

Full Length Research Paper

Farmers' perceptions about the impacts of human-wildlife conflict on rural livelihoods and natural resource management efforts in Cheha Woreda of Guraghe Zone, Ethiopia

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We conducted a household survey, supplemented with group discussions, to identify problematic wild animals and to assess the effects of Human-Wildlife Conflicts (HWC) in rural Ethiopia. Our findings show that monkeys, porcupines, apes, antelopes, warthogs and wild pigs are the major crop raiders in the area, while hyenas, foxes, pythons, eagles and ratel are the most common livestock predators. About 93% of the households reported that they faced damages to their property by at least one of these animals. Additionally, most of the respondent reported believing that wild animals have been contributing to the shortages of food in their family and affecting their natural resource management efforts. We conclude that HWC and farmers' perceptions of conflict in the area have had and continue to have remarkable impacts on the social, economic and environmental wellbeing in the area. Hence, different management options must be adopted to mediate the effects and minimize future conflicts

Key words: Human-Wildlife Conflict, perception, livelihood, natural resource, Ethiopia.

INTRODUCTION

Human-Wildlife Conflict (HWC) is defined as "any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment" (WWF, 2005). The causes of HWC are generally related to interactions between specific groups of humans and wildlife due to demand for the same resources. However, the causes of the conflict often arise in response to macro-level changes beyond the actions of the primary actors.

To feed the ever-increasing human population on earth, the demand for natural resources—especially land for agricultural use—is continuing to shrink natural habitats and destroy wildlife corridors (Falcon-Lang, 2011; Wilson, 1991). Conversely, localized increases in wild-

life populations due to new migration, plentiful food sources or a decrease in natural predators have also been noted; a case in point is the increased ungulate populations in parts of North America (Côté et al., 2004).

Whether resulting from resource scarcity or abundance, many cases demonstrating the severity of HWC are being reported worldwide (Sillero-Zubiri and Switzer, 2001). HWC is generally more intense in the tropics and in developing countries, where livestock rearing and agriculture are important aspects of rural people's livelihoods and income (Else, 1991; Eniang, 2011; Treves, 2006). For these reasons, the threats of HWC in developing countries extend beyond the concerns over wildlife conservations that are widespread in the West. HWC often affects subsistence farmers' ability to feed their families. The conflict can also result in negative social impacts, causing children to miss school and adults to miss work in order to guard fields, and

causing community members to lose sleep due to overnight guard duties and suffer from the fear of crop damage; at its most severe, HWC can result in human fatality (Hoare, 1992; Muruthi, 2005; Treves et al., 2006).

Moreover, HWC must be viewed in the context of the human-human conflicts that generally accompany it. When considering the actual and perceived impacts of HWC on farmers' lives and livelihoods, these factors are paramount. Humans' reactions to HWC have as much to do with perceptions of risk and lack of control as they do with the actual damage done (Madden, 2004). Because community members' experience of HWC does not rely solely on the —facts of the damage done by wildlife but on a host of social, political, cultural, economic and ecological factors (Dickman, 2008), it becomes clear that community members' perceptions of and reactions to HWC are of more practical importance to designing interventions than empirically measuring the impacts of such conflicts. Proposed solutions or mitigation strategies must be aligned with community members' perceptions of and attitudes toward wildlife and HWC (Dickman, 2008; Hill, 2004; Lee and Priston, 2005).

In Cheha Woreda, Guraghe Zone of Ethiopia, farmers had reported remarkable crop and other damages that result from HWC. In order to design effective interventions that were acceptable to the farmers, research was undertaken to assess farmers' perceptions of the damage, their attitudes toward the wildlife and their knowledge of existing cultural practices to minimize wildlife-related crop damage.

Cheha farmers are highly affected by food shortages and undernourishment due to several reasons, including shortage of land; unreliable weather; low crops yield as a result of low soil fertility and lack of improved varieties; and due to damage by different pests. Among those, the damage done to farmers' crops by wildlife such as monkeys and apes is what farmers are most vocal about; this was first observed during a visit to the area for other fieldwork. Sprague and Iwasaki (2006) also addressed that primates are major agricultural pests because of their agility and intelligence. Consequently, some of the Cheha farmers expressed frustration and an unwillingness to adopt new crop technologies until a solution is found for these pests.

As in informal reports from other areas of Ethiopia, conflicts between humans and wildlife seem to be increasing over time in Cheha Woreda. Since the area is covered with different tree and shrub species that are the remnants of the old-growth forests of years past there is a worry that the farmers may choose to further clear that leftover vegetation in order to chase away the animals from their area. Although the impact of those wild animals may not be judged as significant by common standards, for communities with little subsistence economy, like the farmers in Cheha Woreda, even small losses can be of economic importance and can generate negative attitudes toward

wildlife and conservation in general (Eniang et al., 2011).

