoara and especially Kandèrou).

Differing local conditions help explain these results. For example, Kandèrou lies at edge of the cotton frontier, which has encroached significantly on the Park since ECOPAS ended. The expansion of cultivated area and the relative unattractiveness of cotton as food source for wildlife have likely combined to increase the distance between the village population and wildlife. In addition, decreasing wildlife populations near Kandèrou may be due to an increase in poaching originating from this well-known hunter's settlement following ECOPAS (B. Sinsin, pers. communication; WNP guards, interview, Banikoara, July 2011). A decrease in human-wildlife conflict in some villages, like Kandèrou, may also have contributed to generally increasing mammal species abundance found within the Park. In contrast to Kandèrou, Petchinga's location wedged between the Park and the Niger and Mekrou Rivers means that the land surrounding it is especially valuable for both humans and wildlife. The area around the village is a key site for wildlife migration and transhumant cattle herding between Benin and Niger. Given overall increasing species abundance in the Park, it is not surprising that Petchinga residents would report greater conflict with wildlife.

An analysis that focused solely on aggregate results would have missed the spatial heterogeneity of wildlife populations and their differential impact on people. Taking such heterogeneity into account can inform more effective strategies of PA management, as experience in other PAs demonstrates (e.g. Nagendra et al. 2010).

2.5.2 Livelihoods Outcomes

While ECOPAS delivered on its overall biodiversity conservation goal, it was only partially successful in meeting its objective of doing so "for the benefit of local populations" (ECOPAS 2005). Livelihoods results were mixed and varied significantly among village subpopulations.

As expected, ECOPAS-financed conservation activities curtailed household access to most natural resources. Greater enforcement supported by ECOPAS limited the ability of households to access land for agriculture, resources for animal husbandry, and forest products. By contrast, increasing access to water is likely due to ECOPAS efforts to provide wells and dig watering holes for livestock in villages near the Park (Photo 8). Conservation measures under ECOPAS may also have contributed to increased availability of water in two additional ways. First, watershed protection may have improved access to this resource as found in other studies of PAs (e.g. Andam et al. 2008). Second, enforcement under ECOPAS may have reduced competition from extra-local resource users for water resources, thereby increasing access for households in ECOPAS villages.

The impact of ECOPAS on financial capital was more socially and spatially heterogeneous than the project's impact on natural capital. Average household income in some villages and among some social groups decreased due to ECOPAS but increased among others. For households in the two villages adjacent to the Park, Kandèrou and Petchinga, benefits brought by the project, such as employment, wells, and revenue from ecotourism and trophy hunting,[17] appear to have been insufficient to offset losses due to restricted access to natural capital. These two villages experienced the greatest increase in enforcement but the least

[17] See chapter 3 for more detail on the revenue generated by WNP and its Hunting Zones.

benefits due to ECOPAS (Table 2.5). Neither Kandèrou nor Petchinga are near Park entrances, tourism facilities, or guard posts, so employment opportunities relating to the Park are minimal.

Table 2.5. Enforcement change and project benefits reported in ECOPAS villages

Village	Percent reporting maximum enforcement increase	Percent reporting ECOPAS benefits
Alfakoara	42%	28%
Boïffo	50%	21%
Kandèrou	83%	5%
Petchinga	78%	5%

Note: Results derived from household survey.

In contrast to Kandèrou and Petchinga, households in Alfakoara and Boïffo appear to have benefitted from ECOPAS: income in these villages increased over the study period despite decreasing access to some natural resources. Given its location near the main Park entrance, where a prime elephant viewing site and major guard post are located, Alfakoara appears to have benefitted disproportionately from ECOPAS. For example, approximately 20% of average household income derives from non-farm income in Alfakoara, most of which is due to Park-related employment (e.g. as tour guides, guards, cooks, or seasonal laborers). This figure is more than double that for any other ECOPAS village.

A different set of factors explains the relatively large increase in average household income in Boïffo. First, access to resources was not as restricted there as in other ECOPAS villages, which is likely due to lower levels of enforcement in the PA near Boïffo compared to other areas of the Park and its adjacent hunting zones (Table 2.5; Aveling et al. 2008). At the same time, average household access to water increased more in Boïffo than in any other ECOPAS village. Households in Boïffo thus appear to have been able to take advantage of ECOPAS benefits (Boïffo had the highest percentage of the population aware of ECOPAS (79%)

and highest participation in the project (21%) among ECOPAS villages) while suffering the least costs in terms of reduced access to natural resources.

In addition to varying across village subpopulations, ECOPAS impacts varied according to wealth. The poorest group across all ECOPAS villages experienced the most negative impacts on financial capital. These farming households do not own any cattle, frequently do not own land, and have less education than better off groups. Like asset-poor households in other rural contexts in the tropics (McSweeney 2005), these households may have relied particularly heavily on the natural resource commons provided by WNP prior to ECOPAS and therefore suffered disproportionately due to the resource use restrictions enforced with project support.

2.5.3 Relationship between Biodiversity and Livelihoods Outcomes

There appears to be a trade-off relationship between conservation and livelihoods outcomes around Benin's WNP. Mammal species abundance increased within the Park and in some areas around it, while access to most natural resources decreased in all ECOPAS villages and income decreased in two of them. Household-level analysis sheds additional light on trade-offs as well as synergies between these outcomes (Table 2.4). The strong negative association between change in human-wildlife conflict and change in access to resources for livestock-raising suggests that increased wildlife populations have come at a cost for animal husbandry among WNP neighbors. For example, in Petchinga, where this association was especially strong, more than half of the respondents reported owning fewer cattle after ECOPAS than before the project began. During the post-ECOPAS period, nearly all of these households reported insufficient pasture and fodder as their primary worry in raising livestock, but prior to ECOPAS none reported having this concern. Focus group interviews with resource users in

Petchinga suggest that this change is due to decreased access to the Park where these resources are abundant.

The finding of trade-offs between biodiversity and livelihoods outcomes resulting from ECOPAS accords with the experience of many other international conservation efforts over the past quarter century (McShane et al. 2010). However, evidence for trade-offs at the household level is limited to the relationship between animal husbandry resources and wildlife abundance. Relationships between this latter outcome and other livelihoods-related outcomes were not statistically significant. Moreover, analysis revealed synergies among indicators for livelihoods outcomes such as that between access to water and increasing income. That increasing access to water was associated with increased income is not surprising in the dryland environment of the W region. Better access to water may have had direct benefits for livelihoods activities like animal husbandry and agriculture as well as for human health and sanitation, all of which may have increased household income.

The trade-offs and synergies identified in this analysis have at least two implications for PA policy and management, particularly in drylands. First, the positive association between better access to water and increasing incomes suggests that improved water provision is an important means to help mitigate the negative impacts PAs may have on the livelihoods of neighboring human populations. Second, the negative association between increasing wildlife abundance and change in access to resources for livestock raising suggests the need to provide viable alternatives to compensate for lost access to these resources through increased enforcement.

2.6 Conclusion

A decade ago, the Fifth World Parks Congress recommended that PA establishment and

management must, at the very minimum, "not contribute to or exacerbate poverty" (World Parks Congress 2003). Recent retrospective assessments in Costa Rica and Thailand suggest that PAs in those countries have achieved and even exceeded this goal (Andam et al. 2010; Sims 2010). Aggregate results of this study suggest that Benin's WNP has met this recommendation: biodiversity gains were accompanied by no change in average income among households around the Park compared to control villages. However, examining individual village effects revealed that impacts on income were socially and spatially heterogeneous, with some villages and some social groups harmed by ECOPAS and others benefitting from it.

A study that only examined treatment and control villages in the aggregate would have missed the social and spatial differentiation described above. Results of this study, as those in other regions of Africa (Foerster et al. 2011) and the tropical world more generally (Ferraro and Hanauer 2011), show that examination of population subgroups matters in assessments of conservation impacts. Such finer-grained analysis can reveal disparities in the distribution of harm and benefit that provides insights for better policy and project design relating to both existing and future PAs.

By disaggregating statistical analysis and integrating qualitative field research this study facilitates understanding of local-scale dynamics relevant to the identification of populations most vulnerable to PA-based conservation interventions. Its examination of biodiversity and livelihoods outcomes simultaneously and among different subgroups provides a foundation to evaluate synergies and trade-offs between outcomes, build theory about the relationship among PA impacts, and develop assessments of possible future trajectories. Finally, the approach used here can aid in identification of the mechanisms driving divergent biodiversity and livelihoods outcomes, an important task facing next generation conservation impact evaluation (Miteva et al.

2012). In these ways, this study advances knowledge of the multi-stranded legacy of PAs relevant to conservation policy and practice not only in the W region but also to other contexts across the globe.

Chapter 3

The Effect of Enforcement and National Political Context on Biodiversity and Livelihoods around the W National Parks of Benin and Niger

3.1 Introduction

A rapidly growing body of evidence suggests that governance is a critical determinant of the social and ecological impacts of national parks and other protected areas (PAs) in diverse settings across the globe (Coad et al. 2008; Pullin et al. forthcoming). Yet few studies have examined the effect of governance variables in generating or moderating the impact of PAs and the conservation and development aid projects focused on them in many low-income countries.[18] This chapter analyzes enforcement, an important element of governance, as a key causal mechanism of PA impacts. It focuses on how enforcement—the regular monitoring and sanctioning of compliance with rules (Gibson et al. 2005b)—interacts with national political context to affect local livelihoods and biodiversity in PAs.

Effective enforcement has been identified as a decisive factor shaping environmental outcomes in locally-managed commons (Chhatre and Agrawal 2008; Ostrom 1990; Pagdee et al. 2006) as well as state-run PAs (Bruner et al. 2001; Hilborn et al. 2006; Stoner et al. 2007). By restricting extraction and use, enforcement can maintain or improve ecosystem and resource conditions. The effect of enforcement on livelihoods is less clear, however. Studies of the

[18] Notable exceptions include Nolte et al. 2013 and Pfaff et al. 2013.

commons identify important benefits that forests, pastures, and other resource systems can provide to local communities, but few examine in detail the links between improved resource condition and local livelihoods. Research on the effect of changing enforcement regimes in state-owned PAs on livelihoods has generally found negative livelihoods impacts, although there is evidence that impacts may attenuate over time (McNally et al. 2011). Because joint analysis of social and ecological outcomes remains rare in scholarship on PA impacts (Ferraro and Hanauer 2011; Naughton-Treves et al. 2005) and on the commons (Agrawal and Benson 2011), knowledge of the relationship between these outcomes and how they are affected by PAs remains limited.

Research on natural resource governance often acknowledges the importance of national political context in structuring institutions and outcomes (Adams and Hutton 2007; Brooks et al. 2012). Despite this recognition, however, the existing evidence base is insufficient to identify patterns that may exist across countries to indicate how context moderates PA impact and with what effect (Pullin et al. forthcoming). This research gap exists in part because the relevant literature tends to treat the effect of factors, like enforcement, that shape social-ecological outcomes as context invariant (Agrawal et al. 2013). As a result, there is little available theory about the moderating effect of context. Limited theory, in turn, diminishes our ability to understand the range of causal processes linking policy interventions to conservation outcomes and the sustainability of results. More systematic knowledge is therefore needed on how national political and other contexts moderate the factors generating outcomes. Such understanding is especially important given that extra-local influences on local resource governance may be those most amendable to effective change through policy (Dietz and Henry 2008).

This chapter thus seeks to build empirical and theoretical knowledge by developing and testing hypotheses about the role of enforcement and national political context in producing social-ecological effects. It evaluates the impact of changing levels of enforcement spurred by a large European Union aid project on biodiversity and livelihoods in the transboundary W National Parks (WNPs) of Benin and Niger. These two countries differ along two key national political dimensions: governance quality and extent of decentralization reform. This variation facilitates comparative analysis of the effects of a blanket conservation program, Protected Ecosystems in Sudano-Sahelian Africa (ECOPAS), in different political contexts. Using original data collected in this dryland region of Francophone West Africa, I seek to explain how and why enforcement supported under the same project led to different outcomes in the two national political contexts.

This chapter is organized as follows. The next section reviews existing literature on enforcement and national political context in natural resource management and conservation policy. This review provides the basis for hypotheses about the impact of increasing enforcement on biodiversity and local livelihoods outcomes in different national political contexts. Section 3 presents background on the WNPs, the ECOPAS project, and the national political contexts of Benin and Niger. In section 4, I describe the fieldwork, methods, and data used in this study. Section 5 presents the findings, and Section 6 interprets results and places them in larger context. I conclude by highlighting broader implications of this study for advancing understanding of the causal pathways through which PAs produce social-ecological effects.

3.2 Theoretical Expectations: Enforcement and National Political Context in Resource Management and Conservation Policy

3.2.1 Enforcement, Resource Condition, and Livelihoods

Effective enforcement is vital to sustainable governance of natural resources and the environment. Extensive literatures on both community resource commons (Agrawal and Yadama 1997; Chhatre and Agrawal 2008; Gibson et al. 2005b; Ostrom 1990; Pagdee et al. 2006) and state-managed PAs (Bruner et al. 2001; Hilborn et al. 2006; McNally et al. 2011; Stoner et al. 2007) highlight the importance of enforcement to improved environmental outcomes. Without rules limiting resource use and enforcement of those rules ensuring that the costs to rule breakers is higher than the benefits from breaking the rules, the resource system is likely to degrade, possibly to the point where it no longer provides valued resources (Hardin 1968; Ostrom 1990). In dryland areas capable of supporting wildlife valuable for tourism like those considered here, greater enforcement should result in greater mammal species abundance, which has been shown to be a useful indicator of biodiversity change more generally (Collen et al. 2009). The foregoing leads to the hypothesis that, all else equal:

H1: Increasing levels of protected area enforcement will lead to increasing species abundance.

If literatures on local commons and state PAs agree on the ecological impact of enforcement, there is less convergence on the effect of enforcement on livelihoods.[19] Studies of the commons identify the important benefits that forests, pastures, and other resource systems can provide to local communities, but they tend to assume that improved resource condition translates into improved local livelihoods. Empirical examination of the relationship between

[19] Nor is there agreement on the proper locus of enforcement authority. There is evidence that, under the right conditions, both governments and community-level groups can effectively enforce commons (see, e.g. Bruner et al. 2001; Dietz et al. 2003).

livelihoods and environmental outcomes within this literature remains rare (Agrawal and Benson 2011).

Research on PAs managed by central states has been less sanguine on the connection between improved environmental conditions brought about by enforcement and livelihoods. At the extreme, enforcement entails physical relocation and eviction of people living in or near PAs, with concomitant negative impacts on welfare (Agrawal and Redford 2009; Brockington and Igoe 2006; Cernea and Schmidt-Soltau 2006). But even without such extreme measures, changing levels of enforcement can negatively affect local livelihoods (Ferraro 2002; McElwee 2010), though evidence exists that negative impacts may attenuate over time in certain resource systems (McNally et al. 2011). Improved ecological conditions brought about through protected area enforcement may enhance the flow of ecosystem services and present other opportunities (see chapter 1) to mitigate resource access restrictions and positively effect local livelihoods. To date, however, studies of PAs and externally-funded conservation projects centered on them in the developing world have typically found that the livelihoods benefits such interventions offer are insufficient to redress negative impacts, including household income levels, due to restricted access to resources (Igoe 2006; McShane and Wells 2004; Naughton-Treves et al. 2005).

This outcome likely holds for the near term, but little data exists to enable analysis of whether improved ecological conditions begin to shift the balance toward more positive livelihoods impacts over the medium and longer term and how ecosystem type may affect the nature and timing of impacts. Like research on the commons, few studies of protected areas have jointly assessed the effect of enforcement on ecological and social outcomes. Recent econometric studies of PA impacts have begun to consider both of these outcomes (Ferraro et al. 2011; Naughton-Treves et al. 2011), but they have not focused on the mechanisms, like

enforcement, linking PAs to impacts. Based on available evidence, it is reasonable to expect that, *ceteris paribus*, greater protected area enforcement will be associated with decreasing incomes among affected households in the near term, particularly in dryland environments where it may take many years for the ecosystem to regenerate so as to provide vital resources and ecosystems services. I therefore also test the following hypothesis:

H2: Increasing levels of enforcement will lead to decreasing levels of income, on average, among protected area neighbors.

3.2.2 The Importance of National Political Context

A curious gap exists in many studies of environmental resource governance between recognition of the importance of broader context to local processes and outcomes and integration of this recognition into empirical research. Research in this domain largely focuses at a single level despite the development of frameworks to investigate processes at multiple levels (Clement 2010; Ostrom 2007; Paavola 2007). A recent review of the impacts of PAs on human well-being also finds that empirical research tends to focus at one level of analysis and that insufficient attention has been paid to how context moderates impact and with what effect (Pullin et al. forthcoming). We thus know that national context matters, but much less about *how* and *why* it matters.

The literature on the political economy of international aid suggests that aid is more effective in reaching its objectives in better-governed countries. The outcomes of development (Burnside and Dollar 2000; Denizer et al. 2011; Dollar and Levin 2005) and environment (Buntaine and Parks 2013) aid projects are more positive in countries with stronger public sector institutions, more political stability, and greater adherence to rule of law. There is also evidence that higher levels of corruption decrease the effectiveness of environmental aid (Ross 2001;

Smith et al. 2003), though the links between corruption and biodiversity outcomes are complex and require more rigorous empirical testing (Barrett et al. 2006; Ferraro 2005). Political regime type and stability can also interact with aid to determine conservation policy choice, implementation, and outcomes (Gibson 1999; McPherson and Niewsiadomy 2000; Petursson et al. 2013). More political stability and stronger rule of law at the national level should increase the likelihood that local level enforcement of protected area rules is routinized and equitably applied. These and other attributes of good governance at the national level should also mean that protected area and other relevant authorities can be held accountable for their activities, thereby mitigating potentially negative effects of enforcement on livelihoods.

Research on natural resource decentralization supports these theoretical expectations about how national political context may affect factors that shape policy impacts. For example, Chhatre's (2008) study of a conservation and development aid project in India's Greater Himalayan National Park shows that the ability of citizens to influence policy through local democratic institutions such as political parties and elections—what he terms "political articulation"—can affect project implementation and outcomes. Decentralization reforms brought new powers to constitutionally mandated local level governance institutions (*panchayats*), which developed into the main locus of decision-making relevant to conservation in the region. Key features of the national political context, including regular elections and competition between political parties, facilitated downward accountability and agency in local conservation and development processes.

Other writings on natural resource decentralization also emphasize the importance of accountability relations across administrative scales (Agrawal and Ribot 1999; Ribot 2004). This literature suggests that national contexts characterized by greater electoral competition and

political articulation should have a positive influence on local resource governance and therefore livelihoods outcomes. More generally, because trust has been shown to be a necessary precondition for the cooperation required to achieve sustainable natural resource conservation and management (Ostrom et al. 1999), stable, transparent, and accountable national governance institutions should provide an environment of trust in which local governance institutions can operate more effectively to enhance both biodiversity and livelihoods outcomes (Brooks et al. 2012). For example, broad-based participation by local communities in protected area management may not only help improve the effectiveness of enforcement, but provide incentives for it to be more equitably applied. Greater cross-scale accountability should also dampen potential corruption and abuse of power.

In view of these considerations, I thus test the following hypothesis:

H3: Increasing enforcement will lead to greater increases (or smaller decreases) in income in countries with better governance and more advanced decentralization reforms.

The effect on biodiversity of increased enforcement in better-governed, more articulated political systems may also be positive, though the time scale at which this result might be expected is less clear. Local constituents may prefer actions that maintain natural resources they find useful, but this does not guarantee the prioritization of rare or endangered species and habitat types viewed as having no immediate utility even though they may nevertheless prove to be vital to longer-term ecosystem viability. Based on available theory, I expect that:

H4: Increasing enforcement will lead to greater increases in species abundance in countries with better governance and more advanced decentralization reforms.

A recent systematic review of the influence of national political context on the success (measured in attitudinal, behavioral, ecological, and economic terms) of a range of community-

based conservation projects found little support for the conclusion that such projects are successful when they are implemented in countries with more stable governance and more democratic accountability (Brooks et al. 2012). However, this study did not explore the possibility that national political context operates not as an independent effect but as a moderating influence on the other key factors in the analysis of the projects. Rather, on the basis of expectations derived from the literature reviewed above, this chapter tests the moderating influence of national political context on the effect of enforcement on biodiversity and livelihoods outcomes.

3.3 Conservation in the W Region and National Politics in Benin and Niger

Chapter 1 provided background on the historical, ecological, and social context of the W region. Here I present additional information on PA management in the W region prior to the ECOPAS project and on ECOPAS activities specific to Benin and Niger, particularly relating to enforcement. I also compare the national political contexts of these two countries over the past decade. My discussion includes information on the national political contexts of Benin and Niger before, during, and after ECOPAS implementation.

3.3.1 Protected Area Management in the W Region Prior to the ECOPAS Project

Geographic proximity and shared colonial history mean that there are some similarities in PA management between Benin and Niger, but there are also some important differences between the two countries.

In Benin, WNP, its Hunting Zones, and the buffer zone surrounding these PAs have been governed through the National Center for Wildlife Reserves Management (CENAGREF) since the 1990s. The Park is defined as an area of strict protection with no direct off-take of natural

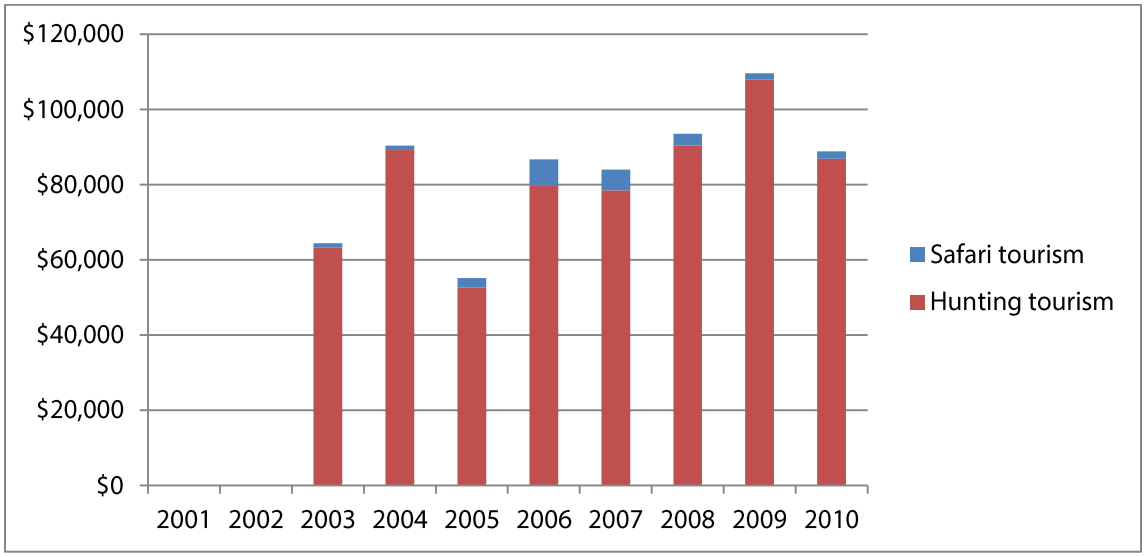
resources permitted except for "scientific or management reasons" (ECOPAS 2005). The two Hunting Zones operate under the same rules with the exception that trophy hunting is allowed (Table 1.1). Trophy hunting is the main source of revenue derived from the W region PAs (Fig. 3.1). These revenues together with those from wildlife-based tourism are grossly inadequate to effectively manage WNP. It is estimated that effective Park management in the W region would cost approximately $120/km^2 annually (Aveling et al. 2008). For Benin's WNP this totals nearly $700,000/year, more than seven times average annual revenues generated by the Park over the past decade.

The Village Association for Wildlife Reserve Management (AVIGREF) was created in the late 1990s to help CENAGREF with PA management and to increase local support for PAs. By law, AVIGREF is designated to receive 30% of the receipts from hunting receipts and fines levied for illegal activities to undertake "eco-development" activities in communities around the Park. AVIGREF in the W region includes 83 separate village-level member associations as well as a regional coordination body (Tchabi 2004).

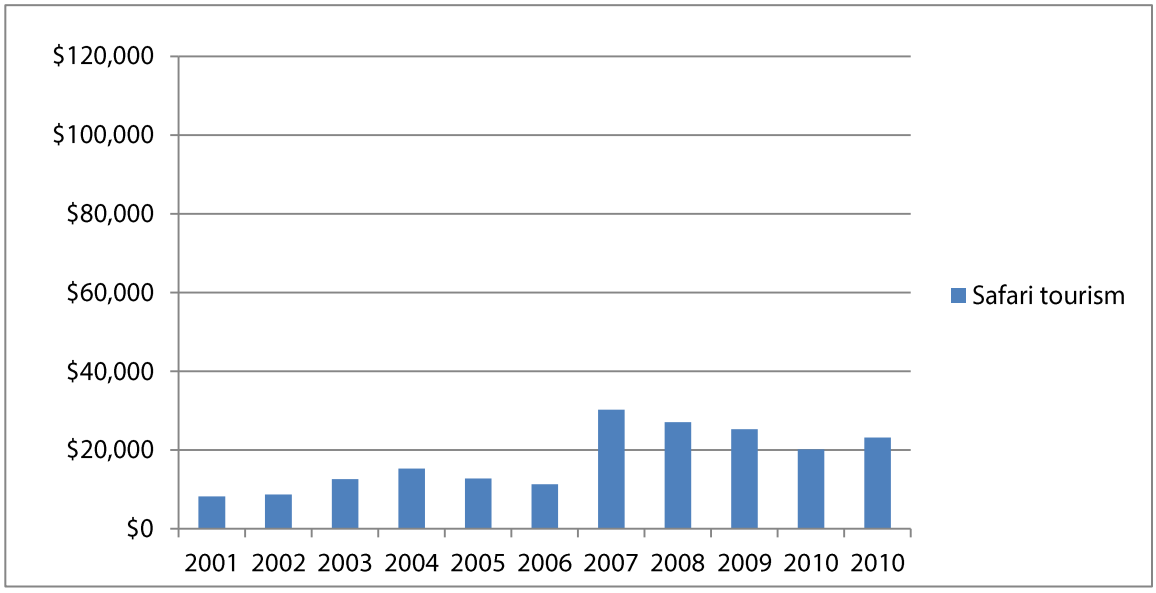
From Benin's independence in 1960 to the start of ECOPAS in 2001, WNP and the Djona and Mekrou Hunting Zones served as de facto resource commons despite their formal protected status. Surveys conducted in 2002 and 2003 showed nearly 20,000 cattle in the Park in Benin (Hibert et al. 2010). Besides grazing, hunting and the gathering of fuelwood, fodder, and other natural resources were all common activities in these PAs. For example, some 10,000 hectares of land were cultivated within the Park, largely along its southern border (Former WNP Director, interview, Cotonou, Benin, January 2011; ECOPAS 2005). Before ECOPAS, Benin's W PA complex had virtually no infrastructure, and only 12 guards patrolled its vast territory. In these circumstances, the Park was largely denuded of large mammals, and conservationists began

to question whether it could be maintained as a National Park (CENAGREF 1999; Monfort et al. 1994).

(a) Benin



(b) Niger



Data source: W National Park Services in Benin and Niger. *Note*: 2001 and 2002 data missing for Benin.

Figure 3.1. W National Park tourism revenues in (a) Benin and (b) Niger

The management structure of Niger's WNP is more hierarchical and centralized than that of Benin. The Park is managed under the Protected Areas Division of the Department of Wildlife, Fishing, and Fish Farming (DFPP), which in turn is under the Ministry of Water Resources, Environment, and the Struggle Against Desertification (MHED). A "Conservator" (as opposed to a "Director" in Benin) is directly responsible for management of the Park. Until 2006, all revenues from the Park (Fig. 3.1) were sent to the central government, which was then supposed to deposit 20% in the public treasury, use 30% for Park management and provide 50% to municipalities bordering the Park. In practice little, if any, of these funds were returned to local governments (Former ECOPAS staff member, interview, W region, Niger, June 2011). However, a decree in late December 2005 ushered in distributional changes, with 50% of entrance fees designated to the municipal government of Tamou, one of three municipalities adjacent to the Park and the location of the main Park entrance. As of 2011, the other two eligible municipalities had not received funds. There is no such revenue-sharing agreement between Park authorities and local municipalities in Benin. However, in Niger there is no formal co-management institution like AVIGREF. Because hunting is illegal in Niger (except for scientific research purposes) it has no state-owned Hunting Zones connected to WNP, which limits associated revenues. Park revenues are thus substantially lower than those in Benin (Fig. 3.1). Even in the best recent years, revenues were only about 10% of the estimated costs of adequate protection: total Park management expenses are estimated at about $265,000 annually (author calculation based on Aveling et al. 2008).

Another difference in PA management between the two countries is that CENAGREF is responsible for WNP and its adjacent hunting and buffer zones in Benin, whereas Park authorities in Niger must coordinate their activities with the Nigerien Forest Service, which is

charged with management of the PAs adjacent to the Park. Cattle grazing and other natural resource uses are sanctioned to varying extents in these reserves, but are forbidden in the Park itself. Unlike Benin, there was relatively little evidence of cattle grazing in the core of the Park at the start of the ECOPAS project (Hibert et al. 2010), suggesting more effective enforcement by Nigerien authorities. The Park is close to the capital city of Niamey (150 km) and the state has maintained an interest in management of the Park for decades given its contribution to national coffers through tourism and related aid funds. The central government has also maintained an interest in the region for security reasons given on-going tensions with neighboring Benin and Burkina over the location of shared borders. Although revenues have been smaller in Niger's WNP than its Benin counterpart (Fig. 3.1), it is the country's only National Park and has stood as the sole PA to generate significant revenue directly for the central government. Nevertheless, even as Niger's WNP was significantly better patrolled and managed than Benin's WNP prior to ECOPAS, these activities were still insufficient for effective protection (IUCN 1996).

3.3.2 The ECOPAS Project

To achieve its overall goal of reversing natural resource degradation processes and conserving biodiversity in the W region PA complex "for the benefit of local populations" ECOPAS focused much of its effort in the individual countries of the W region on improving infrastructure, management, and enforcement capacities (ECOPAS 2005). Given that Benin's portion of the Park is more than twice as large as Niger's, Benin received about $7 million in aid from ECOPAS while Niger received $3.5 million. Enforcement was identified as a major priority in Benin due to its relative size, lack of central state management presence, and high level of ecological degradation. An estimated 90% of ECOPAS funds were spent on

enforcement-related activities in Benin, thereby dramatically increasing resources available for enforcement and PA management. The number of guards increased more than threefold from 12, prior to ECOPAS, to 49 within the first two years of project implementation and continuing through 2011 when data for this study were collected. This large and rapid expansion to 0.6 guards per 100 km^2 in Benin's part of the W Transboundary Reserve represents a significant increase in enforcement capacity, though it is significantly lower than the 3 guards per 100 km^2 associated with effective protection in tropical parks (Bruner et al. 2001). During the ECOPAS implementation period the number of kilometers of roads for enforcement also increased markedly in Benin. A mere 70 km of passable road traversed Benin's WNP in 2001, but this number increased more than 15 times to 985 km by 2008 (CENAGREF 2008). ECOPAS also supported other infrastructure and operating costs relating to enforcement, from supply of vehicles and uniforms to training and salaries for Park guards.

Given government interest prior to the project, ECOPAS-induced change in enforcement in Niger's WNP was less than in Benin. There were 19 Park guards responsible for enforcement in Niger's WNP in 2000. An additional 15 guards were hired under the ECOPAS project in 2002, leaving a total of 34 guards, a number that remained constant through my fieldwork in 2011. This sums to 1.2 guards per 100 km^2 or twice that in neighboring Benin. However, while this density of guards is three times reported levels in the least effective topical parks in a cross-national study, it is still well below the 3 guards per 100 km^2 associated with more effective parks (Bruner et al 2001). In addition to this increase in personnel, the number of kilometers of passable roads for enforcement increased 18% from 637 km to 750 km under the ECOPAS project. As in Benin, ECOPAS allocated funds for materials, infrastructure, salaries, and other activities necessary for enforcement and broader management of WNP.

While much of the country-level funding under ECOPAS related directly to core PA management and enforcement, the project also sought to deliver community benefits. Tourism was designed as the primary mechanism through which local populations would benefit from and thereby support conservation activities. Although direct spending on tourism development comprised only about 5% of the ECOPAS budget in Benin, most of the project's other activities, including increased enforcement, ecological research, and improvement of Park infrastructure, were planned to support this objective. Direct expenditures on tourism in Niger (about 9% of the total budget) were similar to those in Benin (ECOPAS 2005). Other community-oriented project activities included environmental education, clarification of land rights, development of alternative agricultural practices, conflict resolution, and support for legal pastoralism and transhumance. In Benin, AVIGREF comprised the main vehicle through which ECOPAS sought to engage communities in conservation and natural resource management. ECOPAS worked with municipal- and village-level land commissions (COFO, or *Commission Foncière*) in Niger. These institutions were set up in 1993 to enhance the security of rural producers and facilitate joint management of natural resources at local levels the rural areas of Niger (Kandine 2010; Lund 1998). In the communes bordering WNP there are 73 community-based COFO, each involving a mix of central government officials, local elected representatives, customary authorities, and rural producers (ECOPAS 2005).

3.3.3 National Political Context in Benin and Niger

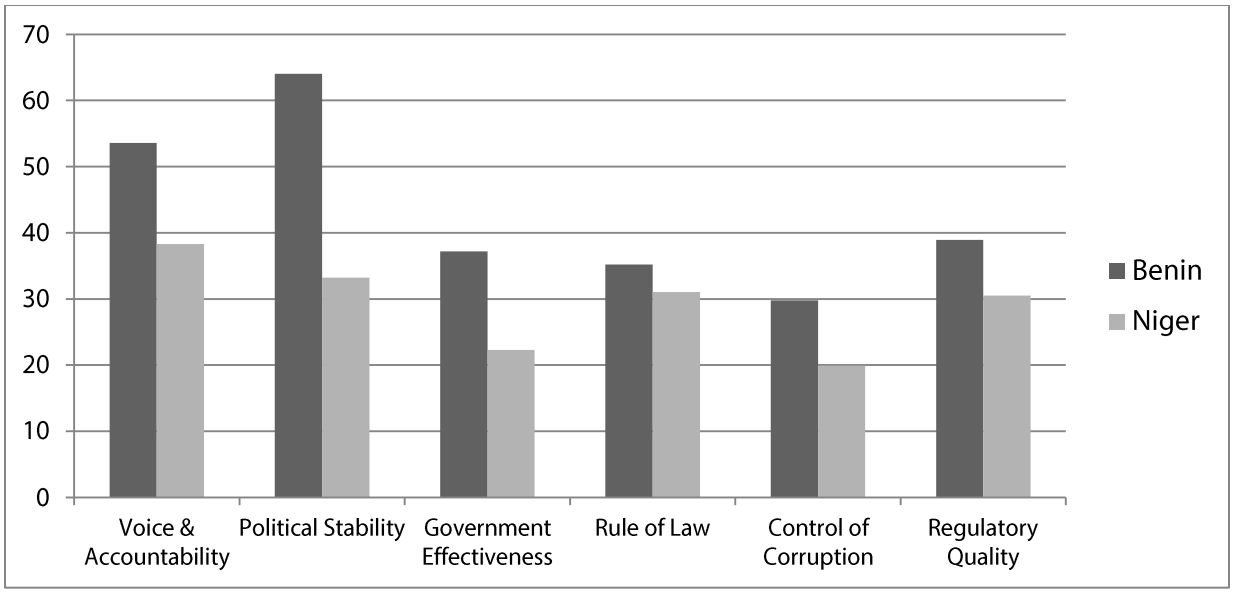
The national political contexts of Benin and Niger differ in two important ways: indicators of good governance and the extent of decentralization reforms. In line with the hypotheses developed above, I expect that these differences will have shaped the implementation, particularly in relation to enforcement and impacts of ECOPAS.

