

Approaches to Human-Wildlife Conflict Management in and around Chebera-Churchura National Park, Southern Ethiopia

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ABSTRACT

The objective of this study was to investigate Approaches to Human-Wildlife Conflict Management in and around Chebera-Churchura National Park, Ethiopia. Three hundred semi-structured interviews and various focus group discussions were conducted. About 12 carnivores, 6 herbivores and 2 primate species were posing significant human-wildlife conflict. High level of conflict was observed in Agare, Koisha and Churchura which are very close to the park. The conflict was severe during the mid night and the peak time like morning and night where livestock go to the field and return to their home. All of the livestock losses were associated with the poor livestock husbandries. About 61.67% kept their livestock in grass hut, 29% in tin house and 9.33% kept outside over night. About 9.33% were using additional methods like collars, guard dogs and traditional weapons during night time. During daytime, 89% herd their livestock in the pasture in a group and 11% leave in the pasture without attending. About 3.66% burn fires around the herding place, 11.33% shout loudly while their livestock return. Others were using lethal control like shooting and trapping illegally. Thus, improving livestock husbandry, developing awareness and strengthens the capacity of managers to mitigate the problem were recommended.

Key words: Conflict Management, Depredation, Focal carnivores, Livestock husbandry, Wildlife.

INTRODUCTION

Human-Wildlife Conflict (HWC) is one of the fundamental challenges of wildlife management being faced by many conservation biologists in the world (Sillero-Zubiri & Laurenson, 2001). The conflict occurs because of competition between human and wildlife for shared and limited resources (Graham *et al.*, 2005, Ocholla *et al.*, 2013, Ogada *et al.*, 2003). These conflict ranges from crop raiding herbivores to livestock raiding and human attack (Dickman, 2008). The communities' effective participation in wildlife conservation programmes is more comprehensive and cost effective method in conservation of biodiversity (IUCN, 2010). In developing countries, most communities use their indigenous knowledge and traditional methods to mitigate the effects of HWC within their locality (Adams, 1998). Wide range of different strategies like prevention, mitigation and protection has been applied methods where most these are site and species specific measures (Ogada *et al.*, 2003). This provides insights on how different communities continue to survive where wildlife, people and livestock interact and compete for the same natural resources (Ocholla *et al.*, 2013).

In Ethiopia, more than 40 protected areas are available which covers about 16.4% (186,000 km) of the county's land area (Tessema *et al.*, 2007). Population growth, land use around the protected areas and human-wildlife conflicts are the major challenges observed around these protected areas (Ashenafi & Leader-Williams, 2005). Competition between local

communities and wildlife has been reported in various conservation area of Ethiopia (Kumsa & Bekele, 2014, Tessema *et al.*, 2007). However, the nature and magnitude of the problem varies from area to area depending on human population growth rate and scarcity of critical natural resources especially grazing and farm land (Kumsa & Bekele, 2014). In 1991, community-based conservation programs were established in Ethiopia to gain local support for conservation. Participatory management and benefit sharing were also adopted, along with the granting to local communities of limited ownership rights for some resources (Tessema *et al.*, 2007). However, the programs were not applied in most of these protected areas yet.

Chebera-Churchura National Park (CCNP) is one of such places of conservation concern established in 2005 by the regional government. The Park is located in high livestock production region and the poorest parts of the country. It was also reported that there was high human-wildlife conflict in and around the park (Datiko & Bekele, 2013). Here we aim to fill the gap of scientific data on the approaches to human-wildlife conflict management in and around CCNP, Southern Ethiopia.

MATERIALS AND METHODS

Description of the Study Area

CCNP is located in Southern Nation, Nationalities and People administrative region, Ethiopia between the Dawro zone and Konta special district on 580km from Addis Ababa towards the south at the center of

