# Bridging the gap between bird conservation and sustainable development

## Perceptions and participation of rural people in Burkina Faso's Sahel region

Michiel O.L. van den Bergh

Universiteit Leiden

African Studies Centre Leiden

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This book is dedicated to the late Georges Henry Oueda

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# 1

# Introduction

## A (research) project in the Sahel

*The Sahel*

The Sahel is a loosely defined and not well demarcated region; it comprises the semi-arid transition region between the Sahara Desert to the north and wetter regions of sub-Saharan Africa to the south (CSELS 2010; UNEP 2007; Agnew & Chappell 1999).[1] The Sahel region is often defined by means of the number of days of the growing season or by the average annual amount of precipitation. Alternatively, the boundaries have also been drawn using latitude and longitude (Agnew & Chappell 1999). However, the boundaries are gradual and arbitrary, changing in time following weather patterns (e.g. droughts), climate changes, and land-use changes and concomitant land-cover changes (Ton Dietz, director ASCL, *pers. comm.* 2015). Agnew & Chappell (1999: 300) argue that "it is normally taken to be the arid West African countries from Senegal to Chad, but some also include Sudan to the East" (Figure 1.1).

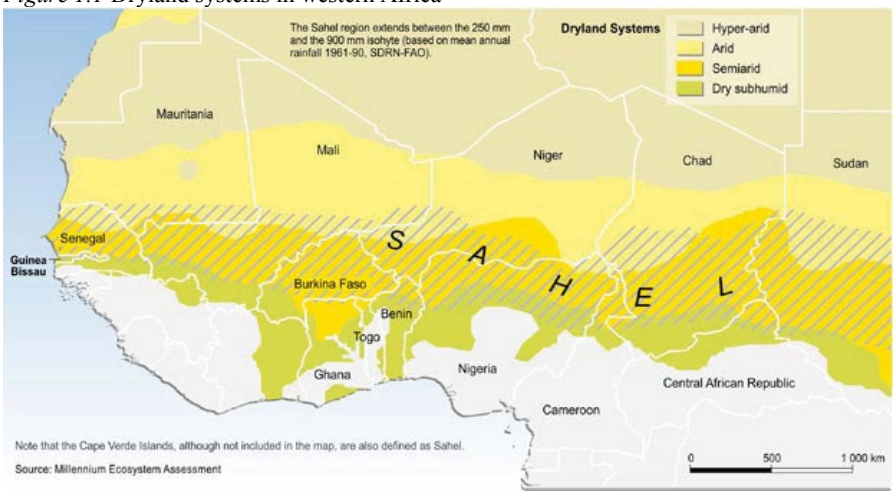
The Sahel region constitutes one major ecoregion[2] of the African continent (Brito *et al.* 2014). Different habitats can be found in the region, including large flat plains, gallery forests and sand dunes. The plains are mostly used for grazing and extraction of commodities (i.e. food, medicine, fodder and wood), and some smaller areas are also used for cultivation (increasing in area from north to south in the region) (Lykke *et al.* 2004). Traditional land-use practices such as nomadic pastoralism and agroforestry, as well as modern forestry rules, are adapted to the arid climate and erratic rainfalls (Zwarts *et al.* 2009; Mortimore & Adams 2001; Boffa 2000). However, this dynamic equilibrium is in jeopardy from increased agricultural and pastoralist activities, but also from overhunting, unsustainable

[1] "Due to the large contrast in the yearly rainfall, the West African landscape gradually changes from north to south, within a distance of 600-700 km from Sahara desert to humid woodland" (Zwarts *et al.* 2015).

[2] "Ecoregions are relatively large units of land containing a distinct assemblage of natural communities and species, with boundaries that approximate the original extent of natural communities prior to major land-use change." (Olson *et al.* 2001: 933)

extraction of natural resources and water overexploitation (irrigation and hydroelectric dams) (Adams *et al.* 2014; Brito *et al.* 2014; Zwarts *et al.* 2009).

*Figure 1.1* Dryland systems in western Africa




*Source*: *Millennium Ecosystem Assessment* (2005)
The Sahel region is shown as the barred area on the map.

Most, if not all, Sahel countries' economies are strongly dependent on natural resources, but at the same time they are depleting their natural capital, making them exceptionally vulnerable (Cohen *et al.* 2011). Furthermore, agriculture and animal husbandry in the Sahel are highly vulnerable to climate change (Dietz *et al.* 2004). The region is home to a population of 100 million, and UN demographic projections for 2050 are 300 million. This rapid population growth coupled with environmental degradation and, at the same time a high dependence on the environment, is cause for grave concern. In 2012, 18 million people in the West African Sahel were suffering from malnutrition (Potts & Graves 2013). Indeed, the Sahel is sometimes labelled as one of the poorest and most environmentally degraded areas on earth (Brandt *et al.* 2014; CSELS 2010; Lindskog & Tengberg 1994).

The African continent is a winter ground for a quarter of the more than 500 bird species breeding in Europe, which includes between 2 and 5 billion individual birds. Especially the continent's northern savannas, including the Sahel region, serve as a wintering ground for migrant birds. Indeed, the Sahel is an important area for migrant European birds, both for those species that spend their winter here, and for those species wintering further south on the continent that

use this region as a staging area. These migrant birds are highly vulnerable to environmental change in the Sahel (Vickery *et al.* 2014; Zwarts *et al.* 2009; Jones 1995). Thus, environmental degradation in the Sahel is threatening the survival of both birds and people (Brandt *et al.* 2014; Ouédraogo *et al.* 2014; Cresswell *et al.* 2007).

*The Living on the Edge project*

In Sahelian West Africa, the integrated development and conservation project 'Living on the Edge' was developed and implemented by *Vogelbescherming Nederland* (VBN, i.e. BirdLife in the Netherlands) and *BirdLife International*[3] (BirdLife) between 2011-2015. This ambitious initiative aimed to improve living conditions in the Sahel for birds and people, by working with the local population to conserve and restore the natural environment and enhance livelihoods through a more sustainable use of natural resources. The Living on the Edge project follows the publication of an important book, from which the project borrows its title. This milestone publication analyzes land use, meteorology and demographics in combination with trends and the ecology of African-Palearctic (A-P) migrant birds[4] (Zwarts *et al.* 2009).

The Living on the Edge project was limited to the western Sahel region as shown in Figure 1.1, and had a focus on A-P migrant birds that winter in this region (VBN *in litt*. 2009). The project consisted of 12 site-based projects[5] in four 'Sahelian' countries – Senegal, Mauritania, Burkina Faso and Nigeria (Figure 1.2) – and programmes for exchange, advocacy, capacity building and communication, which enable these projects to serve as an example within the wider Sahel region. The project philosophy was based on existing successes of the BirdLife approach: addressing biodiversity and livelihoods issues simultaneously and at the grassroots level, and providing a connection to national and international processes and policies (VBN *in litt.* 2010).

The projects were implemented in each country by the local (BirdLife) partner organizations, and they collaborated with others who are active in the region, e.g.

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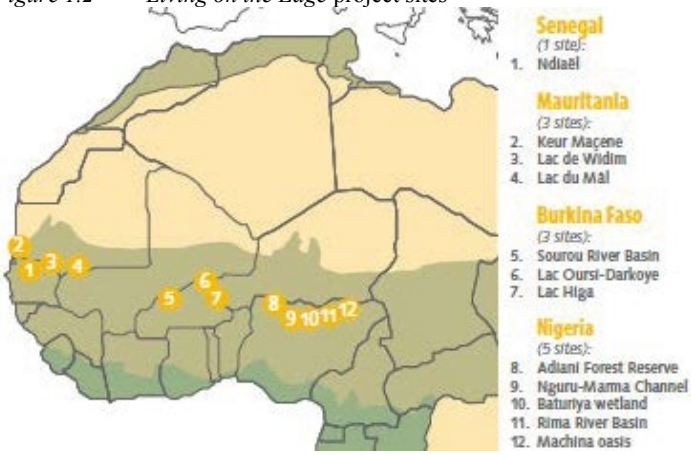
[3] BirdLife is a global partnership of 120 national non-governmental conservation organizations with a focus on birds. It is the world's largest partnership of conservation organizations and strives to conserve birds, their habitats and global biodiversity, working with people towards sustainability in the use of natural resources (BirdLife 2015a; BirdLife 2000).

[4] "An A-P migrant is a species in which at least part of the population moves between breeding areas in the Palearctic region [Europe, Asia north of the Himalaya foothills, northern Africa, and the northern part of the Arabian Peninsula] and non-breeding grounds in sub-Saharan Africa each year" (Vickery *et al.* 2014: 2). Following this definition, 126 bird species can be regarded as A-P migrants, with between 2.1 and 5 billion individual birds involved each year (Vickery *et al.* 2014).

[5] One site in Nigeria consists of two neighbouring sites and is therefore sometimes considered two sites (Bernd de Bruijn, senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* June 2016). In that case, a total of 13 site-based interventions are distinguished, as is sometimes indicated (see e.g. Van den Bergh 2014).

Wetlands International. BirdLife had an important role in the project management. The local partner organizations are *NATURAMA* (BirdLife in Burkina Faso), *Nigerian Conservation Foundation* (BirdLife in Nigeria) and Nature Mauretanie (*L'Association Mauritanienne de Conservation de la Nature*). For several years, VBN has been supporting national BirdLife partners in West Africa, notably *NATURAMA* in Burkina Faso. A project in Senegal was being developed by *Dienst Landelijk Gebied*, in collaboration with *Altenburg & Wymenga Ecologisch Onderzoek B.V.*,[6] the *Direction des Parc Nationaux*, and the *Association inter-Villageoise de Ndiaël* (there was no BirdLife partner in Senegal at the time).

*Figure 1.2* *Living on the Edge* project sites




*Source*: *VBN brochure 2011*

Local Conservation Groups (LCGs), also known as Site Support Groups in Africa, were responsible for the project's local execution and management strategy (VBN *in litt*. 2009; Figure 1.3). LCGs are "organisations or individuals who, together with relevant stakeholders, work with BirdLife partner organisations to help promote conservation and sustainable development" (BirdLife 2010a: 1).[7] BirdLife's (*in prep*.) newly formulated LCG vision reads as follows: "Whilst

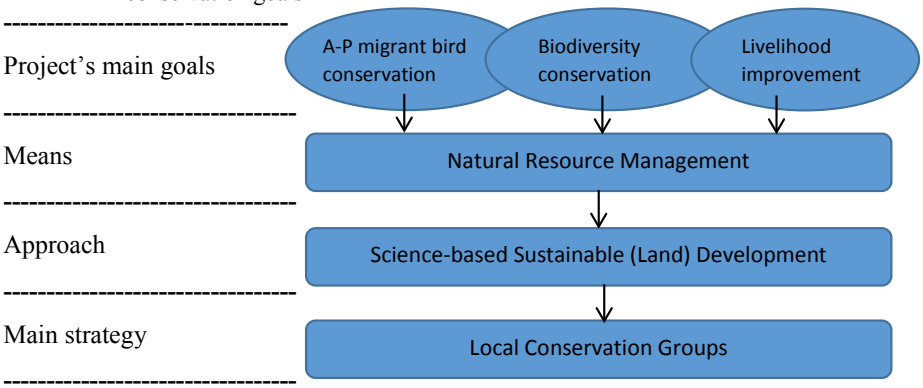
[6] *Altenburg & Wymenga Ecologisch Onderzoek B.V.* is a research and consultancy company in the field of ecology and related themes such as water, nature conservation and spatial planning. Note, (Eddy) Wymenga is also co-author of the book *Living on the Edge* (A&W 2010).

[7] "Members are usually volunteers and are typically drawn from the local community but may also include local authority representatives, business persons or other stakeholders. Where members look after 'their' local IBA(s) [Important Bird Areas], and include people from local communities, local branches of a BirdLife partner are also considered as LCGs" (BirdLife 2010a: 1).

your LCG strategy should link to your organization's mission, the LCG's activities should be driven by the interests, capacity and needs of the organisation's members and the wider community. It is important that they are self-motivated and have ownership of the activities they undertake".

BirdLife, the world's leading authority on the status of birds and their habitats (IUCN 2004), argues that conservation action should be based on sound science, and therefore proper research should precede conservation action. Besides building on earlier research, best practices and similar initiatives (BirdLife 2015b; Box 1.1), the project included additional research components as described in the next section.

*Figure 1.3* Conceptual model of Living on the Edge project, which combines development and conservation goals




*Box 1.1* A parallel initiative

A project titled The African Re-greening Initiatives (ARI) was created by the Centre for International Cooperation (VU University Amsterdam) in the period June 2009-June 2012. Some of the project's key activities are:[8]

1. Identify and analyze existing grassroots success stories in farmer-managed re-greening, and use these success stories as a starting point for expansion. ARI has developed a strategy for scaling up, including through farmer exchange visits and study visits.
2. Advocate for policy change. It is essential that farmers are granted exclusive rights to the trees (they protect and manage) on and off their farms. Therefore, ARI will lobby for national policies and legislation that support investments by farmers.
3. Use mass media, internet and other forms of communication to inform farmers and the wider public about success stories, results of farmer study visits and advantages of on-farm trees. A special project is being developed in cooperation with the Network Institute of VU University and the Web Foundation, called Web alliance for Re-greening in Africa (W4RA).

[8] See also Reij (2010) and The African Re-greening Initiatives (2010).

*Research within the framework of the Living on the Edge project*

Ornithological research was co-funded by the project and conducted by Dutch and British scientists, in cooperation with BirdLife partners, universities and institutes in the region. This comprised research on the distribution and movements, habitat use and limiting factors of A-P migrant birds, including the relation between migrant birds and land-cover changes.[9] In addition, monitoring under the Living on the Edge project, including by LCGs, provided information on habitats and their relevance to migratory birds. *Altenburg & Wymenga Ecologisch Onderzoek B.V*. contributed by conducting research on the importance of tree species to migrant birds (VBN *in litt*. 2010). In Burkina Faso, Adama Belemvire (director of EAC)[10] evaluated LCGs, and Nana Adama (*NATURAMA*) conducted socio-economic research at the LCG sites.

This current research focuses on the socio-cultural, socio-economic and institutional aspects of the project in Burkina Faso, predominantly including two of Burkina Faso's three LCGs, namely the Sourou LCG and the Higa LCG. For comparison purposes, and to place the Living on the Edge project in a broader context, similar interventions were also studied. In addition, the local population[11] and the development actors[12] active in the two LCG areas were also included in the study, as well as development actors with similar activities in other areas in the country. Furthermore, ecological aspects, including changes in land use and land cover, and their (potential) impact on A-P migrant birds are also discussed. It connects this with integrated conservation and development concepts.

Field research was conducted between July and September 2011; between December 2011 and March 2012; in February/March 2013; between February and April 2014; and again in April 2015. Due to negative travel advice for northern Burkina Faso in 2013, I was not able to travel to Higa in that year. Instead,

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[9] For example, the Royal Society for the Protection of Birds and the British Trust for Ornithology conducted ecological field research in Ghana and Burkina Faso for the research project 'Drivers of Land Use Change Relevant to Migratory Birds in the Sahel'. The Sahel region in Burkina Faso was included in the field research. They used point count methodology and mist-netting as research methods. The researchers record migrants along a degradation gradient at five different stations on a north-south transect (http://migrantbirdsinafrica.blogspot.com/). A related research 'Land Use Change and African-Palaearctic Migrant Birds' was conducted in collaboration with the University of Cambridge (http://www.geog.cam.ac.uk/research/projects/landusemigrantbirds/).

[10] Études Action Conseils (EAC) is a research consultancy firm based in Burkina Faso. It undertakes research on Africa in the humanities and social sciences.

[11] In this study, the local population refers to all people living in a particular area (e.g. in Sourou and/or Higa), with two exceptions: excluding development actors as, in practice, they all live temporarily and often for (very) short periods in the area and do not directly depend on the area's natural resources for their survival, but including (semi-)nomadic people as they depend (directly) on the area's natural environment for their subsistence livelihoods.

[12] In this study, development actors refers to government officials, NGO staff, employees of companies engaged in sustainable agriculture (bio-agriculture) and/or socially responsible (social) business.

Achille Ouédraogo, a biology Master's student at the University of Ouagadougou, conducted several interviews in Higa between 10-13 March 2013 (that is after he had already acted as my research assistant; see also Table 1.1). In addition, Achille Ouédraogo conducted PADev-inspired (Participatory Assessment of Development) exercises in Sourou in April 2015.

*Study areas*

Burkina Faso was selected for this study because of its Living on the Edge project sites, the connected research agency (EAC)[13] and BirdLife's national conservation partner *NATURAMA*. In addition, the country was relatively stable politically and the security situation was considered acceptable at the time when the research project was being designed. Two of Burkina Faso's three Local Conservation Groups (LCGs) – Sourou LCG and Higa LCG – were selected. The country's third LCG in Mare d'Oursi (Oursi LCG) falls within the Sahel biome area but was not studied due to local security concerns (there was a travel warning issued by, among others, the Dutch Ministry of Foreign affairs). However, interviews were conducted with the former LCG president during his visit to the Higa LCG.

The studied LCGs are located in the Sudanese-Sahelian climatic zone and Sahelian climatic zone, respectively (Figure 1.4). Both climatic zones are considered to be part of the Sahel region in this study, similar to that of the Sahel region as shown in Figure 1.1. The areas covered by the two studied LCGs included two so-called Important Bird Areas (IBAs):[14] the Lake Sourou IBA (hereafter referred to as Sourou) and the designated Lac Higa IBA[15] (hereafter referred to as Higa). Both areas are included on the Ramsar list of wetlands of international importance.[16] Sourou (ca. 22,000 ha) is in both Lanfiera Department (12 communities) and Di Department (13 communities) in Sourou Province in the northern part of the Sudanese-Sahelian climatic zone near Burkina Faso's northwestern border with Mali. Higa (ca. 1,500 ha) is in Tankougounadié Department (13 communities) in Yagha Province on the southern edge of the Sahelian climat-

[13] Études Action Conseils (EAC) is a research consultancy firm based in Burkina Faso. It undertakes research on Africa in the humanities and social sciences.

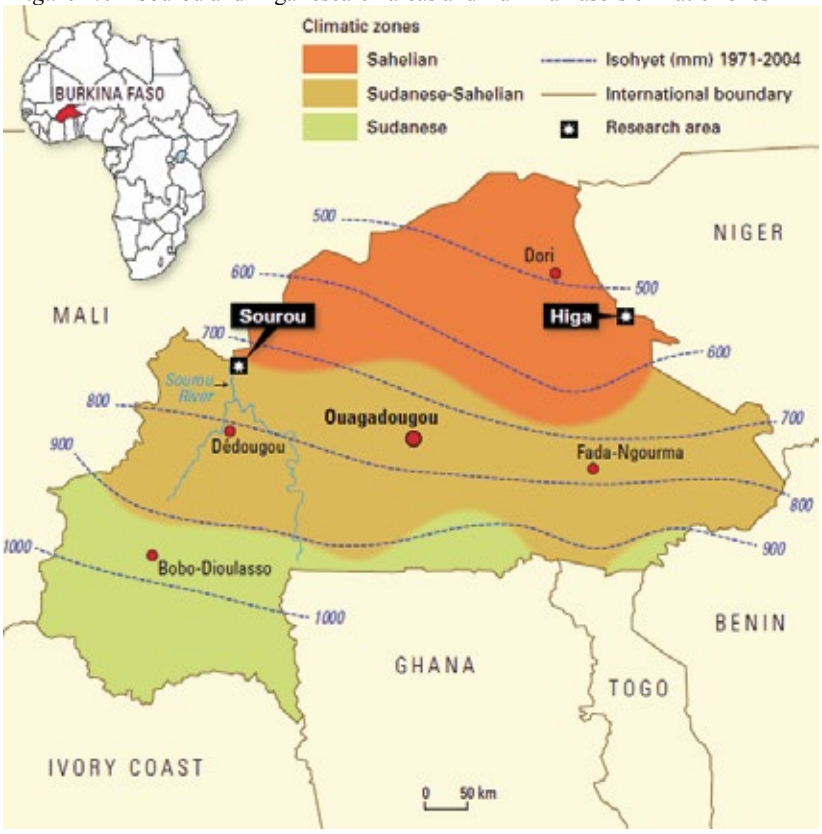
[14] Important Bird Areas "are key sites for conservation – small enough to be conserved in their entirety and often already part of a protected-area network. They do one (or more) of three things: a) hold significant numbers of one or more globally threatened species, b) are one of a set of sites that together hold a suite of restricted-range species or biome-restricted species, c) have exceptionally large numbers of migratory or congregatory species" (BirdLife 2010b).

[15] Higa LCG's area of operation officially encompasses the whole of Tankougounadié Department (102,300 ha) but is, in practice, limited to the Tankougounadié community of the same name and the IBA area. Higa refers to these areas in this paper.

[16] "The Ramsar Convention is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories" (Ramsar 2010).

ic zone near Burkina Faso's north-eastern border with Niger (Ramsar 2013; Fishpool & Evans 2001). Including these two research areas for comparison purposes seemed valuable as the two areas differ in many ways (see Chapter 3 and Van den Bergh 2014).

*Figure 1.4* Sourou and Higa research areas and Burkina Faso's climatic zones




*Source*: Adapted from *Atlas de l'Afrique 2005*

These differences were the principal reason for selecting these research areas, as they represent two different Sahelian, as well as two different conservation settings. Some of the key differences include: remote versus less remote; developed versus less developed; numerous sustainable development interventions versus few such interventions; wet Sahelian landscape versus dryer Sahelian landscape; a diversity of livelihood activities versus a predominantly (semi-nomadic) farmer-pastoralist population; and so on (for a more detailed discussion see Chapter 3). In Sourou, bird conservation activities were regular and a local

LCG was active here since 2003 (formally 2007). In Higa, no bird conservation activities did (yet)[17] exist and a local LCG was only established in 2009 (formally 2010). Both Sourou and Higa have an extensive area with surface water (a river and a lake, respectively), which might make these areas somewhat atypical in the context of Sahelian landscapes. However, many people in the Sahel live near areas with extensive (although often seasonal) surface water, such as lakes and rivers (Ton Dietz, director ASCL, *pers. comm.* 2016). Moreover, the heterogeneity of the Sahel is marked, with differentiated local combinations of natural, social, technical and economic characteristics (Raynaut 2001; see also Chapter 2).

Most of the development actors that were included in this study were based in two of Burkina Faso's main urban areas, namely, the country's capital Ouagadougou and the country's second largest city Bobo-Dioulasso. On some occasions, depending on the actors' activities and office locations, research was conducted outside these particular areas and carried out in rural or other urban areas.

## Research objective and questions

The main objectives of this study are to uncover the local values of birds, the environment and conservation for rural people[18] in the Sahel, and to increase insights into interventions that aim to achieve integrated (migrant bird) conservation and sustainable development objectives in this area. It covers a region that is underrepresented in existing publications and highlights several thematic areas that warrant further research and debate. By focusing on issues like local perceptions,[19] local institutional arrangements and the role of birds, this study adds new insights to the existing literature and insights. The links between conservation and livelihood concerns remain much debated, and there is no agreement about the degree to which these concerns are linked, and how they should be tackled together (Christensen 2004; Sheil *et al.* 2003). In addition, to design sustainable (bird) conservation and land management strategies, it is vital to determine the symptoms and causes of environmental degradation through both scientific data and literature, as well as through local perceptions (Lindskog & Tengberg 1994). Hence, the study's main research question is as follows:

> *How can (migrant) bird conservation and local sustainable development objectives be successfully integrated and implemented in Burkina Faso's Sahel region?*

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[17] The LCG Higa conducted its first bird conservation activity in 2012, namely, a bird-monitoring training for a few of its members.

[18] Scoones (1998: 17) indicates that "rural and urban livelihoods are clearly intertwined, and the rural distinction is somewhat artificial." In this study, the distinction between the rural and urban population is also somewhat artificial and flexible, but principally refers to those people living outside the major cities in areas where the vast majority of inhabitants have subsistence livelihoods.

[19] I.e. the perceptions of the local population.

The human inhabitants of the Sahel are strongly connected with their environment and the participation of these local inhabitants in the Living on the Edge project – and similar integrated development and (bird) conservation efforts – is often regarded as important or even essential (Adams *et al.* 2014; Cohen *et al.* 2011; Dietz *et al.* 2004; Raynaut 2001; Roe *et al.* 2006; Ribot 1999; Zwarts *et al.* 2009). However, following, among other things, insufficient conservation results from community-based projects, the involvement and role of communities appears to be uncertain (Dzingirai 2003). Therefore, existing policies need to be debated and validated by stakeholder groups, including local populations (Diallo *et al.* 2012). Perhaps most importantly, local needs, attitudes, and aspirations, and thus local perceptions, need to be better understood (Owusu & Ekpe 2011; Lindskog & Tengberg 1994). Particularly, the currently understudied livelihood perceptions from outside protected areas need to be explored (see e.g. Tessema *et al.* 2010; Infield & Namara 2001; Gillingham & Lee 1999). There is also a need for community-based conservation data that include more than one specific type of livelihood or resource domain, thus obtaining a more holistic livelihood view (Brooks *et al.* 2013). Even less is known about the (potential) role of (migrant) birds in these issues, despite the fact that birds are an excellent indicator of environmental health and conservation issues (BirdLife 2015b). Thus, the inhabitants' perspective on, and their understanding of, these subjects – thereby uncovering the relation between inhabitants, the environment, and birds – is an important element in the study, and this is the objective of Chapter 4 (Local Perceptions of Birds, the Natural Environment and Conservation in Burkina Faso's Sahel region). Because the information is directly derived from the inhabitants themselves, who know what is important to them, this study could contribute to successful and effective conservation that simultaneously contributes to livelihood improvement.[20] Moreover, increased knowledge on the interaction between local populations and the environment could help direct conservation efforts to tackle the true causes of environmental degradation (Lindkskog 1994). This leads us to sub-question 1:

*How are the natural environment, birds and bird conservation perceived by the local population, and how can understanding local perceptions contribute to the integration of bird conservation and local sustainable development objectives?*

Similarly, increased knowledge on the interaction between local populations and development actors could help us understand the 'gap' between theory (i.e. development policy) and practice (i.e. project implementation) (Mosse 2004).

[20] The research tries to determine if and how birds and the environment contribute to inhabitants' livelihoods and welfare. This information can be used to stimulate the conservation of birds by making (other) inhabitants aware of the mentioned advantages. On the other hand, conservationists can try to invalidate the, perhaps wrongly, assumed disadvantages of birds and conservation and thus contribute to a more positive attitude towards (migrant) birds among some local inhabitants.

Mosse (2005 & 2004) argues that development actors are preoccupied with generating the right policy models, although, rather than being driven by policy, development practice is shaped by the actors' relationships and interests and cultures of specific organizational settings. Policy discourse generates metaphors such as 'participation', of which the "vagueness, ambiguity and lack of conceptual precision is required to conceal ideological differences, to allow compromise and the enrolment of different interests, to build coalitions, to distribute agency and to multiply criteria of success within the project system" (Mosse 2004: 663). Chapter 5 (The Social Interface of Sustainable Development Actors and the Rural Population in Burkina Faso. Who is in Charge?) examines the effectiveness of collaboration between development actors and the local population in these participative conservation projects. Its objective is to increase insights into conservation and sustainable development interventions in the Sahel, in particular regarding the interaction between development actors and local populations. It looks at the (potential) gap between participation policies and practice (i.e. how and to what extent local populations participate in sustainable development projects) and pays close attention to the perception of the local population. In this way, the study addresses sub-question 2:

*How does collaboration between development actors and the local population take place and how is it valued by the local population?*

Furthermore, empirical data is required in order to derive the best local institutional arrangement (Benjamin 2008; Ribot 2003). Global trends toward democracy and decentralization have also reached developing countries. Many developing countries have also decentralized some aspects of natural resource management (Benjamin 2008). Benjamin (2008: 2255) indicates that "much recent work on decentralized natural resource management has focused on the institutional arrangements that shape the balance of powers between central and local governments. It has given comparatively less attention to relationships between local government and community-level institutions."[21] This study included extensive research on this knowledge gap, the results of which are discussed in Chapter 6 (The Role of Community Organizations in Integrated Conservation and Development Projects: Local Perspectives from the Sahel Region). The chapter's objective is to increase insights into local institutional arrangements by focusing on the functioning of local community organizations, including their external (conservation-related) relationships. It addresses sub-question 3:

*How do local organizations (local conservation groups and other community organizations) function in relation to conservation and local participation?*

[21] Benjamin argues that the (ambiguous) relationships between legal institutions and community institutions can undermine both the authority of local governments and the performance of customary institutions (Benjamin 2008).

By addressing these questions and increasing our understanding of these interrelated topics, the study aims to contribute to successful (migrant bird) conservation and sustainable development efforts in the Sahel (and other drylands). Successful here means that local inhabitants participate in, and gain from, these efforts because they address local needs and aspirations. This study provides information, examples, and conclusions on the (perceived) relations between (migrant) birds, the environment, and integrated conservation and sustainable development efforts, as well as specific recommendations for development actors (including conservationists) in Chapter 7 (Conclusions).

First, however, the research methodology will be introduced in this introduction chapter (Chapter 1. Introduction). Chapter 2 (Land use, Migrant Birds, Conservation and Sustainable Development in a changing Sahel) provides a literature review on the subjects of land use (including vegetation cover trends), A-P migrant birds, and conservation and sustainable development in the Sahel. In Chapter 3 (Land use, Migrant Birds and Conservation in a changing Burkina Faso and the Research Areas), the research areas will be introduced, including a description of the human population, land use, vegetation cover trends, A-P migrant birds, and conservation in Burkina Faso and the research areas.

## Research methodology

A broad range of research methods and sources were used for this study, including written sources, remote sensing data, interviews, observations, and workshops. This provided a great diversity of information that allowed a more holistic view of the many interrelated researched topics. Yet, field research was the study's fundamental data source, in particular interviews with the local population, as their perception on the research topics is the focus of this study. However, development actors were also an important study group because of their integrated (bird) conservation and sustainable development efforts. All development actors studied had (ecologically) sustainable (livelihood) development objectives. The conservation-oriented actors were also considered development actors in this study, as all these actors also had sustainable development objectives. The development actors included conservation and development NGOs, bio-agriculture and social businesses, and government organizations as their participation and decision-making in natural resource management is important (Raynaut 2001).

Extensive literature research was conducted for all research topics, and particularly for ecological aspects (Chapter 2). The principal field research method consisted of individual and group interviews, chiefly in the two rural research areas (Sourou and Higa) and two urban areas (Ouagadougou and Bobo-Dioulasso). These included semi-structured in-depth interviews with national and

international sustainable development actors, as well as with local inhabitants. Other research methods included participation in workshops (Chapter 2), the analysis of remote sensing data (Chapter 3), PADev (Participatory Assessment of Development) exercises (Chapter 5), website examination (Chapter 5), reading of documents (Chapter 6), expert consultations, and participant and field observations.

The book consists of seven chapters of which three are in journal article style (Chapters 4, 5 and 6), including one chapter (Chapter 6) that has already been published. For this reason, the research methods are repeated and further described in each of these three chapters.

*Research methods*

**Written sources**

Literature research

An extensive − primarily English, and to a lesser extent French − literature examination was conducted for all chapters. Most literature was collected through online search engines (principally Google Scholar and the African Studies Centre Leiden library catalogue), but much literature was also provided by colleagues, library staff, fellow researchers, and others. Other search methods and sources included references in literature, conferences, and several (other) libraries.

Reading of documents and website examination

Close reading of documents of (local) organizations and (local) governments provided information on the functioning and statutes of these organizations. An examination of the development actors' websites provided useful information on local collaboration policies (see also Ybema *et al.* 2009). Notably, the mission statements (or similar section) on the websites of thirty development actors were scanned for possible references to local involvement, and in particular references to decentralization, participation, and empowerment (policies).

**Remote sensing data**

For the analysis of remote sensing data, four points were selected in the rural research areas for vegetation and rainfall trends analysis. To include both dry Sahelian sites and surface water rich Sahelian sites, two points were selected adjacent to the river and lake in Sourou and Higa, respectively, and two points more than five kilometres away from these water sources. Vegetation trends were analyzed by means of 10-daily composites of the Normalized Difference Vegetation Index (NDVI) derived from the Satellite Pour l'Observation de la Terre (SPOT)-

VEGETATION time series (1998-2014).[22] Rainfall trends were analyzed by means of 10-daily Climate Hazards Group InfraRed Precipitation with Station (CHIRPS) data for the same period (Funk *et al.* 2015). The NDVI SPOT-VEGETATION and CHIRPS data were provided by Dr. Anton Vrieling (University of Twente), who also assisted with the analysis.

**Interviews**

Semi-structured in-depth interviews

For this study, 241 people were interviewed. Semi-structured in-depth interviews were held in each rural research area with government officials, development actors, community and religious leaders, semi-randomly selected local inhabitants, the board members (presidents and/or secretaries) of community, cooperative,[23] and union organizations, and with the presidents and secretaries of the Sourou and Higa LCGs, as well as with several of their members (169 interviewees). In addition, in the urban research areas (chiefly Bobo-Dioulasso and Ouagadougou) interviews were also held with development actors (72 interviewees). Many of the interviewees were interviewed on several research themes during one, two, or three interviews, and the data from the analysis of their interviews was used for more than one chapter.

Among the development actors were government officials, NGO staff, bio-agriculture and social business employees. Community organizations (COs) refer here to locally-based non-state institutions and exclude LCGs so that this specific type of COs can be compared to other COs. The selection of the COs was made according to each organization's main characteristics (gender focus, activities and goals) in order to get a good selection of the broad range of COs present in the two areas, but with a particular focus on land-use oriented organizations. Semi-randomly selected local inhabitants refer to a selection of the local population that aims at representing the diversity found among the population, and particularly regarding people's occupation (i.e. land use activities) in an attempt to uncover the different perceptions regarding the research subjects. There were no population statistics available that included such variables as people's religion, ethnicity, or occupation.[24] The selection was made by approaching inhabitants in their homes or fields, on the road, or at local markets. Informal interviews revealed that essentially four types of occupations could be found among the population in both research areas, namely fisher, farmer, farmer and pastoralist, or

[22] An envisioned comparison of tree density between historic and recent very high resolution satellite or aerial images of the research areas (in order to establish changes and trends) failed due to a lack of high resolution historic images in which trees are clearly visible (Leo Zwarts, independent researcher, *pers. comm.* 2015).

[23] No cooperative organization was found in Higa.

[24] Hence, it is not possible to establish whether ratios of such variables in the selection are representative of those in the populations of the two rural research areas.

another combination. Care was taken to ensure that all occupation types were included in the selection; for instance, by visiting small islands that are inhabited by fishers so as to include fishermen (see also Photos 1.1 and 1.2). The following characteristics were noted for each interviewee from the local population: gender, age, place of residence, ethnicity, religion, marital status, number of children, education level, literacy level, French speaking/writing, main livelihood activities, (farm) land ownership, livestock ownership, (board) memberships in community organizations, and (board) memberships in LCG.

Individual interviews and group interviews aimed to achieve an in-depth general understanding of their activities, values, relations and perceptions, among others. The goal was not to obtain exact numbers and statistics from the interviewees. Semi-structured in-depth interviews were therefore used, and the analysis of the interviews is thus mostly qualitative (see also Bernard 2011 and Robson 2002; only in Chapter 4 are quantitative analyses also included). A conversational style was adopted during the interviews by using a research questionnaire as a guideline and checklist (Annex 1.1).[25] This semi-structured approach allowed freedom in the sequencing of questions and in the amount of time and attention paid to each particular question. Some questions proved unsuitable with particular interviewees, while additional questions were included in some interviews when needed (Robson 2002).[26] In addition, some freedom was given to the interviewees regarding the exact discussion topic. The purpose of this interview style was to bring unknown issues to light and to discover what the interviewees think are important issues and topics. One result of this conversational style was that there was often no time to deal with all the questions on the questionnaire (read: the interviewees were reluctant to spend more time on the interviews). This is reflected in the diverse numbers of interviewees for each research theme (particularly in Chapter 4). The differences between the research areas were amplified due to a negative travel advice for northern Burkina Faso in 2013.[27]

[25] BirdLife's guidelines (BirdLife unpublished data, a-e) were consulted, as well as researchers (including my PhD promotors) and conservationists (including BirdLife employees), among other sources. In addition, trial interviews provided useful feedback that was incorporated in the final research questionnaire.

[26] Also, an extra explanation was sometimes needed and provided.

[27] Due to a limited general selection size, and one that is particularly small for several research themes, it was not always possible to statistically assess the influence of interviewees' characteristics and/or the local context on interviewees' perceptions.

*Photo 1.1* A one-day visit to an island in Sourou

*Photo 1.2* An interview with a local inhabitant in Higa

Inhabitants were often approached in the field to include, for example, (semi-)nomadic herders. Similarly, a small village on an island was visited on several occasions to include fishermen (and to make observations of their activities).

I always used one research assistant[28] in each of the two rural research areas and sometimes in the urban research areas as well (Table 1.1). These assistants functioned as interpreter during the interviews. Many inhabitants of Sourou and (especially) Higa, did not speak French (or English), and during these interviews the interpreters translated the responses from a local language to English. The local languages included, starting with those most frequently used, Mooré, Dioula (especially in Sourou), and Fulfulde (especially in Higa). The interviews with the development actors took place in either French or English. I did not make any audio recordings of the interviews; instead, I made thorough notes with use of a pen and paper. As an interpreter was often needed to communicate I usually had ample time to make notes. Most interviews lasted between 1-3 hours, the lengthy ones were broken up by a short break. We always used a private and/or quiet place for the interviews, often in the field or at someone's home, so that we were not interrupted or distracted and the interviewee could speak freely. For similar reasons, women were interviewed separately from men, as they might speak more freely without the presence of men. Besides, women might think differently on subjects and might have different roles in several respects.

Twenty-eight group interviews were carried out. As Robson (2002: 284-285) highlights, group interviews have several advantages: i) "natural quality controls on data collection operate; for example, participants tend to provide checks and balances on each other and extreme views tend to be weeded out"; ii) "participants are empowered and able to make comments in their own words, while being stimulated by thoughts and comments of others in the group"; and iii) "contributions can be encouraged from people who are reluctant to be interviewed on their own, feel they have nothing to say or may not usually participate in surveys". The 28 group interviews consisted either of two interviewees (18) or of three interviewees (8), thus 60 interviewees in total. According to Robson (2002), opinions on the optimum size of interview groups varies, but groups of 8 to 12 persons are usually thought to be suitable. I chose to keep my groups sizes much smaller, because larger groups tend to be dominated by the more talkative persons were only heard (attested to by my experiences in the trial interviews; see section on 'Reflections' below).

The interview notes were processed after each fieldwork period in the software programme 'Microsoft Excel', thus I went through all the notes and categorized all the responses in Excel sheets. Categorization was done according to content as well as interviewee's characteristics. In this way, a workable overview was created of all the responses, and in such a way that comparisons could easily be made.

[28] I selected them on the basis of their familiarity with the research topics, willingness to stay in remote villages, and their language and social skills (see also Table 1.1).

*Table 1.1* Research assistants

| | University of Ouagadougou | Languages | Ethnicity | Religion |
|---|---|---|---|---|
| Idrissa Ouédraogo | Master's Animal Biology[1] | Mooré, Dioula, French, English | Mossi | Muslim |
| Achille Sougrinoma Ouédraogo | Master's Animal Biology[1,2] | Mooré, Dioula, French, English, Fulfuldé (basic) | Mossi | Christian |
| Ibrahim Compaoré | Bachelor's English | Mooré, Dioula, French, English | Mossi | Christian |

Note 1: At present a PhD student.
Note 2: Member of Teaching and Research Unit of Life and Earth Sciences.

Informal interviews

During my fieldwork many informal conversations were held with various people, especially with local inhabitants (and most extensively with my host families, see also 'Reflections'). These conversations uncovered interesting topics, behaviours, and thoughts, and led to a better understanding of local cultures, customs, and practices (see also Ybema *et al.* 2009), and therefore played a valuable part in the research (Robson 2002). The informal interviews were all unstructured interviews; they mainly consisted of small chats, but some were conversations of considerable duration (up to more than an hour). The subject of each informal interview differed greatly, and they covered almost all aspects of the research. I usually did not make any notes during the informal interviews,[29] because this would have ended any spontaneity and informality (*Ibid.*). I did, however, make detailed notes as soon as possible afterwards.

Expert consultations

Many researchers, policymakers, and conservationists were consulted for this research. They provided feedback on the text, references to debates and literature, and insights and discussion on research topics, as well as sharing their personal experiences, observations and ideas.

**Observations**

Participant observations

Participant observations, in which 'first-hand' experience and exploration were key, were garnered from 22 negotiation processes and other interactions between local inhabitants and development actors. These interactions lasted between 30 minutes to three days, and included stakeholder meetings, joint project activities, job trainings, and policy, project and sales negotiations (see also Ybema *et al.*

[29] With the exceptions of a few informal interviews; especially lengthy interviews and/or those that provided much detailed information.

2009). The purpose of these observations was to determine which actors lead and direct the conversation, do most of the talking, and to what extent they speak freely and give their opinion. Understanding these processes and the different roles played by the different actors is important because "the notion of negotiation is essential in the setting up of 'sustainable' relations between the different types of users and the environment" (Raynaut 2001: 18-19). Ribot (2003) and Benjaminsen (2000) argue that the communities' role in natural resource management depends greatly on the negotiation power of individual local organizations.

In addition, I participated in a two-day long LCG bird monitoring training and a one-day tree-planting activity, and joined four LCG meetings. These observations provided a good impression of the functioning of the LCGs and the exact role of their members (see also Photo 1.3).

Field observations

During the entire field research period, observations and notes were made of potentially interesting activities and conditions, such as (the lack or presence of) bird hunting and land use activities. Often, the first and/or last hour(s) of a day were used for birdwatching. During these walks, notes and photographs were made of A-P migrant bird(s) (sightings) in particular. I have described and published several new and notable bird records for Burkina Faso, including A-P migrant birds (see also Van den Bergh 2013, 2012).[30]

[30] In addition, I was co-editor, co-producer and scientific advisor for the documentary 'Living on the Edge', which was produced by *Vogelbescherming Nederland* in the context of the Living on the Edge project. It was broadcasted on Dutch national television (300.000 viewers, and increasing during the broadcast), and an English and French version was distributed among the many project partners (and shown to the LCGs). To view the movie trailer, see: https://www.youtube.com/watch?v=JDhIQqTjKIE.

*Photo 1.3* LCG members participating in a bird monitoring training in Higa

Valuable information about the functioning of LCGs was gathered by joining them on their activities, such as a bird monitoring training.

**Workshops**

PADev (Participatory Assessment of Development) workshops

PADev is a participatory and holistic methodology for evaluating development interventions. Information about changes in six domains (natural, physical, human, economic, socio-political, cultural) and the impact of interventions is gathered in workshops in which all layers of the local society participate (Dietz & the PADev team 2013).

In both Sourou and Higa, two PADev (try-out) workshops were held with one women's and one men's group (3-5 persons each) in 2011-2012. The principal aim of these workshops was to obtain an impression of historical events and the changes in the area over the last decennia, based on the value systems of the population (see also *Ibid.*). The participants were asked, in turn, to mention a major past event until no one could mention any other event (some further details were sometimes asked, such as how the event impacted their lives). An overview of historical changes was created through a group discussion of several domain-related themes for each of the six domains set out in the PADev guidebook (see *Ibid.*). Other PADev exercises were included through an exploration with the participants; due to the limited time that people had available for the workshop, they only provided short answers and feedback on all the main exercise themes (see Annex 1.2 for some additional details). As it proved difficult (for a solitary

researcher) to find participants willing to complete a (multiple day) PADev workshop[31] it was decided to limit these comprehensive workshops to two in each research area.

Instead, in Sourou, 15 PADev-inspired focus workshops were held in 2015 with 33 participants, divided into nine individual and six group (2-6 persons) workshops. Due to security concerns in Higa in 2014-2015, it was decided not to organize any PADev-inspired focus workshops in the area. Due to similar concerns, a Burkinabe research assistant (see section 'Research within the framework of the Living on the Edge project') conducted the PADev-inspired workshops in Sourou. Workshop participants included board members of COs, religious leaders, and semi-randomly[32] selected inhabitants. The focus in these workshops was on the PADev 'assessment of actors' exercise, which was used to discover participants' perceptions of interventions and the actors working in the area. In the PADev-inspired exercise, participants were asked to assess the actors working in the area based on various statements, which are considered criteria in this study (see Chapter 5, the section on 'Methods').

It has been observed that "exercises employing the use of stones generated a lot of discussion and engagement among participants because there was an element of 'fun' about them" (Dietz & the PADev team 2013: 18). This exercise type was adapted to maximize the input of all participants. The group was given 30 stones and was asked to score each criterion by placing between 1-5 stones next to each criterion on a sheet of A1 paper (see Photos 1.4-1.6). Participants discussed the number of stones for each criterion until consensus was reached within the group.[33]

Cambridge Workshops

In 2010, I participated in a multiday workshop organized by the University of Cambridge, the Royal Society for the Protection of Birds and the British Trust for Ornithology in 2010. Participants (scientists and conservationists) worked together to produce a prioritization of the most critical land-use changes in the Sahel (see also Cambridge Workshop 2010).

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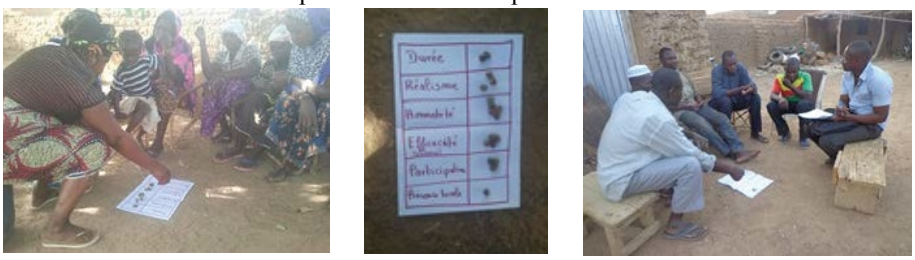
[31] Besides, some specific modules would yield more valuable data for this study than others.

[32] They were selected in a similar way as the semi-randomly selected interviewees (see section 'Semi-structured in-depth interviews' for details)

[33] According to the PADev methods, participants should respond to the statements by indicating either that they apply 'always', 'usually', 'sometimes', 'usually not', or 'never', thus providing each criterion with a score from 5 ('always') to 1 ('never'). In this study, these scores were often taken as a way of grading, and following their responses could generally better be interpreted as 'very much so', 'much so', 'neutral', 'not so much', and 'not at all'.

*Photos 1.4-1.6* PADev-inspired focus workshops in Sourou




Women (left) and men (right) participating in a workshop, and a sheet of A1 paper on which stones are placed by the participants to score each criterion. Photos by Achille Ouédraogo.

*Reflections*

An initial field research with a strong explorative component was conducted between July and September 2011. The research areas were explored and many informal interviews were conducted to validate or adjust the proposed research where needed. Proposed research methods were also tested to see whether the planned procedures worked out as envisioned (see also Chenail 2011). Although the research questionnaires were composed prior to the field research, they were adjusted after several trial interviews and discussions with local key-actors (such as mayors, board members of community organizations and local government employees). Similarly, trial PADev workshops were held. Such trials allowed me to test, for example, whether the group sizes were suitable, whether the questions and methods were appropriate, and whether any important ones were missing.[34] During my field research in the two rural research areas I always stayed overnight with local families, usually with the same families. This allowed me to make many community observations and conduct countless informal interviews (particularly with the host and hostess and their family and friends).

My presence as a researcher could have intruded on the setting or altered people's responses (Merriam *et al.* 2015). Indeed, one should be aware of the potential influence of my presence during, for example, observations of interaction between development actors and local inhabitants, which might stimulate, what is thought to be, appropriate negotiation behaviour. However, due to my often extended stay with the participants, my presence was less peculiar in the negotiation processes. The interactions appeared to be natural and people demonstrated relaxed postures. Something similar can be said for the interviews, as participants readily entered into dialogue and shared personal information, suggesting that

[34] At the end of each interview, I asked the interviewees whether there was something I had not asked and/or if they would like to tell me something that they thought would be important for me to know (which happened on several occasions).

they felt comfortable with me and my research assistants (see also Sword 1999; Ybema *et al.* 2009). My extended stays with local families during my field research allowed me to win the inhabitants' trust and make them feel comfortable with my presence (Merriam *et al.* 2015).

That said, my (prolonged) presence, including often being associated with the LCGs, potentially influenced people's behaviour and responses. However, I always introduced myself as social scientist researcher conducting unbiased research for a Dutch (or European) university on the relation between local inhabitants, the environment, and development actors (governments, organizations, etc.). Questions related to people's characteristics and their livelihood activities were asked first, while bird and conservation related questions were asked and discussed last. I always assured the interviewees that their information would be treated anonymously and that they would not be held accountable for their responses. Interviews were conducted in a quiet, often private location, without other people around. I am convinced that people felt confident to speak freely. For instance, some people asked me to help them to get rid of small birds that feed on their crops, while others initially thought I was talking about domestic birds (note: only after the first question about birds did I clarify, if necessary, that I was referring to wild birds). Also, many interviewees shared personal information. Moreover, many local inhabitants did not know of the existence of an LCG nor of *NATURAMA*. When still in doubt about whether an interviewee's response was unbiased, I asked for explanations, argumentation and/or more details regarding their response, or I formulated the question differently to ask it once more. A similar strategy was adopted for dealing with seemingly conflicting information given by various groups of stakeholders. It usually turned out to be a difference in perception between the interviewees, or otherwise it illustrated an existing disagreement between different actor groups.

I also had to be mindful of generating biased information through the interpretation of interviewees' responses and perceptions, especially given my frequent use of an interpreter. To limit an interpretation effect, I processed information immediately by making direct notes. Particularly in cases of unusual or unanticipated answers, I expanded on my understanding of their responses, including by summarizing their answers. I then asked them to comment on my interpretation of their response (see also Merriam *et al.* 2015).

# 2

# Land use, migrant birds, conservation and sustainable development in a changing Sahel

This chapter discusses the current knowledge and information on land-use (including land-cover changes), A-P migrant birds, conservation, and sustainable development in the Sahel region. It highlights different perspectives and describes changes over time.

## Land use

*Desertification and the greening of the Sahel*

The Sahel region has been hit by a series of severe droughts in the 1970s and 1980s, which deteriorated groundwater regimes and suppressed vegetation cover, leading to soil degradation, increased wind and water erosion, and higher levels of dust.[1] Together with financial and political instability and regional conflicts, the droughts contributed to notorious famines in the region (Brandt *et al.* 2014; Millennium Ecosystem Assessment 2005; Dietz *et al.* 2004; Mortimore & Adams 2001). Since this period of Sahel droughts, and the simultaneous southward encroachment of the Sahara desert, the concept of 'desertification' has dominated interpretations of the above-described environmental change (Brandt *et al.* 2014; Mortimore & Turner 2005). Mortimore & Turner (2005) point out that the term 'desertification' has commonly been employed in two ways: I) to describe biological or physical changes, but in one direction only (towards greater aridity and reduced productivity); or II) to characterize modes of management that are considered to result in these biological or physical changes (Mortimore & Turner 2005: 568). However, both descriptions do not appear to apply to the Sahel region, or perhaps only partly and/or for a short period, for two reasons.

[1] "The decreasing rainfall and devastating droughts in the Sahel since the 1970s are among the least disputed and largest recent climate changes recognized by the global climate research community. The reduced rainfall has been attributed to ocean surface temperature changes, particularly to warming of the southern hemisphere oceans and the Indian Ocean, leading to changes in atmospheric circulation" (UNEP 2007: 126).

Firstly, already in the early 1990s, Helldén (1991) claimed that there was a lack of data to substantiate the hypothesis of a human-induced trend towards desertification in the Sahel. The causes of land-cover change are complex, and the relationship between human activities and habitat degradation in the Sahel is uncertain. Speculations about to what extent anthropogenic effects, climate changes, and droughts had led to habitat loss, land degradation, and desertification remain unsolved (Brandt *et al.* 2014; Atkinson *et al.* 2014; Cresswell *et al.* 2007; Hutchinson *et al.* 2005; Millennium Ecosystem Assessment 2005; Olsson *et al.* 2005). However, it has often been suggested that a combination of natural and human factors led to the severe habitat degradation and loss of land productivity and subsequent famines in the 1970s and 1980s (Brandt *et al.* 2014; Millennium Ecosystem Assessment 2005). According to the Millennium Ecosystem Assessment (2005), reduced vegetation cover could, at least partly, be attributed to human activities such as unsustainable land-use practices, including overstocking, overgrazing, deep ploughing, and mono-cropping (Millennium Ecosystem Assessment 2005).

Secondly, despite this history of presumed desertification, long-term remote sensing studies indicate extensive recovery of vegetation productivity after the droughts of the 1970s and 1980s, the so-called increasing vegetation 'greenness' (Figure 2.1). An increase in rainfall is a valid explanatory factor.[2] However, the recent trend of increasing vegetation greenness in the Sahel cannot be explained by a single factor such as rainfall.[3] Other potential explanations are improved land management as well as land-use changes as a result of human (urban) migration (Brandt *et al.* 2014; Helldén & Tottrup 2008; Cresswell *et al.* 2007; UNEP 2007; Hutchinson *et al.* 2005; Millennium Ecosystem Assessment 2005; Olsson *et al.* 2005).

*Improved land management*

Dietz *et al.* (2004) show that farmers in the Sahel region have improved their agricultural and livestock husbandry skills following the recent period of droughts and that Sahelian land management has become more resilient.[4] For instance, investments in uncomplicated on-farm water harvesting techniques have restored the productivity of what used to be unproductive, degraded land (Reij & Smaling 2008). For instance, large-scale efforts to restore degraded land

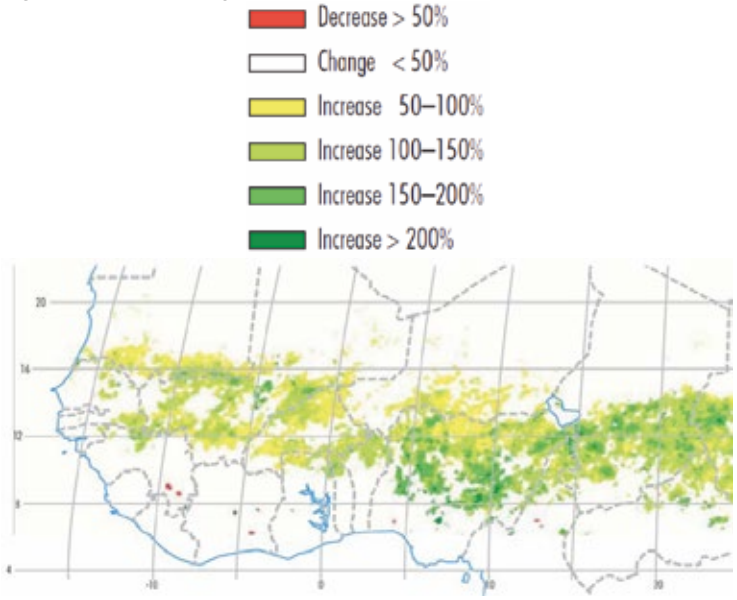
[2] Helldén & Tottrup (2008) found an overall high correlation between Normalized Difference Vegetation Index (NDVI) anomalies and rainfall anomalies in African drylands, and argue that rainfall is therefore a dominant causative factor for dryland vegetation changes.

[3] Helldén & Tottrup (2008) indicate that the greening in some areas cannot be explained by rainfall, as in some areas NDVI trends and rainfall trends are not always correlated and show opposite trends.

[4] This suggests that people's response to decreasing rainfall and land cover degradation was an improvement in land management.

in Niger, Burkina Faso, Mali and Senegal have led to increases in crop yields and on-farm trees. This was largely achieved through water harvesting techniques (especially 'zaï' i.e. planting pits, 'contour stone bounds' i.e. single line of stones, and 'half-moons' i.e. semi-circular bunds) and the development of agro-forestry systems (especially the protection and the management of the spontaneous regeneration) (Botoni & Reij 2009). In southern Mali, for example, non-governmental organizations (re-)introduced practices to reduce erosion, increase soil moisture, raise soil organic matter levels, and conserve forest cover, including the use of rock lines, vegetative strips, windbreaks, composting, and residue management (Tappan & McGahuey 2007). In Niger, inhabitants spread risks by sowing several varieties of crops. By investing in different production strategies they reduce their risk of total crop failure, as at least one strategy should be suitable for the weather circumstances that year (Brouwer 2008; Dietz *et al.* 2004). In addition, conservation and development initiatives, such as those included in this study, frequently include reforestation efforts (see e.g. Berrahmouni *et al.* 2014). Trees are a source of fruit and browse for livestock, and trees can nitrify the soil and reduce wind speed (Reij 2010; Jones *et al.* 1996). Indeed, "trees are part of the production system and have allowed a strong integration of agriculture, breeding, and forestry" (Botoni & Reij 2009).

*Figure 2.1* Trends in greenness in the western Sahel, 1982-1999




*Source: Adapted from UNEP 2007*

Explanation: A trend analysis of time series of the Normalized Difference Vegetation Index (NDVI) data from 1982 to 1999. Areas with trends of <95% probability are in white (Olsson *et al.* 2005).

*A changing environment*

These often detailed ground studies (frequently supported by remote sensing tools), which describe successful cases of farmer-managed natural regeneration leading to a massive greening, show that extensive recovery of vegetation has occured in the Sahel (Helldén & Tottrup 2008; Cresswell *et al.* 2007). Furthermore, based on global NDVI data sets for the period 1982-2003, Helldén & Tottrup (2008) indicate that there are no current signs of extensive land degradation in the Sahel, i.e. "a lack of systematic growth of land degradation/desertification, expressed in terms of declining vegetation productivity or coverage over extended areas" (*Ibid.*: 175). However, locally occurring degradation and desertification might be obscured by the limited resolving power[5] of the data (*Ibid.*). Moreover, Atkinson *et al.* (2014) and Vickery *et al.* (2014) indicate that the exact environmental changes are unknown, as a detailed assessment of land-cover change across the whole of the Sahel is not available. However, in a number of case studies, analysis of satellite images shows the extent of land-cover change, namely extensive loss of forest and woodland habitat (Atkinson *et al.* 2014; Vickery *et al.* 2014).

Indeed, climate changes and human activities have caused a major environmental change in the Sahel, and environmental degradation[6] is also detected (Brandt *et al.* 2014). During the severe droughts in the 1970s and 1980s there appeared to be convincing evidence of overgrazing, over-cultivation, and deforestation (Mortimore & Adams 2001). This may have resulted in, among other things, soil erosion, soil nutrient depletion, and the disappearance of (useful) species (Rasmussen *et al.* 2001). Some of the more continuous major changes include loss of woodland and a decline of woody cover in natural habitats, as well as the conversion of natural habitats (including wetlands) into pastures and agricultural fields (Brito *et al.* 2013; Zwarts *et al.* 2009). Long-term studies have shown an overall decrease in natural vegetation and an increase in agricultural areas (Brandt *et al.* 2014). In general, tree densities have significantly declined in recent decades, but especially outside the so-called agroforestry parklands[7] where trees occur scattered on farmers' fields (Boffa 2000). For centuries, farmers have maintained a selection of trees on their fields, particularly certain tree species that provide economically valuable non-wood products, such as gum arabic (from *Acacia senegal*) and shea nuts (from *Vitellaria paradoxa*).[8] These agroforestry

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5 The ability of an optical instrument to separate two far away objects that are close together, into individual images.