To the knowledge of the authors so far, there is no documented information about the HWC from this part of the world. Therefore, this study is an original contribution to the existing literature in several ways. Firstly, we generate information about the type of the major problematic wildlife, extent of their damages, trends in their population change, and proportion of farmers suffering from the conflicts. Secondly, we identify the farmers' perception about the direct and indirect economic, environmental and social impacts as a result of the HWC in the area. Thirdly, we share farmers' knowledge about the management and control options suggested from the study area. Additionally, we reviewed and documented different management options, best experiences and lessons practiced worldwide so that the farmers in the study area may adopt to better manage the conflicts.

We organized the remanent of this paper as follows: Section 2 describes the study area and introduces the data collection methods. Section 3 deals with the results of the research activities and presents a discussion of the findings. Finally, in section 4 we present the major conclusions of the study, and we suggest for further research.

METHODOLOGY

Site description

The survey was conducted in Cheha Woreda (a woreda is the Ethiopian equivalent to a Western district), Guraghe Zone of Southern Nations, Nationalities, and Peoples Regional State (SNNPRS), Ethiopia. The Woreda capital, Imdibir town, is located at about 180 kilometers from Addis Ababa and 30 kilometers from the present zonal capital of Wolkite. Imdibir means "mother forest" and is the combination of two words in the Gurage language, Im = mother and dibir = forest. This name clearly indicates that the area was once covered by forests. Around Imdibir, there are also places locally known as Girar Dibir (Acacia forest) and Yawre Dibir (forest of wildlife)(Molla and Feleke 1996).

Land is a scarce resource among the Guraghe people. The landholdings for high, middle and low-income households are about 0.75, 0.5 and 0.25 hectares, respectively (HARC, 2011). For the majority of subsistence farmers, enset (*ensete ventricosum*, also called false banana) fields together with a small amount of grazing land, is the only homestead land available. A very small group of households owning more land cultivate tef, barley and wheat. Because of the small size of landholdings, farmers do not have separate plots for particular crops. Consequently, each farming activity is performed for all the crops on the same field.

The Woreda is known for its enset-based farming system, and most of the other crops grown are perennial,

Table 1. Proportion of farmers reporting that they faced some form of damage to their property due to wild animals.

| Cases | Count | Percent (%) |
|-----------------------------------|-------|-------------|
| Farmers who have faced damages | 79 | 92.94 |
| Farmers who have not face damages | 6 | 7.06 |
| Total | 85 | 100 |

Table 2. Farmers' opinion about the extent of damages by crops riders.

| | Number of positive response on Extent of Damages | | | | | Total number of response |
|--------------|--|------------|-------|-------|----------|--------------------------|
| | No damage | Very small | Small | Big | Very big | |
| Wild animals | | | | | | |
| Monkeys | 0 | 6 | 15 | 9 | 34 | 64 |
| Porcupines | 0 | 3 | 13 | 32 | 0 | 48 |
| Apes | 0 | 1 | 5 | 29 | 4 | 39 |
| Antelopes | 0 | 17 | 14 | 3 | 0 | 34 |
| Wild Pigs | 0 | 1 | 13 | 3 | 0 | 17 |
| Warthogs | 0 | 2 | 11 | 5 | 0 | 18 |
| Total | 0 | 30 | 71 | 81 | 38 | 220 |
| Percent (%) | 0 | 13.64 | 32.27 | 36.82 | 17.72 | 100% |

including chat (khat) and coffee. However, in the small rainy season farmers practice intercropping of maize, tomato, cabbage and green pepper with immature enset and coffee. Eucalyptus tree planting for cash income generation is also becoming common in the area (HARC 2011).

Data Collection Methods

A questionnaire survey was conducted in 2011 to collect information about local farmers' attitudes toward wildlife and their perceptions of the extent of HWC in Cheha Woreda. About 100 households were selected randomly from the household lists in the Woreda. Each of the respondents was asked: 1) whether she or he ever faced any damage to its crops and domestic animals by wildlife, 2) about the type of wildlife causing damage in the area and the trends in their population over years, 3) about the extent of any damages, 4) about direct and indirect impacts on the natural resource management practices and livelihoods of the farming community, and 5) for suggestions possible management options. Additionally, three groups discussions were conducted to enrich the household survey data. Moreover, different literatures were also reviewed, and the experiences and lessons from other countries are included as a secondary data. The data collected were analyzed using descriptive

statics, such as frequency of count, mean and percentages.