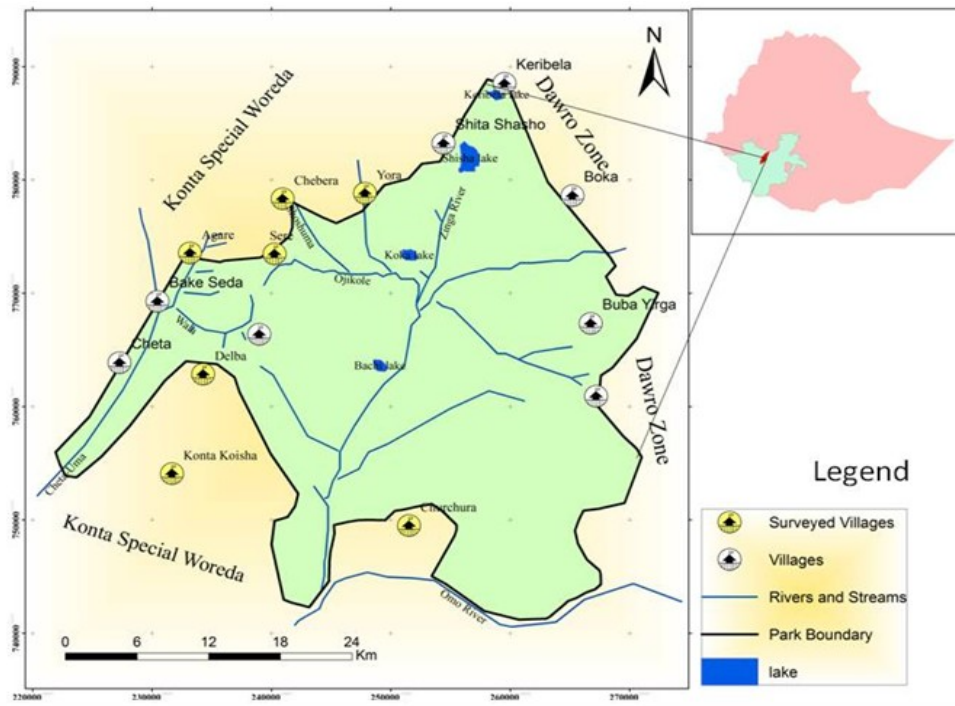


Figure 1. Map of the study area with surrounding villages

Omo-Gibe river basin. It lies between the coordinates $36^{\circ}27'00''$ - $36^{\circ}57'14''$ E longitude and $6^{\circ}56'05''$ - $7^{\circ}08'02''$ N latitude covering $1,250\text{km}^2$ area. The altitude of the park ranges from 550-2000m a.s.l. The Park was established in 2005 by the regional government. Highly undulating to rolling plains with incised river, lakes and perennial streams, valley and gorges and savanna grassland characterize the region of the park (Datiko & Bekelle, 2013; Timer, 2005). The vegetation cover of the area is categorized into four major types. These are wooded Grassland (62.5%), woodland (8%), Mountain Forest (29.5%) and Riverine Forest (3%) (Ademasu, 2006, unpublished data). Thirty seven large mammal and 237 bird species have been recorded in different habitats of the park (Timer, 2005).

Study Design and Site Selection

The study was conducted from November 2010 through January 2011. Before the start of data collection, preliminary survey was conducted during mid-December in 2010. This helped us to identify the boundaries and decide the number of villages/sites and to have a general understanding of the overall situations of the Park. In addition, the questionnaire was pre-tested among some group of a population, which is not included in the main sample group to identify the situation of wildlife conflict and variation in attitude and perception of the societies towards the park and wild animals.

Seven villages were selected based on the distance from the park. Churchura is inside of the park, Agare and Koisha are relatively far from the park (>11 km), Dalba and Yora are found between 2-10km, and Sere and Chebera are found at <1 km distance (Figure 1). All villages were different from one another in its geographical location and household size. A total of 300 households from selected villages (about 15% of the total

number of households) were involved in the study. Simple random sampling technique was used for household selection. The number of samples collected from each village was based on the number of households in the villages (15% from each village). All native ethnic groups (Dawro, Konta, Tsara, Menja and Bacha Nationalities) and other ethnic groups inhabiting due to resettlement (Hadiya and Wolaita) in and around park area were considered for interview. In these villages we interviewed sample household heads between 18 to 80 years old.

Method of Data Collection

The primary data were collected through administration of open and closed ended questionnaires. The questionnaires were designed to explore the situation of respondents' opinion about demography, utilization and importance of the Park, livestock husbandry, human-wildlife conflict management and trend in wildlife population. In addition, five focus group discussions were conducted to discuss their experiences on human-carnivore conflict management, methods of livestock husbandry and their challenges. The group size in each discussion varied from 10-15 people. The collected information were summarized by text analysis and presented in a narrative way.