6 "Degradation implies the reduction of the resource potential of the landscape through different processes" (Helldén & Tottrup 2008: 169).

7 Also described as integrated tree-crop-livestock systems (UNEP 2007).

8 Tappan & McGahuey (2007) note that these 'useful' parkland agroforestry trees are also valued as a source of fodder and wood, at least in southern Mali.

parklands are therefore often dominated by just one or a few tree species (Boffa 2000). In fact, nearly all trees have been removed by the people in this parkland, which covers a large part of the Sahel between 14 and 16°N (a zone more than 200 km wide), except for a few of economic interest (Zwarts *et al.* 2012).[9] According to Zwarts *et al.* (2012) human-induced changes have been so extensive that the Sahelian landscape has now been shaped by people. Indeed, at present, agricultural lands dominate large parts of the Sahel (Atkinson *et al.* 2014).

In fact, although West Africa's drylands are only 7% of the world's tropical and subtropical dryland total, "the most problematic areas, semi-arid areas with relatively high degradation and a relatively high population density, are considerably over represented in West Africa: they consist of 20% of the world's total in that type of drylands" (Dietz & Veldhuizen 2004: 25). According to the United Nations Environment Programme (UNEP), the Sahel is at high risk of desertification. UNEP defines this as land degradation in susceptible drylands and, in relation to the Sahel, they link this, in part, to fuel demand from biomass (UNEP 2007).[10] These environmental risks threaten local livelihoods by decreasing the productivity of cultivated land, and diminishing forage opportunities for livestock and reducing firewood supplies (Reij *et al.* 2009).

*Human drivers of change*

Of the social dynamics raised to explain environmental problems occurring in the Sahel, population density and high population growth rates are the most often cited (Tappan & McGahuey 2007; Raynaut 2001). Fluctuations aside, human populations are generally increasing in the region. The annual human population growth rate in the Sahel countries has usually been over 3% in recent decades (with a doubling of the population in less than 23 years). The growing human population combined with rapid economic development in some areas has resulted in increasing food demands and a concomitant expansion of farmlands and fallows at the expense of woodland, natural grassland, and wetland. Thus, land use has intensified as a consequence (Atkinson *et al.* 2014; Zwarts *et al.* 2009; Mortimore & Adams 2001). Nonetheless, research in Africa in the 1990s has questioned the inevitability of the link between rural population growth and environmental degradation (Adams 2002; Mortimore & Adams 2001; Raynaut 2001). For example, Raynaut (2001) indicates that, in the face of growing demographic pressure on resources, it is vital for farmers to protect the environment and pre-

[9] Namely *Faidherbia albida* in the north, *Parkia biglobosa* in the south and an in-between zone dominated by a monoculture of *Vitellaria paradoxa* (Zwarts *et al.* 2012).

[10] "In areas with higher vulnerability, such as the Sahel, shortages of arable land and water, particularly in drought periods, have sometimes led to violent conflicts along a number of lines of division: rural-urban, pastoralist-agriculturalist and ethnic group-ethnic group" (UNEP 2007: 324).

serve its production capacity, while the availability of additional labour from the increased population can be devoted to natural resource management.[11]

Raynaut (2001: 10) identifies two other factors that determine the impact of society on the Sahelian environment, namely technical conditions for the exploitation of resources and "the proportion of production that is not destined to meet the direct or indirect basic needs of the population" (i.e. responses to opportunities and constraints). Also, the impact of the population depends on local and external needs and demands, and is therefore strongly connected to economic and social conditions (*Ibid.*). In fact, most of these land-use changes and their drivers are interconnected (Lambin *et al.* 2006). For instance, "the clearance of trees and shrubs from farmland often brought other changes in farming systems, such as shortening of fallow cycles, conversion of non-cropland to agriculture, increased grazing pressure, greater harvesting of trees for fuelwood[12] and lumber[13] and increased encroachment of humans into parks and reserves" (Zwarts *et al.* 2009: 497). In turn, the impact of the increasing grazing pressure is manifold, and includes increased disturbance, woodcutting, burning, and predator eradication associated with livestock (*Ibid.*; Box 2.1).

The popular IPAT formulation (Impact on environment or resource = Population × Affluence × Technology), which has captured the attention of researchers and policymakers due to its simplicity and elegance of explaining land-use changes, should, therefore, be considered too simplistic (Lambin *et al.* 2006). Indeed, Raynaut *et al.* (2002) point out that people also adapt their land use according to their physical environment and local natural features (including climate, soil, and vegetation). Furthermore, people respond to economic opportunities and institutional factors. Importantly, "opportunities and constraints for new land uses are created by local as well as national markets and policies. Global forces become the main determinants of land-use change, as they amplify or attenuate local factors" (Lambin *et al.* 2006: 261). Also, "economic factors influencing land use decisions by farmers or livestock-keepers vary in both space (between countries, and between ecological regions within countries) and in time (as economic and other drivers change)" (Adams *et al.* 2014: 105). The different modes of land-use, such as herding and (rain-fed or irrigated) agriculture, is also a major factor of variability and land-use conditions are spatially distributed (Raynaut 2001). Moreover, the impact of grazing pressure varies between areas:

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[11] As previously explained, agricultural fields are often intensively managed as 'farmed parkland', with economic and multipurpose trees conserved and soil fertility carefully maintained (through the management of nutrient cycles, including the use of legume crops and the integration of agriculture and pastoralism) (Adams 2002; Mortimore & Adams 2001).

[12] "Although fuel wood harvest in the Sahel consists mainly in collecting dead wood which has limited impact on the ecosystem" (Hiernaux & Gérard 1999: 157).

[13] "Deforestation usually starts with cutting branches and selective felling, eventually reducing the number of tree species" (Zwarts *et al.* 2009: 497).

"floodplains are more resilient to grazing than the drylands, as each flooding produces a new outburst of vegetation growth" (Zwarts *et al.* 2009: 498). Lastly, different human population densities and trends occur in the Sahel region and human migration amplifies this difference. In general, the western part of the Sahel, including northern Nigeria, is more densely populated than the (central and) eastern part (Table 2.1; Zwarts *et al.* 2009; Dietz & Veldhuizen 2004; Raynaut 2001).

In conclusion, the heterogeneity of the Sahel is marked, with highly differentiated local combinations of natural, social, cultural, technical, and economic characteristics, and an ongoing process of change (Raynaut 2001). This makes it clear that the spatial patterns of land-use change and their drivers are complex and differ across regions (Adams *et al.* 2014; Atkinson *et al.* 2014). Land-use changes are determined by socio-economic and biophysical drivers, including local human-environment conditions, which are increasingly influenced by global factors (Lambin *et al.* 2006). These global factors also include conservation and development initiatives, such as those included in this study.

*Box 2.1* Grazing pressure

Zwarts *et al.* (2009: 498) argue that "persistent grazing of drylands, especially under conditions of drought, eventually leads to loss of tree and shrub cover and prevent grasses from producing seeds and the remaining shrubs and small trees from fruiting. […] Grazing pressure in semi-arid west Africa, which historically was always at its highest at the beginning of the rainy and dry seasons, has become more persistent across seasons. Since the droughts in the early 1970s, many pastoralists have settled to farm, expanding the cultivated area to the detriment of rangeland and leading to spatial dispersion of livestock and a higher grazing pressure relative to the forage availability. Although the productivity of the herbaceous vegetation is influenced mainly by soil conditions and the amount and distribution of rainfall, the negative impact of grazing is increasing." The idea that pastoralists inevitably overgraze their land and cause permanent degradation has been challenged however. Although pastoral lands are often degraded, the causes and processes are complex and not uniform in space (Adams 2002). For example, "selective and intensive grazing of annual herbs during the growing season help the dominance of woody plants" (Hiernaux & Gérard 1999: 157). Notably, in their study that included sample sites of 'brousse tigrée' and related vegetation types in Mali and Niger, Hiernaux & Gérard (1999) found little evidence of grazing influence on the vegetation structure and yield a few hundred metres away from livestock concentration points, except for species composition of the herb layer. See for further discussion below, the section on 'Linking (migrant bird) conservation and development goals in the Sahel'.

*Table 2.1* Population densities

| Region | Human population |
|---|---|
| Sahara | Very low and variable population |
| Northern Sahel | Low population and mostly decreasing during 1960-1995 |
| Sahel | Some areas rapid growth, particularly near urban centres; other areas major fluctuations, in some cases a downward trend, in other parts slow overall-growth |
| Mountains/hills, mountainous | Originally very densely populated; extensive outmigration during the last thirty years; different outcomes |
| Wooded savanna | Population increase; filling up relatively underpopulated areas |
| Forest | Rapid population growth, particularly near cities and in export agriculture and mining zones |

*Source*: Ton Dietz, director ASCL, *pers. comm.* 2010 (see also Dietz & Veldhuizen 2004)

### *Concluding remarks on land-use dynamics*

To conclude, "indicators of the state of the natural environment tend to be contradictory or controversial. There is enormous diversity in the Sahel and simple generalisations should be rejected" (Mortimore & Adams 2001: 50). Nonetheless, the increased agricultural and pastoralist activities, but also overhunting, the extraction of natural resources, and water overexploitation (irrigation and hydroelectric dams), together with the effects of climate change, severely threaten the biodiversity of the Sahel region. Most notable have been the historically disastrous declines in ungulates (a group of large, usually hoofed, mammal species), but also other animal groups, including birds, are presently under threat (Adams *et al.* 2014; Brito *et al.* 2014; Zwarts *et al.* 2009). Increased rains and improved land use have led to a recent re-greening of the Sahel (Helldén & Tottrup 2008; Cresswell *et al.* 2007), but at the same time environmental degradation, which threatens livelihoods and biodiversity, is also (locally) detected (Atkinson *et al.* 2014; Vickery *et al.* 2014).

## Migrant birds

### *Migrant birds under threat*

Migrant birds are probably more vulnerable to environmental change than resident birds as they depend on different sites, such as on their wintering- and breeding grounds, and on their staging sites along their annual migratory route. This places them in multiple jeopardy as each site (potentially) poses different threats (Vickery *et al.* 2014). Sanderson *et al.* (2006) present the first continent-wide analysis of the population trends of European birds. This analysis shows that many populations of Afro-Palearctic (A-P) migrant birds are undergoing a sustained, and often severe, decline (Sanderson *et al.* 2006). Vickery *et al.* (2014)

indicate that long-term datasets suggest long-term, and often – but not always – geographically wide declines across a broad range of A-P migrant species (although some species are increasing in number). Zwarts *et al.* (2009) indicate that the number of trans-Saharan migrant bird species in decline increased from 39% in 1970-1990 to 55% in 1999-2000, which is a trend that is significantly more negative than those of Europe's resident and short-distance migrant birds.

Because many of these migrants spend the greater part of their life in Africa (Zwarts *et al.* 2009) and because of dramatic population declines of number of species that spend the winter in particular regions (Ockendon *et al.* 2012; RSPB 2014), it seems reasonable to assume that (some) factors for these declines may lie within the wintering grounds of these bird species (RSPB 2014; Zwarts *et al.* 2009). Indeed, Hjort & Lindholm (1978) already conducted studies about the (possible) influence of Sahelian conditions (e.g. extreme droughts) on the European migrant birds in the 1970s. The possible influence of the conditions in this region has witnessed an increased interest from conservationists and scientists since then (see e.g. Atkinson *et al.* 2014; Cresswell *et al.* 2007; Thiolly 2006a&b; Wilson & Cresswell 2006; Jones *et al.* 1996). However, Sanderson *et al.* (2006) argue that further research is needed to assess whether the declines in migrant birds are caused by factors operating on the birds' wintering grounds or by other factors (Sanderson *et al.* 2006). Information on potential factors during the non-breeding periods have been assessed for only 27% of the A-P migrant species, and this is often not even based on field studies in the non-breeding grounds, but instead on remotely sensed measures of climate and habitat (change) in Africa (Vickery *et al.* 2014). Based on direct evidence from long-term satellite tracking of raptors, Klaassen *et al.* (2014) suggest that events along the migration routes have an important impact on the population dynamics of A-P migrant species.

Although further research is needed to identify key threats in the Sahel region, there seem to be sufficient research outcomes to argue that severe threats do exist in the Sahel region for some of the A-P migrants that use this region either as a staging site or as winter ground. Some further studies have revealed for several species how some factors in the Sahel affect each specific migrant bird species (see e.g. Gordo & Sanz 2006; Wilson & Cresswell 2006). One significant factor that strongly influences some migrant bird populations in the Sahel is the amount of rainfall. Insect and seed availability decline steeply in the event of droughts, and wetlands and flooded areas diminish; consequently, many species that concentrate in floodplains gradually lose their habitat (Zwarts *et al.* 2009; Cresswell *et al.* 2007; Gordo & Sanz 2006). There is evidence that this also applies to those

species that winter further south in the wetter regions and use the Sahel as a staging area during migration (Atkinson *et al.* 2014).[14]

Several researchers (e.g. Mihoub *et al.* 2010; Zwarts *et al.* 2009; Cresswell *et al.* 2007; Gordo & Sanz 2006) have shown a negative relationship between the precipitation in the Sahel and specific A-P migrant bird populations. The effect of Sahelian droughts on bird populations was epitomized by the population crash of Common Whitethroats between 1969 and the mid-1980s and the increase in subsequent wetter years (Atkinson *et al.* 2014; Zwarts *et al.* 2009). It shows that climate change poses a major threat, and Barbet-Massin *et al.* (2010, 2009), following predicted climate change models, foresee extensive range contraction and species loss for migrant birds across the Sahel region. Climate change impacts are predicted to be especially large for species with restricted wintering ranges and limited dispersal ability (Zwarts *et al.* 2009). However, the data on which these climate change impact studies are based are generally poor (Vickery *et al.* 2014). Also, the strong relationship between rainfall and over-winter survival in several species is no longer evident in the recent wetter decades in the Sahel, perhaps suggesting increasing importance of other potential limiting factors. Indeed, "longer-termed declines are likely to be complex in causation, affected by factors operating on any or all of breeding grounds, migration routes or wintering grounds" (Atkinson *et al.* 2014: 10).

Another common explanation for population declines in A-P migrants is environmental degradation and habitat loss caused by associated land-use change in the Sahel (Adams *et al.* 2014; Wilson & Cresswell 2006; Söderström *et al.* 2003). According to Vickery *et al.* (2014), human-induced habitat change, including forest loss and degradation, is the most important factor in the non-breeding grounds for the declines in A-P migrants species. Mihoub *et al.* (2010), Zwarts *et al.* (2009), and Thiollay (2006a) describe several human-induced factors that have a negative effect on some migrant birds wintering in the drylands of the Sahel; for instance, deforestation, expanding agriculture, chemical pesticide spraying, over-grazing, and bird exploitation.

Despite what appears to be scientific consensus on an impact of human land-use change in Africa on migrant bird populations, there is a great lack of (field) evidence and studies on the significance and its effects (Adams *et al.* 2014; Atkinson *et al.* 2014). A recent search for papers in English language peer-reviewed journals in several online databases and through search engines (i.e. Google Scholar) revealed that 159 papers discussed the status of migrant birds in the context of land-use change in the Sahel. Only 20 of these papers were based on new field data on birds from the Sahel (or more broadly from dryland West Africa).

[14] "In the absence of field studies in sub-Saharan West Africa, knowledge on where species fatten and the ecology strategies they adopt remains poor" (Vickery *et al.* 2014: 10).

Furthermore, few of these papers included quantitative data or direct qualitative observations of land-use change (Adams *et al.* 2014). "Much of the other literature in this area relates to changes in bird populations from breeding surveys in Europe, rather than on the wintering grounds themselves, and much of the evidence of land-use change is usually based on qualitative observations or anecdotal. Only one study measured changes in bird numbers over time and none did so at anything above the local scale" (*Ibid.*: 105).

In fact, direct evidence of land-use change impacting on wintering migrant birds (particularly passerines)[15] exists for only two forms of land-use change, namely loss of wetland habitats and the loss of trees in wooded savannas (Adams *et al.* 2014). The former is usually linked to changes in water management causing desiccation of wetlands and floodplains and thereby reducing the extent of Sahelian wetlands. The construction of dams for crop irrigation and hydroelectric power generation has affected flooding patterns in all major Sahelian rivers, and the extent of flooding in large deltas, such as the Inner Niger, has declined in recent years (Vickery *et al.* 2014; Adams *et al.* 2014). The loss of trees in wooded savannas is linked to clearance for agriculture, wood fuel collection, and livestock grazing (Adams *et al.* 2014). Human deforestation leads to a reduction in the number of tree species (Stevens *et al.* 2010), while "an intact suite of indigenous trees offer Palearctic birds a sequence of food resources from September to April,[16] which is the main reason why unspoilt woodland in the Sahel attracts more birds than degenerate woodland" (Zwarts *et al.* 2009). Zwarts *et al.* (2012) found that most woodland bird species reach their highest densities in the last remaining flood forests in the northern Sahel, and argue that their large declines may partly be attributed to the loss of these forests along the Senegal river, in the Inner Niger delta, and elsewhere.

According to Vickery *et al.* (2014), evidence exists for another human factor on the non-breeding grounds, namely hunting. However, the hunting in sub-Saharan Africa is mostly restricted to certain species and locations, e.g. waterbirds in localized wetlands (as shown in Zwarts *et al.* 2009). Few studies have shown the relation between hunting pressure in these areas and A-P migrant population trends as relevant data is typically lacking, and the impact is therefore impossible to quantify. Vickery *et al.* (2014) indicate that hunting is likely only to be an important driver of declines for a small number of A-P migrant species, even if the more extensive hunting pressure along the birds' migratory route (i.e. the Mediterranean area) is included (Photos 2.1-2.3).

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[15] A passerine is any bird of the order Passeriformes, the largest order of class Aves (c. 5300 species, i.e. more than half of all bird species). It is a diverse group of tiny and fairly large land birds. They are also known as perching birds as one of their characteristics is the arrangement of their toes, three pointing forward and one back, which facilitates perching (Snow & Perrins 1998).

[16] Sahelian tree species differ in their phenology of leafing, fruiting, and flowering (Zwarts *et al.* 2009).

*Photos 2.1-2.3* Land-uses for which direct evidence exits of its impact on wintering migrant birds

Direct evidence of land-use change impacting on wintering migrant birds exists for only two forms of land-use change: loss of wetland habitats (including drying wetlands duo to the irrigation of fields: upper photo) and the loss of trees in wooded savannas (including through wood cutting for firewood: middle photo). Evidence exists for another human factor on the non-breeding grounds, namely hunting (including the hunting of many wader species, such as the Ruff *Philomachus pugnax*: lower photo), although the scale is limited with the exception of e.g. the Inner Niger delta.

*Different species, habitats, changes, and theories*

Just as land-cover changes are complex, so are the impacts of them on A-P migrants. Different species have different habitat requirements and therefore land-cover change can have positive effects for a particular set of species, while having a negative effect for others (see Box 2.2; also e.g. Vickery *et al.* 2014; Atkinson *et al.* 2014 & Zwarts *et al.* 2009). For example, while some wader species that feed in shallow open water apparently benefit from the conversion of reed wetlands to paddy fields, some 'reed warblers' (*Acrocephalus*) do not (Vickery *et al.* 2014; see also Photos 2.4-2.7). Through their study of repeated bird censuses of a woodland site (in northern Nigeria) over a number of years, Cresswell *et al.* (2007) were able to demonstrate the degradation and deforestation of woodland habitat and a concomitant increase in open country species.[17] Though, Sheehan

[17] Potentially contrasting results came from two widespread bird censuses of already degraded woodland in the Sahel (and also in northern Nigeria) separated by five years (Stevens *et al.* 2010). In this period, densities of large trees (>5m) decreased, but densities of smaller trees and shrubs increased. The study showed relatively small changes in bird species' richness and bird community, and only slight change in bird species' density were recorded. They provide three possible explanations: "(1) all habitats

& Sanderson *et al.* (2012; 660) rightly point out that "those species adapted to existing in more open habitats may benefit from intermediate levels of agricultural intensification in landscapes that were originally more enclosed in nature.[18] However, increasing agricultural intensification may ultimately transform these habitats beyond the point of optimality." For instance, agricultural intensification can lead to a decline in bird species diversity, as shown by Hulme's (2007) study in central Nigeria, where, during surveys, more species of birds were observed where farming was less intensive.[19] On the other hand, an analysis of surveys conducted by Buij (2013) in northern Cameroon shows that A-P migrant raptor diversity and richness was unrelated to land use in northern Cameroon's (Sudanese-Sahelian) savanna landscapes, although their abundance was highest in post-harvest rice fields. Here, A-P migrant raptors did not respond negatively to elements of anthropogenic pressure.

Atkinson *et al.* (2013) indicate that insufficient knowledge of A-P migrant birds' habitat requirements in the Sahel severely limits the understanding of implications of present and future land-use change in this region. Indeed, "localised ecological studies of habitat use by migrant birds in the Sahel have been undertaken, but systematic understanding of the place of land-use change in the decline of Palearctic birds is still lacking" (Adams *et al.* 2014: 102). Hulme's (2007) study results from central Nigeria, which include observations of both migrant and resident bird species, show that tree density is potentially the most important variable predicting bird species richness and diversity in farmland, with medium tree density predicting the highest species richness and diversity. To determine the preference of A-P migrant species for different tree species (and for trees having a certain canopy width and height) in the Sahel, Zwarts *et al.* (2012) counted 579,000 trees and 1,002 Paleartic birds in 487 transects on 113 sites in south Mauritania and Senegal. They conclude that nearly all birds in the Western Sahel are concentrated in Acacia trees (Photos 2.8 and 2.9). The *Faidherbia albida* was both very rich in birds and is of particular economic interest due its reverse phenology.[20] Trees must reach a certain size before woodland bird species

sampled were already at relatively low tree density; initial reductions from high tree density or near removal of all trees may cause larger changes in bird densities; (2) reduction in the number of large trees was partially compensated by a more lush development of the vegetation as a whole in the second study period; and (3) the bird species remaining in degraded Sahelian woodland in northern Nigeria are already well adapted to habitat change in low tree density" (Stevens *et al.* 2010: 156).

18 Augiron *et al.* (2015) show that two A-P migrant raptor species, namely Lesser Kestrel and Montagu's Harrier, prefer these intermediate (heterogeneous) Sahelian landscapes, which include a mix of semi-natural and anthropogenic habitats.

19 The study shows the importance of retaining natural features of savanna habitat in farmland, including some trees and good herbaceous vegetation cover, in order to maintain high bird species diversity (Hulme 2007).

20 "Trees are in leaf, growing and fruiting during the dry season, whereas leaves are shed after the first rains and growth resumes only at the end of the wet season. This phenology is advantageous for agroforestry, because competition with associated crops growing during the wet season is minimized"

start using them and flowering trees and trees bearing fruits attract many more birds. In fact, birds do not feed in heavily pruned trees (Zwarts & Bijlsma 2015a; Roupsard *et al.* 1999; Zwarts *et al.* 2012). Based on the same research plus more recent additional research in The Gambia, Guinea-Bissau, Mali, and Burkina Faso (including 2,000 plots and 310,000 trees and shrubs), Zwarts *et al.* (2015) and Zwarts & Bijlsma (2015) show that insectivorous A-P migrants species were highly selective in their tree choice, with none of them at all in 69% of the 182 tree and woody shrub species identified. Therefore, the re-greening of the Sahel does not necessarily mean that the vegetation that birds require is restored (Atkinson *et al.* 2014), as much depends on vegetation type, including shrub and tree species (see Zwarts *et al.* 2015).

*Box 2.2* Cambridge Workshop

During a multiday workshop (entitled 'The Drivers of Land-Use Change Relevant to Migratory Birds in the Sahel') organized by the University of Cambridge (Departments of Geography and Zoology), the Royal Society for the Protection of Birds and the British Trust for Ornithology in 2010, a prioritization of most critical land-use changes in the Sahel was completed by all participants together (including scientists, conservationists, and myself). The following eight land-use changes were judged as the most critical with regards to A-P migrant populations (see also Cambridge Workshop 2010).

- Increased cutting of trees and shrubs
- Change in planting of trees
- Increase of grazing intensity
- Change in fire management
- Change in livestock type
- Use of herbicide/pesticide (and fertilizers)
- Landscape simplification
- Extension of agriculture

Three environmental conditions were thought to be the most important, namely agriculture, grazing, and trees. An attempt was made to map the drivers of environmental change (human social conditions and interactions) and their presumed impact on each of these three environmental conditions and then on A-P migrant species. It clearly shows how complicated these processes are and their very different (assumed) effects on different species populations. Nonetheless, there are significant general differences between groups, perhaps most notable between water and land birds. For example, water birds are limited to (localized) wetlands, and face different threats (such as hunting), while land birds occur more widespread in a more extensive and diverse landscape (see e.g. Zwarts *et al.* 2009).

(Roupsard *et al.* 1999: 460). In that way, these *F. albida* trees increase soil fertility, improve microclimate and produce abundant fodder for livestock during the dry season, and at the same time attract large numbers of flying months and caterpillars that are an important food source for many wintering A-P migrant birds (Zwarts & Bijlsma 2015b; Zwarts *et al.* 2015; Roupsard *et al.* 1999; Vandenbeldt & Williams 1992).

The spatial patterns of Sahelian land-cover change have different implications for different migrant species, and different populations of the same species, as they often have different wintering grounds (see e.g. Atkinson *et al.* 2014; Vickery *et al.* 2014; Zwarts *et al.* 2009). This applies to both the habitat level within an ecoregion and the ecoregion levels themselves (see e.g. Ockendon *et al.* 2014; Atkinson *et al.* 2014; Zwarts *et al.* 2009), as will now be described, respectively. Based on a synthesis of expert consultations and published information, Atkinson *et al.* (2013: 1) indicate that those A-P migrant species wintering in the Sahel that "showed the strongest declines during 1970-1990 were associated with more open (i.e. from very open to intermediate) habitats than those newly declining during 1990-2000, when declining species were more associated with (more intermediate and structurally complex) habitats with more shrubs and trees." For species that use the region only as a staging area during their migrations these trends were largely similar (Atkinson *et al.* 2014). "Currently the most rapidly declining migrants species are those inhabiting woodlands. Some of these will winter further south than the Sahel in the Guinea Savannas but stage in the Sahel" (*Ibid.*: 12).[21] Atkinson *et al.* (2013: 8) argue that the negative correlation with more open grassy (and cropland) areas may be related to the droughts of the 1970s and 1980s as grass and crop biomass responds earlier to droughts than trees and shrubs that are deeper rooted and can exploit deeper groundwater.

According to Zwarts *et al.* (2009), migrant birds wintering in the Sahel-Sudan zone (Africa's northern savannas and in the Sahelian wetlands, but also those species wintering in Southern Africa) suffered the strongest declines. Species wintering from the 'Guinea zone' south of 5°S in East Africa, or more dispersed, fared comparatively better (Zwarts *et al.* 2009). However, in contrast to these findings, Atkinson *et al.* (2013: 1) indicate that "populations of species that winter in the Sahel are generally stable or increasing now as rainfall has increased and is now near the long-term average for the Sahel. Those which use the Sahel only as a staging area are, in many cases, in rapid decline at present." A recent study among 29 British-African migrant birds that winter further south, from Continental Europe to sub-Saharan Africa (of which 20 in sub-Saharan Africa), showed that species that winter in the humid zone of Africa – stretching across the continent from southern Senegal to southern Burkina Faso and Nigeria and further South – show the most dramatic declines.[22] Over 70% of these species have declined since the late 1980s, and 45% by more than half.[23] This contrasts

[21] Zwarts *et al.* (2012: 31) indicate "that most Palearctic woodland bird species spending the northern winter in West Africa are concentrated in the Northern Sahel."

[22] The longest available trends were used for all species, i.e. mostly 1970-2012.

[23] Including European Pied Flycatcher *Ficedula hypoleuca* (53% decline) and Spotted Flycatcher *Muscicapa striata* (49% decline; RSPB 2014; BirdLife 2014), while, again, in contrast to this study, Zwarts *et al.* (2009) note that the few European breeding birds wintering in gallery forest and rainforest, notably flycatchers, seem to have escaped large declines.

with species that winter in the arid zone just below the Sahara desert, including in northern Burkina Faso. These species have fluctuated considerably since 1970, but show a decline of less than 20% overall, and 67% of these species have stable populations (RSPB 2014; BirdLife 2014). Two studies on British-African migrants show similar results, namely that those species wintering in the humid zones of Africa were declining, while those wintering in the more northerly arid zones were not (in the period 1994-2007/8; Ockendon *et al.* 2014; Morrison *et al.* 2013). However, Morrison *et al.* (2013) analyzed the species' population in England and Scotland separately and the results showed that populations of both arid and human zone species are increasing in Scotland. Thus, factors outside the wintering areas most probably (also) play a significant role in these population trends.[24]

Vickery *et al.* (2014) conclude that there appear to have been two phases of decline of European migratory birds, namely, one in the 1960s-1970s (and in some cases into the early 1980s), and one starting in the 1980s. The first period concerned those species wintering in the Sahel region, while the more recent period of decline concerned those species wintering in the Guinea forest-savanna and Guinea moist forest zones. This provides an explanation for the different theories on the decline of species wintering in the Sahel (and adjacent ecoregions). However, perhaps the studies mentioned above cannot simply be compared, or at least should be compared with great care, for at least five reasons:

i) Definitions and/or demarcations of (eco)regions discussed differ or are not provided at all (see e.g. Vickery *et al.* 2014).
ii) The timespan and period over which the declines are measured also differ between studies (see studies above).
iii) Different species are included in each of the studies' analyses and species have different habitat requirement, migratory routes, ecological strategies, etc., and thus different threats and declines.
iv) Even if the same species are included, different populations of particular species are often included (e.g. British versus European population), while different populations of the same species can show different population trends (see e.g. Morrison *et al.* 2013).[25]
v) Some studies do not specify which bird species and which populations are included in the analyses (see e.g. Atkinson *et al.* 2014).

In conclusion, the Sahelian factors for declines are related to species populations and their exact winter ground, habitat requirements, and the land-cover

[24] "The consistently less favourable population trends in England than Scotland of long-distance migrant and resident species strongly suggest that variation in the quality of breeding grounds is influencing recent population changes. The declines in humid zone species in England, but not Scotland, may result from poorer breeding conditions in England exacerbating the impacts of non-breeding conditions or the costs associated with a longer migration, while better conditions in Scotland may be buffering these impacts" (Morrison *et al.* 2013: 1051).

[25] Generally, "western European birds tend to occupy the western and central Sahel, and Eastern Europe the central and eastern parts" (Zwarts *et al.* 2009: 190), but the precise location in the region depends on the particular species and population (see e.g. Morrison *et al.* 2013; Zwarts *et al.* 2009).

changes[26] in these particular habitats and ecoregions. Because of these differences in winter ground, the spatial patterns of Sahelian land-cover change have different implications for different migrant species populations. And because different species have different habitat requirements, land-cover change can have positive effects for some species, while having a negative effect for others. But we know little about these habitat requirements, although we know which – and that only a small number of – tree species is important for A-P migrant species. For these reasons, we should not generalize or (as some species groups have similar life cycles) do so cautiously and give a clear description of the species, population, timeframe, and geographical area. These aspects are essential in any effort to uncover the Sahelian driving factors behind declines.

*New Sahelian habitat in the Sudanese zone?*

Thiollay (2006b) indicates that in West Africa, the wide savanna belt extending between the rainforest and the Sahel, including the Sudanese zone, is increasingly drier and more sparsely wooded from south to north. The region is affected throughout by human land-cover change, even in many protected areas. The steady loss of woody cover in the Sudanese zone has triggered a land-cover change towards Sahelization of the Sudanese zone (Zwarts *et al.* 2009), and the loss and degradation of forest is predicted to continue throughout much of this region (Vickery *et al.* 2014). This new Sahelian habitat in the Sudanese zone could potentially serve as a substitute for lost habitat in the Sahel region. However, this would involve a longer migration for the European migrant birds to reach this area/habitat. Furthermore, Zwarts *et al.* (2012) have shown that the species of trees are also a determining factor, as described earlier, thus its suitability also depends on the occurrence of particular tree species.

The so-called Moreau's Paradox is, in this regard, highly relevant. "Moreau (1972) questioned why so few migrant birds spend the northern winter in the green part of Africa and so many concentrated in a desiccated region as the Sahel, known as Moreau's Paradox" (Zwarts & Bijlsma 2015: 20). This paradox can be explained as follows: the Sahel "has always been subject to heavy grazing from large herbivores, and as a consequence woody species have evolved mechanical (thorns) defences to withstand grazing of large herbivores, at the expense of chemical defence against arthropods. South of the Sahel, where sleeping sickness prevented large herbivores to settle [sic] in large numbers, thorny trees (rich in arthropods) are replaced by (usually non-thorny) trees with less palatable foliage and a higher crude fibre content, and hence with less arthropod food for insectivorous birds" (Zwarts *et al.* 2015; 1). Hence, the new Sahelian habitat in

[26] Influenced by local differences in e.g. weather condition, such as droughts, and density of human population, as explained in the previous and next chapter.

the Sudanese zone is likely to hold only a few tree and bush species rich in arthropods, and only in small numbers, which limits its suitability for many A-P migrant species.

*Photos 2.4-2.7* Inhabitants sharing the (fallow) paddy fields with birds in Sourou, Burkina Faso

Rice is an important crop for many inhabitants of Burkina Faso, especially along the Sourou river. Some wader species that feed in shallow open water apparently benefit from the conversion of reed wetlands to paddy fields. In the photos above: Common greenshank *Tringa nebularia* (upper), Wood sandpiper *T. glareola* (middle), and Wood and Green Sandpiper *T. glareola & ochropus* (lower).

*Photos 2.8 & 2.9* A-P migrant birds foraging in Acacias

Nearly all A-P migrant birds in the Western Sahel are concentrated in Acacia trees. In the photos above: Common whitethroat *Sylvia communi* (upper) and Western bonelli's warbler *Phylloscopus bonelli* (lower).

# Conservation and sustainable development

*The importance of migrant bird conservation*

Species, including bird species, provide an accessible indicator with which to conserve ecosystems by indicating key sites (i.e. priority sites for conservation), key habitats (i.e. priority habitats for conservation) and key issues for conservation (for further explanation see, e.g. BirdLife 2015b; BirdLife 2000). Birds and mammals are the best known taxonomic groups (Stattersfield *et al.* 1998), while birds and amphibians are the best evaluated groups: all species are assessed for the IUCN Red List of Threatened Species[27] (Baillie *et al.* 2004). We therefore have unparalleled information about which bird species are the closest to extinction, the threats they face, action needed, and critical areas that need safeguarding (BirdLife 2000). "These data can help focus and target action to tackle biodiversity loss. Furthermore, as birds are sensitive to environmental changes, popular to watch, relatively easy to monitor, indicators based on bird data are very useful for tracking progress in addressing the biodiversity crisis" (BirdLife 2010b: foreword). Kirby *et al.* (2008; 64) argue that because "migratory birds are popular with the public, they can provide an entry point for raising awareness about some of the bigger environmental issues facing the world." This partially explains, and justifies, a focus on birds, although mostly with regard to biodiversity conservation.

The importance of biodiversity conservation is clearly explained by Stattersfield *et al.* (1998: 13):

> At the ecosystem level, biodiversity underpins the ecological processes which are vital to human life, for example in influencing global climate patterns, in mediating the carbon cycle, in safeguarding watersheds, and in stabilizing soils to prevent desertification. At the species level, components of biodiversity in the form of domesticated and wild animals, plants and micro-organisms provide a vast array of goods and services which are often essential to the survival of humanity as well as being of enormous economic value.

This economic value was assessed by a UN-sponsored study called The Economics of Ecosystems and Biodiversity (TEEB). The study calculated the costs of losing nature at 2-5 trillion US dollar per year, and showed that these costs were more heavily felt in the poorer parts of the world (Fowlie 2010). Stattersfield *et al.* (1998: 13) describe some less tangible, but more wide ranging values that can be ascribed to biodiversity. "There is the value of biodiversity yet to be discovered or realized; there is the value attached by many people to the mere fact that biodiversity exists; and there is the value of leaving existing levels of

[27] The IUCN (International Union for Conservation of Nature) Red List of Threatened Species is widely recognized as the most comprehensive, authoritative, and objective global approach for classifying animal and plant species in terms of the risk of extinction (BirdLife 2009; Baillie *et al.* 2004). The IUCN Red List has a prominent role in guiding conservation activities of governments, NGOs and scientific institutions (IUCN 2004).

biodiversity to future generations. Taken together, these underscore the immense importance of biodiversity to mankind, and provide compelling arguments for maintaining it." BirdLife (2009: 1) explains that "birds and wider biodiversity play key biological, economic, social and cultural roles across the world, providing vital ecological services, revenue, food supplies, enjoyment and inspiration to society. Birds have value in their own right, and we have a moral duty to ensure the continued existence of birds and all other species on Earth."

The severe decline of many A-P migrant bird populations is of growing conservation concern in both scientific and political arenas (Vickery *et al.* 2014). Kirby *et al.* (2008: 68) identified the proposed conservation strategy: "support[s] efforts to reduce and reverse desertification in the African Sahel, using approaches that protect and restore native vegetation and conserve natural flood regimes" as one of the dozen key actions that should be taken for migrant bird species worldwide. Habitat degradation, desertification, and exploitation of species threaten the continued survival of many of the Sahel region's resident flora and fauna. As shown by the severe decline, or extinction, of many of the region's original native large bird and mammal species (Thiollay 2006a). Vegetation degradation decreases the carbon sequestration capacity of drylands, thus increasing the level of carbon dioxide in the atmosphere (Bonkoungou 2001). Furthermore, habitat degradation and desertification make the area less suitable for agriculture and grazing of livestock (Zwarts *et al.* 2009).[28] Sahelian rural populations are especially reliant on natural resources for their subsistence livelihoods, including for food, livestock fodder, fibre, and medicine, which also form their main source of income. These human populations are therefore particularly vulnerable to desertification, because it undermines the resource base that provides them these services (Cohen *et al.* 2011).

*The need for integrated (migrant bird) conservation and development goals in the Sahel*

Integrating conservation strategies at a landscape level, in this case the Sahel region, is often necessary to safeguard ecosystem functions (BirdLife 2000). Indeed, the conservation of (birds in) the drylands of the Sahel should not only be focused on protected areas, but also on the wider countryside, because countryside habitats may contain large populations of many bird species that have considerable conservation value (Adams *et al.* 2014; Zwarts *et al.* 2009; Söderström *et al.* 2003; see also Box 2.3). Farmed Sahelian drylands matter for conservation, and the management of trees and shrubs on the fields are important for migrant land birds (Adams 2002). "Our enthusiasm for biodiversity hotspots and protect-

[28] Livestock are considered one of Africa's main resources and about 60% of the African population are active in agriculture (Abd El-Hai *et al.* 2009).

ed areas should not blind us to the conservation importance of more mundane landscapes" (Adams 2002: 213). Many migrant species "(some 55%) are widely dispersed in their distributions, especially passerines,[29] and most species that congregate do so only in certain phases of their life cycle" (Kirby *et al.* 2008: 67). Taking into account the threats from climate change, the preservation of the wider habitat that includes potentially future distribution ranges, could buffer effects of climate changes (Mihoub 2010). Many migrant species occur in relatively low densities on land that is owned and managed by rural people. A large-scale approach that gives incentives to landholders to manage their land in ways that support these bird species' survival appears more suitable (Adams *et al.* 2014).

Moreover, so-called 'fortress conservation' is not in line with the contemporary conservation strategies (see e.g. Fisher *et al.* 2005; Ros-Tonen & Dietz 2005). During the 1960s and '70s, the majority of the protection of natural resources relied on (national) parks and other protected areas, often described as fortress conservation, controlled by central governments (Ros-Tonen & Dietz 2005; Berkes 2003). The native people did not play a role in this and they were excluded from these protected areas (Fisher *et al.* 2005). The protection of natural resources and biodiversity does not, however, necessarily require the eviction of (native) people from the land (Dietz 1996). In the 1980s, a shift in conservation thinking towards integrating conservation and development was widely supported by international conservation organizations (Fisher *et al.* 2005). It was then that the concept of sustainable development[30] emerged as the means by which natural ecosystems and biodiversity could be saved while enabling humanity to continue to live in prosperity (Groom *et al.* 2006). Since the rise of the sustainable development discourse in the 1980s, the objectives of local development and local support are supposed to be an essential part of (successful) natural resource management (Fisher *et al.* 2005; Berkes 2003). Today, most conservationists agree that declining natural resources, biodiversity loss and poverty allevia-

[29] Trierweiler *et al.* (2013) and Klaasen *et al.* (2014) show that (satellite-tracked) Montagu's harriers are, contrary to earlier hypotheses, not randomly distributed throughout their Sahelian wintering range, but rather a clear spatial structure exists. "Montagu's harriers visited distinct home ranges, they were site faithful and tracked seasonal changes in food availability related to previous rainfall patterns, caused by the shifting Intertropical Convergence Zone. Itinerancy may be the rule rather than an exception among insectivorous birds wintering in African savannahs" (Trierweiler *et al.* 2013: 107). Furthermore, one of the co-authors (Ben Koks, founder Werkgroep Grauwe Kiekendief, *pers. comm.* November 2015) indicates that their research team has visited many of the harriers' winter home ranges and that they observed higher densities of other A-P migrant species, such as Lesser Kestrel, Short-toed Snake Eagle, White Stork, and Northern Wheatear in these areas than elsewhere.

[30] In 1983, the World Commission on Environment and Development was formed by the United Nations (under chairmanship of Ms. Brundtland) to identify and promote sustainable development (O'Riordan 2000). Sustainable development was defined by this commission as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Fisher *et al.* 2005: 136).

tion are related problems and should be tackled side-by-side (Roe *et al.* 2010; Adams *et al.* 2004).

*Box 2.3* Parks and protected areas

Parks and protected areas might be appropriate conservation strategies at biodiversity hotspots, such as IBAs. These are key sites for conservation and often hold large concentrations of (A-P migrant) birds that are vulnerable to, for example, hunting (such as wildfowl in wetlands) (see also BirdLife 2010b; Zwarts *et al.* 2009). Also, parks and protected areas might be necessary to restore and protect the original ecosystems with their large fauna species (see e.g. Zwarts *et al.* 2009; Thiollay 2006a&b). These areas could possibly also contribute to sustainable development with increased income from eco-tourism. Because protected areas reduce livestock grazing opportunities, which threatens the grazing-dependent dryland ecosystems (see also main text below), locally extinct large native herbivores will probably need to be re-introduced (Bonkoungou 2001). However, it should be noted that socio-economic edge effects may impact zones surrounding protected areas, as indicated by Wolf (2010). In a case study, Wolf shows that the establishment of Mole National park in Ghana led to higher population pressure in the buffer zone, because more people needed farmland after they had to abandon hunting and Shea nut collection in the park.

In line with this interrelated conservation and development reasoning, Bonkoungou (2001) indicates that the United Nations Convention to Combat Desertification recognizes that poverty-induced overexploitation of the land is a major cause of environmental degradation in the African drylands, through encroachment of agriculture on grazing land and over-cutting of natural vegetation for fuel wood. According to Bonkoungou (2001: 13), "these problems are compounded by rapid urbanisation, with its concomitant exponential increase in demand for charcoal, other wood products, construction gravel and soil, and other natural resources, not to mention negative impacts from lack of waste management." The above reasoning provides argumentation to combine the biodiversity conservation and poverty alleviation goals in the Sahel. Indeed, "engagement between the conservation and development communities is imperative if rural land use change in the Sahel is to be influenced in ways that benefit birds and local people" (Atkinson *et al.* 2014: 12). Nevertheless, there is also much critique and debate about the links between these concerns. There is no agreement about the degree to which these concerns are linked, and how they should be tackled together (Christensen 2004; Sheil *et al.* 2003).

*Local collaboration and participation*

The participation[31] of local communities "can be used as a basis for the modification of the design of a project, programme or policy in order to make it more acceptable and more effective in achieving the objectives and priorities of communities" (Sumner & Tribe 2008: 143). Indeed, local participation has been supported in natural resource management with the aim of increasing efficiency, benefitting the environment, and contributing to equity and rural development as it can be used to include objectives and priorities of communities. As a result, conservation and development actors involved local populations in their projects (Adams *et al.* 2014; Brosius *et al.* 1998; Gray 2002; Ribot 1999 & 2003; Roe *et al.* 2006).

Another collaborative solution is that of co-management,[32] which essentially implies the sharing of management and power between various parties. This is often done through a more or less formal contract that details the rights and responsibilities of each party. A more informal form of co-management is achieved by involving various partners in the design and implementation of initiatives through, for instance, stakeholder workshops. This latter arrangement is similar to the participation principle. Indeed, it is difficult to identify a sharp demarcation between profound types of participation and actual power-sharing in management as with co-management (Borrini-Feyerabend *et al.* 2007). "Most authors do not regard mere consultation or ad hoc public participation as co-management. Most definitions of co-management require some institutionalized arrangement for intensive user participation in decision-making" (Berkes 2009: 1693).

*Linking (migrant bird) conservation and development goals in the Sahel*

Hutchinson *et al.* (2005: 536) suggest that "there are other positive developments that come from long-term environmental and agricultural studies in the region that can provide a new narrative to guide efforts to stabilize and improve agriculture and natural resource management in the region." For instance, in parts of southern Mali, improved soil and water management practices have improved agricultural and environmental conditions, and some communities have protected their forest resources through community management actions (Tappan & McGahuey 2007). Similarly, farmer interventions in tree dynamics and environmental rehabilitation (especially water harvesting techniques and natural tree regeneration) in the Sahel zone of Niger led to the recovery of vegetation and an

[31] "Involvement in shaping, implementing and evaluating programmes and sharing the benefits" (Rifkin & Kangere 2002: 41).

[32] "A partnership by which two or more relevant social actors collectively negotiate, agree upon, guarantee and implement a fair share of management functions, benefits and responsibilities for a particular territory, area or set of natural resources" (Borrini-Feyerabend *et al.* 2007: 69).

increase in plant and tree diversity (Larwanou & Saadou 2011). Reij (2010: 1) indicates that "farmers in densely populated parts of Niger have protected and managed spontaneous on-farm natural regeneration of trees and shrubs since the middle of the 1980s at a large scale (5 million ha)." Indeed, land-use practices based on indigenous management, as well as on forestry rules, are adapted to the protection of the vegetation (Mortimore & Adams 2001). Farmers and herders often carefully manage soil fertility, tree cover, and biomass (Atkinson *et al.* 2014).

Also, Bonkoungou (2001) indicates that dryland systems have adapted to grazing, and that most drylands are, in fact, grazing-dependent systems (*Ibid.*). Formerly, large numbers of antelopes and other grazers roamed the Sahelian grasslands. Showing seasonal movement, present-day livestock facilitate and maintain grasslands by grazing, as did the wild herbivores before their regional extinction (Zwarts *et al.* 2009). Evidence has even shown that dryland vegetation can degrade if grazing is reduced or halted (Bonkoungou 2001). Further, Brouwer (2008) indicates that fish production, and water bird densities are higher where nutrient loading through watering livestock is greater (see also Photos 2.10-2.12).

There are examples of land use in the Sahel that are important for both migrant birds and local inhabitants. This is illustrated by, for example, Jones *et al.* (1996) who argue that the retention of high density of trees within farmlands is important in determining the value of farmland as a habitat for some migrant bird species. Local inhabitants also value these trees as a source of browse for their livestock and for nitrifying the soil (Jones *et al.* 1996). Further, some tree species produce fruits and trees lower temperatures and reduce wind speed. Thus, on-farm regeneration of shrubs and trees has multiple benefits for the inhabitants (Reij 2010). Indeed, for centuries, farmers have maintained a selection of trees on their fields as they provide wood, medicines, and basic food commodities, as well as fulfilling important ecological functions in soil and water conservation and environmental protection (see also Photo 2.13). Moreover, certain species provide economically valuable non-wood products (Boffa 2000). The earlier example in which farmers in Niger have protected and managed on-farm natural regeneration of trees and shrubs on a large scale (Reij 2010; Botoni & Reij 2009), illustrates the perceived importance by the local inhabitants of retention of high density of trees in farmlands.[33] Söderström *et al.* (2003) argue that conservation in the Sahel can be compatible with human land use as long as the land use maintains a landscape with significant heterogeneity at different scales. Thus, "interventions that meet local development needs while sustaining tree and

[33] "Forestry management should aim at maintaining this productivity [foliage production, and yield of higher value timbers] in organizing selective cutting of live wood, chiefly as building material and fuel" (Hiernaux & Gérard 1999: 157).

woodland cover could be beneficial for migrant land birds" (Atkinson *et al.* 2014: 12).[34]

*Photos 2.10-2.12* A-P migrant waders in Ouagadougou's drying water reservoirs

At the end of the dry season A-P migrant waders gather in large numbers to feed in Ouagadougou's (Burkina Faso's capital city) drying water reservoirs. Water bird densities can be higher where nutrient loading through watering livestock is greater. These reservoirs appear nutrient rich with their dense water vegetation (including abundant algae) (upper photo), probably as a result of the large numbers of livestock feeding along the lakeshores and coming to drink at the lake. In the photos above: Common greenshank *Tringa nebularia,* Ruff *Philomachus pugnax,* and Long-tailed Cormorant *Microcarbo africanus* (lower left), Common Snipe *Gallinago gallinago*, and Wood sandpiper *Tringa glareola* (lower right).

[34] "Other forms of development (for example large-scale commercial farming, commercial woodland monocultures of fast-growing exotic species such as Eucalyptus or Prosopis) could have negative impacts on both birds and local people" (Atkinson *et al.* 2014: 12).

*Photo 2.13* A woman drinking the juice from Neem tree Azadirachta indica leaves as a remedy for her stomach complaints (Higa, Burkina Faso)

Farmers have maintained a selection of trees on their fields as they provide, among others, medicines.

*Applying (migrant bird) conservation and sustainable development goals in the Sahel*

According to Borrini-Feyerabend *et al.* (2007), there are two main challenges in managing natural resources, namely, responding appropriately to the ecological and social characteristics of the local environment. These challenges are pronounced in integrated (migrant bird) conservation and sustainable development projects, "as there is the complexity of issues at stake and the multiplicity of actors involved in pursuing joint conservation and development goals" (Borrini-Feyerabend *et al.* 2007: 99). International collaboration along the whole migratory route is a key component in any conservation strategy for A-P migrant species, as "the effectiveness of conservation of migratory birds in one part of their range may be reduced if they are being killed, and their habitats destroyed, elsewhere" (Kirby *et al.* 2008: 67). According to Kirby *et al.* (2008: 64), "the conservation of migratory birds requires a multitude of approaches, for specific species, for site networks, and for habitats in the wider environment." Conservation strategies in the Sahel should be heterogeneous and flexible, geographically and over time, for at least five reasons (most of which are interrelated):

i) *Regional ecological differences.* The Sahel has a high variability of rainfall, and some of its areas are much more arid than others (CSELS 2010). Due to different levels of aridity, different habitat types exist in the Sahel, which are occupied in varying densities by each migrant bird species. Further variance to the suitability of the area for migrant birds is added by the extent to which the habitat has been modified by human exploitation (Jones *et al.* 1996), and thereby amplifying the regional ecological differences. Furthermore, Sahelian societies act and react in a different way in particular natural environments and land-use conditions are spatially distributed (Raynaut 2001).

ii) *Regional differences in land use and resource exploitation.* There are, for instance, "significant differences between Sahelian social systems and cultures, and these influence their relations with the 'nature' they exploit and transform" (Raynaut 2001: 9). Thus, the type and intensity of land-use, including the exploitation of natural resources, can vary dramatically from one locality to another (*Ibid.*).

iii) *Regional economic, political and institutional differences.* Habitat transformation at landscape level can only be addressed through changes in economic policy and land-use planning. As explained earlier in this chapter, economic factors influencing land-use decisions vary in space (Adams *et al.* 2014).
Economic policies and land-use planning should be addressed according to local economic and land-use practices as well as to the, for instance, local socio-cultural, political, and institutional context (Kirby *et al.* 2008; Raynaut 2001).

iv) *Differences in local perceptions.* Local perceptions regarding birds, the environment, and conservation differ between areas according to local context and the composition of individual characteristics in the communities. Conservation strategies should adapt accordingly to be efficient and relevant for the local inhabitants in order to generate local conservation incentives (see Chapter 4).

v) *Changes over time.* Both weather conditions (e.g. periods of droughts) and rural land uses change over time. Global climate change intensifies these regional changes (Dietz & Veldhuizen 2004) and adds up to the already constantly changing dynamics of the relations that Sahelian societies maintain with their environment (Raynaut 2001). Also, as explained earlier in this chapter, economic factors influencing land use decisions vary over time (Adams *et al.* 2014). For instance, in response to growing populations and growing demand in overseas markets rapid far-reaching changes in land use can occur in drylands (Mortimore 2009).

### *The need to act now*

The above-described processes and statements illustrate the importance of both bird- and habitat conservation in the Sahel for humans, animals, and nature in general. However, the Sahel is one of the most unrecognized areas in conservation in Africa (Brito *et al.* 2014; VBN *in. litt.* 2009). Illustratively, while 6.8% of Africa has the status of protected area, the Sahel zone is almost entirely unprotected (Zwarts *et al.* 2009), and protected area coverage is thus well below the 10% target of the Convention on Biological Diversity (Brito *et al.* 2014). Political insecurity and escalating conflicts are hampering biodiversity research, and optimized conservation solutions are therefore lacking, while the lack of financial resources limits conservation action (Brito *et al.* 2014; Box 2.4).

However, people, both locally and globally, are beginning to see the seriousness of the environmental issues in the Sahel and, consequently, feel the urge to act. Recent community-based natural resource management policies across Afri-

ca, including the Sahel (including e.g. BirdLife's Sahelian projects, and also projects from the IUCN and Wetlands International) have shown that the conservation of biodiversity and migrant birds can be successfully implemented and executed while the livelihoods of local inhabitants can at the same time be improved. What has to be done now is the scaling-up of the successful projects in the Sahel through changes in economic policy and land-use planning (Brito *et al.* 2014; VBN 2010b; Kirby *et al.* 2008; Schomaker *et al.* 2007).

*Box 2.4* Financial resources

Conserving biodiversity requires major financial resources, but all Sahelian countries have a low Gross National Income (GNI) per capita. Countries with a low GNI per capita have few funds available for conservation, although large investments in sustainable resource management are vital to the economic and environmental security of these countries (Cohen *et al.* 2011; Baillie *et al.* 2004). The lack of funds limits conservation action, and Brito *et al.* (2014; 225) provide three reasons for the inefficiency in attracting (international) conservation fund (including for the Sahara region):

i) "funding priority given to global biodiversity hotspots"
ii) "generalised lack of knowledge on biodiversity distribution deriving from the remoteness of the region, regional widespread conflicts, or persistent regional insecurity"
iii) "Chronic poverty with some countries ranking low on the human development"

"The decline of migrant landbirds in the Sahel may not seem important in relation to the Millennium Development Goals. Therefore, it is an important conservation priority to identify development strategies that sustain and not damage the habitats of greatest importance to migrant birds. Developing a funding strategy, possibly involving some of the larger international policy instruments, to address this is an urgent and major challenge" (Atkinson *et al.* 2014: 12). Other countries, particularly those in Europe, but also other major international funding institutions (such as the World Bank or the Global Environmental fund), have significant financial resources, which further justifies their (potential) contribution to conservation in the Sahel (Brito *et al.* 2014; Cohen *et al.* 2011; Baillie *et al.* 2004).

## Concluding remarks

A disproportionate number of A-P migrants is in decline, and there is good reason to believe that these declines are partly caused by factors that operate in the Sahel. There is direct evidence for at least two human-induced factors, namely loss of wetland habitats and loss of trees in wooded savanna (and according to some conservationists also hunting, the impact of which is estimated to be limited). The Sahelian factors for declines are related to species (including their populations) and their exact winter ground, habitat requirements and the land-cover changes in these particular winter grounds. However, data is limited and more research on these ecological aspects is needed and should include a clear description of the species, population, timeframe, and geographical area.

Birds are an excellent indicator of environmental health and conservation issues. Many of these issues are of global value and/or concern, and many are also linked with local livelihoods, including those in the Sahel. Birds can therefore provide an ecological base in Sahelian conservation interventions that are of local and global concern to people. In line with contemporary conservation and development ideas, the A-P migrant bird conservation should, and can go, hand in hand with livelihood improvement goals in the Sahel. Retaining and/or increasing the number of (specific species of) trees (in fields) appears the most evident way to achieve both goals.

Local participation in natural resource management and conservation is a key element in the conservation strategy for A-P migrant birds, not least because livelihood improvement and conservation goals should be integrated. Furthermore, A-P migrant land bird conservation should target the wider environment, because A-P migrant land birds occur in the wider Sahelian landscape, including pasture and farm land, which is managed by local inhabitants for their subsistence livelihoods. (Bird) conservation in the Sahel is increasingly receiving attention, but the projects need to be scaled up, as it requires a landscape approach in which sustainable land use is a key strategy. These conservation strategies in the Sahel should be heterogeneous and flexible – geographically and over time.

# 3

# Land use, migrant birds, and conservation in a changing Burkina Faso and the research areas

This chapter provides a summary of the current knowledge and information on the human population, land use, vegetation cover trends, A-P migrant birds, and conservation in Burkina Faso's Sahel region, including the two rural research areas: Sourou and Higa. Its objective is to describe the research areas and place these areas in their (national and regional) context, particularly where relevant to the research themes.

## Burkina Faso

Burkina Faso is one of the world's poorest countries. Per capita incomes are among the lowest, and the majority (80%) of its population depends on subsistence farming.[1] The main crops are millet and sorghum, with small quantities of maize and rice. Rain-fed agriculture and livestock-raising accounts for almost two-fifths of the national Gross Domestic Product. Cotton is the main cash crop, and – after gold – the country's largest export product. Burkina Faso has few natural resources and a weak industrial base, and despite significant economic growth in some recent years, its economy remains small. Besides the limited natural resources, the country's dry and unpredictable Sudan-Sahelian climate and its landlocked position have severely limited its development opportunities (CIA 2016; Rupley *et al.* 2013; Breusers & Grumiau 2002). It is sometimes suggested that "Burkina Faso's richest resource is its people – who are regarded for their diligence, resourcefulness, and adaptability" (Rupley *et al.* 2013: 65). However, a high illiteracy rate (above 60% in 2015) – which is particularly high among women – is limiting the population's capacity (CIA 2016).

[1] The land is cultivated using mostly traditional farming methods (Rupley *et al.* 2013).

*A recent change in the government*

Burkina Faso[2] has known several military regimes since it gained its independence from France in 1960. In 1987, Blaise Compaoré – a minister delegate at the time – seized power through a coup in which the former rulers were killed. He became president of the 'Front Populaire' regime in 1989 (Rupley *et al.* 2013). His 27-year rule finally came to an end in 2014, when he was ousted from power following months of civil society demonstrations and (especially youth) protests against the government, and particularly against Compaoré's attempts to change the constitution so that he would be able to rule for another presidential term. An interim government was installed, but Gilbert Diendéré seized power through a military coup in September 2015. After yet more popular protests, and pressure from national and international armed forces and governments, the interim government was reinstalled, and national elections were held in November 2015. The presidential election was won by Roch Marc Christian Kaboré of the 'People's Movement for Progress', who now acts as chief of state (CIA 2016; Wikipedia 2016; Eizenga 2015).[3]

*Population*

Burkina Faso has a growing population of nearly 19 million (2016),[4] 70% of which still lives in rural areas. However, urbanization is increasing rapidly with an annual urbanization rate of almost 6% in 2010−2015 (CIA 2016). Especially the northern rural Sahel zone remains sparsely populated (Breusers & Grumiau 2002). In terms of religion, the majority of the population are Muslims (62%), followed by Catholics (23%), Protestants (8%), and traditional/animist people (7%) (estimates from 2010; CIA 2016). Although many are affiliated with a monotheistic religion, traditional beliefs still play an important role in daily life (Rupley *et al.* 2013; Hadnes & Schumacher 2012). These traditional religions often do not have "a formal structure or theology, and its practices are extremely flexible. Though often dismissed or misunderstood by Europeans, animist beliefs reflect the spirituality of people who live in harmony with their natural environment and who understand the essential unity of the visible and invisible worlds" (Rupley *et al.* 2013: 183).

