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

### Introduction

The Sahel region<sup>1</sup> 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

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<sup>1</sup> 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<sup>2</sup> (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<sup>3</sup> 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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<sup>2</sup> The IUCN Red List of Threatened Species<sup>1</sup> 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).

<sup>3</sup> 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).<sup>4</sup> 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).<sup>5</sup>

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).<sup>6</sup> This brings us to sub-question 2:

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<sup>4</sup> 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).

<sup>5</sup> 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.”

<sup>6</sup> “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).

What are the local inhabitants' attitudes towards (bird) conservation?

(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<sup>7</sup> 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):<sup>8</sup> the Lake Sourou IBA (hereafter referred to as Sourou) and the designated Lac Higa IBA<sup>9</sup> (hereafter referred to as Higa). Both areas are included on the Ramsar list of wetlands of international importance.<sup>10</sup> 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 zone near Burkina Faso's north-western border with Mali. Higa (ca. 1,500 ha) is

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

<sup>8</sup> 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).

<sup>9</sup> 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.

<sup>10</sup> “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).

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 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%	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).<sup>11</sup>

### *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 “organisations or individuals who, together with relevant stakeholders, work with

<sup>11</sup> 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’.

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<sup>12</sup> 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.<sup>13</sup> 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 insensitive with particular interviewees, while additional questions were included

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<sup>12</sup> 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’.

<sup>13</sup> The group interviews consisted of two interviewees (18) or three interviewees (8), and included 60 interviewees in total.



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.

<i>Research Theme</i>	<i>Sourou</i>	<i>Higa</i>	<i>Total</i>
<b>Natural environment</b>			
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
<b>Birds</b>			
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

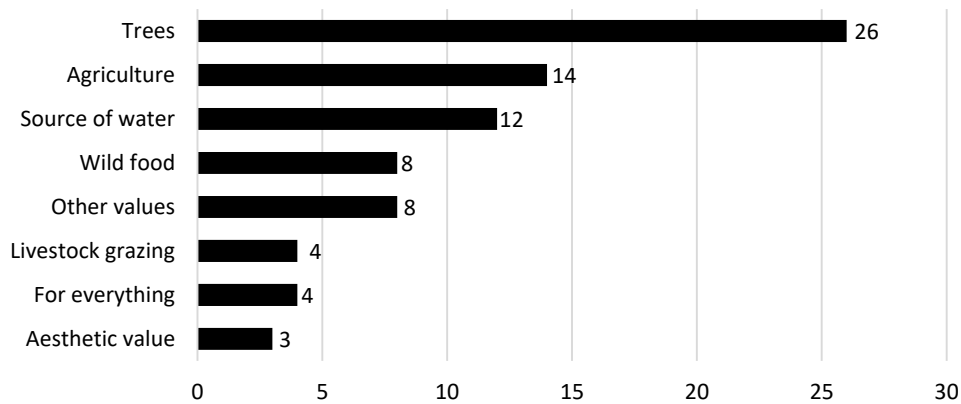
##### *Environmental values and importance (26, 6, 32)<sup>14</sup>*

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.

<sup>14</sup> 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.<sup>15</sup> Collecting and eating wild plants and their fruits are the most common strategies adopted related to the environment.<sup>16</sup> 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.<sup>17</sup>

#### *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 and 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-

<sup>15</sup> 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.

<sup>16</sup> 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*).

<sup>17</sup> 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 farmers 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 result 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<sup>18</sup> 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.<sup>19</sup> 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,<sup>20</sup> overgrazing (only in Higa) and a shortage of fish in the river (in Sourou).<sup>21</sup> 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).

<sup>18</sup> According to the number of times an issue was mentioned by the 38 interviewees.

<sup>19</sup> This appeared to be less important for fishers, who were more numerous in Sourou in relative and absolute terms.

<sup>20</sup> The burning of vegetation was regularly discussed in informal conversations and was undoubtedly prompted by the regular bush fires.

<sup>21</sup> 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.<sup>22</sup> 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 Développement 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 amphibius* and fishermen in Sourou