Data Analysis

Data collected was analyzed statistically by the SPSS software version 16.0. Descriptive statistics, Chi-square test and percentages were done. Pearson Chi-Square test was used to determine the significance difference between independent variables and human-wildlife conflict management among the villages and surveyed pastoralist. Chi-square test at $P < 0.05$ (2-tailed) was considered as significant. Any data or information that could not be expressed by quantitative analysis was analyzed

qualitatively. Data were presented by table and graphically.

RESULTS

Socio-economic Status and Respondents Characteristics

We interviewed a total of 300 respondents (n=300) had interviewed. Of those interviewed 73.33% (n=220) and 26.67% (n=80) were males and females, respectively. The age of respondents ranged from 18–80 years old. Two hundred five of the respondents (68.33%) were under young age (18-39 yrs old) and 95 (31.67%) were under elder age (40-80). About 52% of the respondents were illiterate, 16% had received some form of adult education, 23% completed primary school, 7% completed high school and 2% were university graduated. In case of ethnic groups, 26% of the respondents belonged to the Dawro ethnic group, 21% were Konta, 18% were Tsara, 11% were Menja, 14% were Bacha, 6% were Hadiya and 5% were wolaita of 5 ethnic groups. The majority of respondents (86%) were poor (respondents with insufficient annual income to support basic household expenditures such as for food and clothing), while 14% were grouped under wealthier. Highly significant difference of life status were observed ($\chi^2=41.24$, $df=2$, $P< 0.05$). The primary source of respondents' economy (86%) was livestock rearing followed by agricultural production (9.33%). They cultivate cereals, inset, coffee, fruits and root crops extensively. Fishing, poaching wild animals and wild honey collection were another additional source of income (4.67%). However, no significant difference observed in terms of means of economy ($\chi^2=3.18$, $df=6$, $P=0.79$).

Intensity of Human-Wildlife Conflicts in and around Chebera-Churchura National Park

The surveyed species contained 12 carnivores, 6 herbivores and 2 primates. Large carnivores were mentioned as the most problematic animals followed by herbivores and primates (Table 1).

Livestock Loss by Depredation of Wildlife in and Around Chebera-Churchura National Park

About 4,474 livestock (cattle, sheep and goats) were owned by interviewees, but none of the households in the surveyed villages had donkeys, horses and mules due to the risk of tsetse flies. Of the livestock's owned, cattle, goats and sheep were largely depredated by wild carnivores. From all surveyed villages, about 1,364 of cattle, sheep and goats were depredated within three years (Table 2). High livestock losses by large carnivores were recorded in Churchura and Sere village and the least was observed in Agare and Koisha village (Table 3). Most reported attacks by focal carnivores were diurnal including when livestock return from pasture and staying unattended around village. The number of livestock types attacked by focal carnivores varied significantly within villages ($P<0.05$).

Methods of Livestock Husbandry and Threats in and Around Chebera-Churchura National Park

About 48.33% (n=145) owned cattle, 47.67% (n=143) owned both and 4% (n=12) owned small livestock only. Among the surveyed households, about 55% (n=165) kept their stocks in grass hut that can be easily penetrated by hyena, 35.67% (n=107) constructed tin house for all

Table 1. Percentage of species ranked by interviewees that posing a significant problem in and around CCNP from November 2010 to January 2011.

Species	No problem (n (%))	A small problem (n (%))	A big problem (n (%))
Lion	10 (3.33)	59 (19.67)	231 (77.00)
Leopard	26 (8.67)	70 (23.33)	204 (68.00)
Spotted hyena	20 (6.67)	64 (21.33)	216 (72.00)
Striped hyena	31 (10.33)	184 (61.33)	85 (28.33)
Cheetah	129 (43.00)	138 (46.00)	33 (11.00)
Wild dog	91 (30.33)	170 (56.67)	39 (13.00)
Jackal	106 (35.33)	194 (64.67)	0 (0.00)
Serval	84 (28.00)	181 (60.33)	35 (11.67)
Caracal	89 (29.67)	201 (67.00)	10 (3.33)
Wild cat	56 (18.67)	227 (75.67)	17 (5.67)
Crocodile	115 (38.33)	153 (51.00)	32 (10.67)
Hippo	119 (39.67)	140 (46.67)	41 (13.67)
Buffalo	92 (30.67)	99 (33.0)	109 (36.33)
Elephant	161 (53.67)	53 (17.67)	86 (28.67)
Warthog	32 (10.67)	181 (80.33)	87 (29.00)
Common duicker	75 (25.00)	225 (75.00)	0 (0.00)
Bush Pig	51 (17.00)	150 (50.00)	99 (33.00)
Baboon	0 (0.00)	166 (55.33)	134 (44.67)
Monkey	0 (0.00)	233 (77.67)	67 (22.33)

Table 2. Livestock depredation by wild carnivores in three years period (from November 2007-January 2011) in and around CCNP.