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[2] In 1919, the French created the colony Upper-Volta, which became part of French West Africa. After many years of independence, the country changed its name to Burkina Faso (in 1984), meaning 'Land of upright people' (Rupley *et al.* 2013; Breusers & Grumiau 2002).

[3] The president is elected by absolute majority popular vote for a maximum of two five-year terms. The Prime Minister (Paul Kaba Thieba) is the head of the government, and of a multi-party system. The prime minister is appointed by the president with consent of the National Assembly (127 seats; members are directly elected by proportional representation vote for five-year terms). Executive power is exercised by both the government and the president, while legislative power is vested in both the government and parliament CIA 2016; Wikipedia 2016; Eizenga 2015).

[4] The population growth rate was about 3% in 2015 (CIA 2016).

The predominantly rural population of Burkina Faso is diverse and includes about 60 different ethnic groups (CIA 2016; Breusers & Grumiau 2002; Speirs 1991), although about half of the country's population is Mossi, and slightly more than 10% belongs to Mande groups,[5] followed by the Peul and Gourmantchée[6] (both about 7%; Rupley *et al.* 2013). The Mossi are an ethnic and cultural group of farmers who live mainly in Burkina Faso, Ivory Coast, and northern Ghana. About half of the Mossi are Muslim and about 10% Christian, but many still have traditional religious beliefs and practices, making traditional Mossi religion an important factor in the daily lives of many in Burkina Faso today. The Mossi recognize and propitiate ancestral spirits and natural forces (which emanate from Wende, the Surpreme Being), and acknowledge that these forces impact every aspect of their lives (Rupley *et al.* 2013; Asante & Mazama 2009a).[7]

Although the Mossi are Burkina Faso's largest ethnic group, the Peul are particularly prominent in Burkina Faso's Sahelian north (Breusers & Grumiau 2002). The Peul (also known as Fulani or Fulbe) are a large − predominantly Sahelian − ethnic group who lead a nomadic pastoral way of life.[8] However, many have also adopted an agrarian lifestyle nowadays (see also Photos 3.1 and 3.2). They now commonly engage in both cattle-raising and agriculture and, consequently, have been able to settle (Asante & Mazama 2009b). The Peul have replaced many traditional (pastoral) practices and rituals with Islamic ones, including those living in northern Burkina Faso (Lindskog & Tengberg 1994); but at the same time, they have 'Africanized' many of their Islamic practices (Asante & Mazama 2009b).

The country's great ethnic diversity is largely the result of a long history of migration, originally from Ghana, but later also from Mali (Dioula and Marka) and other northerly regions. Nowadays, Burkina Faso's population remains very mobile, both nationally and internationally. Many families rely on earnings

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[5] A large group of people mainly from the northern bend of the Niger river and the Senegal river basin, who speak languages of the Mande subfamily of the Niger-Congo linguistic family and share numerous traditions and cultural features. The Mande groups have domesticated many of the most important crops of sub-Saharan Africa, including millet and sorghum, and most groups remain skilled agriculturists (although recently many have developed gold mines). The Mande groups traditionally have either hierarchical social structures, or decentralized and relatively egalitarian societies (Rupley *et al.* 2013; Asante & Mazama 2009b; Speirs 1991).

[6] The Gourmantchée, also known as Gurma, primarily inhabit north-eastern Ghana, northern Togo, and southern Burkina Faso (Asante & Mazama 2009b).

[7] "The spirits of the ancestors and powers of nature all originate in Wennam, which is a manifestation of the life force of Wende. Wende is aloof from humanity, but through these specific manifestations, Wende impacts the lives of the Mossi, and, in turn, the Mossi direct their efforts toward these manifestations. The first major manifestation is called Tenga Wende or the Earth deity and is responsible for general climatic conditions and fertility of the soil. Another is Tido Wende, the plant deity, the source of plant growth" (Asante & Mazama 2009a: 427−429).

[8] "Most of their societies are based on a patrilineal endogamous kinship patterns where each of the families is responsible for the administration of its share of the cattle inheritance." (Asante & Mazama 2009b: 528).

from migrating family members. There is a significant migration to Ivory Coast in search of work for short or longer periods (Zongo 2010; Breusers & Grumiau 2002). In the Sahel region, such as in northern Burkina Faso, the diversity of the (changing) relations between society and environment is strongly related to social and cultural diversity. Ethnic diversity is usually a good indicator of social and cultural diversity. However, there are sometimes close similarities between different ethnic groups. The recent erosion of many social and cultural characteristics should also be noted. On the other hand significant social and cultural diversity exists within some ethnic groups. Indeed, none of the Sahelian societies is reducible to one social or cultural model (Raynaut 2001).

In sum, many social and ethnic groups meet in everyday life in Burkina Faso. The competition or complementarity between these groups for natural resources and the use of land (negotiation of land rights) is not new. However, following increased anthropogenic pressures on the land and associated soil and vegetation resources, it has become a central issue in terms of relations between different ethnic groups. Nonetheless, land disputes arise especially between farmers and pastoralists, and between first arrivals and new arrivals (Kuba *et al.* 2003).

*Photos 3.1 & 3.2* A seasonal village in the rainy and in the dry season in Higa, Burkina Faso

These temporary huts belonged to a Peul family who move to different areas each season. They have adopted an agrarian lifestyle during the rainy season, but during the dry season they move around in search of water and fodder for their livestock.

*Land use*

In 2015, Burkina Faso had a population of almost 19 million (Populations du Monde 2015), and an annual growth rate of 3.1% in 2010 (SP/CONEDD 2010). In that same year, around 77% of its population lived in rural areas and the

country had an urbanization rate of 5.87% annually in 2010-2015 (*Ibid.*). Burkina Faso's population density was 63.53 inhabitants per km² in 2015 (FAO 2015) and most of the countryside is relatively densely inhabited (GRUMP 2010; Söderström *et al.* 2003). The Sahel region is among the country's least populated regions (SP/CONEDD 2010). Nearly all the countryside is either bush fallow, or cultivated parkland, i.e. farm fields that usually retain large indigenous trees at a density of 2-20 per hectare giving them a parkland appearance. The fields are dotted with family groups of huts or villages (Söderström *et al.* 2003). At present, natural woodlands are almost exclusively within protected areas and some pastoral areas (Söderström *et al.* 2003; Lungren *et al.* 2001).

The country's northern region is part of the arid Sahel, with an average annual rainfall of less than 700 mm, and where the erratic rainy season lasts for only approximately three months (June-September; see also Photos 3.3 and 3.4). It is traditionally a livestock zone, but agriculture has become a widespread practice, with millet as main crop, followed by sorghum. Central and south Burkina Faso are less arid, with rainfall up to 1000 mm in the south, and a rainy season that usually lasts between three and six months. Agriculture is more extensive here than in the country's Sahel region, while animal numbers are lower (Traoré *et al.* 2012; Atlas de l'Afrique 2005; Breusers & Grumiau 2002; SP/CONAGESE 1999).

*Photos 3.3 & 3.4* Vegetation greenness in the dry and rainy season in Higa, Burkina Faso

The two photos are taken at the same location in January (above) and August (below) and clearly show the enormous difference in the amount of vegetation greenness between the two seasons. The largest hill on the horizon (in the middle of the upper photo, and on the right side of the lower photo) and the two smaller hilltops immediate to the right of this largest hill, provide good mark points for comparison.

Agriculture is Burkina Faso's main economic activity and supports 85% of the country's labour force. However, it is mostly subsistence farming and contributes 'only' 35% to the GDP as it is poorly oriented to the market economy. Grains are the main crops, including millet, sorghum, and rice. Livestock husbandry is practiced by 80% of the Burkinabe households and contributes about 12% to the GDP (SP/CONEDD 2010). Species include, ranked in order of population size (starting with the largest population): poultry; sheep and goats; cattle; and pigs (FAO 2005). Livestock populations are growing at an average annual rate of 2.7%, while sheep and goats are growing at a larger rate than the other species. In recent years, conflicts between pastoralists and farmers have arisen, mainly related to access to, or control over, land or water (SP/CONEDD 2010).

The country's agriculture and livestock husbandry put the environment under increased pressure (Photos 3.5 and 3.6). Environmental pressures are basically of two types: climate-induced and anthropogenic. The climate-induced pressures, such as drought, aggravate the anthropogenic pressures. Besides agriculture and herding, important anthropogenic pressures include forestry, bush fires, industrial activity, and energy production and consumption. These pressures are amplified by the rapid population growth and the strong dependence on natural resources. Energy production is mainly obtained from fuelwood and charcoal,[9] but increasingly also hydro-electric dams. Pressures from agriculture include the (over)use of pesticides and chemical fertilizers, (excessive) irrigation, land clearing for extensive agriculture,[10] clearance of new fields for shifting cultivation, and other destructive farming techniques, whereas pressures from livestock husbandry include overgrazing and the cutting of trees and branches for fodder (SP/CONEDD 2010; SP/CONAGESE 2002).

These anthropogenic pressures lead directly or indirectly to deforestation, land and soil degradation, air and water pollution, and loss of biodiversity. About 34% of Burkina Faso's arable land is estimated to be degraded severely. Particularly in the northern (Sahelian) half of the country, a degradation of the environment and natural resources is noted. Land and soil erosion caused by rainwater run-off is arguably the most common type of degradation, despite Burkina Faso's arid climate, but the thin soil and the precarious vegetation cover combined with torrential rains make the area vulnerable to erosion. This type of degradation is also especially heavy in the country's arid Sahel region

[9] Fuel consumption from Biomass includes firewood, charcoal, and crop residues. In Burkina Faso, biomass in general and especially the wood remains the primary source of domestic energy for urban and rural populations. Indeed, over 87% of households in Burkina Faso still use wood as the main energy source for cooking (SP/CONEDD 2010).

[10] Extensive agriculture continues to predominate in the farming practices of the majority of farmers, despite efforts to extend agricultural intensification techniques, including the production of organic manure, the use of improved seeds, and modern farming tools (SP/CONEDD 2010).

(SP/CONEDD 2010). The clearance of new fields for shifting cultivation, uncontrolled cutting of firewood, overgrazing and concentration of domestic stock along drainage lines, and inappropriate burning are the main causes of deforestation (Lungren *et al.* 2001). According to SP/CONEDD (2010), the practice of bush fires has negative effects on the development of woody and herbaceous vegetation and is therefore a significant driver of deforestation, affecting almost 20% of the total land surface. Besides deforestation (and the associated loss of biodiversity) and water erosion, the disappearance of natural vegetation leads to increased evaporation, temperature, and wind speed (SP/CONEDD 2010).

*Photos 3.5 & 3.6* Agriculture and livestock husbandry put Burkina Faso's environment under increased pressure

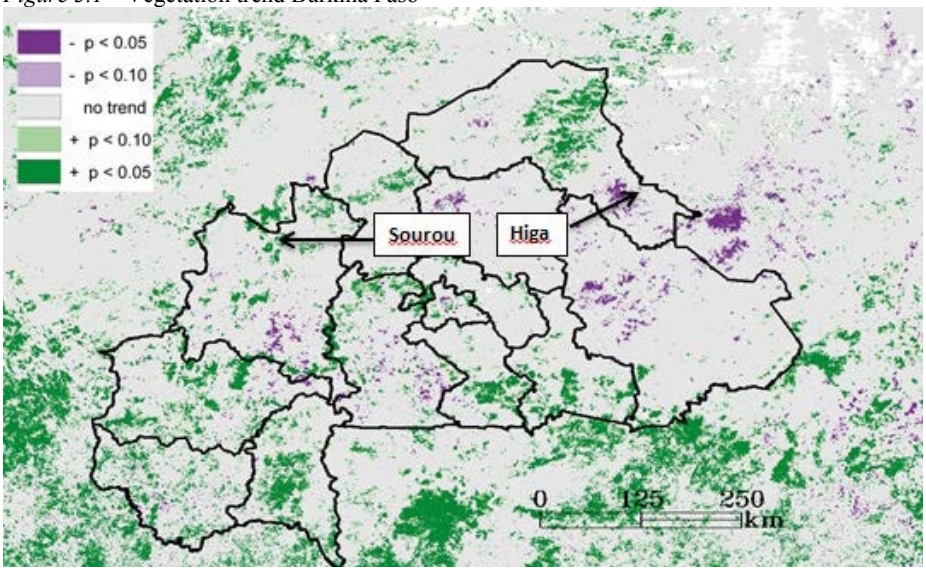
Large-scale irrigated agriculture in the floodplains of Sourou (above), and cattle in the drylands of Higa (below).

*Vegetation cover trends*

Although a recent re-greening of the Sahel is described in literature (Chapter 2), regional differences are expected due to local differences in weather patterns and anthropogenic effects (caused by regional differences in human population growth, economic factors, other drivers, and subsequent land-use decisions and pressure) (Adams *et al.* 2014; Atkinson *et al.* 2014). Remote sensing has been valuable for assessing environmental changes in the Sahel, and the Normalized Difference Vegetation Index (NDVI) is a commonly used indicator for analysing remote sensing measurements. The Global Inventory Modelling and Mapping Studies (GIMMS) dataset has been used to monitor NDVI time series since 1981. However, NDVI cannot conclude on the precise nature of vegetation changes, but only determines the density of green on a patch of land (Earth Observatory 2016; Brandt *et al.* 2014; Prince *et al.* 2007; Herrmann *et al.* 2005; Olsson *et al.* 2005; Lindskog & Tengberg 1994). Detailed assessments of land-cover change across the whole of the Sahel are not available, but large regional variation in woodland-cover change has been noticed (Atkinson *et al.* 2014).

Regional differences in vegetation productivity trends are clearly visible in Burkina Faso, as shown in Figure 3.1 that displays trends in seasonal cumulative Normalized Difference Vegetation Index (NDVI) during 1998-2013. The data are derived from 10-daily Satellite Pour l'Observation de la Terre (SPOT) VEGETATION time series obtained from the Flemish Institute for Technological Research (VITO); for each pixel and year a start- and end-of-season date is determined from the time series and the NDVI is cumulated between these dates. For a more precise description, see Vrieling *et al.* (2011, 2013) who applied similar methods to another NDVI dataset. The 'greening' (shown as green on the map) and the 'de-greening' (shown as purple on the map) of the landscape are clustered. For example, the eastern part of the country shows extensive vegetation degradation, while the south-western part has witnessed an increase of vegetation cover over vast areas. In relation to this, it is interesting to note that the south-west part of the country is a predominately (irrigated) agriculture area, while the north-east is a predominately livestock-rearing (mixed with agriculture) region (SP/CONEDD 2010). Nonetheless, there is also a large area in the north-east that shows an increase of vegetation cover.

*Figure 3.1* Vegetation trend Burkina Faso




*Source*: Dr. Anton Vrieling, University of Twente
Explanation: Cumulative NDVI trends (1998-2013) through Spearman rank correlation. The p-value indicates whether the slope is significantly different from 0 (at the 0.05 and 0.10 level). Purple indicates negative trends and green positive trends. White are places without data.

### *Bird populations and conservation*

Well over 500 birds species have been recorded in Burkina Faso. However, knowledge of the country's avifauna remains limited and much information still needs to be collected or verified (BirdLife 2015c; Portier *et al.* 2002; Lungren *et al.* 2001). As an example, during my, in total, seven months of fieldwork (2011-2013), when only limited time was spent birdwatching, I discovered and described two new bird species for the country, and obtained the first fully documented records of three other species (Van den Bergh 2013, 2012; see also Photo 3.7). Also, observations relating to the status in Burkina Faso of four (including one near-threatened) A-P migrant species were published (Van den Bergh 2013).

Among the 500 recorded bird species are more than 180 migrant species, including over 80 A-P migrants. These include both water and land birds, and one globally threatened species, namely the European Turtle-dove *Streptopelia turtur*, which has been classified as 'vulnerable' on the IUCN (International Union for Conservation of Nature) Red List of Threatened Species (BirdLife 2015c; Lungren *et al.* 2001). Burkina Faso has a number of wetlands that are of significant importance for water birds, both resident and migrant species. Especially

the northern Sahel region has some (seasonal) lakes that receive many A-P migrant species and congregations of at least 20,000 water birds. One of these areas is Sourou, and Sourou is one the country's ten Important Bird Areas (IBAs) (Portier *et al.* 2002; Lungren *et al.* 2001).

*Photo 3.7* First record of Blackstart *Cercomela melanura* for Burkina Faso

The Blackstart shown in this photo concerns the first record of this species for Higa and Burkina Faso. Knowledge of the country's avifauna remains limited and many similar new discoveries are to be expected in the future (provided that the country is further explored by ornithologists).

Burkina Faso has hunting, forestry, and environmental codes and legislation, national and international programmes for natural resource management and conservation, national and international conservation organizations based in the country, protected areas, and it has ratified many international conventions and agreements (Ministère de l'Environnement et du Developpement Durable 2015; Burkina Faso 2013; Portier *et al.* 2002; Lungren *et al.* 2001). About 14% of the total area of the country has received the status of 'protected' by a national legislative framework. This framework recognizes eight categories of protected areas, including 60 'Zones villagoise de chasse', which are local community

lands assigned by villagers for the exploitation of wildlife resources. The country's three 'Parcs Nationals' are set aside for the conservation of flora, fauna, water-bodies, soils, landscapes, or geological formations. However, conservation areas do not receive any significant investment and remain without any effective management (Portier *et al.* 2002; Lungren *et al.* 2001). Similarly, according to Boffa (2000: 16), "forest codes are often poorly understood by rural people and forest agents alike. Faced with a lack of human and financial resources, most forest services are unable to enforce regulations properly and individual agents often interpret obscure permit requirements to their own benefit in order to supplement their meagre salaries." However, Portier *et al.* (2002) and Lungren *et al.* (2001) indicate that progress in the right direction was being made. Lungren *et al.* (2001) indicated that appropriate legislation was being developed for the effective application of the forestry and environmental codes (see e.g. SP/CONEDD 2007). The conservation of birds has also received more attention (see e.g NATURAMA 2015 and Ministère de l'Environnement et du Developpement Durable 2015; SP/CONEDD 2007).

In 1991, the 'Plan d'Action National pour l'Environnement' was designed and comprised an analysis of the state of natural resources and activities proposed, which was updated in 2002 in the form of the 'Plan d'Environnement pour le Développement Durable' (Gray 2002; Marcussen & Speirs 1998). Besides referring to the presence of large numbers of migratory birds in the north of the country, the former action plan did not include specific bird conservation issues. The latter as well as other more recent national conservation and sustainable development policies, refer to bird conservation programmes, including the Ramsar Convention on Wetlands of International Importance, the Important Bird Areas Programme, and the regular monitoring locally of migrant bird species (Ministère de l'Environnement et du Developpement Durable 2015; SP/CONEDD 2007; Ministère de l'Environnement et du Tourisme 1994). In the country's more recent 'Troisieme Rapport sur l'Etat de l'Environnement au Burkina Faso (REEB III)', birds receive a more prominent place, including a textbox that describes the status of birds in Burkina Faso. The report also makes mention of increased involvement of NGOs in conservation, including *NATURAMA* and its bird conservation activities (SP/CONEDD 2010). Besides, being a signatory to the Ramsar convention, the country has signed many other agreements and conventions regarding nature conservation, including some that target migrant birds species, such as the African-Eurasian Waterbird Agreement (AEWA), Convention on the Conservation of Migratory Species of Wild Animals – Bonn 1979 (CMS), and the Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (BirdLife 2015c; Portier *et al.* 2002). The existing hunting legislation prescribes that a permit is

required for hunting animals, including birds, of which some species are strictly protected (Burkina Faso 2013, 2011, 1989). Burkina Faso has a national Birdlife partner (*NATURAMA*), which is active in A-P migrant bird conservation, including through its participation in BirdLife's *Living on the Edge* project and through information exchange on legislation relating to the conservation of migratory birds (NATURAMA 2015).

## The research areas

Sourou and Higa are located in the Sudanese-Sahelian climatic zone and Sahelian climatic zone, respectively (see Figure 1.4). Sourou (ca. 22,000 ha) is in both Lanfiera Department (12 communities) and Di Department (13 communities) in the Sourou Province near Burkina Faso's north-western border with Mali. Higa (ca. 1,500 ha) is in Tankougounadié Department (13 communities) in the Yagha Province near Burkina Faso's north-eastern border with Niger (Ramsar 2013; Fishpool & Evans 2001). Both Sourou and Higa contain an IBA and both of these IBAs are included in the Ramsar list of wetlands of international importance (see also Chapter 1).

The two areas differ in many ways, not least that they represent two different Sahelian as well as two different conservation settings (see also Van den Bergh 2014). Some of the key differences include: remote versus less remote; developed versus less developed;[11] numerous sustainable development interventions versus few such interventions; wet Sahelian landscape versus dryer Sahelian landscape;[12] and so on (see also Table 3.1 and Photos 3.8 and 3.9). Importantly, bird conservation activities were regular in Sourou and a local LCG was active here since 2003 (formally 2007), while no bird conservation activities did (yet)[13] exist in Higa and a local LCG was only established in 2009 (formally 2010).

[11] Compared to Lanfiera and Di, Tankougounadié is less developed: there is no electricity network (only the department's Mayor has a few solar panels), there is no 'modern' agriculture (i.e. no irrigation systems or agricultural machines), and the area's only access road is often not drivable during the rainy season.

[12] Tankougounadié has less surface water ('just' one lake, i.e. Lac Higa) and receives less rainfall on average (see also Figure 1.4).

[13] The LCG Higa conducted its first bird conservation activity in 2012, namely, a bird-monitoring training for a few of its members.

*Photos 3.8 & 3.9* A typical sight of the surface water-rich Sourou and the Sahelian landscape of Higa

Large areas of Sourou are permanently flooded due to the construction of a dam, so transport often goes by boat (upper photo). Higa has a primarily dry Sahelian landscape where one large lake – i.e. lake Higa - is located (visible on the horizon; lower photo).

*Population*

There are also marked differences between the human populations of both areas (Table 3.2). Sourou has a much larger population (ca. 42,000 in 2012) than Higa (ca. 16,000 in 2012), including a small number of Christians and only small numbers of semi-nomadic people that visit or live in Sourou. In contrast, virtually all of Higa's inhabitants are Muslim, while many nomadic and semi-nomadic herders inhabit or visit the area (including herders from Niger). Sourou's population is generally higher educated and engage in a wider diversity of livelihood activities, while Higa has a predominantly (semi-nomadic) farmer-pastoralist population.

Traditionally, the principal ethnic groups of the Sourou and Yagha provinces are the Samo[14] and Peul, respectively (Rupley *et al.* 2013),[15] but nowadays there is much diversity. Due to its irrigated lands and permanent watercourse, Sourou has attracted a great number of people from other regions, including Dogon from neighbouring Mali[16] and many Mossi from the neighbouring Yatenga province (following government initiatives that promoted irrigated agriculture and the settlement of the area) (Rosillin *et al.* 2015; Somda *et al.* 2010). Higa has also attracted populations from elsewhere, although probably to a lesser extent than Sourou (but statistics are lacking), including many Mossi. Today, the Mossi are perhaps the most numerous ethnic group of Sourou and Higa, while other major ethnic groups are the Samo and Dafing[17] in the former, and the Peul, Gourmantché, and Djerma[18] in the latter (Sarogo Adama, mayor Lanfierra Department *pers. comm.* 2013; Tindano Hamado, mayor Tankougounadié Department *pers. comm.* 2013; Bethemont *et al.* 2003; see also Photos 3.10 and 3.11).

[14] The Samo, also known as the Sanan, is one of the Mande groups who, around the fifteenth century, moved from (most likely) Mali along the Sourou river into northern-western Burkina Faso (Rupley *et al.* 2013).

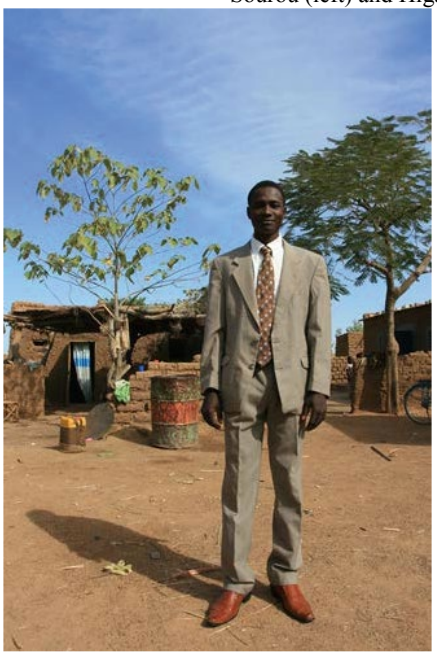
[15] The Pana ethnic group settled in the Sourou area before the Samo did, but they are now virtually absent from the area (Bethemont *et al.* 2003).

[16] An ethnic group of farmers that inhabit mainly the central plateau region of Mali (Asante & Mazama 2009a; Somda *et al.* 2010).

[17] The Dafing, also known as the Marka, are a Mande group who primarily live in Mali and Burkina Faso (Asante & Mazama 2009a).

[18] The Djerma, also known as the Zerma, primarily live in northern Burkina Faso and western Niger and are a subgroup of the Songhai people (once a powerful group with a vast West-African empire before the seventeenth century; Rupley *et al.* 2013; Asante & Mazama 2009a).

*Photos 3.10 & 3.11* There is generally a difference between clothing and housing in Sourou (left) and Higa (right)



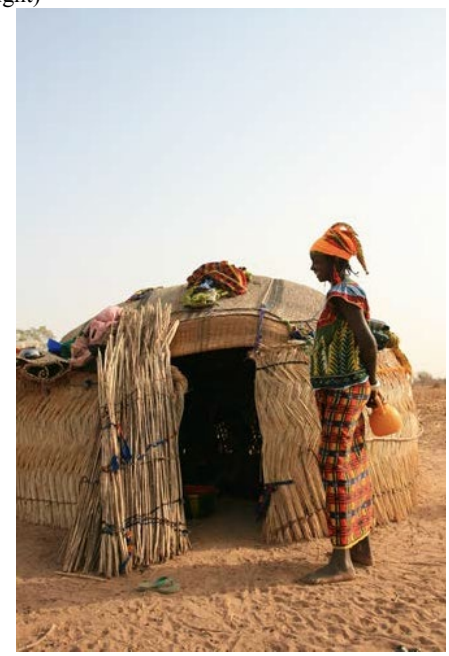


*Table 3.1* General characteristics of Sourou and Higa research areas

| | Population (2012)[1] | Electricity network | Infrastructure | Climatic zone | Surface water |
|---|---|---|---|---|---|
| Sourou | <42,000 | Installed in 2013 | Gravel roads | Sahelian | Permanently flooded river[2] |
| Higa | <16,000 | Missing | One 4WD track | Sudanian-Sahelian | Lake (228 ha) |

*Source*: NATURAMA 2015; Sarogo Adama, mayor Lanfierra Department *pers. comm.* 2013; Tindano Hamado, mayor Tankougounadié Department *pers. comm.* 2013; Atlas de l'Afrique 2005

Note 1 Calculations of population density can be misleading as Sourou includes large areas of uninhabitable, permanently flooded areas. The population density around the Sourou River appears much higher than the population around Lake Higa. In both areas the human populations were said to be increasing, especially in Sourou (Sarogo Adama, mayor Lanfierra Department *pers. comm.* 2013; Tindano Hamado, mayor Tankougounadié Department *pers. comm.* 2013).

Note 2 Since the early 1980s, the Sourou River has been permanently flooded duo to the construction of a dam. This created an artificial 'lake' that varies from several hundred metres to 4 km wide and includes a vast area of shallows covered with perennial grasses (BirdLife 2015d).

*Table 3.2* Population characteristics of Sourou and Higa research areas

| | Religion | | Education level | | Principal livelihood activity | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Muslim | Christian | No Education | ≥ Primary school | Fisher | Farmer | Farmer & pastoralist | Other combination | Other |
| Sourou | 67% | 33% | 30% | 70% | 27% | 33% | 23% | 13% | 3% |
| Higa | 95% | 5% | 55% | 45% | 0%[1] | 30% | 70% | 0% | 0% |

Source: based on the characteristics of 30 and 20 semi-randomly selected interviewees in Sourou and Higa, respectively (percentages are rounded).

Note 1: In Higa, very few people referred to fishing and fishers were rarely seen on the lake. However, a member of the town council reported that 'many' local people did, in fact, fish and that fishing was the main livelihood for some (see also Ouedraogo *et al.* 2015).

*Land use*

Sourou is a flat area dominated by a large permanently flooded river that provides a vast area of shallows covered with perennial grasses (such as *Echinocloa pyramidalis*, *E. stagnina* and *Vossia cuspidate*). These wetlands are surrounded by (mostly irrigated) fields with a great variety of crops, such as rice, sorghum, millet, maize, and several vegetables. Following significant investments from the country's government, intensification techniques are being used for the many cash crops that are grown for the markets.[19] Shea trees (*Vitellaria paradoxa*) are found scattered on the fields, but especially on those fields that are further away from the river. Several large villages are located in the area, including a few villages on small islands that are inhabited by fishers. Some bushland is preserved further away from the river and is used for fuelwood production and as grazing areas (Table 3.3; see also BirdLife 2015c; NATURAMA 2013; Ramsar 2013; Somda *et al.* 2010; Nana 2002).

In contrast, Higa consists of an open and dry Sahelian landscape that is dominated by acacia trees; common species include *Faidherbia albida*, *Vachellia seyal* and *Acacia senegal*. This open savanna landscape is interspersed with some seasonal rivers, barren grounds, inselbergs, (mainly non-irrigated) fields (the main crops include sorghum and millet), and Lake Higa (approximately 300ha, but depending much on rainfall). Small villages are scattered throughout the area, but most are located within a few kilometres from the lake. Small vegetable gardens are often kept near these villages. The area also includes a strict grazing-only zone that holds a relatively high density of trees (see also BirdLife 2015c; NATURAMA 2013; Ramsar 2013; Nana 2002; see also Photos 3.12 and 3.13).

[19] Despite the government's continued efforts to promote (irrigated) agriculture in the area since the 1970s (Somda et al. 2010), the IUCN reports on an economic survey (2009) that showed that agriculture represented only a minor economic value to the local population. Instead, trees for fuelwood and timber, non-timber forest products, pasture resources, fisheries, and water transport, each represented – in descending order of economic value - a greater economic value than agriculture (Ibid.).

*Table 3.3* Livestock in Sourou and Higa

| | Cattle | Goat | Sheep | Donkey | Pig | No livestock |
|---|---|---|---|---|---|---|
| Sourou | 57% | 43% | 50% | 36% | 7% | 21% |
| Higa | 35% | 55% | 55% | 10% | 0% | 10% |

*Source*: percentages are based on the response of 14 and 20 semi-randomly[20] selected inhabitants in Sourou and Higa, respectively, to the question: "which species of livestock do you own?"

*Vegetation cover and rainfall trends*

Vegetation trends in the research areas were analyzed by means of 10-daily composites of the Normalized Difference Vegetation Index (NDVI)[21] derived from the SPOT-VEGETATION time series (1998-2014).[22] Rainfall trends were analyzed by means of 10-daily Climate Hazards Group InfraRed Precipitation with Station (CHIRPS) data for the same period (Funk *et al.* 2015). The NDVI SPOT-VEGETATION and CHIRPS data were provided by Dr. Anton Vrieling (University of Twente), who also assisted with the analysis. Two points were selected in both areas for trend analysis, i.e. a river foreland-agricultural (Sourou) and a lake-agricultural (Higa) area, and two grazing areas (Sourou and Higa). The former two points were selected adjacent to the river and lake in Sourou and Higa, respectively, and the latter two points several kilometres away from these water areas (Table 3.4). The grazing areas were primarily used for livestock grazing, but also for gathering firewood and other livelihood activities. The other two areas were used for a diversity of livelihood activities, including agriculture (primarily in Sourou).

*Table 3.4* Location of four trend analysis points in Sourou and Higa

| Description | Sourou grazing | Sourou riverbed | Higa grazing | Higa lake area |
|---|---|---|---|---|
| latitude | 12.994689 | 13.005143 | 13.574621 | 13.612705 |
| longitude | -3.391514 | -3.430309 | 0.731106 | 0.720978 |

[20] However, there is no basis for knowing whether ratios of such variables in the selection reflect those in the population. See for more details, Chapter 1, section 'Research methods'.

[21] "Values of NDVI can range from -1.0 to +1.0, but values less than zero typically do not have any ecological meaning, so the range of the index is truncated to 0.0 to +1.0. Higher values signify a larger difference between the red and near infrared radiation recorded by the sensor – a condition associated with highly photosynthetically-active vegetation" (The Landscape Toolbox 2016; webpage).

[22] An envisioned comparison of tree density between historic and recent very high resolution satellite or aerial images of the research areas (in order to establish changes and trends) failed due to a lack of high resolution historic images in which trees are clearly visible (Leo Zwarts, independent researcher, *pers. comm.* 2015).

*Photos 3.12 & 3.13* Typical livelihood activities for Sourou (fishing) and for Higa (herding)

The seasonal variability in vegetation cover evidently corresponds with the seasonal variability in rainfall in both research areas (Annex 3.1-3.4). The Sourou research area has a denser vegetation cover, corresponding to the larger rainfall amount in the more southern Sourou as compared to Higa (Figures 3.2 and 3.3). Vegetation cover varies considerably between years, including with regards to differences between consecutive years. Moreover, there are major differences in the density of vegetation cover between the two areas in Higa, with a very low density of vegetation cover in the 'lake area'.

The annual variability in vegetation cover appears to correspond, to a greater or lesser extent, with the annual variability in rainfall.[23] For example, 2003 was a year with high amounts of rainfall and a high density of vegetation cover, while the previous year showed lower rainfall amounts and a lower vegetation index. This indicates that rainfall determines vegetation cover. That vegetation cover within the Sahel fluctuates from year to year in accordance with inter-annual variability in rainfall was already demonstrated decennia ago (Nicholson *et al.* 1998). However, in this case study, in 1999, for example, the rainfall and vegetation index do not show a shared trend, as Sourou shows low amounts of rainfall but a decreased vegetation cover. In, for example, 2000, Higa shows high amounts of rainfall but a relatively stable vegetation cover. This suggests that (also) other factors than the yearly amount of rainfall influence the vegetation cover (and/or that the period of rainfall plays a role).

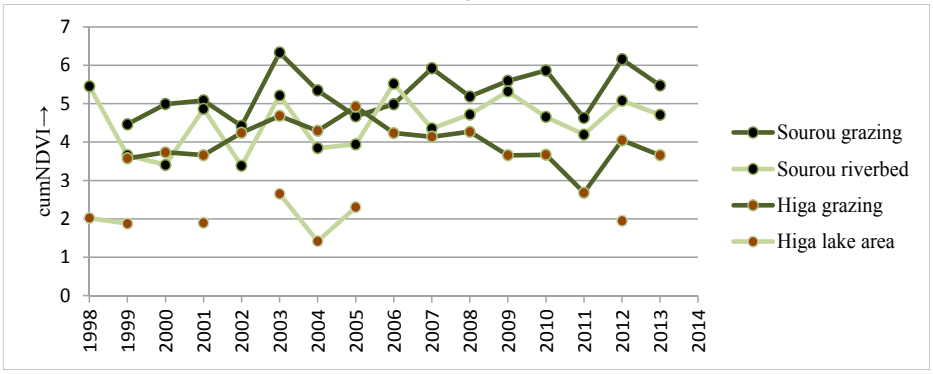
Sourou appears to show an increase in vegetation cover in 1998-2014, or at least some greening after an initial decreasing vegetation cover. Vegetation cover trends in Higa seem more stable, although a decrease in vegetation in the 'grazing area' appears visible in the second half of the period. Basically, the 'grazing area' shows a small rebound in the first period from the 1998 level, but this is followed by a decrease to the level of 1998.

The general trend for the period 1998-2014 is clearly visible with a linear regression, as shown in Figures 3.4 and 3.5. In Higa, both the vegetation and rainfall trend are negative for this period. However, for Sourou, two different trends are visible, namely an increase in vegetation cover and decrease in rainfall. This again suggests that other factors besides rainfall determine the amount of vegetation cover. However, with these linear regressions much depends on the first and last year, and trends within this period are not visible. The polynomial regressions (Figures 3.6 and 3.7) show more diverse vegetation trends. Only the

[23] The rainfall data for both research areas show some considerable differences between the areas. Firstly, the amount of rainfall can reach much higher levels in Sourou than in Higa, but in several years it is below the level of that in Higa. The differences in the amount of rainfall between years is higher in Sourou than in Higa, at least in absolute terms. This gives the appearance that in Higa trends are more visible, or at least there is less variability between consecutive years. The difference within each research between the two locations is small.

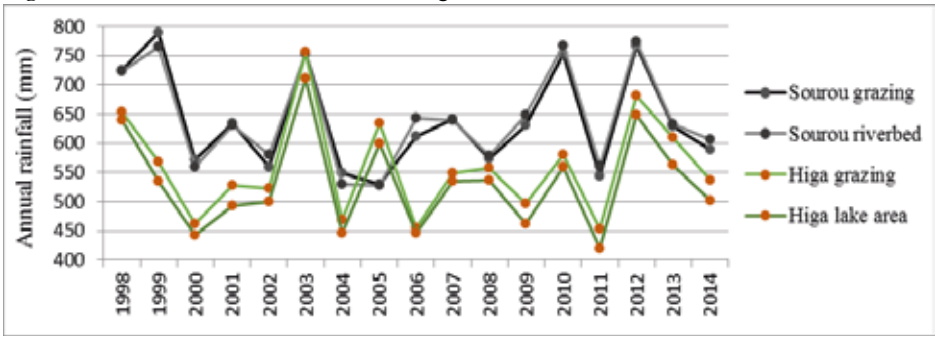
second half of the period appears to be predominantly positive, especially in the Sourou riverbed area, but the vegetation trend for the Higa grazing area is noticeably negative in that period. The period started with relatively high amounts of rainfall in all areas, followed by a dip and ending again with higher amounts of rainfall, but less pronounced than at the start of the period.

*Figure 3.2* Vegetation trends in Sourou and Higa



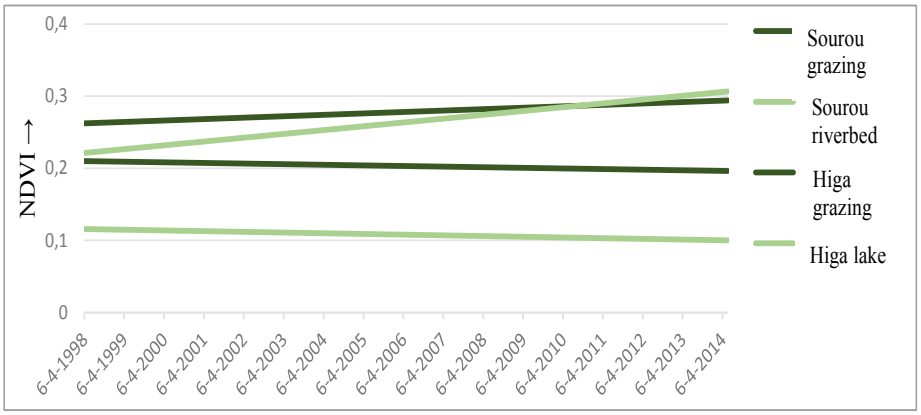

Explanation: Cumulative NDVI time series for four points: 'Sourou grazing'; 'Sourou riverbed'; 'Higa grazing'; and 'Higa lake area'. Years without data imply that it was not possible to perform a good retrieval of season start- and end-dates for that year due to a low NDVI varibility.

*Figure 3.3* Rainfall trends in Sourou and Higa



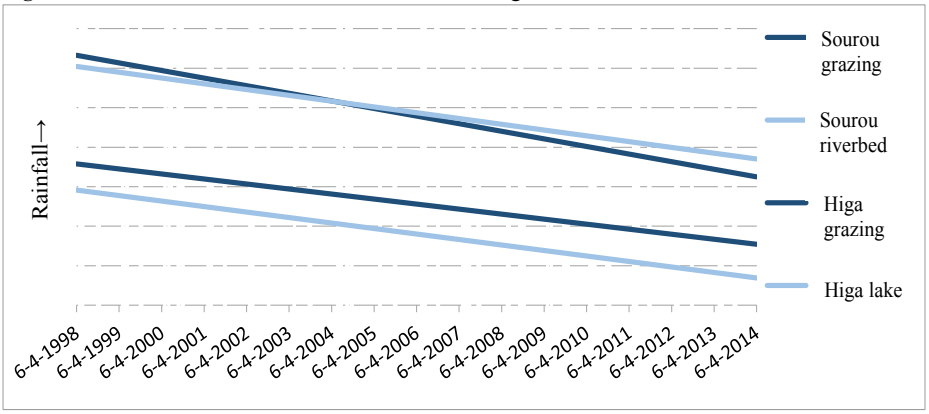

Explanation: Cumulative CHIRPS time series for four points: 'Sourou grazing'; 'Sourou riverbed'; 'Higa grazing'; and 'Higa lake area'.

*Figure 3.4* Linear vegetation trends in Sourou and Higa



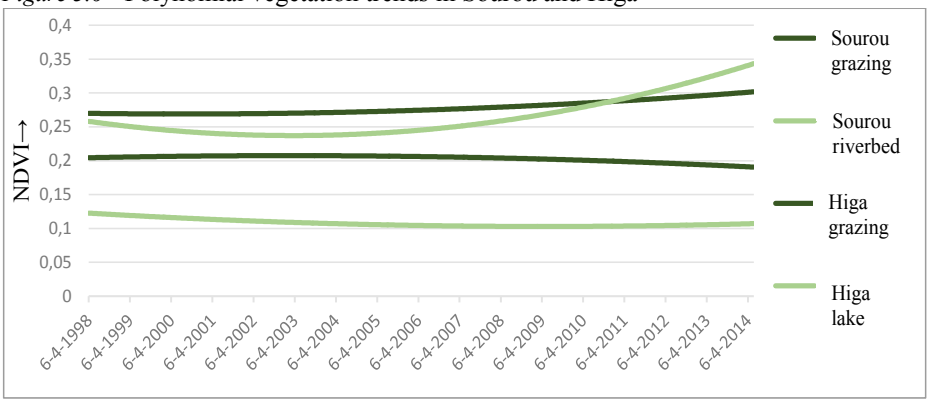

Explanation: Linear regression of NDVI time series for four points: 'Sourou grazing'; 'Sourou riverbed'; 'Higa grazing'; and 'Higa lake area'.

*Figure 3.5* Linear rainfall trends in Sourou and Higa



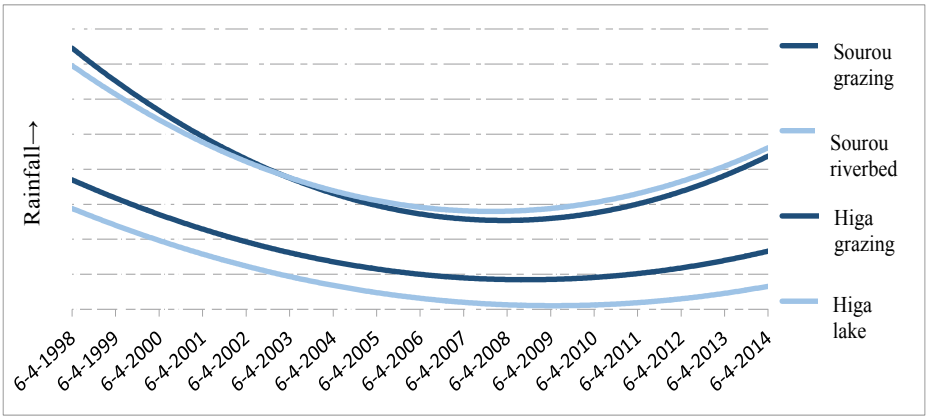

Explanation: Linear regression of CHIRPS time series for four points: 'Sourou grazing'; 'Sourou riverbed'; 'Higa grazing'; and 'Higa lake area'.

*Figure 3.6* Polynomial vegetation trends in Sourou and Higa




Explanation: Polynomial regression of NDVI time series for four points: 'Sourou grazing'; 'Sourou riverbed'; 'Higa grazing'; and 'Higa lake area'.

*Figure 3.7* Polynomial rainfall trends in Sourou and Higa




Explanation: Polynomial regression of CHIRPS time series for four points: 'Sourou grazing'; 'Sourou riverbed'; 'Higa grazing'; and 'Higa lake area'.

To conclude, vegetation cover varies considerably between years, but the general trend in 1998-2014 was negative in Higa and positive in the already more densely vegetated Sourou. This is consistent with the general trends for the regions in which the research areas are located (see Figure 3.1). Especially in the Sourou 'riverbed' area and in the second half of the period, vegetation cover increased. However, this is an increasingly irrigated agricultural area, so it is more likely that we are observing a transformation: a decrease in natural vegeta-

tion and tree density[24] and an increase in crop density (Photo 3.14). A change of vegetation composition, including through irrigated agriculture, is also among several plausible explanations for regional 'greening' worldwide by Helldén & Tottrup (2008).[25] Indeed, this analysis reveals that the amount of rainfall in the research area is not the sole factor that determines the amount of vegetation cover (see also *Ibid*.). Some high rainfall years are not always matched by dense vegetation cover, as well as the opposite. Also, differences occur in vegetation greenness trends between areas in periods with similar rainfall amounts. Besides increased (irrigated) agriculture, livestock is potentially another factor that impacts vegetation cover. For example, vegetation in the Higa grazing area (where other activities besides herding are prohibited by law) decreased in a period when rainfall increased. Also, in the Higa lake area, livestock from surrounding areas passes through on their way to the lake where they come to drink water, arguably impacting vegetation cover by browsing and trampling. The vegetation trend of this area was generally negative (and the site shows the least vegetation cover from all four sites). Indeed, Nana (2002) indicates that grazing pressure is higher in Higa than Sourou.

In line with the conclusion drawn by Rasmussen *et al.* (2001), from observations in a more northerly region in Burkina Faso, the current analysis shows that a broad generalization on land degradation processes is risky as significant variations exits locally. Similarly, this analysis does not point to a simple answer with respect to the discussion about whether natural or human factors should be considered the most important causes of observed vegetation change (*Ibid*.). Rather, it shows, as argued by, among others, Helldén & Tottrup (2008), that explanations for vegetation trends should be sought through a broad spectrum of factors (see also Chapter 2, section 'Desertification and the greening of the Sahel'). The outcomes of this analysis will be compared with local perceptions from the communities of the two research areas in Chapter 7.

*Photo 3.14* An extreme example of increasing vegetation greenness due to irrigated agriculture in Sourou

[24] Based on aerial photographs, Woodhouse *et al.* (2000) also note a reduction in tree cover in a neighbouring area (near the Baye community) in 1992-1996.

[25] As noted earlier, the predominantly (irrigated) agricultural south-western part of Burkina Faso shows much 'greening' (Figure 3.1).

*Bird populations and conservation*

A few wetlands in Burkina Faso receive congregations of at least 20,000 water birds annually. All of these sites are found in the country's Sahel region, and one among them is Sourou (BirdLife 2015c; Porter *et al.* 2002). In fact, the site is known to hold what may be the largest concentration of wildfowl (*Anatidae*) in Burkina Faso. It is presumed that at least some of these *Anatidae* species have more than 1% of their world population found in the area, and for that reason the area has been designated as an IBA. Among the *Anatidae* species are also some A-P migrants, such as Northern pintail (*Anas acuta)*, Garganey (*A. querquedula)* and Eurasian teal (*A. crecca)* (Fishpool & Evans 2001). Many other A-P migrants winter in the area, including many species of land birds. Among these species is the globally threatened European Turtle-dove (*Streptopelia turtur*; see also Photos 3.15-3.24*)*.[26] However, few data exist (Fishpool & Evans 2001), although recent surveys in the context of the *Living on the Edge* project have increased available data (Nana 2012).

In total, more than 220 bird species have been recorded at Lake Higa and its surroundings, including three globally-threatened species. Of these bird species, 58 species are dependent on wetlands, and the lake is also important as a breeding area for water birds (NATURAMA 2015; Ramsar 2015, 2013). The lake and surrounding area are also the wintering grounds for many A-P migrant species, including the globally threatened European Turtle-dove (*Streptopelia turtur*; see also Photos 3.15-3.24). However, only recently have any bird surveys been conducted in the area, and many ornithological discoveries are still to be made (Georges Oueda, former conservation director *NATURAMA*, *pers. comm.* 2013; Van den Bergh 2013, 2012). Lastly, in both Sourou and Higa, most information is restricted to water birds.

In both Sourou and Higa, most conservation-related information is also restricted to the lakes and wetlands. The last year of IBA assessment for Sourou was in 2001, when it was assessed as 'favourable'. Nonetheless, some site specific concerns are posed by the promotion of irrigated agriculture[27] and modern rice farming along the eastern side of the Sourou river (BirdLife 2015c&d; Lungren *et al.* 2001). Furthermore, Ramsar (2015) indicates that "with continual growth in the human population, the pressure on available resources is also increasing, leading to excessive cutting of wood, water pollution due to overuse

[26] I regularly observed this species during my fieldwork in the area (up to 100 birds at a roost site adjacent to Lake Higa), and the species was also noted in the area by Georges Oueda (former conservation director at *NATURAMA*, *pers. comm.* 2013).

[27] The area is recognized as one of the country's key areas for potential large-scale irrigated agriculture developments (SP/CONEDD 2010), while at the same time the IUCN warned that existing agricultural practices were unsustainable and harmful to the environment; threatening the environmental services that are important to the local populations (Somda *et al.* 2010).

of fertilizers and over-irrigation". Notably, a local tourism organization (*Express Safari du Sourou*) organizes hunting trips in Sourou. Besides targeting large mammals, they also hunt for birds, including A-P migrant birds such as the Garganey *Anas querquedula* (Somda *et al.* 2010; see also: http://www.safaridusourou.com/index.php/en/hunting).

For Higa, NATURAMA (2015) indicates that, like other semi-arid areas of the country, the area is experiencing a gradual degradation of its natural resources. Increased pastoral activity puts a lot of pressure on the natural vegetation while demand for agricultural land use is increasing, particularly in the lower (lake) areas. Notably, the described environmental degradation corresponds with the above presented remote sensing data. Other main threats currently include market gardening, harvesting of tubers of the *Nymphea lotus*, hunting (poaching of any kind), uncontrolled fishing, and the uncontrolled cutting of trees. NATURAMA (2015) and Ramsar (2015, 2013) indicate that threats to the lake are posed by, among others, increased agriculture and livestock rearing, leading to severe erosion and siltation of the lake. Ouédraogo *et al.* (2015) indicate that the aquatic ecosystem of Lake Higa indeed shows signs of degradation, and that at least two fish species have become extinct locally extinct.

In 1986, the Autorité de Mise en Valeur de la Vallée du Sourou (AMVS) was established as the authority responsible for sustainable management of the Sourou area in collaboration with the Ministry of Water (Ramsar 2013). The IUCN has urged for an improved management plan that highlights and addresses the interrelationship between development and the conservation of natural resources (Somdo *et al.* 2010). In contrast, Higa lacks a sustainable management strategy and conservation action and has an inadequate forestry staff (NATURAMA 2015). However, both areas are *Living on the Edge* project sites and several conservation action have been undertaken, including the foundation of the Higa Local Conservation Group in 2009-2010. Sourou had already been a *NATURAMA* project site for a much longer period, and a Local Conservation Group was founded there in 2002-2007 (see Chapter 6).

*Photos 3.15-3.24* A-P migrant species in Burkina Faso and the research areas








I observed and photographed many A-P migrant bird species during my fieldwork, including the globally threatened European Turtle-dove *Streptopelia turtur*. Some of the regularly observed birds in the research areas included (from the top down, left to right): Marsh Harrier *Circus aeruginosus*, Common Sandpiper *Actitis hypoleucos*, Purple Heron *Ardea purpurea*, Sedge Warbler *Acrocephalus schoenobaenus,* Yellow Wagtail *Motacilla flava*, Woodchat Shrike *Lanius senator*, Northern Wheatear *Oenanthe oenanthe* (2x), Common Redstart *Phoenicurus phoenicurus*, and European Turtle-dove *Streptopelia turtur*.

## Concluding remarks

Major regional differences in land use are found in Burkina Faso, though the Sahel is primarily a livestock area. Livestock populations are increasing, and so are other anthropogenic pressures countrywide, leading to environmental degradation and biodiversity loss. There are also major regional differences in vegetation cover trends in Burkina Faso, including the research areas. Besides being linked to rainfall patterns, these vegetation trends are probably also affected by human activities. Conservation is well documented in the national law and policies, and the country is signatory to many international conventions, but human and financial resources are lacking (although, allegedly, this has recently improved). Bird conservation, including A-P migrant birds, has received increased attention, not least because of a local BirdLife partner. Nonetheless, there is still relatively little known about bird populations in Burkina Faso, but at least 80 A-P migrants species have been recorded in the country.

The research areas differ considerably in many ways. Sourou is more developed and has widespread intensified (irrigated) agriculture for cash crops, as opposed to smallholder farming in Higa. Higa receives less rain and also has much less vegetation cover. Vegetation cover varies considerably between years, but the general trend in 1998-2014 is negative in Higa, but positive in the already more densely vegetated Sourou. Besides rainfall, anthropogenic pressures, including increased agriculture (Sourou) and livestock (Higa) are presumed to have negative effects on the vegetation cover, biodiversity, and birds in both areas. However, the conservation status of the two areas is somewhat uncertain. Knowledge on the local conservation conditions, as well as local conservation efforts, have increased considerably in recent years since the *Living on the Edge* project. Particularly Sourou holds large concentrations of water birds, while Higa holds lower quantities, and both areas receive many A-P migrant species in the dry season.

# 4

# Local perceptions of birds, the natural environment, and conservation in Burkina Faso's Sahel region

## Introduction

The Sahel region[1] is one of the poorest areas on earth and is suffering from severe environmental degradation (Centre for Sustainable Energy for Life in the Sahel 2010). The economies of most, if not all, Sahelian countries are heavily dependent on natural resources; at the same time, they are depleting their natural capital, which makes them exceptionally vulnerable (Cohen *et al.* 2011; UNEP 2007). Sahelian rural populations are particularly reliant on natural resources for their subsistence livelihoods, including, food, livestock fodder, fibre, and medicines, which also form their main source of income (*Ibid.*). The Sahel is also one of the most neglected areas in terms of conservation in Africa (*Vogelbescherming Nederland in litt.* 2009). Only 6.8% of Africa has been declared a protected area and the Sahel is almost entirely unprotected. Moreover, large-scale approaches that give incentives to local landholders to manage their land in a sustainable way have yet to be achieved (Adams *et al.* 2014; Zwarts *et al.* 2009). However, local knowledge about the decline and/or conservation of various species in Africa is being increasingly considered in conservation management strategies and ways of using this knowledge effectively are being developed and tested (Paré *et al.* 2010).

Species, including bird species, present a focus when it comes to conserving the ecosystem as important sites and crucial habitats, and key issues for conservation can be identified (BirdLife 2010b, 2000). Birds and mammals are the best-known taxonomic groups (Stattersfield *et al.* 1998), while birds and amphibians are the most evaluated groups. All species have been assessed for the IUCN Red

[1] The Sahel region is not well demarcated and comprises the semi-arid transition region between the Sahara Desert to the north and the wetter regions of Sub-Saharan Africa to the south (Agnew & Chappell 1999; Centre for Sustainable Energy for Life in the Sahel 2010).

List of Threatened Species[2] (Baillie *et al.* 2004) and unparalleled information about which bird species are the closest to extinction, the threats they face, the action needed, and the critical sites that need safeguarding have already been identified (BirdLife 2010b). Therefore, "these data can help focus and target action to tackle biodiversity loss. Furthermore, as birds are sensitive to environmental changes, popular to watch, relatively easy to monitor, indicators based on bird data are very useful for tracking progress in addressing the biodiversity crisis" (*Ibid*.: 1). "Birds and wider biodiversity play key biological, economic, social and cultural roles across the world, providing vital ecological services, revenue, food supplies, enjoyment and inspiration to society" (BirdLife 2009: 1).

This chapter attempts to uncover how bird (and nature) conservation can contribute to improved livelihood or socio-cultural conditions of the local population in the Sahel. This study therefore examines the socio-economic as well as cultural aspects of the natural environment and conservation in the Sahel with a focus on birdlife. It uses a local perception approach to assess the needs of local people in integrated conservation and development efforts. These broad themes are addressed in the research question:

> *How are the natural environment, birds and bird conservation perceived by the local population, and how can knowledge of local perceptions contribute to the integration of bird conservation and local sustainable development objectives?*

### *Integrated conservation and development efforts: Local perceptions*

A shift in conservation thinking towards integrating conservation and development was widely supported by international conservation organizations in the 1980s (Fisher *et al.* 2005). It was then that the concept of sustainable development[3] emerged as a means by which natural ecosystems and biodiversity could be saved, while still allowing humanity to live in prosperity (Groom *et al.* 2006). Today, most conservationists agree that declining natural resources, biodiversity loss, and poverty alleviation are related problems and should be tackled side-by-side (Adams *et al.* 2004; Roe *et al.* 2010). Since the rise of the sustainable development discourse, the objectives of local development and local support are considered an essential part of successful natural resource management (Fisher *et al.* 2005; Berkes 2003; Dietz 1996). It would appear reasonable to argue that en-

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[2] The IUCN Red List of Threatened Species' is widely recognized as the most comprehensive, authoritative, and objective global approach for classifying animal and plant species in terms of the risk of extinction (Baillie *et al.* 2004; BirdLife 2009). The list has a prominent role in guiding conservation activities of governments, NGOs, and scientific institutions (IUCN 2004).

[3] In 1983 the World Commission on Environment and Development was formed by the United Nations (under the chairmanship of Ms Brundtland) to identify and promote sustainable development (O'Riordan 2000). Sustainable development was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Fisher *et al.* 2005: 136).

hanced conservation could lead to increased livelihood benefits that would encourage (further) conservation incentives (Berkes 2013). But is this working? Can livelihood needs be coupled with conservation needs? Berkes (2013: 272) argues that "there is no assumption that the two objectives of biodiversity conservation and community benefits are always compatible. In fact, it is likely that conservation-development will involve trade-offs in most cases."

According to many scholars and policymakers (e.g. Ribot 2003; Schusler *et al.* 2003; Gray 2002; Virtanen 2001), local communities should receive more authority and power by being involved in the design of projects, their management, and resource control, while the benefits should also be shared. Berkes (1999), among others, refers to a change from the Western conservationist style of knowing what to do and neglecting the needs and aspirations of local people, towards local participation. However, many international conservation organizations have established global conservation priorities and have been criticized for setting an agenda that does not take local conditions and priorities into account (Thomas 2013). Nonetheless, broad recognition of the significant role of local communities in conservation and development agendas has led to increasing attention among researchers, donors, conservation agencies, and protected area authorities to understanding local communities' attitudes, needs, and aspirations (Kideghesho *et al.* 2007). Understanding their attitudes, needs, and aspirations is imperative, as a crucial factor that determines how people behave towards an issue relates to their perception about the issue. Changing their behaviour and attitudes about conservation is the ultimate aim of community conservation (Owusu & Ekpe 2011). Indeed, biodiversity conservation depends on understanding the relationship between local people and their environment and what motivates them to become involved in conservation activities (Berkes 2013; Tessema *et al.* 2010). Attitudinal studies are being undertaken to gain additional insight into these issues as well as to develop new management strategies for conservation and development organizations (Kideghesho *et al.* 2007).