RESULTS AND DISCUSSION

In this section we present the results of the study and discuss the findings about farmers' perceptions of HWC in Cheha Woreda. The proportion of the farmers facing the conflicts, the major wild animals found in the area, the perceived extent of damage done to the crops and domestic animals, other direct and indirect impacts, and suggested and existing management options in the area are described and discussed in the context of farmers' impressions.

Proportion of farmers facing damages

In the study area, we asked randomly selected farmers whether they have ever faced damage to their annual crops, fruit trees or domestic animals by wild animals in their area. About 93% of the farmers in the study area reported that they had experienced damage to their property as a result of the actions of wild animals (Table 1). The result from the group discussions also fully confirmed that the damages were almost to everyone's belonging in the study area. Similar reports by Eniang et al. (2011) and Muruthi (2005) show that wildlife causes

Table 3. Farmers' perceptions of the trends in population of different wildlife over the last five years.

| Wild animal | Trends in population of the wildlife | | | | | Total number of farmers |
|-------------|--------------------------------------|-------------------|-------------------|--------------------|--------------------|-------------------------|
| | No change | Highly decreasing | Decreasing little | aIncreasing little | aHighly increasing | |
| Monkeys | 1 | 0 | 5 | 16 | 37 | 59 |
| Porcupines | 0 | 0 | 8 | 35 | 1 | 44 |
| Apes | 0 | 1 | 2 | 12 | 24 | 39 |
| Antelopes | 29 | 0 | 1 | 0 | 0 | 30 |
| Warthogs | 0 | 1 | 12 | 5 | 0 | 18 |
| Wild Pigs | 0 | 0 | 7 | 10 | 0 | 17 |
| Total | 30 | 2 | 35 | 78 | 62 | 207 |

property damage including destruction of agricultural crops, grain stores, water installation, fencing and pipes; these damages can impose significant economic costs to the local community.

Major crop-raiding and predatory wildlife, extent of damages, and trends in their populations

Crops raiders

According to WWF (2005), animals that pose no obvious threat to humans can be responsible for devastating damage to crops. Similarly, farmers in Cheha Woreda identified different wild animals that threaten their crop production. They reported that, in their order of importance, monkeys, porcupines, apes, antelope, warthogs and wild pigs are the major wild animals that frequently damage their crops. Additionally, mousses and birds are addresses to be important treats of their crops during the group discussion. With regard to rating the extent of damages to their crops, about 55% of the farmers expressed suffering a high severity of crop damage (36.82% perceiving large and 17.72% perceiving very large damages), while 46% reported a low severity of damages (32.27% reporting small damages and 13.64% reporting very small damages) (Table. 2). Among the 207 responses concerning trends in populations of crop-raiding animals, 141 responses indicated that the numbers of major crop raiders, particularly monkeys, porcupines, and apes, were

increasing over the last five years (Table 3). During the group discussion we also captured similar report that monkeys, porcupines and wild pigs are the top problematic wild animals.

Predators

Unlike damage to crops, many households in the study area did not report experiencing damage to their domestic animals. However, some farmers still identified ratel, hyenas, monkeys, foxes, pythons and eagles as the major wildlife preying on their domestic animals. The severity of the damage done by these animals was ranked as —smallll on average. However, the farmers perceived a slight increase in the populations of ratel and hyenas, while the number of foxes, pythons and eagles was reported to be decreasing a little over the last five years (Table 4). The participants on the group discussions underlined that foxes are on the verge of disappearing.

Direct and Indirect Impacts of HWC in Cheha Woreda

Environmental impacts

Farmers in Cheha Woreda have been using different options to reduce the direct crop and livestock damage done by wild animals. Among these, one practice und-

Table 4. Types, extent of damages and changes in population of the predators.

| Type of wild animals | Extent of damage | Trends in population over last five years |
|----------------------|------------------|---|
| | Small | |
| Ratel (Honey badger) | | Increasing a little |
| Hyena | Small | Highly increasing |
| Fox | Small | Decreasing a little |
| Python | Very small | Decreasing a little |
| Eagle | Small | Decreasing a little |

Table 5. Proportion of farmers who undertook vegetation clearing to reduce the impact of wild animals on their crops and livestock.