Livestock type	Livestock number	Predated livestock	% of predated livestock
Cattle	2,719	619	22.77%
Sheep	812	358	44.09%
Goat	943	387	41.03%
Total	4,474	1,364	100

Table 3. Livestock loss by depredation in three years period (from 2007- 2011) among the villages in and around CCNP.

Villages	Livestock loss by predators					
	No. stock	Lion	Leopard	Spotted hyena	Others	Over all predated
Agare	884	96	61	66	10	233 (17.08)
Koisha	331	3	17	6	30	56 (4.12%)
Dalba	619	16	76	60	20	172 (12.52%)
Sere	1245	153	58	68	34	313 (22.95%)
Chebera	422	24	22	19	23	88 (6.455%)
Yora	280	11	46	21	23	101 (7.41%)
Churchura	693	129	135	106	31	401 (29.39%)
Total	4474	432	415	346	171	1364 (100%)

Table 4. Livestock housing methods at night in the seven surveyed villages

Village	Livestock housing methods			
	In tin house	In grass hut	keep outside	Total
Agare	2	5	28	35
Koisha	13	45	0	58
Dalba	10	30	0	40
Sere	21	17	0	38
Chebera	17	27	0	44
Yora	7	28	0	35
Churchura	37	13	0	50
Total	107	165	28	300

livestock types and 9.33% (n=28) which is exclusively belongs to Agare village kept them outside of their home over night (Table-4). The enclosure construction for livestock among villages is significantly different ($P<0.05$). Most of the reported attack during night was associated with poor management and poor quality of huts.

Of the all, about 9.33% (28) of the respondents are using other additional strategies like strengthening collars or houses to prevent penetration, moving around collars with torches, using of stones and traditional weapons and using guard dogs during night time. During daytime, almost all respondents 89% (n=267) herded all livestock in the pasture in a group but, some 11% (n=33) respondents said that they leave their livestock in the pasture without attending. About 85.67% (n=257) respondents herd their livestock by two or three adults, 3.33% (n=10) herd by mixing adults and children and 11% (n=33) leave unattended in the bush (Agare). About

11.33% (34) mentioned that shouting loudly and attending livestock when return from pasture place. Other (3.66% (11)) were burn fires around the herding place and produce the sound of whips like that of guns to frighten off predators. Herding system among villages were varied ($P<0.005$).

Human Attacks by Wildlife in and Around Chebera-Churchura National Park

Discussions, told that there was seven human attacks by lions, five by hyenas and six injuries by leopard at different times in survey villages from 2007-2011. Most discussions reported that these attacks were when the people cross deep forests from their villages to other villages. From herbivores and primates, Buffalo and savannah Baboon were the most reported wild animals that had risk to humans. Buffalo injured two women and two children and baboon killed one child in 2009 and 2010.

Carnivore's Removal Methods

Even though there was order from government, there had been killing of wild large carnivores as a revenge of their livestock loss and human attacks. Lethal control methods like trapping and shooting have been used in all villages. Lion killing is the most acute one relating to its problematic level. Two lions, six hyenas and two leopards killed by local people were observed directly during data collection. People shifted from direct hunting to trapping due to oppression from government. However, all of the discussant said that they are not using the poisonous and traps materials for killing of these animals publically. Fear of order from park management, government and absence of materials for not using traps or poison are the major factors hindering them (Table 5).

Table 5. Reasons given by surveyed pastoralists for not using poisons or traps to control carnivores in and around CCNP.