Following his study of ten conservation development projects in the world's equatorial regions, Berkes (2013) has shown that economic benefits are perceived to be important in community-based conservation projects. Similarly, based on a study of two conservation development projects in Burkina Faso, the importance of tangible (financial) benefits in community-based conservation was demonstrated, including their significant role as conservation incentives (Van den Bergh 2014). In addition, for many communities, the conservation incentive is not only financial but, often more importantly, a mix of economic, political, social, and cultural objectives, while empowerment is almost always a prime ob-

jective (Berkes 2013).[4] Contemporary African attitudes towards the environment reflect both the struggle for conservation and to create sustainable, stable livelihoods as well as the determination to preserve and revive deeply held beliefs about the relationship between man and all other living things (McBeath & Rosenberg 2006). "Instead of being conceptually separate, spirituality, human survival in the temporal world and ecological values and principles are fully integrated. What western observers might construe as attitudes toward the environment in contemporary Africa are actually much broader, and substantially different than simple environmentalism" (McBeath & Rosenberg 2006: 28).[5]

In conclusion, in Africa's Sahel region, people's livelihoods and cultural values interrelate with the local natural environment. Their Sahelian environment has been degrading, while conservation action has been limited. Both birds and local perception can be valuable indicators and tools for conservation strategies. This study considers how local inhabitants perceive the environment, birds, and conservation and it contributes to filling the lacuna in literature on three related themes:

(i) *local values of and conflicts with birds* for the successful integration of (bird) conservation and development efforts in the Sahel, where research is needed on the interactions between people, especially rural landholders, and (migrant) birds (CCI 2010a,b). This brings us to sub-question 1:

*What value do local inhabitants place on the environment and birds?*
*Are there also conflicts with birds?*

(ii) knowledge about *local conservation perceptions* are important for conservation management purposes (Owusu & Ekpe 2011).[6] This brings us to sub-question 2:

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[4] Simplistic and older definitions of poverty, in which the focus lies on the financial benefits of conservation, have hindered community-based conservation by misdirecting conservationists regarding what communities want and need. More recent descriptions of poverty recognize that it not only results from a low income, but also reflects a lack of provision of basic livelihood needs (Berkes 2013).

[5] McBeath & Rosenberg (2006: 28) argue that, in Africa, "contrary to Western notions of value, the valuation of land and resources emphasizes the spiritual and social rather than the economic. The relationship with the land, its resources, fauna and flora is identical to the meaning, integrity and survival of human communities that are a part of it."

[6] "Indigenous practices of conservation differ from western conservation in the context and motive, and it may never be possible (or desirable) to integrate the two but rather to find common ground in sustainability.' 'Area common between western and indigenous conservation is sustainability." "One way of assessing the complementarity of the two systems is to look for examples in which the combination enhances or at least maintains the potential for sustainability[…]" (Berkes 1999: 155-6). Similarly, "local and indigenous understandings of what is to be protected and whether local use should be allowed are different from government views" (Berkes 2013: 280).

(iii) *local context and individual characteristics* as the importance local communities attach to bird conservation is dependent on the locality where people live (Owusu 2008) and socio-demographic factors, such as gender, education, and occupation, are also important predictors of conservation attitudes (Kideghesho *et al.* 2007). This brings us to sub-question 3:

*(How) do local context and individual characteristics influence local inhabitants' perceptions of birds, the environment, and conservation?*

These sub-questions address the chapter's main objective, i.e. uncovering the relation between inhabitants, birds, the environment, and conservation in Burkina Faso's Sahel region.

## Methods

### *Study areas*

Burkina Faso was selected for this study because of its Living on the Edge project sites (see next section), the research agency EAC[7] and BirdLife's national conservation partner *NATURAMA*. In addition, the country was relatively stable politically and the security situation was considered acceptable at the time when the research project was being designed. Two of Burkina Faso's three Local Conservation Groups (LCGs) – Sourou LCG and Higa LCG – were selected. The areas covered by these LCGs included two so-called Important Bird Areas (IBAs):[8] the Lake Sourou IBA (hereafter referred to as Sourou) and the designated Lac Higa IBA[9] (hereafter referred to as Higa). Both areas are included on the Ramsar list of wetlands of international importance.[10] Sourou (ca. 22,000 ha) is in both Lanfiera Department (12 communities) and Di Department (13 communities) in Sourou Province in the northern part of the Sudanian-Sahelian climatic

[7] Études Action Conseils (EAC) is a research consultancy firm based in Burkina Faso. It undertakes research on Africa in the humanities and social sciences.

[8] Important Bird Areas "are key sites for conservation – small enough to be conserved in their entirety and often already part of a protected-area network. They do one (or more) of three things: a) hold significant numbers of one or more globally threatened species, b) are one of a set of sites that together hold a suite of restricted-range species or biome-restricted species, c) have exceptionally large numbers of migratory or congregatory species" (BirdLife 2010b).

[9] Higa LCG's area of operation officially encompasses the whole of Tankougounadié Department (102,300 ha) but is, in practice, limited to the Tankougounadié community of the same name and the IBA area. Higa refers to these areas in this paper.

[10] "The Ramsar Convention is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories" (Ramsar 2010).

zone near Burkina Faso's north-western border with Mali. Higa (ca. 1,500 ha) is in Tankougounadié Department (13 communities) in Yagha Province on the southern edge of the Sahel climatic zone near Burkina Faso's north-eastern border with Niger (Ramsar 2013; Fishpool & Evans 2001: Figure 1.4). Including these two research areas for comparison purposes seemed valuable as the two areas differ in many ways (see Tables 4.1 and 4.2).

*Table 4.1* General characteristics of Sourou and Higa research areas

| | Population (2012) | Electricity network | Infrastructure | Climatic zone | Surface water |
|---|---|---|---|---|---|
| Sourou | <42,000 | Installed in 2013 | Gravel roads | Sahelian Flooded river | Permanently |
| Higa | <16,000 | Missing | One 4WD track | Sudanian-Sahelian | Lake (228 ha) |

Source: NATURAMA 2015*;* Sarogo Adama, mayor Lanfierra Department *pers. comm.* 2013; Tindano Hamado, mayor Tankougounadié Department *pers. comm.* 2013; *Atlas de l'Afrique* 2005

Note 1: Calculations of population density can be misleading as Sourou includes large areas of uninhabitable, permanently flooded areas. The population density around the Sourou River appears to be much higher than the population around Lake Higa.

Note 2: Since the early 1980s, the Sourou River has been permanently flooded by the construction of a dam. This created an artificial 'lake' that varies from several hundred metres to 4 km wide and includes a vast area of shallows covered with perennial grasses (BirdLife 2015d).

*Table 4.2* Population characteristics of Sourou and Higa research areas

| | Religion | | Education levevel | | Principal livelihood activity | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Muslim | Christian | No education | ≥ Primary school | Fisher | Farmer | Farmer & pastoralist | Other combination | Other |
| Sourou | 67% | 33% | 30% | 70% | 27% | 33% | 23% | 13% | 3% |
| Higa | 95% | 5% | 55% | 45% | 0% | 30% | 70% | 0% | 0% |

Source: based on the characteristics of 30 and 20 semi-randomly selected local inhabitants in Sourou and Higa, respectively (percentages are rounded).[11]

### *Local Conservation Groups in Burkina Faso*

"*BirdLife International* (BirdLife) is a global partnership of national non-governmental bird conservation organizations. In line with developments in conservation and development thinking, BirdLife sees local communities as the key actors in achieving integrated biodiversity conservation and livelihood-improvement goals" (Van den Bergh 2014: 89). As part of this approach, BirdLife is working with so-called local conservation groups (LCGs), described as

[11] However, there is no basis for knowing whether ratios of such variables in the selection reflect those in the population. For more details, see Chapter 1, the section on 'Research methods'.

"organisations or individuals who, together with relevant stakeholders, work with BirdLife partner organizations to help promote conservation and sustainable development at IBAs" (BirdLife 2010a: 1). BirdLife's (*in prep*.) newly formulated LCG vision reads as follows: "Whilst your LCG strategy should link to your organizations mission, the LCGs activities should be driven by the interests, capacity and needs of the organisations members and the wider community. It is important that they are self-motivated and have ownership of the activities they undertake". *Vogelbescherming Nederland* (BirdLife in the Netherlands) "started its *Living on the Edge* project to protect (migratory) birds in the drylands of the Sahel in 2011. […] One of the main strategies applied in this project is the creation (where necessary) and capacity building of LCGs, as well as knowledge exchange between LCGs, primarily at IBAs. […] There are now 13 site-based interventions in four countries, including three sites in northern Burkina Faso" (Van den Bergh 2014: 89).

*Interviews*

Field research was conducted between July and September 2011, in December 2011, in March 2012, and again in February/March 2013. Semi-structured in-depth interviews were held in each research area with government officials, NGO staff, community and religious leaders, semi-randomly[12] selected local inhabitants, and the board members (presidents and/or secretaries) of 13 community organizations. Community organizations refer here to locally-based non-state institutions and exclude local conservation groups for comparative purposes. Similar interviews were held with the presidents and secretaries of the Sourou and Higa LCGs, as well as with 13 and six of their members, respectively. In total, 147 interviews were conducted: 78 in Sourou and 69 in Higa. Of these, 28 were group interviews.[13] The 147 individual and group interviews also included 35 follow-up interviews. In total, 160 respondents were interviewed. More men than women were interviewed, namely 74% in Sourou and 84% in Higa, because the non-randomly selected interviewees generally included men as few women have community, organizational, and/or leadership functions.

A conversational style was adopted during the interviews by using a research questionnaire as a guideline and checklist. This semi-structured approach allowed freedom in the sequencing of questions and in the amount of time and attention paid to each particular question. Some questions proved unsuitable or

[12] Semi-randomly selected local inhabitants refer to a selection of the local population that aims at representing the diversity found among the population, and particularly regarding people's occupation (i.e. land use activities). The selection was done by approaching inhabitants in their homes or fields, on the road, or at local markets. For more details, see Chapter 1, the section on 'Research methods'.

[13] The group interviews consisted of two interviewees (18) or three interviewees (8), and included 60 interviewees in total.

insensitive with particular interviewees, while additional questions were included in some interviews when needed (Robson 2002). This is reflected in the diverse numbers of interviewees in each research theme (Table 4.3). The differences between the research areas is amplified due to a negative travel advice for northern Burkina Faso in 2013. I was therefore unable to travel to Higa in that year, resulting in a smaller number of interviews in Higa than in Sourou, although Achille Ouédraogo, a biology Master's student at the University of Ouagadougou, conducted several interviews in Higa between 10-13 March 2013 (that is after he had already acted as my research assistant).

All interviews and all interviewees' responses that were related to the research themes were included in the results section; no selection was made. The interviewees were not notified beforehand about the precise questions that were going to be asked. Rather, I indicated that questions were going to be asked about their livelihoods and related aspects. The following characteristics were noted for each interviewee: gender; age; place of residence; ethnicity; religion; marital status; number of children; education level; literacy level; French speaking/writing; main livelihood activities; (farm) land ownership; livestock ownership; (board) membership in community organizations; and (board) membership in LCG. Due to a limited general selection size, and one that is particularly small for several research themes (see explanation above), it was not always possible to assess the influence of the local context and/or peoples characteristics on their perceptions. The interview results of the local authorities and children are treated separately in the results section because the children's characteristics differed markedly from the other interviewees, and the local authorities included external actors that were (usually) only temporarily based in the area.

Although quantitative analyses were made, the goal was not to obtain exact numbers and statistics from the interviewees (see Bernard 2011). Individual interviews and those with organizations aimed to achieve an in-depth understanding of their values, relations, and perceptions of the natural environment, including birds, and (potential) conservation methods and issues. Information gathered in these interviews was complemented with field observations, literature research, documentary sources, informal interviews, and expert consultations (see Ybema *et al.* 2009 and Chapter 1, the section on 'Research Methods'). The results are based on interviewees' opinions unless stated otherwise.

*Table 4.3* Interviewees per research theme, excluding children and local authorities.

| *Research Theme* | *Sourou* | *Higa* | *Total* |
|---|---|---|---|
| Natural environment | | | |
| Value and importance | 26 | 6 | 32 |
| Environmental and general problems | 16 | 13 | 29 |
| Environmental problems | 22 | 16 | 38 |
| Solutions for environmental problems | 17 | 16 | 33 |
| Environmental legislation | 13 | 2 | 15 |
| Birds | | | |
| Values and conflicts | 30 | 20 | 50 |
| Status and threats | 10 | 17 | 27 |
| Solutions to the threats | 8 | 13 | 21 |
| Bird conservation | 25 | 13 | 38 |
| Hunting (laws) | 6 | 4 | 10 |

## Results: Natural environment

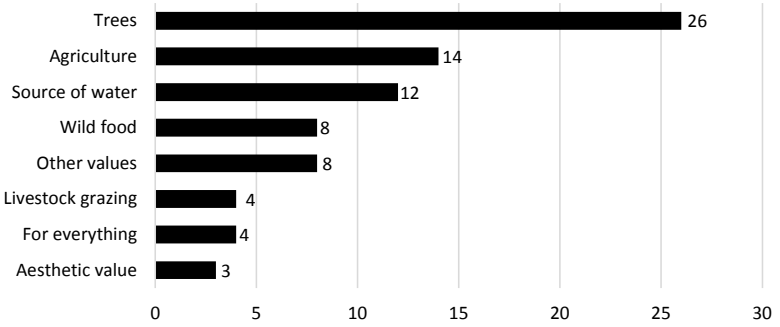
*Environmental values and importance (26, 6, 32)*[14]

All the 32 inhabitants interviewed on this topic indicated that the natural environment, which was often perceived as everything around them, was important to them. Interviewees felt that the natural environment assisted agriculture and was the source of all their food; four of the six interviewees in Higa even claimed that the natural environment was important for everything (Figure 4.1). Trees were most often mentioned as an important aspect of the environment as they provide wood (15 interviewees; most importantly for firewood, followed by the use as building material), but also, according to nine interviewees, because they attract rain. In addition, two of the 26 interviewees in Sourou also mentioned trees' capacity to avert erosion and strong winds. The natural environment was seen by eight interviewees as a source of food including wild fruits, fish, and wildlife (bush meat) but each was mentioned by only a few interviewees.

Other important aspects mentioned were water (in Sourou) and, to a lesser extent, grazing areas for livestock (especially in Higa). The importance of medicinal plants, peace and quiet, the use of it as a toilet, and as a way of combatting desertification were also mentioned by one or two interviewees. Wildlife was appreciated by three interviewees for its aesthetic value, i.e. actually seeing animals.

[14] The number of interviewees with whom this research theme was discussed in Sourou, Higa, and in total, respectively,

*Figure 4.1* Environmental values mentioned (79) in the research areas (N=32)




Note: Environmental values mentioned (79) by 32 interviewees from Sourou and Higa. The 'coping strategy' value is not included as this was only mentioned when interviewees were specifically asked about such strategies.

The environment and its natural resources are also used as coping strategies, especially in periods of drought.[15] Collecting and eating wild plants and their fruits are the most common strategies adopted related to the environment.[16] However, people typically indicated that plants did not often supply many nutrients and involved extensive collection and preparation time. Another strategy was hunting and the consumption of wild animals, including birds, although, according to some, there were not enough animals and birds left to allow local inhabitants to survive from hunting alone. This was historically more important.[17]

*Environmental and general problems (16, 13, 29)*

Some of the frequently mentioned problems in people's lives were the poor road infrastructure, the lack of water for livestock, agriculture, and drinking, and inadequate facilities such as schools a*n*d hospitals. In Sourou, poor electricity and a lack of modern machinery were also mentioned, while limited education, a lack of knowledge, and insufficient food were perceived as major issues in Higa. Hu-

[15] Other non-environmentally related coping strategies are migrating to other areas/countries, seeking help from friends and relatives, and trading goods. Batterbury (2001) also notes that diversification, which includes depending on other things than land only, has been adapted as a strategy by communities in south-west Niger to cope with change, such as droughts and soil erosion.

[16] Including the fruits of Tamarind (*Tamarindus indica*), 'desert date' (*Balanites aegyptiaca*; but has many common names) and baobab (*Adansonia digitata*), parts of water lilies (*Nymphaeaceae*), herbs and grasses, and gum arabic (from *Senegalia Senegal/Vachellia seyal*).

[17] These included rabbit, hare, antelope, rat, guinea fowl, and herons.

man (land) conflicts and disputes were suggested as problems only after specifically asking about conflicts (Box 4.1).

Other more specifically environmentally related issues were mentioned by a minority in Sourou (six of the 16 interviewees) and by almost all respondents in Higa (12 of the 13 interviewed) when referring to general issues. In both areas, the declining numbers of trees, the low survival rates of planted trees and the subsequent shortage of wood and trees were important points (Photos 4.1 and 4.2). A lack of rain and water in general and poor, degraded soils were also mentioned. In Higa, mention was also made of flooding and less frequently of sand deposits in Lake Higa as well as plagues of insects, especially grasshoppers and locusts, that destroyed crops, and general environmental degradation.

*Photos 4.1 & 4.2* A shortage of wood and trees is among the main perceived problems in the lives of many inhabitants in Sourou and Higa

*Box 4.1* Human (land) conflicts

Human (land) conflicts and disputes were suggested only after specifically asking about conflicts. None of the 24 inhabitants who were asked about conflicts in Sourou (8) and Higa (16) suggested any conflict related to environmental issues, except for a woman in Sourou. This particular woman indicated that conflicts have arisen about environmental laws, specifically about fishermen who were not using the correct mesh size for their nets. Several interviewees indicated that land conflicts exist in Sourou (2) and Higa (7), mainly between famers and pastoralists (in Higa). None of the interviewees suggested that conflicts arose between the resident population and nomadic people or immigrants. One interviewee in Sourou and two interviewees in Higa suggested that population growth has led to conflicts as a results of increasing land scarcity. Notably, no signs of conflicts were noted during my extended stay in these communities.

*Environmental problems (22, 16, 38)*

When specifically asked about environmental problems, everyone mentioned at least one issue. The environmental problems perceived were categorized and ranked[18] in descending order of importance: the lack and degradation of trees; the overexploitation of natural resources (excluding trees); water issues; the (local) extinction of wildlife; soil problems; a lack of care and caretakers; threats posed by wildlife; and other environmental problems (see Figure 4.2). There was little difference in the ranking between the two areas except for the lack of care and caretakers (only in Higa) and threats posed by wildlife (only mentioned in Sourou). The decline in the number of trees, and in Higa of big, older trees in particular, was the main concern and was more marked in Higa.[19] The perceived reasons for the decline in trees were the felling of trees, the unsustainable lopping of branches, livestock browsing, water shortages and poor soil quality. The second most commonly expressed concern was related to overexploitation, namely hunting, the burning of vegetation,[20] overgrazing (only in Higa) and a shortage of fish in the river (in Sourou).[21] Hunting was exclusively mentioned as an environmental problem by LCG members, who also mentioned the disappearance and local extinction of wild animals more often than other interviewees. Almost as frequently, issues were mentioned related to water, especially the shortage of rainfall, but also flooding and water pollution (the latter only in Sourou).

[18] According to the number of times an issue was mentioned by the 38 interviewees.

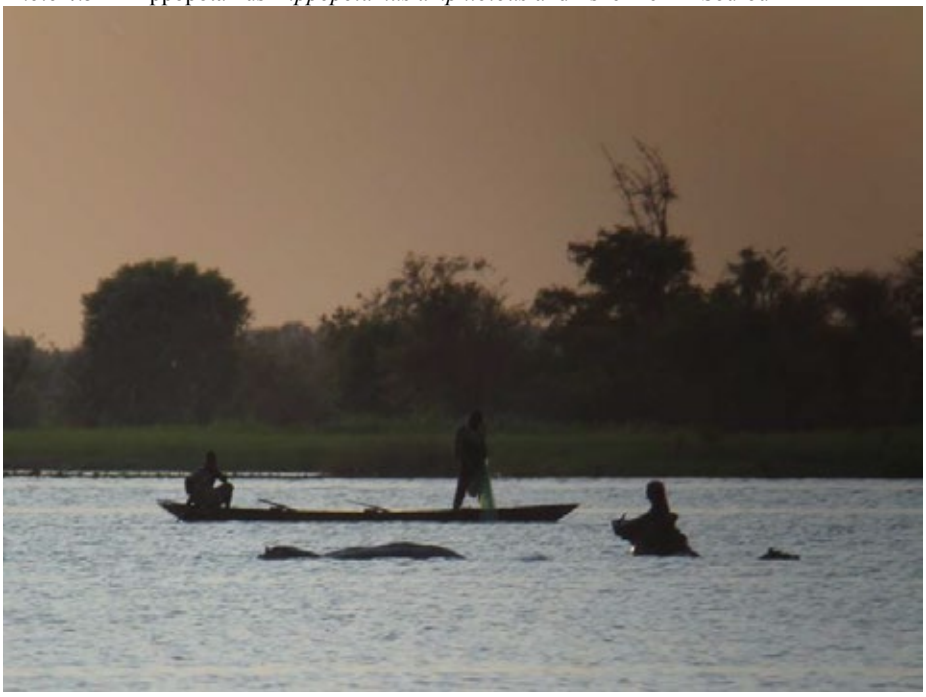
[19] This appeared to be less important for fishers, who were more numerous in Sourou in relative and absolute terms.

[20] The burning of vegetation was regularly discussed in informal conversations and was undoubtedly prompted by the regular bush fires.

[21] In Higa, very few people referred to fishing and fishers were rarely seen on the lake. However, a member of the town council reported that many local people did, in fact, fish and that fishing was the main livelihood for some (see also Ouédraogo *et al.* 2015). He mentioned that fishing might be limited due to a shortage of fishing gear and the lake lacked big fish because it is too small for them to survive in the dry season.

The mentioned (local) extinction of wildlife generally referred to the disappearance of mammals; one interviewee also referred to plants and birds. Soil issues were primarily related to a lack of manure and other natural or synthetic fertilizers but also to erosion.[22] Several respondents expressed their concern about a general lack of care for the environment, as well as a shortage of foresters (*Chef de Service Departmental de l'Environnement et de Development Durable*) who take care of the environment. The mentioned threats posed by wildlife included, Hippopotamus *Hippopotamus amphibius* that posed a threat to humans and destroy crops and birds feeding on crops (Photo 4.3). Other points that were mentioned by no more than two interviewees included a lack of (environmental) education, general environmental degradation, poor natural resources, and climate change.

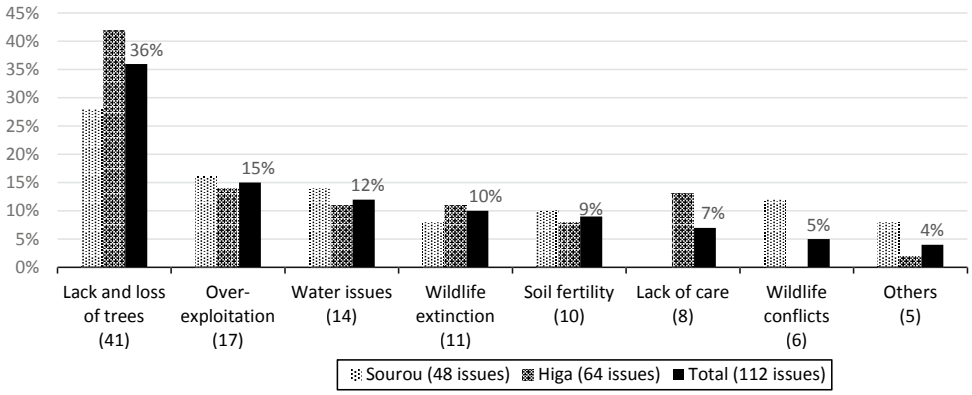
*Photo 4.3* Hippopotamus *Hippopotamus amphibious* and fishermen in Sourou



The Sourou river basin is inhabited by both many hippos and many fishermen, which can lead to conflicts as hippos are known to feed on crops and pose a threat to humans.

[22] Including agriculture fields that are too close to the river or lake, which cause sand deposits in the river or lake and floods due to the lakes reduced capacity to hold rainwater.

*Figure 4.2* Perceived environmental problems (112) by research area (N=38)

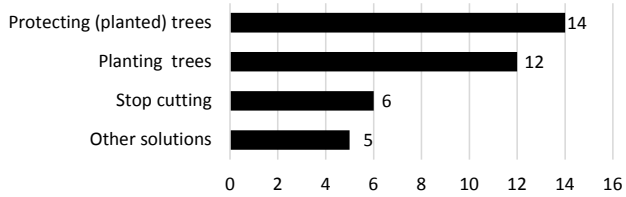



Note: The relative number of times issues were mentioned (112) by 38 interviewees (Sourou 22, Higa 16), depicted in percentages per category. The 'overexploitation' category excludes the exploitation of trees, because this is included in the 'lack and loss of trees' category.

*Solutions for environmentally related problems (17, 16, 33)*

All but one interviewee believed that there are solutions to reduce the impact of the environmental problems they mentioned. The solutions suggested were most frequently related to retaining or increasing the number of trees (37 of the 74 solutions suggested and these were mentioned by 17 of the 33 interviewees). Protecting trees, planting tree seedlings, and not felling trees were given as possible solutions (see Figure 4.3). The latter included surveillance measures by government representatives, essentially the forester, to prevent the illegal felling of trees and branches, and informing him if someone was caught cutting down trees illegally. LCG members put more emphasis on protecting trees, especially protecting planted tree seedlings, while non-members stressed the need to plant more trees. Raising awareness and education are also important strategies in combatting the decline in tree numbers, according to two respondents, while more rain, prayers, and money for the protection and planting of trees were each mentioned by one respondent.

*Figure 4.3* Suggested solutions (37) for increasing the number of trees in the research areas (n=17)




Education was seen as important by eight respondents in tackling environmental issues, for example, education about the importance of trees and the threat posed by bush fires. Improving soil fertility and the construction of small farm dams against rain run-off and erosion were mentioned by nine people, primarily in Higa (7). Three respondents in Sourou talked about using fishing nets with bigger mesh and protecting the river by having trees, rather than agricultural fields next to the river. Some of the solutions suggested for environmental problems included potentially environmentally harmful activities, such as using pesticides to eradicate insects and building river dams to control water levels. However, these solutions were only put forward by two interviewees. Finally, five interviewees, all except one in Sourou, suggested various passive or indirect measures, such as getting help, praying, receiving (or having) money and resources from outside the area.

*Environmental legislation (13, 2, 15)*

Knowledge about existing environmental legislation varied considerably among local inhabitants. Thirteen of the 15 interviewed were aware of the existing permits for fishing, hunting, and gathering wood and the rules about cutting down trees and lopping branches. However, the exact content was often unknown or incorrect. Some thought that hunting and the felling of trees were prohibited under any circumstances. It was well known that the forester was the authority that issued permits and enforced environmental legislation, including monitoring compliance with the law. Some inhabitants felt that most people abided by the law, while others thought that only a few people obeyed the rules. Fines were known to be given to those who violated environmental laws.

## Results: Birds

*Inhabitants' perceptions of birds: Values and conflicts (30, 20, 50)*

When asked about birds, nine of the 50 respondents referred to domestic birds, like chickens and domesticated guinea fowl, which are often appreciated as a valuable food source and trading goods. And some enjoy keeping pigeons. Interestingly, seven interviewees also referred to foreign (migrant) birds that came to their area. Apparently, someone had found a bird with a ring around its leg that had originated from Europe, which is how they knew birds from elsewhere visit the area.[23] LCG members were also aware of migratory birds from Europe wintering in their area because *NATURAMA* had informed them about this.

Only a few men expressed themselves negatively towards all birds (one in Sourou and four in Higa). Generally, there are two perceptions regarding wild birds: either positive regarding all birds or positive regarding large birds but negative regarding small (seed-eating) birds that feed on crops (see also Photos 4.4 and 4.5).[24] The first perception is prevalent in Higa (17 of the 20 persons interviewed), while in Sourou the latter perception is equally common (15 of the 30 interviewed), but this was largely restricted to the Christian population (10 of the 14 Christians interviewed compared to four of the 16 Muslims interviewed).[25] None of the 13 women interviewed were negative regarding birds in general (Figure 4.4). On the other hand, the women in Sourou were especially negative regarding small birds (none in Higa). Such negativity regarding small birds was slightly more prevalent among the population with strong agricultural backgrounds, especially in Sourou. All the 15 LCG members interviewed were positive about all birds, except for two from the Sourou LCG, who were negative regarding small birds. No one in a formal position (usually a board position in a community organization) thought negatively about birds in general, but in Sourou almost half of these persons were negative regarding small birds. In Sourou and Higa, a higher level of education was relatively more often associated with a negative perception of (small) birds, namely 12 of the 22 (i.e. 55%) interviewees with some level of education compared to seven of the 19 (37%) interviewees with no education.

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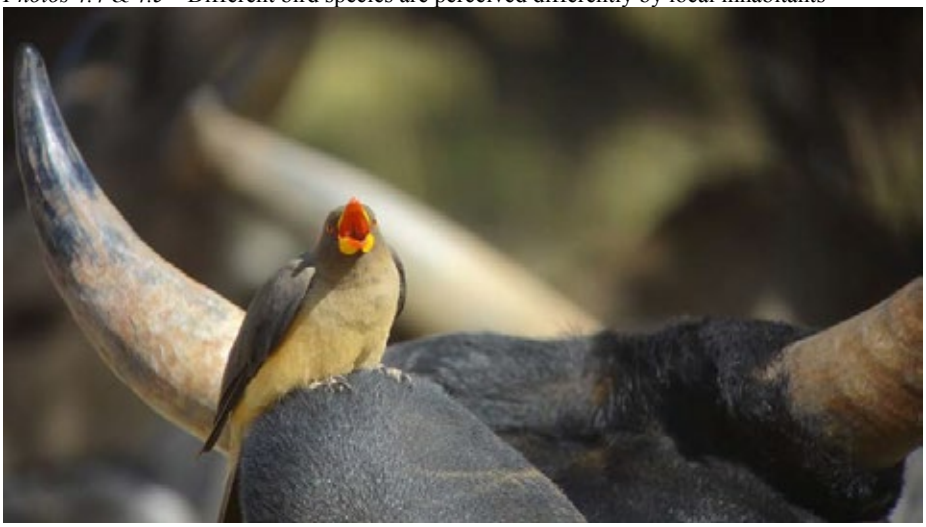
[23] This occurred many years ago and the person who found the bird was untraceable.

[24] Common birds observed feeding in large flocks were mainly red-billed quelea (*Quelea quelea*) and several species of 'bishops' (*euplectes*) and 'weavers' (*plocues*), and in Higa also large numbers of Sudan golden sparrow (*Passer luteus*).

[25] In this study, the interviewed Christians did not show any distinct differences in individual characteristics compared to the interviewed Muslims.

*Photos 4.4 & 4.5* Different bird species are perceived differently by local inhabitants



Many bird species are valued by the local inhabitants, such as the Yellow-billed Oxpecker *Buphagus africanus* (upper photo), while some others are often perceived negatively, namely the small seed-eating bird species, in particular the abundant Red-billed Quelea *Quelea quelea* (lower photo). The different perceptions can be explained by the birds' feeding behaviour: the Yellow-billed Oxpecker usually eats ticks and other parasites from livestock, while the Red-billed Quelea usually feeds on crops, often in huge flocks.

*Figure 4.4* Perceptions of birds in Sourou and Higa by respondents' characteristics (N=50)

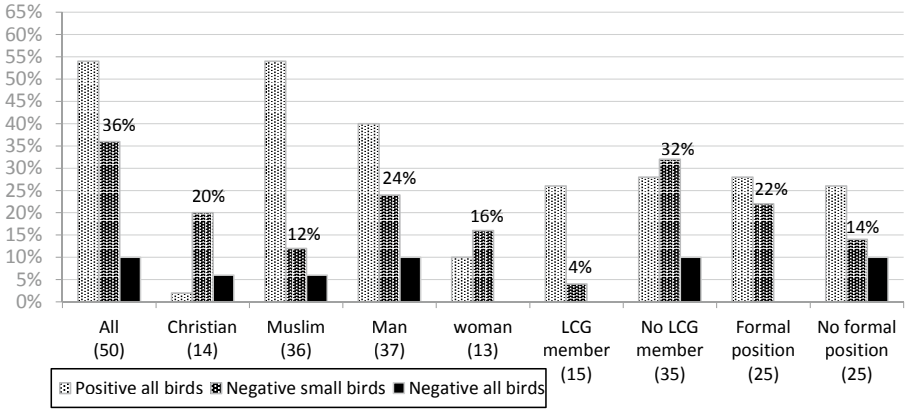
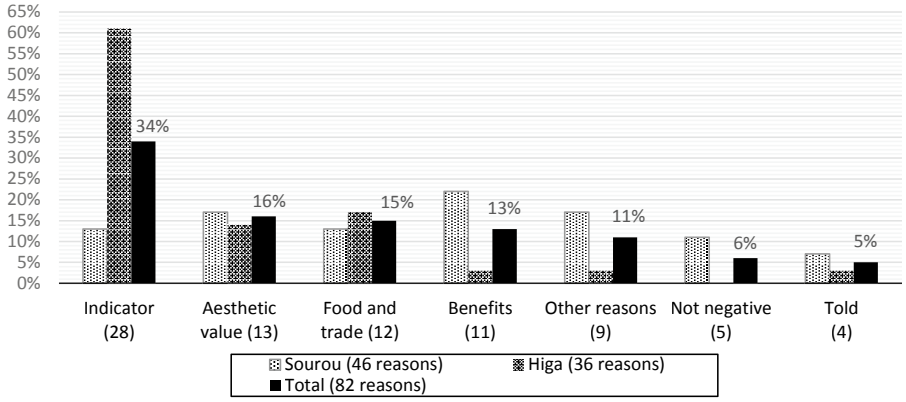



*Figure 4.5* Reasons (82) for people's positive perceptions of birds by research area (N=45)




Note: The relative number of reasons given by 45 interviewees (Sourou 28, Higa 17), depicted in percentages per group. For a description of the content of each category, see Table 4.4.

The reasons for peoples' positive perceptions varied considerably (Table 4.4). The benefits of birds as indicators of forthcoming rain and, to a lesser extent, changes in the season,[26] and as a source of food were the most common features mentioned, but these were still only indicated by a quarter of the 50 interviewees. These two reasons are followed by an appreciation of their aesthetic value, name-

[26] They sing when the rains or the rainy season arrives and different species, for example the Abdim's stork (*Ciconia abdimii*), arrive during the rainy season.

ly: the beauty of the birds. Other reasons were only mentioned in one of the two areas, but each one by several persons; namely: that birds were seen as indicators of environmental health (Higa); foreign birds arrived in the region and formed part of the natural environment (Sourou); the big birds do not destroy crops (Sourou); and they also warn of possible dangers, such as snakes and other predators (Higa).

*Table 4.4* Reasons for people's positive perceptions of birds by research area

| Category | | Reasons: Sourou (1) & Higa (2) |
|---|---|---|
| Indicator | 1 | 'indicators of the rainy season', and 'indicators of danger (i.e. predators, principally snakes)' |
| | 2 | indicator of 'environmental health', 'the arrival of the rains and different seasons', 'danger (i.e. predators, principally snakes)', and as an 'indicator of where water or dead livestock are located' |
| Aesthetic value | 1 | 'beautiful to see', 'part of nature', and 'for future generation and children to see (different species)' |
| | 2 | 'show the beauty of nature', and 'they are part of people's lives (they know them from their childhood)' |
| Food and trade | 1 | 'consuming (usually domestic) birds' and 'breeding and selling (usually domestic) birds' |
| | 2 | 'consuming (often domestic) birds' |
| Benefits | 1 | 'birds eat caterpillars', 'vultures clean carcasses', 'oxpeckers eat ticks & parasites from livestock', 'they attract tourists with money', 'good for peace', 'they plant trees through the seeds in their droppings', and 'because of their presence it rains' |
| | 2 | 'prediction of future events' |
| Other reasons | 1 | 'foreign birds come here', 'created by God', and 'I don't know why' |
| | 2 | 'because of birds, people protect nature' |
| Not negative | 1 | 'birds are ok', and 'they do not eat our crops (referring to big birds)' |
| Told | 1 | 'the LCG told us that birds are important', and '*NATURAMA* told us that birds are important' |
| | 2 | 'the LCG told us that birds are important' |

Categorization of peoples' positive attitudes towards birds shows differences between the two areas (Figure 4.5). The relative importance of the categories differs markedly between the areas. In Sourou, there were, in descending order of importance, several large categories that only differed slightly in importance: benefits; aesthetic value; others; indicator; food and trade and not negative. By

contrast, the reasons given in Higa were almost entirely restricted to three categories: indicator; food and trade; and aesthetic value.[27] The category of indicator stands out in Higa as it was almost twice as prevalent as the other categories combined. Several LCG members, especially in Sourou, also indicated that they appreciated the birds because LCG and/or *NATURAMA* told them that they are important.

*Status of birds and threats (10, 17, 27)*

There is a marked difference in the perception of the status of bird populations between the inhabitants of Sourou and Higa. In Higa, all the adult interviewees thought that birds were threatened and on the decline, while half of the interviewees in Sourou thought they were not threatened and two even felt they were increasing in numbers. In Higa, four people indicated that they were noticing fewer birds, especially on and around Lake Higa due to the reduced number of trees there.

Felling and the lack of trees were the most frequently mentioned threats to birds (three of the 10 interviewed in Sourou and 14 of the 17 interviewed in Higa). In Higa, there were two other commonly perceived threats that were not mentioned in Sourou: hunting (although hunting was more regularly observed in Sourou) and a lack of water and rainfall (mentioned by nine and eight inhabitants, respectively). Other threats mentioned in both places were general environmental degradation, desertification, and the decline in vegetation (especially herbs; each threat was mentioned by two or three inhabitants). Finally, a lack of food and people chasing birds off their fields was only mentioned in Higa (by one and three persons, respectively), while the use of chemical fertilizers and the increase in agricultural area, which chiefly included irrigated land owned by the government, was only mentioned in Sourou (by one and two persons, respectively), although a rise in the local (human) population was also mentioned by one interviewee in Higa.

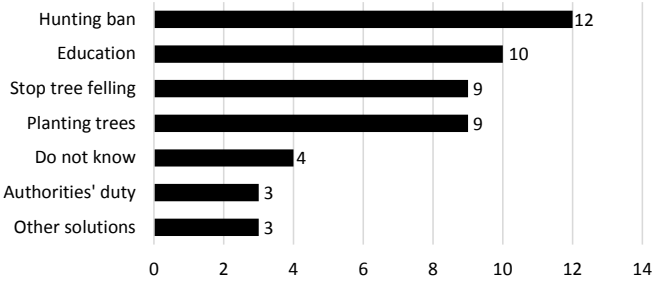
*Solutions to eliminate threats to birds (8, 13, 21)*

The most frequently mentioned measure to protect birds was a ban on hunting (Figure 4.6). Although the forester and the government's prefect were sometimes mentioned as being responsible for achieving this, this suggestion did not necessarily refer to law enforcement. Education, especially on the subject of hunting, was also mentioned, as was the fact that people should just stop hunting. Raising awareness and education, preventing trees from being cut down, and planting tree seedlings were commonly suggested solutions, after a ban on hunting. If halting

[27] Two other reasons in Higa were that 'they predict future events' and 'because people protect the environment because of birds'.

the loss of trees and increasing their numbers were considered as one reason, this would be the most prevalently perceived solution. Help from the government, including financially, was specifically mentioned as a requirement in this respect and three respondents recommended taking care of planted trees, including installing (iron) fences around areas planted with seedlings to keep livestock out. Other suggested conservation measures were creating waterholes and making the forester responsible for bird conservation (Higa). Several respondents in Sourou could not come up with any bird conservation measures. The suggested solutions banning hunting and preventing trees from being cut down were mentioned frequently by LCG members in particular.

*Figure 4.6* Perceived solutions (50) to eliminate threats to birdlife in the research areas (N=21)




*Attitude towards bird conservation (25, 13, 38)*

Almost half of the 25 Sourou interviewees expressed a negative attitude towards the conservation of birds, either only small birds (10) or even all birds (2). In contrast, all the 13 Higa interviewees viewed the conservation of all birds positively, including those who were negative towards small birds (people should respect all living things).

Agriculturists were more negative about bird conservation and were usually only positive about conserving big species that do not feed on their crops. LCG members were generally more positive about bird conservation (namely, 87% compared to 42% of the non-members). The reasons for peoples' positive attitude towards bird conservation were similar to the reasons for their positive per-

ception of birds[28] but additionally included the fact that they do not like birds dying, and that they can use some parts of birds against diseases.[29]

*Bird hunting (laws) (6, 4, 10)*

When asked about laws concerning wild birds, local inhabitants always referred to legislation related to hunting.[30] Their knowledge varied from a total ban on wild bird hunting[31] to being allowed to hunt all bird species, but only when they had the correct permit. Although there was an awareness that hunting regulations exist, none of the respondents knew exactly which species were protected and which could be legally hunted (with a permit).[32] It was generally known that a few species were protected, such as vultures and crows, and people often assumed that all big birds were protected.[33] Only one (Higa) interviewee knew about seasonal hunting legislation (see Burkina Faso 2013, 2011, 1989). While some claim to obey the hunting laws, others do not. Among these were some who indicated that offenders were sometimes fined by the forester, who is charged with ensuring that local people comply with hunting legislation (see also Box 4.2).

*Box 4.2* Hunting observations

Hunting activities were observed on an almost daily basis in both Sourou and Higa during my fieldwork. Perhaps the most commonly targeted animals were hares (*Lepus*), knob-billed ducks (*Sarkidiornis melanotos*) and white-faced whistling ducks (*Dendrocygna viduata*), but other large and medium-sized birds were also shot at. All species were hunted with guns, the ducks were usually targeted from a boat. Only men hunted, occasionally with dogs. Young men and children were seen daily using slingshots against small passerine birds that feed on crops, especially in Sourou, although larger birds, such as moorhens (*Gallinula*), were occasionally also targeted for consumption. In Sourou, fishing nets were used in (rice) fields to catch flocks of small seed-eating birds but they were not eaten as there is little meat on them. There is a hunters group there too. All members are hunters but they do not hunt collectively. The group attends celebrations where they sing and shoot in the air and for which they receive money from the organizers of the event (see also Photos 4.6 and 4.7).

[28] These include 'so children will know different species', 'an indicator of healthy environment', 'can hunt and eat birds', 'collect their eggs to grow at home (guinea fowl)', 'beautiful to see' and 'tourists come to watch which brings money into the community'.

[29] Although the person who mentioned this did not know any details about this alleged use.

[30] In Burkina Faso, a permit is required for hunting animals. There are special permits for subsistence hunting but many restrictions apply. For example, only small game are included and some (bird) species are strictly protected (Burkina Faso 2013, 2011, 1989).

[31] This includes two LCG members who thought there was a total ban in place.

[32] This includes Sourou LCG members and 'hunters'.

[33] One hunter mentioned that he did not hunt egrets as 'they are not harmful and nobody wants to buy them'.

Various hunters showed me their hunting permits and some claimed that they had them to avoid trouble with the forester, although one of them had never been asked for his permit. The foresters claimed to actively check hunting permits and to raise awareness about hunting legislation. The LCG in Sourou runs awareness-raising activities regarding bird conservation and informs the forester or the mayor about peoples hunting activities. Two hunters indicated that members had addressed them regarding bird hunting, while five others, including a hunter who lived only a few hundred metres from the LCG board members in Sourou, had never heard of the group or been approached by them.

*Photos 4.6 & 4.7* Smaller bird species are often caught in nets or hunted with slingshots

Fishing nets are regularly deployed around paddy fields to catch, or keep out, the small seed-eating birds. As there is little meat on them the inhabitants usually do not consume these birds. Illustratively, the bird in the left photo is caught but not consumed. The right photo shows a young boy in Sourou who shot two Lesser Moorhens *Gallinula angulata* with a slingshot for consumption purposes.

*Perceptions of local authorities (13) and children (8: 12-16 years)*

In total, 13 local authorities were interviewed. These included local government representatives (including forester and mayor) and (co-)directors of schools and a governmental research institute. The local authorities' perceptions of the environmental values and problems were generally similar to those of the local inhab-

itants, with the exception that they mentioned a wider variety of environmental problems.[34] Overgrazing and pollution were seen as important issues, as was soil degradation in Higa and gold mining in Sourou. The lack of care (takers) was only referred to by local authorities in Sourou whereas it was only mentioned by local inhabitants in Higa.

Maintaining and even increasing the number of trees was generally considered the most important strategy for solving many environmental issues, according to ten local authorities. They emphasized the importance of caring for newly planted trees, watering them and especially protecting them from being tramped down and browsing. Livestock protection measures included fencing an area, using baskets or bricks to protect each plant individually, or installing a guard (see also Photo 4.8).[35] Other important conservation strategies were awareness raising and education. In Sourou, the use of fuel-efficient stoves and reducing bush fires were also regarded as important (see also Photos 4.9-4.12).

Attitudes towards birds show a similar divide to that seen with the local inhabitants' views. Several reasons not mentioned by local inhabitants were mentioned by the local authorities, especially in the category benefits, but most reasons overlapped (see Table 4.5). The most commonly voiced opinion (nine of the 13 respondents) was that birds are part of a larger whole, including human life and the environment (that needs birds to survive), and that all living things should be treated with respect.

*Table 4.5* Reasons behind local authorities' positive perceptions of birds in the research areas

| Category | Reasons |
|---|---|
| Indicator | 'indicator of the rainy season', 'owls and parrots predict the future' |
| Aesthetic value | 'they are living things', 'can show future generation', 'part of the environment', 'beautiful to see', 'nice to hear them sing', and 'consuming wild birds' |
| Food and trade | 'consuming wild birds' |
| Benefits | 'seed dispersal', 'oxpeckers eat ticks & parasites from livestock', 'vultures clean carcasses', 'pollination of trees', 'they reduce insect populations' and 'attract tourists', and 'the environment needs birds to survive' |
| Other reasons | 'the environment needs birds to survive' |

[34] lso, a greater diversity of conflicts was mentioned, including between pastoralists and farmers (Sourou 1, Higa 3) and between residents and migrants (Sourou 1). However, conflicts were never thought to be common, and two local authorities suggested that conflicts have not occurred (see also Box 4.1).

[35] Several related issues include time-consuming and expensive baskets and bricks that can easily get stolen. A forester suggested that the village development councils (*conseil villageois de développement*) should be made responsible for specific planted areas.

The most frequently suggested bird conservation measures (six of the 13 respondents) were related to hunting and included a ban on hunting, preventing illegal hunting, and raising awareness regarding hunting legislation. Other actions mentioned included (protecting the river bank by) planting (fruit) trees, introducing bird species from elsewhere, taking better care of the environment, improving soil conditions, and creating a conservation area. All interviewed local authorities were positive about bird conservation and one indicated that action was needed to prevent them from disappearing, while someone else felt that it was not considered a priority for the community.

Children's[36] responses differed markedly from those of the adults interviewed and the children interviewed had trouble coming up with reasons or examples to support their answers. Two of the eight interviewed children did not value the environment at all, four children valued the environment for the food, wood, agriculture, trees and fruits it provided, and two did not know why they saw the environment as important. Like the adults, the children's perception of major issues did not generally include environmental issues, except for the problem of poor soils (mentioned by four of them).[37] However, unlike their parents, two children did not see any threats to the environment, while the other children mentioned a lack of rain, general environmental degradation, decreasing soil fertility, flooding, bush fires, and especially declining wood supplies and trees. Possible solutions given by the children included surveillance by the authorities regarding compliance with the law, education, planting tree seedlings, and taking better care of trees.

Five of the children interviewed tended to think that birds were important because they could be bred and traded. No other values were mentioned. Three children did not value birds at all, because small birds feed on the crops. One girl from Sourou was convinced that owls were evil because they fly around at night and kill children, which was a story her mother had told her.[38] Three children thought birds were threatened and hunting was the only perceived threat to them. The children were positive regarding bird conservation, although one child was explicitly negative towards small birds because they feed on crops. The children's knowledge of hunting legislation varied and none of them was familiar with the system of hunting permits.

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[36] Two boys and two girls in each of the two research areas.

[37] Like their parents, the children did not perceive conflicts as being common: none suggested environmentally-related conflicts, and three children suggested that land conflicts exist (between the resident inhabitants, including issues about livestock eating crops in Higa) (see also Box 4.1).

[38] In the traditional African belief system, witches can turn into nocturnal animals at night, including in the form of an owl. So when people see owls, they may think they are witches who are on a mission to kill, destroy, or harm. Killing these animals is believed to be a way of destroying and disabling witches (Butterflies & Wheels 2014; Williams *et al.* 2014).

*Photo 4.8* Wooden baskets are sometimes installed to protect tree seedlings from livestock

*Photos 4.9-4.12* Different types of fuel-efficient fire stoves

Fuel-efficient stoves reduce the amount of wood needed for cooking (as opposed to cooking above open fires), and were therefore regarded as important by local authorities.

# Discussion

*Environmental perceptions*

Many Africans make a sharp distinction between their village and the natural environment (alias 'the bush'). In the Sahel in Mali, for example, people cultivate millet, which is a major staple food, and grow vegetables in their gardens around the village, while they collect firewood, timber, meat, relishes, tree fruits, cattle fodder, and various medicinal herbs in the bush (Ingold 2011). This distinction was not made by the inhabitants of Sourou and Higa, who commonly saw the bush and the immediate surroundings of the village as their natural environment and one that supports all aspects of life, including agriculture. Similarly, according to the Dogon in Mali, the bush's value extends beyond just a list of its products and is the source of life itself (Ingold 2011).

The Millennium Ecosystem Assessment (2005) recognizes four categories of ecosystem services: supporting; provisioning; regulating; and cultural. The majority of the perceived values in this study can best be attributed to the first two categories, including the environments capacity to support agriculture and the provision of wood, water, and food. Ingold (2011) argues that there are essentially two ways of acquiring a livelihood from the natural environment: production (agriculture) and collection (gathering wood, water and food). The main environmental values in Sourou and Higa are linked to procuring a livelihood, but despite the fact that most people have livestock, the function of the natural environment as a grazing area was seldom mentioned. The category of regulating was less important for them than the supporting and provisioning categories and included the environment's role in combatting desertification, averting erosion and winds, and trees attracting rain. The least prominent was the cultural category that involved seeing and enjoying wild animals and the environment radiating peace and calm.

Trees were the most important aspect in people's perceptions of environmental values, problems, and solutions. They were especially valued for their wood,[39] the unsustainable use of which has led to a serious loss of trees according to local inhabitants. Similar to the results from Audet-Bélanger's (2010) study in Ghana and from Lindskog & Tengberg's (1994) study in northern Burkina Faso, the loss of forest and trees, especially big trees, was seen as an important environmental change. At least in Sourou, the decrease in the number of trees was such a problem that inhabitants from the more forested community of Yo, which is about

[39] Notably, branches of trees are often cut and used as browse for livestock, but this was never mentioned as an important aspect of trees (see also Burkina Faso 2011). Boffa (2000) indicates that most subsistence farmers in the Sahel consider trees as an integral part of agriculture, as trees are maintained on their farmland to provide medicines, wood, and basic food commodities. These food commodities are of nutritional importance to a large number of people in rural areas (*Ibid.*)

5km away, complained that people from Sourou regularly came to cut down trees in their community.[40] The emphasis on the lack of trees as an environmental problem was evident, but the focus on trees was even more pronounced in people's conservation perspectives. This could be related to Burkina Faso's reforestation policies that include tree-planting schemes, such as those at community (*forêts villageoises*) and department (*forêts départementales*) level (UICN 2013; Burkina Faso 2004). Sourou and Higa inhabitants encouraged these and other environmental conservation measures and were willing to take action.[41] There are various community organizations (COs) in Sourou and Higa that frequently arranged tree-planting activities (Van den Bergh 2014). This was virtually the only conservation-related activity noted among the COs besides environmental awareness raising and fishing with nets with larger mesh sizes.[42] Two of the thirteen COs investigated had explicitly stated conservation-related objectives (among other objectives). In their study of communities in Nepal, Muller-Boker & Kollmair (2000) found that institutional regulations and the organization of actors and communities were a consistent part of peoples' responses to solving environmental issues. By contrast, this was almost never mentioned in Sourou or Higa, which might be related to the fact that there are already many COs in these communities.

Although everyone interviewed felt that (serious) environmental problems existed, fewer than two-thirds of them mentioned these when asked about the major concerns they had in their lives. Considering that many inhabitants had stressed the importance of the environment and the severity of environmental problems, these results may highlight the perceived seriousness of the other problems. Environmental problems may be of less immediate importance to them than, for example, a hospital and include more long-term issues such as forest degradation. Muller-Boker & Kollmair (2000) noted similar results in communities in Nepal where only a few interviewees mentioned environmental problems, such as those mentioned by people in Sourou and Higa, namely erosion and poor supplies of firewood.[43]

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[40] This shows that at least some local environmental issues, namely a shortage of trees and wood, have started to affect neighbouring communities and could potentially lead to conflicts. In several studied communities in southern Mali, woodcutting by outsiders is even seen perceived to be the main human-induced cause of degradation (Tappan & McGahuey 2007).

[41] For example, the Imam of Tankougounadié (Higa) explained how he preaches about environmental matters, including the dangers of bush fires and the importance of protecting the environment and planting trees.

[42] Similar results were noted by Grootaert *et al.* (1999) who undertook extensive research among local social organizations in Burkina Faso. Youth organizations and environmental organizations accounted for the smallest categories and the latter group was geographically limited to northern Yatenga Province. Environmental organizations focus almost exclusively on limiting erosion and reforestation.

[43] In relation to this, Infield & Namara (2001) argue that communities sometimes fail to recognize the actual benefits of conservation. They are primarily interested in development contributions rather than conservation support or the provision of access to resources.

And finally, observations and informal conversations revealed that some inhabitants violated environmental laws, such as the capture of and trade in protected species, even those who participated in conservation projects. As in other parts of the world (Muller-Boker & Kollmair 2000), solutions for environmental issues are sometimes sought through law enforcement. Infield & Namara (2001: 58) refer to Hackel (1999) who

> has commented on the failure of many community conservation projects to make explicit the relationship between efforts to win the support and participation of local communities and law enforcement activities. The contradiction of results showing improving attitudes and continued high levels of illegal resource use to indicate that law enforcement must remain a central aspect.

*Inhabitants' perceptions of birds and bird conservation*

The local inhabitants generally had a positive attitude towards birds and their conservation.[44] People's reasons for their positive attitude were diverse, but similar to the environmental values, they were usually linked to their livelihood(s) (activities). The values of birds were essentially socio-cultural (see Table 4.4, category 'indicator', 'aesthetic value', 'benefits', and 'other reasons'), and, to a lesser extent, socio-economic (see Table 4.4, category 'food and trade' and 'benefits'). Although there was a considerable difference between the mentioned values in the two areas, in both areas a good number of inhabitants indicated that they are valued as food source. Owusu (2008) noted that the major reason for a positive attitude towards bird conservation in three Ghanaian villages was the local peoples' use of wild birds as a food source. Although conservation and hunting may appear contradictory, this was also a reason for a positive attitude towards bird conservation in Sourou and Higa, though not a major reason. This attitude arguably implies that hunters see that wild game is in need of sustainable hunting practices. The second most important reason noted by Owusu (2008) was that birds serve as useful indicators, namely of the presence of pests (insects) and the best time to plant, and they also act as an omen or can bring good luck. Although this was seldom mentioned as a conservation incentive in Sourou and Higa, many inhabitants attributed this indicator value to birds. In fact, several people in Higa explained that birds can be seen as an indicator of environmental health.[45] This corresponds with BirdLife's view that birds are excellent indicators of environmental change and are therefore useful in addressing biodiversity issues (BirdLife 2010c).

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[44] For no apparent reason, people sometimes appeared slightly more positive about the conservation of birds than about birds in general.

[45] Similar statements included: 'if you see many birds you know that the environment is OK' or 'I no longer see some bird species that I saw in the past, so I know the environment is not okay now'.

People in Sourou were generally positive about bird conservation, apart from small birds, which were considered pests as they cause damage to agriculture by feeding on local crops. A similar division in opinion regarding the protection of fauna was noted by Muller-Boker & Kollmair (2000) in communities in and bordering on a conservation project in Nepal. Certainly, both indigenous and non-indigenous people are not always concerned with the conservation of all the species in their area (Berkes 1999). Some people near the Nepalese conservation project stated that, given the frequent harvest losses they experienced due to wild animals as well as dangerous encounters with bears, they would rather see some species become extinct (Muller-Boker & Kollmair 2000). In Sourou, too, the negative attitude towards small birds was sometimes so extreme that people would have liked to see these birds disappear from the area; indeed, two female LCG members in Sourou asked if I knew how they could get rid of them. A local government representative in Higa presented himself as a keen advocate of bird conservation but at the same time admitted he sold bird poison to help farmers kill off the small seed-eating birds in their areas. Damage to crops caused by wildlife influences views on conservation and creates negative attitudes, and probably affects behaviour as well (Kideghesho *et al.* 2007; Infield & Namara 2001), specifically regarding birds (Owusu 2008). The reason given by the few interviewees in Sourou and Higa who expressed themselves negatively towards all birds, was that small birds are perceived as a pest. This essentially means that a negative perception of small birds can lead to an overall negative perception of birds in general. As Kideghesho *et al.* (2007: 2214) state, "a growing research-based literature indicates that support to conservation is often compromised in situations where peoples' interests and livelihoods are threatened." And Adams (2003: 138), referring to Africa, says that "it is widely argued that conservation will either contribute to solving the problems of the rural poor who live day to day with wild animals, or those animals will disappear." Finally, although perceived as a major bird-related issue by a small majority of people, birds as pests were never mentioned among peoples major concerns. Of all those asked about environmental issues, only a few from Sourou mentioned birds as pests, and those were seed-eating birds that feed on crops.

The results from Sourou and Higa about peoples' incentives for bird conservation show considerable overlap with the results of Muller-Boker & Kollmair (2000) about incentives for protecting the environment. Similarly, these focused mainly on respondents own interests,[46] followed by aesthetic features.[47] In Mul-

[46] In Sourou and Higa: 'can hunt and eat birds'; 'collect their eggs to grow at home' (guinea fowl); and 'can use some parts of birds against diseases' (although the person who mentioned this did not know any details about this alleged use). Less in respondents' own interests but more community focused were responses that included 'indicator of healthy environment' and 'tourists come to watch which brings money into the community'.

ler-Boker & Kollmair's (2000) study, the incentives also included a few religiously motivated factors. In Sourou and Higa, such reasons were never mentioned, although, arguably, religion did play a role, as will be discussed in the next section.