Table 3.1. Key elements of national political context relevant to the W region in Benin and Niger

Element	Benin	Niger
National Governance		
Global percentile rank, average governance scores, 2002-2011[a]	43%	29%
Decentralization		
First local elections	December 2002	July 2004
Community participation in PA management	Yes, formalized through AVIGREF	No formal institutional mechanism
Municipal participation in PA management	No formal role	No formal role
Local distribution of PA revenues	30% of revenue to villages via AVIGREF (since 2002)	50% of revenue to one local government (since 2006)

[a]Based on data from Kaufmann et al. 2012

The Worldwide Governance Indicators (Kaufmann et al. 2012) provide a basis to compare the quality of governance in a consistent manner over time across national contexts (Appendix G). Over the past decade (during which ECOPAS was implemented) Benin was rated as being better governed than Niger (Table 3.1; Fig. 3.2). Differences are especially stark for Voice and Accountability and Political Instability, which together enable assessment of the processes through which governments are selected, monitored, and replaced. Although both countries are consistently ranked among the poorest 20 countries globally (UNDP 2011; World Bank 2013a), Benin has been seen as a model of democracy in Africa (Bierschenk 2009) while Niger has been beset by political instability. Both countries rank in the bottom half of all countries globally for the other governance indicators, but Benin scores higher than Niger for each, particularly on government effectiveness, which measures perceptions of the quality of public services, the independence of the civil service from political pressures, and the quality of policy formulation and implementation (Kaufmann et al. 2012).



Source: Kaufmann et al. 2012

Figure 3.2. Country percentile rank based on average governance scores, 2002-2011

The extent of decentralization reforms is a second key element of national political context that varies between Benin and Niger. Implementation of decentralization reforms is significantly more advanced in Benin than Niger (Table 3.1). In late 1989, following nearly two decades of rule by Mathieu Kérékou under a Marxist-Leninist regime, Benin began a successful transition to democracy that led a wave of democratization in Africa (Olowu et al. 1999). The constitution ratified in 1990 paved the way for democratic decentralization, but it was not until a decade later that the country passed laws specifically mandating devolution of political-administrative powers. Territorial reorganization instituted in 1999 led to the division of Benin into 12 *départments* (provinces) and 77 *communes* (municipalities). Municipalities comprise the main administrative unit to which new responsibilities and resources were devolved under decentralization (République du Bénin 2005).

Four municipalities ring WNP: Banikoara, Kandi, Karimama, and Malanville. The first municipal elections were held in December 2002/January 2003 and again in May 2008.

Municipalities have financial autonomy and assume responsibilities related to the environment, but the central state has maintained control of management of National Parks and their adjacent Hunting Zones. AVIGREF brings some measure of local representation to PA management through its collaboration with CENAGREF, but this institutional arrangement is independent of the decentralized municipal structure.

In contrast to Benin, Niger has had a highly unstable political history over the past 25 years. With the installation of a transition government and approval of a new constitution in 1991, Niger joined the wave of democratization sweeping across Africa and other parts of the world at that time (Olowu et al. 1999). Presidential elections were held in 1993, but the regime only lasted a few years until it was overthrown by a military coup in 1996. Another constitution was approved that year, which lasted until another coup in 1999. That same year a voting-weary Nigerien public approved the constitution of the Fifth Republic, and Mamadou Tandja assumed the presidency (Idrissa 2009).

In June 2002, three years after Benin, the National Assembly passed a series of decentralization laws, which transferred administrative powers to 265 *communes* (municipalities) within 36 *départements* and 8 *régions*. Decentralized powers and responsibilities were similar to those in Benin, with municipalities the main recipient of new budgetary and decision-making authority for primary education, health, land management, and local development. Niger's first local elections were held in July 2004. Decentralization reforms have lived up to some of their promise, including improved local development planning, municipal services (such as public records offices, mediation of conflict between farmers and herders, livestock vaccination, etc.), and access to new markets due to investment in economic infrastructures (Mohamadou 2009), but they have fallen short in other areas. Local governments have been hampered by inadequate

resources, limited capacity, and weak linkages with civil society and the private sector (Maercklein 2008).

The decentralization process has been further hampered by political instability. In 2004, Mamadou Tandja was elected to his second five-year presidential term, the first presidential election in Niger with a democratically elected incumbent. During his time in office, however, he sought to circumvent his term limit through a series of actions, leading to a severe political crisis that culminated in a coup d'état by a military junta in February 2010. Democratic governance institutions were reinstated over a one-year period and another new constitution was adopted in November 2010. 2011 saw a series of local, legislative, and presidential elections and with them renewed promise for furthering decentralization reforms.

As in Benin, the central state has retained control of WNP and its adjacent PAs in Niger. Municipalities have no formal role in management of these areas, though revenues from WNP were shared between central and local governments for the first time under decentralization reforms in 2006. Only one of the three eligible municipalities, Tamou, has received revenues. The other two, Falmey and Kirtachi, have been lobbying to receive a share of these revenues (WNP Conservator, interview, June 2013). Revenues available to share decreased precipitously after January 2011 when foreign tourism to Niger collapsed due to the abduction and subsequent murder of two French tourists by Al-Qaeda in the Islamic Maghreb (AQIM) (WNP Conservator, pers. communication).

3.4 Data and Methods

3.4.1 Data Collection

Data were collected during fieldwork in Benin and Niger from June-July 2008 (before

ECOPAS ended) and from September 2010-August 2011 (after ECOPAS ended). I used mixed methods, including a household survey, individual and focus group interviews, participant observation, and archival research. Data on ecological outcomes were collated from the household survey as well as inventories of mammal populations in the WNPs carried out from 2002-2008 by the national parks agencies and ECOPAS.

I used stratified purposive sampling (George and Bennett 2005) to select eight villages within 2 km of WNP in which the ECOPAS project was active (Fig. 1.1).[20] These villages were chosen not only because they were explicitly targeted for ECOPAS activities, but also to represent the ecological and political variation around the Park in both countries: they span a range of climatological zones (average annual rainfall of 600 to 950mm/year), and at least one village from each municipality around the Park was selected (Table S.3). I identified study villages based on ECOPAS reports, interviews with former ECOPAS staff, and exploratory visits to candidate villages.

Within each study village, households were randomly selected using probability proportional to size (PPS), based on Bernard's (2006) map sampling method (Appendix C). In the absence of reliable census records, this method ensured a random sample that compensated for differences in housing density, potential irregularity in the spatial distribution of wealth in the community, and variation in livelihoods strategies (Bernard 2006). The final survey included 300 households, evenly divided between villages in Benin and Niger.

Additional information on the administration of the survey can be found in chapter 2 of this dissertation, and the survey instrument is available in Appendix D. Interviews, participant observation, and archival research complemented the survey. These methods are also described

[20] In Benin, two villages were adjacent to the Djona Hunting Zone, and in Niger one village was next to the Tamou Reserve. For ease of exposition and because the rules and enforcement regimes governing these protected areas are nearly the same as those for the W Parks, I refer to all villages as bordering WNP in the remainder of this paper.

in more detail in chapter 2.

3.4.2 Biodiversity Indicators

Mammal species abundance, which was used by ECOPAS to assess progress toward the project's overall biodiversity conservation goal, is the primary indicator for the biodiversity outcome used in this study. It derives from annual surveys of 20 different mammal species conducted by Park authorities using a consistent methodology from 2002, just as ECOPAS activities began in the field, to 2008 as the project was winding to a close. These 20 species comprise all large and small ungulates, primates, and carnivores observed during the course of the annual inventories (Table 3.2).

The measure of species abundance is the kilometric index, which expresses the ratio of the total number of individuals by species observed along a transect by the total length of each transect by zone covered (Maillard et al. 2001). In Benin, eight large zones, covering about one-third of W Park and its two adjacent hunting reserves, were selected to represent the geographic diversity within the PA complex (CENAGREF and ECOPAS 2008). Within these zones, a total of 102 transects, ranging from 9-17 km in length, were identified. A team of four Park Service staff walked each transect, counting each individual of the different mammal species they saw directly or the trace of which they recognized. Transects were spaced 3 km apart from one another to minimize the risk of double counting. Surveys were conducted in the morning from 7-10am at the end of the dry season (May) each year (CENAGREF and ECOPAS 2008). In Niger, the same methodology and timing was used for the years 2002 and 2005-2008. Surveys were conducted in six large zones that, together, covered nearly half the area of W Park (Service Ecologie Parc W du Niger 2006). Six transects 3 km apart ranging from 2.5-9 km in length were

identified and a team of three Park Service staff carried out the survey along each one. Transect length in Niger and total area covered is proportionate to that in Benin.

This study also used household perceptions of change in human-wildlife conflict from 2000-2011 as an alternative indicator of changes in species abundance. This measure complements direct species counts by enabling comparison of changes in abundance in the area around WNP where ECOPAS intervened and around control villages. It also provides a measure of mammal species abundance for the post-ECOPAS period. The indicator ranged from 1 to 10 where 1 was the incidence of a given household's conflict with wildlife "decreased greatly" and 10 was the incidence "increased greatly" from 2000-2011 (Table S.4). Additional detail on this indicator, including discussion of its utility and limitations, is contained in chapter 2 of this dissertation.

3.4.3 Livelihoods Indicators

The main livelihoods indicator in this study is change in household income from the period immediately prior to the start of the ECOPAS project to the period after the project's conclusion (2000-2011). Here income means not only monetary capital but "total revenue from livelihoods activities" which may include "on-farm" income such as the total value of harvest sold or used for household consumption; value of livestock sold, consumed and owned; value of forest products; the value of fish or game meat sold or consumed within the household; and "off-farm" income from wage labor or self-employment. Values for this variable range from 1 to 10, where 1 signifies that income "decreased greatly" and 10 that it "increased greatly" during the study period.

3.4.4 Modeling the Effect of Enforcement and National Governance Context on Biodiversity and Livelihoods

In this chapter I seek to infer the effects of changing levels of enforcement at the household level in the same broad ecological context (the W region) but in different national political contexts. Chapter 2 used a quasi-experimental research design to compare household-level outcomes in ECOPAS treatment villages with those of matched control villages. Data collection in ECOPAS villages in Niger introduces variation on key explanatory variables that enriches understanding of ECOPAS effects. Theory-based comparison across the Benin-Niger border enables investigation of causal mechanisms and processes that is not possible using within-country quasi-experimental design. At the same time, the findings about the overall impact of ECOPAS in Benin can aid interpretation of results relating to its impact in Niger.

To analyze the effect of changes in enforcement and national political context on biodiversity and livelihoods outcomes I developed both ordinary least squares (OLS) and multilevel linear regression models. I first estimated the following OLS model:

$$y_i = \beta_0 + \beta_i X_i + \varepsilon_i \qquad (4.1)$$

where y_i is change in household conflict with wildlife (Model 1) or change in household income (Model 4), X_i is a suite of independent and control variables and ε_i is a random error term. The independent variables tested were enforcement, national governance context, and an interaction term of these two variables.

Analysis focuses on the household level because that is where the consequences of enforcement are likely to be most keenly felt. Analysis of households living in different locations is also more likely to capture spatial variation in enforcement effort. Reported change

in household ability to use WNP from 2000-2011 was used as an indicator of PA enforcement at the household level. Based on this measure, decreases in ability to use the PAs signify higher levels of enforcement. The measure is a categorical variable ranging from 1 to 5, where 1 indicates a large decrease in enforcement (i.e., reported ability to use WNP has increased greatly), 5 indicates a great increase in enforcement (i.e., reported ability to use WNP has decreased greatly), and 3 indicates no change in the level of enforcement. This variable was mean centered to facilitate interpretation.

Extractive use of WNP is illegal in both Benin and Niger. This restriction is widely known among Park neighbors, but many still make use of Park resources. Measuring and monitoring such illegal natural resource use poses a methodological challenge as rule breakers have little incentive to reveal their actual practices (Gavin et al. 2010; Keane et al. 2008), particularly in a militarized context like the WNP where consequences of getting caught can be severe. To avoid asking directly about illegal activities and thereby potentially putting survey respondents at risk, the survey queried people's "ability to use Park W," which implies extractive use in this context. Although other factors (e.g. change in health, migration of household members, etc.) may also affect responses, qualitative field research suggests that changes in ability to use the Park are likely due to changes in enforcement (see chapter 4).

Records of fines and arrests during the study period were available for Benin but not Niger. I was thus unable to use these data as an alternative indicator of enforcement in this comparative study. However, in the multi-level models described below, I used distance to Park guard post as a village-level indicator of enforcement. This indicator has been used in other studies of natural resource governance and PA impacts (Agrawal and Chhatre 2006; McNally et al. 2011).

A country dummy variable is used to represent national political context in Benin and Niger. Models use an interaction term of enforcement and country to assess the moderating effect of national political context on enforcement. Although the country dummy variable also likely encompasses other national level differences, qualitative research suggests (see, e.g. chapter 4) that the two aspects of governance discussed above are the most relevant source of national-level variation between the two countries. I control for other potentially important variation, such as population and market integration, through village-level indicators (see below).

Models controlled for a series of respondent and household attributes that may also influence the outcomes of interest. These variables included: age and sex of the household head, the highest level of formal education received by a household member, the number of people living in the household, and the relative wealth of the household as measured by the number of cattle owned (Table S.4). As in other parts of Africa, cattle are an especially important source of wealth in the W region (de Haan 1997; Mortimore and Adams 1999). Models also controlled for household participation in ECOPAS activities. This variable is a proxy for benefits received from ECOPAS,[21] which may affect changes in income or conflict with wildlife. For example, much of local participation in ECOPAS project activities was through employment relating to the Park, which may lead to increases in household income or conflict with wildlife. Finally, models controlled for household dependence on three locally important natural resources that are more abundant within W Park than outside it: pasture, fishing, and forest products. These measures were based on the percent of household income derived from activities directly related to these resources. I controlled for these variables on the assumption that households more

[21] Results were robust using a similar variable measuring reported household benefits due to ECOPAS. This alternative indicator is a count of the number of benefits reported ranging from 0 (no benefits) to 9 (9 benefits). The two benefits indicators are highly correlated (Spearman's rho = 0.7659 (Prob > |t| = 0.000)).

dependent on these natural resources for their livelihoods are more likely to be harmed by increasing enforcement of areas that provide such resources than households that are less dependent.

Table S.4 summarizes all the household level variables used in this analysis. OLS models were adjusted for clustering at the village level to correct for correlation at that level (Angeles et al. 2005). A series of regression diagnostics indicate that OLS assumptions are met and that the model is not misspecified.

To better account for the multi-tiered structure of the data, I also estimated multilevel linear models. I use two-level random-intercept models in which households (n=300) comprise level 1, and the eight villages in which they are nested comprise level 2. These models explicitly account for the clustered nature of the data by partitioning variance into two groups, within and between clusters, with random terms. They also have the benefit of minimizing heteroskedasticity of model residuals (Gelman and Hill 2007).

The first multilevel models (Models 2 and 5 in Table 3.3 below) were random-intercept models without any explanatory variables. Village-level effects were included as the random component (Equation 4.2). Variance in these unconditional models was partitioned into household-level and village-levels.

$$y_{i,j} = \gamma_{00} + U_{0j} + \varepsilon_{ij} \qquad (4.2)$$

where $y_{i,j}$ is change in household conflict with wildlife (Model 2) or change in household income (Model 4), γ_{00} is the intercept, and U_{0j} is the random error term for village. Models 2 and 4 were used as baselines to estimate village-level variance in the dependent variable. I then added the same individual-level independent variables described

above to create Models 3 and 6.

$$y_{i,j} = \gamma_{00} + \gamma_{10} x_{1i,j} + \ldots + \gamma_{q0} x_{qij} + \gamma_{01} z_{1j} + \ldots + \gamma_{0r} z_{rj} + U_{0j} + \varepsilon_{ij} \quad (4.3)$$

where $\gamma_{10} x_{1i,j} + \ldots + \gamma_{q0} x_{qij}$ is the fixed effect of individual-level variables, γ_{q0} is the regression coefficient, and x_{qij} represents the independent variables for household i in village j, $\gamma_{01} z_{1j} + \ldots + \gamma_{0r} z_{rj}$ is the fixed effect of village-level independent variables where γ_{0r} is the regression coefficient and z_{rj} is the independent variable, and U_{0j} is the random error term for village. Individual-level independent variables are as in previous models, but two village-level variables were included. As in other studies of local resource governance and PA impacts (Agrawal and Chhatre 2006; McNally et al. 2011), I used distance of the village to a Park guard post as an indicator of enforcement and distance to major regional market to control for the potential effect of this variable on change in income and conflict with wildlife.

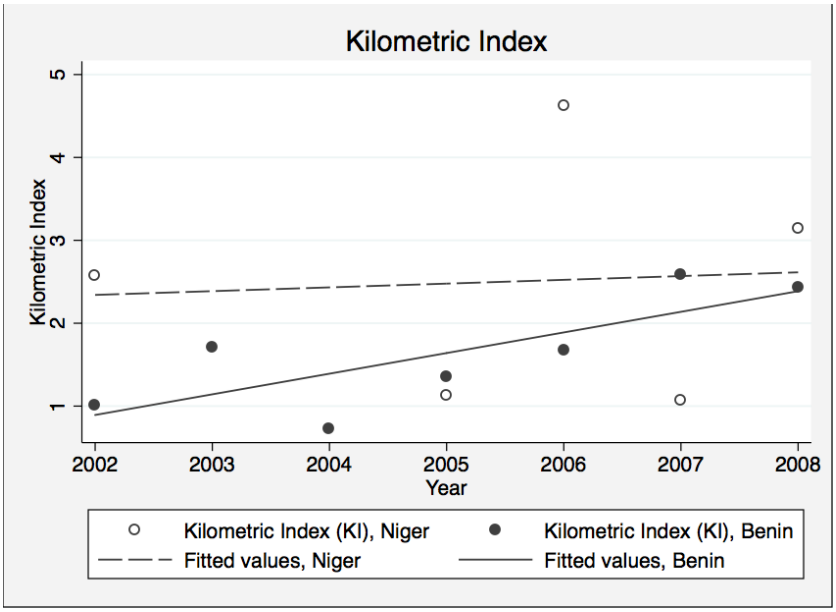
I calculated the proportion of overall variance accounted for by the village-level independent variables ($\rho(U_0)$) by dividing the variances at that level ($\text{var}(U_0)$) by the total variance of the models. All of the multilevel statistical models were estimated using the restricted maximum likelihood (REML) method. Statistical analysis was conducted using Stata 12.0 (StataCorp, College Station, Texas, USA).

3.5 Results

3.5.1 Biodiversity Conservation Outcomes

Annual measures of mammal species abundance in Benin's WNP showed a clear positive trend from 2002-2008 (Fig. 3.3. p=0.04). Results suggest increases in the abundance for 14 of the

species surveyed in Benin (Table 3.2), including lions and all large ungulates, species targeted for improved management under ECOPAS (Appendix F). By contrast, the trend line for this relationship in Niger was relatively flat (p=0.911) indicating very little change in species abundance over time. Change in abundance was not statistically significant for any species in Niger, though data were available for only five years of the series compared to seven for Benin. Mean abundance of seven of the 20 surveyed species in the WNPs of Benin and Niger over the study period was statistically significantly different (Table 3.2). The West African buffalo, western buffon's kob, red-fronted gazelle, and oribi were more numerous in Niger while bushbuck, gray duiker and green monkey were found in greater abundance in Benin.



Note: data unavailable for years 2003-2004 for Niger.
Data source: WNP Authorities and ECOPAS.

Figure 3.3. Kilometric index of mammal species abundance in the W National Parks of Benin and Niger, 2002-2008

Overall species abundance was greater overall in Niger. The average total annual kilometric index for Niger's WNP was 2.5 during the study period with a high of 4.6 compared

to a 1.6 average in Benin and a high of 2.6. The relatively large kilometric index measure for Niger in 2006 was due to the presence of exceptional numbers of buffalo (*Syncerus caffer*): the kilometric index for this species in 2005 was 0.26, but it jumped to 3.03 in 2006 (Service Ecologie Parc W du Niger 2006). Olive baboon (*Papio anubis*) and roan antelope (*Hippotragus equinus*) numbers were also significantly higher in 2006 than 2005 in Niger.

Table 3.2. Change in mammal species abundance in the W National Parks and satellite Hunting Zones of Benin and Niger, 2002-2008[a]

		Benin	Niger		Benin	Niger
English Name	**Latin Name**	**Mean KI[a]**	**Mean KI[a]**	**Difference in Mean KI[a]**	**Change in Abundance**	**Change in Abundance**
Large Ungulates						
African Elephant	*Loxodonta Africana*	0.095	0.083	No	I**	D
West African Buffalo	*Syncerus caffer*	0.198	1.260	Yes*	I*	D
Roan Antelope	*Hippotragus equinus*	0.404	0.295	No	I*	D
Defassa Waterbuck	*Cobus defassa*	0.011	0.018	No	I*	I
Western Hartebeest	*Alcelaphus buselaphus*	0.073	0.040	No	I	I
Small Ungulates						
Common Warthog	*Phacochoerus aethiopicus (africanus)*	0.134	0.111	No	I+	D
Western Buffon's Kob	*Kobus kob*	0.0378	0.088	Yes**	I	I
Bushbuck	*Tragelaphus scriptus*	0.0310	0.016	Yes+	I	I
Bohor Reedbuck	*Redunca redunca*	0.009	0.014	No	D	I
Red-Fronted Gazelle	*Eudorcas rufifrons*	0	0.034	Yes**	NP	I
Oribi	*Ourebia ourebi*	0.0356	0.096	Yes**	I*	I
Gray (Common) Duiker	*Sylvicapra grimmia*	0.073	0.038	Yes*	I	D
Red-flanked Duiker	*Cephalophus rufilatus*	0.023	0	No	D+	NP
Primates						
Olive Baboon	*Papio anubis*	0.330	0.288	No	I	I
Patas (Red Monkey)	*Erytrocebus patas*	0.112	0.093	No	D	I
Green Monkey	*Cercopithecus aethiopicus*	0.043	0.002	Yes*	I	D
Carnivores						
Lion	*Panthera leo*	0.006	0.010	No	I+	I
African Wild Dog	*Lycaon pictus*	0	0.004	No	NP	I
African Civet	*Civettictis civetta*	0.001	0.001	No	I	I
Side-striped Jackal	*Canis adustus*	0.016	0.011	No	D	I
Total		1.632	2.502			

Sources: CENAGREF and ECOPAS 2008 and Lamarque 2004.

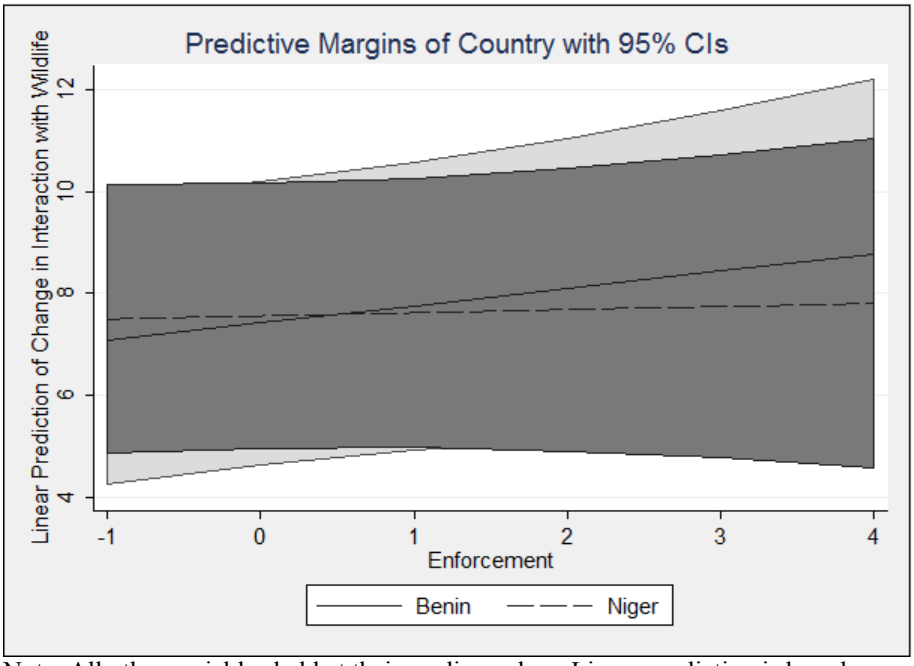
[a] Abbreviations and symbols: KI: Kilometric Index; I: Increase in species abundance; D: Decrease in species abundance; NP: Species not present; ** $p<0.01$, * $p<0.05$, $^{+}$ $p<0.10$. Difference in Mean KI between Benin and Niger calculated using a two-tailed t-test. Change in species abundance results based on OLS models that regressed kilometric index on year for each species.

Household-level measures of mammal species abundance corroborate findings based on direct counts. Results suggest that biodiversity levels increased from before to after the ECOPAS project in both countries, but overall biodiversity levels were higher in Niger than Benin ($z=-4.06$; Prob > |z| = 0.00). The reported incidence of household conflict with wildlife was nearly identical in Benin (103 of 149 or 69% of households) as in Niger (101 of 150 or 67% of households). However, mean reported change in conflict with wildlife was more than a point higher on a 10-point scale in Niger (8.3) than Benin (7.0). More households in Benin than Niger (96% vs. 66%) reported a change in the incidence of conflict with wildlife during the study period. The change in the intensity of human wildlife-conflict appears to have been greater in Niger where 64% of households reported the maximum increase in conflict with wildlife compared to 32% in Benin. The three villages immediately adjacent to the Park in Niger (Boumba, Koro Goungou, and Moli Haoussa) experienced the largest average increases human-wildlife conflict, while Kandèrou in Benin had the greatest proportion of households reporting decreases in conflict with wildlife, with half reporting the most extreme value for decrease (1 on a 10-point scale).

There is some evidence of national level differences in biodiversity levels (Table 3.3). Higher levels of enforcement were associated with greater increases in species abundance in Benin in Model 1 ($p<0.1$).[22] While this finding was not statistically significant in the multi-level specification Model 3, the negative interaction term between country and enforcement suggests similar results: there was a slightly stronger association between higher levels of enforcement on wildlife abundance in Benin than in Niger (Fig. 3.4). However, neither country nor the

[22] The coefficients of the constitutive elements of interaction terms should not be interpreted as unconditional or average effects (Brambor et al. 2006). Thus, here the coefficient on enforcement only captures the effect of enforcement on wildlife abundance when country is zero (i.e., country = Benin).

interaction of enforcement and country were statistically significant predictors of change in household conflict with wildlife in any of the regression models(Brambor et al. 2006)(Brambor et al. 2006).



Note: All other variables held at their median value. Linear prediction is based on the fixed effects portion of the model and enforcement is mean-centered.

Figure 3.4. Marginal effects of enforcement on change in household conflict with wildlife by country

Participation in ECOPAS activities was positively associated with an increase in conflict with wildlife (p<0.01 in Models 1 and 3). For a one unit change in participation in ECOPAS activities a 14% change in household conflict with wildlife is expected. Reported household participation in ECOPAS activities was more than three times greater in Niger (69%) than in Benin (21%).

Table 3.3. OLS and multilevel linear regression model results

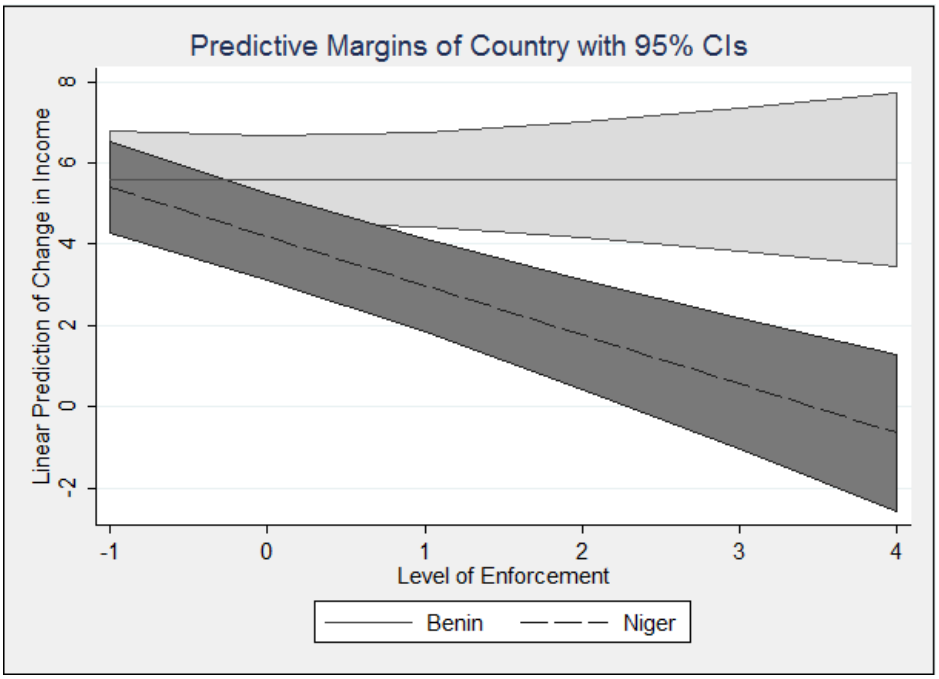
Variables	*Change in Conflict with Wildlife*			*Change in Income*		
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Fixed Effects						
Main independent variables						
Country	0.917		0.141	-0.787		-1.413
	(0.992)		(2.358)	(0.931)		(0.950)
Enforcement	0.466+		0.339	-0.301		-0.00147
	(0.206)		(0.260)	(0.238)		(0.237)
Country*Enforcement	-0.572		-0.278	-0.991*		-1.21***
	(0.341)		(0.344)	(0.368)		(0.307)
Household level variables						
ECOPAS Participation	1.409**		1.409**	0.832		0.840*
	(0.307)		(0.495)	(0.722)		(0.423)
Natural Resource Dependence	-3.220		-0.617	0.479		1.537+
	(2.621)		(1.124)	(0.795)		(0.870)
Sex of Household Head	0.586		0.330	-0.480		-0.377
	(0.349)		(0.585)	(0.605)		(0.516)
Age of Household Head	-0.008		-0.028+	-0.022+		-0.03*
	(0.023)		(0.017)	(0.012)		(0.013)
Education Level 1	0.703		0.236	1.243*		0.722
	(1.206)		(0.530)	(0.396)		(0.459)
Education Level 2	-0.405		-0.330	1.642**		0.855
	(1.468)		(0.636)	(0.438)		(0.537)
Household Size (ln)	0.160		0.323	-0.328		-0.457
	(0.332)		(0.438)	(0.419)		(0.350)
Constant	6.968**	7.237***	11.98***	5.594**	5.118***	7.771***
	(1.591)	(0.729)	(2.879)	(1.044)	(0.368)	(1.392)
Village level variables						
Distance to Guard Post (0km)			-2.770			-1.213
			(2.722)			(1.075)
Distance to Guard Post (12km)			-3.745			-2.776**
			(2.594)			(1.070)
Distance to Market (0-24km)			-0.625			1.027
			(2.509)			(0.980)
Distance to Market (25-50km)			-3.220+			0.445
Random Effects						
var(U_0)		3.938	3.413		.837	.3444
ρ(U_0)		6.929	6.759		9.052	7.379
Intra-Class Correlation Coeff.		0.362			0.085	
Observations	202	203	202	291	295	291
R^2	0.149			0.217		
Pseudo-R^2 (village level)			0.133			0.588
Pseudo-R^2 (individual level)			0.025			0.185

Note: There were 8 villages in the multilevel models. Reference categories were high school education or above (Education), furthest village (47 km) (Distance to Guard Post), and greater than 50 km (Distance to Market). Household members variable was (natural) log transformed. Pseudo-R^2 at the village level = $(\text{var}(U_{0j})_{unconditional\ model} - \text{var}(U_{0j})_{conditional\ model})/ \text{var}(U_{0j})_{unconditional\ model}$; Pseudo-$R^2$ at the individual level = $(\text{var}(\varepsilon_{ij})_{unconditional\ model} - \text{var}(\varepsilon_{ij})_{conditional\ model})/ \text{var}(\varepsilon_{ij})_{unconditional\ model}$; Robust standard errors in parentheses; *** $p<0.001$, ** $p<0.01$, * $p<0.05$, $^{+}p<0.10$.

3.5.2 Livelihoods Outcomes

On average, there was little change in household income from 2000-2011 in Niger (mean=5.4) or Benin (mean=4.8; Prob > |*z*| = 0.19). Although neither country nor enforcement variables on their own were statistically significant predictors of change in household income, there is strong evidence that the effect of enforcement varies by country (Table 3.3). Increasing enforcement was associated with sharply decreasing income levels in Niger, whereas in Benin the effect of enforcement on income was relatively constant (Fig. 3.5). At the lowest and mean levels of enforcement, change in income was similar for both countries. However, at the two highest levels of enforcement there was a more than 5-point difference in predicted change in income between Benin and Niger (on a 10-point scale). National political context thus mattered for those households experiencing greater levels of enforcement. In practical terms, this finding suggests that the households that reported experiencing the two highest levels of enforcement in Niger (n=76 or more than half those surveyed) saw the most extreme declines in income on the scale.

Residing in a village at a medium distance from a guard post (12 km) was associated with an almost three-point decrease in income (-2.8 on a 10-point scale; $p<0.01$). This finding only applied to two villages, Kandèrou and Petchinga, both of which are in Benin. Participation in the ECOPAS project was also associated with change in income: on average, households participating in ECOPAS activities experienced a one-point increase in income regardless of country context ($p<0.05$). Household dependence on natural resources relating to livestock-raising, fishing, and forest product use was also associated with an increase in income (1.5 on a 10-point scale; $p<0.10$). Increasing age of the household head correlated with a very slight decrease in income ($p<0.05$).



Note: All other variables held at their median value. Linear prediction is based on the fixed effects portion of the model and enforcement is mean-centered.

Figure 3.5. Marginal effects of enforcement on change in income by country

3.6 Discussion

Results indicate that the ECOPAS project successfully increased biodiversity levels, as measured by mammal species abundance, in the W Region Transboundary Reserve. Increases were greater in Benin's portion of the Reserve, but overall levels of biodiversity were slightly higher in Niger. There is mixed support for the hypothesis that increasing enforcement due to ECOPAS led to increasing biodiversity levels. This relationship obtained in Benin but not Niger. Qualitative evidence suggests that relatively better national level governance and more advanced decentralization were not the reason for this difference. Rather, ECOPAS did not adequately engage with decentralization in Benin (Aveling et al. 2008), and local governments were marginalized during project implementation. With deepening decentralization reforms in the

post-ECOPAS period, local politicians felt empowered to encourage extractive use of the Park by their constituents (see chapter 4).