| Cases observed | Frequency | Percent (%) |
|--------------------------------------|-----------|-------------|
| Farmers who cleared vegetation | 40 | 47.06 |
| Farmers who did not clear vegetation | 45 | 52.94 |
| Total observation | 85 | 100.00 |

ertaken by some farmers is the clearing of local vegetation in order to make the area less inhabitable. The survey findings show that nearly 50% of the respondents have undertaken some kind of vegetation clearing for this purpose (Table 5). However, during the group discussion, some farmers claimed that they didn't clean any vegetation as a result of the conflict. Treves et al. (2006) also reported that the negative impacts of HWC on environment and wildlife conservation activities include the clearing of vegetation on private land in order to reduce the habitation of wildlife, which sometimes results in wildlife fatalities. A report about wildlife populations in Kenya estimated that the wildlife populations declined by 50% from 1978 to 1998 (Okello 2008). Clearing vegetation obviously has significant negative impacts on the environment, biodiversity as well as livelihood improvement efforts in the area. As a result of clear-cutting, soils become vulnerable to erosion, and households suffer from lack of firewood.

Shifts in production

The farmers were asked whether they stopped producing any crops, fruit trees or livestock due to the severity of damage done by wild animals. Accordingly, about 65% of the farmers reported abandoning production of some crop types due to intolerable rates of damage done by wild animals (Table 6).

As indicated in Table 7, some of the crops that farmers

gave up producing are: 1) Fruit trees such as avocado, mango, orange and banana. 2) Cereals, namely maize, wheat and barley in some areas. 3) Vegetables and root and tuber crops, including cabbage, potato, sweet potato and yam, and 4) Pulses, such as beans. About 60% of the respondents reported that they no longer produce fruit trees on their farmland. However, some of the farmers continue to grow fruit trees, but solely on their homesteads, where the trees are more easily guarded. Additionally, more than 50% of farmers also reported that they gave up production of cereals like maize, wheat and barely. Vegetables, root and tuber crops are also some of the most common crops being severely damaged by wild animals. Surprisingly, 33 respondents (40%) also reported that they had stopped producing their main crop, enset, in some areas where it is highly accessible to wild animals. Some local varieties are almost becoming out of production since they are relatively sweet. A report by Brandt et al. (1997) also supported the findings that porcupines, mole rats and wild pigs are the major pests of enset in the field. Enset is regarded as a food security crop in this densely populated area because of its high productivity per unit area compared to cereals and because it serves as livestock feed during the dry season (Elias, 2003). Though this crop tolerates drought, it is threatened by wildlife damage. The result from the group discussion also supports the aforementioned findings. Even, some farmers were stating, potato, the newly introduced variety crop in the

Table 6. Proportion of farmers who stopped producing at least one type of crop or livestock due to damage by wildlife.

| Cases observed | Frequency | Percent (%) |
|---|-----------|-------------|
| Farmers who stopped producing at least one type of crop or domestic animals | 53 | 64.63 |
| Farmers who not yet gave up | 29 | 35.37 |
| Total observation | 82 | 100.00 |

Table 7. The name of the crops, fruit trees and livestock that farmers stopped producing due to damage by wildlife.

| Items | Number of respondent who stopped | Percent (%), based on total observation. |
|---|----------------------------------|--|
| Fruits (avocado, mango, orange, banana) | 49 | 59.76 |
| Enset | 33 | 40.24 |
| Goats, sheep and chickens | 8 | 9.76 |
| Number of observation = 82 | | |

Table 8. Farmers' opinions about whether wild animals have significant contribution for the shortage of food in their area.

| Response of farmers | Frequency of count | Percent (%) |
|------------------------------------|--------------------|-------------|
| Yes, they significantly contribute | 77 | 88.51 |
| No, they do not contribute | 2 | 2.30 |
| Neither | 8 | 9.20 |
| Total | 87 | 100.00 |

area, is the next one to be out of production since it is highly affected by the animals.

Conversely, only 10% of farmers reported that they gave up keeping some domestic animals, such as goats, sheep and chickens, due to fears of predation (Table. 7). This suggests that the major source of conflict between humans and wild animals in Cheha Woreda is crop raiding, rather than predators attacks on livestock.

Contribution of the wild animals to food shortages

What is shocking is that nearly 90% of farmers reported believing that the above-discussed wild animals

significantly contributed to the shortage of food and the poverty in the area (Table 8). A participant in the group discussion narrated, —...wild animals which came from other area made our living conditions to be below other communities. They cleaned all the bamboos (the roots are sweet to the monkeys) and now cleaning the other crops. Similarly, Fuentes (2006) report shows that competition for food between human and non-human primates can have significant impact on both human nutritional status and agricultural yields.