*Local context and individual characteristics*

The chances of unravelling the influence(s) of local context and individual characteristics on local perceptions were the greatest for people's perception of birds as these included the most respondents. Nonetheless, there were some marked differences between the perceptions of the population of Sourou and Higa regarding the environment, birds and conservation. The influence of local context can be explained by means of three variables: environmental conditions; local events; and the level of (human) development.

i) Higa has a more arid and hilly landscape compared to Sourou and lacks irrigation systems, which explains why (rain) water shortages and soil (conservation) issues were (more) commonly mentioned there than in Sourou. Also, birds were valued as indicator of where water is located. On the other hand, in the Sourou river basin, (conservation) issues related to surface water, including protecting river banks and conflicts with Hippopotamus *Hippopotamus amphibius*, were regularly mentioned. In the more sparsely vegetated Higa, the lack of and decline in numbers of trees was of greater concern than in Sourou, regarding both their livelihoods, birds and conservation.

ii) Building river dams to control water levels was only suggested in Higa, not coincidentally in a period when the area was experiencing one of its worst floods in decades. Sourou, on the other hand, was coping with many bush fires, and reducing these fires was regarded as important by the local authorities. In Sourou, where development interventions are more common, which hypothetically could reduce incentives for local initiatives, passive or indirect conservation measures (such as getting help, and receiving or having money) were more often mentioned than in Higa. Also in Sourou, fuel-efficient stoves were recently introduced by development actors and these were also regarded as important by the local authorities in this area.

iii) People in the less developed Higa area appeared to be more reliant on, and connected with, the environment. For instance, several interviewees indicated that the natural environment was important for everything. Also, environmentally related issues were mentioned by almost all respondents when referring to general issues. Birds also played a more 'traditional' role, such as that they warn of possible dangers, such as snakes and other predators, and are seen as an indicator of environmental health. On the other hand, the use of chemical fertilizers and the increase in agricultural area was only mentioned as an environmental problem in the more developed Sourou area.

[47] In Sourou and Higa: 'so children will know different species'; 'beautiful to see'; but also emotional features such as 'I don't like [the fact] that birds die'.

The local context does not seem to explain some of the consistent differences in perception between the two research areas. In Higa, for example, hunting was a commonly perceived threat to birds that was not mentioned in Sourou, although hunting was more regularly observed in Sourou. The inhabitants of Sourou were generally more positive about the status of bird populations than the inhabitants of Higa. This is surprising as Sourou is much more developed and, consequently, has much less natural habitat left for birds, except in some flooded areas. However, birds were considered to be more common in Sourou, which might be partly related to the relatively large numbers of conspicuous water birds and huge flocks of seed-eating birds. Based on a study of three villages in Ghana, Owusu (2008) found that an important reason why people did not see bird conservation as important was that birds were already perceived as being numerous. Indeed, compared to Higa, the inhabitants of Sourou were more critical regarding bird conservation, but the argument that birds were common was never mentioned as a reason for opposing their conservation. The differences in attitude to conservation might be explained by other factors, such as pests or religion, as will be explained below.

Besides local context, the individual characteristics of respondents also influenced people's perception. The individual characteristics i) gender and ii) education level appeared to show some influence, but the more distinct influences were noted from the characteristics iii) livelihood activities; iv) religion; v) LCG (board) membership; vi) local authority; and vii) age (i.e. children: 12-16 years). The main impacts of these characteristics are summarized as following: i) The often negative perception of the female respondents regarding small birds did not lead to a negative perception of birds in general, which was often the case with men. ii) A higher level of education was relatively more often associated with a negative perception of (small) birds. Although the differences were perhaps too small to talk of a substantial and consistent difference, a possible explanation could be the fact that such people were often those with salaried jobs who were less connected with the environment and birds. iii) The people who were more dependent on subsistence farming, i.e. the population with predominantly agricultural livelihoods, were markedly more negative towards small birds (and their conservation), which should be linked with the threats that birds pose to their crops. Fishermen were less concerned with the decline in the number of trees, but were, for obvious reasons, more concerned with (unsustainable) fishing issues.

Some livelihood characteristics were more common in one of the two research areas, often because of the local context, and in these cases individual characteristics and local context overlap. For instance, in Higa, which has a greater pastoralist population, overgrazing and land zoning (including setting livestock grazing areas) were important issues, while in Sourou, which has a larger fishermen pop-

ulation, (unsustainable) fishing issues were often mentioned. Similarly, in Higa birds (including vultures) were valued as indicator of where dead livestock is located. More inhabitants in Sourou than in Higa had a negative view of small birds and their conservation. One might initially think the difference could be explained by the fact that these birds are less numerous in Higa[48] and the pest situation would therefore be less severe.[49] However, iv) virtually the entire population of Higa is Muslim and it was largely the Christian population in Sourou that viewed small birds and their conservation negatively. Religion is arguably a key factor in determining people's attitudes to birds and their conservation. Environmental values and attitudes in Africa have been influenced by Islam as Muslims are expected to show responsibility towards the environment (McBeath & Rosenberg 2006; Bagader *et al.* 1994). There are passages in the Koran that promote a positive attitude towards bird conservation. These include "whoever is merciful even to a sparrow, Allah will be merciful to him on the Day of Judgment" (khaleafa.com 2014) and "who has hurt the feelings of this bird by taking its young? Return them to her" (McBeath & Rosenberg 2006: 28). On the other hand, the Bible has approximately 300 references to birds and they have a symbolic or figurative role as well as an important role in sacrificial offerings (Studylight.org 2014). The Bible endorses respect for nature and birds: "(God said) [...] let the birds increase on the earth" (Genesis 1:22). However, it also states "(God said) rule over [...] the birds in the sky" (Genesis 1:28) and "(God said) [...] let them (people) have dominion over the fowl (birds) of the air" (Genesis 1:26). It is hard to deny that dominion resonates forcefulness and violence (Burggraeve 1993).

The v) LCG (board) members were more aware of bird(s) and conservation issues and were also more positive towards their conservation, which is undoubtedly related to their close relation and collaboration with a conservation organization (*NATURAMA*; see also Van den Bergh 2014). Similarly, due to the LCGs frequent collaboration with the local authorities, the LCG (board) members perceptions match those of the local authorities, vi) at least regarding the emphasis on protecting (planted) trees, preventing bush fires, and the consistent perceived importance of reducing hunting pressure as a bird conservation strategy. vii) Children's perceptions differed markedly from those of the adults interviewed. They appeared less connected with the environment and birds. For example, several interviewed children did not value the environment and birds at all and the

[48] This is undoubtedly related to the farming conditions and includes less extensive fields. In particular, the smaller area of small-grain cereal crops, including sorghum, millet, and rice, on which these seed-eating birds feed (see also Elliot *et al.* 2014; Jackson 1974).

[49] Interviews were conducted in different seasons in both areas, including at harvest time when damage by birds is most serious (Owusu 2008).

only value mentioned for birds by the other children was that they could be bred and traded.

## Concluding remarks and implications for conservation

Although environmental issues are not always among people's main worries in this region, the environment is seen as being highly important to their livelihoods, and also for their coping strategies and their socio-cultural values. Birds are often considered an integral part of the environment and play numerous roles in people's lives, sometimes directly related to their livelihoods.[50] Birds are seen by some inhabitants as an indicator of environmental health and are therefore useful in addressing conservation issues. Many believe that bird populations are being threatened and declining, and various (human-induced) causes have been suggested, some of which overlap with those found in the literature on A-P migrant birds threats, such as deforestation and the exploitation of birds (Mihoub *et al.* 2010; Zwarts *et al.* 2009; Thiollay 2006a).[51] However, existing literature on this topic is based on very limited field research in the Sahel and little is known about the link between environmental change in the Sahel and the numbers of migrant birds that winter there (Adams *et al.* 2014). Adams *et al.* (2014) have established that two land-use changes. for which most evidence exists, namely the loss of wetlands and fewer trees in woodland habitats, are impacting negatively on birds, although not on all species. It has been suggested that the most critical Sahelian land-use change for birds involves the extent of trees and scrub in rural landscapes (CCI 2010b).

Trees play an essential role in local inhabitants and authorities perceptions of the environment and conservation including specific aspects related to birds. Trees also have a (perceived) crucial link with local livelihoods and affect, for example, flooding levels and soil degradation. Trees form an important and visible link between bird conservation and livelihood improvement. Seedlings are regularly planted by the communities and LCGs, but the long-term success rate of such planting has been limited and many have died due to a lack of water, livestock browsing, and trampling. A lack of care for the planted trees was noted (Van den Bergh 2014). Similar results were noted by Adama Belemvire (director of *Études Action Conseils*, *pers. comm.* December 2014). Assigning reforestation resources to protect and care for planted trees is suggested and staff who look after these areas should (partly) be rewarded according to proven results. Indeed, Larwanou & Saadou (2011) mention positive results from sites in the Sahel zone

[50] Including as coping strategy, namely hunting wildlife, including birds, in periods of extreme drought.

[51] Two factors mentioned in the literature, namely the spraying of chemical pesticides and overgrazing, were not mentioned by local inhabitants. Related aspects, including chemical fertilizers and a decline in vegetation, particularly the herbs, were however touched upon.

of Niger where farmers took care of trees, including through the preservation and protection of planted trees and the monitoring of cutting. They also note that water harvesting techniques and farmer-managed natural tree regeneration can accelerate the rehabilitation of tree diversity. According to Bernd de Bruijn (senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* November 2015), several projects in Burkina Faso have shown that regeneration proved to be more successful than reforestation efforts, and Reij (2000) indicates that initiatives based on farmers protecting and managing natural regeneration on their farms and/or off their farms, is a low cost and effective way to achieve regreening (see also Botoni & Reij 2009).

One often recurring aspect in both environmental and bird conservation perceptions is the importance of raising awareness and education about these issues (Photos 4.13 and 4.14). This overlaps with the current lack of law enforcement. Little was known about hunting and environmental legislation and education could contribute to a better understanding. Birds help to control insect levels but this was not often mentioned by interviewees in this study, although those in Higa did talk about a serious locust plague in 2010. Using chemicals against locusts, grasshoppers, and other insects was suggested, but raising awareness could highlight the important role that birds play in reducing locust and grasshopper numbers.[52] Apart from LCG members, few inhabitants were aware of the many migrant birds from Europe that winter in their area. Among those who did know about them, this was a source of pride and another reason for protecting them.

Inhabitants' perceptions and conservation incentives were influenced by local context and individual characteristics. These variables should therefore be considered and used to direct conservation in a more efficient manner, targeting the issues that matter to local inhabitants. For example, stakeholder groups can be used to address individual characteristics, including livelihood, local authority, and children groups, but also churches and mosques. LCG members held similar views to non-members but were generally more positive about bird conservation. Infield & Namara (2001) suggest that involving local inhabitants can produce significant improvements in conservation attitudes. Children were generally less connected with the environment and birds and showed less interest in conserva-

[52] About 90% of Burkina Faso's population is engaged in subsistence agriculture (CIA 2014). However, the agricultural yields of these farmers can be seriously impacted by grasshoppers and migrating infestations of locusts, with the country's Sahel region being the worst affected. Grasshoppers are an annual problem, while locusts are erratic and the damage they cause varies greatly over time periods of ten to twenty years. Many locusts and grasshopper species are considered pests in Burkina Faso and chemicals are being used for control purposes. Various studies have shown the important role bird species play in reducing grasshopper and locust numbers. In Africa, 537 bird species from 61 families prey on locusts and grasshoppers and many of these are found in the Sahel: raptors; herons; storks; crows; and songbirds. The abdim's stork's (*C. abdimii*) movements are even in synchrony with the seasonal movements of grasshoppers, at least in Niger (USAID 1991; Zwarts *et al.* 2009).

tion issues. Moreover, while children regularly hunted birds with slingshots, none of them were familiar with the system of hunting permits. Together with teachers and curriculum developers, a relevant and meaningful approach needs to be developed to educate youngsters about hunting legislation and the environment, including about birds and their contribution to the quality of people's lives in the region. Similarly, local context should be considered, including the area's specific environmental conditions, the occurrence of local events, and the level of human development. For example, after the occurrence of recent floods and (associated) erosion issues, the trees' capacity to prevent or limit floods and erosion can be explained to promote the protection and planting of tree seedlings. Further, conservation actions that are relevant for the inhabitants' local environment should be communicated, as should those, albeit to a lesser extent, that are relevant to the wider environment. Similarly, issues should be addressed that are relevant in developed or less-developed areas, according to the local context, including through understanding the level of reliance on, and the level of interrelation with the natural environment.

Inhabitants' conservation incentives were mainly focused on people's own or their communities' interests. Not surprisingly, when livelihoods were under threat, conservation incentives diminished. Conservation should therefore address the issues of bird pests for crop cultivation. Elliot *et al.* (2014) have indicated that pesticide spraying and the use of explosives as standard practice to control bird-breeding colonies or roosts that threaten crops in Africa have negative side effects that affect non-target species and also the environment. With further refinement and the establishment of proper regulations, using mist nets to control colonies or roosts would seem likely to be a viable alternative to the spraying of pesticides. In addition, any birds caught can be used as food for local people (Elliot *et al.* 2014).[53]

Although most of the literature on local environmental and conservation perceptions is limited to protected areas (see e.g. Tessema *et al.* 2010; Infield & Namara 2001; Gillingham & Lee 1999), most of the world's biodiversity is not in protected areas but on lands and waters used by people for their livelihoods (Berkes 2013). The research areas selected had no protected status. Creating protected areas is unlikely to be effective for migrant (land) bird conservation as many species are found in relatively low densities across the wider agricultural landscape on land that is owned and managed by rural people who are living in extreme poverty (Adams *et al.* 2014; Bernd de Bruijn, senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* November 2015). The crea-

[53] However, according to several Sourou inhabitants, small birds are rarely consumed because there is virtually no meat on them. Elliot *et al.* (2014) indicated that people in some regions are not interested in eating birds such as queleas (*Quelea*), although at least part of the population in most countries regards them as a valuable addition to their diet.

tion of protected areas was suggested by only one interviewee. Instead, promoting sustainable land-use practices that contribute to habitat restoration and conservation as well as better livelihoods for local people would seem more appropriate (Van den Bergh 2014). This current study has highlighted how poor, rural people are mindful of the crucial relationship between their livelihoods and the natural environment, in which birds play a multitude of roles and local inhabitants demonstrate a positive attitude towards (bird) conservation, provided that their own livelihoods are not threatened.

*Photos 4.13 & 4.14* Awareness raising and education can be valuable conservation tools

To conclude, the lives and livelihoods of the local inhabitants were strongly interrelated with the natural environment, mainly through the environment's supporting and provision services, which were both linked to procuring a livelihood. Similarly, bird values were often linked with people's livelihood (activities). In addition, aesthetic value was frequently attributed to birds. Indeed, peoples' incentives for bird conservation focused mainly on respondents' own interests, followed by aesthetic features. Bird conservation should therefore focus on positive links between bird(s) (conservation) and individual livelihood aspects. Increasing the number of trees is the most important aspect in this regard. This should be stimulated at local (farm) level, or at most at community level, thus linking it to people's own livelihood. Furthermore, some (of the earlier mentioned) less well known (potential) conservation incentives should be explained and promoted in such a way that people can recognize the actual benefits of conservation. Thus, local inhabitants have to understand that certain conservation measures are in their own interests, and conflicts with wildlife should be addressed. The many aesthetic values, particularly for birds, serve as conservation incentives, which

can be facilitated by communicating and promoting these values. This does not mean, however, that conservation action should be entirely voluntary, and that law enforcement can be neglected. On the contrary, the two concepts are not mutually exclusive and both should be pursued. Importantly, the conservation efforts should take into consideration local context and individual characteristics, to make them more efficient, effective, and relevant for the targeted population. When the above aspects are taken into account, bird conservation can positively contribute to local inhabitants' livelihoods and socio-cultural values, specifically in a way that they themselves value.

# 5

# Who is in charge? The social interface of sustainable development actors and the local population in Burkina Faso

## Introduction

The ways decisions are taken is set by the (formal and informal) rules and meanings of the decision-making process (Engberg-Pedersen 2003; North 1990). North (1990) has described this as the concept of 'institution'. "Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape interaction" (*Ibid.*: 3). Participants of decision-making processes prefer a set of rules that give them the most advantageous outcome, and disagreement among the actors can therefore arise regarding which institution to choose (Ostrom 2015). The actors'[1] interpretation and their ability to adapt ensures that there is no straightforward relationship between the rules and meanings and the decision-making. Nonetheless, a lack of correspondence between decision-making and rules does not mean that decision-making is free-floating; meanings and rules generally have a strong influence (Engberg-Pedersen 2003).

An encounter between individuals and groups belonging to different social systems, professions, or levels of social order have been described by Long (2001) as a 'social interface'. Encounters at the interface can either take the form of struggles and conflicts or of agreements and fair collaboration. Conflicts commonly arise over access to resources, definitions of development, and the roles to be played by the various actors. The interface between the local populations and development actors often takes the form of struggles and conflicts as the two groups have different principles, knowledge, strategies, and ideologies. The groups are not homogeneous, however, and interests and strategies may or may not overlap (Engberg-Pedersen 2003).

Donors and development actors should be aware that interventions are not always taken at face value or exploited in accordance with their official goal. Bene-

[1] In this study, an actor refers to either a person or an organization, depending on the context.

ficiaries of projects may select what they find useful and use only particular elements of it, often for purposes other than originally intended. Occasionally, beneficiaries will do much, at least on the surface, to comply with project suggestions and requirements in order to obtain access to resources controlled by projects and non-governmental organizations (NGOs). The willingness to create or retain local organizations at the behest of donors can be one reflection of this, as can the construction of token developments projects, such as school buildings and tree plantations. Potential beneficiaries sometimes give appropriate responses to any enquiry from donors and development actors and use appropriate language, including terms such as poverty alleviation, democracy, creating signs of harmony, collective action, participation, and so on, to attract and convince donors (Engberg-Pedersen 2003; Marcussen 1999; Michener 1998). In natural resource management (NRM), the accountability of all actors is critical. The use of multiple accountability methods, such as regularly auditing of projects, public access to information, and public display of financial expenditures, is therefore necessary, even with democratically elected (government) agencies, as elections are not sufficient to ensure accountability (Wangui Chomba 2015). Also, it is essential that NRM policies are debated, readjusted, and validated by stakeholder groups to enhance genuine local legitimacy (Diallo *et al.* 2012).

This chapter's objective is to increase insights into conservation and sustainable development interventions in Burkina Faso's Sahel region, in particular regarding the interaction between development agencies and local populations. The study includes the perceptions of a diverse and interlocked world of actors, with a focus on local inhabitants. It therefore uses an actor approach as opposed to a structural, institutional, and political economy analysis (Long 2001). It includes actor-defined issues such as unfair trade, unsustainable land-use, and declining biodiversity. The researched arena (see also Long 2001) is (global) decentralization policies in Burkina Faso. As such, it addresses the following research question:

*How does collaboration between development actors and the local population take place and how is it valued by the local population?*

This study focuses on sustainable rural development (including conservation) interventions and it supposes that local participation and empowerment are important aspects in these sectors. Mosse (2005, 2004) suggests that development workers have different ideas about such local collaboration than their organizations' policies prescribe. The former assumption and the latter suggestion are addressed in sub-question 1:

## *Local collaboration in Africa*

In many African states community-based organizations, local governments, NGOs and African scholars have acquired a significant role in NRM. The environment and natural resources have always had a key position in African politics, and attention for environmental policies has further increased since African scholars and NGOs have gained more prominent positions in key development debates (Oyono & Ntungila-Nkama 2015; Coulibaly-Lingani *et al.* 2011; Fabricius & Koch 2004; Venema & Van den Breemer 1999; Shaw & Malcolm 1982). Local participation, empowerment and decentralization have been supported in NRM with the aim of increasing efficiency, benefitting the environment, and contributing to equity and rural development. As a result, conservation and development actors involved local populations in their projects (Roe *et al.* 2006; Ribot 2003; Gray 2002; Ribot 1999; Brosius *et al.* 1998). The participation of local communities "can be used as a basis for the modification of the design of a project, programme or policy in order to make it more acceptable and more effective in achieving the objectives and priorities of communities" (Sumner & Tribe 2008: 143).

Thomas (2013) indicates that international conservation organizations have established global conservation priorities and have been criticized for setting an agenda that does not take local conditions and priorities into account. In Sub-Saharan Africa, existing local organizations have been overlooked by development actors and, apparently, little attention has been paid to the diverse interests among different social groups, leaders, and non-leaders (Ribot 2003; Benjaminsen 2000). A recent series of papers from the *Responsive Forest Governance Initiative* demonstrates the importance of knowing how to include local stakeholders – and which ones – in project phases, for both conservation and socio-political purposes (see also IUCN 2015). For example, Dem Samb (2015) demonstrates that working with women exclusively (e.g. for gender equity purposes) can lead to a negative perception of both the project and NRM in general. Based on an NRM project in Senegal, she shows that this gender policy affected the democratization of NRM since the other social groups (men and youth) felt excluded. As a consequence, gender equity issues amplified in the community and men disengaged from conservation activities in general (Dem Samb 2015). In another example, based on studies in the Democratic Republic of the Congo and Nigeria, respectively, Oyono & Ntungila-Nkama (2015) and Nuesiri (2015), argue that conservation and NRM can only be sustainable when they promote local representation and democracy. This way, local inhabitants feel represented in, and connected to the project (Nuesiri 2015; Oyono & Ntungila-Nkama 2015).

Generally, in African states customary authority is still in place, giving influential but unelected people power. This can undermine the representation of the locally elected government officials (Nuesiri 2012). Therefore, local representation should not only be by elites, i.e. influential people, but also by means of democratically elected local government agencies (Nuesiri 2015; Oyono & Ntungila-Nkama 2015). In an extension of these studies, and based on an NRM project study in Kenya, Wangui Chomba (2015) indicates that projects should only include community organizations that are under the presidency of elected local governments, so that decisions are kept within the realm of local government. Communities involved could learn critical lessons on how to address their needs through elected leaders.

*Local collaboration in Burkina Faso*

According to some scholars (Cleary 2003; Donnelly-Roark *et al* 2001), local populations in Burkina Faso moved from merely passive beneficiaries of development projects to partner positions in locally based development, principally since the country's *Decentralization Law* of 1998. However, it remained unclear what the role of the local communities was (Ribot 2003; Benjaminsen 2000). The government in Burkina Faso arguably devolved insufficient powers and benefits, either to constitute a decentralization or to motivate local actors to carry out new management responsibilities (Ribot 2003). Burkina Faso has informally recognized community-based organizations for a long time, but only since this decentralization law have they been formally integrated into the legal, economic, and institutional framework of decentralization. The country now has a large number of community organizations (Van den Bergh 2014; Cleary 2003; Donnelly-Roark *et al.* 2001). The communities' role in NRM depends a lot on the negotiation power of individual local organizations (Ribot 2003; Benjaminsen 2000). Whether the transfer of NRM to these organizations promotes or undermines representative, accountable, and equitable processes depends strongly on which local actors are being entrusted with resource control (Ribot 2003).

As part of its decentralization policy, Burkina Faso has a decentralized administration that includes a locally elected administration and a centrally appointed administration (Figure 5.1). The administration officers of the former structure are directly elected by the local inhabitants, while for the latter they are appointed by the central government (Consulat Général du Burkina Faso à Paris 2015; Coulibaly-Lingani *et al.* 2011). According to Mathieu *et al.* (2002), as far as land and NRM is concerned, customary authorities have lost influence since the *1984 Land Reform Act* as this act defines the entire rural land as national domain. However, in her paper on local governance institution for NRM in Mali, Burkina Faso, and Niger, Hilhorst (2008) argues that customary authority continues to

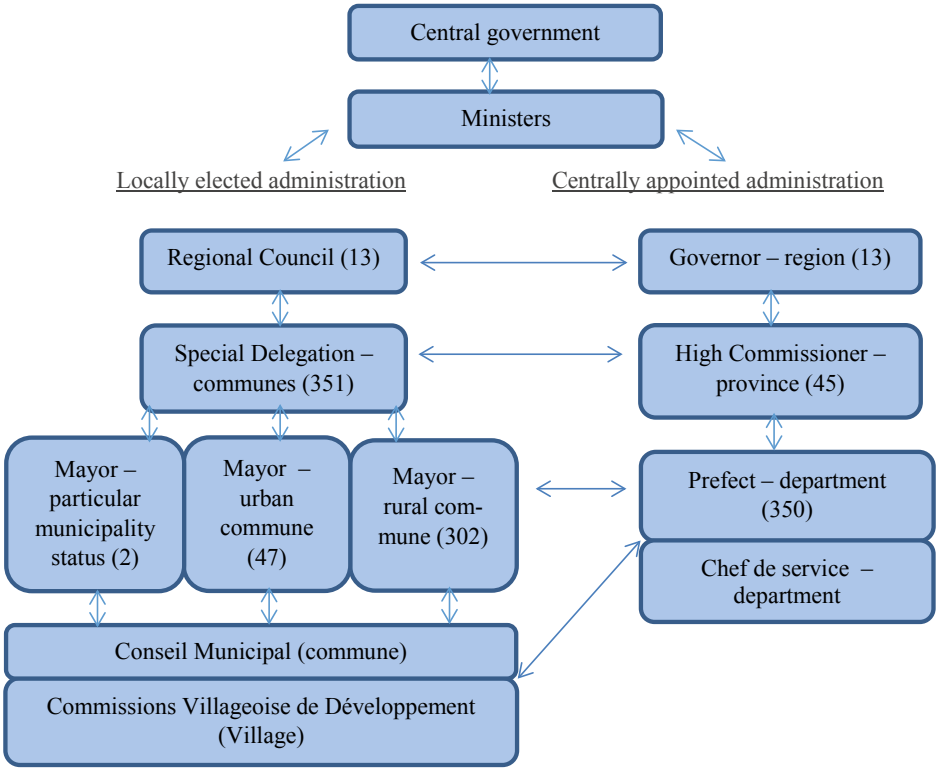
play an important role in NRM, especially in remote areas where government presence is more limited. Furthermore, for the locally-elected administration, local populations often elect former traditional chiefs (i.e. customary authorities; Boukari Ouédraogo, communication officer of *Inades-Formation Burkina-Faso*, *pers comm*., March 2014). Coulibaly-Lingani *et al.* (2011) indicate that conflicts over decision-making power have arisen between the many actors, including the central government, local elected officers, customary authority and community organizations. In addition, the contemporary development and conservation domains in Burkina Faso are also strongly influenced by many national and international organizations, such as donor, research, and development organizations, including many (international) NGOs (Engberg-Pedersen 2003; Enée 2010; SP/CONAGESE 1999).

At the village level, following the establishment of elected local governments in 2006, *Commissions Villageoise de Développement* were installed in 2007. These councils act as intermediates between the local population and the local government and are intended to contribute to development and the implementation of communal plans. Each council consists of 12 members, including two who are responsible for land issues and NRM, including forestry. The composition of these commissions should be a representation of village interests; they are elected by the local population (Coulibaly-Lingani *et al.* 2011; Hilhorst 2008). One administrative level higher, at the commune[2] level, the *Conseil Municipal* acts as the representative council for the local community. The council consists of locally elected members from each village in the commune: two *Conseil Municipal* members for a village with less than 5,000 inhabitants, and three *Conseil Municipal* members for a village with more than 5,000 inhabitants. The council members elect the mayor from among their members, who acts as head of the council (Coulibaly-Lingani *et al.* 2011; Zougouri Abdoul, member *Conseil Municipal*, *pers. comm.* December 2011; Tindano Hamado, Mayor, *pers. comm.* August 2011). The Mayor is the head of the communal administration. As such, it administrates all communal business and organizes industrial, commercial, and administrative services in order to promote and safeguard the public and private interests of the commune (Burkina Faso 2004). The prefect is the head of the departmental administration. As such, he or she is in charge of national interests, law enforcement, public order, and public safety. He/she ensures the implementation of regulations and decisions in the department. The *Chef de Service* is the head of the ministries' technical services at the department level, and include, for example, the *Chef de Service Departmental de l'Environnement et de Développement Durable*. As such, they are in command of their sector in accord-

[2] "A 'commune rurale' usually incorporates a number of other towns or villages as well as the principal town of the area" (Rupley *et al.* 2013: 41)

ance with existing regulations. Officially, they fall under the authority of the High Commissioner, but they are coordinated and controlled by the prefect (Presidential decree 2013 & 2012).

*Figure 5.1* Organization of Burkina Faso's territorial administration




*Source*: Consulat Général du Burkina Faso à Paris (2015); Boukari Ouédraogo, communication officer of Inades-Formation Burkina-Faso, *pers. comm.* March 2014; Coulibaly-Lingani *et al.* (2011).

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The current study explores the interface between local populations and development actors in Burkina Faso. The study does not focus on conditions, context, and 'driving forces', rather, it explores actor-defined issues and events, decision-making processes, and the networks and relationships of actors. It is not so much about differences within sectors and between development actors, but more about general patterns between said actors and the local population. Distinctions between different development actors are therefore often not explicitly named. In this way, the study addresses sub-questions 2:

*How do development actors and the local population perceive their collaboration?*

Understanding the negotiation processes and the different roles played by the different actors is important because "the notion of negotiation is essential in the setting up of 'sustainable' relations between the different types of users and the environment" (Raynaut 2001: 18-19). Ribot (2003) and Benjaminsen (2000) argue that negotiation power is an important element in natural resource management. This leads us to sub-question 3:

*Does the social interface occur in the form of struggles and conflicts or of agreement and fair collaboration; who is in charge of the negotiation process?*

## Methods

### *Study areas*

Field research was conducted between July and September 2011; December 2011 and March 2012; in February/March 2013; between February and April 2014; and again in April 2015. The study areas included two rural research areas – Sourou valley (hereafter referred to as Sourou) and Lac Higa (hereafter referred to as Higa). Sourou (ca. 22,000 ha) is in both Lanfiera Department (12 communities) and Di Department (13 communities) in Sourou Province, in the northern part of the Sudanian biome near Burkina Faso's north-western border with Mali. Higa (ca. 1500 ha) is in Tankougounadié Department (13 communities) in Yagha Province, on the southern edge of the Sahel biome near Burkina Faso's north-eastern border with Niger (Ramsar 2013; Fishpool & Evans 2001; Figure 1.4). The two areas differ in many ways (see Van den Bergh 2014). Most institutions that were included in this study were based in two of Burkina Faso's main urban areas – the country's capital Ouagadougou and the country's second largest city Bobo-Dioulasso. On some occasions, depending on the actors' activities and office locations, research was conducted outside these areas.

### *Website examination*

An examination of the development actors' websites provided useful information on local collaboration policies (see also Ybema *et al.* 2009). The mission statements (or equivalent section) on the websites of thirty development actors were examined for references to local involvement and, specifically, references to decentralization, participation and empowerment (policies) (Annex 5.1, and Tables 5.1 and 5.2).

*Interviews*

Semi-structured in-depth interviews were held with the local population and with development actors. Among the local population were (board) members of community organizations (COs), community and religious leaders, and semi-randomly[3] selected local inhabitants. Among the development actors were government officials, NGO staff, bioagricultural and social business employees (Annex 5.1, Tables 5.1 and 5.2). In total, 88 interviews were conducted, 60 with development actors and 28 with local inhabitants. The semi-structured style provided a systematic approach while still allowing freedom in the sequencing of questions, and in the amount of time and attention paid to each particular question. Some questions proved to be unsuitable for particular interviewees, while additional questions were included when needed (see also Robson 2002). In addition, some freedom was given to the interviewees regarding the exact discussion topic. The purpose of this interview style was to bring unknown issues to light and to discover what the interviewees perceive to be important issues and topics.

*Table 5.*1 Development actors: research numbers and abbreviation

| Development actors | National | International (I) | Abbreviation |
|---|---|---|---|
| Government (department) | 3 | 3 | (I)GO |
| Non-governmental organization | 2 | 14 | (I)NGO |
| Research institute | 3 | 1 | (I)RI |
| Business | 2 | 2 | (I)BS |
| Total | 10 | 20 | 30 |

*Table 5.2* Local population: details and number of interviewees

| Local population | Details | N. |
|---|---|---|
| (Board) members of 6 community organizations | e.g. farming and conservation organizations | 6 |
| Village representatives | e.g. village development councils and Mayor | 12 |
| Religious leaders | e.g. imam and pastor | 4 |
| (Non-affiliated) individuals | e.g. farmers, herders and fishermen | 6 |
| Total | | 28 interviewees |

[3] Semi-randomly selected local inhabitants refers to a selection of the local population that aims at representing the diversity found among the population, and particularly regarding people's occupation (i.e. land use activities). The selection was made by approaching inhabitants in their homes or fields, on the road, or at local markets. For more details, see Chapter 1, the section on 'Research methods'.

*PADev in Sourou*

PADev (Participatory Assessment of Development) is a participatory and holistic methodology for evaluating development interventions. Information about changes in six domains (natural, physical, human, economic, socio-political, cultural) and the impact of interventions is gathered in workshops in which all layers of the local society participate (Dietz & the PADev team 2013).

In Sourou, 15 PADev-inspired focus workshops were held in 2015 with 33 participants, divided into nine individual and six group (2-6 persons) workshops. Due to security concerns in Higa in (at least) 2014-15 it was decided to not organize any PADev-inspired focus workshops in the area.[4] Workshop participants included board members of six COs (including three women-only groups), four religious leaders (all male), and eight semi-randomly selected inhabitants (3 women). Altogether, the participants discussed and rated 11 projects from 8 actors, most of which were discussed in more than one workshop (Table 5.3). The focus in these workshops was on the PADev 'assessment of actors' exercise, which was used to discover participant's perceptions of interventions and the actors working in the area. In the PADev-inspired exercise, participants were asked to assess the actors working in the area based on various statements:

a) The actor is committed to us in the long term
b) The actor doesn't promise more than they can deliver
c) When something goes wrong they tell us honestly
d) The actor addresses the problems that affect us
e) We have a voice in the type of projects the actor does and how projects are done
f) The actor staff live among us

These statements are considered criteria in this study, namely: 'long term engagement'; 'realistic expectation'; 'honesty'; 'relevance'[5]; 'participation'; and 'local presence', respectively.

It has been observed that "exercises employing the use of stones generated a lot of discussion and engagement among participants because there was an element of 'fun' about them" (Dietz & the PADev team 2013: 18). This exercise type was adapted to maximize the input of all participants. The group was given 30 stones and was asked to score each criterion by placing between 1-5 stones at each criterion listed on a sheet of A1 paper (see Photos 1.4-1.6). The participants respond to the statements by indicating either that they apply 'very much so' (5 stones); 'much so' (4 stones); 'neutral' (3 stones); 'not so much' (2 stones); or

[4] For similar reasons, Achille Ouédraogo, a biology Master's student at the University of Ouagadougou conducted the PADev-type exercises in Sourou in April 2015 (that is after he had already acted as my research assistant).

[5] Generally locally regarded as a synonym for effectiveness.

'not at all' (1 stone). Participants discussed the number of stones for each criterion until consensus was reached within the group.[6]

*Table 5.3* 'PADev' research numbers by type of actor

| Type of actor | Number of actors | Number of projects | Number of workshops[1] | Number of participants[1] |
|---|---|---|---|---|
| GO | 2 | 4 | 4 | 7 |
| IGO | 2 | 3 | 10 | 28 |
| NGO | 3 | 3 | 4 | 7 |
| INGO | 1 | 1 | 2 | 2 |
| Total | 8 | 11 | 20 (15) | 44 (33) |

Note 1: The total number of workshops held was 15, and these included 33 participants. However, several actors and their projects were included in more than one workshop, and as a result a higher total is calculated for the number of workshops and participants, namely 20 and 44, respectively.

*Participant observations*

Participant observations, in which 'first-hand' experience and exploration were key, were garnered from 22 negotiation processes and other interactions between local inhabitants and development actors, namely: one NGO (*NATURAMA*); two INGOs (*Vogelbescherming Nederland* and *BirdLife International*); one IBS (*BioVisio*); one GO (*La Direction Générale des Eaux et Forêts*); and one IGO (GIZ). These interactions lasted between 30 minutes to three days, and included stakeholder meetings, joint project activities, job trainings, and policy, project, and sales negotiations (Ybema *et al.* 2009). The purpose of these observations was to determine which actors lead and direct the conversation, do most of the talking, and to what extent they speak freely and give their opinion.

## Results

*Development actors' mission statements and references to local collaboration*

All 30 development actors (DAs), except for one (government actor), referred to local involvement in some way[7] on their websites' mission statement (or similar

[6] According to the PADev methods, participants should respond to the statements by indicating either that they apply 'always', 'usually', 'sometimes', 'usually not', or 'never', and in that way provide each criterion with a score from 5 ('always') to 1 ('never'). In this study, these scores were often taken as a way of grading, and following their responses could generally better be interpreted as 'very much so', 'much so', 'neutral', 'not so much', and 'not at all'.

[7] Including by referring to: capacity building; engagement; self-sufficiency; autonomy; partnership; collaboration; and cooperation in a local context.

section[8]), either prominently (16; e.g. we support initiatives of local organizations, we ourselves do not start projects), or less explicitly (13; e.g. engaging with local providers in the future). The latter category included mainly national actors and, more specifically, mostly research and government actors. Almost half (14) of the 30 DAs referred to 'participation' (6), 'empowerment' (4), 'decentralization' (3), or all three (1) in a local context (Table 5.4). The national actors' focus was on decentralization, while the international actors put more emphasis on empowerment and participation.

*Development actors' perception of local collaboration*

Local actors were usually not mentioned in the interviews among the DAs' collaboration partners, but instead only cited after having specifically asked about local, on the ground, collaboration partners. Nonetheless, the respondents of the majority (22) of the 30 organizations indicated having strong local partnerships. Although the employees of INGOs placed the most emphasis on the collaboration with local actors, the intensity of collaboration varied, especially between projects and between comparable DAs. In addition, on some occasions it also depended on individual interpretation, experience, and explanation, as they sometimes differed between employees of the same organization, and thus on who was interviewed within the organization. Statements on the collaboration type varied from a bottom-up design approach, in which the locals largely design and implement the project, to a more top-down approach. In the latter approach, the DA is in control and designs the project (sometimes in discussion with locals, but the discussion results are not always incorporated in the project design), which is implemented with 'only' the help of local community members (providing them with little freedom and flexibility). Because DAs earn more respect and have more authority than the local population, it was suggested that certain social and political project aspects are easier arranged by them. Several DAs have suggested that the local participation level depended largely on financial benefits (e.g. from NTFPs, trophy hunting, and tourism), which increased with increased revenues.

The respondents described several ways to approach and collaborate with local communities, including organizing community meetings in which all community members are invited or in which the inhabitants are represented by the Mayor and/or the Prefect, or by the *Conseil Villageois de Développement* and/or *Conseil Municipal*. Other common ways are by approaching existing COs and through

[8] Including: vision; objectives; commitment; corporate responsibility; values; mandate; philosophy; policies; goal; about us; mandate; and presentation.

*Table 5.4* Development actors: Type, sector and mission

| Actor | Type[1] | Sector (principal)[2] | Mission[3] |
|---|---|---|---|
| Ministère de l'Environnement et du Développement Durable (Générale) | GO | Cons./Dev. | x |
| Ministère de l'Environnement et du Développement Durable (La Direction Générale des Eaux et Forêts) | GO | Conservation | x |
| AMVS | GO | Development | x |
| PNUD/UNDP | IGO | Development | 2 |
| CILSS | IGO | Development | x |
| GIZ (GIZ FAFASO) | IGO | Development | 1, 2 & 3 |
| *NATURAMA* | NGO | Conservation | x |
| ONG AGED Burkina Faso | NGO | Development | x |
| Autre Terre (Burkina Faso) | (I)NGO | Development | 3 |
| IUCN (Burkina Faso) | (I)NGO | Conservation | 3 |
| Eau Vive (Burkina Faso) | (I)NGO | Development | x |
| Oxfam International (Burkina Faso) | (I)NGO | Development | x |
| Christian Aid (Burkina Faso) | (I)NGO | Development | 2 |
| Diobass (Burkina Faso) | (I)NGO | Development | x |
| SNV (Burkina Faso) | (I)NGO | Development | 2 |
| CIRAD (Burkina Faso) | (I)NGO | Development | x |
| *BirdLife International* | INGO | Conservation | 2 |
| *Vogelbescherming Nederland* | INGO | Conservation | x |
| Marie Stopes International | INGO | Development | x |
| Broederlijk Delen | INGO | Development | x |
| Thamani | INGO | Development | 3 |
| L'Orange Bleue Afrique | INGO | Development | 3 |
| INERA Institut de l'Environnement et Recherches Agricoles | RI | Cons./Dev. | 1 |
| Université de Ouagadougou | RI | Cons./Dev. | 3 |
| Université Polytechnique de Bobo-Dioulasso | RI | Cons./Dev. | 1 |
| CIFOR | IRI | Cons./Dev. | x |
| Gebana Afrique | (I)BS | Development | x |
| Anatrans | (I)BS | Development | x |
| Biovisio | IBS | Development | x |
| Roxgold | IBS | Development | 3 |

Note 1: The type of actor involved: some international actors have a national branch with a distinct structure and mission, these are indicated with an 'I' between brackets.

Note 2: The principal sector in which the actor is active: the development orientated actors were partially selected on the basis that they also have some conservation and/or environmental activities and/or objectives.

Note 3: his column shows whether, and which one of the following terms are used in the actor's mission (or similar) statement on their websites: (1) 'decentralization'; (2) 'empowerment'; (3) 'participation'; (x) 'no reference to these terms'.

known individuals, such as informants and 'local capacity builders' (a local 'middleman' is often used as a strategy for long-term sustainability and reduced salary and travel costs). The DAs frequently indicated that they always inform the Mayor and/or Prefect on their (planned) activities in the area. Frequently, the DAs were also approached by the local inhabitants themselves, including by those looking for long-term partnership arrangements. Having a local office was an important part of the philosophy of some DAs as well as a strategy of decentralization and local participation. In contrast, one INGO reasoned that they do not want to keep money in their own organization and therefore outsource activities to local organizations. Those DAs that collaborate on a project basis (and thus not structurally) do not usually have a regional or local office.

In general, the major collaboration partners at the local level were the COs and more than half (18) of the organizations collaborated with them. Collaboration with COs was particularly common among INGOs (12 out of 14). While some DAs collaborated only with existing COs, others stimulated and/or helped to found new COs for collaboration.[9] For some DAs, the foundation of COs was a development objective in itself (and they retreat when the CO functions well). One (I)NGO indicated that, in response to their presence, COs have been formed by inhabitants in the hope that it increases their chance of a collaboration partnership.

Collaboration was especially common with COs with an organized structure, including a management board. Collaboration usually happens via the CO's board members, especially with the secretary (the president is usually the person with status and good networks,[10] while the secretary is usually the person with vision and plans). As commonly argued by DAs, by working with CO leaders, a broader range of inhabitants is involved through the participation of its members, thereby expanding the reach of activities. Businesses have indicated that this is one of their main reasons for wanting to work with COs (and especially with the bigger unions, i.e. a federation of COs), as it is the large number of members that makes it commercially attractive. For this reason, DAs – and especially the businesses interviewed – occasionally unite COs into unions for scaling purposes. Another method of collaboration is hiring a local representative, a so-called middleman, who acts as an intermediary between the DA and the CO. On occasions when a DA employee visits the local area, he or she often organizes a meeting with all members for collaboration purposes.

Some of the disadvantages raised by DAs on CO collaboration included the COs' unclear objectives, accountancy issues, limited discipline of their members,

[9] For a detailed account on the foundation process of two COs in Higa and Sourou, see Van den Bergh (2014).

[10] According to one INGO, "the key thing of local collaboration is having many contacts."

and limited resources and capacity. The latter included limited time available for CO activities as all other subsistence livelihood activities continue, such as farming and herding. Also, partnership building is a long process that requires much time, according to the DAs. In general, DAs argued that the advantages of CO collaboration outweigh the disadvantages, for both themselves and the local communities. Some DAs expressed their satisfaction towards proper information exchange[11] and punctual meeting times, and argued that working with COs improves the quality of the work through checks and balances. DAs often provide a wide range of training, education (primarily literacy lessons), offer allowances, and contribute to capacity building. Furthermore, COs provide a platform that enables the inhabitants' economic and political power.[12] One INGO claimed that the government does not want farmers to have too much power. Nonetheless, it was found that some government actors did collaborate closely with COs.

The second major local collaboration partner were government actors. Nonetheless, they were less often a collaboration partner at the local level than at national level; namely, almost one third (9) of the DAs at the local level compared to more than two thirds (21) of the DAs at the national level. Some DAs (4) pointed at the responsibility of the government regarding local participation and its decentralization policy, and therefore work through local governments locally. In their view, local governments should lead and be in charge of the project, while the local community should be the one implementing it. To increase its efficiency, capacity building of local governments is often part of the DA's collaboration strategy. Two (I)BS' raised a problem with involving the government, namely that each government official wants a share of the benefits. Also, government officials usually use a more top-down approach, according to one IGO.

The third major local collaboration partners were community representatives, including the *Conseil Municipal*, *Conseil Villageois de Développement*, and the Mayor.[13] Collaboration with the Mayor was generally considered more important than with the Prefect, but both were often included to prevent conflicts. According to one business organization (IBS), the political power of the Prefects has been decreasing since the country's decentralization policies, while that of the Mayor has been increasing. Nonetheless, three INGOs still collaborated very little with the Mayor compared with the Prefect (apparently because of existing links). It was also suggested by (I)NGO employees that the Mayor and Prefect

[11] One IBS indicated that local inhabitants keep most information to themselves, which gives them the advantage of having information that others do not have.

[12] According to one (I)BS, mutual contracts are sometimes used so that no one has absolute control and power, and local authorities can interfere when needed.

[13] Some (4) agencies considered the Mayor as a local government agent, but because the Mayor is elected by the community it is considered a community representative in this study.

should decide who will be in charge of the project. In some cases they jointly dealt with the project.

Notably, none of the organizations mentioned religious or influential (non-elected) leaders, or households among the collaboration partners, but a few did mention collaboration with (non-affiliated) individuals (2), customary authority (1; primarily chiefs), and schoolteachers (1). Some organizations worked at local (project implementation) level together with national NGOs, but they did not consider them local partners as their office was based in one of the country's urban areas. According to one INGO, NGOs take less initiative than COs, and are often passive and show more financial dependence towards INGOs (described by the INGO as 'showing begging features').

*Perceptions of local collaboration in Sourou*

Thirty-seven local inhabitants were approached for the PADev-inspired workshops in Sourou, but three men and one woman did not know of any development or conservation project or had only heard of a project without knowing more than the name. The remaining 33 participants mentioned 8 actors and 11 of their projects in total. Among the actors were national and international governments (2 GOs and 2 IGOs), and national and international NGOs (3 NGOs and 1 INGO). As for the projects, the IGO ones were the most widely known and most familiar to many participants. For that reason, these were assessed by many participants, and their PADev-type ratings are therefore the most reliable. In particular, the women tended to know very little about the actors and projects, because, according to the women, "it's the husbands who go to get help from the projects."

Overall, the 11 projects were reviewed 'positively', namely ≥2.50, with an average of 3.39 on a scale of 1 to 5 (Table 5.5). However, one (GO) project received an average score of 2.17 by its only workshop participant. One INGO project was also reviewed negatively by one participant (also 2.17), but more positively by another participant (3.67; which gives the project an average of 2.92). These two projects scored particularly low on 'long term engagement', 'realistic expectation', and 'relevance'.[14] The other projects were judged similarly between participants, e.g. one IGO project was judged in 9 exercises (by 23 participants in total) and the overall scores varied by a maximum of 1 point (3.17 - 4.17). However, different projects by the same actors varied considerably, e.g. two GO projects (grants project; 2.17 versus fish transformation project; 4.50). On average, women gave higher scores (3.60) than men (3.21).

[14] These exceptions did not influence the overall outcome (i.e. statistics) markedly and are included in the analysis.

When one looks at the average criterion scores of all actors together, the criterion 'local presence' stands out as scoring markedly lower than the other five criteria. This criterion received the score 4 (both NGOs) only twice, and never the score 5. At the other extreme, the criterion 'relevance' only scored 1 once, and 2 twice. The smallest variation between the actor groups (meaning each actor group scored 'notably' different from the average) was within the criterion 'honesty' (all ≤0.30 from average), and the largest variation was within the criterion 'relevance' (all ≥0.50 from average), although the criterion 'long-term engagement' had the two largest extremes in relation to its average.

*Table 5.5* Assessment of development actors' projects[1]

| Actor type[2] | local presence | participation | Long t. engagement | realistic expectation | honesty | relevance | Average |
|---|---|---|---|---|---|---|---|
| GO | 2.50 | 2.75 | 4.25 | 3.50 | 3.50 | 3.50 | 3.33 |
| IGO | 2.00 | 3.50 | 3.50 | 3.90 | 3.70 | 4.60 | 3.53 |
| NGO | 3.00 | 3.00 | 3.50 | 3.25 | 3.75 | 3.50 | 3.33 |
| INGO | 3.00 | 2.50 | 2.00 | 3.00 | 4.00 | 3.00 | 2.92 |
| Average[3] | 2.40 | 3.15 | 3.50 | 3.60 | 3.70 | 4.00 | 3.39 |

Note 1: No (I)BSs and RIs projects were included as the 'PADev' participants were unaware of any.

Note 2: See Table 5.3 for the number of actors, projects, workshops and participant per actor type.

Note 3: The averages are based on the total of the 11 project scores per criterion.

Collaboration between actors and local inhabitants was discussed in detail with 28 inhabitants (see Table 5.2), including 6 workshop participants and 22 additional interviewees. According to the vast majority (24), decisions were made by the actors. Only four respondents indicated that they had a key role in decision-making.

The main perceived weakness of collaboration with development actors was that they do not deliver what they had promised (8). Indeed, many respondents expressed a wish for development actors to keep their promises (10) and for projects to be more realistic (5). Other weaknesses concerned, in descending order of importance, financial matters (dishonesty, no allowances), the short time span of projects, and lack of activities, information, communication, and motivation. On the other hand, five respondents did not note any weaknesses.

The DAs' understanding of the inhabitants (13) was the major perceived strength, followed by the grants they provided (7). These two are followed by: punctuality during meetings; motivation of actors; employment within the actor; provisions of tools (including ovens); provision of training; no discrimination

(treating all religions the same); improved agricultural crops; honesty; dialogue; obedience of people to leaders; and the regular organization of meetings. Only three respondents could not come up with any strength.

Suggestions for improvement in collaboration included allowing inhabitants to have more input in meetings (8); increasing the duration of projects (6); and direct collaboration between DA and local population (rather than indirect collaboration via a 'local' middleman who is chosen and paid for by the DA, partly because these middlemen mostly help, and collaborate with, their friends and family) (5). Other suggestions included, in descending order of importance, providing enough resources (tools) to be able to continue the project activities when the actor pulls out; building on good relationships; helping with essentials such as food, medicine and clean drinking water; and increasing credit loans.

*Observations of interactions and local participation*

Typically, individual characteristics, such as personality (e.g. authoritarian or not), gender, authority/function (e.g. career background), seniority and experience/skill level, played a key role in determining who was leading and directing the conversation and/or was talking the most. For example, an experienced and authoritarian senior male who was head of an organization was most likely to lead the conversation. On two occasions, the nature of interaction appeared to be the decisive factor, e.g. in one case, one of the actors was the customer and therefore the one with 'negotiation power'. No clear relation was found/noticed between development actors and local inhabitants. Still, the development actors led the conversation slightly more often, and were also more likely to speak more often. In general, no signs were noticed that participants could not speak freely or give their opinion;[15] instead, during most interactions the opposite was noticed, with the exception of women. During four interactions women were clearly more introvert and seemingly reluctant to interact freely. The male participants focused more on the male participants by, e.g., eye contact and directing questions to them. This was confirmed by some women. A male development actor acknowledged that this is often the case (but also indicated that women are appreciated for not involving themselves in political games and relations). Lastly, nepotism was noticed on one occasion when a law enforcement officer witnessed some (minor) law-breaking by some local inhabitants with whom he had become friends having relocated to the area two years before. He assessed the offence

[15] One should be aware of the potential influence of my presence during these processes, which might stimulate, what is thought to be, appropriate negotiation behaviour. However, due to my often extended stay with the participants my presence was less emphatic in the negotiation processes and the processes appeared to go naturally.

less strictly than he did with those with whom he did not have a personal relationship.

Several proactive initiatives by local actors were noticed, including the planning of new activities by COs, although the long-term agenda was provided by a DA. The CO board members were particularly proactive, while the members usually showed passiveness in meetings but were more active, interested, and involved (including providing input) during project activities. The development actors regularly participated in the project implementation and often acted in the same way as the local inhabitants, in order to help and/or teach the community members. Issues of miscommunication were noticed on several occasions. This appeared to be a result of differences in education level and professional background (e.g. local inhabitants were not familiar with professional jargon). In some cases, the development actor provided a brighter picture of the projects' local participation than it was in reality. The same applied to claims that the local community continued the project fully independently. On at least two of these occasions, the local actors indicated that they were still supported, with resources, but also occasionally financially. A recurring aspect was the local actors' request for resources (equipment, but also office buildings). On at least one occasion, fraud was noticed when a CO demanded an excessive and false expense allowance from a DA. Similar practices were also noticed by the DAs, and it was suggested that local actors need to receive training on (financial) responsibility. In this way, they will be accountable for their own (financial) mistakes, which stimulates financial efficiency and accuracy. It also reduces corruption, as fraud is allegedly less likely to occur among peers (i.e. local actors), due to personal and family relations, than among local actors and outsiders (i.e. DAs).

## Discussion

Local collaboration appeared to be an important component of the conservation and development organizations' mission statements, commonly including decentralization, empowerment, and particularly local participation. Although the perceptions of the employees of these organizations confirmed this type of policy, their interpretation varied, also within a single organization. The majority of the selected local inhabitants were familiar with at least one DA and were involved in one or more of the DAs' projects and activities.

Indeed, collaboration between DAs and local communities was common and appeared extensive in many cases. Local collaboration was most common between DAs and COs. This type of collaboration was especially valued by DAs because it meant that many people (i.e. CO members) could be reached through collaboration with a limited selection of people (i.e. CO board members). It has

been suggested by DAs that as many people as possible should be involved in community collaboration to prevent conflicts, but one INGO warned that, in particular, the poorest inhabitants are not members of any CO, and they will thus automatically be excluded from these collaboration partnerships. The creation and retention of COs, including their many tree planting activities (see Van den Bergh 2014), suggests that local populations did much to comply with project suggestions and requirements, arguably in order to obtain access to resources controlled by projects and NGOs (see also Michener 1998; Marcussen 1999; Engberg-Pedersen 2003). An employee from an RI argued that there were now too many COs, creating too much overlap and conflicts.

Even though local collaboration was widespread, local communities were usually not listed among the DAs' collaboration partners. This arguably shows that local inhabitants are not seen as full partners. Indeed, it was sometimes indicated that the local 'partners' were merely those who implemented the projects. Although genuine participation in project design was also observed, it was usually restricted to the board members of COs. Local inhabitants often indicated having no role in the decision-making process, and many of them wished to have more input in meetings. Similarly, the PADev criterion 'participation' scored below the average of all criteria combined. Nonetheless, observations of interactions, including negotiation processes, showed a fairly equal power relationship between development actors and local inhabitants. These local inhabitants usually included a select group, however, such as the board members of COs. Based on extensive PADev-type research in Ghana and Burkina Faso, Dietz & the PADev team (2013) note that top-down development aid without consultation is considered bad aid by the local 'beneficiaries'. It appears that a low level of project participation can negatively influence the perception of projects. For example, Lahai (2009) shows that in her study area in northern Ghana, the level of participation was moderate in projects regarded as best, but low in the worst projects. Nonetheless, in the current study, the DAs' projects were generally positively evaluated by the local inhabitants.

Women were generally less aware of the presence of DAs and their projects and were also less involved in their activities, at least partly as a result of development actors' discriminatory attitude towards women. Even so, on average, the women evaluated the projects more positively than men. PADev-type studies in northern Ghana and southern Burkina Faso showed varied results in this regard, and included research communities in which women and men made similar evaluations (Dietz & the PADev team 2013; Rijneveld 2012; Lahai 2009). The difference in the current study should be considered with care, however, because men and women did not always evaluate the same projects.

These results reflect those from a case study on an NGO project in southern Burkina Faso in which limited participation did not lead to a negative perception of the project (Marsais 2009). Here, local inhabitants saw their role in the project merely as a support to the organization and abdicated any decision-making power, for which no space was provided by the NGO either. "[…] It was acknowledged that participation was merely represented by adherence of beneficiaries to the ideas of the project" (Marsais 2009; 142). Marsais (2009) also argues that this shows a dependency towards development aid, and a lack of confidence towards their own autonomous capacities, which averts empowerment:

> Indeed, the participatory paradigm, re-appropriated by the mainstream development discourse, has turned away from its original purposes of empowerment against various forms of oppression and domination. Rather than fostering full consciousness on the duty of populations to take part in processes of social change, it has worked as another tool of dependency towards what one can call the 'Western model' of development. (*Ibid*.: 141).

Only one of the 30 researched organizations referred to both participation and empowerment in its mission statement, arguably indicating that empowerment is not a related objective. Marsais (2009) labelled this type of participation as pseudo-participation, as genuine participation comprises features of empowerment and cooperation, while pseudo-participation is merely composed of assistance and consultation. This type of participation could be linked to participation as a means instead of an end of development.

> The former refers to a rather passive experience where people are told what to do in order to attain pre-determined objectives. Hence the top-down approach is maintained and empowerment is not achieved. Participation as an end is a path by which local actors are empowered through different steps. People are directly involved in shaping, deciding, and taking part in the development process from the bottom-up perspective (Audet-Bélanger 2010: 30-31).

The generally positive evaluation of the projects corresponds with the results of similar, recent PADev-type research in northern Ghana and southern Burkina Faso (Rijneveld 2012; Audet-Bélanger 2010; Bymolt 2010; Lahai 2009). However, Audet-Bélanger (2010) notes that the PADev criterion 'local presence' was (very) negatively judged for the three evaluated projects in her study. Also in the current study, it was this criterion that scored below the positive average. Actually, although local representation was considered an important component of the decentralization policy of many DAs, most agencies did not have a local office or representative. Instead, they visited the area on a regular basis and/or used a middleman, despite the fact that local inhabitants prefer direct collaboration. Remarkably, the PADev criterion 'realistic expectation' was judged above average, be it with a range from 2 to 5, while the main perceived weakness of collaboration was that DAs did not deliver what they had promised. People's experience and/or interpretation of this aspect differed, but it also depended on the specific

DA or project involved. Dietz & the PADev team (2013) also noted that aid perceived as 'bad' did not live up to its promises and expectations.

The four (national) government projects were rated very differently, something similar was also noted in a PADev-type study in northern Ghana. Here, Bymolt (2010) suggested that the varied ratings could be interpreted as performing somewhat less, but this refers mainly to the ratings of different criteria. Actually, Dietz & the PADev team (2013) noted that government agencies in most areas in northern Ghana and southern Burkina Faso were more often perceived to be involved in 'bad' aid than NGOs or the private sector. 'Bad' aid was perceived to be, among other things (see discussion below), quick ('hit and run') and looking for fast and visible success, which is often not sustainable (Dietz & the PADev team 2013). For instance, projects with a longer duration (e.g. 30 years) can draw lessons and incorporate them into local democratic governance structures, provided they have enough resources to do so (Wangui Chomba 2015). In line with these findings, this study revealed that increasing the duration of projects was a common local aspiration, including the provision of resources for the continuation of the project when the agency pulls out. Similarly, in Marsais' (2009) study in Burkina Faso, most of the respondents believed it necessary to have another project to continue the activities of the preceding project.