The positive association between enforcement and human-wildlife conflict in Benin is more likely due to the different initial conditions in the two countries: Benin's WNP was practically denuded of wildlife prior to ECOPAS compared to Niger (CENAGREF 1999; Monfort et al. 1994). Increased hunting, grazing, and the expansion of agriculture into the Park in Benin and Burkina Faso as well as outside the Park in Niger had caused large mammals to migrate to WNP in Niger before ECOPAS began implementation (IUCN 1996). Further ecological research into the dynamics and spatial distributions of different mammal species in the transborder W Region would open up avenues for more detailed exploration of the influence of national political context and other factors on biodiversity outcomes.

That participation in ECOPAS activities was associated with an increase in household-level conflict with wildlife is expected since such participation often entailed employment in the Park, including as park rangers, ecotourism guides, or seasonal labor. Participation rates were much higher in Niger than Benin, especially in villages directly adjacent to the Park. The distribution of participation suggests that ECOPAS may have targeted benefits to households in villages more likely to experience conflict with wildlife in Niger. It may also reflect deeper community involvement in and knowledge of ECOPAS in Niger where each of the study villages included presence of WNP guards or personnel. By contrast, only one study village in Benin had a guard post (Alfakoara) and this is where reported ECOPAS benefits were the greatest among villages on that side of the border. Finally, because overall levels of biodiversity were higher in Niger the expectation is that, on average, households involved in activities related to the Park through participation in ECOPAS would report greater conflict with wildlife. Only 18% of

households in Benin reported being involved in ECOPAS and experiencing an increase in conflict with wildlife. By contrast, in Niger, this number was 63%, with 75% of those participating in ECOPAS reporting the highest levels of change in conflict with wildlife.

Like many donor-funded conservation and development projects implemented across the tropical world over the past quarter century (McShane and Wells 2004), ECOPAS does not appear to have substantially increased average incomes for WNP neighbors in either Benin or Niger. The absence of data from control villages in Niger prevents more rigorous testing of this conclusion, but evidence from Benin suggests wide variation in ECOPAS impacts on household income (chapter 2). Households that experienced relatively less enforcement and more project benefits saw their incomes increase, while those reporting greater increases in enforcement and less benefits saw their incomes decrease.

Livelihoods results from this comparative study suggest that national political context strongly moderated the effect of enforcement. Increasing enforcement at the household level on its own did not affect income, but in the national political context of Niger, which was marked by political instability, poor governance, and a slow, uneven process of decentralization, the greatest increases in enforcement were strongly associated with decreasing incomes. This may stem from the fact that households in Niger, on average, were more dependent on the natural resources for which access was most likely to be curtailed under increased enforcement than their counterparts in Benin. The average proportion of household income derived from these resources—livestock, fishing, and forest products—in Benin was 20% compared to 26% in Niger. Alternative livelihoods possibilities tend to be less common in Niger than Benin, given severe economic instability in Niger and generally better economic performance in Benin over the past decade (World Bank 2013b). As the literature on political economy suggests (Baland et

al. 2010), political instability and low overall governance effectiveness in Niger have likely been key determinants of this economic performance.

The varying extent of decentralization reforms may be linked to the different effects of enforcement in Benin and Niger. The two villages in Niger where the largest number of respondents reported experiencing the maximum change in enforcement, Boumba (45%) and Koro Goungou (63%), are located in municipalities that do not receive revenue from Park receipts under decentralization. By comparison, the two villages located in Tamou municipality had considerably fewer households report the highest increase in enforcement (27% in Moli Haoussa and 18% in Tamou). This result may be because the former pair of villages is directly adjacent to the Park and so increased enforcement within them was a response to the perception that livelihoods activities in these villages posed the greatest threat to the Park. At the same time, because these households are in municipalities that are less "articulated" (Chhatre 2008) to municipal and national democratic institutions they may have had less of a voice in how ECOPAS was implemented. Not only were households in Boumba and Koro Goungou unable to receive benefits brought by Park revenues under decentralization reforms, they also received fewer benefits on average directly from the ECOPAS project. That participation in ECOPAS is a significant predictor of increasing income suggests that benefits brought through the project were important for many households in the W region on both sides of the border.

The village-level indicator of enforcement did appear to have a strong effect on incomes. On average, households in the two villages (Kandèrou and Petchinga) located a medium distance from a park guard post (12 km) saw a large decline in income. Qualitative data (see chapter 4) suggests that this finding is likely because these villages were in areas targeted by enforcement by ECOPAS and were close enough to the guard post to make enforcement easier, but far

enough away not to benefit from activities associated with the Park (e.g. employment as guards, guides, or seasonal labor). Indeed, the lowest levels of participation in ECOPAS among the study villages were reported in Kandèrou and Petchinga.

Examination of biodiversity and livelihoods outcomes together suggests that ECOPAS implementation led to increases in the former while negatively affecting incomes for the subset of the population in Niger that experienced the greatest increases in enforcement. In Benin enforcement change had a constant effect on livelihoods, though overall change in income was slightly lower there than Niger.[23] The effect of enforcement on the trade-off between increasing biodiversity and income appears to be modulated by national political context. In the comparatively better governed, more decentralized context of Benin, enforcement appears to have had a negligible effect on income but to have increased biodiversity. In Niger, where governance quality was worse and decentralization less advanced, higher levels of enforcement had little positive effect on biodiversity but had a large negative impact on household income. These findings support the conclusion from recent research on multiple outcomes in local resource governance (Persha et al. 2011) and PA (Miteva et al. 2012) systems that future analysis should devote more attention to the role of extra-local contexts.

3.7 Conclusion

This study advances theoretical and empirical understanding of PA impacts and natural resource governance in two main ways. First, it opens up the "black box" of why PAs generate certain social-ecological effects by focusing on a key causal mechanism: donor-supported changes in enforcement. Second, it extends the current generation of quantitative PA impact studies by using a mixed methods approach in a transboundary conservation context.

[23] As Chapter 2 showed, however, there was significant heterogeneity among village subpopulations in Benin.

Drawing from available theory, this study complements research that has focused on the identification of broad *patterns* of PA impact (see e.g. Canavire-Bacarreza and Hanauer 2013; Miteva et al. 2012; Nolte et al. 2013b; and studies reviewed in Miteva et al. 2012; Pfaff et al. 2013) through analysis of *processes* producing impact. Examining variation in the effect of enforcement on more than one outcome and in different national political contexts of Benin and Niger opens up analytical possibilities to refine theory in this area. Results reveal that national political context can affect the impact of PAs and interventions centered on them by shaping the influence of changes in enforcement. National political context may not matter on its own (Brooks et al. 2012), but my findings suggest that it can have significant effects in combination with other causal variables, such as enforcement. Changing levels of enforcement had little effect on changes in income in Benin but the highest levels of enforcement had strong negative effects on income in Niger.

One implication of this study is that researchers and policymakers alike should explicitly consider national political context. Without doing so research conclusions may be inaccurate and policy ineffective. Promulgation of "one size fits all" policy that insufficiently engages with the national political context can threaten the sustainability of outcomes (Chhatre and Saberwal 2005). This can be seen, for example, in the failure of ECOPAS to engage sufficiently with the national political process in Niger to ensure that project funds did not displace national support for WNP. Prior to ECOPAS a national budget line provided funding for Park staff and management, but with far larger ECOPAS funds available and facing hard budget choices, the Nigerien government eliminated this budget line (WNP Conservator, interview, June 2011). Better understanding of broader political contexts is also important as extra-local factors may be those most amenable to influence through policy change (Dietz and Henry 2008).

A caution is in order, however. The paucity of well-defined theory about how national political context influences the effects of enforcement and other causal mechanisms (Ferraro 2005, Barrett et al 2006, Miteva et al 2012), suggests care should be taken in interpreting empirical results to avoid hasty, atheoretical generalizations. Qualitative data shed light on the links between national political context, local level enforcement, and outcomes in the two cases studied here, but further comparative research is needed to untangle the complex causal pathways through which PAs produce impacts. In particular, data from a larger number of countries could help "unpack governance" (Engle and Lemos 2010) to test hypotheses about the influence of specific elements of national political context on enforcement and other local-level variables that affect PA outcomes.

Such research should extend to include comparison of PAs and resource governance in a variety of ecological contexts. Recent work in Tanzania has shown how PA establishment in a mangrove ecosystem led to negative near-term but positive long-term livelihoods impacts due to improved shrimping and fishing resulting from mangrove protection (McNally et al. 2011). Research on impacts in other ecosystem types promises to advance understanding of whether and how the nature of the resource affects livelihoods. For example, the link between greater enforcement and positive livelihoods outcomes may be shorter in a mangrove environment in which fish and shrimp populations can recover relatively quickly than in forest or savanna ecosystems where key resources such as trees or large mammals typically take much longer to generate value. Literatures on the commons and PA impacts have rarely attended to the potentially variable role of ecosystem type in linking livelihoods outcomes to changes in the resource base due to enforcement.

The second main contribution of this chapter is methodological. This study combines qualitative and quantitative analysis to examine processes generating PA outcomes at multiple levels in different country contexts. Despite repeated calls for more rigorous evaluation of the impacts of conservation policy (Agrawal and Redford 2006; Ferraro and Pattanayak 2006), the quantity and quality of outcome monitoring of PAs and projects centered on them remains minimal (Pullin et al. forthcoming). Impact studies have assessed only a very small percentage of the total number of donor-funded ICDP projects (Brooks et al. 2012; Miller 2013 (in review)) and PAs (Pullin et al. forthcoming; West et al. 2006). There is also comparatively little evidence from Francophone West Africa, which has received less scholarly attention compared to the eastern and southern regions of the continent (Holmes et al. 2012). Further, despite the increasing prevalence of transboundary PAs (there are now more than 225 of them (UNEP-WCMC 2007)), the social ecological impacts of transboundary PAs have not been rigorously analyzed. This study thus provides rare evidence from Francophone West Africa and is the first of which I am aware to analyze both social and ecological impacts of a transboundary PA. Further research on transboundary PAs, like those of the W region, may serve as a useful laboratory for examining how national political context shapes the effect of local governance on outcomes.

Such research promises to complement the current generation of quantitative PA impact studies (Miteva et al. 2012; Nolte et al. 2013b), which have typically made use of a small number of indicators available in national-scale GIS datasets. However, the conclusions of these studies remain at a high level and they may not enable assessment of the range of potentially relevant causal variables identified in resource governance literature (Ostrom 1990, 2007). This study demonstrates the value of comparative case studies based on the collection of original data as a

complement to larger scale econometric approaches to impact evaluation. Chapter 2 used quantitative program evaluation methods with treatment and control groups to compare the impact of ECOPAS in Benin. However, on its own it was unable to test hypotheses about causal mechanisms or the influence of the national political context. The cross-border comparative analysis of households in ECOPAS intervention villages presented here enables such hypothesis testing. In this way, this study has sought to advance empirical and theoretical knowledge of protected area impacts and environmental governance more generally.

Chapter 4

The Missing Middle: International Biodiversity Aid and the Politics of Property around Benin's W National Park

When two elephants fight, the grass suffers.

-African Proverb

4.1 Introduction

At the end of 2010 a song of protest rang out across the airwaves in the Banikoara region around Benin's W National Park. In their hit "*Foreba Ba Sum Kam Kua*" ("The Foresters Reduced Us to Nothing") the popular band Orchestre de Yinyimpogou sang:

> *Children of Banikoara, look how the foresters reduced us to nothing… You who grow sorghum, you who grow corn, you who grow cowpeas, you who raise livestock: look how the foresters reduced us to nothing! This is what the foresters know how to do, when they trek into the bush… If they see you, they'll get you… We farmers who produce cotton, the foresters have reduced us to nothing … If they see your cattle they kill them. If they see that your cattle are fat they will take them and give them to their wives.*[24]

Recorded in the two main languages spoken in this savanna region of West Africa, Baatonum and Fulfulde, the song responded to a dramatic raid in October 2010 by Park authorities and the Beninese army on several settlements illegally located within the Park. These state agents systematically burned crops and houses, shot cattle, and pierced cooking pots to discourage

[24] I thank Dramane Kegamonre Zimé and Ryan Smith for translating the lyrics to this song.

people from returning (Photo 9). No one was killed or injured, but according to a local police report the operation left more than 1,100 people homeless and dispossessed of their livelihoods (Bah-l'Imam 2010; Photo 10).

The song concludes by appealing to a litany of local and national politicians to "save us from this disaster." These public figures were posed in stark contrast to *foreba* ("foresters" or park guards in Baatonum), the villains responsible for the violent eviction. Foresters are agents of the state trained in forestry and law enforcement who are responsible for managing Benin's protected area (PA) estate. As in other parts of Francophone Africa (Poppe 2012; Sodikoff 2012), foresters have been feared since the colonial era due to their reputation for harsh enforcement tactics, corrupt practices, and their historic role in forced labor conscription. Derived from the French *forestier*, the term has come to denote any state PA staff, including those from the National Centre for Wildlife Reserve Management (CENAGREF), which is responsible for managing Benin's national parks.

Two years prior to the eviction in Banikoara a very different song could be heard on the radio. The single "Na Siara" ("Thank You"), performed by another well-known local group, Orchestre de Pkade, praised foresters, CENAGREF, and the ECOPAS project:

> *You, poacher, the forester is not your enemy.*
> *You, farmers, the forester is not your enemy.*
> *You, sawyers, the forester is not your enemy.*
> *The foresters keep watch for our well-being.*
> *That's why I thank the people of CENAGREF and ECOPAS.*
> *That's why I thank the foresters*.

These dueling pop songs colorfully express the on-going political contestation over land, conservation, and development in the W region of northern Benin. In line with the tradition established by praise-singing *griots* popular across West Africa (Hale 1998), the two dominant interests in the region—local political-economic elites and CENAGREF—had commissioned

these two contrasting songs. Both of these interests sought to assert control over territory in the Park and its periphery. CENAGREF's mandate is to ensure the protection of the Park's biodiversity. In practice, this mandate has meant that CENAGREF intervenes both within the Park and in the lands immediately adjacent to it. CENAGREF's dependence on aid funds (ECOPAS 2005) structures its accountability largely upward to the Ministry for Environment (MEHU) and foreign aid donors. By contrast, political-economic elites in the region derive their power from local resources and populations. As a result, their interest lies primarily in productive use of land in and adjacent to the park for cash crops and cattle grazing.

This chapter examines the changing relationship between these two interests, focusing on the catalytic role of international biodiversity aid. Specifically, it analyzes how the ECOPAS project altered property relations and local political competition, and with what effect, for people around W National Park (WNP). I argue that reallocation of property rights through ECOPAS activities created uncertainty for local resource users as well as park managers in the periphery of the Park and that this uncertainty is one of the most important legacies of the project. It opened up new patronage opportunities for local political-economic elites at the expense of many people's livelihoods as well as the sustainability of conservation and resource governance in the region. Viewed in terms of the proverb that opens this chapter, local elites and CENAGREF are the two elephants, and as a result of their fighting it is the rural people on the periphery of the Park who have suffered.[25]

[25] The origins of this proverb are unclear, but it is widely used in different parts of Africa to suggest that ordinary people are the ones likely to be hurt in a conflict between two powerful people or groups. It has special resonance in reference to disputes between local officials and leaders. I heard the proverb several times during my fieldwork, including from the former head of Niger's WNP who used it to describe his own predicament in the 1980s when the Nigerien president and certain ministers disagreed about allowing powerful elites to hunt and graze their cattle in the Park (interview, Niamey, July 2011).

This research advances theoretical and empirical understanding of the impacts of PAs and international aid projects centered on them by demonstrating the pivotal role of sub-national politics and political actors. An earlier generation of research on the social impacts of conservation and conflict over natural resources in the developing world portrayed a powerful central state more or less capable of imposing its will on dispersed, largely immobilized rural populations (e.g. Guha 1989; Neumann 1998; Peluso 1992). In the past 15 years a series of in-depth studies has evinced a more nuanced approach to the state and local communities in conservation and natural resource governance (e.g. Agrawal and Gibson 2001; Gibson 1999; Sodikoff 2012; West 2006). However, in contrast to extensive scholarship on natural resource decentralization (Larson and Soto 2008; Ribot 2004), writings on PA impacts and related conservation interventions have tended to skip over the level between the central state and local communities (cf. Chhatre and Saberwal 2006). Yet political arenas at this meso level—from municipalities, prefectures, and districts to states and provinces—comprise a critical link between community, national, and international processes that shape social-ecological outcomes.[26] (Raffles 1999; Sivaramakrishnan and Agrawal 2003)(Raffles 1999; Sivaramakrishnan and Agrawal 2003) Political and economic interests in this "missing middle"[27] mediate national policies and international aid projects. Powerful local actors can block, direct, or smooth implementation using a variety of legal and extra-legal means. Thus, only by squarely

[26] In this chapter, I use the terms meso, middle, sub-national, and sometimes local or regional to refer to the various political-administrative levels located between village or community and nation. I employ the notoriously slippery term "local" primarily to refer to the geographic and administrative space around WNP, especially within municipalities. "Region," as used here, typically denotes more than one municipality or the entire peripheral area of WNP. Context should make clear when these terms are used otherwise (e.g. local community in reference to village or region in reference to a supra-national geographic area). For thoughtful treatments of the concepts of "region" and "local" see Sivaramakrishnan and Agrawal 2003 and Raffles 1999, respectively.

[27] I thank Arun Agrawal for suggesting this phrase, which usefully captures the range of levels between village and nation that is the focus of this chapter.

addressing this level can we understand the power-laden pathways through which international conservation and development projects produce social-ecological effects.

Here I illustrate the importance of the meso level to research on the social impacts of international conservation and development interventions through detailed analysis of property rights, access, and local politics in the W region of Benin before, during, and after the ECOPAS project. Like many other countries in Africa and across the developing world (Ribot 2004; Ribot et al. 2010), municipalities in Benin form the key administrative locus between the nation-state and village because they have received the bulk of new responsibilities and powers under on-going decentralization reforms.

This study suggests that changes to property rights and patterns of access are likely to be among the most enduring effects of externally-driven conservation projects, but that the failure of aid projects to adequately engage with the messy realities of local level politics can undermine their effectiveness and sustainability. I focus on local politics in the W region of Benin but make reference to the dynamics of property and politics in the W region of neighboring Niger, where ECOPAS also intervened, as well as similar localities in northern Benin where ECOPAS did not intervene (see chapters 2 and 3). These comparisons strengthen conclusions about how the conjuncture of ECOPAS, local political-economic elites, and CENAGREF affected property, livelihoods, and conservation in Benin's W region. They also suggest the relevance of these dynamics in other parts of Africa and the developing world more generally.

Before delving into detailed case study analysis, I first present a theoretical overview of property rights and access in relation to PAs and external conservation interventions. Based on literatures on conservation and natural resource governance, I develop the argument that meso-level political arenas are crucial to these impacts even as they are often overlooked in current

scholarship. I then briefly describe the research methods used in this study and provide background information on the W region, focusing on the history of property relations and the changing constellation of interests in the region from the colonial era to the start of the ECOPAS project. The core of this chapter then characterizes property rights, access, and local politics in the periphery of WNP before, during, and after ECOPAS. I connect the unfolding of ECOPAS and processes of democratic decentralization with changing property relations and practices among local elites, park authorities, and villagers living around the Park. I conclude the chapter by recapitulating the argument, describing the broader theoretical relevance of this study, and speculating on the longer-term legacy of ECOPAS.

4.2 Theorizing Property and the Impacts of International Aid for Biodiversity Conservation

4.2.1 The Relationship of Clear Property Rights to Social and Ecological Outcomes

Common property theory suggests that clear property rights, particularly those pertaining to tenure security, shape incentive structures for sustainable resource governance (Ostrom 1990; Pagdee et al. 2006). Property relates to the ownership and use of a given resource. Property rights refer to a situation in which the ability to benefit from a resource is sanctioned and enforceable as a result of law, custom, or convention (Macpherson 1978). Property rights thus involve relationships among different kinds of social actors linked to one another with respect to resources and objects of value (Sikor and Lund 2009). Five types of property rights are especially relevant to the use of resource commons such as forests and pastures: 1) withdrawal—the right to obtain resources from a defined geographical area; 2) management—the right to regulate use and make improvements to the resource; 3) income—the right to derive revenue

from the resource; 4) exclusion—the right to determine who can withdraw resources, and 4) alienation—the right to sell or lease the other four property rights (Agrawal and Ostrom 2001; Mwangi et al. forthcoming; Schlager and Ostrom 1992). Exclusion and alienation rights assume particular importance for sustainable natural resource governance. If resource users only have withdrawal rights, their incentive to maintain the resource stock are weak because they are dependent on other users' withdrawal practices to ensure the condition of the resource (Schlager and Ostrom 1992). Even with management rights, the incentive for sustainable use may be weak as their ability to use the resource may be appropriated by the owner. In cases defined by these two rights, effective enforcement by the owner or other powerful claimant may be the only way to prevent overexploitation of the resource.

Although access (as distinct from withdrawal) is conceived as a property right in studies of the commons (Schlager and Ostrom 1992), another strand of literature challenges this conception as too narrow (Ribot and Peluso 2003; Sikor and Lund 2009). Because people may access and derive benefits from resources even without holding property rights to them, studies in this vein view access as encompassing property. Ribot (1998), for example, shows how markets, labor, knowledge, and social relations in addition to customary property rights all provide a means through which various social actors gain access to and benefit from resources along a charcoal commodity chain in Senegal.

The importance of different mechanisms of access notwithstanding, clarity of property rights is widely regarded as leading to better social and ecological outcomes not only in community commons but also state-managed PAs. Greater clarity over rights and duties and empowerment through the process of acquiring land titles and setting boundaries are key factors in lessening negative or achieving positive social impacts of PAs (Coad et al. 2008; Pullin et al.

forthcoming). Clarity of land rights also appears to be a key determinant of environmental impacts. For example, in the Brazilian Amazon Nolte and colleagues (2013a) found that the clear, uncontested tenure rights consistently predicted PAs success in avoiding deforestation.

By contrast, the creation of a new PA or change in the management status or boundaries of an existing PA can alter property rights so as to create confusion and lead to negative social and ecological impacts. Physical displacement and eviction from PAs is perhaps the most extreme example of how PAs may influence property rights (Agrawal and Redford 2009; Brockington and Igoe 2006). By excluding people from living in or using land within their boundaries PAs can disrupt existing systems of natural resource governance, including common property regimes, many of which are long-lived and have developed to fit their context (Peters 1994). This disruption, in turn, can negatively affect livelihoods and lead to conflict over land (e.g. McDermott Hughes 2006; Peters 1994). In some cases, the uncertain institutional environment created by a new PA can lead to rapid "claiming" of land in and around it (Brandon et al. 1998; Peters 2004). The strategy of creating buffer zones around already existing national parks to create Biosphere Reserves (Batisse 1997) can also give rise to such claiming and to ensuing confusion and conflict (Neumann 1997). At worst, as cases across the tropics have shown, "paper zones" drawn in and around "paper parks" create open access areas to the detriment of diverse ecosystems and local livelihoods (Brottem 2011; Naughton-Treves 2012).

A number of studies have found that African government interventions in the area of land tenure, often with the support of international aid donors, can lead to disastrous results, especially for the poor and for women (e.g. Neumann 1998; Platteau 1996; Scott 1998). Other assessments are more sanguine. Berry (1993; 201), for example, argues that "government interventions have tended to create new spaces for maneuver and debate, rather than exerting a

decisive influence on patterns of production." She and others (Bierschenk and Olivier de Sardan 2003) find that central governments and donor agencies have more often been intrusive rather than completely hegemonic in rural African affairs. Both of these outcomes may be possible in the specific case of PA policy depending on the extent to which direct use of natural resources by neighboring communities is allowed, the enforcement capacity of the central state, and the configuration of local political-economic interests. I argue that large-scale external conservation and development projects can affect all three of these factors, but the ways in which such projects interact with local and political interests is likely to be a key determinant shaping impacts.

4.2.2 Meso-level Politics and the Impact of Conservation and Development Aid

The literature on the social impacts of protected impacts and conservation aid interventions has often focused at the village or PA scale, while largely neglecting meso- or local-level political arenas (Coad et al. 2008; West et al. 2006). Community-level research is vital, but a fuller grasp of the causal processes through which PA interventions generate impacts requires analysis of broader local-level political arenas. An expansive literature on property rights, access and authority in Africa (e.g. Berry 1993; Lund 2008; Sikor and Lund 2009) and on natural resources decentralization across the globe (e.g.Andersson et al. 2006; Larson and Soto 2008; Ribot 2004) provide theoretical insights for analysis at this level. So, too, do recent writings on the behavior and logics of state forestry agencies in meso-level political arenas (Fleischman 2012; Kumar and Kant 2005; Matthews 2011). However, with rare exceptions (e.g. Chhatre and Saberwal 2006), these literatures have not engaged with biodiversity conservation and PAs.

It is important to bring insights from literatures on meso-level resource governance to bear on PA impacts for at least four reasons. First, the meso level is becoming an increasingly important locus of environmental governance as decentralization processes unfold in more than 60 countries across the world (Lemos and Agrawal 2006; Ribot 2004). Newly empowered actors and institutions at this level refract, mediate, and otherwise shape the ultimate impacts of national policy and international aid. Decentralization laws are often vague on specifics, leaving wide latitude for local politicians and bureaucrats to determine their implementation (Chhatre and Saberwal 2006). Further, powerful local actors can be expected to channel international aid project activities for their benefit or at least to minimize the harm such activities may visit upon them (Bähre 2007; Bierschenk et al. 2000). To the extent they enjoy legitimacy, local elites[28] are also pivotal to the success of policy and project implementation "on the ground." However, although meso-level political areas are increasing in importance in many contexts, the central state remains a key actor, often retaining control of certain sectors and territory at local or regional levels. For example, many national PAs remain under central state control (Bertzky et al. 2012) even as other environmental responsibilities are decentralized. In this context, it becomes important to understand the relationship between local elected officials and central state PA authorities for these two "elephants" may exert a decisive influence on the environmental and social outcomes of aid projects even as they are influenced by such projects.

Analysis of relationship between these two actors promises new insights into the character and effects of different modes of governance as described by Olivier de Sardan (2011) that may coexist and overlap at the local level. For example, local political-economic elites are

[28] For a description of the constellation of political-economic elites at the municipal level under decentralization in Benin see Métodjo 2008. He highlights the importance of *ressortissants*, civil servants, business people, and intellectuals from the village who live in towns and cities, but who exert considerable influence on municipal politics in the rural areas where they are from.

the key actors in a "municipal" mode of governance characterized by decentralization of many functions formerly carried out by the central state to municipalities. Central state agencies, like CENAGREF, represent a "bureaucratic" mode that consists of governance performed by administrative units of the central state present at the local level. These two classes of actors, in turn, vie for influence within a "project" mode of governance that performs functions similar to the bureaucratic mode but exists as a temporary enclave that is usually spectacularly better financed (Olivier de Sardan 2011). Fuller understanding of the causal pathways through which externally-driven conservation interventions generate specific effects requires investigation of the competitive, mutually constitutive relationships among these and other modes of governance. Yet empirical study of the relationships among local modes of governance and their connection to governance at higher levels remains rare in studies of natural resources decentralization.

The second reason to train an analytical lens on the meso level, particularly in African contexts, is to better understand who benefits and who loses from the "negotiability" of property rights and access (Berry 1993; Shipton and Goheen 1992). Powerful local actors are likely to take advantage of the uncertainty that may surround changes to property rights regimes ushered in by new PA policies. Alternatively, they may contest such changes if they feel they would undermine their financial or political support (Andersson et al. 2006).

A third reason for meso-level analysis is that it presents an opportunity to improve understanding of environmental governance by moving beyond the state-society dichotomy characterizing an earlier generation of research. Earlier studies found, on one hand, a state that is either predatory or incompetent with priorities that do not match local interests and, on the other, inert communities that are helpless against these forces with little hope of influencing or benefitting from them (Migdal et al. 1994; Peluso 1993). Alternatively, other studies have

valorized "participatory" approaches that treat communities as harmonious and undifferentiated when in reality they are suffused with power and history and interact with larger state and market agendas of powerful external actors (for a review see Agrawal and Gibson 1999). Analysis at the meso level can bring certain features of governance into relief that may be less apparent at either the national or community levels. For example, analysis of municipal politics in Benin reveals the surprising finding that reforms under the Marxist-Leninist regime of the 1970s produced the most significant expansion of democracy at the local level in the post-colonial period, while widely touted national level "democratization" led to a constriction of democracy at that level (Bierschenk and Olivier de Sardan 2003). Analysis at the meso level through a conservation lens brings to light other governance dilemmas and contradictions. Of particular concern in this chapter is the extension of central state control into the peripheral areas of Benin's National Parks and the simultaneous decentralization of natural resource governance in Benin.

Finally, meso-level analysis can produce policy insights. Scholars and policymakers alike avoid the messy realities of local-level politics at their own peril since powerful local interests may undermine efforts to sustainably manage and conserve natural areas. Meso-level political arenas can be decisive for the success of policy outcomes, and politics at this level may provide "the only terrain for an effective reconciliation of interests, long-and short-term, human and natural. The rule of law is *only* as good as the legitimacy it enjoys, and righteous but unpopular statutes stand to harm rather than serve long-term interests" (Chhatre and Saberwal 2006, 81, emphasis in original). The effectiveness of local political arenas for the "conciliation of conflicting interests" (Crick 1962) will depend on safeguards against arbitrary exercise of localized power and clear relations of accountability, both downward to constituents and upward

to higher levels in the political-administrative hierarchy. Research at the meso-level attuned to the ways that this level is simultaneously shaped by and shapes local community as well as national and international levels thus promises new insights into the social impacts of PAs and related conservation aid.

4.3 Research Methods

The methods used in this research are described in the introduction to this dissertation, but here I provide additional detail on those used in this chapter. I combined qualitative and quantitative data collected in 2008 prior to the conclusion of ECOPAS and over a longer period in 2010-2011 (after the project ended). I used mixed methods, including a household survey, individual and focus group interviews, participant observation, and archival research.

This chapter centers on archival and qualitative data, but I also use quantitative data in a comparative research design to analyze ECOPAS effects at the household level in Benin. I first compared households in four villages targeted by ECOPAS in Benin's WNP to households in villages in northern Benin that were as similar as possible to those targeted by ECOPAS but were far from the Park and thus were not influenced by the project (see chapter 1 for more detail). The "ECOPAS villages" were spread around the Park and the Djona Hunting Zone, with one in each of the four neighboring municipalities. I then compared these villages to ECOPAS-influenced villages around WNP in Niger. As in Benin, ECOPAS villages in Niger were drawn from each of the municipalities around the Park. The two-pronged comparative approach taken here enables analysis not only of whether and how households in the W region of Benin are different from households in similar conditions not affected by ECOPAS, but also why ECOPAS-influenced households might be different in Benin and Niger.

4.4 Background on the W Region and ECOPAS

4.4.1 The Social Context and Origins of W National Park

The first state PA in the W region was established in 1926 when the colonial government in French West Africa (*Afrique Occidentale Française*) created the W Reserve, which spanned territory in the colonies of Niger and Haute-Volta (now Burkina Faso) and, eventually, Dahomey (now Benin). The W National Park was officially declared in 1954. In the period leading up to and after this time colonial authorities demarcated the boundaries of the Park and forcibly removed people in dozens of villages located within them (Benoit 1999; ECOPAS 2005). At independence in 1960, WNP was divided along former colonial borders (Fig. 1.1). The largest portion of the adjacent W National Parks is found in Benin, which is flanked by the Djona and Mekrou Hunting Zones.

The population of the W region has fluctuated over time in response to the prevalence of disease, especially trypanosomiasis, conflict among competing West African empires, and colonial and post-colonial government policies (Benoit 1999). By the late 1990s some 110,000 people in 61 villages lived in the periphery of Benin's WNP or its adjacent Hunting Reserves (CENAGREF 1999). The population was and continues to be comprised of several different ethnic groups including the Bariba, Dendi, Fulani, Gourmantché, and Mokollé.[29] Bariba form the majority of the population in Banikoara, Mokollé are most prevalent in Kandi, and Dendi in Karimama and Malanville. Fulani live throughout the region, usually dispersed in settlements on the periphery of villages where space is more available for the livestock-raising activities for

[29] The term "Bariba" derives from the Yoruba word for this ethnic group and has come into common usage in the national contexts of Francophone Benin and Anglophone Nigeria where Bariba populations are found. They refer to themselves as Baatombu (pl. Baatonu). Fulani is the common term in English for members of the Fulbe (in their language) ethnic group. Gulmanceba, the term they use to describe themselves, are often referred to as Gourmanché in French and English.

which they are known. Livelihoods for the vast majority of the population in this rural area derive primarily from agricultural and pastoral activities (de Haan 1997; ECOPAS 2005). Other natural resource-based livelihoods activities, such as hunting, fishing, and gathering forest products, complement farming and herding. Hunting remains a culturally and economically important livelihood activity for many households in the W region.

4.4.2 Governance of Benin's W National Park

Since Benin's independence, the boundaries, laws and institutions developed to govern the WNP and its satellite Hunting Zones in the colonial era have largely remained in place. The Park is an IUCN category II PA in which no direct off-take of natural resources is permitted except for "scientific or management reasons" (IUCN 2013). The two Hunting Zones operate under the same rules with the exception that trophy hunting is allowed during the dry season each year. Each of the countries have instituted some kind of buffer zone around the areas of the Park and, in some cases, the adjacent reserves, in an effort to limit human impacts in the core PAs. In Benin, the buffer zone was legally defined in 1990 as a "ring of at least 5 km in width that circumscribes a classified domain [for wildlife protection]" in which all human settlement, agriculture, and livestock grazing are expressly outlawed (Decree 90-366 of December 4, 1990 article 38). However, the decree allows that "particular measures may be taken in buffer zones" (Article 58).

Benin's 1993 Forestry Law (Law 93-009) and 2002 Wildlife Law (Law 2002/16) prescribe the rules and regulations governing WNP and its adjacent hunting zones (see chapter 1). These laws prescribe various penalties for illegal behavior in relation to these areas, ranging

from fines of CFA 5,000 ($7.50 in year 2000 USD[30]), for infractions such as illegal removal of certain non-timber forest products, up to CFA 1,000,000 ($1,500 USD) for illegal grazing by domestic animals. In a national context in which GDP per capita (PPP) totaled about $1,000 in 2000, these fines can represent a huge amount of money for those subject to them.

The Wildlife Law (Article 67) includes an incentive for park guards to enforce these rules by stipulating that 20 percent of the receipts derived from fines are to be given to the individuals involved in the capture and conviction of lawbreakers (Photo 11). While maintaining these punishments for infractions, the law sought to reverse previous exclusionary laws and decrees by allowing for participatory management of wildlife: "the management of wildlife and its habitat must be made in partnership with neighboring communities in order to maintain and develop for the long-term their value and biological, ecological, socioeconomic, nutritional, scientific, cultural, aesthetic, and recreational functions" (Article 3).