Reason for not using poisons or traps	N (%)
Don't have it	67 (22.33)
Don't know how to use it	22 (7.33)
Due to the order of government	154 (51.33)
Think that it is wrong	3 (1.00)
Too expensive	12 (4.00)
Use of other methods	31 (10.33)
Threat to domestic animals	11 (3.67)

DISCUSSION

Human-Wildlife Conflict arises from a range of direct and indirect negative interactions between humans and wildlife (Ocholla *et al.*, 2013). These can culminate into potential harm to all involved, and lead to negative human attitudes, with a decrease in human appreciation of wildlife and potentially severe detrimental effects for conservation (Nyhus *et al.*, 2000). The present study reveals that about 12 carnivores, 6 herbivores and 2 primates were wild animals interacting negatively with surrounding communities (Table-2). The findings were similar to results by Mwele *et al.* (2011) and Ocholla *et al.* (2013). Totally, about 1,364 of livestock were depredated within three years (Table-3). High livestock losses were observed in Churchura and Sere villages which are very close to the park (Table-4). According to Patterson *et al.* (2004), the levels of conflict is depends on the distance from a protected area. Similar results were reported in Tanzania (Bauer and Kari 2001), Cameroon (Dickman, 2008), India (Ahmed *et al.*, 2012) and Benin (Sogbohossou *et al.*, 2011) respectively.

Our result also revealed that there are different livestock husbandry methods in this area. Most of the reported attack during night was associated with poor management and poor quality of huts. The strong construction of night enclosures for livestock to the night was associated with reduced losses to carnivores (Ogada *et al.*, 2003). A similar result was reported in and around Semien National Park, Ethiopia (Yehune *et al.*, 2009). Therefore, constructing huts or tin enclosures from strong wood and increased protection at nighttime will

be valuable to reduce conflict as suggested by other countries of Africa (Butler, 2000). In addition, using a well trained domestic dog is a good method to reduce depredation by informing herders to alert the approach of carnivores (Atickem *et al.*, 2010, Dickman, 2008, Hemson, 2003, Marker *et al.*, 2005). The study also shows that the livestock attack during daytime was associated with methods of herding system in and around the park. Similar results were reported by Atickem *et al.* (2010), Bauer (2009) and Gidey and Bauer (2010). Thus, increasing the number of herders and adult people keeping during hot season of conflict is the most effective method mentioned (Ogada *et al.*, 2003).

The present study also shows that there were certain human attacks by wild animals at different times in all villages from 2007-2011. In Africa, large carnivores attack on humans is a serious problem reported (Bauer & Kari, 2001; Gidey & Bauer, 2010). Ethiopia, Mozambique and Tanzania were indicated by serious problem of human attacks by large carnivores from east African countries (Timer, 2005). The attacks on humans by lion in southern Ethiopia (Bauer, 2009) and spotted hyena in northern Ethiopia (Gidey & Bauer, 2010) were also another similar reported problem. Human attacks in the present study were occasional situation, which resembled with finding elsewhere (Bauer & Kari, 2001, Gidey & Bauer, 2010). Thus, encourage people not to walk alone a long distance during high-risk times is a good measure to mitigate the problem (Frank *et al.*, 2006).

Killing of large carnivores for revenge of livestock loss and human attacks are the principal method being used for carnivores' removal. Lethal control methods like trapping and shooting have been used in all villages illegally (Table-6). Similar results were indicated from Wabe Valley of Bale (Atickem *et al.*, 2010). According to Woodroffe *et al.* (2005), the threat of livestock loss drives a considerable killing of these animals. This indicates that human wildlife conflict can contribute to the future decline of large carnivore populations. Thus, additional efforts to quantify illegal removals are imperative method to control the problem (Dickman, 2008). Also strengthen the capacity of protected area managers, stakeholders and communities are very important to better prevent and mitigate human-wildlife conflict in a safe way (Taylor & Francis, 2004).

CONCLUSION

The present study has shown that there is intense conflict between wildlife and local people. The level of conflict varied among survey villages. Different methods of traditional husbandries were observed to protect their livestock. Keep stocks in grass hut and tin house are the major methods being used. Others keep their livestock outside overnight. Collars, stones, traditional weapons and guard dogs are some additional methods being used during nighttime. Herd livestock by two or three adults, burn fires around the herding place, shouting loudly when return from pasture place are methods being used to mitigate the conflict during day time. Nevertheless, there is high livestock loss and human-wildlife conflict in the area. Thus, underlying and deep-rooted drivers of conflict

is very important to mitigate the problem. In addition, further improving the technique of livestock husbandry and taking necessary protection are likely the most viable method of conflict resolution.

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