## Concluding remarks

Local collaboration is propagated by development actors, including through their mission statement (frequently referring to decentralization, empowerment, and/or local participation) and by their employees (in various ways, and often less explicitly). However, since participation and the delegation of authority (including decision-making) was limited in this study, empowerment appeared limited as well and the collaboration between DAs and the local populations showed characteristics of pseudo-participation. The local population did not move to a full partner position. These results correspond with the wildlife sector in Tanzania, where policies and laws were directed towards decentralized environmental governance. Here, Kwango *et al.* (2015) noted that the transfer of power and authority to local levels had been limited, and decision-making had not been brought close enough to the people, therefore limiting participation and accountability. In line with these observations, and based on his research in Mali, Kassibo (2006 & 2002) argues that laws and/or systems are needed that award authority to local institutions and individuals to support local empowerment and participation.

In the studied interactions, local representation and democracy appear to be promoted at the social interface, as DAs work directly with the community or through locally elected leaders, and not through influential non-elected people.

Influential people, including former traditional chiefs (i.e. customary authorities), can be elected as CO board members or as government officials in the country's deconcentrated administration and collaborate with DAs once in that position. Nonetheless, in contrast to Hilhorst's (2008) findings, customary authority played no important traditional role, also not in the remote Higa area.

The perceptions of both the DAs and the local population, as well as observations of interactions at the interface, show that their collaboration does not take place in the form of struggles and conflict, but rather of reasonable collaboration. There is mostly agreement, but the participation level was somewhat restricted especially regarding the design of projects, policies, and programmes (and less so regarding the implementation). Decision-making is mostly done by the DAs, who seem to be in charge, and agreements do not, therefore, necessarily have to be made. Also, it is doubtful whether it is fair collaboration in cases where the DA is the principal decision maker.

In conclusion, this study revealed some important factors to consider when it comes to local collaboration, especially regarding decentralization, empowerment, and participation. For instance, DAs should consider firming their local presence to meet the needs of the local inhabitants, and be cautious with what they promise to the local population in order to manage realistic expectations. Furthermore, DAs should be aware that when exclusively working with COs, a particular selection of the community is included. They should consider involving other collaboration structures as to include, for example, (more) women and the poorest community members. Similarly, for engaging in partnerships, COs should be chosen carefully according to their representation of the community (i.e. composition of members). Furthermore, DAs should be supporting the founding of new COs when local inhabitants have genuine motives and intentions and not when inhabitants do it merely to comply with DAs' requirements. The same applies to participation in projects, because 'false' motives can threaten the sustainability of the project or CO. Another aspect to consider is whether the new CO would have much overlap in activities and objectives with other, already existing COs, because overlap could create conflicts as the CO could be regarded as competition for DAs' assistance and resources. For long-term sustainability, DAs should consider increasing the duration of the project and/or developing a follow-up project. Preferably, the project should provide local inhabitants with enough capacity, skills, and resources to continue activities on their own when the project and/or DA's assistance has ended. Lastly, although limited participation did not seem to lead to negative perception of DAs' projects, it limited empowerment. Moreover, increased local participation, and primarily local inhabitants' input in meetings, was a common aspiration among the researched inhabitants.

# 6

# The role of community organizations in integrated conservation and development projects: Local perspectives from the Sahel region[1]

## Introduction

The Sahel is one of the world's poorest and most environmentally degraded areas (CSELS 2010). Most, if not all, of the Sahelian economies are highly dependent on natural resources and this makes them vulnerable to degradation of the local environment (Cohen *et al.* 2011). Numerous Palearctic migratory birds also depend on these natural resources, either species that spend their winters in this region or those that winter further south and use it as a staging area (Zwarts *et al.* 2009; Jones 1995). Many of these species are experiencing a sustained and severe decline in their numbers (Zwarts *et al.* 2009; Sanderson *et al.* 2006).

Most conservationists agree that declining natural resources, the loss of biodiversity and poverty alleviation are interrelated problems and should be tackled concomitantly (Adams *et al.* 2004). Biodiversity conservation could contribute to an improvement in livelihoods as biodiversity supports the delivery of ecosystem services that are essential for human well-being (Roe & Bond 2007; Roe *et al.* 2006). Local communities are increasingly being seen as key actors in natural-resource management (NRM) by academics and policymakers who are promoting greater local public participation under the rubric of democratic decentralization (Ribot 2003; Schusler *et al.* 2003; Gray 2002; Virtanen 2001). These communities need to obtain greater authority and power by becoming involved in project design, management and resource control, and any benefits should be shared (Roe *et al.* 2006; Ribot 2003; Gray 2002). However, financial resources are required to delegate authority to lower levels but these are currently limited. This may result in decentralization depending on the support of donor organizations instead (Engberg-Pedersen 1995). The communities' role in NRM has re-

[1] A slightly different version of this chapter has been published in *Biodiversity*: Van den Bergh, M. O. (2014). The role of community organisations in integrated conservation and development projects: local perspectives from the Sahel region. *Biodiversity*, 15(2-3): 88-100.

cently come under greater scrutiny following, among other reasons, insufficient conservation results (see e.g. Dzingirai 2003). Calls for a return to more centrist NRM regimes have emerged (referred to by some as the 'back to the barriers-counter-narrative') as these are thought to be more efficient (Murombedzi 2010). Conservation, livelihoods and democracy often conflict and are not always mutually reinforcing (Ribot *et al.* 2010).

Collective action is recognized as an important component in local conservation and development interventions (McCarthy *et al.* 2004). Traditionally, local institutions received little attention from development agencies and national governments (Donnelly-Roark *et al.* 2001) and although community-based conservation[2] has received much attention from scholars and policymakers, "there is little empirical data or experience from which to derive the best local institutional arrangement or to show which factors link decentralization reforms to improved social and ecological outcomes" (Ribot 2003: 54). This can be partly explained by the fact that collective action in rural development and local-level NRM remain difficult issues to address empirically (McCarthy *et al.* 2004). In addition, most community-based conservation data is limited to one specific type of livelihood[3] or resource domain (Brooks *et al.* 2013). Mahanty & Russel (2002: 179) argue that "conservation professionals need to build their capacity as facilitators and negotiators, paying greater attention to how stakeholder organisations form and function, their links to wider arenas, and the aims and positions of organisations and individuals."

*Objectives*

This chapter considers the formation, functioning and membership characteristics of community organizations and their levels of authority, decision-making and involvement in project design and implementation. Its objective is to increase insights into local institutional arrangement by focusing on the functioning of local community organizations, including regarding their external (conservation-related) relationships. It also looks at the local benefits arising from conservation[4] and local organizations' financial resources in relation to dependency on donors, the links between the mutual enforcement of (bird) conservation, livelihood and democracy objectives, and the diverse interests, positions and aims of the different community organizations and individuals. Community organiza-

[2] 'Community-based conservation' implies at least some of the following: local-level, voluntary, people-centred, participatory, decentralized, village-based management (Campbell & Vainio-Mattila 2003).

[3] "A livelihood is defined as comprising the capabilities, assets (including both material and social resources) and activities required for a means of living" (Scoones 1998: 5).

[4] The following definition of conservation has been adopted in this study: it is the "preservation, protection, or restoration of the natural environment and of wildlife" (Oxford Dictionary 2014).

tions' links to the wider community are also discussed. These broad themes will be addressed in the research question:

*How do local organizations (local conservation groups and other community organizations) function in relation to local participation and conservation?*

*Social organization and decentralization in Burkina Faso and the Sahel*

The organizational context in Burkina Faso, and the Sahel in general, with its wide variety of local cultures and livelihoods, is particularly complex as statutory and customary authority structures and laws co-occur (Hilhorst 2008). The social organization of one of the Sahel region's principal ethnic groups, the pastoral Peul (Fulani), is traditionally structured around lineage or class relations, similar to the Samo and Gourmantcheé ethnic groups. Burkina Faso's principal ethnic group, the hierarchical Mossi, have self-help organizations and farming cooperatives that traditionally played a role in the organization of their society (Rupley *et al.* 2013; Englebert 2000; Grootaert *et al.* 1999; De Zeeuw 1997; Speirs 1991). Burkina Faso has informally recognized such local organizations for a long time but only since the Decentralization Law of 1998 have they been formally integrated into the legal, economic and institutional framework of decentralization (Cleary 2003; Donnelly-Roark *et al.* 2001). Burkina Faso now has a significant number of local organizations (Grootaert *et al.* 1999).

As part of a broader, worldwide shift towards decentralization, both governmental and non-governmental organizations are encouraging local (participatory) resource management programmes through the *Gestion des Terroirs (villageois)* approach, which aims to improve the organizational development of villages in francophone West Africa. This involves assisting communities in developing and supporting local community-based institutions in order to increase their autonomy and their capacity to take decisions (Wageningen UR 2013; Wethe 2009; Ribot & Oyono 2005; Clearly 2003; Gray 2002; Donnelly-Roark *et al.* 2001). Since its introduction in the early 1990s, Burkina Faso has been leading the way in the development and implementation of the *Gestion des Terroirs* approach (Gray 2002). Based on fieldwork in Burkina Faso, Engberg-Pedersen (1995) argued that existing local decision-making and resource-management institutions were being overlooked and little attention was being paid to the diverse interests of different social organizations. For example, local people were not participating in labour-intensive resource-conservation activities unless they were expected to be profitable in the near future. The country is still in an experimental phase in its decentralization process (Madiès 2013).[5]

[5] "The approach is based on selecting a sample of local authorities, deconcentrating certain responsibilities before devolving them, and then extending this approach to other local authorities while gradually

*Living on the Edge: Empowerment and participation*

*BirdLife International* (BirdLife) is a global partnership of national non-governmental bird conservation organizations. In line with developments in conservation and development thinking, BirdLife sees local communities as the key actors in achieving integrated biodiversity conservation and livelihood-improvement goals (BirdLife 2011). This view is reflected in its Local Empowerment Programme (LEP): "The vision of the LEP is that local organisations at critical sites for biodiversity are empowered to effectively conserve, manage and defend their sites, so that biodiversity values and benefits are provided locally, nationally and globally in the long term" (*Ibid*.: 16). Empowerment in this study refers to the sharing of resources and the delegation of authority and enables self-efficacy among the members of local organizations.[6] An element of the LEP is working with so-called local conservation groups (*Ibid*.). BirdLife (2010a: 1) describes local conservation groups (LCGs) as "organisations or individuals who, together with relevant stakeholders, work with BirdLife partner organizations to help promote conservation and sustainable development at IBAs."[7] BirdLife's (*in prep.*) newly formulated LCG vision reads as follows:

> Whilst your LCG strategy should link to your organization's mission, the LCG's activities should be driven by the interests, capacity and needs of the organisation's members and the wider community. It is important that they are self-motivated and have ownership of the activities they undertake.

*Vogelbescherming Nederland* (VBN; BirdLife in the Netherlands) started its Living on the Edge project to protect (migratory) birds in the drylands of the Sahel in 2011. According to the organization, the region suffers from a lack of investment in terms of conservation. One of the main strategies applied in this project is the creation (where necessary) and capacity building of LCGs, as well as knowledge exchange between LCGs, primarily at IBAs (BirdLife 2010a; Bernd de Bruijn, senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* September 2009). Having achieved local successes using this approach in Oursi in northern Burkina Faso, following joint efforts by *NATURAMA* (BirdLife in Burkina Faso) and VBN, it was decided that this model would be implemented on a larger scale across the Sahel. There are now 12 site-based in-

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phasing in the effective devolution of selected responsibilities" (Madiès 2013: 274). Dafflon *et al.* (2013) argue that promoting grassroots development and strengthening local governance are the underpinnings of the Burkinabe decentralization process.

6 For more discussion on the definition of empowerment, see Conger & Kanungo (1988).

7 Important Bird Areas: "(IBAs) are key sites for conservation – small enough to be conserved in their entirety and often already part of a protected-area network. They do one (or more) of three things:

- Hold significant numbers of one or more globally threatened species
- Are one of a set of sites that together hold a suite of restricted-range species or biome-restricted species
- Have exceptionally large numbers of migratory or congregatory species" (BirdLife 2010b).

terventions in four countries, including three sites in northern Burkina Faso as well as programmes for policy advocacy, research and awareness-raising in Europe and Africa (Bernd de Bruijn, senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* December 2013).

The Living on the Edge project has adopted a participatory approach (David Thomas head of 'communities and livelihoods' at BirdLife, *pers. comm.* 2014). According to Ribot *et al.* (2010: 36), a distinction should be made between democratic decentralization on the one hand and participatory approaches on the other. The former is "specifically about including whole populations in decision making based on representative authority" and "involves the transfer of powers to democratically elected local governments" (i.e. devolution), while the latter involves "any consultation, mobilization or involvement of local people" (*Ibid*.: 40). Definitions of community participation range from people passively receiving benefits from health/disability programmes to them actively making decisions about the programme's policies and activities. Participation in this study refers to "involvement in shaping, implementing and evaluating programmes and sharing the benefits" (Rifkin & Kangere 2002: 41). "Decentralisation is the devolution of central state assets and powers to local or private decision-making bodies: representative local government, local administrative branches of central government, non-state organizations (NGOs, co-operatives, associations, etc.) or private individuals and corporations" (Ribot 1999: 27).

This study explores the relationship between a range of interventions and multiple livelihood aspects and the paper considers LCGs and other community organizations (COs) in the context of decentralization, participatory approaches and local empowerment. COs refer here to locally-based non-state institutions[8] and exclude LCGs for comparative purposes. In this way, it addresses the following sub-questions:

*i) Do decentralization and participatory approaches facilitate participation and empowerment of the communities researched and their organizations?*
*ii) How and why do local conservation groups (LCGs) differ from other community organizations and how is this reflected in (bird) conservation-related activities?*

[8] According to Hodgson (2006: 8), these organizations are "special institutions that involve (a) criteria to establish their boundaries and to distinguish their members from non-members, (b) principles of sovereignty concerning who is in charge, and (c) chains of command delineating responsibilities within the organization." These criteria only partly apply to local churches and mosques and these are not, therefore, included as community organizations.

## Methods

*Study areas*

Burkina Faso was selected for this study because of the presence of conservation pilot sites (from the Living on the Edge project), a connected research agency, namely the EAC,[9] and a conservation partner (*NATURAMA*). In addition, the country was relatively stable politically and the security situation was considered acceptable. Two of Burkina Faso's three LCGs were included, namely Sourou LCG and Higa LCG (Figure 1.4). The areas covered by these LCGs included two IBAs: the Lake Sourou IBA (hereafter referred to as Sourou) and the designated Lac Higa IBA[10] (hereafter referred to as Higa). Both areas are included on the Ramsar list of wetlands of international importance.[11]

Sourou (ca. 22,000 ha) is in both Lanfiera Department (with about 12 communities) and Di Department (13 communities) in Sourou Province in the northern part of the Sudanian biome,[12] near Burkina Faso's north-western border with Mali. Higa (ca. 1500 ha) is in Tankougounadié Department (13 communities) in Yagha Province on the southern edge of the Sahel biome near the Niger border in north-eastern Burkina Faso (Ramsar 2013; Fishpool & Evans 2001). The two areas differ in many ways (see Table 6.1).

*Table 6.1* Comparison of the Sourou and Higa research areas

| Characteristics | Population Density | Muslim population | (Semi) nomadic | Level of development | Rainfall & surface water |
|---|---|---|---|---|---|
| Sourou | + | - | - | + | + |
| Higa | - | + | + | - | - |

*Interviews*

Field research was conducted between July and September 2011, December 2011 and March 2012 and in February/March 2013.[13] The LCGs in Sourou and Higa

[9] Études Action Conseils (EAC) is a research consultancy firm based in Burkina Faso. It undertakes research on Africa in the humanities and social sciences.

[10] The area of operation of Higa LCG officially encompasses the whole of Tankougounadié Department (102,300 ha) but, in practice, it is mostly limited to the Tankougounadié community of the same name and the IBA area. Higa refers to these latter areas in this paper.

[11] "The Ramsar Convention is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the 'wise use', or sustainable use, of all of the wetlands in their territories" (Ramsar 2010).

[12] Three bioclimatic zones (also known as biomes) correspond to a greater or lesser extent with the country's three (differently named) climatic zones (*Atlas de l'Afrique* 2005).

[13] Due to negative travel advice for the Sahel region in 2013, I was not able to travel to Higa. For this reason, Achille Ouédraogo, a biology Master's student at the University of Ouagadougou, conducted

and thirteen COs, eight in Sourou and five in Higa, were selected for study (see Table 6.2). The selection of the COs was made according to each organization's main characteristics (gender focus, activities, goals) in order to achieve a representative selection of the broad range of COs in the two areas involved and with a particular focus on land-use organizations. In addition, two cooperatives and two union organizations were chosen in Sourou,[14] and one union organization was selected in Higa. No other unions or cooperatives were found in Higa.

*Table 6.*2 Community organizations studied, including two LCGs.

| Sourou | Higa |
|---|---|
| Local conservation group | Local conservation group |
| Women's organization | (Muslim) Women's organization |
| Environmental/cultural organization | Environmental/development organization |
| Agricultural/trade organization | Agricultural/trade organization |
| Agricultural/youth organization | Livestock organization |
| Livestock organization | Agricultural union |
| Agricultural cooperatives | |
| Agricultural union | |
| Fishing union | |

In-depth interviews were held in each research area with the COs' board members (the presidents and/or secretaries). These were complemented with similar interviews with government officials, NGO staff, community and religious leaders, and semi-randomly[15] selected local inhabitants. Comparable interviews were held with the presidents and secretaries of both the Sourou and Higa LCGs, as well as with 13 and six of their members, respectively. In addition, the head of *NATURAMA*'s Conservation Department and Oursi LCG's former president were interviewed at length. Information gathered in these in-depth interviews was complemented with field observations,[16] literature research, reading documentary sources, informal interviews and expert consults (see also Ybema *et al.* 2009 and Chapter 1, the section on 'Research methods'). In total, 169 interviews were conducted: 78 in Sourou, 69 in Higa and 22 in other parts of the country,

several interviews in Higa between 10-13 March 2013 (that is after he had already acted as my research assistant).

[14] A cooperative organization in Sourou is locally described as a federation of plot 'owners' on government-owned (agricultural) land that is for rent, while a union organization is a federation of cooperatives or organizations.

[15] Semi-randomly selected local inhabitants refers to a selection of the local population that aims at representing the diversity found among the population, and particularly regarding people's occupation (i.e. land use activities). The selection was made by approaching inhabitants in their homes or fields, on the road, or at local markets. See for more details, Chapter 1, the section on 'Research methods'.

[16] Including during LCGs' meetings and bird monitoring (training) activities.

mainly in Ouagadougou. Of these interviews, 28 were 'group' interviews.[17] The 169 individual and group interviews also included 35 follow-up interviews so a total of 166 respondents were interviewed.

The interviews were semi-structured, which meant that the interviews took place in a conversation style; using a research questionnaire as a guideline and checklist. BirdLife's 'Guidelines for Site Support Groups Institutional Analysis' were consulted (BirdLife unpublished data) among other sources. The semi-structured style provided a systematic approach while still allowing freedom in the sequencing of questions, and in the amount of time and attention paid to each particular question. Some questions proved to be unsuitable with particular interviewees, while additional questions were included when needed (see also Robson 2002). Individual interviews and those with organizations aimed to achieve an in-depth general understanding of their activities, processes, values, relations and perceptions. The goal was not to obtain exact numbers and statistics from the interviewees. The analysis presented in this paper is thus mostly qualitative (see also Bernard 2011), and the results are primarily based on the interviewees' opinions unless otherwise stated.

## Major findings

*Local conservation groups*

The historical context of the two LCGs studied differed considerably (see Table 6.3 for an overview). The creation of Sourou LCG was initiated by *NATURAMA* but it was set up by the local inhabitants with the support of *NATURAMA* in 2002 and the construction was legally formalized in February 2007. The local founding members represented six livelihood groups,[18] with each group being represented in the LCG by two members. Higa LCG was set up in 2009 when an organization of young Tankougounadié community inhabitants asked the NGO *Eau Vive*[19] for financial help. It agreed on condition that they formed a Community Organization (CO). As a result, a CO with legal status was created in April 2010 and, after a first meeting between *NATURAMA* and the CO, a collaborative agreement was signed in May 2010. *NATURAMA* declared it Burkina Faso's third LCG in June 2010. The organization's original structures, members and

[17] The group interviews consisted of two interviewees (18) or three interviewees (8), and included 60 interviewees in total.

[18] These groups were tree nursery owners, local beer brewers, fishers, fish smokers, fish inspectors and forest exploiters. According to the LCG secretary, the forest exploiters only joined the organization on paper and did not join in practice because they felt that their activities might be threatened by the LCG's objectives. The fish inspectors also left the organization, apparently because they thought the organization did not provide sufficient benefits for them.

[19] Founded in 1987, *Eau Vive* is a French NGO that was partly decentralized in Burkina Faso in 2008 (*Eau Vive* 2013).

objectives have not been altered since the LCG was set up although *NATURAMA* have suggested various new activities.

*Community organizations*

COs are common in both research areas, with more than ten in Higa and more than 20 in Sourou. The goals of the COs vary and they offer a wide range of activities from healthcare to agricultural production and from trade to environmental protection. Many of the COs limit the geographical areas in which they work to one or two communities, while others restrict themselves to different groups, such as women's and religious groups. Agriculture-related organizations are most common, followed by fishing organizations, chiefly in Sourou, and trade organizations. There is also a so-called hunters' organization in Sourou.[20] Most COs have multiple activities and objectives that often overlap with those of other organizations. Although the majority of the COs were set up within the last 25 years, and most in the last 15 years, some of the COs in Sourou have been in existence for at least 30 years. The number of COs is increasing in both areas according to the inhabitants but it should be noted that even though some COs still exist on paper, they have ceased to exist in practice.

*Table 6.3* Key characteristics of LCGs by research areas

| Characteristics | Sourou LCG | Higa LCG |
|---|---|---|
| Year established | 2002 (informally); 2007 (formally) | 2009 (informally); 2010 (formally) |
| *NATURAMA*'s involvement | since 2002 | since 2010 |
| Communities | Six | two (although essentially just one) |
| Principal objectives | conservation (birds & biodiversity) and sustainable development | community development and (informally) conservation since *NATURAMA*'s involvement |
| Activities (in random order) | raising awareness about conservation, bird monitoring, bird & habitat conservation, sustainable fishing, tree planting, maintaining a tree nursery, LCG meetings | raising awareness (and education) of development, tree planting, cleaning offices, bean cultivation (in the past), constructing facilities, (recent) bird-monitoring training, LCG meetings |

[20] All members are hunters but they do not hunt collectively. The organization's aim is to attend any celebrations where they can sing and shoot in the air, for which they receive money from the organizers of the event.

*Table 6.4* Characteristics of the COs and LCGs

| Characteristics | Sourou LCG | Higa LCG | Community organizations |
|---|---|---|---|
| **General** | | | |
| Founding associates | NGO (*NATURAMA*) | NGO (*Eau Vive*) | diverse (including NGOs) |
| Age of organization | 6-11 years | 3-4 years | Sourou: 2->30 years<br>Higa: 2-25 years |
| Tree-planting activities | common | common | common |
| Other conservation-related activities | common | uncommon but increasing | uncommon |
| **Membership** | | | |
| Average membership | 20 (± 150 at the start) | 77 (107 since 2013) | 20-35 |
| Membership trend | decreasing | stable/increasing | decreasing |
| Admission regulations | none | none | none (but gender and religious COs exist) |
| % of female members | low | low | low |
| Main reasons for joining | financial benefits & conservation-related | promote development | financial benefits |
| Members' responsibilities | participation and contributions & fees | participation and contributions & fees | participation and contributions & fees |
| Members' livelihoods | diverse | diverse | moderately diverse |
| Ethnicity of members | diverse | diverse | diverse |
| Average age of members | >30 years | 20-30 years | 20-30 years |
| **Finance** | | | |
| Main income source | *NATURAMA*, followed by members' fees & contributions | *NATURAMA*, followed by members' fees & contributions | Members' fees & contributions |
| Profit-making activities | uncommon | uncommon (in the past) | common |
| Degree of unpaid participation | medium | medium to high (decreasing) | high |
| **Operational** | | | |
| Governing board's structures & processes | structured and (fairly) democratic | structured and (fairly) democratic | structured and (fairly) democratic |
| Election of governing board members | elections (or consensus) by members | elections by members | elections or consensus by members |
| (Board) members' knowledge of objectives | variable (sometimes very limited) | variable (sometimes very limited) | variable (sometimes very limited) |
| Perception of objectives achieved | (generally) no | no | (generally) no |
| Main reason perceived for not achieving objectives | lack of finance | lack of finance | lack of finance |
| **Collaboration** | | | |
| Main collaboration partners | diverse but mainly *NATURAMA* & government officials | diverse but mainly *NATURAMA* & government officials | diverse but mainly government officials |
| Main information source | *NATURAMA* | *NATURAMA* | members and inhabitants |
| Permission required from authorities for activities | medium to high | medium to high | Sourou: high<br>Higa: moderate |
| **SWOT assessment** | | | |
| Main weaknesses & opportunities | financial aspects | financial aspects | diverse (financial aspects) |
| Main perceived strength | activities | activities | activities |
| Main perceived threat | diverse (conflicts and poor collaboration) | diverse (poor financial management) | diverse (financial aspects) |

*Organizational comparison*

The organizational statutes of the COs and LCGs studied are comparable, including the composition of their governing boards, their election procedures, members' responsibilities and membership admission regulations (see Table 6.4). These organizational aspects show that the LCGs and COs have (fairly) structured and regulated operational procedures.[21] There is a wide diversity in members' backgrounds but CO members often have similar livelihoods because the COs tend to focus on one particular activity (e.g. fishing or trading). Both the LCGs and almost all the 'mixed gender' COs have (very) few female members because of the negative perceptions men have of women's capabilities, although this appeared to be chancing.[22]

There are pronounced similarities regarding organizational performance between the COs and LCGs but, compared to the LCGs, many of the COs are more focused on profit-making. These profit-making activities result in the COs being more vulnerable to bad agricultural and/or trade conditions, which can lead to a halt in activities or even to the end of an organization. Several COs and LCG Sourou saw their membership decrease as members left the organization for a variety of reasons, such as failed activities and/or bad harvests. Additional risks of (labour or financial) investments in potentially profit-making activities include time-consuming investments with little or no return on them, and debts.

The fear of debt is sometimes a reason for choosing not to join a certain CO, although of the 28 randomly selected inhabitants, 13 were not a CO/LCG member and they all indicated that they would like to join such an organization. Nevertheless, the selected COs and LCGs did not attract many new members. The most common reason given by non-CO/LCG members for not having joined an organization was that COs/LCGs did not (actively) recruit members. In contrast, the main perceived reason for failing to attract new members was the alleged problematic functioning of the organization, including its poor management. Indeed, several non-members indicated that poor management discouraged them from becoming members, even though many of them would in fact have liked to join such an organization. Some of the perceived reasons for inadequate management included board members not having sufficient (management) training, fraudulent activities, and minimal education and high illiteracy levels among (board) members.

The perceived poor management is partly confirmed by a combination of observations. These included (board) members' limited awareness of other

[21] Like 68% of 211 LCGs in Africa (BirdLife 2010a).

[22] The following two quotes illustrate the change in thoughts: "we (men) thought that women can't work well in CO, but nowadays women are getting education, and we now think they can do the job too" (CO member) and "maybe we will have women members in the future: in Africa there is a mentality to refuse women, but we now see this is wrong attitude" (CO board member).

COs/LCGs (including ones with similar activities and objectives), board members commonly knowing little about the organization's objectives (especially the presidents), a very real lack of female representation, COs ceasing to exist (for some, as a result of alleged failed management), and observed forms of 'neopatrimonialism'.[23] Furthermore, a lack of discipline was occasionally noted.[24] *NATURAMA* planned to invest in the institutional building of LCGs, for instance, by providing training for its board members in administration, financial and association management, drafting projects, reporting and by organizing exchange visits between LCGs. A coordinator was appointed for each LCG by *NATURAMA* in 2011, all of whom have a good educational background and extensive experience working in sustainable development.

*Decentralization and participation*

The setting up of more than half of the COs studied was not supported or financed by the government, at least not directly, and was not, therefore, directly linked to Burkina Faso's government decentralization policy. Nevertheless, government officials were the major collaboration partners of COs. Similar to both the LCGs being studied here, the founding of some COs was promoted by NGOs and/or financial institutions,[25] while others were established without any outside assistance. They were, therefore, not directly linked to any decentralization policy. Formal (and informal) transfers of power (i.e. devolution), which are a characteristic of democratic decentralization (Ribot *et al.* 2010), were limited for the COs, as was illustrated by the fact that the COs generally needed authorization for their activities, including those COs of which their founding that was encouraged and/or initiated by the government.[26] This was also the case with the LCGs but they typically informed or involved the relevant local authorities. Interesting-

[23]" Neo-patrimonialism is normally associated with the absence or inapplicability of bureaucratic norms that have been associated with the development of the state in the western world" (Amadi 2009: 1). Amadi (2009: 1) states that "Neo-patrimonialism mainly takes the form of power concentration, provision of personal favours and misuse of public resources." The provision of personal favours was particularly noted, especially in the form of designating functions to friends.

[24] For example, at Lanfiera's mayor's public office, COs and Sourou LCG planted tree seedlings and protected them with baskets. However, after several months many of the baskets were lying on the ground next to the trees and were never put back over them to offer protection even though inhabitants, including CO and LCG members, indicated that the baskets were desperately needed to protect the trees from livestock. According to the director of the Sourou department of INERA (*Institut de l'Environnement et Recherches Agricoles*), lack of discipline is a major issue when it comes to the functioning of community organizations (Dao Vincent, regional director at INERA, *pers. comm.* 2011).

[25] COs in Burkina Faso have often been set up as a precondition to receiving credits and/or help from NGOs (Sabine Luning, Lecturer at Leiden University, *pers. comm.* 2013) as was the case in one of the COs studied and in Higa LCG.

[26] In neighbouring Mali, Kassibo (2006) noted a lack of democratic decentralization in environmental management due to the absence of downward accountability between the central government and decentralized institutions.

ly, the need for authorization was generally less in the more remote and less resource-rich Higa area. This corresponds with the findings of Hilhorst (2008: 6), who found that "in remote areas with a poor resource base, government presence is more limited, which increases local space for decision-making." No other consistent differences were noted between the COs in Sourou and those in Higa.

The LCG and CO governing boards are, at least to a certain extent, democratically elected by their members but members serve on them for an undetermined period in Higa LCG. These governing boards are also the organizations' principal decision-makers.[27] Decision-making is thus based on authorized representatives, another characteristic of democratic decentralization of NRM (Ribot *et al.* 2010).[28] However, they do not represent the whole population as many people in the community are not members of a CO or LCG.[29] In fact, "BirdLife is careful not to claim that the local organisations it works with are automatically representative of the community from which its members are drawn" (Thomas 2011: 10).

LCGs may be "special interest organizations" but "through their social networks within the community, LCGs provide a reach that goes well beyond organisation membership alone, thus providing an important entry point into wider society" (Thomas 2011: 10). Indeed, in total, 35 of the 39 interviewees (90%) in Higa knew the LCG. The Sourou LCG was less well known, 14 of the 58 people interviewed (24%) knew of its existence. Very few of the randomly selected Sourou inhabitants knew the LCG (less than 10%).[30] In contrast, the majority of the interviewees in each actor group[31] in Higa was aware of Higa LCG's existence. It should be noted that Higa LCG is geographically limited to a smaller area with a lower population. In several actor groups, a large minority of the people who knew 'their' local LCG were not aware of any of the organization's aims or activities. Even some of the LCG and CO (board) members had extremely limited knowledge of their organization's objectives.[32][33] This could be related to the

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[27] Although three of the interviewed Higa CO presidents had a virtual monopoly on decision-making, while *NATURAMA* significantly influenced LCG objectives and activities.

[28] This corresponds with an important characteristics of BirdLife's LCG approach of working locally, namely contributing to a network of open, democratic, membership-based organizations (BirdLife 2011).

[29] Note that LCGs have a larger number of members than most COs, although it is unclear what defines a member in Sourou LCG. Membership numbers thus vary.

[30] A two-year-old local cultural-environmental CO did not know about Sourou LCG.

[31] Divided into LCG (board) members, CO board members, non-members, key non-members, key actors and non-members from neighbouring communities.

[32] Illustratively is the comment of one LCG Higa woman member: "all things that help development, we don't really remember all objectives, is told many times, but difficult to remember."

[33] The secretaries generally knew more about LCGs and COs, while the president had more status in the community. This conclusion is shared by *NATURAMA*, which accordingly adapted its collaboration strategy. For example, they invite LCG secretaries twice a year for strategic meetings in Ouagadougou, while the presidents are only invited once a year (Georges Oueda, former conservation director *NATURAMA*, *pers. comm.* 2011).

fact that some members participated in only one or a few of the LCG's activities, as was especially the case in Sourou.[34] Many of the conservation-related activities were executed by a few (board) members, with the exception of tree planting (see Photos 6.1-6.3).

*Photos 6.1-6.3* The planting of tree seedlings is done by most community members

[34] Grootaert *et al.* (1999) extensively researched local social organizations in Burkina Faso and found that only a minority of the respondents indicated being an active member of 'their' organization(s).

*Collaboration and local empowerment*

Cooperation between LCG and *NATURAMA* appeared to be much more intense than that observed between COs and NGOs. Compared to LCGs, COs seem more restricted locally regarding information and collaboration. Collaboration between COs, and especially between COs and LCGs, is limited. None of the COs studied collaborated with LCGs, although one CO in both Higa and Sourou had similar environmental objectives and activities.[35] Also, few randomly selected inhabitants received help or collaborated with an LCG or CO. A general lack of external communication would seem to have been a key factor here. For example, many COs and LCGs did not know of each other's existence.[36] In fact, *NATURAMA* indicated that communication needed to be improved (Georges Oueda, former conservation director *NATURAMA*, *pers. comm.* August 2011), while INERA's regional director for Sourou (Dao Vincent, *pers. comm.* 2011) has argued that there are "just too many COs" since they often have similar objectives.

The most common type of support given by BirdLife partners to LCGs in Africa is the provision of funding for activities, materials and training (Bernd de Bruijn, senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* November 2015; BirdLife 2010a). Similarly, besides being the main information source and partner, *NATURAMA* was also the main source of income for both LCGs, followed by membership dues and contributions. Compared to LCGs, many COs were more focused on making a profit. Together with membership dues and contributions, profits are one of the main income sources for many COs. They make them less dependent on external funding and, therefore, less dependent on donor NGOs too. This arguably gives them more freedom through self-governance. It is interesting to see that LCG (board) members' perceived weaknesses and opportunities are mainly financial, while the alleged weaknesses and opportunities of the less funding-dependent and more profit-focussed COs are slightly more varied. However, most of the CO board members interviewed also indicated not having achieved the organization's objectives mainly for financial reasons, as did the majority of LCG (board) members. In addition, many members did not pay their initial registration fee and/or their annual membership contribution. Poverty in both areas reportedly prevented members from making (long-term) investments and this limits the financial resources of both COs and LCGs. *NATURAMA* (Georges Oueda, former conservation director at *NATURAMA*, *pers. comm.* 2011) felt that financial limitations were the main reason why LCGs had not yet been able to achieve all their goals.

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[35] Involvement of existing conservation-related organizations appears to be limited but an existing CO was transformed into Higa LCG.

[36] Although a quote from the president of a women's organization suggests that a reluctance to collaboration might also play a role: "we do not work together with other CGs, because they did not come to approach us."

Sourou LCG's self-governance was also restricted because the group did not have a general budget but received funding from *NATURAMA* for specific projects, such as bird surveys and awareness-raising programmes. The income received by COs is less project-based and the same is true for Higa LCG, although the situation is changing for Higa LCG as *NATURAMA* is adopting a greater funding role. In addition, conservation-related activities were initiated by *NATURAMA* and executed by LCG (board) members following instructions received from *NATURAMA*. Although virtually all LCG and CO members are unpaid volunteers, they, and especially LCG (Sourou) members, do regularly receive money or food as allowance for participating in an activity. This could explain why LCG (board) members often showed a rather passive attitude towards (potential) LCG aims and activities. This was seen, for example, in their lack of ideas and suggestions and was noted by Higa LCG's president: "*NATURAMA* is their father and they are the child – children listen to their father."[37]

The above would seem not to include local empowerment objectives and does not necessarily reflect BirdLife's LEP goal of helping local organizations achieve their own aims and ambitions (BirdLife 2011).

*Linking conservation and development*

The planting of tree seedlings is one of the LCGs' main activities. Although less common, a majority of the COs also frequently organized and/or participated in tree-planting activities, namely seven of the twelve COs studied, but only two of them had explicitly stated conservation-related objectives among its objectives. This is virtually the only conservation-related activity noted for the COs besides environmental awareness raising (two COs) and fishing with nets with larger mesh sizes (one union).[38]

In addition to tree planting, Sourou LCG's conservation-related activities included bird monitoring, awareness raising, bird and habitat conservation and sustainable fishing (Photo 6.4).[39] Higa LCG and a few COs carried out several other conservation-related activities, such as cleaning the village and public buildings and constructing so-called farm dams, but conservation was not the main objective in these cases.[40] Moreover, any environmentally friendly outcome remains

[37] The previously mentioned focus by (board) members on financial aspects regarding perceived weaknesses, opportunities, objectives and achievements could also be associated with this attitude.

[38] Similar results were noted by Grootaert *et al.* (1999) who undertook extensive research among local social organizations in Burkina Faso. Youth organizations and environmental organizations accounted for the smallest categories and the latter group was geographically limited to the northern Yatenga Province. Environmental organizations focus almost exclusively on erosion control and reforestation.

[39] Some other conservation-related activities, including agro-forestry and the building of improved fire stoves, were not mentioned by LCG members and could be treated as *NATURAMA* activities in which the LCG (secretary) is partly involved.

[40] As part of the Living on the Edge project, several additional activities were planned for both LCGs, including conservation-related activities, such as promoting the utilization of butane gas and undertak-

uncertain. Various field observations raised similar questions about the effectiveness and quality of some of Sourou LCG's conservation-related activities: their limited bird-identification skills; several hunters did not know of the LCG; and some (board) members did not speak out against the illegal possession of birds and animals. Furthermore, the (long-term) success rate of the tree-seedling planting organized by the LCGs and COs has been limited, as many trees have died due to a lack of water and livestock browsing and trampling them. Another worrying observation from a conservationist point of view is that several Sourou LCG members bought additional wood and fishing materials with the microcredit that they received from *NATURAMA*. This suggests that development and conservation goals are not always mutually enforcing.

Demonstrating BirdLife's underlying principle of providing tangible benefits for LCGs that link conservation and development (BirdLife 2010a) is difficult concerning Sourou LCG and Higa LCG. There was one conservation activity with tangible benefits, namely tree planting and the subsequent cutting and selling of planted trees, which reduces pressure on natural woodlands (Bernd de Bruijn, senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* May 2014). Most of the LCGs' conservation activities, such as sustainable fishing and bird and habitat conservation, could be better attributed to BirdLife's Local Empowerment Programme and its aim of promoting the development of sustainable local livelihoods (BirdLife undated). It is perhaps the lack of tangible benefits from the conservation activities that explains why, although conservation is the core business of Sourou LCG, only half of the (board) members interviewed had conservation-related reasons for joining. It might be reasonable to assume that their relatively new relationship with *NATURAMA* and the virtual lack of conservation objectives and activities explains why Higa LCG (board) members had less conservation-related reasons for participating in local organizations than Sourou LCG members.[41] Similarly, conservation-related activities were mentioned by four of the ten LCG Sourou (board) members interviewed as being an opportunity, while none of those interviewed in COs or Higa LCG (board) members mentioned this.

ing fish and Hippopotamus *Hippopotamus amphibius* surveys (Georges Oueda, former conservation director *NATURAMA*, *pers. comm.* August 2011; Bernd de Bruijn, senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* November 2011).

[41] Most Higa LCG (board) members mentioned 'creating or promoting development reasons', while COs and Sourou LCG (board) members mainly had financial reasons for joining the organization, while most of the non-CO/LCG members wanted to join an organization for financial reasons.

*Photo 6.4* Bird monitoring at the shores of the Sourou river

## Concluding remarks

Most of the COs studied demonstrated a link with Burkina Faso's and/or NGOs' decentralization policies, although they had few characteristics relating to specifically democratic decentralization. Like the LCGs, many COs revealed elements of a participatory approach. The LCGs, and Sourou LCG in particular, had a close relationship with their (conservation) donor organization and this appeared to limit the (board) members' involvement and participation in their organization. This kind of relationship explains Sourou LCG's emphasis on conservation-related objectives and activities, while the newly formed relationship between Higa LCG and *NATURAMA* has led to additional planned conservation-related activities for this LCG. Even though many of the conservation-related activities contribute to sustainable development, the tangible benefits of such activities are limited and probably not (yet) sufficient to persuade people to undertake such activities of their own accord. It is interesting to note that conservation-related activities are very limited in the COs studied, with the exception of tree planting, which is precisely the only LCG conservation-related activity with tangible benefits. However, in at least one case, the direct benefits of this conservation activity appeared still not apparent in the short-term, as planted trees were being lost due to a lack of care. The LCGs' focus on conservation-related activities leaves them (financially) dependent on their donor organization(s) because of these activities'

inadequate tangible (financial) short-term benefits, which in turn reduces the empowerment of these organizations. Nonetheless, like LCGs, the less or non-conservation-focused COs also had limited incomes. This could partly be caused by, as well as partly be a cause of, the limited and basic level of management and governance capabilities in most of these organizations, including LCGs. The factors behind inadequate management include a lack of discipline, little or no education and high illiteracy rates among (board) members, which are undoubtedly related to general poverty and a lack of access to education in rural areas of the Sahel. These are likely also to be due in part to poor communication and may be contributing to limited collaborative practices with other organizations and community members. However, the LCGs displayed advanced levels of collaboration with *NATURAMA*, which provided them with a greater geographical reach than the COs, including access to high-level governance actors. In addition, it provided training and information from people with specialized education. And lastly, institution building takes a long time and the LCGs and many of the COs have only recently been set up. It might, therefore, be partly a matter of time and 'learning by doing'. Indeed, Oursi LCG (see Box 6.1), which has a longer history of institution building, appears to be better organized and has reportedly higher levels of conservation incentives and results, participation and empowerment.

The COs and LCGs' principal conservation-related activity, i.e. tree planting, is highly significant for migrant bird conservation in the Sahel as the most critical habitat change for migrant birds in this region is the amount of trees and scrub in rural landscapes. However, the impact of tree planting may be positive or negative for different species. The impacts of habitat change in the Sahel on migrant birds are poorly understood and more research is needed (see e.g. CCI 2010 and Chapter 2).

*Box 6.1* A note on Oursi LCG

The country's third LCG in Mare d'Oursi (Oursi LCG) falls within the Sahel biome area but was not studied due to local security concerns. However, interviews were conducted with the former LCG president and several other key persons (such as conservation officers at *NATURAMA* and VBN). Oursi LCG has a longer history than the country's other two LCGs, as it was informally founded in 1997 before becoming a legal entity in 2006. Oursi LCG is often held up by *NATURAMA* and VBN as an example of a successful and well-functioning community-based conservation group. Indeed, interviews with the LCG host (the former president) showed a well-developed organization with higher levels of local participation and empowerment than Sourou and Higa LCGs. Oursi LCG's conservation-related activities are more varied than those in Sourou or Higa and in addition include the ecological monitoring of habitat, trees and grasses and environmental education in schools. According to VBN, one of the reasons for its success is that *NATURAMA* started out with a participatory management plan for NRM (Bernd de Bruijn, senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* June 2012). It should be noted that the LCG Oursi is located in a traditional Peul region, while Peul traditional social organizations were merely through lineage or class relations. This apparently has had no decisive negative impact on Oursi LCG's allegedly successful non-lineage and non-class-based form of organization. Finally, some Sourou LCG members indicated that other members regularly do not participate because of the large distances they had to travel to meet (because Sourou LCG's area covers two departments). The area of Oursi LCG includes only one community, which reduces distances and thus has potentially led to increased member participation.

# 7

# Conclusions

## A changing environment: Trends and perceptions

### *Vegetation trends and causes: Perceptions, scientific data, and written sources compared*

Although the literature describes a re-greening of the Sahel since the mid-1980s and '90s, regional differences exist due to local differences in weather patterns and anthropogenic effects (Adams *et al.* 2014; Atkinson *et al.* 2014). Indeed, the Normalized Difference Vegetation Index data for the research areas clearly showed major differences between years and location, which was also regularly suggested by local inhabitants in both areas. Furthermore, vegetation cover trends were not always related to rainfall trends that were derived from SPOT-VEGETATION and CHIRP time series, respectively.

In Sourou and (especially) Higa many local inhabitants claimed a declining number of (large) trees, and some claimed a desertification threat, both due to several human-induced factors. Overgrazing was also mentioned as a serious threat, although primarily in Higa and/or by local authorities. In Higa, it was also sometimes suggested that burning of vegetation had led to the disappearance of vegetation and had caused subsequent erosion (land and soil erosion is the most common type of degradation in Burkina Faso's Sahel region, according to SP/CONEDD 2010).

Altogether, vegetation degradation seemed particularly evident in Higa. In that respect, it makes sense that remote sensing data revealed a distinct decrease in vegetation cover in Higa, particularly in the officially designated 'livestock area'.[1] Overgrazing (and wood cutting) might be a plausible explanation, as suggested by the local inhabitants. Several inhabitants supported the assumption that at the Higa 'lake area' large numbers of livestock from surrounding areas impact the vegetation cover when they pass through on their way to the lake. Further-

[1] The NDVI data revealed that in recent years a slight increase in vegetation cover had occurred at the 'lake area'.

more, pastoral activity is explicitly mentioned as an environmental issue in Higa by NATURAMA (2015), but not in Sourou.

The fact that NDVI data revealed a vegetation greening in Sourou, after an initial decreasing vegetation cover, does not necessarily contradict the local view of decreasing vegetation cover (which was also relatively less pronounced than in Higa).[2] The greening is probably the result of an increased surface of irrigated agricultural land (see also Helldén & Tottrup 2008). Rather, a transformation is probably observed: a decrease in natural vegetation and tree density, as suggested by the local inhabitants, and an increase in crop density, and thus environmental degradation. Indeed, conservation organizations consider increasing irrigated agricultural land an environmental problem, particularly in Sourou (NATURAMA 2015; Ramsar 2015, 2013).

In line with the conclusion drawn by Rasmussen et al. (2001) from observations in a (even) more northerly region in Burkina Faso, the current analysis shows that a broad generalization on land degradation processes is risky as significant variations exist locally. Similarly, this analysis does not point to a simple answer with respect to the discussion about whether natural or human factors should be considered the most important causes of observed vegetation change (Ibid.). Rather, it shows, as argued by, among others, Helldén & Tottrup (2008), that explanations for vegetation trends should be sought through a broad spectrum of factors.

*Environmental threats: Perceptions and written sources compared*

Environmental threats in the Sahel are primarily related to livestock (overgrazing and conversion of natural habitats into pastures), agriculture (intensification, irrigation and expanding of fields), and unsustainable wood harvesting (loss of trees and woodland) (Adams et al. 2014; Brito et al. 2014; Zwarts et al. 2009). Notably, all three issues are also locally indicated for the research areas, but issues related to livestock are less evident, at least compared to other perceived threats. This might be related to the fact that the impact of livestock and grazing pressure is manifold and often indirect (Zwarts et al. 2009; Hiernaux & Gérard 1999), and therefore less clearly allocated to livestock.

According to conservation organizations, the (unsustainable) cutting of branches and trees and expanding agricultural land are major environmental threats for both Sourou and Higa (however, most information is restricted to the

[2] In their study area in southern Mali, Tappan & McGahuey (2007) note that the general local perception is that local forest resources have degraded since decades, including a decline in trees. Nonetheless, a comparison of (historic) aerial photos does not reveal a loss of woody cover. However, they do note that the forested areas have probably become less biologically diverse.

wetland areas) (NATURAMA 2015; Ramsar 2015, 2013).[3] Interestingly, the tree issue was also a major environmental problem according to the local inhabitants. In contrast, expanding agricultural land was almost never mentioned by the local inhabitants; only a few inhabitants mentioned that fields close to rivers and lakes cause soil erosion. Other environmental threats and problems were raised by both conservation organizations and inhabitants, although the inhabitants mentioned a greater diversity of problems. One national conservation organization (NATURAMA 2015) indicated one issue that was not mentioned by the interviewees (namely harvesting of tubers of *Nymphea lotus*). Despite a supposed increasing population in Sourou and Higa, population growth was never mentioned as an environmental threat.[4] This is consistent with those academics who question the inevitability of the link between rural population growth and environmental degradation (Adams 2002; Mortimore & Adams 2001; Raynaut 2001).

*Implications of environmental degradation: Perceptions and* written sources *compared*

Knowledge of Burkina Faso's and the research areas' avifauna is limited and much information still needs to be collected or verified (BirdLife 2015c; Lungren *et al.* 2001). We do know, however, that the population of many African-Palearctic (A-P) migrant species that winter in these areas are declining (Zwarts *et al.* 2009). Sahelian factors for decline are related to (populations of) species and their exact winter grounds, habitat requirements and the land-cover changes in these particular regions and habitats (Vickery *et al.* 2014; Atkinson *et al.* 2014).

In the research areas, many inhabitants thought that bird populations are declining, and various (human-induced) causes have been suggested. Some of these causes overlap with the ones found in the literature on A-P migrant birds in the Sahel, such as deforestation and the exploitation of birds. Evidence of a negative impact on birds in the Sahel is greatest for two land-use changes, namely the loss of wetlands and fewer trees in woodland habitats (although this is not the case for all species) (Mihoub *et al.* 2010; Zwarts *et al.* 2009; Thiollay 2006a). Despite this, local inhabitants only mention the lack of trees. This is not surprising because a loss of wetlands has probably not taken place in the research areas. The opposite occurred in Sourou, however, where there is an increased surface of (permanently) flooded land due to the damming of the Sourou river. It has been suggested that the most critical Sahelian land-use change for birds involves the extent of trees and scrub in rural landscapes (CCI 2010b). Interestingly, felling

[3] Knowledge of the local conservation conditions, as well as local conservation efforts, have increased considerably in recent years, following the implications of the Living on the Edge project.

[4] Although, a few interviewees suggested that population growth has led to conflicts as a result of increasing land scarcity.

and the lack of trees were the most frequently mentioned threats to birds in Sourou and (especially) Higa.

The severe Sahelian droughts and consequent environmental degradation in the 1970s and 1980s have shown us the kind of devastating impacts environmental degradation can have on local livelihoods (Dietz et al. 2004; Mortimore & Adams 2001). This study reveals that several contemporary environmental problems are still critical issues for people's livelihood, as environmental problems are among many people's main perceived problems in their lives. These were problems related to trees, soil, water and plagues of insects. Moreover, all interviewees indicated that environmental problems exist.

*Concluding remarks and implications for conservation*

Although a general greening of the Sahel is noted following increased rains and improved land use in recent decades, the exact causes of the greening are diverse and not always well-understood. Furthermore, environmental degradation is also (locally) detected, and human-induced environmental degradation is (still) threatening the survival of both birds and people, while droughts remain an ever-present threat (Ouédraogo *et al.* 2014; Brandt *et al.* 2014; Cresswell *et al.* 2007). Indeed, although some greening is observed, vegetation degradation is also detected in both research areas, and anthropogenic activities are an important factor. This shows that a detected greening (including by means of NDVI data) does not necessarily mean that natural vegetation, or vegetation that birds require, is restored (see also Atkinson *et al.* 2014). It therefore stresses the importance of determining the exact vegetation and land cover changes (through multiple methods).

Similar to Lindskog & Tengberg's (1994) findings in a slightly more northerly part of the Sahel region in Burkina Faso, local knowledge of land cover changes is in line with the scientific data. Furthermore, similar to their results and those from Audet-Bélanger's (2010) study in Ghana, the loss of forest and trees, especially big trees, was seen as an important environmental change. However, in this study, local inhabitants attributed the cause of land degradation to mostly human activities. This is in contrast to the results from Lindskog & Tengberg's (1994) older study in the northern parts of Burkina Faso's Sahel region. There, local inhabitants (i.e. Muslims from the Fulani ethnic groups, of which there are many in Higa) attributed the cause of land degradation to God, Allah. A change in who they ascribe the causes to possibly marks a change in people's (traditional) beliefs. In other words, the Fulani Muslims no longer ascribe such causes to God, Allah, and the Mossi no longer believe it is the work of the Supreme Being, Wende (see also Rupley *et al.* 2013; Asante & Mazama 2009a, 2009b; Lindskog & Tengberg 1994). It is possible that traditional beliefs are playing a diminishing

role in people's daily life, although not all authors would agree. Rupley *et al.* (2013) and Hadnes & Schumacher (2012) indicate that traditional beliefs still play an important role. The Sourou and Higa inhabitants' recognition of their own role is a major contributing factor for development organizations seeking local motivation and participation to combat environmental issues (see also Lindskog & Tengberg 1994).

Similar to the literature on environmental change in the Sahel (Brito *et al.* 2013; Zwarts *et al.* 2009; Mortimore & Adams 2001), conservation organizations indicate that agricultural expansion and increased livestock grazing (Higa only) are among the principal environmental problems in the research areas (NATURAMA 2015; Ramsar 2015, 2013). These problems were, however, seldom mentioned by the local inhabitants. The issue of expanding agriculture was mentioned even less often in Higa with a more pastoral orientation, while the overgrazing issue was never mentioned in Sourou with a more agricultural orientation. Thus, local context, including land-use practices, appears to influence the perceived environmental problems. This does not explain the relative lack of mentioned agriculture and livestock grazing issues, however. Perhaps people's high dependence on these livelihood activities prevents them from seeing these activities as potential environmental problems. Besides, the environment is sometimes seen as one that supports all aspects of life, including agriculture (see also next section). Most notably, the unsustainable use of wood has led to a serious loss of trees according to local inhabitants. This issue is also mentioned as an environmental problem in these areas by conservation organizations, and as a major problem for the whole Sahel in more general Sahelian literature (NATURAMA 2015; Ramsar 2015; Adams *et al.* 2014).

Conservation organizations and local inhabitants show slight differences in how environmental problems are perceived and/or communicated. Conservation organizations often mention a process (i.e. the drivers of environmental change), while inhabitants often mention the consequences (i.e. the environmental change). For example, conservation organizations generally talk about environmental issues, such as tree cutting, overfishing and soil degradation, whereas local inhabitants usually talk about lack of trees, lack of fish, and degraded soil. To catch people's attention, the consequences of problems should therefore also be communicated, as inhabitants are more aware and worried about the actual consequences than the processes behind them.

Recent studies have started to uncover the (severity of the) impacts of environmental degradation in the Sahel on A-P migrant birds (Adams *et al.* 2014; Atkinson *et al.* 2014; Vickery *et al.* 2014; Zwarts *et al.* 2009). Local inhabitants are reasonably aware of the threats birds face, but some threats are unknown to the inhabitants. These threats are either locally non-existent (i.e. the loss of wet-

lands) or they are largely invisible (i.e. chemical pesticide). This illustrates that those less visible, often indirect, threats should be explained to local populations by conservation organizations if these threats must be addressed. The fact that inhabitants recognized (other) threats to birds helps to raise awareness about these issues to their attention and it makes them realize why conservationists are actively involved in combatting these threats.

Importantly, many of these threats to birds were perceived as major environmental problems by local inhabitants, including problems that were seen to have a significant impact on people's lives. This shows that addressing these issues is also a priority for local livelihood improvement. The tree problem is among these 'livelihood issues', and is also a major threat to A-P migrant birds (CCI 2010b). However, the livelihood problem of insects (plagues) does not pose a threat to birds; indeed, the opposite is true, as many (A-P migrant) bird species feed intensively on locusts and grasshoppers (Zwarts *et al.* 2009). Soil and water issues were perhaps less directly related to birds. However, they are related, to a greater or lesser extent, to trees as they retain soil and water and reduce floods, as was sometimes suggested locally.

In conclusion, this comparison shows that retaining and/or increasing the number of trees would be an effective way of achieving community-based (migrant) bird conservation that contributes to local sustainable development. Although the heterogeneity of the Sahel is marked (Raynaut 2001), and similar comparisons should be made at specific locations, it highlights that trees warrant close attention and shows that these comparisons can help address those issues that are (locally) relevant to both birds and people.

## Local values of birds, the environment, and conservation

### *The perceived values of birds and the environment*

The environment was seen by local inhabitants as highly important to their livelihoods, and also for their coping strategies and socio-cultural values. Inhabitants commonly saw the bush and the immediate surroundings of the village as their natural environment and one that supports all aspects of life, including agriculture. Ingold (2011) found the same perceptions among the Dogon in neighbouring Mali. The lives and livelihoods of the local inhabitants were strongly linked with the natural environment, mainly through the environment's supporting and provisioning services (including the environment's capacity to support agriculture and the provision of wood, water and food, respectively). Both categories are thus linked with providing a livelihood.

Birds are often considered an integral part of the environment and play numerous roles in people's lives, frequently directly related to their livelihood ac-

tivities. Only a few men expressed themselves negatively towards all birds. Generally, there are two perceptions regarding birds: either a positive perception of all birds or a positive perception of large birds but a negative perception of small (seed-eating) birds that feed on crops. The positive perception generally prevails. The reasons for people's positive attitude towards birds were diverse, and were both socio-cultural and socio-economic in nature. In fact, an aesthetic value was regularly attributed to birds, and in both research areas a good number of inhabitants indicated that birds are valued as food source. In addition, birds were often valued as an indicator for (coming) events, environmental conditions or (potential) dangers, and for fulfilling their ecological role, such as vultures 'cleaning' carcasses. Some inhabitants, especially members from a local conservation group, were aware of migratory birds wintering in their area, sometimes resulting in a sense of pride.[5]

Inhabitants' perceptions of birds and the environment were influenced by the local context and individual characteristics. Regarding local context, for example, people in the less developed Higa area appeared to be more connected with the environment, and birds played a more 'basic' role in their lives (such as locating surface water or dead livestock by observing birds). On the other hand, the use of chemical fertilizers was only mentioned as an environmental problem in the more (agriculturally) developed Sourou area. Regarding individual characteristics, for example, people who were more dependent on subsistence farming, i.e. the population with predominantly agricultural livelihoods, were markedly more negative towards small birds (which should be linked with the threats that birds pose to their crops). On the other hand, fishermen were less concerned with the decline in the number of trees, but were, for obvious reasons, more concerned with (unsustainable) fishing issues.[6]

*Altitudes towards (bird) conservation*

Almost all of those interviewed believed that there were solutions to environmental problems. These solutions were most frequently related to retaining or increasing the number of trees. Although most of the literature on local environmental and conservation perceptions is limited to protected areas (see e.g. Tessema *et al.* 2010; Infield & Namara 2001; Gillingham & Lee 1999), most of the world's biodiversity is not in protected areas but on lands and waters used by people for their livelihoods (Berkes 2013). Creating protected areas is unlikely to be effective for migrant (land) bird conservation as many species are found in

[5] However, distinction between African non-migrant species, and African and/or A-P migrant species was usually not made, and often unknown, and local perceptions therefore usually concerned birds in general.

[6] Some livelihood characteristics were more common in one of the two research areas, often because of the local context, and in these cases individual characteristics and local context overlap.

relatively low densities across the wider agricultural landscape on land that is owned and managed by rural people who are living in extreme poverty (Adams *et al.* 2014; Bernd de Bruijn, senior international policy officer at *Vogelbescherming Nederland*, *pers. comm.* November 2015).[7] The creation of protected areas was suggested by only one interviewee.