Prior to the start of the ECOPAS project in 2001 a yawning gap separated the rules governing WNP and their enforcement on the ground. State management presence in the Park's buffer zone was even less. In 1996, CENAGREF was created with financing from the World Bank, UNDP, German Aid, and AFD (*Agence Française pour le Développement*) to improve management and enforcement of Benin's PAs. Until that time, legal authority for these areas rested with the Forest Service (*Direction des Forêts et Ressources Naturelles*). In addition to offering technical expertise more specific to wildlife and PAs than available with the Forest Service, CENAGREF was also structured to provide a measure of independence from bureaucratic politics within Benin's central government (CENAGREF 2002). It maintained

[30] In 2000, the average exchange rate from CFA to USD was 0.0015. USD figures used in this chapter are based on this rate.

control of its own budget and sole management authority over Benin's national parks, hunting reserves, and BZs. Donors also sought to bolster conservation in and around Benin's national parks by institutionalizing community participation in their management through the creation of the Village Associations for Wildlife Reserve Management (AVIGREF). This new structure, put in place in 1998, drew together hunters and diverse other natural resource users in a co-management relationship with CENAGREF (Tchabi 2004).

Even with these changes, authorities faced considerable challenges in managing the PAs of the W region of Benin. First, the borders of Benin's WNP are less obvious or strategic than those of Niger's WNP, where the Niger and the Tapoa Rivers clearly demarcate Park boundaries. This geographic difference has complicated law enforcement and management on the Benin side of the border (Sinsin and Hessou 1999). Second, the Park was severely understaffed, with a mere 12 guards responsible for surveillance within its vast territory along with its two hunting zones and buffer zone. Third, necessary infrastructure and resources for patrol were almost entirely lacking. In 2000, only 70 km of passable road traversed WNP. Thus, in practice, the land use restrictions applying to the Park and its buffer zone in Benin were scarcely enforced by PA authorities who concentrated their limited resources on the Park and its Hunting Reserves (former WNP Director, interview, Cotonou, January 2011). Moreover, once direct aid project funding ended in the late 1990s, AVIGREF in its co-management role with CENAGREF weakened in the W region and by the start of the ECOPAS project this institution was largely defunct (ECOPAS 2005).

The relationship between CENAGREF and other relevant state agencies at the national and local levels shapes property relations and governance in WNP and its periphery. CENAGREF has retained legal control of territory in the Park and its buffer zone. However,

though it retained a semi-autonomous position, CENAGREF itself was under the Ministry of Agriculture, Livestock, and Fisheries (MAEP). Local level administrative authority outside the Park and its hunting zones areas resided with four *sous-préfectures* (sub-prefectures) within the province of Borgu. These sub-prefectures—Banikoara, Kandi, Karimama, and Malanville—became *communes* (municipalities) with greater authority over local land and resource management under national decentralization reforms enacted in 2002. These municipalities, in turn, were divided into four to ten lower-level administrative units called *arrondissements* depending on the population and geographic size of the municipality. A *conseil communal* (communal council), elected at the arrondissement level, chooses a mayor (i.e. municipal executive or council chairperson) to lead it and govern the municipality. Despite rhetoric to the contrary, MAEP and these local-level governments have favored development and use of natural resources in the sub-prefectures around the Park, which has pitted them against the conservation mission of CENAGREF. In a context in which CENAGREF had few resources and was charged with a politically unpopular mandate, the interests of development largely prevailed, with local level authorities endorsing use of the park for agriculture, grazing, and other uses (Sinsin and Hessou 1999).

4.4.3 Property Rights, Resource Access, and Political Institutions in Benin's W Region

Land tenure arrangements in the periphery of WNP resemble those described in the literature on land in many other parts of Africa. Historically, kinship or lineage groups have held rights over land that may not be formally delimited but are widely recognized by the community in which they reside (Bassett and Crummey 1993). In Francophone African contexts, the term *terroir* often denotes these community lands. This concept refers to cultivated areas that have a specific cultural resonance for local residents based on historical and affective connections

(Bassett et al. 2007). Rules and norms governing land access and use across rural Africa are flexible (Berry 1993; Shipton and Goheen 1992) and subject to power-laden negotiation (Peters 2004). Land and the distribution of rights to use it have formed a crucial basis for patron-client relations in agrarian societies across in Africa. These relations are often based on a dynamic of "host/stranger" or "first-comer/late-comer" in which first occupants in a geographic area gain de facto property rights that they may then allocate to those who come later (Kuba and Lentz 2006). In the W region, hunter clans were the original founders of many communities, and their descendants maintain authority in determining land access and tenure (Brottem 2011). Over time, many villages were established following the internal frontier dynamic seen elsewhere in Benin (Le Meur 2006) and across sub-Saharan Africa (Kopytoff 1987).

The imposition of colonial administrative structures altered these arrangements by vesting in the state many property rights, such as those governing parks, reserves, and natural resource concessions. Outside such areas, however, the broad pattern of tenure described above continues to hold in the W Region as elsewhere in rural Africa (see e.g. Berry 2009), though demographic, economic, and political changes in the post-colonial period have shifted the property rights regime in the areas around WNP in a more individualist direction, with family groups and individual farmers often supplanting lineage groups in asserting rights over land (Brottem 2011; CENAGREF 1999).

The agrarian communities in the periphery of WNP have experienced profound changes in their land and social structure in the post-independence period. New actors and institutions have proliferated at the village and regional levels. As elsewhere in Africa (Bayart 1993 [1989]; Berry 1993), the creation of new local or regional institutions by successive national political regimes has rarely led to the abolition of previous institutions. Thus, with time, claims to power

over land and resources accrete and overlap, leading to confusion and conflict. To cope with such institutional uncertainty, local resource users seek to diversify their membership in social institutions that mediate access to the land (Berry 1993; Le Meur 1999).

The most substantive change in property relations prior to the ECOPAS project in Benin occurred in the wake of the 1972 Marxist-Leninist revolution. Territorial reform beginning in 1974 sought to eliminate customary land management structures and create new positions of local authority: *delegués* (delegates) and councils at the village or urban community level and mayors and local government councils at the sub-prefecture level. Elections, from which "traditional" chiefs were excluded, were put in place as the mechanism for selecting officials for these positions (Bierschenk and Olivier de Sardan 2003). This institutional shift limited the influence of traditional leaders, including those with authority for distributing access to land. The "traditional chieftaincy" thus became a parallel but much less powerful institution across rural Benin (Bierschenk and Olivier de Sardan 2003).

The village of Kandèrou, which lies immediately adjacent to WNP and was a key site of the evictions in 2010 described above, illustrates these dynamics. A hunter founded the village. As historically common in Bariba culture (Lombard 1965), the hunter and his seko (blacksmith) clan eventually aligned with wassangari, the princely class, providing them with land within the village territory. Administrative structures set up during the French colonial period granted a certain autonomy to each of these Bariba groups, but until the 1972 revolution wassangari princes acknowledged seko authority over land (Laye 2002). Under political reforms and state-sponsored attacks on traditional leaders as "feudal," elected delegates gained legal authority to determine land allocation and administration. Given official interdictions on the candidacy of "traditional" leaders, the delegate in Kandèrou has always been a member of the wassangari

group, which is concentrated in a part of the village called Yabadou. The founder's clan, located in the "original" village of Kandèrou Kotchèra, was largely reduced to a symbolic role in relation to land (Laye 2002).[31] A conflict therefore exists between the legal power claimed by wassangari and "legitimate" power over land claimed by the Sego, who do not accept the wassangari claims. Therefore, Kotchèra leaders have refused to recognize the elected village chief and have reclaimed their rights to control their traditional village lands (Laye 2002). This competition over village land and resources creates confusion and conflict, which poses a challenge for land management in the village territory and in the Park given the village's location flush against Park boundaries.

At the sub-prefecture or municipality level, a variety of "strategic groups" vie for authority and influence, including through engagement with externally-funded development and conservation projects (Bierschenk 1988). Key actors include "traditional chiefs" from different ethnic groups, a rural elite, including elected officials, civil servants who reside in administrative centers but have roots and continued connections to their home villages, representatives of the central state, such as many park agents, who are posted to the region but originate elsewhere, and increasingly, NGOs. Politics at this meso level is highly fragmented with unclear boundaries between different state and private organizations and levels of governance (Bierschenk and Olivier de Sardan 2003). The presence of many different political institutions and veto players whose consent is required for policy change (Tsebelis 2002) means policy implementation requires extensive negotiation which in turn inhibits political accountability and the sustainability of any policy gains. New actors and institutions have been incorporated in the

[31] Wassangari, who are said to have arrived on horseback to the Baribalands in the 15th century, have long been known as bandits and clever usurpers of power and privilege (Lombard 1965). Scholars of Bariba history and society argue that wassangari have had an exceptional ability to incorporate the power of indigenous Bariba to become the dominant political force in the society (Bio Bigou 1995; Lombard 1965).

wake of Benin's "*Renouveau Démocratique*" (Democratic Renewal) that began in 1989 and with the onset of decentralization reforms in 2002, but these changes have not substantially altered meso-level political dynamics (Bierschenk 2009; Bierschenk and Olivier de Sardan 2003). It is at this level where the hegemonic claims of the central state are mediated and, arguably, where the success or failure of externally supported interventions is most determined.

4.4.4 The ECOPAS Project

The ECOPAS project responded to calls since at least the early 1980s for greater attention to conservation in the W region (Grettenberger 1984). The region is home to several rare and endangered species and has long attracted conservation international conservation interest due to the range of flora and fauna it represents from all the major habitat types of the West African savanna belt (see Chapter 1).

ECOPAS implementation began January 1, 2001 and concluded December 31, 2008. This EU-funded project included US$7 million for project activities solely in Benin within an overall budget of US$32 million spread across the three countries of the W region. With ECOPAS support, the "W Region Reserve" became Africa's first transboundary biosphere reserve in 2002. This designation envisioned the region as a single ecological unit managed in common as it was during the colonial era, with the difference that, rather than the French government, the three post-colonial governments with responsibility for the W region would manage it with support from a confederation of European countries (the EU). Although the ECOPAS project included a variety of activities, as described below and elsewhere (chapters 3 and 4), ECOPAS directed the bulk of its financing toward increasing the capacity to monitor and enforce the official rules governing the WNPs and their adjacent reserves, hunting zones, and buffer areas.

4.5 Property Rights and Access around W National Park Prior to ECOPAS

Benin's WNP was effectively an open access resource prior to the ECOPAS project, despite its formal protected legal status and ownership by the state. Cattle grazing by both foreign and domestic pastoralists formed the most extensive human activity within the Park boundaries. Benin's portion of WNP was renowned in the broader region as a green oasis due to its relatively undegraded ecological condition (at least compared to the largely agricultural lands outside it) and lax enforcement compared to the neighboring parks in Niger and Burkina (Sinsin and Hessou 1999; Turner 1999). Throughout the 1990s almost the whole of the Park and its hunting zones were crisscrossed by domestic animals during the dry season. In 1995, for example, there were more than 120,000 cattle reported in WNP out of some 800,000 total from the sub-prefecture of Banikoara alone (Sinsin and Hessou 1999).

To the extent enforcement of the various regulations governing the Park occurred it most often targeted pastoralists, especially those engaged in transhumance from Niger, Burkina Faso, and Nigeria. The combination of the value of their cattle, which could be readily converted into hard currency, their lack of legal protection due to illicit entry into the country, and relatively minimal local social capital available to help blunt the effects of enforcement meant that herders from neighboring countries were often targeted by park guards for rule enforcement or by corrupt practices (Sinsin and Hessou 1999; Appendix H).

Agriculture, especially for the primary regional cash crop, cotton, was the second most prevalent illegal activity in the Park prior to ECOPAS. By the time ECOPAS began some 10,000 hectares were cultivated in the Park and most of the land in the buffer zone was also used extensively for agriculture (Kleitz 2002; former WNP Director, interview, Cotonou, Benin, January 2011). Land clearing within the Park constituted an obvious legal infraction, but the

practice was difficult to stop given limited enforcement resources and the support this practice enjoyed from a powerful elite. Thus, unlike Fulani pastoralists, farmers largely escaped punishment for agricultural incursions into the park. "Farmers have taken over land dozens of kilometers in the interior of the Park and continue to stay there while we herders are fined if we go in the buffer zone let alone the park," the rugga (a Fulani authority in charge of regional transhumance) of Banikoara protested. "We have the right to live also" (quoted in Sinsin and Hessou 1999, 15).

Besides farming and herding, activities such as fishing, hunting, and forest resource gathering were also commonly practiced in WNP, its buffer zone, and adjacent hunting zones before ECOPAS. Park officials allowed local communities to fish or gather forest products in the latter two areas but sought to enforce a ban on these activities within the Park itself (CENAGREF 1999; Kleitz 2002). Hunting was still widely practiced, though numbers of large mammals in the Park were very low in the 1990s: carnivores were extremely rare and only 420 individual herbivores were estimated to survive in Benin's WNP (CENAGREF 1999). The widespread and largely unregulated resource use practices described above had so degraded the Park that degazettement was considered (Monfort et al. 1994).

The most contentious land-related issues in and around WNP prior to ECOPAS concerned agriculture and livestock grazing. Several factors conspired to produce increasing competition over land for these purposes. First, national policy prioritized cotton production. The cotton sector in Benin has accounted for 70-80 percent of the country's agricultural export value and it has contributed between 10 and 15 of GDP since the 1980s (Gergely 2009). Production is especially important in the north, particularly in Banikoara, where it is the only cash crop cultivated on a large scale (Photo 12). Cotton farming led to soil depletion and

degradation in many traditional farming areas around the Park (de Haan 1997) as it has in other parts of the world (Clay 2004). This land degradation in combination with the high price of fertilizer made the productive land in the Park and buffer zone very attractive. Backed by local elites seeking to expand their power, farmers were emboldened to move into these ostensibly protected lands.

Land devoted to cotton farming thus increased spectacularly from the late 1970s until the dawn of ECOPAS implementation in 2001. The total area under cultivation the municipalities of Banikoara and Kandi in the southern and eastern flanks of WNP increased upwards of 15 times during this period (CENAGREF 1999). A report on the periphery of the Park in the late 1990s claimed that Banikoara owed its renown as a production zone for cotton in large part to the occupation and clearing of the buffer zone and a considerable portion of the southern part of WNP (Sinsin and Hessou 1999). Bariba elder Biosenon Biogon describes the consequences of this expansion in and well beyond his village of Kandèrou Kotchèra: "Here, even the sacred trees are no longer spared in land clearing. People want to cut everything down for cotton. Now, to find s*ɔn baka* (dense forest) like we had 50 years ago, it is necessary to go very far, into the depths of W Park" (quoted in Laye 2002, 69). In addition to increasing environmental degradation, the expansion of cotton farming also led to greater questioning of traditional authorities and propelled the rise of new, contested authority in villages based on something other than rights as first occupants (ECOPAS 2005).

A growing population is a second factor that increased pressure on land in the W region. The annual population growth rate in the sub-prefectures around the Park was about 2.5% and the population doubled to about 22 people per km^2 from the early 1980s to the late 1990s (CENAGREF 1999; de Haan 1997). Finally, the droughts of the 1970s in neighboring Niger and

decreasing availability of land for grazing in that country caused many Fulani agro-pastoralists to either migrate permanently to northern Benin or to arrive on a seasonal basis for transhumance to the greener pastures of that country's WNP (ECOPAS 2005; Turner 1999). This pattern of migration also increased competition over land.

Grazing in the Park and its periphery, particularly by foreign pastoralists, set different local (sub-prefecture) actors against one another. As land use for agriculture became more extensive, farmers living around the Park increasingly came into conflict with herders trampling their crops and causing other damage through transhumance practices (CENAGREF 1999; de Haan 1997). These conflicts sometimes became violent (Laye 2002). The volume of cattle in the Park was also becoming of greater concern to PA managers even though they gained revenues from the fines they imposed on herders for illegal use (CENAGREF 1999). At the same time, however, local elected officials, the state veterinary service, and Fulani leaders from Benin were pleased with international transhumance because it served as a significant source of patronage. Payments by foreign herders for services and the right to graze cattle in the region were estimated at several dozen million FCFA annually (between 50,000 and 100,000 USD) (CENAGREF 1999). Many Beninese Fulani households also enjoyed the annual exchange with their fellows from other West African countries (de Haan 1997; Dendi and Fulani leaders, interviews, Karimama, November 2010).

The W region thus became a site of political contest between interests favoring international transhumance[32] and those, namely CENAGREF, against it. More generally, both those benefitting from transhumance and from cotton farming had shared interests in using the Park. These two productive activities formed the main avenues for wealth accumulation in the

[32] Local, small-scale transhumance, which takes place during the rainy season and is undertaken by Beninese Fulani, found widespread support, though increasingly this practice also encroached on the buffer zone and the interior of the Park (CENAGREF 1999).

W region and they assumed particular importance as sources for the revenue required to access political power. Since demonstrable wealth can help establish credibility among rural constituents and facilitate the exercise of influential elected positions such as mayor or delegate (Bako-Arifari 1998; Métodjo 2008), local interests in cotton and transhumance constituted a formidable political block against the exclusionary PA conservation mandated by law. In a way, the Park formed a release valve that enabled these two use interests to align in a context where competition for land was increasingly intense.

It is in this context that park guards who tried to enforce the law were ordered to "step aside," particularly at certain periods, as during legislative elections (Sinsin and Hessou 1999, 14). During election campaigns in different sub-prefectures around the Park candidates seeking to curry popular favor promised their constituents that they would secure declassification of the Park so that it could be more freely used.

4.6 Property Rights and Access around W National Park During ECOPAS

The ECOPAS project brought major changes to the W region. It represented by far the largest infusion of funds to pour into this area of Benin since the colonial era. However, unlike other cases where local elites have captured much of the aid project funding (e.g. Chhatre and Saberwal 2006), ECOPAS implementation reshaped land use and access patterns and political relations in the localities of the W region generally, though its influence was most immediate in the Park and its adjacent hunting zones and the buffer zone. In effect, the project took up the challenge posed by the IUCN assessment from the mid-1990s (Monfort et al. 1994) to "re-conquer" the Park for conservation. In so doing, it supported the Beninese state, through CENAGREF, as the sole owner of WNP with claim to all property rights within its boundaries,

including alienation, exclusion, management, and withdrawal. It also supported state claims to these same rights over new territory in the buffer zone beyond the Park boundaries.

4.6.1 Re-establishing State Control of the Core Protected Area

The first priority of ECOPAS was the re-establishment of control over territory within the core PA. That some 90% of project funds in Benin were allocated directly or indirectly to activities in the Park itself and its hunting zones (see chapter 3) and that the earliest project actions involved strong enforcement of existing rules demonstrates the importance ECOPAS placed on this task. Although much of the first year of implementation was devoted to extensive study of the region, ECOPAS nearly quadrupled the number of park guards, offered temporary employment to dozens of *auxiliaires villages* and *pisteurs* (rangers),[33] and hired several other support staff. These new personnel were trained and began work in January 2002. That year CENAGREF warned local political and traditional leaders that they were going to more rigorously enforce the rules governing the Park (Senior CENAGREF staff, interview, July 2011).

The dry season at the end of 2002 and the beginning of 2003 saw perhaps the most dramatic action demonstrating that CENAGREF was serious about asserting control over the Park. With guidance from agents in a helicopter above, several trucks with park guards, newly outfitted, armed, and supplied by ECOPAS, moved through the Park on the ground in search of herds of cattle and their herders. Unlike previous encounters between guards and pastoralists there would be no negotiating this time. Park agents were instructed to arrest any herders they found and to kill their cattle. In all, between 2,000 and 5,000 cows were slaughtered and more

[33] Both *auxiliaires villages* and *pisteurs* are usually former hunters from local communities with extensive knowledge of the Park who assist state-trained guards, who are often not from the immediate area. The French term "pisteur" conveys the double role of these latter actors in a way that "ranger" does not: they are at once trackers, including for hunting safaris, and spies, who advise park authorities on illegal activities. On the ambiguous and central role of pisteurs in conservation in the W region see Poppe 2012.

than 80 Fulani pastoralists, mostly from countries neighboring Benin, were arrested is this "*action musclée*" (muscular action).[34] In the years before ECOPAS, park guards were reported to "vaccinate"—that is shoot—cows from time to time in the Park (Kleitz 2002), but nothing at this scale had been seen before.

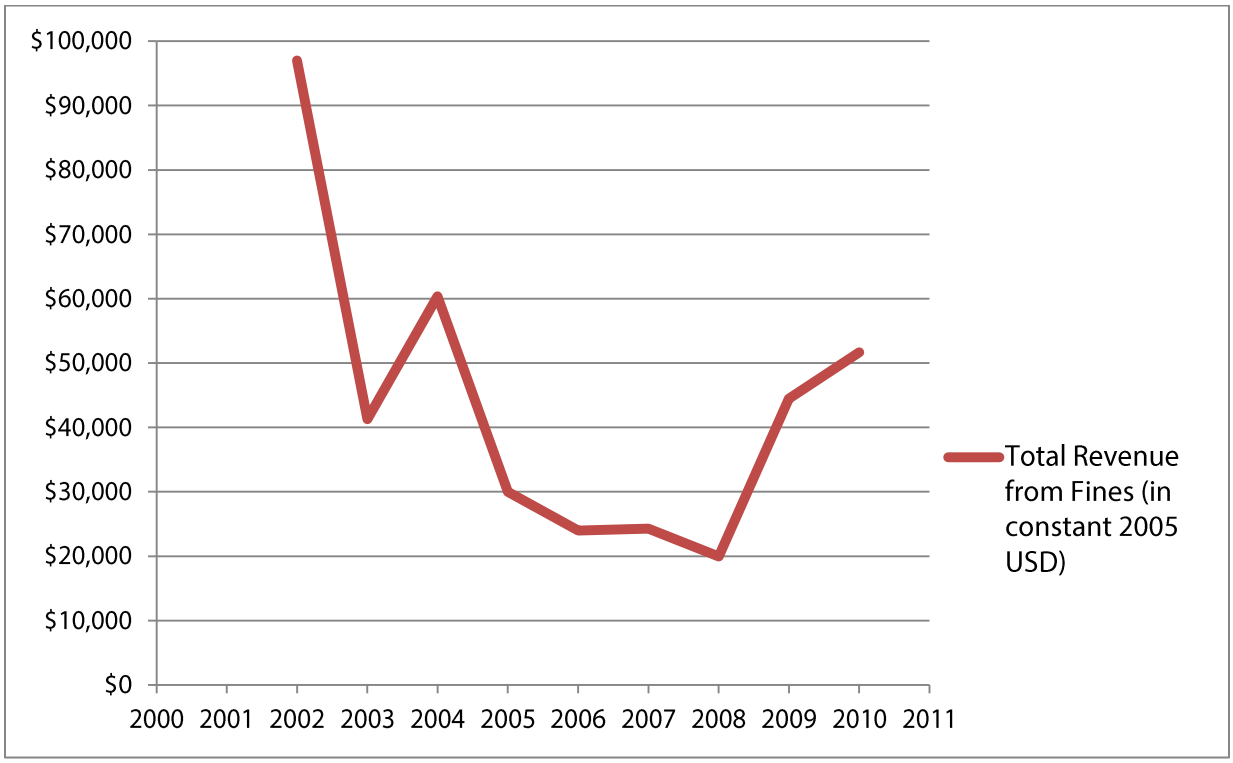
Word of this action and the new enforcement policy it signaled spread in the communities near the Park and broadly among networks of Fulani herders throughout the region. I heard about it during my fieldwork across the border in Niger nearly 10 years later. Though less dramatic, CENAGREF also began to evict people farming illegally in the Park during the early years of ECOPAS and to crack down on poaching within Park boundaries (Brottem 2011; village focus group interviews). The final evaluation of ECOPAS commissioned by the EU is thus mistaken in its conclusion that "safeguarding the W ecosystem could be done without any evictions" (Aveling et al. 2008, 17).

With this early stiffening of the enforcement regime, it became clear that CENAGREF, bolstered by ECOPAS support, was serious about reasserting control over the Park. Over time, CENAGREF built monitoring and enforcement capacity through installation of new guard posts, construction and repair of roads and other infrastructure, training of guards, organization of regular patrols, and, for the first time since independence, coordination of joint patrols across national boundaries. Records of fines levied for violations of Park rules provide additional evidence that the changed enforcement regime was exceptional (Fig. 4.1). Given the lack of personnel and resources prior to ECOPAS, we can infer that fines spiked in 2002, the first year of on-the-ground activities under the project (and the first year for which data are available). Fines dropped dramatically thereafter and generally leveled out during the rest of the project.

[34] This story was related to me in October 2010 by a senior advisor to CENAGREF/ECOPAS, who was present during the operation. It was also confirmed in interviews with park guards and with Fulani pastoralists during village-level fieldwork.

They increased somewhat again after the project's completion in 2008 (see below).

The fear that "foresters" continued to inspire locally was in evidence not only through interviews with Park neighbors, particularly Fulani agro-pastoralists, but also in the reaction to my arrival for research in several settlements near the Park. Whereas children in some settlements would run to greet my forest green truck, in other places people would drop everything and run away as the vehicle approached in the belief that I was from the Park service. Similarly, during the overflight of the Park I saw several herders and their cattle running away (Photo 13) upon seeing the plane. By the time of my flight in May 2011 herders had enough experience to know that the plane, which was purchased through ECOPAS, was used to identify illegal activities and report to guards on the ground who would arrive to confront them shortly thereafter.



Source: CENAGREF figures

Figure 4.1. Total revenue from fines in Benin's W National Park, 2002-2010

4.6.2 Extending State Control in the Buffer Zone

The second area where ECOPAS intervened directly to alter de facto property and access arrangements was in the periphery of the Park. This form of internal state territorialization (Vandergeest and Peluso 1995) affected some 20,000 people in 110 permanent settlements living in the 5 km band stipulated as the Park's buffer zone (Casti 2004; Fig. 1.1).

Both ECOPAS and CENAGREF viewed the buffer zone as important to ensuring that gains to secure the core PAs for conservation would be sustained. In addition to the national legal context for conservation, embracing the buffer zone concept was also required as part of the 2002 designation of the W region as a Transboundary Biosphere Reserve. There were two stated objectives for the process of delineating and regulating this zone: 1) to create gradient from greater to lesser human land use from periphery to core and 2) to reduce conflict between different types of land use, especially between agriculture and grazing (Brottem 2011; ECOPAS 2005).

ECOPAS funds were therefore used to "activate" the buffer zone as a geographic space mandated under the biosphere reserve concept and governed by a new wildlife law in 2002, which stipulated that "in all cases where it is possible, PAs will have a buffer zone for socio-economic activities or planning compatible with the PA, for the benefit and with the participation of local populations" (Article 25). Unlike the 1990 law, which specified a 5 km buffer zone, this law was silent on the width of the buffer zone. In theory, this meant that "the buffer zone could be 50 m in one place and 10 km in another" (Senior CENAGREF staff, interview, Cotonou, July 2011), but in practice the operating assumption was 5 km.

Beginning in 2003, after the initial displacement actions were taken in the core of the Park, PA authorities facilitated a process of stakeholder consultation to set the boundaries and rules for

the buffer zone. As in other cases across Africa (Neumann 1997), the implementation of the buffer zone expanded Park service authority to regulate land and resource use by people who had themselves or whose ancestors had been evicted from the Park. Results of the household survey I conducted suggest that at least a third of the population living within 5 km of the Park in Benin and more than 55 percent in Niger, within the same radius, included at least one member who was evicted or whose ancestors were evicted from the Park.

The historic backdrop of eviction and the more immediate crackdown on illegal activities in the Park posed a challenged for meaningful participation in the creation of the buffer zone. Prioritizing "muscular action" and then starting a more participatory process with communities around the Park was a "big error," according to a former ECOPAS project leader (interview, November 2010, Kandi, Benin). Decisive exclusionary actions within the Park heightened distrust and fear of CENAGREF, which created an unfavorable environment for "participatory" delimitation of the buffer zone.

Nevertheless, a series of consultations with different groups, especially farmers and herders, were held and resulted in some innovation in the buffer zone concept. To delimit and develop regulations governing this zone, ECOPAS rejuvenated AVIGREF and hired three community organizers to work in the villages around the Park (ECOPAS 2005). Working with communities through these actors required a change for CENAGREF, which had operated under an exclusionary model of conservation rooted in the colonial forest service. Prior to ECOPAS, a sort of stalemate existed between villagers and Park officials, relating to their potentially conflicting conservation and livelihood development objectives and as they awaited the final form of the law that would, in 2002, mandate more participation by local populations in PA management. Both CENAGREF and local communities viewed ECOPAS as a means to unblock

these strained relations (Kleitz 2002). ECOPAS tried to do so by supporting AVIGREF to undertake a series of activities designed to build local support for the Park and compliance with its rules. These activities included joint patrols in the Park, sharing revenues from hunting and tourism,[35] conservation-compatible development activities such as improved agriculture techniques, infrastructure building (schools, roads, wells), beekeeping, and development of specific rules for natural resource use in the buffer zone (ECOPAS 2005).

The idea of dividing the peripheral zone into three zones emerged to assuage the interests of different actors. In what became known as the "2-1-2" system, these zones included 2 km reserved for agriculture, 1 km for beekeeping and medicinal plant collection, and 2 km for pasture immediately abutting the Park. After discussion with user groups, the system evolved to become "3-2" in Karimama on the north side of the Park with the bee keeping/forest products band designated for agriculture (Aveling et al. 2008). New lands were opened up for these uses in some cases, such as the villages of Sampéto in Banikoara and Alfakoara in Kandi, both of which have Park guard posts. Here the buffer zone was moved several kilometers away from the center of the village, and land within Park or hunting zone boundaries was made available to their residents (Brottem 2011; interviews, Alfakoara, Dec 2010). However, no additional land was made available in many other villages, which were located within 5 km of the Park border. Petchinga and Kandèrou, for instance, saw most of their village terroir enveloped by the new buffer zone. In the case of Petchinga, only 2 km separate it from the Park on one side and the Niger River on the other. Cases like Sampéto and Alfakoara suggested to people in other

[35] CENAGREF is mandated to give 30% of the income generated by sport hunting along with the meat generated through this practice to AVIGREF, which then distributes revenues through an administrative council. Half of AVIGREF funds were to be directed to the management of the association and to PA management (e.g. partial payment of the per diem and honorariums of villagers participating in anti-poaching surveillance) and the other half to local development activities.

villages that every village would be granted 5 km of land for productive use in the direction of the Park, regardless of distance from its border (Volk 2009). For Park managers, however, the Park boundary was inviolable and delineation of the buffer zone would have to extend out from it. As a consequence, those villages within the buffer zone would gain legal recognition for their territories, but the amount of land they were allowed to use would be less than villages that were on the fringes of the buffer zone, further from the core PA.

These differences in land distribution set the stage for negotiation and conflict. Like other conservation development projects in Africa and elsewhere (Bierschenk et al. 2000; Lewis and Mosse 2006), strategic concerns as well as the interests of development courtiers or brokers were decisive in the distribution of resources and effort under ECOPAS. Powerful elites also sought to take advantage of the newly fluid zoning process and claims of 20-50 ha within the buffer zone were made in many localities around the Park despite a rule specifying a maximum of 5 ha per household (AVIGREF members and CENAGREF staff, interviews, July 2008 and December 2010). "The strong topple the poor," a senior CENAGREF official remarked, echoing the epigraph for this chapter (interview, Kandi, November 2010). "If 50 leaders take 50 ha in the buffer zone," he continued, "what's left for the poor and for the herders?"

In addition to identifying, in principle, the different land use areas within the buffer zone, CENAGREF also instituted a new fee-based permit system governing resource use within its boundaries. Park guards and the community organizers hired under ECOPAS were charged with collecting this new tax from farmers and herders. In theory, the revenue raised would support buffer zone management via CENAGREF and deliver the public good of conflict reduction among resource users. According to interviews with herders and farmers in different locations around the Park, however, enforcement of these new rules was sporadic and the ends to which

revenues were put not clear. Tax collection apparently lasted about three years, but this regime halted at the conclusion of the ECOPAS project (Volk 2009; focus group interviews, villages in the W region, Jan-June 2011).

Through zoning, taxation, and rule enforcement, the Beninese state was thus able to extend its control to territory beyond the Park and hunting zones. In so doing, the buffer zone effectively annexed a large portion of communal and private land outside Park boundaries. Participatory rhetoric notwithstanding, the state thus claimed all property rights within the newly reinvigorated institution of the buffer zone. During the ECOPAS period, the state, through CENAGREF, claimed authority to give resource users living in or near the buffer zone rights to access, withdrawal, and management (i.e., the right to regulate internal use patterns and improve the resource, including through farming or maintaining tree cover).

This new property regime did not go uncontested. The 2-1-2 scheme could not withstand confrontation with the ecological and social reality on the ground. Although GIS whizzes working with the ECOPAS project could create visually stunning, almost psychedelic maps[36] of concentric land use zones, the mosaic of agricultural fields, grazing areas, sacred groves, infertile lands, and human settlements around WNP (Photo 4) meant that such a vision would remain largely confined to paper. All of the actors involved would likely have known this, but the almost grotesquely unrealistic simplification of space, power, and access provided useful room to maneuver.

The new buffer zone scheme furnished a new institutional framework for patronage in which resource use would have to be negotiated. Local political-economic elites and CENAGREF staff alike sized up this new institutional arrangement as another opportunity to "eat" in a "politics of the belly" as described in many other African political contexts (Bayart

[36] I thank Barry Ferguson and Christoph Nolte for this phrase.

1993 [1989]).[37] They competed for authority to allocate property rights, derive personal benefit from buffer zone resources, or broker settlements between conflicting parties. Negotiation took place not only regarding the bands of resource use within the buffer zone, but also its limits in either direction, toward or away from the Park. The distinction between the Park and the buffer zone was usually not well marked, such that neither local communities nor park guards knew the limits in many cases (park guards, interview, Banikoara, June 2008).

From the perspective of many villagers whose homes and farms were inside the buffer zone and who thus gained less territory than their counterparts just outside it, the institutionalization of the buffer zone was an unjust appropriation of their lands. In a cultural milieu characterized by extensive patron-client networks, Park authorities were perceived as a patron who gained access to territory and resources that they should have redistributed among all "clients"—villages around the Park. However, only some villages benefitted from their newly powerful patron. This arrangement was understandably seen as unfair given a prevailing moral economy of mutual obligation among people with varying degrees of power in which a guarantee of subsistence is a minimal norm.[38](Neumann 1998; Scott 1976; Thompson 1963)(Neumann 1998; Scott 1976; Thompson 1963) Many rural people therefore felt justified in flouting new resource use restrictions (Volk 2009; village focus group interviews, W region, January-August 2011).

In sum, the project of building the buffer zone institution was left incomplete under

[37] "*La politique du ventre*" is an expression widely used in Francophone Africa to describe a kind of political opportunism and corruption. It has many shades of meaning, but generally implies activities necessary to accumulate the wealth and resources necessary for social mobility or solidification of authority. The politics of the belly is linked to the creation of the excessive bureaucracy in many states in Africa as well the corpulent "administrative belly" (*ventre administrative*) of many men in power. See Bayart 1993.

[38] For a thorough overview of the concept of moral economy with particular reference to protected areas in Africa see Neumann 1998. The moral economy around WNP appears to approximate that of Meru described in Neumann's study even as it shares affinities with moral economies in other geographic and historic settings (e.g. Thompson 1971, Scott 1976).