The zone is known for its very fragmented and small landholdings, and only a small percentage of farmers can adequately support their families. Most households

Table 9. Management options proposed to control or reduce crop raiding in Cheha Woreda,.

| Proposed options | Frequency | Percent (%) |
|---|------------------|--------------------|
| Chasing and scaring system, such as gesturing, mimicking or impersonating | 64 | 77.11 |
| Protecting crops with fences | 60 | 72.29 |
| Cleaning of vegetation | 14 | 16.87 |
| Hunting and killing the wild animals | 8 | 9.64 |
| Establishing closed wild animal center/park | 5 | 6.02 |
| Other | 3 | 3.61 |
| Number of observation | 83 | |

receive a substantial percentage of their income from remittances sent by their children or relatives living in other cities or other countries (USAID 2005).

Management options for Human – Wildlife Conflict

Management options suggested from the study area

Ranges of management options are available for different wildlife in different places. Farmers in the study area suggested several options to be used to minimize or control damage to their crops. Among these, the chasing and scaring system, in which humans use gesturing, mimicking or impersonating as a way to frighten wild animals, was proposed by about 77% of the farmers. Some farmers also reported using watchdogs to scare or chase monkeys. Others let their children stay in the field to keep away monkeys. The participants on the group discussion also supplemented that unless there is a dog and a male in the family, it is impossible to tolerate the damage by the monkeys. This has an implication that female-headed households are more vulnerable to the wild animals' attack compared to the male-headed.

About 70% of the farmers also proposed using fences and ridge/furrow to protect their crops especially from some animals like porcupines. Molla and Feleke (1996) also reported that subsistence farmers of Cheha Woreda, build stone walls and use locally made traps in order to reduce raiding by wild pigs and porcupines. Some 17% and 10% of the farmers suggested, respectively, that clearing vegetation, and hunting and killing the animals were appropriate options (Table 9). However, some of these management options are not environment friendly and can't be sustainable solutions.

Some management options suggested worldwide

There are many different HWC management options being used worldwide. Management approaches are generally categorized as —prevention or —mitigation,

although the African Wildlife Foundation adds a third category—activities designed to educate and promote attitudinal change, what the foundation calls —winning hearts and minds (Muruthi 2005).

The suitability of a management option depends upon its effectiveness, cost and acceptability to the human community

(Muruthi 2005). The most effective management options are those that incorporate —a full arsenal of conflict mitigation strategies and applications with flexibility to change as conditions change (Madden, 2004).

Lamarque et al. (2009) developed an extensive, well-researched collection of HWC management options, complete with case studies that represent the range of strategies available. These will not be duplicated in this paper; however, some of the options included are community awareness creation, direct and indirect compensation schemes, relocation of wildlife or human communities, fencing and other barriers, livestock and agricultural management methods and land use strategies, including zoning and the creation of wildlife corridors.

Conclusions and Suggestions

This study assessed farmers' perceptions of the effects of HWC in Cheha Woreda. Almost all of the farmers in the area indicated that their land had been affected by one or more of the identified crop raiders such as monkeys, porcupines, apes, antelope, warthogs and wild pigs; predators including ratel, hyenas, foxes, pythons and eagles; or both. The perceived extent of damage done to the crops and domestic animals, and other direct and indirect impacts, are found to be critical. The severity may be higher than local governments and development practitioners are aware.

The social, economic and environmental impacts of this conflict are complex and multidimensional. The survey findings show that about half of the respondents undertook some kind of vegetation clearing to decrease habitable areas for wild animals. This has an adverse

effect on the environment and wild animals, and in turn on the community. Furthermore, the study identifies that the HWC in the area has resulted in shifts in cultivation (to uneatable Eucalyptus tree in some cases). The majority of the farmers reported that they have abandoned producing some important crops, including cereals, vegetables, roots, tubers and fruits that were frequently damaged by wild animals. It was also indicated that female-headed households are more vulnerable to direct attacks by wild animals, particularly monkeys. Farmers reported believing that the wild animals significantly contributed to poverty and shortages of food in the area.

Farmers have been using different HWC management options in the study area. Among these, the chasing and scaring system, in which humans use gesturing, mimicking or impersonating as a way to frighten wild animals, was proposed by majority of the farmers. Some farmers also reported using watchdogs to scare or chase animals, especially monkeys. This study concludes that HWC is a potential barrier to effective, sustainable natural resource management and livelihood improvement efforts being undertaken in the area. This study recommends that local government and development entities shall give more attention to mitigating the effects of these conflicts. The study also suggests further study for detailed quantification or estimation of the area's populations of wild animals, as well as species identification and estimation of economic and environmental values of the damages by the wild animals in the area.

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