I have demonstrated that both birds and the environment are valued in many ways and are strongly linked with local livelihoods. At the same time, the study shows that serious environmental problems exist, and that both local livelihoods and birds are negatively impacted. This has created, among other things, conservation incentives among the local population. Muslims and inhabitants who collaborate with conservation organizations (namely, Local Conservation Group (LCG) members) were the most positive towards (bird) conservation. Surprisingly, children were the least positive, which raises a question about the role of education. People were generally positive about bird conservation, except for small birds, which are considered pests as they cause damage to agriculture by feeding on local crops. Not surprisingly, when livelihoods were under threat from wildlife, (general) conservation incentives diminished.

Inhabitants' conservation incentives were mainly focused on people's own or their communities' interests. Similar to their general conservation incentives, bird conservation incentives were focused mainly on respondents' own interests, followed by aesthetic features. Conservation incentives were influenced by the local context (environmental conditions, local events and the level of human development) and individual characteristics (e.g. gender and education). The more distinct individual variables in this regard were livelihood activities, religion, LCG (board) membership, local authority and age (i.e. adults versus children).

*Concluding remarks and implications for conservation*

The environment is seen as being highly important to people's livelihoods, and also for their coping strategies and their socio-cultural values. Trees are highly valued by local inhabitants and authorities and also have a (perceived) crucial link with local livelihoods and affect, for example, flooding levels and soil degradation. The focus on trees was even more pronounced in people's conservation perspectives.[8] Birds, including those that migrate, are often considered an integral part of the environment and play numerous roles in people's lives, sometimes directly related to their livelihoods.[9] Birds are seen by some inhabitants as an indicator of environmental health and are therefore useful in addressing conser-

[7] However, parks and protected areas might be appropriate conservation strategies at biodiversity hotspots, such as Important Bird Areas (see Box 2.3).

[8] It should be noted that the focus on trees by both local inhabitants and (local) governments as well as conservation organizations can undoubtedly reinforce each other's emphasis on trees.

[9] Including as coping strategy, namely hunting wildlife, including birds, in periods of extreme drought.

vation issues (BirdLife 2000). These local values demonstrate the perceived importance of a healthy environment for birds and people alike, showing that (migrant) bird conservation can contribute to local development and livelihood improvement.

In line with the argumentation provided in this study (based on literature; see also Chapter 2), there was, except for one, no suggestion to create protected areas as a solution to environmental problems. Hence, promoting sustainable land-use practices that contribute to habitat restoration and conservation as well as better livelihoods for local people appears to be more appropriate (Van den Bergh 2014). Trees form a noticeable and strong link between bird conservation and livelihood improvement, especially those tree species that are of particular value to both birds and people (such as *Faidherbia albida*). Importantly, this link is clearly recognized by the local inhabitants, making it an excellent target for community-based conservation.

Because environmental, bird, and conservation values were often linked with people's livelihoods, understanding individual (including livelihood) characteristics is crucial. This need is emphasized by the influence of individual characteristics on conservation incentives. Conservation incentives were also influenced by local context. This reiterates that conservation action in the Sahel should be heterogeneous, and thus adapted to the local context. Conservation efforts in consideration of local context and individual characteristics increase the (perceived) relevance for the targeted population, thereby promoting participation and contributing to efficiency and effectiveness as people respond to those issues that locally matter.

Local context should be considered, including the area's specific environmental conditions, the occurrence of local events, and the level of human development. For example, after the occurrence of recent floods and (associated) erosion issues, the trees' capacity to prevent or limit floods and erosion can be explained to promote the protection and planting of tree seedlings. Further, conservation actions that are relevant for the inhabitants' local environment should be communicated, as should those relevant to the wider environment, albeit to a lesser extent. Similarly, issues should be addressed that are relevant in developed or less-developed areas, according to the local context. Understanding the level of reliance on, and the level of interrelation with the natural environment, is important in this regard. Similarly, stakeholder groups can be used to address individual characteristics, including livelihood, local authorities, and children groups, but also churches and mosques. Children were generally less connected with the environment and birds than adults and showed less interest in conservation issues. Moreover, while children regularly hunted birds with slingshots, none of them were familiar with the system of hunting permits. Together with teachers

and curriculum developers, a relevant and meaningful approach needs to be developed to educate youngsters about hunting legislation and the environment, including about birds and their contribution to the quality of people's lives in the region. This kind of education seems desirable as the children in this study were the least positive towards bird conservation. Moreover, a higher level of education did not lead to a more positive perception of (small) birds (rather, the opposite was noticed). Indeed, raising awareness and education about birds and the environment in a more general sense was also frequently suggested by both the local authorities and the local population, including children.

On the other hand, hunting can also be a tool for promoting conservation, as local peoples' use of wild birds as a food source can act as a conservation incentive (as noted in this study, but also in northern Ghana; see Owusu 2008). The large concentrations of wildfowl in Burkina Faso and the research areas, and in Sourou in particular, (Porter *et al.* 2002; Fishpool & Evans 2001) probably provide excellent hunting opportunities. In fact, a tourist organization is providing hunting trips in Sourou (Somda *et al.* 2010). This could potentially provide an additional hunting-induced conservation incentive, i.e. in addition to providing a food source hunting tourism can provide an income. However, hunting can also pose a threat to A-P migrant birds (Zwarts *et al.* 2009), which are already targeted in Sourou (Somda *et al.* 2010). Indeed, the consequences of recreational hunting are complex and its conservation and livelihood benefits are disputed (Dickson *et al.* 2009). Education and raising awareness, including about the impact of hunting (on particular species), but also hunting law enforcement should be promoted by governments and conservation organizations. In fact, the most frequently mentioned measure to protect birds was a ban on hunting, but this suggestion did not necessarily refer to law enforcement. Education, especially on the subject of hunting, was also mentioned, as was the fact that people should just stop hunting.

The current study has highlighted how poor, rural people are mindful of the crucial relationship between their livelihoods and the natural environment, in which birds play a multitude of roles and local inhabitants demonstrate a positive attitude towards (bird) conservation, provided that their own livelihoods are not threatened. Conservation incentives were focused mainly on respondents' own interests. Bird conservation should therefore focus on positive links between bird(s) (conservation) and individual livelihood aspects. Increasing the number of trees is the most important aspect in this regard. This should be stimulated at local (farm) level, or at most at community level, thus linking it to people's own livelihood. Furthermore, some (of the earlier mentioned) less well known (potential) conservation incentives should be explained and promoted in such a way that people can recognize the actual benefits of conservation. Thus, local inhabitants have to understand that certain conservation measures are in their own interests,

and conflicts with wildlife should be addressed. This does not mean, however, that conservation action should be entirely voluntary, and that law enforcement can be neglected. On the contrary, the two concepts are not mutually exclusive and both should be pursued (Infield & Namara 2001). The many aesthetic values, particularly for birds, serve as conservation incentives, which can be facilitated by communicating and promoting these values. In particular, the sense of pride about receiving migrant birds, which was also a catalyst for being a supporter of the protection of these birds, could stimulate migrant bird conservation.

In conclusion, when the above aspects are taken into account, bird conservation can positively contribute to local inhabitants' livelihoods and socio-cultural values, specifically in a way that they themselves value. Knowing and understanding local perceptions, including the perceived bird and environmental values, and related conservation incentives should be considered important. By focusing on conservation action on environmental issues that are also valued by the local inhabitants, the needs and wishes of local populations can be addressed (Owusu & Ekpe 2011; Lindskog & Tengberg 1994). In this way, local inhabitants have genuine motives and intentions for participation in related conservation and sustainable land-use activities. This promotes continued and increased participation (see also Roe *et al.* 2006; Ribot 2003, 1999), not least because most incentives were focused mainly on respondents' own interests. People's realization that something can be done about the environmental problems raises hope for the participation of local inhabitants in conservation efforts. As suggested by Infield & Namara (2001), involving local inhabitants can produce significant improvements in conservation attitudes. Indeed, although LCG members held similar views on birds to non-members, they were generally more positive about bird conservation.

## Local population participation

*Conservation through local participation*

Local participation is a key element in the conservation strategy for A-P migrant birds; not least because livelihood improvement and conservation goals can and should be integrated (Roe et al. 2010; Adams et al. 2004). Indeed, as most land is managed by local inhabitants for their subsistence livelihoods and A-P migrant land birds occur in the wider landscape, the participation of local inhabitants is needed for a more sustainable Sahelian landscape. Moreover, local participation should increase efficiency, contribute to equity and can be used to include objectives and priorities of communities, among other things, and is therefore frequently promoted by all actor groups in Burkina Faso (Adams et al. 2014; Roe et al. 2006; Ribot 1999). As argued in the previous section, local participation can

improve local conservation attitudes, while the variables of local context and individual characteristic can be incorporated in conservation strategies through the participation of the local population in project design.

Importantly, the above sections also show that there are favourable conditions for local participation. These conditions include people's recognition of their own environmental impact (see also Lindskog & Tengberg 1994), their (current) realization that something can be done about existing environmental problems, as well as people's recognition of the link between bird conservation and livelihood improvement aspects, such as the protection of trees. Furthermore, and significantly, people generally show a positive attitude towards conservation and local conservation incentives exist. Also, environmentally-related human conflicts appear to be (at most) incidental, while land-related conflicts were also perceived as uncommon and many inhabitants thought they were non-existent. Land-related conflicts arise mostly between pastoralists[10] and farmers (see also UNEP 2007; Kuba *et al.* 2003), and generally about livestock eating crops from farmers' fields. In contrast to what UNEP (2007) and Kuba *et al.* (2003) note, conflicts with immigrants and nomadic people were rarely mentioned, which also applied to conflicts between different ethnic groups (in contrast to what Kuba *et al.* 2003 note). Similar, in contrast to observations by Coulibaly-Lingani *et al.* (2011) in Burkina Faso, conflicts over decision-making power were not revealed. In sum, (land) conflicts were seldom related to autochthony claims, even though migration is extensive in Burkina Faso and the research areas (see also Geschiere 2009).[11] The relatively limited degree of conflicts and the notable lack of conflicts between the many different religious and ethnic groups present, appears to favour local collaborative participation.

However, local participation generally remains limited in the studied areas, even though local collaboration partnerships are common (especially with international government organizations). Different causes have been revealed, such as too close relationships between the local population and (conservation) donor organizations and limited tangible benefits from their joint activities (despite the fact that activities often contribute to sustainable development).[12] Furthermore, development actors did not cede enough power and control to the local population to promote participation, even though these were often elements of the or-

[10] In this case, generally referring to the owner of livestock, who may or may not also be an agriculturist.

[11] The term autochthony is often used as a political tool to separate 'locals' from 'people from elsewhere'. In West Africa the term was introduced by French colonials around 1900 who struggled with the question of how to administrate land. In Ivory Coast, for example, only autochthons had full citizen rights, notably the right to own land. Autochthony remains a key matter there in issues such as belonging, including land ownership, and associated conflicts (Geschiere 2009).

[12] Engberg-Pedersen (1995) also noted that local people were not participating in labour-intensive resource-conservation activities unless they were expected to be profitable in the near future.

ganization's stated objectives.[13] Thus, a rather top-down approach was used and local empowerment was not achieved. Indeed, inhabitants frequently rated local participation as (too) limited and wished to have more input. Their limited negotiation potential could avert any sustainable relations (Raynaut 2001). Nonetheless, the local study population generally rated the collaboration with development actors (DAs) as positive. Also, interactions at the interface showed that the collaboration between DAs and the local population did not take place in the form of struggles and conflict, as is often the case according to Engberg-Pedersen (2003), but rather of reasonable collaboration. However, the limited participation also limited their involvement and therefore threatened the (long-term) sustainability of the projects and activities.

Although genuine participation in project design was also observed, it was usually restricted to the board members of community organizations (COs), and decision-making was mostly done by the development actors. Furthermore, local people's position at the social interface was influenced by their individual characteristics (such as 'gender', 'job function', and 'seniority'), and, for example, a young uneducated woman would probably find it difficult to get her voice heard. In sum, the local population did not move to a full partner position, and sometimes their role was merely to implement the project activities. Women were even less involved in the activities, at least partly as a result of development actors' discriminatory attitude towards women. Similarly, the men of the local population also regularly had negative perceptions of women's capabilities; hence, women were often excluded from CO membership (and were therefore automatically excluded from the COs' collaboration with development actors).

*Local participation through community organizations*

Collaboration with the local population mostly took place through COs, which was especially valued by DAs because many people (i.e. CO members) could be reached through the collaboration with only a selection of people (i.e. CO board members). However, some members participated in only one or a few of the COs' activities, and many of the LCGs' conservation-related activities were executed by a few (board) members, with the exception of tree planting. Also, COs do not represent the whole population, and, in particular, the poorest inhabitants and women are least likely to be members of a CO. In addition, COs may be organizations that often have members of a rather homogeneous composition (e.g. when limited to male farmers); yet, through their community networks, COs can

[13] Because employees' emphasis on local collaboration differed sometimes from their organizations' policies, as propagated through their mission statement, arguably it shows that DAs' local collaboration is indeed shaped by actors' relationships and interests and cultures of specific organizational settings, rather than by their policy models, as suggested by Mosse (2005, 2004).

provide a platform for the wider community (see also Thomas 2011). On the other hand, limited external communication appeared to be limiting communities' awareness of COs,[14] restraining collaboration with and/or assistance to local inhabitants and limiting collaboration between conservation-minded COs and other COs. In fact, government officials were the major collaboration partners of COs.

The majority of the COs studied demonstrated a link with Burkina Faso's and/or NGOs' decentralization policies. Because heterogeneous and flexible conservation strategies are required in the Sahel (as argued in this study), decentralization seems a positive development. However, in line with observations from Kassibo (2006) in neighbouring Mali, most COs studied had few characteristics relating to democratic decentralization, as devolution (namely the transfer powers to democratically elected COs) was limited (see also Ribot *et al.* 2010). This could be severely limiting the communities' role in conservation and natural resource management, which depends greatly on the negotiation power of these organizations (Ribot 2003; Benjaminsen 2000). Like the LCGs, many COs revealed elements of a participatory approach (Ribot *et al.* 2010), which included the consultation, mobilization, or involvement of local people. The creation and retaining of COs, including their many tree planting activities, arguably indicates that local populations did much to comply with project suggestions and requirements, arguably in order to obtain access to resources controlled by projects and NGOs (see e.g. Engberg-Pedersen 2003; Marcussen 1999). This has resulted in perhaps too many COs, creating too much overlap and conflicts. Furthermore, COs created with help from conservation organizations implemented conservation activities following the instructions of these donor (conservation) organizations.

Most conservation-related activities by COs provide inadequate tangible (financial) short-term benefits, which leaves the organizations (financially) dependent on their donor organization(s). This, in turn, reduces the empowerment of these organizations. The limited and basic level of management and governance capabilities in most of these organizations further reduce empowerment and financial improvement, and discouraged people from becoming a member. The factors behind inadequate management include a lack of discipline, incidental (or suspected) fraudulent activities, board members not having sufficient management training, and their sometimes extremely limited knowledge of their organization's objectives. Furthermore, little or no education and high illiteracy rates among (board) members were other important factors, which are undoubtedly related to general poverty and a lack of access to education in rural areas of the Sahel. These are likely also to be due, in part, to poor communication and may be

[14] COs were better known locally in smaller communities with a lower population, such as in Higa.

contributing to limited collaborative practices with other organizations and community members.

Although the vast majority of members are unpaid volunteers, they do regularly receive money or food as an allowance for participating in an activity, because profits are seldom made. A lack of financial resources has been perceived as a major reason why some COs had not yet been able to achieve their goals. Other less or not conservation focused COs were more focused on profit-making. These profit-making activities contribute to independency, participation and empowerment, but, at the same time, this makes them more vulnerable to bad agricultural and/or trade conditions, which can lead to a halt in activities or even to the end of an organization.

*Concluding remarks and implication for conservation*

As participation and the delegation of authority (including decision-making) was generally limited in the study areas, empowerment also appeared limited and the collaboration between DAs and the local populations often showed characteristics of pseudo-participation (i.e. participation that is merely composed of assistance and consultation). However, local representation and democracy appear to be promoted at the social interface, as DAs work directly with the community or through locally elected leaders, and not through influential non-elected people.[15] Further participation is needed for a more widespread and long-term sustainable land use.[16]

The study reveals several ways to promote participation, including through profound decentralization policies (DAs should consider working with a local representative); long-term project vision (including feasibility to continue activities without support); local capacity building (including improved local management, such as community organization with educated and trained board members); reward-driven activities (including tangible benefits); managing expectations (being cautious not to promise too much to the local population); people's genuine motives (namely, to pursue project objectives and not just to comply with DAs' objectives); the scope of activities (activities that are locally perceived as important); linking to individual livelihoods (e.g. planting trees at local farm level); and catching people's attention (by communicating the consequences of problems). Participation should include elements of local empowerment, local decision-making and local authority through local involvement in project proposal, design and management, and the provision of financial benefits and resources. Strict laws and implementation systems are needed to ensure local insti-

[15] This could promote downward accountability and hence increase democratic decentralization (see also Kassibo 2006).

[16] As was also demonstrated by the 'Oursi' conservation project, and its best practices served as an example for the *Living on the Edge* project.

tutions and individuals gain authority (Kassibo 2006, 2002). Moreover, all community groups should be included, including women and the poorest community members.

Through their community networks, COs can provide a platform for the wider community (see also Thomas 2011). However, DAs should consider also including other collaboration structures (e.g. decentralizing their organizations and working directly with the population) in order to include those who are not a member of any CO and/or to encourage COs to diversify their membership. Similarly, when engaging in partnerships, COs should be chosen carefully according to their representation of the community (i.e. composition of membership). Also, as Engberg-Pedersen (1995) noticed earlier in Burkina Faso, existing local institutions are perhaps overlooked. DAs should consider working with existing COs instead of supporting the creation of a new one, and at least be mindful of newly created COs that would have (too) much overlap in activities and objectives with other already existing COs. Furthermore, new COs should perhaps only be promoted when local inhabitants have genuine motives and intentions, and not when inhabitants do it merely to comply with DAs' requirements, because 'false' motives could threaten the sustainability of the CO and/or activities.

Indeed, as Mahanty & Russel (2002) suggest, conservationists need to pay greater attention to how organizations form and function, to their links to the wider community, and to the aims and positions of organizations and members. Especially so considering that the COs' own organizational contexts are complex due to the variety of cultures, religions, ethnicities and livelihoods of their members (see also Hilhorst 2008).[17] Capacity building proved to be an important factor for the participation of local organizations, as was also demonstrated in a successful conservation project ('Oursi') in northern Burkina Faso, and could improve the (currently often poor) functioning of COs. This should certainly be considered in particularly poor and underdeveloped areas. As the communities' role in NRM depends greatly on the negotiation power of COs (Ribot 2003; Benjaminsen 2000), the organizations should reach a high degree of independence − including by generating income − in order to gain negotiation power.

In conclusion, if the above mentioned aspects are promoted and included, decentralization and participation policies can contribute to (long-term) sustainable community-based conservation. Indeed, local participation should be considered a key element in any integrated (A-P migrant bird) conservation and sustainable

[17] The diversity of ethnicity among the COs' members meant it was difficult or impossible to determine the possible influence of the (historic) social organization of different ethnic groups on the functioning of COs. For example, no groups with specific ethnic characteristics existed and comparison between such groups could thus not be made.

development effort, including − although not exclusively − through independent and highly motivated COs.

## Bridging the gap between bird conservation and sustainable development

*The (perceived) link between birds, conservation, and sustainable development*

Birds, including those that migrate, are typically valued by the studied local population in many (socio-cultural and socio-economic) ways, and play numerous positive roles in people's lives, sometimes directly related to their livelihoods. Bird species present an excellent indicator of environmental health and conservation issues (BirdLife 2000), as is often also indicated by the inhabitants themselves, and therefore present a focus when it comes to conserving ecosystems, critical habitats and key issues. Many of these conservation issues are of global value and/or concern (Fowlie 2010) and many are also strongly linked with local livelihoods, including those in the Sahel (Mortimore 2009) and the research areas. In fact, this study shows that addressing many of the threats faced by (A-P migrant) birds will also positively impact the livelihood of the local population. Birds can therefore provide an ecological base in Sahelian conservation interventions that are of local and global concern to people. Indeed, this study highlights how poor, rural people, are mindful of the crucial relationship between their livelihoods and the natural environment, and that the inhabitants demonstrate a positive attitude towards (bird) conservation, provided that their own livelihoods are not threatened. It is of prime importance that any conservation effort should address such issues. I conclude therefore that A-P migrant bird conservation should, and can, work hand in hand with livelihood improvement and sustainable development objectives in the Sahel.

It has been observed that farmers in the Sahel have improved their land management in recent times, and many reforestation initiatives have emerged (Reij 2010; Botoni & Reij 2009; Jones *et al.* 1996), including in the research areas. This, together with increased rainfall and large-scale reforestation efforts, has led to the greening of large areas in Burkina Faso and neighbouring countries (Berrahmouni *et al.* 2014; Botoni & Reij 2009; Dietz *et al.* 2004). This study shows that retaining and/or increasing the number of trees (in fields) is in fact the most evident way to achieve both (migrant bird) conservation and sustainable development objectives. Trees have a perceived crucial link with local livelihoods and affect, for example, flooding levels and soil degradation, and are especially valued for their wood. Trees play an essential role in the perceptions that the local inhabitants and authorities have of the environment and conservation, especially regarding birds. For many A-P migrant birds, a healthy amount of trees in rural

landscapes is vital (and for many species perhaps the most important element; Zwarts & Bijlsma 2015b). Trees thus form an important and locally recognized link between bird conservation and livelihood improvement, making it an excellent target for community-based conservation. Tree planting was also the only regular conservation-related activity of the COs studied, and was the only conservation-related activity executed by most of their members.

However, trees are certainly not the only perceived link between birds, conservation and local livelihoods. Both birds and people benefit in general from a more sustainable land use, in which natural resources, such as natural vegetation, is partially retained. Indeed, it is recognized that the environment's supporting and provisioning services are important. Furthermore, many socio-cultural, including aesthetic, and socio-economic values of birds, exist among the local inhabitants.

*Perceptions and participation of the local populations*

As argued in this study, the participation of local inhabitants is needed for a more sustainable Sahelian landscape. In fact, the study provides a strong argument for the need to increase local participation. It demonstrates several ways to do so, including through a much needed better understanding of local needs, attitudes and aspirations (see e.g. Owusu & Ekpe 2011; Lindskog & Tengberg 1994). By understanding the relationship between the inhabitants, the birds, the environment, and conservation, and addressing issues that are perceived as being important for their livelihood, the needs and wishes of the local populations can be mutually addressed by the conservation efforts. At the same time, local perceptions can reveal, potentially, unknown threats, problems and causes to DAs. Furthermore, by knowing which threats, problems and causes the local population recognizes and identifies for birds and/or people, DAs can adjust their communication and project strategies accordingly thereby increasing overall efficiency and effectiveness of the approach. For example, by explaining those important (locally occurring) issues that are apparently unknown to the local population, including those based on scientific data, and addressing, without detailed explanation, those that are already known to them.[18] Similarly, some (of the earlier mentioned) less well known conservation incentives should be explained and promoted in such a way that people can recognize the actual benefits from conservation. In this way we can avert 'the tragedy of the commons' doomsday scenario (Hardin 1968), in which individuals exploit shared resources independent-

[18] The study's analysis of the perceptions and attitudes also shows that many of the activities that people directly depend on and/or strongly benefit from (such as agriculture) remain – deliberately or not – unrecognized as potential environmental threats.

ly, according to their own self-interest, and act contrary to the common good by depleting natural resources through collective exploitation.

Thus, for any successful initiative, the local inhabitants have to understand that certain conservation measures are in their own interest, so that they have a genuine motive in participating in the conservation and sustainable land-use activities. Careful thought should be given to how environmental issues are communicated, for example, we should primarily communicate the conservation actions that are relevant for the inhabitants' local environment, and to a lesser extent those of the wider environment. We would therefore expect a continued and increased participation, given that most incentives are focused mainly on respondents' own interests.[19] In addition, it is important that the consequences of activities are explicitly communicated, as inhabitants are more aware and worried about the consequences of actions than the processes behind them.

The many profound differences between the two rural research areas (notably on the subjects of ecology, economy, institutions, and local perceptions), as well as the diverging ecological changes over time within both areas, have illustrated and highlighted that conservation strategies in the Sahel should be heterogeneous and flexible; geographically and over time. Indeed, the heterogeneity of the Sahel is recognized (Raynaut 2001). Knowing the local context, including the area's specific environmental conditions, the occurrence of local events and the level of human development, acting accordingly is therefore essential (see for similar arguments, Raynaut 2001). Because environmental, bird, and conservation values were often linked with people's livelihoods, understanding the characteristics of the local inhabitants is crucial, including livelihood activities, religion, LCG (board) membership, local authority, and age. In fact, inhabitants' perceptions, including their conservation incentives, were influenced by local context and individual characteristics. Nonetheless, this study also demonstrates that some environmental issues are less local context- and people-specific and that some conservation goals are beneficial for many different people (i.e., in both rural research areas), including increasing the number of trees. Indeed, the challenge is to respond to specific local conditions, while also considering wider issues (Raynaut 2001).

Thus, the two variables: local context and individual characteristics, should both be considered and used to direct conservation in a more efficient manner, targeting the issues that matter to the local environment as well as to the local inhabitants. Indeed, as Borrini-Feyerabend *et al.* (2007) indicate, there are two key challenges in managing natural resources, and particularly in integrated con-

[19] Thus, a comparison of environmental threats, problems, and causes between scientific data, written resources and local perceptions can help address those issues that are (locally) relevant to both birds and people.

servation and sustainable development projects: responding appropriately to the ecological and to the social characteristics of the local environment. Incorporating these variables in intervention strategies can be done by designing them in collaboration with local populations. This goes beyond presenting different options of interventions to the local populations, as suggested by, for example, Batterbury (2001). It should include formal[20] local participation in the project design. In other words, there should be participation with strong elements of co-management (Borrini-Feyerabend *et al.* 2007). For example, stakeholder groups, including livelihood, local authority and children groups, but also churches and mosques, can be used to address issues in such a way that correspond(s) with individual characteristics. Also, stakeholder groups can be used to offer a voice to those who would otherwise not be heard, such as young uneducated women.

A popular strategy for DAs to involve the local population is through COs (including LCGs), because they allow for many people (i.e. CO members) to be reached through collaboration with a limited selection of people (i.e. CO board members). However, COs do not represent the whole population. Moreover, this study highlights several shortcomings in the functioning of COs, such as limited capacity and an often strong dependence on DAs. Unfortunately, many COs have not (yet) lived up to the governmental and non-governmental organizations' expectations or reached their participation and empowerment objectives (BirdLife 2011; Clearly 2003; Gray 2002). Also, with the exception of LCGs, COs have few conservation-related activities. Those activities undertaken by LCGs tend to be carried out by only a few members, with the exception of tree planting. Several recommendations are therefore provided in this study, such as including other local collaboration structures, in addition to also investing in capacity building, increasing the number of activities with tangible and financial benefits, and promoting a long-term vision.

*The need for a long-term vision*

One of the key issues with most conservation activities, is that benefits are not felt in the short-term (see also Engberg-Pedersen 1995). Conservation action is therefore also a matter of long-term vision and investment. For instance, a tree seedling takes years before becoming a tree of significant size. In fact, seedlings are regularly planted by the communities and LCGs, but the long-term success rate of such planting has been limited and many have died due to a lack of water, livestock browsing and trampling. A lack of care for the planted trees was also noted, and suggested by several local inhabitants. Larwanou & Saadou (2011) show that taking care of (planted) trees can be an important tool for the conserva-

[20] A clear institution should be formulated by all actors involved to support a fair decision-making process and to prevent disagreement about the course of events (see also Ostrom 2015 and North 1990).

tion of trees. I therefore propose assigning reforestation resources to protect and care for planted trees, and that staff who look after these areas should be rewarded in accordance to proven results. In addition, tree planting and tree protection should be linked to people's own livelihood, and as such stimulated at the local (farm) level, or at most at the community level.[21] Regeneration efforts are possibly more successful than reforestation efforts, and are a low cost and effective way to increase the number of trees (and other vegetation) (Brandt *et al.* 2014; Larwanou & Saadou 2011; Reij 2010).

Similarly, institution and capacity building, which are essential elements for the participation of local organizations, also require considerable and long-term (labour) investments. Indeed, this study reveals that increasing the duration of projects was a common local aspiration, including the provision of resources for the continuation of the project when the conservation organization pulls out. Thus, for long-term sustainability, DAs should consider increasing the duration of the project and/or develop a follow-up project. Preferably, the project should provide the local inhabitants with enough capacity, skills and resources to continue activities when the project and/or DA's assistance has ceased. Profit-making is an important aspect for continued efforts as they often involve financial investments, but many conservation efforts include sustainable land-use practices that do not provide (direct) profits. For this reason, awareness and education about the long-term benefits, in particular financial, should be important elements in any conservation effort in order to convince people to make considerable long-term (financial) investments in activities without direct/immediate tangible benefits.

Indeed, an often recurring aspect in both environmental and bird conservation perceptions is the importance of raising awareness and education. The numerous socio-cultural values, including aesthetic values (particularly for birds), that existed among many local inhabitants could be used more widely to promote conservation incentives, in particular, elevating the sense of pride at receiving (A-P) migrant birds. Education and awareness-raising should address the importance of birds, the environment, and conservation, but should also cover hunting and environmental legislation, as many people were rather unfamiliar with them, and ille-

[21] As explained in Chapter 2, the species of trees is also of vital importance for A-P migrant birds (Acacia trees in particular) and people (including economically valuable and fruit producing trees). Thus, reforestation efforts should carefully select tree species. Notably, the *Faidherbia albida* tree is of high importance to birds (providing a good food source, including moths and caterpillars) and also highly valuable for people (as a multipurpose tree that is widely distributed in agroforestry parklands; Roupsard *et al.* 1999; Zwarts *et al.* 2012). However, several other species are also valued by both birds and people, and retaining a diversity of species is probably important, because it benefits a greater diversity of bird species (Tews *et al.* 2004; MacArthur & Macarthur 1961). Tree density is also a crucial factor for (migrant) birds on farmland (Hulme 2007).

gal hunting was regularly observed.[22] Education could contribute to a better understanding. It does not mean, however, that conservation action should be entirely voluntary, and that law enforcement can be neglected. For example, even those who participated in conservation projects violated environmental laws.[23] The two concepts of law enforcement and awareness raising are not mutually exclusive, and both should be pursued (as some interviewees also suggested; see also Infield & Namara 2001).

*Concluding remarks*

Law enforcement should be promoted by conservation organizations and (in particular by) governments, especially since a landscape approach is needed for the conservation of migrant birds. Conservation organizations do not have the capacity to work on sustainable land use and conservation practices with all the inhabitants of the Sahel. Nonetheless, as argued in this study, the involvement and participation of the local population is required as part of an integrated (A-P migrant) bird conservation and sustainable development effort. Working with COs, including LCGs, is only part of the participation solution.

I therefore argue that conservation organizations should focus on stimulating sustainable land-use practices through promoting favourable legislation, and land-use and economic policies. Government policies should take the local context and the influence of individual characteristics into account, which can be done through far reaching decentralization strategies. Conservation organizations should set an example and demonstrate the effectiveness and positive outcomes of their conservation strategies through a few local flagship projects. These should then be promoted so that best practices are integrated in (national) land use policies. The projects should preferably be located at 'Important Bird Areas', such as Sourou, where targeted efforts of conservation organizations are appropriate as they include bird and biodiversity hotspots. At the same time, awareness-raising among the public and enterprises should help to promote a general, more sustainable land use. International concerted action between governments, enterprises, conservation organizations, researchers, and local populations is also essential, as both (semi-)nomadic people and migrant birds cross borders, and the Sahelian landscape stretches far and wide over many countries. Knowledge, experiences and best practices should be shared between people and organizations as well as between sites and countries. This can be done through, among other

[22] Conservation legislation is well documented in Burkina Faso's national law, but implementation is weak and limited (although reportedly improving, including the attention given to migrant birds) (SP/CONEDD 2007; Lungren *et al.* 2001).

[23] Nonetheless, the people who were connected to conservation projects were generally more positive about bird conservation, suggesting that involving local inhabitants can produce significant improvements in conservation attitudes.

things, conferences, literature, social media, imagery and video, but also through exchange programmes that give people the opportunity to directly learn from each other and from the locality visited.

To conclude, the key factors to bridging the gap between bird conservation and sustainable development are:

- local perceptions (including needs and values, particularly about the importance of trees) and participation (partly through COs),
- awareness-raising and education (including in school),
- flagship projects (that include local benefits, long-term investments and local capacity building),
- promoting appropriate law (enforcement) and land-use policies (that are in consideration of local context and individual characteristics), and
- international concerted actions (with all actors involved in land use).

*Further research needed*

Much has already been published on integrated conservation and development projects (see e.g. Thomas 2013 and Roe 2006), but this study underlines that conservation and development actors regularly establish conservation actions without taking existing research and (local) knowledge into account (see also Thomas 2013). At the same time, this study indicates that ecological data is still limited and more research is needed, with a focus on understanding migrant birds' habitat requirements and how these are linked to land use and land-use changes (Adams *et al.* 2014; Atkinson *et al.* 2014).[24] Most importantly, this study highlights that all studies on migrant birds should include a clear description of the species, population, timeframe and geographical area, so that studies can be compared and the Sahelian driving factors behind declines revealed. Lastly, this study was mostly qualitative, so more quantitative follow-up research, including by means of surveys, could contribute to this study's findings. This would help quantify results and increase statistical analysis possibilities in order to draw more generic, region-wide, and general dryland-related conclusions and recommendations.

[24] Also knowledge of Burkina Faso's and the research areas' avifauna is limited and much information still needs to be collected or verified (BirdLife 2015c; Lungren *et al.* 2001).

# Annexes

## Annex 1.1 Research Questionnaires

Note 1: All open questions; no answer categories were provided.
Note 2: Questions regarding the cause of problems were (often) not included, but were asked specifically if not evident from their answers regarding the possible solutions to problems.

Urban research areas

### Foreign and Burkinabé organizations

- *Name, address & contact details*

a) Organization

1) What is your position and what are your main activities?

a) How long have you held this position and what was your previous job/function?

2) What are your organization's/department's main activities, objectives, strategies, and in which geographical regions is it active (in LCG areas?)?

3) Who are the organization's partners, and with whom, and in what way, does the organization collaborate? (local inhabitants? international organizations?)

5) How are decisions made, programmes/projects designed, and information gathered and knowledge created? (What is the role of local inhabitants and international organizations?)

6) What, in your opinion, are the strengths, weaknesses, opportunities and threats associated with the organization's NRM structures and processes (SWOT analysis of NRM negotiation processes, including those with local populations if applicable)?

7) How are the organization/department and projects/programmes financed?

8) To what extent are environmental (including specifically bird related) aspects regarded as important in the department/organization, and why? (from an organization's perspective)

b) General

9) How are land use, NRM, bird/biodiversity conservation, (sustainable) development institutionally arranged?

4) Who are the actors (formal and informal) in National Resource Management (NRM)? (local and international actors?)

10) What legislation is in place regarding NRM and environmental aspects in land use and bird/biodiversity conservation? (or: What is the (main) land use, NRM, environmental, and bird (related) legislation?)

11) What (major) projects and programmes exist regarding land use, NRM, bird/biodiversity conservation and sustainable development?

12) Which research institutes address NRM and environmental issues?

c) Personal
   13) What is your personal opinion of NRM and bird/biodiversity conservation?
   14) Are you aware of any related/similar research?
   15) Which persons do you recommend that I contact regarding my research?
   16) Do you have any comments and/or suggestions regarding my research (questionnaire), including certain aspects/subject I should include/omit?
   17) Do you know the Burkinabe organization *NATURAMA*, (and what do you know about them)?
   18) Do you have any documents regarding your organization's strategies, processes, projects etc.?

d) Optional (Depending on interviewee's position and background, and his/her willingness to continue)
   18) What are the major changes and trends in demography and land use in Burkina Faso and the rural research areas?
   19) What do you believe the (potential) opportunities are that would bring benefit from the environment?

Rural research areas

**Government, NGOs & religious leaders (& COs):**

- *Name, age, address (since when?), contact details, ethnicity, religion, marital status, (number of) children, education level, literate, French speaking and writing, main activities, own farmland and/or livestock (species and numbers), member of any (social, political) group?*

a) Organization/position
   1) What is your position and what are your main activities?
      a) How long have you held this position and what was your previous job/function?
   2) What are your organization's/department's main activities, objectives, strategies, and in which geographical regions is it active?
   3) Who are the organization's partners, and with whom, and in what way, does the organization collaborate?
   4) How are decisions made, programmes/projects designed, and information gathered and knowledge created?
   5) How are the organization/department and projects/programmes financed?
   6) Are there environmental, conservation and/or National Resource Management (NRM) aspects(/activities) to your work? If yes, what?
   7) To what extent are environmental (including specifically bird related) aspects regarded as important in the department/organization, and why? (from an organization's perspective)

   Note) If time, etc. allows, include a-e, otherwise only d & e

b) Institutional arrangement (local context)
   8) How are land use, NRM, bird/biodiversity conservation, (sustainable) development institutionally arranged?

9) What is the (main) land use, NRM, environmental, and bird (related) legislation?
10) What are the (major) projects and programmes regarding land use, NRM, bird/biodiversity conservation and sustainable development?
11) Is zoning applied in land use; if so, what are the details (e.g. timing and activities permitted)?

c) Environment (local context)
12) What are the main problems/issues in local people's lives?
13) What are the main local land use conflicts, including specifically those caused by human migration?
14) What are the main local environmental problems and issues?
15) What solutions do you suggest for the above mentioned problems?
16) What do you believe the (potential) opportunities are that would bring benefit from the environment?

d) Birds
17) What do you think of (wild) birds (importance, menace, aesthetic value)?
a. Does your view differ between bird species?
18) What are the main threats to birds?
19) What are your thoughts on bird conservation?
20) Are birds protected, and which ones?
a) How do you think we can protect wild birds?
21) Do you know the Burkinabe organization *NATURAMA*; if so, what do you know about this organization?
22) Do you know the Local Conservation Group; if so, are you a member of the LCG, and why (not)? Also, what do you think of the LCG?

e) Personal
23) What is your personal opinion of NRM and bird/biodiversity conservation?
24) Do you have any comments and/or suggestions regarding my research (including certain aspects/subject I should include/omit)?
25) Are you aware of any related/similar research or surveys?
26) Which persons do you recommend that I contact regarding my research?

f) Optional
Depending on interviewee's function and background, ask about changes and trends in demography and land use in research area.

**LCG board members & CO board members:**
*- Name, age (estimate), address (since when), ethnicity, religion, marital status, (number of) children, education level, literate, French speaking and writing, main activities, own farmland and/or livestock (species and numbers), member of any (social, political) group?*
Adjusted from: *Guidelines for Site Support Group Institutional Analysis. BirdLife International guidelines serie for IBAs projects*.

1. General information
   - 1.1 Name of the Site Support Group/Community Based Organization
   - 1.2 Date that the LCG/CO was established
   - 1.3 Why was the LCG/CO established? Was there any involvement of an NGO/Government?
   - 1.4 Does the LCG/CO have any legal status? If so, provide details.
   - 1.5 Does the LCG/CO have an annual budget or bank account? If so provide approximate details (annual budget [US$], savings)
   - 1.6 What is their total annual expenditure?

2. Membership
   - 2.1 Number of members, and/or participants? (Persons or groups?)
   - 2.2 Number of men; number of women?
   - 2.3 Is the membership of the LCG/CO representative of the wider community? If not, how does it differ?
     - a) Where do the members live?
   - 2.4 Can anyone in the community participate? (If not, what are the conditions for membership?)
   - 2.5 Provide a profile of LCG/CO membership (i.e. what kind of people are members – young/old; educated/uneducated; men/women; particular ethnic groups; particular occupations or interests)
   - 2.6 What is the main motivation for people's membership?
   - 2.7 What are the responsibilities of the members?
   - 2.8 Does the LCG/CO have any paid members – or are they all volunteers?
   - 2.9 Do members receive anything for participating in activities?
   - 2.10 Do members pay a joining fee and/or contribution? If yes, how often and how much? And in practice?
   - 2.11 Has the LCG/CO received any grants, or implemented any projects before? If so, provide details (size of grant, donor, dates, purpose of project, success of project)
   - 2.12 Does the LCG/CO have any other income/financial sources? (provide details)

3. Governance and decision-making
   - 3.1 Does the LCG/CO have an institutional structure (e.g. board, chairman, committees). If so, please describe it (provide an organizational diagram if that helps).
   - 3.2 If there are office holders (board, chairman, treasurer etc.) how are they elected?
   - 3.3 How are decisions made by the LCG/CO? (including planning, authorization, and information gathering)

4. Objectives, activities and planning
   4.1 What are the LCG/CO's main activities (past and present)?
   4.2 Are there any environmental and/or (bird) conservation activities?
      a) Ask if scheduled meetings, education campaign, tree planting, bird surveys or other activities take place; if so: how often, by whom, and when (were the last ones held)?
   4.3 Does the LCG/CO have objectives; a work plan? If so, provide details.
   4.4 Does the LCG/CO have a Mission Statement? If so, please provide details.
   4.5 Have the initial objectives been achieved? If not, why not?

5. Linkages and networking
   What linkages does the LCG/CO have (In each case where a linkage exists, describe the nature of the relationship/linkage, what its purpose was/is, what was achieved, when the relationship/linkage existed (i.e. when there was last any communication, etc.):
   5.1 Within the village/community (e.g. to other COs, to the village council)
   5.2 Within the region (e.g. neighbouring villages)
   5.3 With local/regional decision-makers and institutions (e.g. District Councils, district departments of government, regional NGOs)
   5.4 With national decision-makers and institutions (e.g. government departments, national NGOs, national forums)
   5.5 Internationally (e.g. international NGOs, international agencies)
   In each case where a linkage exists, describe the nature of the relationship/linkage, what its purpose was/is, what was achieved, when the relationship/linkage existed (i.e. when there was last any communication, etc.)

6. Strengths, weaknesses, opportunities, threats
   6.1 What are the perceived strengths, weaknesses, opportunities and threats associated with the LCG/CO?

7. Personal opinions
   7.1 Do you regard the environment as important, and why (not)?
   7.2 What do you think of (wild) birds (importance, menace, aesthetic value)?
   7.3 Do you hunt birds?
   7.4 What are the main threats to birds (and cause behind threat), and what are your thoughts on bird conservation?
   7.5 Are wild birds protected and do you/people obey the law?
   7.6 Do you know the LCG/*Naturama*? (For CO's only)
   a) If yes, why and what do you know about them?

8. Additional questions (if time, etc. allows):
   8.1 Specifically ask who are all the stakeholders in bird conservation and NRM?
   8.2 Furthermore, talk about (potential) opportunities to bring benefit from the environment

**LCG (board) members:**

*Name, age (estimate), address (since when), ethnicity, religion, marital status, (number of) children, education level, literate, French speaking and writing, main activities, own farmland and/or livestock (species and numbers), member of any (social, political) group?*

a) General

1) What are the main problems/issues in your life?
2) What are the main local land use conflicts, including specifically those caused by human migration? (b) Is there any zoning in land use, and what are the details (e.g. timing and activities permitted)?
3) What are the main local environmental problems?
4) What solutions do you suggest for the above mentioned problems and issues?
5) (How) does, and (how) could, the Site Support Group (LCG) help to solve these problems?
6) Is zoning applied in land use; if so, what are the details (e.g. timing and activities permitted)?
7) For which purposes do you use the environment, and in which way?
8) What are (potential) opportunities to bring benefit from the environment?
9) Do you regard the environment as important, and why (not)?
10) What do you think of (wild) birds (importance, menace, aesthetic value)?
11) Do you hunt birds?
12) What are the main threats to birds (and cause behind threat), and what are your thoughts on bird conservation?
13) Are wild birds protected and do you/people obey the law?

b) LCG

14) When and why did you join the LCG?
15) What is the LCG's mission and/or what are its objectives?
16) Does the LCG have any paid members – or are they all volunteers?
17) Do scheduled meetings, education campaign, tree planting, bird surveys or other activities take place; if so: how often, by whom, and when (were the last ones held)?
18) What are the activities of the LCG, and in which activities did you participate, and why?
19) Do you receive money for any activity? If so, how much, for what purposes do you use it, and what do you have to do in return?
20) What are the responsibilities of LCG members?
21) How are decisions made by the LCG?
22) What are the strengths, weaknesses, opportunities and threats associated with the LCG?

**Local inhabitants**

*Name, age (estimate), address (since when), ethnicity, religion, marital status, (number of) children, education level, literate, French speaking and writing, main activities, own farmland and/or livestock (species and numbers), member of any (social, political) group?*

1) What are the main problems/issues in your life?
2) (a) What are the main local land use conflicts, including specifically those caused by human migration? (b) Is there any zoning in land use, and what are the details (e.g. timing and activities permitted)?
3) What are the main local environmental problems?
4) What solutions do you suggest for the above mentioned problems and issues?
5) For which purposes do you use the environment?
6) Are you aware of any environmental legislation? If so, give details and explain how your use of the environment is influenced by legislation.
7) Do you regard the environment as important, and why (not)?
   a) Do you (want to) protect the environment?
8) What do you believe are (potential) the opportunities that can bring benefit from the environment?
   a) How do you think you will use the environment (more) in the future?
9) What do you think of (wild) birds (importance, menace, aesthetic value)?
10) Do you hunt birds?
11) What are the main threats to birds (and cause behind threat), and what are your thoughts on bird conservation?
12) Are wild birds protected and do you/people obey the law?
13) Do you know the Burkinabe organization *NATURAMA*, and if so, what do you know about this organization?
14) Do you know the Local Conservation Group; if so, are you a member of the LCG, and why (not)?
   a) What are your thoughts on the LCG?
16) Do you work for, with, or deal in any way with any community organization?

**Annex 1.2 PADev additional details**

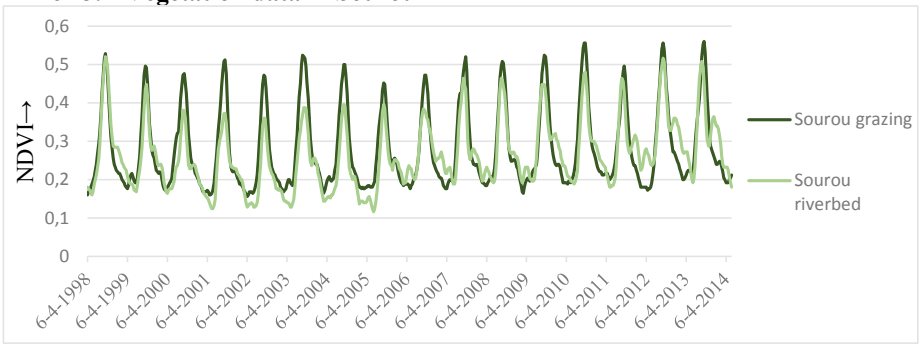
Initial questions for each participant: *Name, age (estimate), address (since when?), ethnicity, religion, marital status, (number of) children, education level, literate, French speaking and writing, main activities, own farmland and/or livestock (species and numbers), member of any (social, political) group?*

PADev Module 2 (Historic profile): Extra attention was given to the domain 'natural environment'. Also, with regards to the domain 'socio-political', we talked about how national and sub-national factors, such as legislation, the structure, accessibility and effectiveness of institutions, economic and sector (e.g. agriculture, forestry, energy) policies affect people's livelihoods and their use of natural resources. Detailed descriptions of changes and trends in land use were asked for.

Additional module: Relations between livelihoods and the environment/IBA
Talking about coping strategies, livelihood strategies and the role of birds and the environment (and the IBA) in people's livelihood (see BirdLife, unpublished data, a; section 'baseline survey', point 3). In other words, how people's livelihoods (and poverty) are related to birds and the environment. This module also included talking about people's adaptations to environmental changes and natural disasters, including coping strategies and the role of the IBA in people's coping strategies (see also BirdLife, unpublished data, b; especially section III.2).

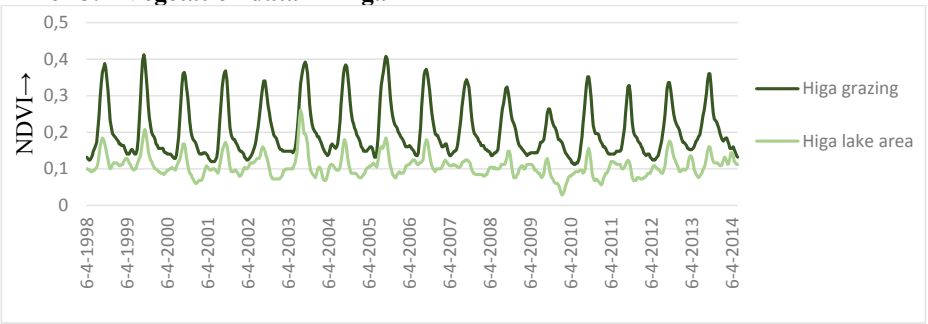
Additional module: Suggestions for improvement
Participants were given the opportunity to elaborate on their perceived opportunities for improvement of (future) interventions, and suggestions for additional interventions.

**Annex 3.1 Vegetation data in Sourou**



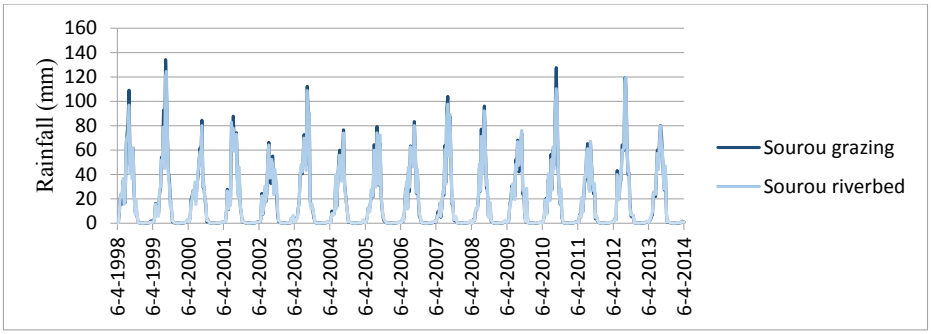

Explanation: SPOT-VEGETATION time series for two points: 'Sourou grazing' and 'Sourou riverbed', for the period 1998-2014. "Values of NDVI can range from -1.0 to +1.0, but values less than zero typically do not have any ecological meaning, so the range of the index is truncated to 0.0 to +1.0. Higher values signify a larger difference between the red and near infrared radiation recorded by the sensor – a condition associated with highly photosynthetically-active vegetation" (The Landscape Toolbox 2016; webpage).

**Annex 3.2 Vegetation data in Higa**



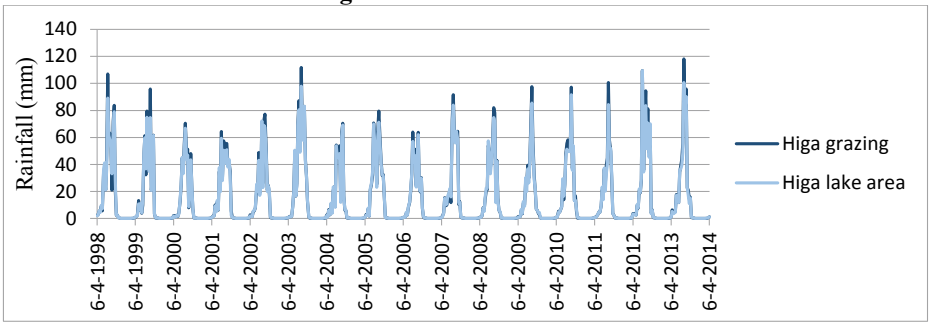

Explanation: SPOT-VEGETATION time series for two points: 'Higa grazing' and 'Higa lake area', for the period 1998-2014.

**Annex 3.3 Rainfall data in Sourou**




Explanation: CHIRPS time series for two points: 'Sourou grazing' and 'Sourou riverbed', for the period 1998-2014.

**Annex 3.4 Rainfall data in Higa**




Explanation: CHIRPS time series for two points: 'Higa grazing' and 'Higa lake area', for the period 1998-2014.

## Annex 5.1 Development actors: Websites & number of interviewees

| Development actors | Websites | Interviewees |
|---|---|---|
| *BirdLife International* | *http://www.birdlife.org/worldwide/partnership/our-vision-mission-and-commitment* | *2* |
| *Vogelbescherming Nederland* | *http://www.vogelbescherming.nl/over_ons/de_organisatie* | *2* |
| Marie Stopes International | *http://mariestopes.org/where-in-the-world#burkina-faso* | *1* |
| Broederlijk Delen | *http://www.broederlijkdelen.be/wat-we-doen* | *1* |
| Thamani | *http://www.thamani.be/index.php/thamani/valeurs* | *2* |
| L'Orange Bleue Afrique | *https://www.scribd.com/fullscreen/41886828?access_key=key-okztbkbwc4vafkzh7eg* | *3* |
| Autre Terre (Burkina Faso) | *http://www.autreterre.org/fr/medialibrary/9-burkina-faso-ouaga.aspx* | *3* |
| IUCN (Burkina Faso) | *https://www.iucn.org/fr/propos/union/secretariat/bureaux/paco/paco_burkinafaso/presentation_bf/* | *1* |
| Eau Vive (Burkina Faso) | *http://www.eau-vive.org/fr/burkina-faso/association/missions-et-valeurs/* | *1* |
| Oxfam International (Burkina Faso) | *https://www.oxfam.org/en/countries/burkina-faso* | *2* |
| Christian Aid (Burkina Faso) | *http://www.christianaid.org.uk/whatwedo/africa/burkina_faso.aspx?Page=2* | *2* |
| Diobass Burkina Faso | *http://www.diobass-bf.org/Objectifs-finalites.html* | *1* |
| SNV (Burkina Faso) | *http://www.snvworld.org/en/countries/burkina-faso* | *4* |
| CIRAD (Burkina Faso) | *http://afrique-ouest-continentale.cirad.fr/le-cirad-en-afrique-de-l-ouest-continentale/burkina-faso* | *1* |
| CIFOR | *http://www.cifor.org/about-cifor/* | *3* |
| *NATURAMA* | *http://www.NATURAMA.bf/spip.php?page=article&id_article=2* | *5* |
| ONG AGED Burkina Faso | *http://agedburkina.org/spip.php?page=agedburkina&lang=en* | *1* |
| CILSS | *http://www.cilss.bf/spip.php?rubrique41* | *1* |
| GIZ (GIZ FAFASO) | *https://www.giz.de/en/aboutgiz/identity.html* | *2* |
| PNUD/UNDP | *http://www.bf.undp.org/content/burkina_faso/fr/home/operations/about_undp.html* | *2* |
| Ministère de l'Environnement et du Développement Durable (Générale) | *http://www.environnement.gov.bf/index.php/le-ministere/les-services-centraux/la-direction-des-amenagements-forestiers#* | 3 |
| Ministère de l'Environnement et du Développement Durable (La Direction Générale des Eaux et Forêts) | *http://www.environnement.gov.bf/index.php/le-ministere/les-services-centraux/la-direction-generale-des-eaux-et-forets* | 3 |
| AMVS | *http://www.amvs.bf/spip.php?article4* | *2* |

**Annex 5.1 Development actors: Websites & number of interviewees, continued**

| Development actors | Websites | Interviewees |
|---|---|---|
| INERA Institut de l'Environnement et Recherches Agricoles | *http://www.inera.bf/presentation/miss_attrib.htm* | *2* |
| Université de Ouaga-dougou | *http://www.univ-ouaga.bf/spip.php?rubrique1* | *2* |
| Université Polytech-nique de Bobo-Dioulasso | *http://www.univ-bobo.bf/spip.php?page=article&id_article=15* | *2* |
| Biovisio | *http://www.biovisiogmbh.de/en/bioviso/origins* | *2* |
| Roxgold | *http://www.roxgold.com/s/SocialResponsibility.asp* | *2* |
| Gebana Afrique | *http://www.gebana.com/en/principles/vision/* | *1* |
| Anatrans | *http://www.whitebirdinternational.nl/cm/49/wbi/burkina-faso/anatrans/about-us* | *1* |
| Total | | *60* |

Note: development actors, actors' website (i.e. webpage with their mission statement or similar section, including, vision, objectives, commitment, cooperate responsibility, values, mandate, philosophy, policies, goal, about us, mandate and presentation), and number of interviewees.

# References

A & W (Altenburg & Wymenga ecologisch onderzoek B.V.) (2010), Altenburg & Wymenga Ecologisch Onderzoek [Website]. Available from: http://www.altwym.nl/page/Home/.

ABD EL-HAI, M., A-K DIAB & S.H. AHMEN (2009), Prospective of Agriculture Development in Africa. *In:* Seck, D. & D. Busari, eds, *Growth and Development in Africa.* Africa World Press, Inc.: 320-342.

ADAMS, W.M. (2002), Goodbye Malthus, Hello Humankind. *Oryx*, 36 (03): 213-214.

ADAMS, W.M. (2003), *Future Nature. A Vision for Conservation*. London: Earthscan Publications.

ADAMS, W.M., R. AVELING, D. BROCKINGTON, B. DICKSON, J. ELLIOT, J. HUTTON, D. ROE, B. VIRA & W. WOLMER (2004), Biodiversity Conservation and the Eradication of Poverty. *Science* (306): 1146-1149.

ADAMS, W.M., R.D.S. SMALL & J.A. VICKERY (2014), The Impact of Land Use Change on Migrant Birds. *Biodiversity,* 15 (2-3): 101-108.

AGNEW, C.T. & A. CHAPPELL (1999), Drought in the Sahel. *GeoJournal*, 48 (4): 299-311.

AMADI, H. (2009), Persistence and Change of Neo-patrimonialism in Post-Independence Kenya. Available from: http://erepository.uonbi.ac.ke/bitstream/handle/123456789/40279/Henry%20Amadi.pdf?sequence=1.

ASCL (African Studies Centre Leiden) (2016), African Study Centre Leiden [website]. Available from: http://www.ascleiden.nl/.

ASANTE, M.K., & A. MAZAMA, eds, (2009a), *Encyclopedia of African Religion (Vol. 1)*. Sage Publications.

ASANTE, MK. & A. MAZAMA, eds, (2009b), *Encyclopedia of African Religion (Vol. 2)*. Sage Publications.

ATKINSON, W., W.M. ADAMS, J. BROUWER, G. BUCHANEN, R.A. CHEKE, W. CRESSWELL, C.M. HEWSON, *et al.* (2014), "Defining the Key Wintering Habitats in the Sahel for Declining African-Eurasian Migrants Using Expert Assessment" *Bird Conservation International*. April 2014: 477-491.

*ATLAS DE L'AFRIQUE* (2005), Climate [website]: http://www.fructifera.org/ENG/HTML/Climate.htm.

AUDET-BÉLANGER, G. (2010), Participatory Assessment of Environmental Projects: Concerns and Realities of Villagers and Development Organisations in the East Mamprusi District, Ghana. Masters' Thesis at University of Amsterdam.

AUGIRON, S., B. GANGLOFF, S. BRODIER, F. CHEVREUX, J.F. BLANC, P. PILARD, *et al.* (2015), Winter Spatial Distribution of Threatened Acridivorous Avian Predators: Implications for their Conservation in a Changing Landscape. *Journal of Arid Environments*, 113: 145-153.