ECOPAS. It was widely recognized that ECOPAS did not devote enough resources to activities in the periphery of the Park (CENAGREF staff, interviews, Kandi, November 2010-August 2011). Instead, ECOPAS focused on strengthening control over the core of WNP. This emphasis held for all three countries of the W region, but was especially pronounced in Benin's WNP. "ECOPAS constructed a beautiful house, but failed to build an enclosure to complete the concession," the former head of ECOPAS activities in W Park's periphery explained. "The door of the house is now left open to everyone" (interview, Kandi, November 2010). The "enclosure" of the buffer zone would include a population supportive of the Park, limited conflict, and effective enforcement to maintain the "beautiful house" of the Park itself. This metaphor resonates in a cultural context where people typically live in "concessions" with family homes organized around a central courtyard enclosed by a wall made from grasses, stalks of millet, mudbrick, or, in some cases, concrete. The enclosure not only affords privacy, but also marks ownership.

The ECOPAS project was thus only partial, not totalizing as described in project documents or as similar projects have at times been portrayed in writings on conservation and development aid interventions in Africa (e.g. Neumann 1997). It at once reflected and refracted local power dynamics. Rural elites and *ressortissants* (notables from local villages, but living in cities and towns) were often able to secure more land in newly opened areas of the buffer zone than other claimants (CENAGREF staff and AVIGREF members, interviews, January-August 2011). But the buffer zone also shifted power by adding another institutional layer to which resource users might appeal in making claims to land. That CENAGREF claimed rights over this territory unsettled the authority of traditional elites in determining land allocation within village terroirs. The result is that conflict continued during the ECOPAS period, but it was

significantly tamped down through increased enforcement, the promise of greater local participation in management of the Park and buffer zone through AVIGREF, and provision of some benefits such as wells, watering holes for animals, tourism facilities, and school construction.

ECOPAS thus significantly shifted property rights and access to resources both in the Park and in its buffer zone. But the project of institutionalizing the buffer zone was not completed and when the project ended so did most enforcement in the area. "That's how projects are in Africa," remarked a former ECOPAS staff member in Benin, "they put things in order for a moment, but when they leave it's over" (interview, Kandi, November 2011).

4.7 Property Rights and Access around W National Park after ECOPAS

4.7.1 Clarity of Property Rights

"Those who know 'paper' know the limits," a farmer from a village bordering Benin's WNP told me as we discussed the land and resource issues he and his family faced in early 2011. His remark referred to people who have a formal education and can read (survey results suggest that 35% of households have no member with formal education). More specifically, he meant Park authorities who may provide authorization to use the buffer zone or issue a fine for illegally using the Park, both of which come with "paper," that is, a receipt. His statement sheds light on the status of property rights three years after the conclusion of the ECOPAS project not only in his village, but also in the periphery of WNP more broadly.

Property rights for different kinds of resources remain much less clear among households in villages influenced by ECOPAS in Benin than their counterparts in ECOPAS villages in Niger and non-ECOPAS villages in Benin. Rights to access and use land for agriculture, livestock-

raising, and collecting forest products were all much less clear in ECOPAS villages in Benin than in comparator groups (Table 4.1). For example only 59% of respondents reported agricultural land rights were clear in ECOPAS villages in Benin compared to 80% of non-ECOPAS villages in that country and 90% of ECOPAS villages in Niger ($p<0.000$). Results were similar for rights to land for livestock and for forest products.

Clarity of land rights decreased slightly in ECOPAS villages while it increased very slightly in non-ECOPAS villages in Benin and ECOPAS villages in Niger (Table 4.1; $p<0.01$). However, this aggregate measure masks important variation. For households in Kandèrou all but one respondent (96%) reported that land rights had become less clear since 2000. By contrast less than 20% reported that land rights became less clear in Boïffo. Very few households (less than 8%) across all villages in Niger reported that land rights became less clear from 2010-2011. This comparative evidence suggests that the changes to de facto property rights brought by ECOPAS in Benin's WNP and its buffer zone have endured and continue to cause confusion among agro-pastoralist communities in the post-project period. Greater uncertainty about property rights appears to be an important and enduring impact of the ECOPAS project in Benin. Though full analysis is beyond the scope of this chapter, the greater clarity in land rights reported among households in Niger villages may be due to the role played by *Commissions Foncières* (COFO), local-land commissions with which ECOPAS engaged in that country (see chapter 3).

Table 4.1. Land ownership, property rights, and resource access among households in study villages

(a) Categorical variables

		ECOPAS Villages - Benin		Non-ECOPAS Villages - Benin		ECOPAS Villages - Niger	
Variable	**Category**	**n**	**%**	**n**	**%**	**n**	**%**
Land ownership							
Household owns land	Yes	126	84%	128	98%	145	97%
	No	24	16%	3	2%	5	3%
	Total	150	100%	131	100%	150	100%
Clarity of property rights in the village							
Agricultural land rights clear	Yes	86	59%	104	80%	131	90%
	No	60	41%	26	20%	14	10%
	Total	146	100%	130	100%	145	100%
Livestock resource rights clear	Yes	54	45%	78	76%	95	77%
	No	65	55%	25	24%	28	23%
	Total	119	100%	103	100%	123	100%
Forest product rights clear	Yes	60	47%	117	89%	117	86%
	No	68	53%	4	3%	19	14%
	Total	128	100%	121	100%	136	100%

(b) Continuous variables

	ECOPAS Villages - Benin		Non-ECOPAS Villages- Benin		ECOPAS Villages - Niger	
Variable	**mean**	**sd**	**mean**	**sd**	**mean**	**sd**
Land ownership						
Land owned in 2011 (total ha)	6.26	8.02	8.61	8.69	5.04	5.13
Natural resource rights						
Change in clarity of land rights, 2000-2011*	2.81	1.10	3.09	0.93	3.33	0.80
Natural resource access						
Change in access to agricultural land	3.08	2.47	4.70	1.94	4.95	2.41
Change in access to livestock resources	2.49	2.33	3.30	2.20	3.77	2.69
Change in access to forest products	2.33	2.37	4.26	2.33	4.13	2.82
Change in access to water	6.97	2.84	4.00	2.13	7.48	2.54
Park Use						
Change in capacity to use Park	1.71	1.07	n/a	n/a	2.34	1.26

Note: Based on survey of 431 households (131 in non-ECOPAS villages; 150 in ECOPAS villages in Benin and 150 in ECOPAS villages in Niger) in 2011. sd = standard deviation. Variables measure change in clarity of land rights and access based on responses on a scale of 1-10 where 1 is "decreased greatly," 5 is "no change" and 10 is "increased greatly" from 2000-2011 with the exception of * where the scale is 1-5 where 1 is "decreased greatly," 3 is "no change" and 5 is "increased greatly." Mean responses in ECOPAS villages in Benin statistically significantly different than non-ECOPAS villages (t-test, $p<0.05$) and ECOPAS villages in Niger ($p<0.01$) except for land ownership.

As described above, part of the reason property rights in the W region of Benin are unclear is due to lack of clarity regarding the boundaries and rules of the Park and buffer zone. Only a third of survey respondents report that the boundaries of WNP are clear in Benin compared to nearly 60% in Niger (Table 4.2). More people in Benin also report that the boundaries and rules of the Park have changed (37%) than in Niger (22%). Again the villages of Kandèrou and Petchinga stand out: a much higher proportion of households in those villages report that the Park boundaries have become less clear since 2000.

The buffer zone boundaries and rules in Benin are somewhat clearer in Benin than the boundaries and rules of the Park. About half of the survey respondents in both Benin and Niger reported that the boundaries and rules of the buffer zone were clear. Again results vary by village, but while majorities in Kandèrou and Petchinga were less clear about the boundaries and rules in the buffer zone, some 66% in Alfakoara reported lack of clarity. The comparatively large number of people who are not clear about buffer zone limits and rules in Niger may be due to the large size of the reserves adjacent to the Park in that country such that the boundaries are in some cases very far from households surveyed. Further, a specifically demarcated buffer zone exists within parts of these reserves, the limits of which were not clear to some survey respondents.

Table 4.2. Clarity of boundaries and rules of W National Park in Benin and Niger

Variable	Category	Benin		Niger	
		n	%	n	%
WNP boundaries clear*	Yes	49	33%	85	57%
	No	100	67%	65	43%
	Total	149	100%	150	100%
WNP rules clear	Yes	65	44%	73	49%
	No	83	56%	77	51%
	Total	148	100%	150	100%
Park limits/rules changed since 2000*	Yes	55	37%	33	22%
	No	92	62%	115	78%
	Total	148	100%	148	100%
Buffer zone or reserve boundaries clear	Yes	77	52%	79	53%
	No	70	48%	71	47%
	Total	147	100%	150	100%
Buffer zone or reserve rules clear	Yes	75	50%	70	47%
	No	74	50%	80	53%
	Total	149	100%	150	100%

*Difference of means between Benin and Niger groups statistically significant (Chi^2 test, $p < 0.01$)

4.7.2 Land Ownership

There are more landless people in the W region of Benin than in comparable non-ECOPAS villages in Benin or counterpart ECOPAS villages in Niger (Table 4.1; $p<0.000$). These landless are concentrated in the villages of Alfakoara and Kandèrou, which have comparatively larger migrant populations than the other two study villages near the Park in Benin. Cotton is also the main cash crop in these villages, which increases competition for land. The landless are from different ethnic groups than the dominant founding groups (Mokollé and Bariba, respectively) in the two villages. In the case of Kandèrou, the majority of the landless are Fulani pastoralists. While many Fulani continue to be nomadic or semi-nomadic herders, contrary to dominant discourses not all Fulani make their living this way and many have now

settled in particular localities in the W region and beyond to make their living from farming and another livelihood activities (Turner 1999).

Households in the W region of Benin own less land than households in comparable non-ECOPAS villages.[39] On average, households in the latter group of villages own more than 2 ha of land than those living near the Park ($p<0.0001$). However, land ownership among households near the Park is slightly higher in Benin than in Niger. Generally, competition for land around the Park is more intense in Niger than in Benin. National policies since the 1970s favoring "land to the tiller" undermined the land holding power of rural elites in Niger leading to more landholders. Migration into the comparatively rich lands around the Park also increased land claimants following the droughts of the 1970s and 1980s (Turner 1999).

Information on changes in access to resources over time suggests that the difference between average land ownership among households in ECOPAS and non-ECOPAS villages in Benin is due largely to change in Park management spurred by ECOPAS. While some villages around the Park gained and others lost land due to changes in park and buffer zone management, the aggregate effect of the ECOPAS project around the Park has been a reduction in available land. Part of the reason for this decrease is due to the return of many farmers who were expelled from the interior of W Park early during the ECOPAS project to the terroir of their home villages. Field research revealed this pattern in both the northern and southern sectors of the Park. These farmers either subdivided the fields they retained in the village territory or cultivated land less suitable for agriculture (Brottem 2011).

[39] As described above, land ownership is complex and fluid in this West African context and claims to ownership can derive from legal as well as customary sources. In the W region land ownership is largely based on customary claims without official legal recognition by the state.

4.7.3 Access to Resources

For households in all three groups of villages, access to land for agriculture, resources for livestock, and forest products decreased from 2000 to 2011 (Table 4.1). This result reflects a broader trend not only in the West African region (Berry 2009), but across the continent more generally (Matondi et al. 2011). However, access to these resources decreased the most among households around Benin's WNP. Similarly, households in Benin's W region report greater reduction in their capacity to access and withdraw resources from WNP than those around the Park in Niger (Table 4.1). Indicative of increased enforcement during and after ECOPAS, households in the W region on both sides of the border saw significantly reduced capacity to use the Park. Overall, households in the W region of Benin were more likely to trace their reduced access to land and natural resources to ECOPAS (more than a fifth of households surveyed) than their counterparts in Niger (less than 5% of households surveyed).

Access to water is an exception to general declines in resource access. Households in ECOPAS villages in Benin and especially Niger reported significant increases in their ability to access water for human and animal consumption as well as for fishing (Table 4.1). Access to water declined on average in non-ECOPAS villages. Increases in ECOPAS villages are likely due to ECOPAS efforts to provide wells and dig watering holes for livestock. The increase in enforcement ECOPAS supported may have also improved water provision through watershed protection and by reducing competition for water from claimants outside the village, such as seasonally migrating pastoralists.

4.8 Park Management and Shifting Local Politics in the Post-ECOPAS Period

4.8.1 CENAGREF in the Wake of ECOPAS

After the conclusion of the ECOPAS project in 2008 through at least 2011, the relative influence and authority of CENAGREF in the W region waned. At the same time, rural elites and other actors gained power as decentralization reforms became more entrenched and the political economy of the W region shifted.

At the time of my dissertation fieldwork in 2010-2011 there had been almost no financing made available to continue ECOPAS's work beyond that of minimal operating expenses provided to the Park's agencies through national governments of the W region. These funds were not enough to cover the personnel who had been hired under the ECOPAS project, including most notably "ecoguards." Unlike state-supported foresters, ecoguards' salaries were paid through project money and through a 20% return on arrests and fines in which they were involved. Records indicate that fines levied in WNP more than doubled from 2008 to 2010 (Fig. 4.1), which would have helped offset lost revenue from ECOPAS. But interviews with villagers and park guards in 2011 suggest that corruption also increased given the difficult operational situation park managers faced in the financial vacuum post-ECOPAS and the absence of EU oversight. As in other parts of Africa (Blundo et al. 2006), several different forms of "everyday corruption" exist in and around WNP. However, Fulani herders illegally grazing their livestock in the Park form the most lucrative target as their cattle are essentially ambulant currency (Appendix H). Focus group interviews with Fulani agro-pastoralists in villages around the Park suggest that, although they have always been targeted, such corrupt practices have become more severe and unpredictable after ECOPAS.

In addition to dramatic reductions in official funds to pay salaries of Park staff and

auxiliaries after ECOPAS ended, support for basic functioning of the Park also became scarce. There was little money available for gas, vehicle maintenance, or upkeep of roads and guard posts in the Park (Photo 14). CENAGREF also stopped devolving revenues from the Park to AVIGREF, which negatively affected Park management (AVIGREF representatives, interviews, W Region, 2010-2011). The idea of co-management was foreign to CENAGREF prior to ECOPAS, and this state-centric institution resisted sharing revenues with AVIGREF from the beginning (Kleitz 2002). The 2002 Forestry Law mandating greater local participation in PA management, backed with ECOPAS funding, compelled CENAGREF to collaborate with AVIGREF, but with these incentives no longer in place formal collaboration between CENAGREF and AVIGREF eroded once the project ended. As a result, many AVIGREF members turned to illegal activities, such as poaching, to replace lost income (former ECOPAS community organizer and AVIGREF members, interviews, W region, January-August 2011). Lack of coordination with AVIGREF as well as widespread resistance by residents in the periphery of WNP also meant that CENAGREF stopped collecting taxes for productive activities in the buffer zone. In effect, management of the buffer zone by CENAGREF returned to what it had been prior to ECOPAS.

Transboundary cooperation among the park agencies of Benin, Burkina Faso, and Niger largely ceased in the absence of funds and oversight by ECOPAS. The social relationships forged among park staff from the three countries as well as the institutional architecture, including the 2008 the "Agreement on the Concerted Management of the W Transboundary Biosphere Reserve," supported through ECOPAS may one day facilitate renewed collective action across national borders in the W region, but without external impetus the prospect is dim. In the meantime, illegal resource users, including poachers seeking elephant ivory (Photo 15)

and transhumant cattle herders have been able to exploit the lack of coordination among the Park agencies of the three countries.

4.8.2 Local Elites, Elections, and the Park after ECOPAS

At the same time as CENAGREF's position weakened post-ECOPAS, key political and economic changes conspired to augment pressures on the Park and bolster the position of many local political-economic elites. First, decentralization reforms became more entrenched through a second round of local elections in 2008. National elections three years later also altered the political and, in turn, the social and ecological landscape in the W region. Finally, like other agricultural commodities worldwide, global cotton prices spiked in 2010-2011.

Benin's second local-level elections under decentralization took place on April 20 and May 1, 2008. By this time, most of ECOPAS funding had already been committed and enforcement and other activities supported under the project had begun to wane (ECOPAS technical advisor, interview, Kandi, Benin, June 2008). Diminished on-the-ground project presence created conditions in which newly elected politicians could credibly claim that their influence had led to reduced enforcement in both the buffer zone and the core of the Park. Indeed, the coincidence of local elections and the conclusion of ECOPAS opened up new spaces for politicians to maneuver and they held out the promise of making land available in the Park and its peripheral zones (Volk 2009). Fields were again planted within park boundaries, especially in the municipality of Banikoara, and herders used the Park with more frequency (village focus group and park guard interviews, April-August 2011). However, as increasing levels of fines for illegal use of the Park in 2009 and 2010 indicate (Fig. 4.1), a cash-strapped CENAGREF still retained enforcement capacity as it sought to "make do" while waiting for another infusion of foreign aid.

"Surveillance in the Park is like the rain," Fulani herders explained (focus group interview, W region village, January 2011). Enforcement, like the rain, varies in intensity and location from year to year within the Park. Herders expect this variation and have developed ways to cope with it.[40] There is widespread recognition among park authorities, local elites, and farmers of the importance of the Park and its BZs to Fulani herders. As in other pastoralist contexts in Africa (Butt 2011), for many herders the risk of enforcement or corruption is one they must take. "The [W] Reserve is our life—if it does not exist we will not exist," a Fulani elder put it (interview, W region village, February 2011). In this sense, Fulani herder interests may ultimately align with conservation as opposed to those of farmers seeking to expand agricultural production in the Park, though more research is needed to better understand the relationship between grazing and wildlife in savanna regions like the W (Butt and Turner 2012; Hibert et al. 2010).

While mayors and other municipal leaders were making claims about their role in reducing enforcement, they were also beginning to eye other sources of revenue and to implement often vaguely defined aspects of decentralization reform. This objective placed them in conflict not only with CENAGREF, but also with AVIGREF. The 1999 law on the organization of municipalities in Benin broadly outlines municipal responsibilities in the domain of natural resource management (République du Bénin 2005). However, the law gives very little specific guidance for the scope of these responsibilities, how they are to be carried out, and how they relate to other existing laws (municipal development planner, interview, Banikoara, July 2011). Indeed, some aspects of the decentralization law conflict with laws and decrees relating to forests and wildlife. For example, municipalities began to claim the right to revenues

[40] Including, apparently, by training their cattle to run faster to escape park guards! (Focus group interview with Fulani herders, village near WNP, December 2010)

designated directly for communities who participate in PA management through AVIGREF (CENAGREF 2011; Volk 2009). This situation has led to a tension between AVIGREF in alliance with CENAGREF on one hand and elected officials at the municipal level on the other. Municipal leaders have little stake in the Park and have no control over AVIGREF, which buttresses CENAGREF's authority in the periphery of the Park potentially at the expense of political and financial support. Such leaders, thus, have an interest to undermine AVIGREF (former Park W sector chief, interview, July 2011). Competition between these two factions remains unsettled at the time of writing and is another source of unclarity that affects lives and livelihoods around the Park.

Presidential and national legislative elections held in March and April 2011 further unsettled the balance of power in the W region. In the run-up to these elections mayors of the municipalities around the Park and other elected officials and candidates seeking office exhorted the Park Director and guards not to "disturb their electorate" through enforcement.[41](Kourouma 1998)(Kourouma 1998) Continued enforcement threatened their authority by undermining their promises of new lands for farming, herding and other uses. The eviction in Banikoara described in the song that opens this chapter thus took on extra significance given its timing just a few months prior to national elections. The story of two key local actors, the mayor of Banikoara and the former director of WNP, both of whom harbored higher political ambitions, illustrates the stakes in this conflict.

[41] Currying the favor of rural constituents in this way was undoubtedly viewed as a more reliable strategy than at least one alternative: conserving the habitat of wild animals in the Park in order to secure their electoral support, an approach satirized in Amadou Kourouma's novel *En Attendant le vote des bêtes sauvages* (*Waiting for the Vote of the Wild Animals*) 1998.

4.8.3 Political Advancement and the Flexibility of Conservation in the W region

Following municipal elections in 2008, the Mayor of Banikoara and the Park Director had organized a series of meetings to try to resolve simmering conflict between Park authorities and neighboring populations in "zones of turbulence": the buffer zone and, in some places, in the Park itself. These meetings continued under the Director's successor and protégé post-ECOPAS. Despite formal declarations and proposals by both sides, no agreement was reached. The conflict came to a head when Park officials undertook the evictions in Banikoara in October 2010. This served to mobilize the population much more strongly against the Park in that municipality and also provided a national profile for its mayor. At the same time, world cotton and agricultural commodity prices in general were beginning to spike (Fig. 4.2), while Benin had been experiencing a significant economic slowdown with growth decelerating from 5 percent in 2008 to 2.6 percent in 2010 (World Bank 2013a). A key component of President Boni Yayi's electoral platform was to increase cotton production. This goal necessarily implicated Banikoara, Benin's leading cotton producing area, and raised the stakes for protected lands under the jurisdiction of CENAGREF.

Source: Index Mundi, 2013

Figure 4.2. World cotton prices, 1998-2013 (US cents per pound)

In this context, there was strong pressure for the Park Director to reduce enforcement levels, particularly given that northern Benin, including the W region, was a stronghold for the President and his political coalition, the *Forces Cauris pour un Bénin Emergent* (FCBE - Cowrie Forces for an Emerging Benin). In addition to pressures from mayors and other local officials, the Director also received pressure from his main patron, the former director of the Park, who declared his candidacy to be a representative to the national assembly. As part of his campaign, he took to local radio to promise that he would act so that farmers and herders in the Park buffer zone could use part of the Park. He touted his position as former Park director and head of the Forest Service to bolster the credibility of this commitment. Privately, he entreated the current Park director to hold off on enforcing the rules governing the Park. The Director complied, much to the chagrin of many park guards and the broader conservation community in Benin (WNP Director, interview, Kandi, July 2011; Park Guards, Banikoara, July 2011; B. Sinsin, July 2011). In addition, CENAGREF staff were encouraged to openly and actively campaign for the former director during the election even though a number of them were displeased with his hypocrisy or supported candidates from other political parties. In an effort to ensure that CENAGREF presented an integrated public front in support of the designated party and candidates, guards known to favor other candidates were sent on mission to patrol deep in the Park for the week before the election (park guards, interview, August 2011).

As a consequence of the freeze on enforcement, the sale of bushmeat was rampant in the W region and in major market centers across Benin during the election season. Hunters were reported to mock guards who were powerless to stop them as they walked by guard posts to poach in the Park. "I tell you, during that time, the foresters were little [powerless]," a member

of AVIGREF told me, "you could take all the foresters in Benin and it would not be enough to confront all the hunters in the Park" (interview, August 2011). Cattle, too, were allowed to graze freely in the Park during this period. The timing of the elections in the late dry season meant that resource users could extract maximum benefit from the Park. Wildlife was as abundant as it had been in decades due to conservation measures under ECOPAS (see chapters 2 and 3) and at the end of the dry season it was easier to locate game because animals concentrate around available sources of water. The Park was also much greener during this period than areas outside it and it thus provided especially rich fodder for cattle and other livestock.

The former Park director's strategy worked. He was elected at the head of the list of candidates for the administrative region in northern Benin. Although his position was self-serving and sowed confusion and precarious hopes for local populations, it was not explicitly anti-park. He believed that different land use claims could be negotiated while maintaining the basic functioning of the Park (former WNP director, interview, Kandi, July 2011; B. Sinsin, Cotonou, July 2011). By contrast, his one-time rival, the Mayor of Banikoara, did adopt an explicitly anti-park position. Originally from the village of Kandèrou Yabadou and trained as an agricultural engineer, he subtly, but openly encouraged agricultural expansion into the Park and advocated for changing its boundaries and rules. He also sought a revenue sharing scheme between WNP and its neighboring municipalities. For his commitment to agriculture, handling of the conflict in Banikoara relating to the October 2010 eviction, and role in securing votes for the President, he was rewarded with the post of Minster of Agriculture, Livestock, and Fishing following Boni Yayi's re-election.

As the mayor of Banikoara took up his new position and results of the May 2011 legislative elections were released, WNP authorities reasserted themselves. They again "hit

hard" in their enforcement efforts, fining and arresting people caught in violation of park rules (WNP Director, interview, Aug 2011). In at least one case, angry guards beat someone they arrested, a hunter who had killed a female roan antelope in the Park, an offense that contradicted traditional norms as well as Beninese wildlife law. According to witnesses, he was beaten "*comme les bonnes dames tappent le mil*" ("like good women hit millet [to separate seed from stalk]"). He was kept at the guard post for three days before being sent to Park headquarters at Kandi for further judgment. His body swollen from the beatings he endured, he was made to watch the guards eat the meat of the animal he had killed (anonymous, interview, village near park guard post, August 2011). Examples of a heavy-handed, retaliatory enforcement were reported in other locations around the Park following elections (park guards and village focus groups, interviews, June-Aug 2011).

In November of 2011, the Director of WNP, along with his counterpart at Pendjari National Park, was fired by the Minister of Environment, who had been installed at the same time as the former Mayor of Banikoara. The official reason for the firing was that both parks had suffered serious degradation and a lack of control by CENAGREF (Gandigbé 2012). This is ironic given the clear political pressures to allow exploitative activities in the Park as well as absence of adequate financial support for park management. Though his role has not been confirmed, it is suspected that the former Mayor of Banikoara influenced the decision of his new ministerial colleague, thereby exacting some payback against the director of the Park.

This dramatic contest represented the latest installment of the battle between the two "elephants" of local political elites and national PA authorities. This battle will continue, though the terrain may again shift with a new park director, infusion of foreign aid under the PAPE project, and local elections slated for late in 2013.

But what of the "grass?" As the epigraph to this chapter suggests, it is people in the periphery of the Park who bear the brunt of this tussle between "elephants." Those living around the Park are not uniform in their interests, resources, and practices and care must be taken not portray them as hapless victims of a hegemonic form of global conservation. That portrait is too stark, though research reveals that conservation under ECOPAS has come at a cost for many households in the region (see chapters 2 and 3). Extreme variability in enforcement and rights to access resources in recent years is perhaps the most important legacy of ECOPAS for the diversity of resource users around WNP. Certain villages and locations around the Park have suffered from this more than others. It is no coincidence, for example, that the two villages in Benin's W region that saw the greatest decrease in household income during the ECOPAS period, Kandèrou and Petchinga, were also those with the most unclear property rights and most diminished access to resources. The overall effect is to undermine public authority, rule of law, and incentives to invest in maintenance of the resource commons within the Park and its peripheral zones. During focus group and individual interviews in different villages around the Park, people expressed their desire for greater clarity in property rights so that they may have more security in their livelihoods. Achieving such clarity will not be easy given competing interests in the Park and its buffer zone and growing pressure from external forces such as the international market for ivory and climate change. But doing so—through engagement with the messy realities of meso-level politics—stands as a vital task if the Park is to persist and people in the W region are able to improve the quality of their lives over the long term.

4.9 Conclusion

In this chapter I have argued for the importance of sustained analysis at the meso level to understand the social impacts of PAs and the international aid projects focused on them. I have

shown how international biodiversity aid in the form of the ECOPAS project altered property rights in the WNP and its peripheral zones and, so doing, jostled the configuration of local-level political-economic interests. Changes in property rights continued to shape livelihoods and political contest several years after the ECOPAS project ended and it appears that these changes will continue to resonate. ECOPAS heightened the value of the Park and its buffer zone as a political commodity over which different actors, notably CENAGREF and local elites, could struggle. It did so through attempts to institutionalize resource use in the buffer zone and by demonstrating that it could be a source of revenue through tourism, but especially international aid funds. This value is likely to remain even as local politicians seek to assert themselves at election time and Benin's process of decentralization continues to unfold.

The forgoing analysis helps explain the divergent impacts of ECOPAS on biodiversity and livelihoods between Benin and Niger and also in different municipalities around WNP in Benin (see chapters 2 and 3). More broadly, it provides evidence that the reallocation of property rights comprises an important causal factor generating protected area impacts and demonstrates the importance of grappling with meso-level political arenas to understand the causal pathways through which PAs and international aid interventions centered on them generate effects. Given that so many countries are currently undergoing decentralization reforms and that the international community has committed to placing 17% terrestrial land under some form of conservation protection by 2020 (CBD 2010), such study of the "missing middle" should have relevance in countries across the globe.

In the specific context of the W region, results suggest that conservation faces an uphill battle over the longer term. The relationship between local political-economic elites and park authorities will be pivotal. As decentralization reforms deepen, mayors and local elected

officials in Benin have an incentive not to alienate their rural constituents who struggle with increasing competition over land and often have a deep distrust of the Park Service based on a history of eviction and arbitrary law enforcement. From the point of view of local politicians, the Park comprises a huge area of land nominally within their purview over which they have no control. That the law is silent on the role of municipalities in relation to Benin's PAs further limits their incentive to support conservation in these areas. The financial support they gain through authorizing and, in some cases, making direct use of the Park and its buffer zone to grow cash crops and graze cattle further reduces their incentive to assist in PA conservation. Finally, skillful politicians can take advantage of confusion generated by overlapping authority, unclear property rights, and institutional uncertainly to serve as brokers between local populations and park authorities thereby generating financial and political capital. Uncertainty, a hallmark of the local political arenas in Benin (Le Meur 1999), essentially becomes another patronage resource. Thus, although local authorities may not want to openly contradict national conservation laws, they may work to undermine them.

PA authorities and external conservation interests have no choice but to confront these realities. According to the analysis presented here as well as the final evaluation commissioned by the EU, ECOPAS was not successful in engaging local authorities and the decentralization process unfolding in the W region more generally. It was successful in increasing wildlife populations and bolstering management capacity in Benin's WNP (see chapter 2), but the longer term viability of conservation gains remains in doubt given the local level political dynamics described in this chapter. The infusion of project funds enabled CENAGREF to reestablish control of the core of WNP and extend its authority over the buffer zone. But this control began to erode once project funding ended, with agro-pastoral activities, including wildlife poaching,

again being practiced within the Park. Another EU conservation project, PAPE, has begun to fill the gap left by ECOPAS. To return to the epigraph that opens this chapter, this new project may well enable the "elephant" of CENAGREF a victory in its on-going contest with local elites, but if it does not take steps to more adequately engage with existing local politics and institutions, especially those connected to downwardly accountable democratic processes, victory will likely only be temporary. Meanwhile, local people and the exceptional biodiversity of this West African region will be left to suffer the consequences.

Chapter 5

Conservation Legacies: Advancing Understanding of the Impacts of Protected Areas and Biodiversity Aid over the Long Term

5.1 Introduction

Global biodiversity continues to decline and the rate of loss does not appear to be slowing (Butchart et al. 2010) with potentially dire consequences for humanity (Cardinale et al. 2012; Rockström et al. 2009). At the same time, poverty, often extreme, persists in many parts of the world, especially in rural areas of low-income tropical countries where much of the world's biodiversity is concentrated (Sachs et al. 2009; World Bank and IMF2013). Financial resources to address these interrelated challenges remain inadequate (McCarthy et al. 2012), whether from national budgets of tropical countries (Waldron et al. 2013), international aid for biodiversity (Miller et al. 2013), or other non-market or market sources (Hein et al. 2013). Partly because of this inadequacy, efforts to achieve the twin goals of biodiversity conservation and poverty reduction have not met with the success their proponents envisioned (Agrawal and Redford 2006; Brooks et al. 2012; McShane and Wells 2004; Rands et al. 2010). However, despite a broad understanding of the effectiveness of various policy interventions designed to reach these goals (i.e., strict protected areas, integrated conservation and development, community-based conservation, etc.), there remains a paucity of systematic evidence about the social and ecological effects of these efforts (Millennium Ecosystem Assessment 2005; Miteva et al. 2012;

Sutherland et al. 2009), the trade-offs and synergies among outcomes (Persha et al. 2011), and the conditions under which different kinds of interventions are likely to succeed or fail (Agrawal and Chhatre 2006; Brooks et al. 2012; Pagdee et al. 2006). Finally, the extent to which the impacts of conservation interventions will fade or endure, over what time period, and for what reasons remain especially poorly understood. Further research to address these gaps is imperative if policymakers, practitioners, and scholars are to understand and more effectively address the global challenge of conserving the earth's rich natural heritage while enhancing human well-being, particularly among the poorest segments of society.

Protected areas (PAs), including national parks, are at the forefront of efforts to meet this challenge. Given inadequate domestic financial resources, international aid has been an influential source of support for PAs across the developing world. It is this source of support that crucially determines the governance, day-to-day operation and, ultimately, the impacts of many tropical PAs. For these reasons, I have chosen PA-related biodiversity aid as the focus in this study.

This dissertation has sought to advance more systematic understanding of PA and biodiversity aid impacts. It has done so through an in-depth analysis of the social-ecological effects of ECOPAS, a "conservation with development" aid project (Robinson and Redford 2004) of the kind commonly implemented in diverse contexts across the developing world over the past 25 years. Here I summarize the major findings and contribution of this study. I then discuss three key research areas where further investigation is needed in order to develop a more robust understanding of the legacies of conservation efforts in and around PAs in the developing world. Finally, I conclude this dissertation with a brief synopsis of ECOPAS impacts in the

broader context of global efforts to balance biodiversity conservation with the needs and aspirations of local people.

5.2 Summary of the Major Findings

The introduction to this dissertation identified three key gaps in the literature on the social-ecological impacts of PAs and the international aid projects centered on them. These gaps included insufficient understanding of: 1) the *causal pathways* through which impacts are produced; 2) the *influence of contextual factors*, especially politics and governance at multiple scales; and 3) the *spatial, social, and temporal heterogeneity* of impacts. Together, the three chapters that form the core of my dissertation further theoretical and empirical understanding along these research frontiers. They have done so through detailed examination of the impacts of the ECOPAS project in the W National Parks of Benin and Niger.

Chapter 2 used a quasi-experimental research design to jointly assess ECOPAS impacts on biodiversity conservation and local livelihoods in and around Benin's W National Park. I found that the positive impacts on biodiversity that were highlighted in the final project evaluation commissioned by the EU in 2008 (Aveling et al. 2008) had persisted. Mammal species abundance increased significantly from 2000, immediately prior to ECOPAS, to the time of my fieldwork in 2010-2011. However, livelihoods outcomes were mixed. Increased enforcement, supported by ECOPAS, led to biodiversity gains, but reduced access to valuable natural resources among communities that neighbor the Park. The exception was water access, which increased among the villages in which ECOPAS intervened. The impacts of ECOPAS on household income were more socially and spatially differentiated than were impacts on resource access. ECOPAS had the most negative effects on household income among the poorest groups across all ECOPAS villages. At the same time, average household income in two ECOPAS

villages decreased significantly, while it increased significantly in the other two. This heterogeneity in impact was explained by differences in enforcement and benefits due to ECOPAS, with higher enforcement and lower benefit levels associated with decreased income and lower enforcement and higher benefits associated with increased income. These results demonstrated the importance of analyzing social and ecological outcomes simultaneously and among different subpopulations to better understand the distribution of benefit and harm due to strictly PAs like WNP. Such knowledge becomes important for more equitable PA management that is capable of complying with the developing international policy norm that PAs "should do no harm" (Agrawal and Redford 2009; World Parks Congress 2003).