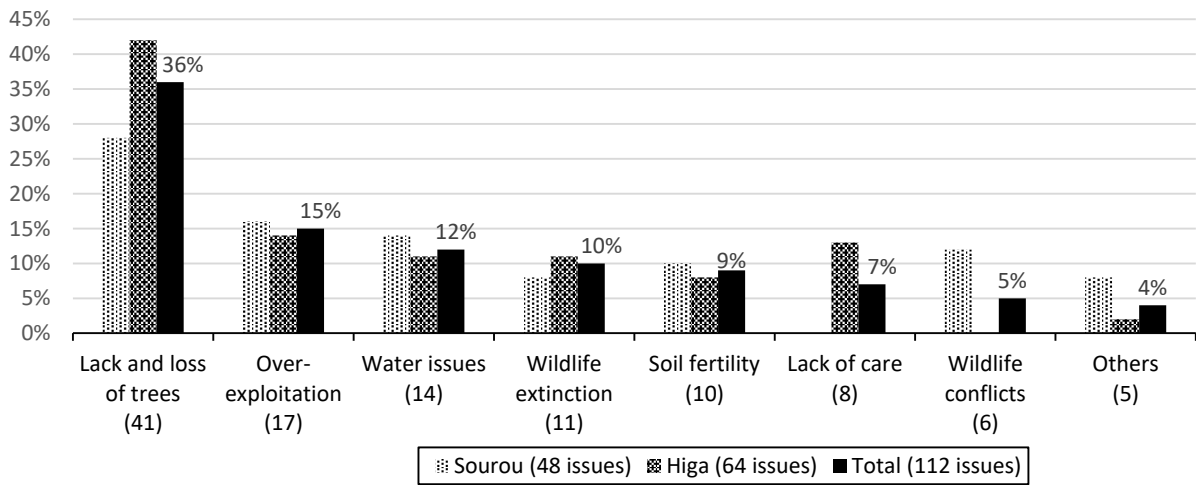


The Sourou river basin is inhabited by both many hippos and many fishermen, which can lead to conflicts as hippos are known to feed on crops and pose a threat to humans.

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<sup>22</sup> 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)

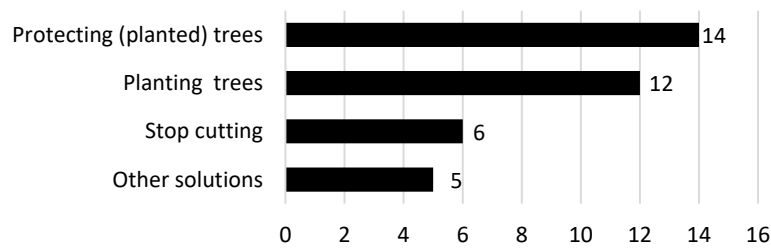


Note: The relative number of times issues were mentioned (112) by 38 interviewees (Sourou 22, Higa 16), depicted in percentages per category. The 'overexploitation' category excludes the exploitation of trees, because this is included in the 'lack and loss of trees' category.

#### *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 combating 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.<sup>23</sup> 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).<sup>24</sup> 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).<sup>25</sup> 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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<sup>23</sup> This occurred many years ago and the person who found the bird was untraceable.

<sup>24</sup> 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*).

<sup>25</sup> 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)

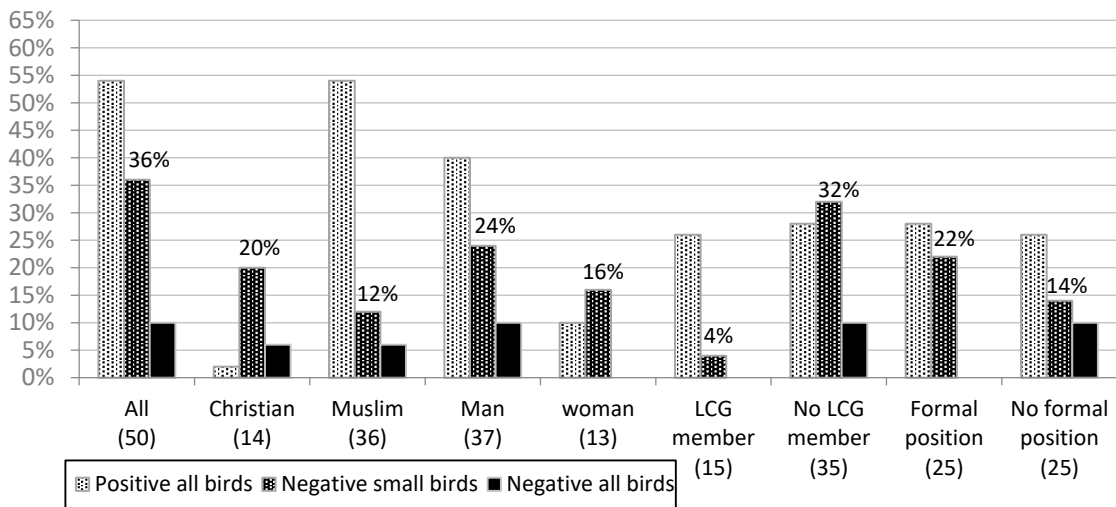
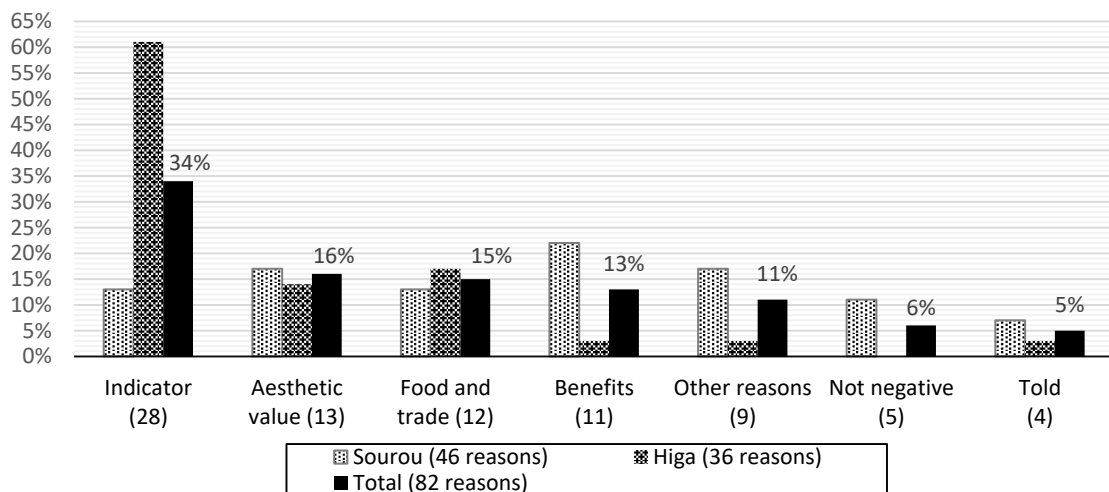