BAGADER, A.A., A.T.E. EL-SABBAGH, M.A. AL-GLAYAND & M.Y.I. SAMARRAI (1994), Environmental Protection in Islam / Protection de l'Énvironnement en Islam. Gland/Cambridge: IUCN.

BAILLIE, J.E.M., HILTON-TAYLOR, C. & S.N. STUART, eds, (2004), *2004 IUCN Red List of Threatened Species. A Global Species Assessment*. IUCN, Gland, Switzerland and Cambridge, UK.

BARBET-MASSIN, M., W. THUILLER & F. JIGUET (2010), How much do we Overestimate Future Local Extinction Rates when Restricting the Range of Occurrence Data in Climate Suitability Models? *Ecography,* 33: 878-886.

BARBET-MASSIN, M., B.A. WALTHER, W. THUILLER, C. RAHBEK & F. JIGUET (2009), Potential Impacts of Climate Change on the Winter Distribution of Afro-Palaearctic Migrant Passerines. *Biology Letters,* 5: 248-251.

BATTERBURY, S. (2001), Landscapes of Diversity: A Local Political Ecology of Livelihood Diversification in south-western Niger. *Cultural Geographies*, 8(4), 437-464.

BENJAMIN, C.E. (2008), Legal Pluralism and Decentralization: Natural Resource Management in Mali. *World Development*, 36 (11): 2255-2276.

BENJAMINSEN, T.A. (2000), Conservation in the Sahel: Policies and People in Mali, 1900-1998. In: *Producing Nature and Poverty in Africa*. Nordiska Afrika institute.

BERKES, F. (1999), *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Philadelphia: Taylor & Francis.

BERKES, F. (2003), Rethinking Community-Based Conservation. *Conservation Biology* 18 (3): 621-630.

BERKES, F. (2009), Evolution of Co-management: Role of Knowledge Generation, Bridging Organizations and Social Learning. *Journal of Environmental Management*, 90 (5): 1692-1702.

BERKES, F. (2013), Poverty Reduction Isn't Just About Money: Community Perceptions of Conservation Benefits. In: D. Roe, J. Elliott, C. Sandbrook & M. Walpole, eds, *Biodiversity Conservation and Poverty Alleviation. Exploring the Evidence for a Link*. Chichester: John Wiley & Sons: 270-285.

BERNARD, H.R. (2011), *Research Methods in Anthropology.* Walnut Creek: Rowman Altamira.

BERRAHMOUNI, N., F. TAPSOBA & J.C. BERTE (2014), The Great Green Wall for the Sahara and the Sahel Initiative: Building Resilient Landscapes in African Drylands: 15-18. In: *Genetic Considerations in Ecosystem Restoration Using Native Tree Species. State of the World's Forest Genetic Resources – Thematic Study*. Rome: FAO and Bioversity International.

BETHEMONT, J., P. FAGGI & T.P. ZOUNGRANA (2003), *La Vallée du Sourou (Burkina Faso). Genèse d'un Territoire Hydraulique dans l'Afrique Soudano-sahélienne*. Paris: L'Harmattan.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2000), *Threatened Birds of the World*. Barcelona/Cambridge: Lynx Edicions/BirdLife International.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2009), BirdLife International Trustees Report and Accounts 2009 [online]. Available from: http://www.birdlife.org/worldwide/finances/Stats2009-FINALSIGNED.pdf [Accessed Nov 2010].

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2010a), *A Review of IBA Local Conservation Groups in Africa.* Nairobi: BirdLife International, Africa Partnership Secretariat.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2010b), *Meeting the 2020 Biodiversity Targets: Action and Monitoring Based on Birds*. Cambridge: BirdLife International.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2010c), Science: Our Starting Point. Available from: http://www.birdlife.org/action/science/sites/index.Html.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2011), *Empowering the Grassroots: BirdLife, Participation and Local Communities*. Cambridge: BirdLife International.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2014), *World BirdWatch*, 37 (3).

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2015a), BirdLife Worldwide [online]. Available from: http://www.birdlife.org/worldwide/index.html.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2015b), BirdLife Data Zone. Available from: http://www.birdlife.org/datazone/sitefactsheet.php?id=6025.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2015c), Country Profile: Burkina Faso. Available from: http://www.birdlife.org/datazone/country/burkina-faso.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (2015d), Sites - Important Bird and Biodiversity Areas (IBAs) BF003 Lake Sourou. Available from: http://www.birdlife.org/datazone/sitefactsheet.php?id=6025.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (undated), BirdLife's Local Empowerment Programme. Available from: http://www.birdlife.org/community-blog/wp-content/uploads/2010/09/Local-Empowerment-Programme-factsheet.pdf.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (Unpublished data, a), *Guidelines for Establishing Indicators and Measuring Socio-economic Baseline Status at Important Bird Areas (IBAs) in Africa*. BirdLife International (Africa) 2008.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (Unpublished data, b), *Guidelines for Participatory Poverty Assessment at IBAs and the Identification of Poverty Reduction Indicators. BirdLife International guidelines series for IBAs projects*.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (Unpublished data, c), *Guidelines on Stakeholder Analysis. BirdLife International guidelines series for IBAs projects.*

BIRDLIFE (BIRDLIFE INTERNATIONAL) (Unpublished data, d), *Guidelines for Site Support Group Institutional Analysis. BirdLife International guidelines series for IBAs projects*.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (unpublished data, e), *Guidelines for Local Conservation Group Institutional Analysis*.

BIRDLIFE (BIRDLIFE INTERNATIONAL) (in prep.), *Guidance Note. Developing a National Strategy for Local Conservation Groups*.

BOFFA, J.M. (2000), West African Agroforestry Parklands: Keys to Conservation and Sustainable Management. *Unasylva,* 51.

BONKOUNGOU, E.G. (IUCN) (2001), Biodiversity in Drylands: Challenges and Opportunities for Conservation and Sustainable Use. Available from: http://fly.undp.org/biodiversity/biodiversitycd/Biodiversity-in-the-Drylands-Challenge-Paper.pdf**.**

BORRINI-FEYERABEND, G., M. PIMBERT, M.T. FARVAR, A. KOTHARI & Y. RENARD (2007), *Sharing Power. Learning by Doing in Co-management of Natural Resources throughout the World.* London: Earthscan.

BOTONI, E., & C. REIJ (2009), *Silent Transformation of Environment and Production Systems in the Sahel: Impacts of Public and Private Investments in Natural Resource Management*. Ouagadougou/Amsterdam: CILSS/Free University Amsterdam.

BRANDT, M., C. ROMANKIEWICZ, R. SPIEKERMANN & C. SAMIMI (2014), Environmental Change in Time Series – An Interdisciplinary Study in the Sahel of Mali and Senegal. *Journal of Arid Environments*, 105: 52-63.

BREUSERS, M. & C. GRUMIAU (2002), *Burkina Faso*. Amsterdam: KIT Publishers, Den Haag: Novib.

BRITO, J.C., R. GODINHO, F. MARTÍNEZ-FREIRÍA, J.M. PLEGUEZUELOS, H. REBELO, X. SANTOS, *et al.* (2014), Unravelling Biodiversity, Evolution and Threats to Conservation in the Sahara-Sahel. *Biological Reviews*, 89 (1): 215-231.

BROOKS, J., K.A. WAYLEN & M. BORGENHOFF MULDER (2013), Assessing Community-Based Conservation Projects: A Systematic Review and Multilevel Analysis of Attitudinal, Behavioral, Ecological, and Economic Outcomes. *Environmental Evidence,* (2): 2.

BROSIUS, J.P., A.L. TSING & C. ZERNER (1998), Representing Communities: Histories and Politics of Community-based Natural Resource Management. *Society & Natural Resources*, 11: 417-34.

BROUWER, J. (2008), *Within-field Soil and Crop Growth Variability. Its Importance to Improving Food Production in a Changing Sahel*. Brouwer Envir. & Agric. Consultancy.

BUIJ, R. (2013), *Raptors in changing West African savannas: the Impact of Anthropogenic Land Transformation on Populations of Palearctic and Afrotropical raptors in northern Cameroon.* Institute of Environmental Sciences (CML), Faculty of Science, Leiden University.

BURGGRAEVE, R. (1993), *De Bijbel geeft te Denken. Schepping, Milieu, Lijden, Roeping, Gods Passie en de Ander, Vergeving, Bevrijding van de Ethiek, in Gesprek met Levinas.* Leuven/Amersfoort: ACCO.

BURKINA FASO (1989), Raabo N° AN VII/0001/FP/MET/MAT/MF du 14 Août 1989 portant Définition et Réglementation de la Chasse Villageoise. Available from: http://faolex.fao.org/docs/pdf/bkf4144.pdf.

BURKINA FASO (2004a), Rapport National sur la Gestion Durable des Forêts au Burkina Faso. Available from: http://www.un.org/esa/forests/pdf/national_reports/unff5/brukinafaso.pdf.

BURKINA FASO (2004b), LOI n°055-2004/AN du 21 décembre 2004 Portant Code Général des Collectivités Territoriales au Burkina Faso (JO spécial n°2 du 20/4/2005), Modifiée par les Lois 040-2005/AN du 29/11/2005, art. 1 (JO n°51/2005), 021-2006/AN du 14/11/2006, art. 1 (JO n° 50/2006) et 065-2009 du 9/12/2009, art. 1 (JO n°10/2010) Available from : http://www.burkina24.com/wp-content/uploads/2013/09/LOI-n%C2%B0055-2004-AN-du-21-d%C3%A9cembre-2004.pdf.

BURKINA FASO (2011), DECRET N°2011-306/PRES Promulguant la Loi n°003-2011/AN du 05 avril 2011 Portant Code de Forestier au Burkina Faso. Available from: vuw/Personal$/Homes/B/berghmvanden/Downloads/code%20forestier_05_03_2011.pdf.

BURKINA FASO (2013), Arrêté N° 2013 - 191 /MEDD/CAB/ Portant Ouverture et Organisation de la Saison d'Exploitation de la Faune 2013-2014 au Burkina Faso. Available from: http://www.environnement.gov.bf/files/Arrt_ouverture_saison_2013_-_2014.pdf.

BUTTERFLIES & WHEELS (2014), Belief in Witchcraft in Africa. Available from: http://www.butterfliesandwheels.org/2011/belief-in-witchcraft-in-africa/.

BYMOLT, R. (2010), *HADev - Holistic Assessment of Development Assessing the 'Big Picture' of Development in Nanumba South, Ghana*. Masters' Thesis at University of Amsterdam.

CAMBRIDGE WORKSHOP (2010), The Drivers of Land Use Change Relevant to Migratory Birds in the Sahel. Jul & Nov 2010. Available from: http://www.geog.cam.ac.uk/research/projects/landusemigrantbirds/.

CAMPBELL, L.M. & A. VAINIO-MATTILA (2003), Participatory Development and Community-Based Conservation: Opportunities Missed or Lessons Learned? *Human Ecology,* 31 (3): 417-437.

CCI (2010a), Research Brief 1: Migrant Birds in the West African Sahel. Cambridge Conservation Initiative. Available from: http://www.geog.cam.ac.uk/research/projects/landusemigrantbirds/SahelBirds1.pdf.

CCI (2010b), Research Brief 4: Drivers of Land Use Change and Migrant Birds in the Sahel. Cambridge Conservation Initiative. Available from: http://www.conservation.cam.ac.uk/sites/default/files/file-attachments/Yes%20Output%208.pdf.

CCI (2010c), Research Brief 3: Migrant birds and Environmental Change in the Sahel. Cambridge Conservation Initiative, Cambridge, UK. Available from: http://www.conservation.cam.ac.uk/resource/policy-briefs-handouts-and-booklets/research-briefs-land-use-change-and-migrant-birds-sahel#sthash.7d6PBSHv.dpuf.

CENTRE FOR SUSTAINABLE ENERGY FOR LIFE IN THE SAHEL (2010), Website. Available from: http://sahel-energy.org/home/index.php.

CHENAIL, R.J. (2011), Interviewing the Investigator: Strategies for Addressing Instrumentation and Researcher Bias Concerns in Qualitative Research. *The Qualitative Report*, 16 (1): 255-262.

CHRISTENSEN, J. (2004), 'Win-Win Illusions'. *Conservation in Practice*, 5 (1).

CIA (Central Intelligence Agency) (2014), The World Factbook: Burkina Faso. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/uv.html.

CIA (Central Intelligence Agency) (2016), The World Factbook: Afrika, Burkina Faso. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/uv.html.

CLEARY, D. (2003), People-Centred Approaches. A Brief Literature Review and Comparison Types. LSP Working Paper 5. Available from: http://www.fao.org/docrep/006/ad682e/ad682e05.htm#bm05.

COHEN, M.J., S. SWEENEY, D. KING, G. SHEPHERD & M.T. BROWN (2011), Environmental Accounting of National Economic Systems of West African Dryland Countries within a Global Context [Online]. Available from: http://sahel.ees.ufl.edu/downloads/Env%20Acc%20Global_Synthesis.pdf.

COHEN, N.T. & J.M. UPHOFF (1980), Participation's Place in Rural Development: Seeking Clarity through Specificity. *World Development*, 8: 213-235.

CONGER, J.A. & R.N. KANUNGO (1988), The Empowerment Process: Integrating Theory and Practice. *Academy of Management Review,* 13 (3): 471-482.

CONSULAT GÉNÉRAL DU BURKINA FASO À PARIS (2015), Organisation Administrative [website]. Available from: http://www.consulatburkinaparis.org/organisation-administrative/.

COULIBALY-LINGANI, P., P. SAVADOGO, M. TIGABU & P-C. ODEN (2011), Decentralization and Community Forest Management in Burkina Faso: Constraints and Challenges. *International Forestry Review,* 13 (4).

CRESSWELL, W.R.L., J.M. WILSON, J. VICKERY, P. JONES & S. HOLT (2007), Changes in Densities of Sahelian Bird Species in Response to Recent Habitat Degradation. *Ostrich - Journal of African Ornithology*, 78 (2): 247-253.

CSELS (Centre for Sustainable Energy for Life in the Sahel) (2010), Centre for Sustainable Energy for Life in the Sahel [website]. Available from: http://sahel-energy.org/home/index.php.

DAFFLON, B., T. MADIÈS & A. KY (2013), Local Public Finance of Territorial Collectives in Burkina Faso. In: Dafflon, B. & T. Madiès, *The Political Economy of Decentralization in Sub-Saharan Africa*. World Bank and Agence Française de Développement.

ZEEUW, F. DE (1997), Borrowing of Land, Security of Tenure and Sustainable Land Use in Burkina Faso, *Development and Change,* 28 (3): 583-595.

DEM SAMB, C. (2015), *Quand la Représentation Résulte à des Fragmentations d'Identités de Genre.* Responsive Forest Governance Initiative Working Paper N. 8. Dakar: CODESRIA.

DIALLO, M.A., E. VALL & I. BAYALA (2012), La Construction d'un Dispositif de Gouvernance Territoriale pour la Gestion des Ressources Naturelles: Le Cas de la Charte Foncière Locale de Koumbia. In: Vall, E., N. Andrieu, E. Chia & H.B. Nacro, ed., *Partenariat, Modélisation, Expérimentations: Quelles Leçons pour la Conception de l'Innovation et l'Intensification Écologique?* Cirad.

DICKSON, B., J. HUTTON & W.A. ADAMS, eds, (2009), *Recreational Hunting, Conservation and Rural Livelihoods: Science and Practice.* John Wiley & Sons.

DIETZ, A.J., R. RUBEN & A. VERHAGEN, eds, (2004), *The Impact of Climate Change on Drylands, with a Focus on West Africa*. Dordrecht: Kluwer Academic Publishers.

DIETZ, A.J. & E. VELDHUIZEN (2004), The World's Drylands: A Classification. In: A.J. Dietz, R. Ruben & A. Verhagen, eds, *The Impact of Climate Change on Drylands, with a Focus on West Africa.* Dordrecht/Boston/London: Kluwer Academic Publishers.

DIETZ, T. (1996), *Entitlements to Natural Resources; Contours of Political Environmental Geography.* Utrecht: International Books.

DIETZ, T. & THE PADEV TEAM (2013), *The PADev Story. PADev 2007-2013 End-of-Project Report*. Leiden: African Studies Centre.

DONNELLY-ROARK, P., K. OUÉDRAOGO & Y. XIAO (2001), *Can Local Institutions Reduce Poverty? Rural Decentralization in Burkina Faso*. Washington: World Bank Environment and Social Development Unit, Africa Region.

DZINGIRAI, V. (2003), The New Scramble for the African Countryside. *Development and Change,* 34 (2): 243-263.

EARTH OBSERVATORY (2016), Measuring Vegetation: Normalized Difference Vegetation Index (NDVI). Available from: http://earthobservatory.nasa.gov/Features/MeasuringVegetation/measuring_vegetation_2.php

EAU VIVE (2013), Fédération Internationale. Available from: http://www.eau-vive.org/notre-association/federation-internationale.html.

EIZENGA, D. (2015), Burkina Faso. *In*: Elischer, S., R. Hofmeier, A. Mehler & H. Melber, eds, *Africa Yearbook Volume 11*. Leiden: Brill: 48-55.

ELLIOT, C.H.C., M.N. BOAZ & R.A. CHEKE (2014), Alternative Approaches to Red-billed Quelea *Quelea Quelea* Management: Mass-capture for Food. *Ostrich,* 85(1): 31-37.

ENEE, G. (2010), Les ONG au Burkina Faso: une Référence dans le Champ du Development africain ? *Espaces et sociétés*, (30): 43.

ENGBERG-PEDERSEN, L. (1995), Creating Local Democratic Politics from Above: The *Gestion des Terroirs* Approach in Burkina Faso. Available from: http://pubs.iied.org/pdfs/7303IIED.pdf.

ENGBERG-PEDERSEN, L. (2003), *Endangering Development. Politics, Projects and Environment in Burkina Faso*. Westpoort: Praeger Publisher.

ENGLEBERT, P. (2000), Pre-Colonial Institutions, Post-Colonial States and Economic Development in Tropical Africa. *Political Research Quarterly,* 53 (1): 7-36.

FABRICIUS, C. & E. KOCH, eds, (2004), *Rights, Resources and Rural Development: Community-Based Natural Resource Management in Southern Africa*. London: Earthscan.

FAO (2005), Livestock Sector brief: Burkina Faso. Available from: http://www.fao.org/ag/againfo/resources/en/publications/sector_briefs/lsb_BFA.pdf.

FAO (2015), Country Fact Sheet Burkina Faso. Available from: http://www.fao.org/nr/water/aquastat/data/cf/readPdf.html?f=BFA-CF_eng.pdf.

FISHER, R.J., S. MAGINNIS, W.J. JACKSON, E. BARROW & S. JEANRENAUD (2005), *Poverty and Conservation; Landscapes, People and Power*. Gland/Cambridge: IUCN.

FISHPOOL, L.D.C. & M.I. EVANs, eds, (2001), *Important Bird Areas in Africa and Associated Islands: Priority Sites for Conservation*. Newbury & Cambridge: Pisces Publications & BirdLife International.

FOWLIE, M., ed., (2014), New Report Reveals Scale of Declines of UK Migratory Birds Wintering in Africa. *World Birdwatch*, 36 (4).

FUNK, C., P. PETERSON, M. LANDSFELD, D. PEDREROS, J. VERDIN, S. SHUKLa, *et al.* (2015), The Climate Hazards Infrared Precipitation with Stations - a New Environmental Record for Monitoring Extremes. Scientific Data, Vol. 2 [online]. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4672685/.

GESCHIERE, P. (2009), *The Perils of Belonging: Autochthony, Citizenship, and Exclusion in Africa and Europe.* Chicago: University of Chicago Press.

GILLINGHAM, S. & P.C. LEE (1999), The Impact of Wildlife-Related Benefits on the Conservation Attitudes of Local People around the Selous Game Reserve, Tanzania. *Environmental Conservation,* 26 (3): 218-228.

GORDO, O. & J.J. SANZ (2006), Climate Change and Bird Phenology: a Long-term Study in the Iberian Peninsula. *Global Change Biology*, 12 (10): 1993-2004.

GRAY, G.C. (2002), Environmental Policy, Land Rights and Conflict: Rethinking Community Natural Resource Management Programs in Burkina Faso. *Environment and Planning D: Society and Space,* (20): 167-182.

GROOM, J.M., G.K. MEFFE & C.R. CARROLL (2006), *Principles of Conservation Biology*. Sunderland: Sinauer Association Inc.

GROOTAERT, C., G-T. OH & A. SWAMY (1999), Social Capital, Household Welfare and Poverty Reduction in Burkina Faso. World Bank Working Paper. Available from: siteresources.worldbank.org/INTSOCIALCAPITAL/Resources/Local-Level-Institutions-Working-Paper-Series/LLI-WPS-7.pdf.

GROOTAERT, C., G-T. OH & A. SWAMY (2002), Social Capital, Household Welfare and Poverty Reduction in Burkina Faso. *Journal of African Economies,* 11 (1): 4-38.

HADNES, M., & H. SCHUMACHER (2012), The Gods Are Watching: An experimental Study of Religion and Traditional Belief in Burkina Faso. *Journal for the Scientific Study of Religion*, 51 (4): 689-704.

HARDIN, G. (1968), The Tragedy of the Commons. *Science*, 162 (3859): 1243-1248.

HELLDÉN, U. (1991), Desertification-Time for an Assessment? *Ambio*, 20 (8): 372-383.

HELLDÉN, U. & C. TOTTRUP (2008), Regional Desertification: A global Synthesis. *Global and Planetary Change,* 64 (3): 169-176.

HERRMANN, S.M., A. ANYAMBA, & C.J. TUCKER (2005), Recent Trends in Vegetation Dynamics in the African Sahel and their Relationship to Climate. *Global Environmental Change*, 15: 394-404.

HIERNAUX, P. & B. GÉRARD (1999), The Influence of Vegetation Pattern on the Productivity, Diversity and Stability of Vegetation: The Case of Brousse Tigrée in the Sahel. *Acta Oecologica*, 20 (3): 147-158.

HILHORST, T. (2008), *Local Governance Institutions for Natural Resource Management in Mali, Burkina Faso and Nige*r. Amsterdam: KIT.

HJORT, C. & C-G. LINDHOLM (1978), Annual Bird Ringing Totals and Population Fluctuations. *Oikos*, 30 (2): 387-392.

HODGSON, G.M. (2006), What Are Institutions? Journal of Economic Issues XL(1) [online]. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4672685/.

HULME, M.F. (2007), *The Density and Diversity of Birds on Farmland in West Africa* (PhD thesis, University of St Andrews).

HUTCHINSON, C.F., S.M. HERRMANN, T. MAUKONEN & J. WEBER (2005), Introduction: The "Greening" of the Sahel. *Journal of Arid Environments*, 63 (3): 535–537.

INFIELD, M. & A. NAMARA (2001), Community Attitudes and Behavior towards Conservation: An Assessment of a Community Conservation Programme around Lake Mburo National Park, Uganda. *Oryx,* 35 (1): 48-60.

INGOLD, T. (2011), *The Perceptions of the Environment. Essays on Livelihood, Dwelling and Skills*. London: Routledge.

IUCN (International Union for the Conservation of Nature) (2004), Contributions to the IUCN Species Survival Commission and the 2004 IUCN Red List of Threatened Species [online]. Available from: http://www.iucn.org/bookstore/HTMLbooks/Red%20List%202004/completed/Contributions.html.

IUCN (International Union for the Conservation of Nature) (2015), Responsive Forest Governance Initiative (RFGI). Available from: http://iucn.org/about/work/programmes/forest/fp_our_work/fp_our_work_thematic/locally_controlled_forests/lcf_projects_partnership/responsive_forest_governance_initiative__rfgi__/.

JACKSON, J.J. (1974), The Relationship of Quelea Migrations to Cereal Crop Damage in the Lake Chad. Proceedings of the 6th Vertebrate Pest Conference (1974). Paper 22. Available from: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1021&context=vpc6.

JONES, P., J. VICKERY, S. HOLT & W. CRESSWELL (1996), A Preliminary Assessment of some Factors Influencing the Density and Distribution of Palearctic Passerine Migrants Wintering in the Sahel Zone of West Africa. *Bird Study*, 43 (1): 73-84.

JONES, P.J. (1995), Migration Strategies of Palearctic Passerines in Africa. *Israel Journal of Zoology*, 41 (3): 393-406.

KASSIBO, B. (2002), Participatory Management and Democratic Decentralization Management of the Samori Forest in Babye Commune, Mopti Region, Mali. In: *World Resources Institute's workshop on decentralization and the environment*, Bellagio, Italy.

KASSIBO, B. (2006), Approches Participatives et Gestion Décentralisée de la Forêt du Samori dans la Commune de Baye, Région de Mopti (Mali). *Afrique et Développement*, 31 (2): 215-242.

KHALEAFA.COM (2014), Islam and Animal Rights. Available from: http://khaleafa.com/islam-and-animal-rights/.

KIDEGHESHO, J.R., E. ROSKAFT & B.P. KALTENBORN (2007), Factors Influencing Conservation Attitudes of Local People in Western Serengeti, Tanzania. *Biodiversity and Conservation,* 16 (7): 2213-2230.

KIRBY, J.S., A.J. STATTERFIELD, H.M. BUTCHART, M.I. EVANS, J.S. GRIMMETT, V.R. JONES, J. O'SULLIVAN, G.M. TUCKER & I. NEWTON (2008), Key Conservation Issues for Migratory Land- and Waterbird Species on the World's major Flyways. *Bird Conservation International,* 18: 49-73.

KIWANGO, W.A., H.C. KOMAKECH, T.M.C. TARIMO & L. MARTZ (2015), Decentralized Environmental Governance: A reflection on its Role in Shaping Wildlife Management Areas in Tanzania. *Tropical Conservation Science*, 8 (4): 1080-1097.

KLAASSEN, R.H., M. HAKE, R. STRANDBERG, B.J. KOKS, C. TRIERWEILER, K.M. EXO, *et al.* (2014), When and Where Does Mortality Occur in Migratory Birds? Direct Evidence from Long-term Satellite Tracking of Raptors. *Journal of Animal Ecology*, 83 (1): 176-184.

KUBA, R., C. LENTZ & C.N. SOMDA (2003), *Histoire du Peuplement et Relations Interethniques au Burkina Faso*. Paris: Karthala Editions.

LAHAI, M.A. (2009), *Participatory Evaluation: Perceptions of Local People on Long-Term Impact of Development Interventions in Northern Ghana*. Masters' Thesis at University of Amsterdam.

LAMBIN, E.F., B.L. TURNER, H.J. GEIST, S.B. AGBOLA, A. ANGELSEN & J.W. BRUCE, *et al.* (2001), The Causes of Land-use and Land-cover Change: Moving Beyond the Myths. *Global Environmental Change*, 11 (4): 261-269.

LARWANOU, M., & M. SAADOU (2011), The Role of Human Interventions in Tree Dynamics and Environmental Rehabilitation in the Sahel Zone of Niger. *Journal of Arid Environments*, 75 (2): 194-200.

LINDSKOG, P., & A. TENGBERG (1994), Land Degradation, Natural Resources and Local Knowledge in the Sahel Zone of Burkina Faso. *GeoJournal*, 33 (4): 365-375.

LONG, N. (2001), *Development Sociology: Actors Perspectives*. London/New York: Routledge.

LUNGREN, C., G.H. OUEDA, F. WALSH & U. BELEMSOBGO (2001), Burkina Faso. In: *Important Bird Areas in Africa and Associated Islands: Priority Sites for Conservation.* Newbury, UK: Pisces Publications; Cambridge: BirdLife International: 117-125.

LYKKE, A.M, C. MBOW, B. SAMBOU & A.T. Ba (2004), Vegetation Change in West Africa: Perceptions and Implications for Policy and Development. Unpublished data in SEREIN - Occasional Paper No. 18 Sahel-Sudan Environmental Research Initiative. Available from: http://person.au.dk/fil/17477203/Lykke_Mbow_Sambou_SEREIN18_2005.pdf#page=67.

MACARTHUR, R.H. & J.W. MACARTHUR (1961), On Bird Species Diversity. *Ecology*, 42 (3): 594-598.

MADIÈS, T. (2013), Decentralization: A Comparative and Cross-cutting Analysis of the Stakes. *In: The Political Economy of Decentralization in Sub-Saharan Africa*. The World Bank and Agence Française de Développement.

MAHANTY, S. & D. RUSSELL (2002), High Stakes: Lessons From Stakeholder Organizations in the Biodiversity Conservation Network, *Society and Natural Resources,* (15): 179-188.

MARCUSSEN, H.S. (1999), Environmental Paradigms, Knowledge Systems and Policy. The Case of Burkina Faso. *Danish Journal of Geography*, (2): 93-103.

MARSAIS, A. (2009), *Participation in the Land of the Righteous: Between Discourse and Development Reality in Burkina Faso*. Masters' Thesis at University of Amsterdam.

MATHIEU, P., M. ZONGO & L. PARÉ (2002), Monetary Land Transactions in Western Burkina Faso: Commoditisation, Papers and Ambiguities. *The European Journal of Development Research*, 14 (2): 109-128.

MCBEATH, J. & J. ROSENBERG (2006), *Comparative Environmental Politics*. Springer Science & Business Media.

MCCARTHY, N., C. DUTILLY-DIANE & B. DRABO (2004), Cooperation, Collective Action and Natural Resources Management in Burkina Faso. *Agricultural Systems,* (82): 233-255.

MERRIAM, S.B. & E.J. TISDELL (2015), *Qualitative research: A Guide to Design and Implementation.* San Francisco: John Wiley & Sons.

MICHENER, V.J. (1998), The Participatory Approach: Contradiction and Co-option in Burkina Faso. *World Development*, 26 (12): 2105-2118.

MIHOUB, J-B., O. GIMENEZ, P. PILARD & F. SARRAZIN (2010), Challenging Conservation of Migratory Species: Sahelian Rainfalls Drive First-Year Survival of the Vulnerable Lesser Kestrel *Falco Naumanni*. *Biological Conservation,* 143: 839-847.

MILLENNIUM ECOSYSTEM ASSESSMENT (2005), *Ecosystems and Human Well-being: Synthesis*. Washington DC: Island Press.

MINISTÈRE DE L'ENVIRONNEMENT ET DU DÉVELOPPEMENT DURABLE (2015), Project d'Appui aux Populations Dépendantes de la Foret (PAPF) Cadre de Gestion Environnementale et Sociale (CGES). Version Finale Avril 2015. Available from: http://cmsdata.iucn.org/downloads/cges_dgm_burkina_faso_revu_ccp_17mai15.pdf.

MINISTÈRE DE L'ENVIRONNEMENT ET DU TOURISME (1994), Plan d'Action National pour l'Environnement (PANE). Available from: http://www.environnement.gov.bf/files/pane.pdf.

MORRISON, C.A., R.A. ROBINSON, J.A. CLARK, K. RISELY & J.A. GILL (2013), Recent Population Declines in Afro-Palaearctic Migratory Birds: the Influence of Breeding and Non-breeding Seasons. *Diversity and Distributions*, 19 (8): 1051-1058.

MORTIMORE, M. (2009), Adapting to Drought in the Sahel: Lessons for Climate Change. *Wiley Interdisciplinary Reviews: Climate Change*, Vol. 1 Issue 1: 134 - 143, Published Online: 22 Dec 2009, John Wiley & Sons, Inc.

MORTIMORE, M.J. & W.M. ADAMS (2001), Farmer Adaptation, Change and 'Crisis' in the Sahel. *Global environmental change*, 11 (1): 49-57.

MORTIMORE, M.J. & B. TURNER (2005), Does the Sahelian Smallholder's Management of Woodland, Farm Trees, Rangeland Support the Hypothesis of Human-induced Desertification? *Journal of Arid Environments*, 63 (3): 567–595.

MOSSE, D. (2004), Is Good Policy Unimplementable? Reflections on the Ethnography of Aid Policy and Practice. *Development and Change*, 35 (4): 639-671.

MOSSE, D. (2005), *Cultivating Development: An Ethnography of Aid Policy and Practice.* London: Pluto Press, 4th edition.

MULLER-BOKER, U. & M. KOLLMAIR (2000), Livelihood Strategies and Local Perceptions of a New Nature Conservation Project in Nepal. *Mountain Research and Development,* 20 (4): 324-331.

MURDOCK, G.P. (1981), *Atlas of World Cultures*. Pittsburgh: University of Pittsburgh Press.

MUROMBEDZI, J.C. (2010), Agrarian Social Change and Post-Colonial Natural Resource Management Interventions in Southern Africa's 'Communal Tenure' Regimes. In: *Community rights, Conservation and Contested Land: The Politics of Patural Resource Governance in Africa*. London: Earthscan.

NANA, A. (2012), *LOTE project. Ecological Monitoring Interim Report*. Unpublished

Natural Resource Issues Series No. 4. London: International Institute for Environment and Development.

NATURAMA (2015), La Fondation des Amis de la Nature [website]. Available from: http://www.NATURAMA.bf/.

NICHOLSON, S.E., C.J. TUCKER & M.B. BA (1998), Desertification, Drought, and Surface Vegetation: An Example from the West African Sahel. *Bulletin of the American Meteorological Society*, 79 (5): 815-829.

NORTH, D.C. (1990), *Institutions, Institutional Change and Economic Performance*. Cambridge University Press.

NUESIRI, E. (2012), *The Re-emergence of Customary Authority and its Relation with Local Democratic Government*. Responsive Forest Governance Initiative Working Paper No. 6. IUCN, University of Illinois, and the Council for the Development of Social Science Research in Africa. Dakar: CODESRIA.

NUESIRI, E. (2015), *Representation in REDD: NGOs and Chiefs Privileged over Elected Local Government in Cross River State, Nigeria*. Responsive Forest Governance Initiative Working Paper No. 11. IUCN, University of Illinois, and the Council for the Development of Social Science Research in Africa. Dakar: CODESRIA.

OCKENDON, N., C.M. HEWSON, A. JOHNSTON & P.W. ATKINSON (2012), Declines in British-Breeding Populations of Afro-Palaearctic Migrant Birds are Linked to Bioclimatic Wintering Zone in Africa, Possibly via Constraints on Arrival Time Advancement. *Bird Study,* 59 (2): 111–125.

OLSON, D.M., E. DINERSTEIN, E.D. WIKRAMANAYAKE, N.D. BURGESS, G.V. POWELL, E.C. UNDERWOOD *et al.* (2001), Terrestrial Ecoregions of the World: A New Map of Life on Earth: A New Global Map of Terrestrial Ecoregions Provides an Innovative Tool for Conserving Biodiversity. *BioScience*, 51 (11): 933-938.

OLSSON, L., L. EKLUNDH & J. ARDÖ (2005), A Recent Greening of the Sahel - Trends, Patterns and Potential Causes. *Journal of Arid Environments*, 63 (3): 556–566.

O'RIORDAN, T. (2000), *Environmental Science for Environmental Management*. Essex: Pearson Education Limited.

OSTROM, E. (2015) *Governing the Commons.* Cambridge: Cambridge University Press.

OUÉDRAOGO, I., J. RUNGE, J. EISENBERG & J. BARRON (2014), The Re-greening of the Sahel: Natural Cyclicity or Human-induced Change? *Land*, 3 (3): 1075-1090.

OUÉDRAOGO, R., A.E. SOARA & A. OUEDA (2015), Description du Peuplement Piscicole du Lac Sahélien de Higa, un site Ramsar du Burkina Faso, Afrique de l'Ouest. *Journal of Applied Biosciences,* 95: 8958-8965.

OWUSU, E.H. (2008), The Perceptions of Local Communities towards the Conservation of Birds in an Important Bird Area in Ghana. *West African Journal of Applied Ecology*, 13 (1): 111-116.

OWUSU, E.H. & E.K. EKPE (2011), An Evaluation of Forest Conservation Perceptions after a Decade of Community Conservation in Afadjato-Agumatsa, Ghana. *International Journal of Environmental Sciences,* 2 (2): 429-439.

OXFORD DICTIONARY (2012), Conservation [website]. Available from: http://www.oxforddictionaries.com/definition/english/conservation.

OYONO, R. & F. NTUNGILA-NKAMA (2015), *Zonage des Terres, Conservation des Paysages et Représentation Locale Déboîtée en RD Congo*. Responsive Forest Governance Initiative Working Paper No. 10. IUCN, University of Illinois, and the Council for the Development of Social Science Research in Africa. Dakar: CODESRIA.

PARÉ, S., P. SAVADOGO, M. TIGABU, J.M. OUADBA & P.C. ODÉN (2010), Consumptive Values and Local Perception of Dry Forest Decline in Burkina Faso, West Africa. *Environment, Development and Sustainability,* 12: 277-295.

POPULATIONS DU MONDE (2015), Burkina Faso [website]. Available from: http://populationsdumonde.com/fiches-pays/burkina-faso.

PORTIER, B., C. LUNGREN & G.H. OUÉDA (2002), Birding in Burkina Faso, More than just Birdwatching. *Dutch Birding,* 24: 127-141.

POTTS, M. & A. GRAVES (2013), Big Issues Deserve Bold Responses: Population and Climate Change in the Sahel/Les Grandes Questions Méritent des Réponses Audacieuses: La Population et le Changement Climatique au Sahel. *African Journal of Reproductive Health/La Revue Africaine de la Santé Reproductive*, 17 (3): 9-14.

PRESIDENTIAL DECREE (2012), DECRET N°2012-804/PRES/PM/MATDS/MEF du 08 Octobre 2012 Portant Modalités de Création, d'Organisation et de Fonctionnement des Circonscriptions Administratives au Burkina Faso. JO N° 44 DU 1ER NOVEMBRE 2012. Available from: http://www.legiburkina.bf/m/Sommaires_JO/Decret_2012_00804.htm.

PRESIDENTIAL DECREE (2013), DECRET N° 2013- 1141/PRES/PM/MEDD Portant Organisation du Ministère de l'Environnement et du Développement Durable. Available from: file://vuw/Personal$/Homes/B/berghmvanden/Downloads/decret_2013_potant_organisation_medd25.pdf.

PRINCE, S.D, K.J. WESSELS, C.J. TUCKER & S.E. NICHOLson (2007), Desertification in the Sahel: A Reinterpretation of a Reinterpretation. *Global Change Biology*, 13: 1308-1313.

RAMSAR (The Ramsar Convention on Wetlands) (2010), About Ramsar [website]. Available from: http://www.ramsar.org/cda/en/ramsar-about-about-ramsar/main/ramsar/1-36%5E7687_4000_0.

RAMSAR (The Ramsar Convention on Wetlands) (2013), The Annotated Ramsar List: Burkina Faso [website]. Available from: http://www.ramsar.org/cda/en/ramsar-pubs-notes-anno-burkina/main/ramsar/1-30168%5E16690_4000_0.

RAMSAR (The Ramsar Convention on Wetlands) (2015), Burkina Faso [website]. Available from: http://www.ramsar.org/wetland/burkina-faso.

RASMUSSEN, K., B. FOG & J.E. MADSEN (2001), Desertification in Reverse? Observations from northern Burkina Faso. *Global Environmental Change*, 11 (4): 271-282.

RAYNAUT, C. (2001), Societies and Nature in the Sahel: Ecological Diversity and Social Dynamics. *Global Environmental Change*, 11 (1): 9-18.

RAYNAUT, C., P.L. DELVILLE, E. GRÉGOIRE, P. JANIN & J. KOECHLIN (2002), *Societies and Nature in the Sahel.* London and New York: Routledge.

REIJ, C. (2010), African Re-greening Initiatives (ARI): Linking Adaptation to Climate Change, Poverty Reduction and Food Security. *Briefing note*: November 2010 (Centre for International Cooperation – VU University Amsterdam).

REIJ, C.P., G. TAPPAN & M. SMALE (2009), *Agroenvironmental Transformation in the Sahel-Another Kind of "Green Revolution"*. Washington: IFPRI, IFPRI Discussion Paper 00914.

REIJ, C.P. & E.M.A. SMALING (2008), Analyzing Successes in Agriculture and Land Management in Sub-Saharan Africa: Is Macro-level Gloom Obscuring Positive Micro-level Change? *Land Use Policy*, 25 (3): 410-420.

RIBOT, J.C. (1999), Decentralization Participation and Accountability in Sahelian Forestry: Legal Instruments of Political-Administrative Control. *Africa: Journal of the International African Institute,* 69 (1): 23-65.

RIBOT, J.C. (2003), Democratic Decentralisation of Natural Resources: Institutional Choice and Discretionary Power Transfers in Sub-Saharan Africa. *Public Administration and Development,* 23: 53-65.

RIBOT, J.C., J.F. LUND & T. TREUE (2010), Democratic Decentralization in Sub-Saharan Africa: Its Contribution to Forest Management, Livelihoods, and Enfranchisement. *Environmental Conservation,* 37 (1): 35-44.

RIBOT, J.C. & R. OYONO (2005), The Politics of Decentralization. In: B. Wisner, C. Toulmin & R. Chitiga, eds, *Toward a New Map of Africa*. London: Earthscan Press.

RIFKIN, S.B. & M. KANGERE (2002), "What Is Participation?" In: Hartley, S. ed., *CBR A Participatory Strategy in Africa.* London: The Centre for International Child Health.

RIJNEVELD, W. (unpublished) (2012), Rapport over het PADev Onderzoek in Tô, Sissili, Burkina Faso ... en Wat Daarin Gevonden Werd over het Landbouwproject van CREDO. Available from: http://www.padev.nl/other_output/Rijneveld_2012.pdf.

ROBSON, R. (2002), *Real World Research* (2nd edition). Carlton: Blackwell Publishing.

ROE, D. & I. BOND (2007), Biodiversity for the Millennium Development Goals: What Local Organizations Can Do. Available from: http://pubs.iied.org/pdfs/11070IIED.pdf.

ROE, D., B. JONES, I. BOND & S. BHATT (2006), *Local Action, Global Aspirations: The Role of Community Conservation in Achieving International Goals for Environment and Develop-*

*ment.* Natural Resource Issues Series No. 4. London, UK: International Institute for Environment and Development.

ROE, D., P. SUKHDEV, D. THOMAS & R. MUNROE (2010), *Banking on Biodiversity: A Natural Way Out of Poverty*. (Big Ideas in Development Series). London and Cambridge: International Institute for Environment and Development & BirdLife International.

ROSILLON, F., P. VAN DER BORGHT & H. BADO SAMA (2005), River Contract in Wallonia (Belgium) and its Application for Water Management in the Sourou Valley (Burkina Faso). *Water Science & Technology*, 52 (9).

ROS-TONEN, M.A.F. & T. DIETZ, eds, (2005), *African Forests Between Nature and Livelihood Resources. Interdisciplinary Studies in Conservation and Forest Management*. Lampeter (Wales): The Edward Mellen Press.

ROUPSARD, O., A. FERHI, A. GRANIER, F. PALLO, D. DEPOMMIER, B. MALLET *et al.* (1999), Reverse Phenology and Dry-season Water Uptake by *Faidherbia albida* (Del.) A. Chev. in an Agroforestry Parkland of Sudanese West Africa. *Functional Ecology*, 13 (4): 460-472.

RSPB (2014), The State of the UK's Birds 2014. Available from: http://www.bto.org/sites/default/files/u16/downloads/SUKB/state_of_uk_birds_2014.pdf.

RUPLEY, L., L. BANGALI & B. DIAMITANI (2013), *Historical Dictionary of Burkina Faso*. Third edition. Plymouth: Scarecrow Press.

SANDERSON, F.J., P.F. DONALD, D.J. PAIN, I.J. BURFIELD & V.P.J. VAN BOMMEL (2006), Long-term Population Declines in Afro-Palearctic Migrant Birds. *Biological Conservation,* 131 (1): 93-105.

SCHOMAKER, M., M. KEATING & M. CHENJE, eds, (2007), *Global Environment Outlook 4: Environment for Development.* Nairobi: United Nations Environment Programme.

SCHUSLER, T.M., D.J. DECKER & M.I. PFEffer (2003), Social Learning for Collaborative Natural Resource Management. *Society & Natural Resources: An International Journal,* 16 (4): 309-326.

SCOONES, I. (1998), Sustainable Rural Livelihoods: A Framework for Analysis. Working Paper 72, Brighton: Institute for Development Studies.

SEALE, C., ed., (2004), *Researching Society and Culture* (2nd edition). London: SAGE Publications - New Delhi: Thousand Oaks.

SHAW, T.M. & J.G. MALCOLM (1982), Africa and the Environment: the Political Economy of Resources. *A Journal of African politics, Development and International Affairs,* 9 (1).

SHEEHAN, D.K. & F.J. SANDERSON (2012), Seeing the Bigger Picture: How Anthropogenic Landscape Modification in Africa Affects Declining Migratory Birds and the Need for Trans-continental Research and Conservation. *Ibis*, 154 (4): 659-662.

SHEIL, D., N. LISWANTI, M. HEIST, I. BASUKI, I. SAMSOEDIN & M.A. SARDJONO (2003), Local Priorities and Biodiversity. Tropical Forest Update, ITTO. Available From: http://www.cifor.org/publications/pdf_files/articles/itto_journal.pdf.

SPEIRS, M. (1991), Agrarian Change and the Revolution in Burkina Faso. *African Affairs*, 90 (358), 89-110.

SNOW, D.W. & C.M. PERRINS (1998), *The Birds of the Western Palearctic. Vol. 2. Passerines*. Oxford: Oxford University Press.

SÖDERSTRÖM, B., S. KIEMA & R.S. REID (2003) Intensified Agricultural Land-use and Bird Conservation in Burkina Faso. *Agriculture, Ecosystems & Environment*, 99(1): 113-124.

SOMDA, J., A. ZONON, J.M. OUADBA & D. HUBERMAN (2010), *Valeur Économique de la Vallée du Sourou: Une Évaluation Préliminaire.* Ouagadougou, Burkina Faso: IUCN (Bureau Régional).

SP/CONAGESE (Permanent Secretariat of the National Council for the Management of the Environment) (1999), Country Study on Burkina Faso Biodiversity [online]. Available from: http://bch-cbd.naturalsciences.be/burkina/bf-fra/contribution/monographie/monographieburkinaversionanglaise.pdf**.**

SP/CONAGESE (Permanent Secretariat of the National Council for the Management of the Environment) (2002), State of the Environment Rapport for Burkina Faso. Summary. Available from: http://www.environnement.gov.bf/index.php/documents-en-ligne/rapports.

SP/CONEDD (2007), Programme National des Renforcement des Capacités pour la Gestion l'Environnment National et Mondial: Stratégie & Plan d'Action 2008-2025. Available from: http://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Integrating%20Environment%20into%20Development/ncsa/final%20report%20and%20action%20plan/french/ncsa-burkina%20faso-fr-ap-FR.pdf.

SP/CONEDD (2010), Troisième Rapport de l'Etat de l'Environnement au Burkina Faso. Available from: http://spconedd.bf/IMG/pdf/REEB_III_version__final.pdf.

SPEIRS, M. (1991), Agrarian Change and the Revolution in Burkina. *African Affairs,* 90 (358)*:* 89-110.

STATTERSFIELD, A., M.J. CROSBY, A.J. LONG & D.C. WEGE (1998), *Endemic Bird Areas of the World: Priority for Biodiversity Conservation*. Cambridge: BirdLife International.

STEVENS, M., D. SHEEHAN, J. WILSON, G. BUCHANAN & W. CRESSWELL (2010), Changes in Sahelian Bird Biodiversity and Tree Density over Five-year Period in northern Nigeria. *Bird Study*, 57 (2): 156-174.

STUDYLIGHT.ORG (2014), Holman Bible Dictionary; Birds [website]. Available from: http://www.studylight.org/dictionaries/hbd/view.cgi?number=T946.

SUMMER, A. & M. TRIBE (2008), *International Development Studies: Theories and Methods in Research and Practice*, Sage publications Ltd.

SWORD, W. (1999), Accounting for Presence of Self: Reflections on Doing Qualitative Research. *Qualitative Health Research*, 9 (2): 270-278.

TAPPAN, G. & M. MCGAHUEY (2007), Tracking Environmental Dynamics and Agricultural Intensification in southern Mali. *Agricultural Systems*, 94(1): 38-51.

TESSEMA, M.E., R.J. LILIEHOLM, Z.T. ASHENAFI & N. LEADER-WILLIAMS (2010), Community Attitudes toward Wildlife and Protected Areas in Ethiopia. *Society & Natural Resources,* 23 (6): 489-506.

TEWS, J., U. BROSE, V. GRIMM, K. TIELBÖRGER, M.C. WICHMANN, M. SCHWAGER, M & F. JELTSCH (2004), Animal Species Diversity Driven by Habitat Heterogeneity/Diversity: the Importance of Keystone Structures. *Journal of Biogeography*, 31 (1): 79-92.

THE AFRICAN RE-GREENING INITIATIVES (2010), Current-projects [website]. Available from: http://www.cis.vu.nl/en/our-expertise/natural-resource-management/current-projects/africa-regreening-initiatives/index.asp.

THE LANDSCAPE TOOLBOX (2016), Normalized Difference Vegetation Index. Available from: http://wiki.landscapetoolbox.org/doku.php/remote_sensing_methods:normalized_difference_vegetation_index.

THIOLLAY, J.M. (2006a), Severe Decline of Large Birds in the Northern Sahel of West Africa: A Long-term Assessment. *Bird Conservation International*, 16 (4): 353-365.

THIOLLAY, J.M. (2006b), Large Bird Declines with Increasing Human Pressure in Savanna Woodlands (Burkina Faso). *Biodiversity and Conservation,* 15: 2085-2108.

THOMAS, D. (2011), *Poverty, Biodiversity and Local Organisations: Lessons from BirdLife International*. London: International Institute for Environment and Development.

THOMAS, D. (2013), Local Organisations- An Entry Point for Conservation and Poverty Reduction. In: D. Roe, J. Elliott, C. Sandbrook & M. Walpole, eds, *Biodiversity Conservation and Poverty Alleviation. Exploring the Evidence for a Link*. Oxford: Wiley & Blackwell: 253-269.

TRAORÉ, A., I. ÁLVAREZ, I. FERNÁNDEZ, L. PÉREZ-PARDAL, A. KABORÉ, G. OUÉDRAOGO-SANOU, Y. ZARÉ, H.H. TAMBOURÁ & F. GOYACHE (2012), Ascertaining Gene Flow Patterns in Livestock Populations of Developing Countries: A Case Study in Burkina Faso Goat [online]. Available from: http://sahel-energy.org/home/index.php**.**

TRIERWEILER, C., W.C. MULLIE, R.H. DRENT, K.M. EXO, J. KOMDEUR, F. BAIRLEIN, A. HAROUNA, M. BAKKER & B.J. KOKS (2013), A Palaearctic Migratory Raptor Species Tracks Shifting Prey Availability Within its Wintering Range in the Sahel. *Journal of animal ecology*, 82 (1): 107-120.

UICN (2013), ONG Locales au Burkina Faso: Quelles Contributions a la Conservation des Ressources Naturelles. Available from: http://papaco.org/wp-content/uploads/2013/12/Document-de-capitalisation-forum_Fada-2013.pdf.

UNEP (United Nations Environment Programme) (2007), Global Environment Outlook GEO Environment for Development 4. Available from: http://www.unep.org/geo/geo4/report/geo-4_report_full_en.pdf.

USAID (1991), Supplementary Environmental Assessment within the Framework of Locusts Grasshopper Control in Burkina Faso. Available from: http://www.encapafrica.org/documents/pea_pestmanagement/burkinafaso_lg_sea_apr91.doc.

VANDENBELDT, R.J. & J.H. WILLIAMS (1992), The Effect of Soil Surface Temperature on the Growth of Millet in Relation to the Effect of *Faidherbia albida* Trees. *Agricultural and Forest Meteorology*, 60 (1-2): 93-100.

VAN DEN BERGH, M.O.L. (2012), First Record of Blackstart *Cercomela melanura* for Burkina Faso. *ABC bulletin: Bulletin of the African Bird Club*, 19 (2): 202-203.

VAN DEN BERGH, M.O.L. (2013), New and Notable Bird Records for Burkina Faso. *Malimbus*, 235 (1): 57-65.

VAN DEN BERGH, M.O.L. (2014), The Role of Community Organisations in Integrated Conservation and Development Projects: Local Perspectives from the Sahel Region. *Biodiversity,* 15 (2-3): 73-88.

VBN (Vogelbescherming Nederland) (2010a), Over Ons, De Organisatie [website]. Available from: http://www.vogelbescherming.nl/over_ons/de_organisatie [Accessed May 2010].

VBN (Vogelbescherming Nederland) (2010b), *Vogels op de Rand* [report]. Vogelbescherming Nederland.

VENEMA, B. & H. VAN DEN BREEMER, eds, (1999), *Towards Negotiated Co-management of Natural Resources in Africa*. Münster- Hamburg- London: Lit verlag.

VICKERY, J.A., EWING, S.R. SMITH, K.W. PAIN, D.J. BAIRLEIN, F. SKORPILOVA & R.D. GREGORY (2014), The Decline of Afro-Palaearctic Migrants and an Assessment of Potential Causes. *Ibis,* 156 (1): 1-22.

Virtanen, P. (2001), Evolving Institutional Framework for Community-Based Natural Resource Management in Mozambique: A Case Study from the Choa Highlands. *African Studies Quarterly,* 5 (3): 139-154.

VRIELING, A., K.M. DE BEURS, & M,E. BROWN (2011), Variability of African Farming Systems from Phenological Analysis of NDVI Time Series. *Climatic Change*, 109: 455-477.

VRIELING, A., J. DE LEEUW & M,Y. SAID (2013), Length of Growing Period over Africa: Variability and Trends from 30 Years of NDVI Time Series. *Remote Sensing*, 5: 982-1000.

WAGENINGEN UR (2013), Gestion des Terroirs. Available from: http://portals.wi.wur.nl/ppmefr/?Gestion_des_terroirs.

WANGUI CHOMBA, S. (2015), *REDD+ Institutional Choices and their Implications for Local Democracy in the Kasigau Corridor, Kenya*. Responsive. Forest Governance Initiative Working Paper No. 16. IUCN, University of Illinois, and the Council for the Development of Social Science Research in Africa. Dakar: CODESRIA.

WETHE, J. (2009), Energy Systems: Vulnerability – Adaptation – Resilience (VAR) Regional Focus: Sub-Saharan Africa, Burkina Faso [online]. Available from: http://www.helio-international.org/VARBurkina%20Faso.En.pdf**.**

WIKIPEDIA (2016), Politics of Burkina Faso [website]. Available from: https://en.wikipedia.org/wiki/Politics_of_Burkina_Faso.

WILLIAMS, V.L., A.B. CUNNINGHAM, A.C. KEMP & R.K. BRUYNS (2014), Risks to Birds Traded for African Traditional Medicine: A Quantitative Assessment [online]. *PLoS ONE,* 9(8). Available from: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0105397.

WILSON, J.M. & W. CRESSWELL (2006), How Robust are Palearctic Migrants to Habitat Loss and Degradation in the Sahel? *Ibis*, 148: 789–800.

WOLF, R. (2010), *Effectiveness of an Important Bird Area for the Conservation of Wintering Passerines; A Case-study of Mole National Park in Ghana*. Unpublished data (i.e. master's thesis: Saxion University (NL)- University of Greenwich (UK).

WOODHOUSE, P., H. BERNSTEIN & D. HULME (2000), *African Enclosures? The Social Dynamics of Wetlands in Drylands*. Oxford: James Currey Ltd.

YBEMA, S., D. YANOW, H. WELS & F.H. KAMSTEEG, eds, (2009), *Organizational Ethnography: Studying the Complexity of Everyday Life*. London, Thousand Oaks, New Delhi, Singapore: Sage Publications Ltd.

ZIMMERMAN, M.A. & J. RAPPAPORT (1988), Citizen Participation, Perceived Control, and Psychological Empowerment. *American Journal of Community Psychology*, 16 (5): 725-750.

ZONGO, M. (2010), *Les Enjeux Autour de la Diaspora Burkinabé: Burkinabé à l'Étranger, Étrangers au Burkina Faso*. Paris: Editions L'Harmattan.

ZWARTS, L. & R.G. BIJLSMA (2015a), *Measuring Absolute Bird Densities in Trees*. Submitted to ARDEA.

ZWARTS, L. & R.G. BIJLSMA (2015b), Detection Probabilities and Absolute Densities of Birds in Trees. *ARDEA*, 103 (2): 99-122.

ZWARTS, L., R.G. BIJLSMA, J.V.D. KAMP, M. SIKKEMA & E. WYMENGA (2015), Moreau's Paradox Reversed, or Why Insectivorous Birds Reach High Densities in Savanna Trees. *ARDEA*, 103 (2): 123-144.

ZWARTS, L., R.B. BIJLSMA, J. VAN DER KAMP & E. WYMENGA (2009), *Living on the Edge. Wetlands and Birds in a Changing Sahel*. Zeist: KNNV Publishing.

ZWARTS, L., J. VAN DER KAMP, M. SIKKEMA & E. WYMENGA (2012), *Birds and Trees in the Sahel: Progress Report 2012*. A&W-report 1809. Feanwalden: Altenburg & Wymenga ecological consultants.

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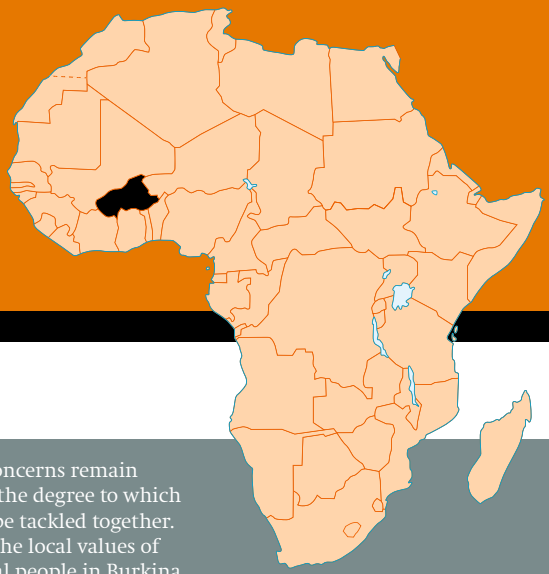

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The links between conservation and livelihood concerns remain much debated, and there is no agreement about the degree to which these concerns are linked, and how they should be tackled together. The main objectives of this study are to uncover the local values of birds, the environment and conservation for rural people in Burkina Faso's Sahel region, and to increase insights into interventions that aim to achieve integrated (migrant bird) conservation and sustainable development objectives in this area. By focusing on issues like local perceptions, local participation, local institutional arrangements and the role of birds, this study adds new insights to the existing literature and knowledge. The study demonstrates that both birds and the environment are valued in many ways and are strongly linked with local livelihoods. At the same time, the study shows that serious environmental problems exist, and that both local livelihoods and birds are negatively impacted. This has created conservation incentives among the local population, which is a major contributing factor for conservation organizations seeking local motivation and participation to combat environmental issues. In fact, the study provides a strong argument for the need to increase local participation, and demonstrates several ways to do so.

Michiel van den Bergh (1983) obtained his master's degree in Human Geography from the University of Amsterdam (2009). In addition, he completed several conservation-related courses at the Wilfrid Laurier University (2006) and two research courses at the Utrecht University (2011). Michiel joined the ASCL in 2011 and became the institute's PhD Representative from 2012 to 2015. In that same period, Michiel published a book and several articles in peer-reviewed journals, was co-director of the documentary 'Living on the Edge', and project-leader of the conservation-golf programme 'Committed to Birds'. Currently, Michiel is working as North Sea programme manager at the WWF.

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