Chapter 3 of this dissertation compared biodiversity and livelihoods outcomes in Benin and Niger. The main overall finding is that national political context crucially moderated the impacts that resulted from higher levels of enforcement by ECOPAS. Biodiversity increased in both Benin and Niger due to ECOPAS. While the magnitude of change was greater in Benin than Niger, Niger retained higher overall levels of biodiversity as measured by mammal species abundance. The effect of enforcement on biodiversity also differed between the two countries. Higher levels of enforcement were associated with increases in biodiversity levels in Benin, but there was no such association in Niger. By contrast, greater enforcement was strongly correlated with decreases in household income in Niger, but not in Benin. Households around WNP in Niger that reported the greatest increases in enforcement experienced the largest decrease in income. The reason for the negative impact of enforcement on livelihoods in Niger compared to Benin was due in large part to differences in national level governance and the extent of democratic decentralization reforms.

These results advance our understanding of the effect of national political context on the

outcomes of conservation interventions by showing that, even if such context may not independently be a significant determinant of outcomes (Brooks et al. 2012), it can interact with other variables, such as enforcement, to significantly determine intervention success or failure. More generally, these results suggest that "one size fits all" policies that inadequately engage with key differences across national contexts may be ineffective in achieving their aims. The chapter supports the conclusion that there are no panaceas in natural resource governance (Ostrom 2007), but it also indicates new research directions to move beyond this general statement to better understand how different elements of national context shape the effective limits of different environmental policies.

Chapter 4 of this dissertation highlights the importance of meso-level political arenas like municipalities to studies of the impacts of external conservation interventions in PAs. It analyzed the interaction of the ECOPAS project with local political-economic elites and the state PA authority, CENAGREF, in the W region of Benin. In addition to enforcement and benefits provision as described in Chapters 2 and 3, reconfiguration of property rights comprised a key causal pathway through which ECOPAS led to biodiversity and livelihoods impacts. Project activities had a strong influence on natural resource property rights and access, which disrupted local norms of land use in the buffer zone and parts of WNP. These changes created considerable uncertainty for people living the Park periphery as well as park guards during project implementation. This uncertainty intensified after ECOPAS when resources for CENAGREF were no longer sufficient to maintain changes to the property rights regime in the buffer zone. Local elites capitalized on this uncertainty by cultivating new patronage opportunities to the detriment of local livelihoods and the longer-term sustainability of conservation and natural resource governance in the region. The analysis in this chapter suggests

that uncertainty over property rights in the Park's periphery and demonstration of the political value of WNP as a site not only for natural resource use but also for international conservation investment are two of the most enduring legacies of the ECOPAS project. If past is prologue, then these impacts will play a decisive role in shaping the future of biodiversity conservation in the W region.

5.3 Towards Understanding Conservation Legacies

This dissertation has focused on identifying and explaining the impact of the ECOPAS project in Benin and Niger three years after it concluded. It quantitatively evaluated a subset of biodiversity and livelihoods related outcomes, namely mammal species abundance, household income, and resource access. It has argued that changes in enforcement and reallocation of property rights comprised key governance mechanisms through which ECOPAS generated these effects in the WNPs. Although these outcomes and mechanisms are among the more prominent ones in literatures on PA impacts and natural resource governance, they do not exhaust the possibilities. And certainly there are many other ecological, social, and political contexts beyond the savanna environment of the two West African countries studied here. Finally, projects such as ECOPAS likely have impacts that last beyond the three-year window on which my dissertation has focused and there is a growing interest in building understanding of the conditions under which the impacts of PAs, and conservation and development aid more generally, persist over time (Buntaine et al. 2013; Shepherd et al. 2013; World Bank 2013c).

To build toward a more comprehensive understanding of the multi-stranded legacies of international conservation aid projects like ECOPAS further research is needed in the areas identified above. These can be grouped into two categories based on two meanings of the concept of legacy in the context of conservation interventions. The first of these is the legacy of

the past—of previous interventions, policies, and practices—in the place where the new intervention is implemented. This is the legacy that the intervention steps into, as it were. It is what the past bequeaths to the present. The second category is the legacy that the intervention may itself have over time. This category captures what the intervention bequeaths to the future. Both of these dimensions of conservation legacies can be examined retrospectively, but research might also analyze expected future legacies based on past and present conditions. One might, for example, examine the legacy—social and ecological impacts over time—of a PA established during the colonial era more than 50 years ago, but also analyze the ecological and socio-political context in which the PA was instituted. Alternatively, one might consider the future legacy of a project that is currently on-going or even in the planning stages. Here I discuss several key research frontiers under the two meanings of the organizational concept of conservation legacies. These frontiers stem from my research in the W region as well as critical engagement with scholarship on PA and conservation impacts.

5.3.1 Past Legacies

The first research frontier I consider is the role of context. Results from this study (chapters 3 and 4) suggest that future research should carefully attend to the mediating role of national and local political contexts in shaping the impacts of PAs and related aid funding. Researchers and decision makers in this domain must also grapple with the context of conservation interventions more generally as such interventions inevitably inherit legacies from the past (Wilshusen et al. 2002). For example, an extensive case study literature from the cross-cutting fields of political ecology and environmental anthropology describes the continuing influence of colonial conservation practices on contemporary practices in Africa (Garland 2008; Hardin 2011; Neumann 1997; Schroeder 1999) and other post-colonial contexts (Agrawal 1997;

Gissibl et al. 2012).[42] These legacies may be a burden that impedes effectiveness or they may help facilitate the intervention. Regardless, better understanding of how context mediates the effects of conservation policies is needed to build theory of the range of causal pathways through which specific interventions affect social-ecological outcomes in PAs and other resource systems. Comparison across countries or sub-national units within countries is especially important to try to identify empirical regularities, such as certain elements of structural context that may be more or less instrumental in leading to certain outcomes. Building toward such systematic understanding will require greater synthesis of insights from the rich body of ethnographic and historical literature on the social impacts of PAs and related conservation aid efforts with studies using quantitative impact evaluation methods.

Future work must also tease apart the differences between historical context and conservation legacies as specific, contingent effects of interventions that become part of broader "history" and are subject to power-laden interpretation and mobilization in diverse contexts. Such research might also examine whether and why different kinds of social and ecological impacts can be expected at different times.

5.3.2 Future Legacies

In addition to greater attention to the role of historical context, three additional research frontiers relate to the legacies that PAs and related conservation aid may have in the future. These include 1) better understanding of the causal mechanisms and pathways of impacts; 2)

[42] The colonial echoes of ECOPAS itself are unmistakable. Some obvious colonial legacies include the very existence and legal status of the W National Parks, their strong exclusionary character, and the persistence of their boundaries as a reference. The design of ECOPAS rested on these elements of colonial conservation, despite gestures toward local community participation in Park management and benefit sharing. The project even sought to resuscitate the pre-independence legacy of common management of the three WNPs as a single transboundary reserve.

simultaneous assessment of a broader range of potential impacts, particularly relating to the context of global climate change; and 3) the persistence of impacts over time.

Causal mechanisms and pathways of impact

The policy-oriented literature on PAs and related conservation aid tends to examine the *effects of causes*, that is, social or ecological impacts. Although this is a useful step, there is a need for carefully designed investigation of the *causes of effects* in this domain of research and policy. As social scientists working in other domains of inquiry have argued (Shepsle 2009), this question of "why?" should occupy more research attention even as the wider availability of large-scale datasets, increasingly rapid computing technology, and ever more sophisticated analytical methods allow more rigorous identification of impacts. Underdeveloped theory about the factors leading to impacts besets research across the social and policy sciences (Gerring 2010) and poses particular problems for the specification of models in experimental and quasi-experimental approaches to impact evaluation, including the risk of omitted variables and inadequate control variables (Ferraro 2009). Limited knowledge of the mechanisms and causal pathways through which conservation interventions have effects also impedes informed targeting of limited conservation funding. In particular, understanding causal pathways is important for the development of indicators of desired outcomes over the longer term (6-25 and more years) not just during and immediately following an intervention as commonly done in donor-sponsored evaluations (see below).

This dissertation has highlighted enforcement and reallocation of property rights as key causal mechanisms that are mediated by local and national political contexts, but there exist a variety of other pathways linking PA interventions and outcomes (see e.g. Hanauer and Ferraro 2011). There is a need to categorize pathways of impacts (Glew et al. 2013) and to try to

understand whether and how their effects vary according to different ecological, social, and political contexts. Untangling causal links across scales of governance stands as an important challenge. The present study has only briefly touched on how governance factors like enforcement that affect households and communities are shaped by the interaction between meso and national level politics. More research is needed to draw out these relationships in order to address the theoretical and policy exigencies discussed above.

Simultaneous assessment of a broader range of potential impacts

The literatures on the social and ecological impacts of PAs and related conservation interventions identify a multitude of potential outcomes. Along with those examined in this study (species abundance, income, and natural resource access), social impacts include physical and mental health, social capital, inequality, empowerment, and attitudes, among others (Coad et al. 2008; Igoe 2006; Pullin et al. forthcoming). A variety of ecological impacts have also been identified. At a given spatial scale of analysis, PAs may have effects on the full gamut of biodiversity features, from genes, individuals, and populations to species, habitats, and ecosystems (Gaston et al. 2008). In practice, much of the literature in this area has focused on the higher levels of this organizational hierarchy, especially habitats and ecosystems. This focus is due in part because data collection via remote sensing is less expensive and time consuming than the extensive fieldwork required to gather in formation on lower levels in the hierarchy, such as species populations as explored in this dissertation (Gaston et al. 2008; Geldmann et al. 2013).

Despite their common focus on PAs, however, little dialogue occurs across these two bodies of research. As a result, our understanding of the potential synergies and trade-offs among different dimensions of social and ecological outcomes relating to PAs remains limited as

is the case for areas of conservation and natural resource governance (Agrawal and Benson 2011; Agrawal and Chhatre 2011; Chhatre and Agrawal 2009). A series of studies help clarify key conceptual issues and provide analytical frameworks for understanding the relationship among social and ecological outcomes (Adams et al. 2004; Agrawal and Redford 2006; Leader-Williams et al. 2010; McShane et al. 2010). Further, the evidence base on these relationships is growing, with studies examining multiple outcomes in the context of PAs (Ferraro and Hanauer 2011; McNally et al. 2011; Sims 2010) forest commons (Chhatre and Agrawal 2009; Persha et al. 2011; Persha et al. 2010), and marine areas (Halpern et al. 2013). These studies have developed innovative approaches and new empirical evidence, but they only examine a subset of the possible outcomes of interest to theory and policy. More work is clearly needed in this area.

New research is also urgently required to understand the legacy of PA interventions in the face of climate change. While a body of research has begun to develop on biodiversity, climate change adaptation, and PAs (Davison et al. 2012; Lemieux and Scott 2011; McClanahan et al. 2009; Pettorelli et al. 2012), the literature on the social impacts of PAs has devoted scant attention to social impacts relative to climate variability and change (cf. MacKinnon et al. 2011). Research is needed on the ways in which the discursive, institutional, and material remains of ECOPAS and other projects like it may affect local capacity to cope with an increasingly variable climate. Such research can enable systematic understanding of what PA-related aid projects leave behind that may help or hinder local communities as they face an increasingly erratic climate. In short, adaptive capacity—the ability of households, communities, or other systems to cope with exogenous stresses or shocks and optimize whatever opportunities they may bring (Adger et al. 2007)—is another impact of conservation aid interventions that is increasingly important to assess.

There are at least two approaches that might be taken to assessing adaptive capacity in the context of PA interventions. First, a deductive approach may be used to construct an index comprised of key determinants of adaptive capacity identified in the burgeoning literature on this topic (Eakin et al. 2011; Engle 2011; Hinkel 2011). Data on these determinants could then be collected before and after the conservation study intervention and among treatment and control groups in a BACI research framework. A second, inductive approach would be to gauge adaptive capacity through actual adaptations people have made due to climate-related events, such as droughts or flooding, or perhaps to the conservation intervention itself. The logic to this approach is that people's actual responses to stimuli similar to those predicted to occur due to climate change will be a better indicator of their capacity to adapt. I collected data during research for this dissertation that would enable me to pursue these two approaches in the case of the ECOPAS project. However, these approaches and others could be applied across the tropical world where projects like ECOPAS have been or are being implemented. Doing so is urgent given the lack of empirical evidence on the relationship between conservation and social adaptation to climate change and the increasingly tangible effects of climate change across the tropical world (Bellard et al. 2012; World Bank 2009).

In addition to the need to consider multiple impacts simultaneously and to expand the range of impacts considered to include adaptive capacity, another research frontier is to critically interrogate the category of "impact" itself. This term poses the risk of fixing people as subjects to which things happen—that are impacted—rather than as agents with varying levels of autonomy to react, adapt, and resist interventions related to PAs. People living in and around PAs are not merely hapless victims or heroic resisters of unjust conservation, as some studies seem to imply (Brockington 2002; Neumann 1998; Peluso 1993). Rather, their participation,

compliance, or resistance—tacit or overt— shape the effects of policy interventions. Deeper inquiry into the conceptual boundaries of the term "impact" in the context of PAs and related interventions and on the mutually constitutive relationship between such interventions and those they may impact is therefore needed. Such inquiry must carefully attend to asymmetries in power that characterize this relationship.

Persistence of impacts

The final research frontier I discuss concerns the persistence of impacts over time. Reviews of social impacts of PAs have had little to say about whether, how, and why impacts are more or less likely to endure beyond the intervention (Coad et al. 2008; Pullin et al. forthcoming; West et al. 2006). Similarly, knowledge about the lag between implementation of an intervention and its ecological impacts and how these impacts change over time remains sparse (cf. Halpern et al. 2009). More broadly, there is virtually no data available to assess the durability of impacts of international environment and development aid (Buntaine et al. 2013). Better understanding of the persistence of impacts is important for both theoretical and policy reasons. Examining the temporal time horizon of multiple impacts promises to contribute to debates about the potential temporal mismatch of ecological and social outcomes (Chan et al. 2007). For example, the time period over which conservation delivers livelihoods benefits may vary depending on the nature of the ecosystem. Research into longer term legacies can help sharpen the analytical tool of path dependence used in political and other social sciences to explain the sources and variations in political outcomes in different contexts (Page 2006; Pierson 2000). The basic intuition behind this concept is that choices made in the past can mold the current decision space so as to rule out many courses of action. However, little is known about what features of the social, economic, ecological, or political world imbue past developments

with such influence over later decisions (Hall 2009). There is thus scope for cross-disciplinary fertilization in the application of this concept to the case of PAs as in, for example, analysis of how PA boundaries and rule in many contexts, including the W region, became so persistent over time.

Study of the circumstances under which certain paths leading to certain outcomes become locked in holds particular relevance for PA donors and other decision makers who are increasingly interested in understanding the longer-term impacts of their investments and what short-term indicators may exist that presage longer-term success (Shepherd et al. 2013; World Bank 2013c). However, the current absence of reliable and granular indicators of the persistence of desired social and ecological effects over time means that they have little empirical evidence beyond anecdote to guide the allocation of scarce resources.

5.4 Summing up

Conserving biodiversity over the long term while ensuring benefits for local people is one of the great challenges of our time. Over an eight-year period during the first decade of this new century, the ECOPAS project sought to contribute to this broad objective by intervening in the W region of West Africa. This dissertation has assessed its efforts to do so and has sought to explain how and why the project produced the social-ecological effects it did. I find strong evidence that ECOPAS met its goal of improving the state of biodiversity in the W National Parks of Benin and Niger. It also partially met its livelihoods-related objectives, with households in some villages experiencing increased income from the project and increased access to water, an important resource in the drylands of the W region. However, conservation gains came at a cost of diminished access to many natural resources on which the vast majority of the population this rural region depends and of decreasing incomes for many households. The poorest social

strata were disproportionately affected. Higher levels of enforcement and uncertainty over property rights and access spurred by ECOPAS were crucial governance mechanisms through which ECOPAS created these impacts. Together, they interacted with national and meso-level political contexts to determine distribution of harm and benefit around the W National Parks. It is these factors in combination with new international biodiversity aid projects that will shape the longer-term legacy of ECOPAS and the future of conservation in this West African savanna region.

APPENDICES

Appendix A Photographs

Photo 1 Family with harvest, W National Park Buffer Zone near Petchinga, Benin

Photo 2 Residents of Alfakoara next to a marker (pink paint on tree) separating the buffer zone from the Djona Hunting Zone, Benin

Photo credit: Ibrachi Gouda

Photo 3 Focus group interview, Petchinga, Benin

Photo 4 Mosaic of land uses, Kandèrou village, Benin

Photo 5 Field Research Team, La Tapoa, Niger

Photo 6 Cow transport, W region, Benin

Photo 7 Main entrance to W National Park, Alfakoara, Benin

Photo 8 Women drawing water from a well built by ECOPAS, Petchinga, Benin

Photo 9 Beninese army officer next to a house destroyed during the October 2010 eviction of people illegally settled in the W National Park, near Kandèrou, Benin

Photo 10 Farmer evicted from W National Park interviewed by National TV and Radio (with Park guards), near Kandèrou, Benin

Photo credit: CENAGREF

Photo 11 Men arrested for poaching in W National Park, Park Headquarters, Kandi, Benin

Photo 12 Cotton growing in the buffer zone of W National Park, near Alfakoara, Benin

Photo 13 Cattle running to escape surveillance in W National Park, near Kandèrou village, Benin

Photo 14 Broken down patrol vehicle purchased with ECOPAS funds, W National Park Guard Post, Benin

Photo 15 Viewing an elephant killed by poachers, W National Park, Niger

Appendix B List of Archives Consulted

Belgium
Bibliothèque, Musée Royale de L'Afrique Centrale, Tervuren
Collection on conservation in Africa, European Commission, Brussels

Benin
Archives nationales de la République du Bénin, Porto Novo
Bibliothèque, Direction Générale des Eaux et Forêts, Cotonou
Bibliothèque-Centre de Documentation, Faculté des Sciences Agronomiques, Université d'Abomey-Calavi
Centre de documentation, Laboratoire d'études et recherches sur les dynamiques sociales et le développement local (LASDEL), Parakou
Centres de Documentation, Centre National de Gestion des Réserves de Faune (CENAGREF), Cotonou, Kandi, and Tanguièta

Burkina Faso
Bibliothèque, Centre Culturel Français Georges Méliès, Ouagadougou
Collection, Laboratoire de Biologie et Ecologie Végétales, Université de Ouagadougou
Library, United States Embassy, Ouagadougou

Niger
Bibliothèque, Institut de Recherche en Sciences Humaines, Université Abdou Moumouni, Niamey
Centre de documentation, W National Park, La Tapoa
Centre de documentation, Laboratoire d'études et recherches sur les dynamiques sociales et le développement local (LASDEL), Niamey
Library, Peace Corps Office, Niamey
Médiathèque, Centre Culturel Franco-Nigérien Jean Rouch, Niamey

France
Archives National d'Outre-Mer, Aix-en-Provence (formerly referenced as CAOM, Centre des Archives d'Outre Mer)
Bibliothèque, Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Montpellier
Médiathèque, Musée du Quai Branly, Paris

Appendix C Example of Map Used to Select Households for Survey Participation

Note: Maps like this were created for each study village based on Bernard's (2006) map sampling method. In the absence of reliable census records, this method ensured a random sample that compensated for differences in housing density, potential irregularity in the spatial distribution of wealth in the community, and variation in livelihood strategies.

Appendix D Survey Instrument

Pre Q1 Name of interviewer: _____

Pre Q2 Date: _____

Pre Q3 Country (circle one): BENIN NIGER BURKINA FASO

Pre Q4 : Département: _____

Pre Q5 : Commune: _____

Pre Q6 : Arrondissement: _____

Pre Q7 : Village: _____

Pre Q8 : Hamlet, quarter, or camp name: _____

Pre Q9 : Village influenced by ECOPAS (circle one): YES NO

Pre Q10: Isohyet: < 600mm 600-700mm 700-800mm 800-900mm 900-1000mm

Pre Q11 : Type of housing structure (circle one):

1. STRAW 2 . MUD AND STRAW 3. MUD AND METAL
4. CEMENT AND STRAW 5. CEMENT AND METAL

Pre Q12 : Respondent number (code) : _____

Pre Q13 : Respondent sex : FEMALE MALE

Pre Q14 : Time interview started : _____

Pre Q15 : Time interview ended:_____

Pre Q16 : Time to complete survey: _____

Section A. Biographical Information

1. What is your name? [enter information in separate document to ensure confidentiality of the respondent]

2. How old are you?

3. What is your primary ethnic identity?

4. Have you lived in this village all of your life? [If yes, skip to question 6. If no, ask next question.] YES NO

5. How long have you lived in this village?

6. Are you married? YES NO

7. From what ethnic group(s) is (are) your spouse(s)?

Section B. Household information

8. How many people live in your household for at least 6 months of the year? These people could be your spouse(s), your children, your parents, your spouse's parents, or other members of your family such as grandchildren, aunts, uncles, brothers, sisters, and cousins, but also people who are not in your family but live here.

9. How many people in your household are over age 60? [i.e. born before 1950]

10. How many people are under age 5?

11. What is the highest educational level anyone in your household has reached?
    a. No formal education
    b. Some primary school
    c. Completed primary school
    d. Some secondary school
    e. Completed secondary school
    f. Professional degree
    g. Completed college degree
    h. Completed advanced degree

Section C. Livelihood Activities

C.1 Farming

12. Have you or anyone in your household participated in farming activities in the last year? [If not skip to next section. If so, read next question.] YES NO

13. What is your greatest worry about being able to continue farming?

14. What was your greatest worry about being able to continue farming 10 years ago (in the year 2000)?

15. Does your family have adequate food the whole year? YES NO

16. Do you feel rights to access land for agricultural activities (through gift, inheritance, sharecropping, purchase, etc.) are clear in this village? YES NO

17. How has your ability to access land for agricultural activities changed since the year 2000?
    a. It has increased greatly
    b. It has increased somewhat
    c. It has not changed
    d. It has decreased somewhat
    e. It has decreased greatly

C.2. Animal husbandry

18. Have you or anyone in your household kept any livestock in the last 12 months? [If yes, go to the next question. If no, skip to section C.3.] YES NO

19. Do you have any cattle? [If yes, go to the next question. If no, skip to question 22] YES NO

20. How many cattle do you have?

21. Do you have more cattle now than in the year 2000?
    a. YES

b. NO
c. ABOUT THE SAME NUMBER

22. What is your greatest worry about being able to raise livestock?

23. What was your greatest worry about being able to raise livestock 10 years ago (in the year 2000)?

24. Do you feel rights to access natural resources for livestock raising (pasture, fodder, water, etc.) are clear in this village? YES NO

25. How has your ability to access natural resources for livestock raising changed since the year 2000?
    a. It has increased greatly
    b. It has increased somewhat
    c. It has not changed
    d. It has decreased somewhat
    e. It has decreased greatly

C.3. Hunting and fishing

26. Have you or any members of your household hunted in the last 12 months? [If yes, go to next question. If no, go to question 31] YES NO

27. What is your greatest worry about being able to hunt?

28. What was your greatest worry about being able to hunt 10 years ago (in the year 2000)?

29. Do you feel rights to access hunting grounds are clear in this village?

    YES NO

30. How has your ability to access hunting grounds changed since the year 2000?

a. It has increased greatly
b. It has increased somewhat
c. It has not changed
d. It has decreased somewhat
e. It has decreased greatly

31. Have you or any members of your household fished in the last 12 months? [If yes, go to next question. If no, go to Section C.4] YES NO

32. What is your greatest worry about being able to fish?

33. What was your greatest worry about being able to fish 10 years ago (in the year 2000)?

34. Do you feel rights to access fishing grounds are clear in this village? YES NO

35. How has your ability to access fishing grounds changed since the year 2000?
    a. It has increased greatly
    b. It has increased somewhat
    c. It has not changed
    d. It has decreased somewhat
    e. It has decreased greatly

C.4. Other natural resources based livelihood activities

36. In the last 12 months have you or any members of your household gathered any of the following resources: fruit, honey, medicinal plants, or fuelwood? [If yes, go to next question. If no, skip to next section]

37. For which of the following reasons do you or your family gather these resources?
    a. For household consumption
    b. For commercial sale
    c. For both household consumption and commercial sale

38. What is your greatest worry about being able to gather these resources?

39. What was your greatest worry about being able to gather these resources 10 years ago (in the year 2000)?

40. Do you feel rights to access these resources are clear in this village?
    YES NO

41. How has your ability to access these resources changed since the year 2000?
    a. It has increased greatly
    b. It has increased somewhat
    c. It has not changed
    d. It has decreased somewhat
    e. It has decreased greatly

C.5. Other livelihood activities

42. Have you or anyone in your household participated in other livelihood activities in the past 12 months? Other livelihood activities could include any other things you do to earn money or make a living, such as working for a business, educational, governmental, non-governmental or other organization or working on your own. [If yes, ask next question. If no, skip to next section.] YES NO
    a. Yes

43. What other livelihood activities have you or your family engaged in over the last 12 months?

C.6. All livelihoods activities

44. What is the percentage of each of the following activities in the total income of your household? (The total income of your household livelihoods and not just money)

Activity		**Percent (total = 100)**
a.	Agriculture	
b.	Livestock Raising	
c.	Hunting	
d.	Fishing	
e.	Other natural resources	
f.	Other activities	

45. How has your household income changed since the year 2000? (The total income of your household livelihoods and not just money). Please respond on a scale of 1-10 where 1 is “it has decreased greatly” and 10 is “it has increased greatly.”

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10

(1) greatly decreased (5) no change (10) greatly increased

Section D. Property and Access to Land

46. Do you own land for agriculture or other activities (e.g. for building, for sale, for renting or for loaning to others)? [If yes, ask next question. If no, skip to question 49.] YES NO

47. How many hectares of land do you own in total?

48. How have land rights in this village changed since 2000?
    a. They have become more much more clear
    b. They have become somewhat more clear
    c. They have remained the same
    d. They have become less clear
    e. They have become much less clear

Section E. The W Biosphere Reserve

49. Do you know of (the existence of) W National Park? YES NO

50. Have you visited W National Park? [If yes, go to next question. If no, skip to section F] YES NO

51. How happy are you with the existence of W National Park?

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10

(1) very unhappy (5) neutral (10) very happy

52. Were you or your ancestors evicted from W National Park? YES NO

53. Do you know anyone who does work in collaboration with the Park? (e.g. forester, ecoguards, ranger, seasonal labor, administrator, tour guide, consultant, etc.)
    YES NO

54. Do you know clearly the boundaries of W National Park? YES NO

55. Do you know clearly the rules of W National Park? YES NO

56. Have these boundaries and rules changed since 2000? [If yes, go to next question. If no, skip to question 58.] YES NO

57. How have boundaries changed since 2000? Please answer on a scale of 1-10 where 1 is they have become much less clear and 10 is they have become much more clear.

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10

(1) much less clear — (5) no change — (10) much more clear

58. Do you know clearly the boundaries of the buffer zone (or neighboring reserve) of W National Park? YES NO
59. Do you know clearly the rules of the buffer zone (or neighboring reserve) of W National Park? YES NO
60. Do you use land or resources within the buffer zone (or neighboring reserve) for livelihood activities? [If yes, go to the next question. If no, skip to question 62].
    YES NO

61. What percent of your household livelihood activities are based on activities you undertake in the buffer zone (or neighboring reserve)?

62. Has you ability to use *W National Park* changed since 2000? [If yes, ask next question. If no, skip to question 64.] YES NO

63. How has your ability to use Park W changed since 2000? Please choose among the following five responses:
    a. It has increased greatly
    b. It has increased somewhat

c. It has not changed
d. It has decreased somewhat
e. It has decreased greatly

64. Have you ever known disturbances due to wild animals? (e.g. they have scared your family, destroyed your crops, wounded a family member, etc.) [If yes, go to next question. If no skip to next section.] YES NO

65. When was the last year you experienced disturbance due to wild animals?

66. Has the number of experiences of disturbance due to wild animals changed since 2000? YES NO

67. How has the number of experiences of disturbance due to wild animals changed since 2000? Please give your answer on a scale of 1-10 where 1 is disturbances have decreased greatly and 10 is they have increased greatly.

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10
(1) greatly decreased (5) no change (10) greatly increased

F. The ECOPAS project

68. Have you heard of the ECOPAS project? [If yes, go to next question. If no skip to next section]. YES NO

69. What is your perception of the project? Please respond on a scale of 1-10 where 1 is very negative and 10 is very positive.

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10
(1) very negative (5) neutral (10) very positive

70. Have you or anyone in your household been involved in ECOPAS activities? [if yes, go to next question. If no, skip to question 72.] YES NO

71. What activities?

72. Have you or someone in your household received one or more of the following benefits from ECOPAS?

a. Increased revenue from tourism (safari or hunting tourism)	g. Compensation for crop damage from wildlife
b. Meat from hunting	h. More reliable water supply
c. Employment (as guard, guide, etc.)	i. Right to access resources
d. Information on natural resource management and the importance of W National Park	j. Cooler climate due to forest cover
e. Training	k. Other (specify):
f. Conflict resolution	l. None (specify):

73. Did the ECOPAS project have any of the following negative effects on you or members of your household?
    a. Discouraged use of the Park for spiritual or recreational reasons
    b. Increased disturbances with wild animals
    c. Limited access natural resources to harvest
    d. Limited access to land for agriculture
    e. Limited access to pasture
    f. Limited access to hunting and fishing grounds
    g. Let to conflict with others in the village, outsiders, or park guards
    h. Other (please list)
    i. none

74. How do you feel the ECOPAS project has affected your community. By community I mean the people in your hamlet or village as a whole. Please answer on a scale of 1-10 where 1 is greatly harmed and 10 is greatly helped.

```
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1        2        3        4        5        6        7        8        9        10
(1) greatly                        (5) no change                        (10) greatly
 harmed                                                                   helped
```

75. Why?

76. What measures have you taken to adapt to changes brought by ECOPAS?

77. Do you think the ECOPAS project will help you cope with climate variability? By climate variability I mean changes in temperature and rain from one year to the next. YES NO

78. Why or why not?

G. Institutions

79. In the past 12 months, which of the following groups have you participated in:
    a. Religious
    b. Village
    c. Credit
    d. Women's
    e. Hunting
    f. NGO
    g. Government
    h. Market

i. Other (please list):
j. None

80. In the past 12 months, have you or someone in your family gone to a leader of your village or municipality? By “help” I mean seeking assistance with something that might improve your life or that of your family, such as seeking spiritual support, dispute resolution, advice, protection, money, or other services.

81. In the past 12 months, have you or someone in your family gone to the government for help? YES NO

82. If you or your family needs help, to whom would you turn? [Choose all that apply]
    a. Other family members in your village
    b. Other family members outside the W region
    c. Other family members in another country
    d. Religious institution
    e. Government
    f. NGO
    g. Other (please list)

83. How do you feel about your ability to have a say in the decisions affecting your life? Please answer on a scale of 1-10 where 1 is very little ability and 10 is a great deal of ability.

|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10

(1) very little (5) neutral (10) a great deal

84. How has this changed since 2000?
    a. It has increased greatly
    b. It has increased somewhat
    c. It has not changed
    d. It has decreased somewhat
    e. It has decreased greatly

85. Do you feel that political and administrative authorities can be sanctioned or replaced in the case of grave offense? YES NO

86. Has your ability to hold your leaders accountable changed since 2000? [If yes, go to next question. If no, skip to question 88.] YES NO

87. How has your ability to hold your leaders accountable changed since 2000? Please answer on a scale from 1-10 with 1 meaning it is has greatly decreased and 10 meaning it has greatly increased.

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10

(1) greatly decreased (5) no change (10) greatly increased

88. What is the level of conflict in your village? Please answer on a scale of 1-10 where 1 is very little conflict and 10 is a great deal of conflict.

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10

(1) very little (5) neutral (10) a great deal

89. Has the level of conflict within the village changed since 2000? [If yes, please go to next question. If no, please skip to next section.] YES NO

90. How has the level of conflict changed since 2000? Please answer on a scale from 1-10 with 1 meaning it is has greatly decreased and 10 meaning it has greatly increased.

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10

(1) greatly decreased (5) no change (10) greatly increased

H. Climate:

91. Has your access to water (for drinking, animals, fishing, etc.) changed since 2000? [If yes, go to next question. If no skip to question 93.] YES NO

92. How has your ability to access to water changed since 2000? Please answer on a scale from 1-10 with 1 meaning it is has greatly decreased and 10 meaning it has greatly increased.

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10

(1) greatly decreased (5) no change (10) greatly increased

93. Think back to 2000 [give locally relevant reference point]. Have you experienced drought between that year and now? By drought I mean a period of time during which rainfall was much less than expected causing crops to die and animals and people in your village to suffer due to lack of water. [If yes ask next questions. If not, skip to end of the survey]. YES NO

94. How many droughts did you experience during that time?

95. What period of drought was most difficult for your family? [record year and month (if month is possible).]

96. What was the impact of this drought on your household? (circle all that apply)

a. Loss of crops
b. Loss of livestock
c. Higher prices for food
d. Lack of food
e. Lacking of water for drinking
f. Change in diet
g. Increased disturbance by wild animals
h. Increased conflict with other people
i. Frustration with lack of help
j. The impact was minimal
k. Others (specify):

97. What measures did you take to adapt to survive this drought?
a. You or some of your family members moved to a new location
b. Replanted crops
c. Diversified crop varieties
d. Planted drought-tolerant verities

e. Used resources closer to or in W National Park W
f. Changed diet
g. Used stored food from previous years
h. Consumed animals that you would not have consumed if no drought
i. Sold animals
j. Sold land
k. Sold other goods
l. Sought contract work
m. Received help from family members working outside the community
n. Received help from other community members
o. Received help from the government or aid agency
p. Others (specify):

98. How important is it for you to farm, use pasture or carry out other livelihoods activities in the buffer zone (or neighboring reserve) of W National Park to cope with drought? Please respond on a scale of 1-10, where 1 is not important and 10 is very important.

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
1 2 3 4 5 6 7 8 9 10

(1) not important (5) neutral (10) very important

99. Have you taken actions to prevent losses due to future drought? [If yes, go to next question. If no, skip to end of survey.] YES NO

100. What actions have you taken? (please list)

Thank you very much for having participated in this survey!

Appendix E Supplementary Tables

Table S. 1. Information on treatment and control villages in Benin

ECOPAS-influenced villages					
Village Name	Population	Climatic Zone	Commune	Distance to Market	Distance to WNP
Alfakoara	3272	900-1000	Kandi	40	0.1
Boïffo	1915	800-900	Malanville	32	0.1
Kandèrou	2179	800-900	Banikoara	25	0.1
Petchinga	3162	700-800	Karimama	63	1.2
Matched villages not influenced by ECOPAS					
Village Name	Population	Climatic Zone	Commune	Distance to Market	Distance to WNP
Foué	2237	900-1000	Kandi	42	38
Sendé Koara Tédji	410	800-900	Malanville	62	58
Gnampogou Wibara	500	900-1000	Banikoara	35	25
Sendé	2817	700-800	Malanville	61	58

Note: distance measured in kilometers; climatic zone refers to climate isohyet based on average annual rainfall in millimeters. Distance to WNP measures study village distance to the closest boundary of either WNP or the Djona Hunting Zone.