Figure 4.5 Reasons (82) for people's positive perceptions of birds by research area (N=45)



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,<sup>26</sup> 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-

<sup>26</sup> 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 ' <i>NATURAMA</i> 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.<sup>27</sup> 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)*

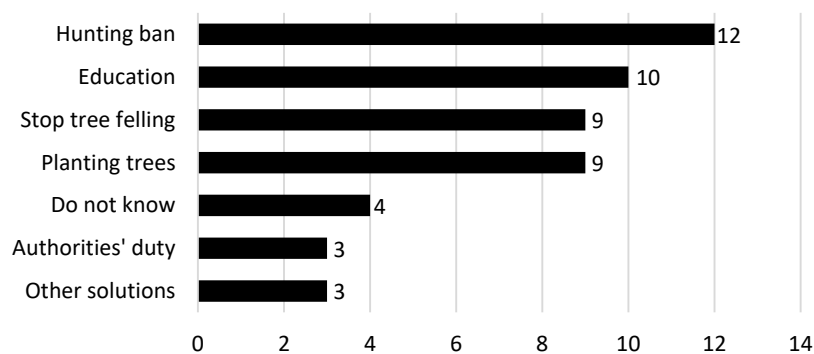
The most frequently mentioned measure to protect birds was a ban on hunting (Figure 4.6). Although the forester and the government's prefect were sometimes mentioned as being responsible for achieving this, this suggestion did not necessarily refer to law enforcement. Education, especially on the subject 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

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<sup>27</sup> 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<sup>28</sup> but additionally included the fact that they do not like birds dying, and that they can use some parts of birds against diseases.<sup>29</sup>

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

When asked about laws concerning wild birds, local inhabitants always referred to legislation related to hunting.<sup>30</sup> Their knowledge varied from a total ban on wild bird hunting<sup>31</sup> 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).<sup>32</sup> 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.<sup>33</sup> 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).

<sup>28</sup> 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’.

<sup>29</sup> Although the person who mentioned this did not know any details about this alleged use.

<sup>30</sup> 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).

<sup>31</sup> This includes two LCG members who thought there was a total ban in place.

<sup>32</sup> This includes Sourou LCG members and ‘hunters’.

<sup>33</sup> 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.<sup>34</sup> 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).<sup>35</sup> 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.

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<sup>36</sup> 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

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<sup>34</sup> Iso, 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).

<sup>35</sup> 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.

<sup>36</sup> Two boys and two girls in each of the two research areas.

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).<sup>37</sup> 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.

*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'

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.<sup>38</sup> 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.

<sup>37</sup> 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).

<sup>38</sup> 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,<sup>39</sup> 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

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<sup>39</sup> 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.<sup>40</sup> 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.<sup>41</sup> 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.<sup>42</sup> 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.<sup>43</sup>

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<sup>40</sup> 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).

<sup>41</sup> 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.

<sup>42</sup> 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.

<sup>43</sup> 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.<sup>44</sup> 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.<sup>45</sup> 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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<sup>44</sup> For no apparent reason, people sometimes appeared slightly more positive about the conservation of birds than about birds in general.

<sup>45</sup> 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,<sup>46</sup> followed by aesthetic features.<sup>47</sup> In Mul-

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<sup>46</sup> 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.

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<sup>47</sup> 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<sup>48</sup> and the pest situation would therefore be less severe.<sup>49</sup> 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 (Burggraevae 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

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<sup>48</sup> 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).

<sup>49</sup> 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.<sup>50</sup> 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).<sup>51</sup> 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

<sup>50</sup> Including as coping strategy, namely hunting wildlife, including birds, in periods of extreme drought.

<sup>51</sup> 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 re-greening (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.<sup>52</sup> 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-

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<sup>52</sup> 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).<sup>53</sup>

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-

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<sup>53</sup> 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.