Table S. 2. Variable definition and descriptive statistics (chapter 2)

(a) Treatment (ECOPAS) villages

Variable	Definition	N	Min	25%	Mean	75%	Max	Std. Dev.
Biodiversity indicator								
Wildlife disturbance	Perception of how depredation of crops and livestock by wildlife has changed from 2000-2011*	102	1	4	6.95	10	10	3.25
Natural capital indicators								
Agricultural land access	Change in capacity to access land for agriculture from 2000-2011*	145	1	1	3.08	5.5	10	2.47
Livestock resources access	Change in capacity to access resources for livestock from 2000-2011*	119	1	1	2.49	3.25	10	2.33
Forest product access	Change in capacity to access fuelwood and non-timber forest products from 2000-2011*	130	1	1	2.33	3.25	10	2.37
Water access	Change in capacity to access water (for drinking, livestock, fishing or other purposes) from 2000-2011*	150	1	5	6.97	10	10	2.84
Household wealth measures								
Change in income	Change in household income level from all sources from 2000-2011*	146	1	2	4.79	7	10	2.85
Household Characteristics								
Age	Age of household head	148	23	37	47.45	59	80	13.06
Sex	Sex of person responding to the questionnaire (female=1; male=0)	150	0	0	0.08	0	1	0.27
Migrant	Whether or not the household head is a migrant to the community (0=no; 1=yes)^	150	0	0	0.07	0	1	0.26
Education	The highest level of formal education achieved by a household member (0=no formal education; 1 up to high school; 2= High school and above)	150	0	0	0.89	1	2	0.76
Economic status	Economic status of the household (number of cattle owned: 0=no cattle; 1=1-2 cattle; 2 = 3-6 cattle; 3 = 7 or more cattle)	150	0	0	1.55	3	3	1.16
Household members	The number of people living in the household for at least six months of the year.	150	0	1.79	2.2	2.71	3.26	0.58

(b) Control (non-ECOPAS) villages

Variable	Definition	n	Min	25%	Mean	75%	Max	Std. Dev.
Biodiversity indicator								
Wildlife disturbance	Perception of how depredation of crops and livestock by wildlife has changed from 2000-2011*	37	1	3	5.35	8	10	2.9
Natural capital indicators								
Agricultural land access	Change in capacity to access land for agriculture from 2000-2011*	130	1	3.25	4.7	5.5	10	1.94
Livestock resources access	Change in capacity to access resources for livestock from 2000-2011*	97	1	1	3.3	5.5	10	2.2
Forest product access	Change in capacity to access fuelwood and non-timber forest products from 2000-2011*	123	1	3.25	4.26	5.5	10	2.33
Water access	Change in capacity to access water (for drinking, livestock, fishing or other purposes) from 2000-2011*	130	1	2	4	5	10	2.13
Household wealth measures								
Change in income	Change in household income level from all sources from 2000-2011*	131	1	3	5.35	8	10	2.69
Household Characteristics								
Age	Age of household head	130	20	30	40.86	50	75	13.05
Sex	Sex of person responding to the questionnaire (female=1; male=0)	131	0	0	0.1	0	1	0.3
Migrant	Whether or not the household head is a migrant to the community (0=no; 1=yes)^	131	0	0	0.19	0	1	0.39
Education	The highest level of formal education achieved by a household member (0=no formal education; 1 up to high school; 2= High school and above)	131	0	0	0.85	1	2	0.65
Economic status	Economic status of the household (number of cattle owned: 0=no cattle; 1=1-2 cattle; 2 = 3-6 cattle; 3 = 7 or more cattle)	131	0	0	1.21	2	3	1.08
Household members	The number of people living in the household for at least six months of the year.	131	0.69	1.79	2.14	2.48	3.69	0.57

Note: The household members variable was (natural) log transformed. * Signifies that variable is measured on a 10 point scale where 1 is "decreased greatly," 5 is "no change," and 10 is "increased greatly." ^"Migrant" is defined as having moved to the community within the past 10 years.

Table S. 3. Information on ECOPAS villages

Village Name	Commune	Climatic zone	Population	No. of Households	Distance to Park W	Distance to guard post	Distance to market
Benin							
Alfakoara	Kandi	900-1000	3272	348	>1km	0km	40
Boïffo	Malanville	800-900	1915	155	>1km	47km	32
Kandèrou	Banikoara	800-900	2179	179	>1km	12km	25
Petchinga	Karimama	700-800	3162	333	>5km	12km	63
Niger							
Boumba	Falmey	700-800	1414	185	>1km	0km	102
Koro Goungou	Kirtachi	600-700	373	48	>1km	0km	37
Moli Haussa	Tamou	600-700	357	37	>1km	0km	74
Tamou	Tamou	600-700	997	104	>1km	0km	48

Note: The latest population figures for Benin are from 2010 and for Niger from 2006; distance measured in kilometers; climatic zone refers to climate isohyet based on average annual rainfall in millimeters.

Table S. 4. Variable definition and descriptive statistics (chapter 3)

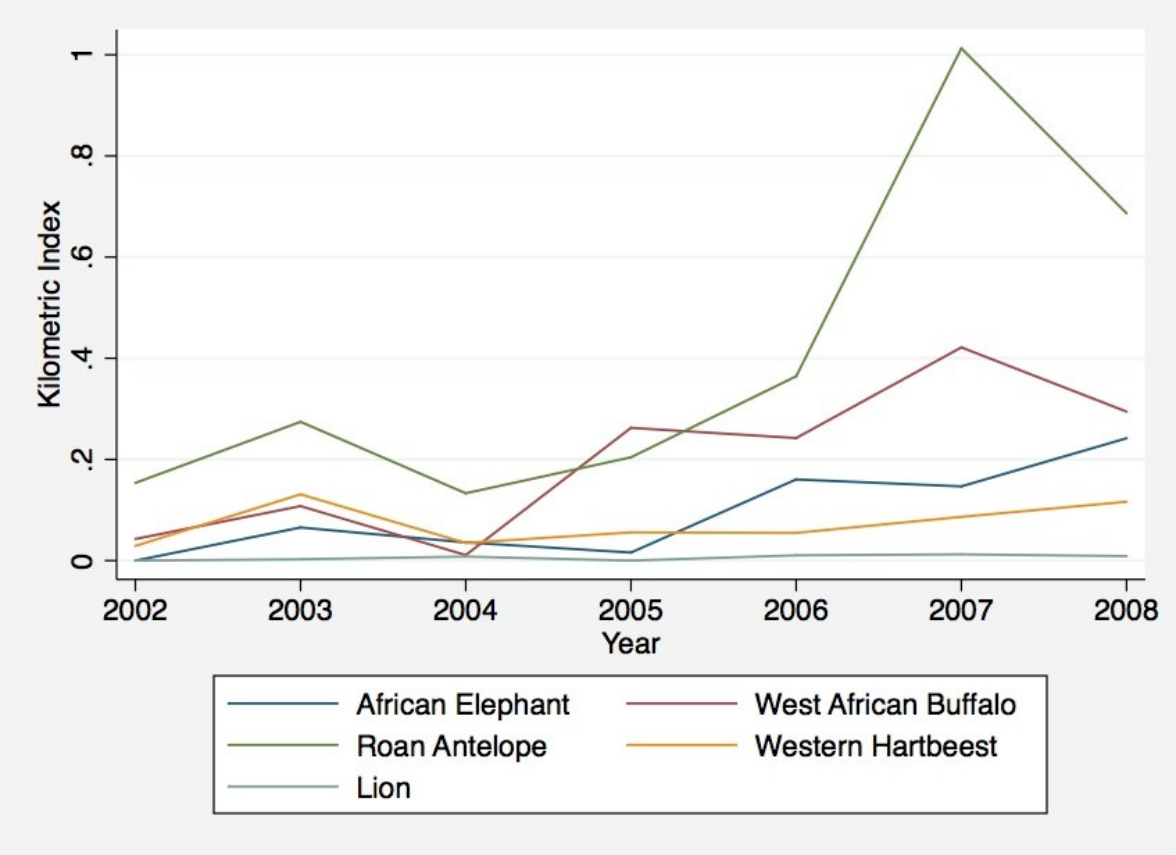
(a) Benin

Variable	Definition	n	Min	25%	Mean	75%	Max	Std. Dev.
Biodiversity indicator								
Conflict with wildlife	Perceptions of change in household conflict with wildlife from 2000-2011*	102	1	4	6.95	10	10	3.25
Household wealth indicator								
Change in income	Change in household income level from all sources from 2000-2011*	146	1	2	4.79	7	10	2.85
Enforcement indicators								
Enforcement1	Change in household ability to use W National Park (and the adjacent hunting zones in the case of Benin) from 2000-2011. Lower levels of enforcement. It is a categorical variable ranging from 1-5 where 1 indicates enforcement has "decreased greatly" (reported ability to use W National Park has increased greatly), 5 indicates enforcement has "increased greatly" (reported ability to use W National Park has decreased greatly), and 3 indicates no change in the level of enforcement	148	1	3	4.28	5	5	1.07
Enforcement2	Mean-centered version of above variable	148	-2.96	-0.96	0.32	1.04	1.04	1.07
Respondent characteristics								
Sex	Sex of person responding to the questionnaire (female=1; male=0)	150	0	0	0.08	0	1	0.27
Age	Age of household head	148	23	37	47.45	59	80	13.06
Household characteristics								
Household members	The number of people living in the household for at least six months of the year.	150	0	1.79	2.2	2.71	3.26	0.58
ECOPAS participation	Whether household member participated in ECOPAS (0=no; 1=yes)	150	0	0	0.1	0	1	0.30
Education	The highest level of formal education achieved by a household member (0=no formal education; 1 up to high school; 2= High school and above)	150	0	0	0.89	1	2	0.76
Economic status	Economic status of the household (number of cattle owned: 0=no cattle; 1=1-2 cattle; 2 = 3-6 cattle; 3 = 7 or more cattle)	150	0	0	1.55	3	3	1.16
Natural resource dependence	Percent of household income derived from livestock raising, fishing, and forest products.	150	0	0.04	0.2	0.25	1	0.25

(b) Niger

Variable	Definition	n	Min	25%	Mean	75%	Max	Std. Dev.
Biodiversity indicator								
Interaction with wildlife	Perceptions of change in household conflict with wildlife from 2000-2011*	101	1	8	8.34	10	10	2.87
Household wealth indicator								
Change in income	Change in household income level from all sources from 2000-2011*	149	1	2	5.4	8	10	3.36
Enforcement indicators								
Enforcement1	Change in household ability to use W National Park (and the adjacent hunting zones in the case of Benin) from 2000-2011. Lower levels of enforcement. It is a categorical variable ranging from 1-5 where 1 indicates enforcement has "decreased greatly" (reported ability to use W National Park has increased greatly), 5 indicates enforcement has "increased greatly" (reported ability to use W National Park has decreased greatly), and 3 indicates no change in the level of enforcement	148	1	3	3.64	5	5	1.25
Enforcement2	Mean-centered version of above variable	148	-2.96	-0.96	-0.32	1.04	1.04	1.25
Respondent characteristics								
Sex	Sex of person responding to the questionnaire (female=1; male=0)	150	0	0	0.17	0	1	0.37
Age	Age of household head	150	21	32	42.74	53	80	13.9
Household characteristics								
Household members	The number of people living in the household for at least six months of the year.	150	0	1.61	1.96	2.3	3.22	0.53
ECOPAS participation	Whether household member participated in ECOPAS (0=no; 1=yes)	150	0	0	0.65	1	1	0.48
Education	The highest level of formal education achieved by a household member (0=no formal education; 1 up to high school; 2= High school and above)	150	0	1	1.12	2	2	0.63
Economic status	Economic status of the household (number of cattle owned: 0=no cattle; 1=1-2 cattle; 2 = 3-6 cattle; 3 = 7 or more cattle)	150	1	1	2.34	3	3	0.86
Natural resource dependence	Percent of household income derived from livestock raising, fishing, and forest products.	150	0	0.06	0.26	0.45	0.8	0.2

Appendix F Change in Abundance of Five Mammal Species Important to Tourism in Benin's W National Park, 2002-2008



Source: Mammal Species Data from CENAGREF and ECOPAS 2008

Appendix G World Governance Indicators

Governance Indicator	Description
1. Voice and Accountability	Perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
2. Political Stability and Absence of Violence	Perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
3. Rule of Law	Perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
4. Control of Corruption	Perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.
5. Government Effectiveness	Perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
6. Regulatory Quality	Perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

Source: Kauffman et al. 2012

Appendix H Forms of Corruption Relating to Livestock Grazing in W National Park

1. A bribe paid directly to park guards when a pastoralist is caught illegally grazing their livestock in the Park. This may be the most common form of corruption and is difficult to detect if a guard is working individually or in a well-coordinated group. Usually the bribe is negotiated such that the herder pays less and has less trouble than he would were he to be fined or arrested. The "fee" given to park guards may be given on the spot or later after the sale of livestock. It may also include one or more animals, often the fattest or most marketable cow. Sometimes if the herder is a boy, the guards will let him go, but will extract a bribe from his father.

2. A bribe paid directly to park authorities for permission to graze their cattle in the Park. Often this kind of "rent" will be arranged with rangers, who are from the same communities as the pastoralists. Based on their intimate knowledge of the Park they can direct patrols away from areas where these herders go. However, state-trained foresters and ecoguards may also agree to allow a "Fulani installation" in which Fulani herders are permitted to graze their cattle in the park for a specific amount of time for a fee. This arrangement may also be made in the buffer zone of the park.

3. Extortion of herders who are grazing their cattle legally outside the Park by chasing them into park or protected area territory and claiming they were in violation of the law. Park authorities will then "negotiate" to take their cows and sell them at market to derive cash or demand more immediate payment.

4. Bribe paid to local political leaders, such as the mayor of a commune or representative in the national assembly, to intervene to release a pastoralist arrested for illegally grazing animals in the Park. The leader will call the park director or other authority and negotiate to reduce the fine and/or release herders. If successful, he will be paid for his services. Such acts also build political capital among Fulani citizens, who represent an important constituency in the administrative territory of the W region.

Note: Compiled based on interviews with park guards, rangers, tour guides, and Fulani agro-pastoralists in the W region of Benin and Niger, January-August 2011.

REFERENCES

Adams W.M. (2004) *Against Extinction: The Story of Conservation*. Earthscan, London.

Adams W.M., Aveling R., Brockington D. *et al.* (2004) Biodiversity Conservation and the Eradication of Poverty. *Science* **306**, 1146.

Adams W.M., Hutton J. (2007) People, Parks and Poverty: Political Ecology and Biodiversity Conservation. *Conservation and Society* **5**, 147-183.

Adger W.N., Agrawala S., Mirza M.M.Q. *et al.* (2007) Assessment of adaptation practices, options, constraints and capacity. pp. 717-743 in M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J.v.d. Linden, C.E. Hanson editors. *Climate Change 2007: Impacts, Adaptation and Vulnerability Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press, Cambridge, UK.

Agrawal A. (1997) The Politics of Development and Conservation: Legacies of Colonialism. *Peace & Change* **22**, 463-482.

Agrawal A. (2003) Sustainable Governance of Common-Pool Resources: Context, Methods, Politics. *Annual Review of Anthropology* **32**, 243-262.

Agrawal A., Benson C.S. (2011) Common property theory and resource governance institutions: strengthening explanations of multiple outcomes. *Environmental Conservation* **38**, 199-210.

Agrawal A., Chhatre A. (2006) Explaining success on the commons: Community forest governance in the Indian Himalaya. *World Development* **34**, 149-166.

Agrawal A., Chhatre A. (2011) Against mono-consequentialism: Multiple outcomes and their drivers in social-ecological systems. *Global Environmental Change* **21**, 1-3.

Agrawal A., Gibson C.C. (2001) *Communities and the Environment: Ethnicity, Gender, and the State in Community-based Conservation*. Rutgers University Press, New Brunswick, N.J.

Agrawal A., Gibson C.G. (1999) Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation. *World Development* **27**, 629-649.

Agrawal A., McGee H., Butt B., Miller D.C., Newton P. (2013) Context variance and context dependence in natural resource governance. *International Forest Resources and Institutions Working Paper.* University of Michigan, Ann Arbor.

Agrawal A., Ostrom E. (2001) Collective action, property rights, and decentralization in resource use in India and Nepal. *Politics and Society* **29**, 485-514.

Agrawal A., Redford K. (2006) Poverty, Development, and Biodiversity Conservation: Shooting in the Dark. *Wildlife Conservation Society Working Paper No 26*.

Agrawal A., Redford K. (2009) Conservation and Displacement: An Overview. *Conservation and Society* **7**, 1-10.

Agrawal A., Ribot J. (1999) Accountability in Decentralization: A Framework with South Asian and West African Cases. *Journal of Developing Areas* **33**, 473-502.

Agrawal A., Yadama G. (1997) How do Local Institutions Mediate Market and Population Pressures on Resources? Forest "Panchayats" in Kumaon, India. *Development and Change* **28**, 435-465.

Andam K.S., Ferraro P.J., Pfaff A., Sanchez-Azofeifa G.A., Robalino J.A. (2008) Measuring the effectiveness of protected area networks in reducing deforestation. *Proceedings of the National Academy of Sciences* **105**, 16089-16094.

Andam K.S., Ferraro P.J., Sims K.R.E., Healy A., Holland M.B. (2010) Protected areas reduced poverty in Costa Rica and Thailand. *Proceedings of the National Academy of Sciences* **107**, 9996-10001.

Andersson K.P., Gibson C.C., Lehoucq F. (2006) Municipal politics and forest governance: Comparative analysis of decentralization in Bolivia and Guatemala. *World Development* **34**, 576-595.

Angeles G., Guilkey D.K., Mroz T.A. (2005) The Impact of Community-Level Variables on Individual-Level Outcomes. *Sociological Methods & Research* **34**, 76-121.

Aubréville A. (1937) La protection de la flore en Afrique Occidentale Francaise. pp. 220-227 in A. Aubréville, A. Barbey, E.-N. Bareclay, e. al. editors. *Contribution à l'Étude des Réserves Naturelles et des Parcs Nationaux.* Editions Paul Lechevalier, Paris.

Aveling C., Chatelain C., Lauginie F. (2008) Evaluation Finale et Prospective du Programme Régional Parc W/ECOPAS: Rapport Définitif. p. 256. European Commission, Brussels, Belguim.

Bah-l'Imam A. (2010) Rapport sur les dégâts matériels et autres désagréments causés à la population de Founougou par les agents du Centre National de Gestion et de Réserve [sic] de la Faune (CENAGREF) Banikoara, lors de l'Operation de Déguerpissement des occupants du Parc National W. Gendarmerie Nationale du Bénin, Banikoara, Benin.

Bähre E. (2007) Beyond Legibility: Violence, Conflict and Development in a South African Township. *African Studies* **66**, 79-102.

Bako-Arifari N. (1998) La democratie à Founougo (Borgou): Paysans et "déscolarisés" en competition pour le pouvoir local. in T. Bierschenk, J.-P. Olivier de Sardan editors. *Les Pouvoirs au Village: Le Bénin entre Démocratisation et Décentralisation.* Karthala, Paris.

Balança G., Cornélis D., Wilson R., editors. (2007) *Les Oiseaux du Complexe WAP.* ECOPAS Press, Ouagadougou, Burkina Faso.

Baland J.-M., Moene K.O., Robinson J.A. (2010) Governance and development. *Handbook of development economics* **5**, 4597-4656.

Balmford A., Moore J.L., Brooks T. *et al.* (2001) Conservation Conflicts Across Africa. *Science* **291**, 2616-2619.

Barrett C.B., Gibson C.C., Hoffman B., McCubbins M.D. (2006) The complex links between governance and biodiversity. *Conservation Biology* **20**, 1358-1366.

Barrett C.B., Travis A.J., Dasgupta P. (2011) On biodiversity conservation and poverty traps. *Proceedings of the National Academy of Sciences* **108**, 13907-13912.

Bassett T.J., Blanc-Pamard C., Boutrais J. (2007) Constructing locality: The terroir approach in West Africa. *Africa* **77**, 104-129.

Bassett T.J., Crummey D., editors. (1993) *Land in African Agrarian Systems.* University of Wisconsin Press, Madison, WI.

Batisse M. (1997) Biosphere reserves: a challenge for biodiversity conservation and regional development. *Environment* **39**, 6-13.

Bayart J.-F. (1993 [1989]) *The State in Africa: The Politics of the Belly*. Longman, New York.
Bellard C., Bertelsmeier C., Leadley P., Thuiller W., Courchamp F. (2012) Impacts of climate change on the future of biodiversity. *Ecology Letters* **15**, 365-377.
Benoit M. (1999) Peuplement, violence endemique et remanence de l'espace sauvage en Afrique de l'Ouest: Le no man's land du 'W' du Niger. *Espace, Populations, Sociétés* **1**, 29-52.
Bernard H.R. (2006) *Research methods in anthropology*, Fourth ed. AltaMira Press, Walnut Creek, CA.
Berry S. (1993) *No condition is permanent: The social dynamics of agrarian change in sub-Saharan Africa*. University of Wisconsin Press, Madison, WI.
Berry S. (2009) Property, Authority and Citizenship: Land Claims, Politics and the Dynamics of Social Division in West Africa. *Development and Change* **40**, 23-45.
Bertzky B., Corrigan C., Kemsey J. *et al.* (2012) Protected Planet Report 2012: Tracking progress towards global targets for protected areas. IUCN, Gland, Switzerland and UNEP-WCMC.
Bierschenk T. (1988) Development projects as an arena of negotiation for strategic groups: A case study from Benin. *Sociologia Ruralis* **28**, 146-160.
Bierschenk T. (2009) Democratization without Development: Benin 1989–2009. *International Journal of Politics, Culture, and Society* **22**, 337-357.
Bierschenk T., Chauveau J.-P., Sardan J.-P.O.d., editors. (2000) *Courtiers en développement: Les villages africains en quête de projets* Editions Karthala, Paris.
Bierschenk T., Olivier de Sardan J.-P. (2003) Powers in the Village: Rural Benin between Democratisation and Decentralisation. *Africa* **73**, 145-173.
Blundo G., Olivier de Sardan J.-P., (with N. B. Arifari and M. Tidjani Alou). (2006) *Everyday corruption and the state: Citizens and public officials in Africa*. Zed Books, London.
Boko M., Niang I., Nyong A. *et al.* (2007) Africa. pp. 433-467 in M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J.v.d. Linden, C.E. Hanson editors. *Climate Change 2007: Impacts, Adaptation and Vulnerability Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press, Cambridge.
Borras S.M., Franco J.C. (2012) Global Land Grabbing and Trajectories of Agrarian Change: A Preliminary Analysis. *Journal of Agrarian Change* **12**, 34-59.
Brady H.E., Collier D., editors. (2004) *Rethinking Social Inquiry: Diverse Tools, Shared Standards.* Rowman & Littlefield Publishers, Lanham.
Brambor T., Clark W.R., Golder M. (2006) Understanding Interaction Models: Improving Empirical Analyses. *Political Analysis* **14**, 63-82.
Brandon K., Redford K., Sanderson S. (1998) *Parks in Peril: People, Politics, and Protected Areas*. Island Press, Washington, DC.
Brandon K.E., Wells M. (1992) Planning for people and parks: Design dilemmas. *World Development* **20**, 557-570.
Brockington D. (2002) *Fortress Conservation: The Preservation of the Mkomazi Game Reserve, Tanzania*. James Currey, Oxford.
Brockington D., Duffy R., Igoe J. (2008) *Nature Unbound: Conservation, Capitalism, and the Future of Protected Areas*. Earthscan, London.
Brockington D., Igoe J. (2006) Eviction for conservation: A global overview. *Conservation and Society* **4**, 424-470.

Brooks J.S., Waylen K.A., Borgerhoff Mulder M. (2012) How national context, project design, and local community characteristics influence success in community-based conservation projects. *Proceedings of the National Academy of Sciences* **109**, 21265-21270.
Brooks T.M., Mittermeier R.A., da Fonseca G.A.B. *et al.* (2006) Global Biodiversity Conservation Priorities. *Science* **313**, 58-61.
Brosius J.P., Russell D. (2003) Conservation from Above: An Anthropological Perspective on Transboundary Protected Areas and Ecoregional Planning. *Journal of Sustainable Forestry* **17**, 39-66.
Brottem L. (2011) Rediscovering "Terroir" in West African Agroforestry Parklands. *Society & Natural Resources* **24**, 553-568.
Bruner A.G., Gullison R.E., Rice R.E., da Fonseca G.A.B. (2001) Effectiveness of Parks in Protecting Tropical Biodiversity. *Science* **291**, 125-128.
Buntaine M., Parks B. (2013) When Do Environmentally-Focused Assistance Projects Achieve their Objectives? Evidence from World Bank Post-Project Evaluations. *Global Environmental Politics* **13**, 65-88.
Buntaine M.T., Buch B.P., Parks B.C. (2013) Political Competition and Persistent Institutional Development in the Environment Sector. *International Studies Association.* San Francisco, CA.
Burnside C., Dollar D. (2000) Aid, Policies, and Growth. *The American Economic Review* **90**, 847-868.
Büscher B. (2013) *Transforming the Frontier: Peace Parks and the Politics of Neoliberal Conservation in Southern Africa*. Duke University Press, Durham, NC.
Butchart S.H.M., Scharlemann J.P.W., Evans M.I., et al. (2012) Protecting Important Sites for Biodiversity Contributes to Meeting Global Conservation Targets. *PLoS ONE* **7**, e32529.
Butchart S.H.M., Walpole M., Collen B. *et al.* (2010) Global Biodiversity: Indicators of Recent Declines. *Science* **328**, 1164-1168.
Butt B. (2011) Coping with Uncertainty and Variability: The Influence of Protected Areas on Pastoral Herding Strategies in East Africa. *Human Ecology* **39**, 289-307.
Butt B., Turner M. (2012) Clarifying competition: the case of wildlife and pastoral livestock in East Africa. *Pastoralism: Research, Policy and Practice* **2**, 9.
Canavire-Bacarreza G., Hanauer M.M. (2013) Estimating the Impacts of Bolivia's Protected Areas on Poverty. *World Development* **41**, 265–285.
Cardinale B.J., Duffy J.E., Gonzalez A. *et al.* (2012) Biodiversity loss and its impact on humanity. *Nature* **486**, 59-67.
Casti E. (2004) Recherche sur les aspects socio-territoriaux dans les Zones Périphériques du Parc du W: proposition de zonage. Programme Régional Parc W / ECOPAS, Ougadougou, Burkina Faso.
CENAGREF. (1999) Schema Directeur du Complexe du Parc Nationale du W. CENAGREF - Centre National de Gestion des Réserves de Faune, Cotonou, Benin.
CENAGREF. (2002) Plan Cadre National de Recherche-Developpement sur les Aires Protegees du Bénin. CENAGREF/World Bank, Cotonou, Benin.
CENAGREF. (2008) Présentation du Parc National W: Réserve Transfronalière de Biosphère W/Benin. CENAGREF, Kandi, Benin.
CENAGREF. (2011) Strategie Nationale de Conservation et de Gestion des Réserves de Faune, 2011-2020. CENAGREF, Cotonou.

CENAGREF and ECOPAS. (2008) Rapport de dénombrement pédestre dans le Complexe Parc W Bénin - Édition 2008. Rapport Définitif. ECOPAS/Parc W, Banikoara, Benin.
Cernea M.M., Schmidt-Soltau K. (2006) Poverty Risks and National Parks: Policy Issues in Conservation and Resettlement. *World Development* **34**, 1808-1830.
Chan K.M.A., Pringle R.M., Ranganathan J.A.I. *et al.* (2007) When Agendas Collide: Human Welfare and Biological Conservation. *Conservation Biology* **21**, 59-68(10).
Chape S., Spalding M., Jenkins M. (2008) *The world's protected areas: Status, values, and prospects in the twenty-first century*. University of California Press, Berkeley, CA.
Chhatre A. (2008) Political Articulation and Accountability in Decentralisation: Theory and Evidence from India. *Conservation and Society* **6**, 12-23.
Chhatre A., Agrawal A. (2008) Forest commons and local enforcement. *Proceedings of the National Academy of Sciences* **105**, 13286-13291.
Chhatre A., Agrawal A. (2009) Trade-offs and synergies between carbon storage and livelihood benefits from forest commons. *Proceedings of the National Academy of Sciences* **106**, 17667-17670.
Chhatre A., Saberwal V. (2005) Political Incentives for Biodiversity Conservation. *Conservation Biology* **19**, 310-317.
Chhatre A., Saberwal V.K. (2006) *Democratizing Nature: Politics, Conservation, and Development in India*. Oxford University Press, New Delhi.
Chomitz K.M. (2007) At loggerheads?: Agricultural expansion, poverty reduction, and environment in the tropical forests. World Bank, Washington, D.C.
Clay J. (2004) *World Agriculture and the Environment: A Commodity-by-Commodity Guide to Impacts and Practices*. Island Press, Washington, D.C.
Clement F. (2010) Analysing decentralised natural resource governance: proposition for a "politicised" institutional analysis and development framework. *Policy Sciences* **43**, 129-156.
Clerici N., Bodini A., Eva H., Grégoire J.-M., Dulieu D., Paolini C. (2007) Increased isolation of two Biosphere Reserves and surrounding protected areas (WAP ecological complex, West Africa). *Journal for Nature Conservation* **15**, 26-40.
Coad L., Campbell A., Miles L., Humphries K. (2008) The Costs and Benefits of Protected Areas for Local Livelihoods: A Review of the Current Literature. UNEP World Conservation Monitoring Centre, Cambridge, U.K.
Collen B., Loh J., Whitmee S., McRae L., Amin R., Baillie J.E.M. (2009) Monitoring Change in Vertebrate Abundance: The Living Planet Index. *Conservation Biology* **23**, 317-327.
Commune Rurale de Falmey. (2006) Monographie de la Commune Rurale de Falmey. Falmey, Niger.
Commune Rurale de Kirtachi. (2007) Plan de Developpement Communale de Kirtachi. Kirtachi, Niger.
Commune Rurale de Tamou. (2009) Plan de Developpement Communal, 2010-2013. Tamou, Niger.
Convention on Biological Diversity (CBD). (2010) Aichi Biodiversity Targets. http://www.cbd.int/sp/targets/.
Craigie I.D., Baillie J.E.M., Balmford A. *et al.* (2010) Large mammal population declines in Africa's protected areas. *Biological Conservation* **143**, 2221-2228.
Crick B. (1962) *In Defense of Politics*. University of Chicago Press, Chicago.

Davison J.E., Graumlich L.J., Rowland E.L., Pederson G.T., Breshears D.D. (2012) Leveraging modern climatology to increase adaptive capacity across protected area networks. *Global Environmental Change* **22**, 268-274.

de Haan L.J., editor. (1997) *Agriculteurs et éleveurs au Nord-Bénin: Écologie et genres de vie.* Karthala, Paris.

DeFries R., Hansen A., Newton A.C., Hansen M.C. (2005) Increasing Isolation of Protected Areas in Tropical Forests over the past Twenty Years. *Ecological Applications* **15**, 19-26.

Denizer C., Kaufmann D., Kraay A. (2011) Good Countries or Good Projects? Macro and Micro Correlates of World Bank Project Performance. World Bank Policy Research Working Paper 5646.

Dex S. (1995) The Reliability of Recall Data: a Literature Review. *Bulletin de Méthodologie Sociologique* **49**, 58-89.

Dickens C. (1999) *A tale of two cities*. Dover Publications, Mineola, NY.

Dietz T., Henry A.D. (2008) Context and the commons. *Proceedings of the National Academy of Sciences* **105**, 13189-13190.

Djogbenou P.C. (2010) Analyse multicritère des Plans d'Aménagement Participatif des forêts classées au Bénin : Développement d'un modèle durable. *Ecole Doctorale Pluridisciplinaire ''Espaces, Cultures et Développement''.* National University of Benin at Abomey-Calavi, Abomey-Calavi.

Dollar D., Levin V. (2005) Sowing And Reaping: Institutional Quality and Project Outcomes in Developing Countries. World Bank Policy Research Working Paper No. 3524.

Eakin H., Bojórquez-Tapia L., Diaz R., Castellanos E., Haggar J. (2011) Adaptive Capacity and Social-Environmental Change: Theoretical and Operational Modeling of Smallholder Coffee Systems Response in Mesoamerican Pacific Rim. *Environmental Management* **47**, 352-367.

ECOPAS. (2005) Plan d'Aménagement et de Gestion de la Réserve de Biosphère Transfrontalière W - 2006-2010: Volumes I-III. Programme Régional Parc W/ECOPAS, Ougadougou, Burkina Faso.

Ellis F. (2000) *Rural Livelihoods and Diversity in Developing Countries*. Oxford University Press, Oxford.

Engle N.L. (2011) Adaptive capacity and its assessment. *Global Environmental Change* **21**, 647-656.

Engle N.L., Lemos M.C. (2010) Unpacking governance: Building adaptive capacity to climate change of river basins in Brazil. *Global Environmental Change* **20**, 4-13.

Faisson R. (1946) *Le W Parc national: Des nuits et des jours parmi le bêtes sauvages*. R. Schindler, Cairo.

Ferraro P. (2005) Corruption and conservation: the need for empirical analyses. A response to Smith & Walpole. *Oryx* **39**, 257-259.

Ferraro P., Hanauer M. (2011) Protecting Ecosystems and Alleviating Poverty with Parks and Reserves: "Win-Win" or Tradeoffs? *Environmental and Resource Economics* **48**, 269-286.

Ferraro P.J. (2002) The local costs of establishing protected areas in low-income nations: Ranomafana National Park, Madagascar. *Ecological Economics* **43**, 261-275.

Ferraro P.J. (2009) Counterfactual thinking and impact evaluation in environmental policy. pp. 75–84 in M. Birnbaum, P. Mickwitz editors. *Environmental program and policy evaluation: New Directions for Evaluation.* Wiley.

Ferraro P.J., Hanauer M.M., Miteva D.A., Canavire-Bacarreza G.J., Pattanayak S.K., Sims K.R.E. (2013) More strictly protected areas are not necessarily more protective: evidence from Bolivia, Costa Rica, Indonesia, and Thailand. *Environmental Research Letters* **8**, 025011.

Ferraro P.J., Hanauer M.M., Sims K.R.E. (2011) Conditions associated with protected area success in conservation and poverty reduction. *Proceedings of the National Academy of Sciences* **108**, 13913-13918.

Ferraro P.J., Pattanayak S.K. (2006) Money for Nothing? A Call for Empirical Evaluation of Biodiversity Conservation Investments. *PLOS Biology* **4**, e105.

Fleischman F.D. (2012) Public servant behavior and forest policy implementation in Central India. p. 328. Indiana University, Bloomington, IN.

Foerster S., Wilkie D.S., Morelli G.A. *et al.* (2011) Human livelihoods and protected areas in Gabon: a cross-sectional comparison of welfare and consumption patterns. *Oryx* **45**, 347-356.

Ford C. (2004) Nature, Culture and Conservation in France and her Colonies 1840-1940. *Past & Present* **183**, 173-198.

Ford C. (2012) Imperial Preservation and Landscape Reclamation: National Parks and Natural Reserves in French Colonial Africa. in B. Gissibl, S. Höhler, P. Kupper editors. *Civilizing nature: National parks in global historical perspective.* Berghahn Books, New York.

Fugelstad F. (1983) *A History of Niger, 1850-1960*. Cambridge University Press, Cambridge.

Gandigbé T. (2012) Crise autour de la gestion des parcs W et de la Pendjari: Le ministre Blaise Ahanhanzo-Glèlè prend ses responsabilités. *L'Evénement Précis.* Cotonou.

Garland E. (2008) The Elephant in the Room: Confronting the Colonial Character of Wildlife Conservation in Africa. *African Studies Review* **51**, 51-74.

Garnett S.T., Sayer J., du Toit J. (2007) Improving the Effectiveness of Interventions to Balance Conservation and Development: A Conceptual Framework. *Ecology and Society* **12**.

Gaston K.J., Jackson S.F., Cantú-Salazar L., Cruz-Piñón G. (2008) The Ecological Performance of Protected Areas. *Annual Review of Ecology, Evolution, and Systematics* **39**, 93-113.

Gavin M.C., Solomon J.N., Blank S.G. (2010) Measuring and Monitoring Illegal Use of Natural Resources. *Conservation Biology* **24**, 89-100.

Geldmann J., Barnes M., Coad L., Craigie I.D., Hockings M., Burgess N.D. (2013) Effectiveness of terrestrial protected areas in reducing habitat loss and population declines. *Biological Conservation* **161**, 230-238.

Gelman A., Hill J. (2007) *Data Analysis Using Regression and Multilevel/Hierarchical Models*. Cambridge University Press, New York, NY.

George A.L., Bennett A. (2005) *Case Studies and Theory Development in the Social Sciences*. MIT Press, Cambridge, MA.

Gergely N. (2009) The Cotton Sector of Benin. *Africa Region Working Paper Series* World Bank, Washington, D.C.

Gerring J. (2010) Causal Mechanisms: Yes, But... *Comparative Political Studies* **43**, 1499-1526.

Gertler P.J., Martinez S., Premand P., Rawlings L.B., Vermeersch M.J. (2011) *Impact evaluation in practice*. World Bank, Washington, D.C.

Gibson C.G. (1999) *Politicians and Poachers: The Political Economy of Wildlife Policy in Africa*. Cambridge University Press, Cambridge, MA.

Gibson C.G., Andersson K., Ostrom E., Shivakumar S. (2005a) *The Samaritan's Dilemma: The Political Economy of Development Aid*. Oxford University Press, Oxford.
Gibson C.G., Williams J.T., Ostrom E. (2005b) Local Enforcement and Better Forests. *World Development* **33**, 273–284.
Gillingham S., Lee P.C. (2003) People and protected areas: a study of local perceptions of wildlife crop-damage conflict in an area bordering the Selous Game Reserve, Tanzania. *Oryx* **37**, 316-325.
Gissibl B., Höhler S., Kupper P. (2012) *Civilizing nature: National parks in global historical perspective*. Berghahn Books, New York.
Glew L., Miller D.C., Mascia M.B. (2013) Services, rights, and infrastructure: Causal mechanisms linking conservation interventions and human well-being. *Association of American Geographers Annual Meeting.* Los Angeles.
Greenstone M., Gayer T. (2009) Quasi-experimental and experimental approaches to environmental economics. *Journal of Environmental Economics and Management* **57**, 21–44.
Grettenberger J.F. (1984) 'W' National Park in Niger. A case for urgent assistance. *Oryx* **18**, 230-236.
Groves R.M., Fowler F.J., Couper M.P., Lepkowski J.M., Singer E., Tourangean R. (2004) *Survey Methodology*. Wiley, Hoboken, NJ.
Gubbi S., Linkie M., Leader-Williams N. (2008) Evaluating the legacy of an integrated conservation and development project around a tiger reserve in India. *Environmental Conservation* **35**, 331-339.
Guha R. (1989) *The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya*. Oxford University Press, Oxford.
Guyer J.I., Peters P.E. (1987) Introduction to "Conceptualizing the household: issues of theory and policy in Africa". *Development and Change* **18**, 197-214.
Hadley M., editor. (2003) *Biosphere Reserves: Special Places for People and Nature.* UNESCO, Paris.
Hale T.A. (1998) *Griots and Griottes: Masters of Words and Music*. Indiana University Press, Bloomington, Indiana.
Hall P.A. (2009) Path Dependence. pp. 246-248 in G. King, K.L. Schlozman, N. Nie editors. *The Future of Political Science: 100 Persepctives.* Routledge, New York.
Halpern B.S., Klein C.J., Brown C.J. *et al.* (2013) Achieving the triple bottom line in the face of inherent trade-offs among social equity, economic return, and conservation. *Proceedings of the National Academy of Sciences*.
Halpern B.S., Lester S.E., Kellner J.B. (2009) Spillover from marine reserves and the replenishment of fished stocks. *Environmental Conservation* **36**, 268-276.
Hanauer M., Ferraro P.J. (2011) Causal Mechanisms of Protected Areas on Poverty. *Annual Institute on Joint Outcomes Related to Sustainability.* University of Michigan, Ann Arbor.
Hardin G. (1968) The Tragedy of the Commons. *Science* **162**, 1243-1248.
Hardin R. (2011) Concessionary Politics: Property, Patronage, and Political Rivalry in Central African Forest Management. *Current Anthropology* **52**, S113-S125.
Hauzeur J., Pelle L. (1993) Fleuve Niger: Toponymie et géographie récente du W (de Kirtachi à Boumba). *Journal des Africanistes* **63**, 35-66.

Hein L., Miller D.C., de Groot R.S. (2013) Payments for Ecosystem Services and the Financing of Global Biodiversity Conservation. *Current Opinion in Environmental Sustainability* **5**, 87-93.
Heller N.E., Zavaleta E.S. (2009) Biodiversity management in the face of climate change: A review of 22 years of recommendations. *Biological Conservation* **142**, 14-32.
Hibert F., Calenge C., Fritz H. *et al.* (2010) Spatial avoidance of invading pastoral cattle by wild ungulates: Insights from using point process statistics. *Biodiversity and Conservation* **19**, 2003-2024.
Hilborn R., Arcese P., Borner M. *et al.* (2006) Effective Enforcement in a Conservation Area. *Science* **314**, 1266.
Hinkel J. (2011) Indicators of vulnerability and adaptive capacity: Towards a clarification of the science-policy interface. *Global Environmental Change* **21**, 198-208.
Holmes G., Scholfield K., Brockington D. (2012) A Comparison of Global Conservation Prioritization Models with Spatial Spending Patterns of Conservation Nongovernmental Organizations. *Conservation Biology* **26**, 602-609.
Idrissa A. (2009) The Invention of Order: Republication Codes and Islamic Law in Niger. p. 376. *Department of Political Science.* University of Florida, Gainsville, FL.
Igoe J. (2006) Measuring the Costs and Benefits of Conservation to Local Communities. *Journal of Ecological Anthropology* **10**, 72-77.
Imai K., Keele L., Tingley D., Yamamoto T. (2011) Unpacking the black box of causality: Learning about causal mechanisms from experimental and observational studies. *American Political Science Review* **105**, 765-789.
Index Mundi. (2013) World Cotton Prices, 1998-2013 http://www.indexmundi.com/commodities/?commodity=cotton&months=180
IUCN. (1996) World Heritage Nomination – IUCN Technical Evaluation: "W" National Park, Niger. IUCN-International Union for the Conservation of Nature, Gland, Switzerland.
IUCN. (2013) IUCN Protected Areas Categories System http://www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories/.
IUCN, UNEP, WWF. (1980) World Conservation Strategy: Living Resource Conservation for Sustainable Development. IUCN - International Union for Conservation of Nature and Natural Resources Gland, Switzerland.
IUCN and UNEP. (2012) The World Database on Protected Areas (WDPA). UNEP-WCMC, Cambridge, UK.
Joppa L.N., Pfaff A. (2011) Global protected area impacts. *Proceedings of the Royal Society B: Biological Sciences* **278**, 1633-1638.
Kandine A. (2010) Decentralized vs. Local Management of Land Tenure: The Niger Case History. Technical Committee on Land Tenure & Development/Agence Française de Développement., Niamey, Niger.
Kaufmann D., Kraay A., Matsruzzi M. (2012) World Governance Indicators, 1996-2011. World Bank, Washington, D.C.
Keane A., Jones J.P.G., Edwards-Jones G., Milner-Gulland E.J. (2008) The sleeping policeman: understanding issues of enforcement and compliance in conservation. *Animal Conservation* **11**, 75-82.
Khagram S., Thomas C.W. (2010) Toward a Platinum Standard for Evidence-Based Assessment by 2020. *Public Administration Review* **70**, S100-S106.

Kleitz G. (2002) Les zones périphériques du Parc du W (Bénin, Burkina Faso, Niger). Programme Régional Parc – W (ECOPAS), Ougadougou, Burkina Faso.
Kopytoff I., editor. (1987) *The African Frontier: The Reproduction of Traditional African Societies.* Indiana University Press, Bloomington, IN.
Kosek J. (2006) *Understories: The Political Life of Forests in Northern New Mexico*. Duke University Press, Durham.
Kourouma A. (1998) *En attendant le vote des bêtes sauvages*. Éditions de Seuil, Paris.
Kremen C., Niles J.O., Dalton M.G. *et al.* (2000) Economic Incentives for Rain Forest Conservation Across Scales. *Science* **288**, 1828-1832.
Kuba R., Lentz C., editors. (2006) *Land and the Politics of Belonging in West Africa.* Brill, Leiden.
Kumar P., editor. (2012) *The Economics of Ecosystems and Biodiversity (TEEB): Ecological and Economic Foundations.* Earthscan-Routledge, London.
Kumar S., Kant S. (2005) Bureaucracy and new management paradigms: Modeling foresters' perceptions regarding community-based forest management in India. *Forest Policy and Economics* **7**, 651-669.
Lamarque F., editor. (2004) *Les grands mammiferes du complexe WAP.* ECOPAS Press, Ouagadougou, Burkina Faso.
Lambin E.F., Meyfroidt P. (2011) Global land use change, economic globalization, and the looming land scarcity. *Proceedings of the National Academy of Sciences* **108**, 3465-3472.
Larson A.M., Soto F. (2008) Decentralization of Natural Resource Governance Regimes. *Annual Review of Environment and Resources* **33**, 213-239.
Laurance W.F., Carolina Useche D., Rendeiro J., et al. (2012) Averting biodiversity collapse in tropical forest protected areas. *Nature* **489**, 290–294.
Laye C. (2002) Savoirs, besoins et institutions territoriales dans les peripheries du Parc W: Typologies d'acteurs et configurations conflictuelles a partir de six villages-cibles. in A. Turco editor. *Rapport établi dans le cadre de la Recherche en Géographie Humaine-Volet "Dynamiques d'acteurs, conflictualité et concertation".* ECOPAS, Ougadougou.
Le Meur P.Y. (1999) Coping with Institutional Uncertainty: Contested Local Public Spaces and Power in Rural Benin. *Afrika Spectrum* **34**, 187-211.
Le Meur P.Y. (2006) State Making and the Politics of the Frontier in Central Benin. *Development and Change* **37**, 871-900.
Leader-Williams N., Adams W.M., Smith R.J., Zoological Society of L. (2010) *Trade-Offs in Conservation: Deciding What to Save*. Wiley-Blackwell, Oxford.
Lemieux C., Scott D. (2011) Changing Climate, Challenging Choices: Identifying and Evaluating Climate Change Adaptation Options for Protected Areas Management in Ontario, Canada. *Environmental Management* **48**, 675-690.
Lemos M.C., Agrawal A. (2006) Environmental Governance. *Annual Review of Environment and Resources* **31**, 297-325.
Lewis D., Mosse D. (2006) *Development brokers and translators: The ethnography of aid and agencies*. Kumarian Press, Bloomfield, CT.
Linkie M., Smith R.J., Zhu Y. *et al.* (2008) Evaluating Biodiversity Conservation around a Large Sumatran Protected Area. *Conservation Biology* **22**, 683-690.
Lombard J. (1965) *Structures De Type 'Féodal' En Afrique Noire: Ètude Des Dynamismes Internes Et Des Relations Sociales Chez Les Bariba Du Dahomey, Le Monde D'outre-Mer, Passè Et Prèsent*. Mouton, Paris.

Lowe C. (2003) *Wild Profusion: Biodiversity Conservation in an Indonesian Archipelago*. Princeton University Press, Princeton, NJ.
Lund C. (1998) *Law, Power and Politics in Niger: Land Struggles and the Rural Code*. LIT Verlag, Hamburg.
Lund C. (2008) *Local politics and the dynamics of property in Africa*. Cambridge University Press, New York.
MacKinnon K., Dudley N., Sandwith T. (2011) Natural solutions: Protected areas helping people to cope with climate change. *Oryx* **45**, 461-462.
Macpherson C.B., editor. (1978) *Property: Mainstream and Critical Positions.* University of Toronto Press, Toronto.
Maercklein D. (2008) Biodiversity and Tropical Forest Assessment for Niger. p. 46. USDA Forest Service/International Forestry for USAID/Bureau for Africa, Washington, D.C.
Maillard D., Calenge C., Jacobs T., Gaillard J.M., Merlot L. (2001) The Kilometric Index as a monitoring tool for populations of large terrestrial animals: A feasibility test in Zakouma National Park, Chad. *African Journal of Ecology* **39**, 306-309.
Mascia M.B., editor. (forthcoming) *Conservation Social Science: Understanding People and the Conservation of Biodiversity.* Wiley-Blackwell, Malden, MA.
Mascia M.B., Claus C.A. (2009) A Property Rights Approach to Understanding Human Displacement from Protected Areas: the Case of Marine Protected Areas. *Conservation Biology* **23**, 16-23.
Mascia M.B., Claus C.A., Naidoo R. (2010) Impacts of Marine Protected Areas on Fishing Communities. *Conservation Biology* **24**, 1424–1429.
Mascia M.B., Pailler S. (2011) Protected area downgrading, downsizing, and degazettement (PADDD) and its conservation implications. *Conservation Letters* **4**, 9-20.
Matondi P.B., Havnevik K., Beyene A. (2011) *Biofuels, land grabbing and food security in Africa*. Zed Books.
Matthews A.S. (2011) *Instituting nature: Authority, expertise, and power in Mexican forests*. The MIT Press, Cambridge, MA.
McCarthy D.P., Donald P.F., Scharlemann J.P.W. *et al.* (2012) Financial Costs of Meeting Global Biodiversity Conservation Targets: Current Spending and Unmet Needs. *Science* **338**, 946-949.
McClanahan T.R., J.E C., N.A.J G. *et al.* (2009) Identifying Reefs of Hope and Hopeful Actions: Contextualizing Environmental, Ecological, and Social Parameters to Respond Effectively to Climate Change. *Conservation Biology* **23**, 662-671.
McDermott Hughes D. (2006) *From Enslavement to Environmentalism: Politics on a Southern African Frontier*. University of Washington Press, Seattle.
McElwee P. (2010) Resource Use Among Rural Agricultural Households Near Protected Areas in Vietnam: The Social Costs of Conservation and Implications for Enforcement. *Environmental Management* **45**, 113-131.
McNally C.G., Uchida E., Gold A.J. (2011) The Effect of a Protected Area on the Tradeoffs between Short-run and Long-run Benefits from Mangrove Ecosystems. *Proceedings of the National Academy of Sciences* **108**, 13945-13950.
McPherson M.A., Niewsiadomy M.L. (2000) African elephants: The effect of property rights and political stability. *Contemporary Economic Policy* **18**, 14-26.
McShane T.O., Hirsch P.D., Trung T.C. *et al.* (2010) Hard choices: Making trade-offs between biodiversity conservation and human well-being. *Biological Conservation*.

McShane T.O., Wells M.P. (2004) *Getting Biodiversity Projects to Work: Towards More Effective Conservation and Development*. Columbia University Press, New York.
McSweeney K. (2005) Natural insurance, forest access, and compounded misfortune: Forest resources in smallholder coping strategies before and after Hurricane Mitch, northeastern Honduras. *World Development* **33**, 1453-1471.
Métodjo A.K. (2008) *Devenir maire en Afrique: Décentralisation et notabilités locales au Bénin*. L'Harmattan, Paris.
Meyer B.D. (1995) Natural and Quasi-Experiments in Economics. *Journal of Business and Economic Statistics* **13**, 51-61.
Migdal J., Kohli A., Shue V. (1994) *State Power and Social Forces: Domination and Transformation in the Third World*. Cambridge University Press, Cambridge.
Millennium Ecosystem Assessment. (2005) *Ecosystems and Human Well-Being: Synthesis*. Island Press, Washington, DC.
Miller D.C. (2013 (in review)) Explaining Global Patterns of International Aid for Linked Biodiversity Conservation and Development. *World Development*.
Miller D.C., Agrawal A., Roberts J.T. (2013) Biodiversity, Governance, and the Allocation of International Aid for Conservation. *Conservation Letters* **6**, 12-20.
Miteva D.A., Pattanayak S.K., Ferraro P.J. (2012) Evaluation of biodiversity policy instruments: what works and what doesn't? *Oxford Review of Economic Policy* **28**, 69-92.
Mohamadou A. (2009) Decentralisation and local power in Niger. IIED, London.
Monfort A., Agbo V., Atoke P. *et al.* (1994) Préparation d'une stratégie de conservation et de gestion des aires protégées. IUCN/PGRN, Cotonou, Benin.
Mortimore M., Adams W.M. (1999) *Working the Sahel: Environment and Society in Northern Nigeria*. Routledge, London.
Mueller J.G. (2009) Including local voices in global discourse in biodiversity conservation: An ethnobotanical study in Boumba, Niger (Park W). p. 292. Tufts University, Medford, MA.
Mwangi E., Miller D.C., Ojanena M., Mshale B., Zhou W., Petrokofsky G. (forthcoming) The Environmental Impacts of Different Property Rights Regimes. *Annual Review of Environment and Resources*.
Nagendra H., Rocchini D., Ghate R. (2010) Beyond parks as monoliths: Spatially differentiating park-people relationships in the Tadoba Andhari Tiger Reserve in India. *Biological Conservation* **143**, 2900-2908.
Naughton-Treves L. (1997) Farming the Forest Edge: Vulnerable Places and People around Kibale National Park, Uganda. *Geographical Review* **87**, 27-46.
Naughton-Treves L. (2012) Participatory Zoning to Balance Conservation and Development in Protected Areas. pp. 234-251 in J.C. Ingram, F. DeClerck, C. Rumbaitis Del Rio editors. *Integrating Ecology and Poverty Reduction: The Application of Ecology in Development Solutions* Springer, New York.
Naughton-Treves L., Alix-Garcia J., Chapman C.A. (2011) Lessons about parks and poverty from a decade of forest loss and economic growth around Kibale National Park, Uganda. *Proceedings of the National Academy of Sciences* **108**, 13919-13924.
Naughton-Treves L., Holland M.B., Brandon K. (2005) The Role of Protected Areas in Conserving Biodiversity and Sustaining Local Livelihoods. *Annual Review of Environment and Resources* **30**, 219-252.

Nelson A., Chomitz K.M. (2011) Effectiveness of Strict vs. Multiple Use Protected Areas in Reducing Tropical Forest Fires: A Global Analysis Using Matching Methods. *PLoS ONE* **6**, e22722.
Neuenschwander P., Sinsin B., Goergen G., editors. (2011) *Nature Conservation in West Africa: Red List for Benin.* International Institute of Tropical Agriculture, Ibadan, Nigeria.
Neumann R. (1997) Primitive Ideas: Protected Area Buffer Zones and the Politics of Land in Africa. *Development and Change* **28**, 559-582.
Neumann R.P. (1998) *Imposing Wilderness: Struggles over Livelihood and Nature Preservation in Africa*. University of California Press, Berkeley.
Nolte C., Agrawal A., Barreto P. (2013a) Setting priorities to avoid deforestation in Amazon protected areas: are we choosing the right indicators? *Environmental Research Letters* **8**, 015039.
Nolte C., Agrawal A., Silvius K.M., Soares-Filho B.S. (2013b) Governance regime and location influence avoided deforestation success of protected areas in the Brazilian Amazon. *Proceedings of the National Academy of Sciences* **110**, 4956-4961.
Obichere B.I. (1971) *West African States and European Expansion: The Dahomey-Niger Hinterland*. Yale University Press, New Haven, CT.
Oliveira P.J., Anser G.P., Knapp D.E. *et al.* (2007) Land-use allocation protects the Peruvian Amazon. *Science* **317**, 1233-1236.
Olivier de Sardan J.-P. (2011) The Eight Modes of Local Governance in West Africa. *IDS Bulletin* **42**, 22-31.
Olowu D., Williams B., Soremekun K. (1999) *Governance and democratisation in West Africa*. Council for the Development of Social Science Research in Africa, Dakar.
Oppenheimer M. (2012) Climate change impacts: accounting for the human response. *Climatic Change*, 1-11.
Orlove B.S., Brush S.B. (1996) Anthropology and the Conservation of Biodiversity. *Annual Review of Anthropology* **25**, 329-352.
Ostrom E. (1990) *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press, Cambridge.
Ostrom E. (2007) A diagnostic approach for going beyond panaceas. *PNAS* **104**, 15181-15187.
Ostrom E., Burger J., Field C.B., Norgaard R.B., Policansky D. (1999) Revisiting the Commons: Local Lessons, Global Challenges. *Science* **284**, 278-282.
Paavola J. (2007) Institutions and environmental governance: A reconceptualization. *Ecological Economics* **63**, 93-103.
Pagdee A., Kim Y.-s., Daugherty P.J. (2006) What Makes Community Forest Management Successful: A Meta-Study From Community Forests Throughout the World. *Society & Natural Resources* **19**, 33-52.
Page S. (2006) Path Dependence. *Quarterly Journal of Political Science* **1**, 87-115.
Peluso N.L. (1992) *Rich Forests, Poor People: Resource Control and Resistance in Java*. University of California Press, Berkeley, CA.
Peluso N.L. (1993) Coercing conservation? The politics of state resource control. *Global Environmental Change* **3**, 199-217.
Persha L., Agrawal A., Chhatre A. (2011) Social and Ecological Synergy: Local Rulemaking, Forest Livelihoods, and Biodiversity Conservation. *Science* **331**, 1606-1608.

Persha L., Fischer H., Chhatre A., Agrawal A., Benson C. (2010) Biodiversity conservation and livelihoods in human-dominated landscapes: Forest commons in South Asia. *Biological Conservation* **143**, 2918-2925.
Peters P.E. (1994) *Dividing the Commons: Politics, Policy, and Culture in Botswana*. University of Virginia Press, Charlottesville, VA.
Peters P.E. (2004) Inequality and Social Conflict Over Land in Africa. *Journal of Agrarian Change* **4**, 269-314.
Peterson M.N., Birckhead J.L., Leong K., Peterson M.J., Peterson T.R. (2010) Rearticulating the myth of human–wildlife conflict. *Conservation Letters* **3**, 74-82.
Pettorelli N., Chauvenet A.L.M., Duffy J.P., Cornforth W.A., Meillere A., Baillie J.E.M. (2012) Tracking the effect of climate change on ecosystem functioning using protected areas: Africa as a case study. *Ecological Indicators* **20**, 269-276.
Petursson J.G., Vedeld P., Sassen M. (2013) An institutional analysis of deforestation processes in protected areas: The case of the transboundary Mt. Elgon, Uganda and Kenya. *Forest Policy and Economics* **26**, 22-33.
Pfaff A., Robalino J., Lima E., Sandoval C., Herrera L.D. (2013) Governance, Location and Avoided Deforestation from Protected Areas: Greater Restrictions Can Have Lower Impact, Due to Differences in Location. *World Development*, in press.
Pierson P. (2000) Increasing Returns, Path Dependence, and the Study of Politics. *American Political Science Review* **94**, 251-268.
Platteau J.-P. (1996) The Evolutionary Theory of Land Rights as Applied to Sub-Saharan Africa: A Critical Assessment. *Development and Change* **27**, 29-86.
Poppe J. (2010) A History of Surveillance, Commodification, and Participation in Nature Conservation. The Case of Park "W", Burkina Faso. *Afriche e Orienti*, 125-146.
Poppe J. (2012) Conservation's ambiguities: Rangers on the periphery of the W park, Burkina Faso. *Conservation and Society* **10**, 330-343.
Poppe J. (Forthcoming) The power of the uniform: Foresters and rangers on the periphery of park W, Burkina Faso. *Africa*.
Pullin A.S., Bangpan M., Dalrymple S. *et al.* (forthcoming) Human Well-being Impacts of Terrestrial Protected Areas. *Environmental Evidence*.
Raffles H. (1999) "Local Theory": Nature and the Making of an Amazonian Place. *Cultural Anthropology* **14**, 323-360.
Rands M.R.W., Adams W.M., Bennun L. *et al.* (2010) Biodiversity Conservation: Challenges Beyond 2010. *Science* **329**, 1298-1303.
Redford K.H., Padoch C., Sunderland T. (2013) Fads, Funding, and Forgetting in Three Decades of Conservation. *Conservation Biology* **27**, 437-438.
République du Bénin. (2005) Recueil de Textes sur la Décentralisation. Présidence de la République du Bénin, Cotonou.
Ribot J.C. (1998) Theorizing Access: Forest Profits along Senegal's Charcoal Commodity Chain. *Development and Change* **29**, 307-341.
Ribot J.C. (2004) *Waiting for Democracy: The Politics of choice in Natural Resource Decentralization*. World Resources Institute, Washington, DC.
Ribot J.C., Lund J.F., Treue T. (2010) Democratic decentralization in sub-Saharan Africa: Its contribution to forest management, livelihoods, and enfranchisement. *Environmental Conservation* **37**, 35-44.
Ribot J.C., Peluso N.L. (2003) A Theory of Access. *Rural Sociology* **68**, 53-81.

Robinson J.G. (1993) The Limits to Caring: Sustainable Living and the Loss of Biodiversity. *Conservation Biology* **7**, 20-28.
Robinson J.G., Redford K.H. (2004) Jack of all trades, master of none: inherent contradictions among ICD approaches. pp. 10–34 in T. McShane, M. Wells editors. *Getting Biodiversity Projects to Work: Towards More Effective Conservation and Development.* Columbia University Press, New York.
Rockström J., Steffen W., Noone K. *et al.* (2009) A safe operating space for humanity. *Nature* **461**, 472-475.
Roe D., Elliott J., editors. (2010) *The Earthscan Reader in Poverty and Biodiversity Conservation.* Earthscan, London.
Roe D., Yassin Mohammed E., Porras I., Giuliani A. (2012) Linking biodiversity conservation and poverty reduction: de-polarizing the conservation-poverty debate. *Conservation Letters*, no-no.
Ross M. (2001) *Timber Booms and Institutional Breakdown in Southeast Asia*. Cambridge University Press, Cambridge.
Rossi P.H., Lipsey M.W., Freeman H.E. (2004) *Evaluation: A Systematic Approach*, 7th Edition ed. Sage Publications, Thousand Oaks, CA.
Rouch J. (1950) Toponymie légendaire du 'W' du Niger. *Notes Africaines* **46**, 50-52.
Sachs J.D., Baillie J.E.M., Sutherland W.J. *et al.* (2009) Biodiversity Conservation and the Millennium Development Goals. *Science* **325**, 1502-1503.
Sanderson S., Bird S. (1998) The New Politics of Protected Areas. pp. 441-454 in K. Brandon, K. Redford, S. Sanderson editors. *Parks in Peril: People, Politics, and Protected Areas.* Island Press, Washington, DC.
Sanderson S., Redford K. (2004) The defence of conservation is not an attack on the poor. *Oryx* **38**, 146-147.
Sayer J., Wells M.P. (2004) The Pathology of Projects. pp. 35-48 in T.O. McShane, M. Wells editors. *Getting Biodiversity Projects to Work: Towards More Effective Conservation and Development.* Columbia University Press, New York.
Schlager E., Ostrom E. (1992) Property-Rights Regimes and Natural Resources: A Conceptual Analysis. *Land Economics* **68**, 249-262.
Schroeder R.A. (1999) Geographies of environmental intervention in Africa. *Progress in Human Geography* **23**, 359.
Scoones I. (1998) Sustainable Rural Livelihoods: a framework for analysis. *IDS Working Paper.* Institute of Development Studies, Brighton.
Scott J.C. (1976) *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia*. Yale University Press, New Haven.
Scott J.C. (1998) *Seeing Like a State: How Certain Schemes to Improve the Human Condition have Failed*. Yale University Press, New Haven, CT.
Service Ecologie Parc W du Niger. (2006) Dénombrement Pédestre de la Faune dans le Parc Régional du W - Composante Niger. Directeur de la Faune, la Pêche et de la Pisciculture, Niamey, Niger.
Shepherd K.D., Farrow A., Ringler C., Gassner A., Jarvis D. (2013) Review of the Evidence on Indicators, Metrics and Monitoring Systems. CGIAR and ICRAF, Nairobi.
Shepsle K.A. (2009) Why? pp. 268-269 in G. King, K.L. Schlozman, N. Nie editors. *The Future of Political Science: 100 Perspectives.* Routledge, New York.

Shetler J.B. (2007) *Imagining Serengeti: A history of landscape memory in Tanzania from earliest times to the present*. Ohio University Press, Athens, OH.
Shipton P., Goheen M. (1992) Understanding African Land-Holding: Power, Wealth, and Meaning. *Africa* **62**, 307-325.
Sikor T., Lund C. (2009) Access and Property: A Question of Power and Authority. *Development and Change* **40**, 1-22.
Sims K.R.E. (2010) Conservation and development: Evidence from Thai protected areas. *Journal of Environmental Economics and Management* **60**, 94-114.
Sinsin B., Hessou C. (1999) Politique d'utilisation des terres dans les zones tampons et strategies de gestion des terroirs villageois autour des aires protegees. CENAGREF, Cotonou, Benin.
Sinsin B., Kampmann D., editors. (2012) *Biodiversity Atlas of West Africa: Volume 1 (Benin).* BIOTA, Cotonou, Benin & Frankfurt, Germany.
Sivaramakrishnan K., Agrawal A. (2003) *Regional modernities: The cultural politics of development in India*. Stanford University Press.
Smith E.P. (2006) BACI Design. *Encyclopedia of Environmetrics.* John Wiley & Sons, Ltd.
Smith R.J., Muir R.D.J., Walpole M.J., Balmford A., Leader-Williams N. (2003) Governance and the loss of biodiversity. *Nature* **426**, 67-70.
Sodikoff G. (2012) *Forest and Labor in Madagascar: From Colonial Concession to Global Biosphere*. Indiana University Press, Bloomington, IN.
Steinberg P.F., VanDeveer S.D., editors. (2012) *Comparative Environmental Politics: Theory, Practice, and Prospects.* MIT Press, Cambridge, MA.
Stoner C., Caro T.M., Mduma S., Mlingwa C., Sabuni G., Borner M. (2007) Assessment of Effectiveness of Protection Strategies in Tanzania Based on a Decade of Survey Data for Large Herbivores. *Conservation Biology* **21**, 635-646.
Sutherland W.J., Adams W.M., Aronson R.B. *et al.* (2009) One Hundred Questions of Importance to the Conservation of Global Biological Diversity. *Conservation Biology* **23**, 557-567.
Tchabi V.I. (2004) Mission d'Evaluation des Capacités des Associations Villageoises de Gestion des Reserves de Faune (AVIGREF) à Gérer les Zones Cynégétiques. p. 53. CENAGREF, Cotonou, Benin.
Thomas C.W., Koontz T.M. (2011) Research Designs for Evaluating the Impact of Community-Based Management on Natural Resource Conservation. *Journal of Natural Resources Policy Research* **3**, 97-111.
Thompson E.P. (1963) *The making of the English working class*. Victor Gollancz, London.
Tschakert P. (2007) Views from the vulnerable: Understanding climatic and other stressors in the Sahel. *Global Environmental Change* **17**, 381-396.
Tsebelis G. (2002) *Veto Players: How Political Institutions Work*. Russell Sage Foundation/Princeton University Press, New York.
Turner M.D. (1999) No space for participation: pastoralist narratives and the etiology of park-herder conflict in southeastern Niger. *Land Degradation and Development* **10**, 345-363.
UNDP. (2011) Human Development Report 2011 - Human development statistical annex. pp. 127–130. United Nations Development Programme, New York.
UNEP-WCMC. (2007) Global List of Transboundary Protected Areas. UNEP-WCMC, Cambridge, U.K.
UNESCO. (2007) Biosphere Reserve Information: W Region. UNESCO, Paris.

UNESCO. (2012) Directory of the World Network of Biosphere Reserves. UNESCO, http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/world-network-wnbr/wnbr/.
Urvoy Y. (1936) Histoire des populations du Soudan central (colonie du Niger). Larose, Paris.
Vandergeest P., Peluso N.L. (1995) Territorialization and state power in Thailand. *Theory and Society* **24**, 385-426.
Volk B. (2009) Debating the buffer zone of Northern Benin "Parc W": Presentation of preliminary fieldwork results. *International Colloquium on "States at Work"*. Laboratoire d'Etudes et de Recherche sur les Dynamiques Sociales et le Développement Local (LASDEL), Niamey, Niger.
Waldron A., Mooers A.O., Miller D.C. *et al.* (2013) Targeting global conservation funding to limit immediate biodiversity declines. *Proceedings of the National Academy of Sciences* **110** 12144-12148.
Walley C. (2004) *Rough Waters: Nature and Development in an East African Marine Park*. Princeton University Press, Princeton, NJ.
West P. (2006) *Conservation is Our Government Now: The Politics of Ecology in Papua New Guinea*. Duke University Press, Durham, N.C.
West P., Igoe J., Brockington D. (2006) Parks and Peoples: The Social Impact of Protected Areas. *Annual Review of Anthropology* **35**, 251-277.
Wilshusen P., Brechin S., Fortwangler C., West P. (2002) Reinventing a SquareWheel: Critique of a Resurgent 'Protection Paradigm' in International Biodiversity Conservation. *Society and Natural Resources* **15**, 17-40.
World Bank. (2004) Sustaining Forests: A Development Strategy. World Bank, Washington, D.C.
World Bank. (2007) World Development Report 2008: Agriculture for Development. World Bank, Washington, DC.
World Bank. (2009) WDR 2010 : Development and Climate Change. World Bank, Washington, DC.
World Bank. (2013a) Benin. World Bank, Washington, D.C.
World Bank. (2013b) http://data.worldbank.org/.
World Bank. (2013c) Report to the Board from the Committee of Development Effectiveness on Managing Forest Resources for Sustainable Development: An evaluation of World Bank Group Experience and Draft Management Response. World Bank, Washington, DC.
World Bank. (2013d) The World Bank Group Goals: End Extreme Poverty and Promote Shared Prosperity. World Bank, Washington, D.C.
World Bank, International Monetary Fund (IMF). (2013) Global Monitoring Report 2013: Rural-Urban Dynamics and the Millennium Development Goals. World Bank, Washington, DC.
World Parks Congress. (2003) Recommendation V.29: Protected Areas and Poverty. IUCN, Durban, South Africa.
Zimmerer K.S., Galt R.E., Buck M.V. (2004) Globalization and Multi-spatial Trends in the Coverage of Protected-Area Conservation (1980–2000). *Ambio* **33**, 520-529.