

Impact of Human-Wildlife Conflict and I'Ts Driving Force in and Around Gibe Sheleko National Park, Southwest, Ethiopia

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Abstract

Human-wildlife conflict (HWC) is a continuous problem in the world and has a significant impact on both human and wildlife populations. The main objective of the study was to identify the driving force of HWC in the study area, to determine the major impact of HWC on conservation action and local people and to recommend the possible mitigation measure of HWC in the study area. The data for this study was collected through structured questionnaires, Focus Group Discussion, interview, direct observation and secondary sources. The collected data was analyzed by Statistical Package for Social Science (SPSS 20). Human-wildlife conflict happens when the needs and behavior of wildlife impact negatively on humans or when humans negatively affect the needs of wildlife. The nature and extent of human wildlife conflict in the study area were profoundly impacted humans, wild animal and the environment through crop damage, habitat disturbance and destruction, livestock predation, and killing of wildlife. The major causes of conflict manifested that wildlife habitat disturbance (41%), increment of wildlife population (24.3%), expansion of agriculture around forest edge (24%), and deforestation (20.7%). To defend crop raider, farmers have been practiced crop guarding (39.5 %), scarecrow (20.6 %), chasing (7.6%), smoking (20.6%) and other traditional method (7.1%). As emphasized in the present study, human-wildlife conflicts are negative impacts on both human and wildlife. Accordingly, possible mitigate possibilities for peaceful co-existence between human and wildlife should be reduce heavy losses of crops, palatable seasonal crops such as maize, sweet potatoes should not be grown near the forest edge, Create or find work opportunities and find option for the local people who depended only on crop production, option like bee keeping, integrating farming for example poultry with other aquatic fauna and flora or organisms and the like.

Keywords: Driving force, human wild life conflict, impact, Gibe Shelleko National Park.

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1. Introduction

Human wildlife conflict has old as old as human civilization, yet currently the phenomenon poses a serious environmental challenge and has been escalated over the past few decades (Anand and Radhakrishna, 2017). Human-wildlife conflicts (HWC) occurred when human beings take negative actions on wildlife and vice-versa. Conover (2002) defined the term HWC as occurring whenever an action by human or wildlife has an adverse effect on each other. Such conflicts have been recorded thought the world in terrestrial, aquatic, and aerial environments and have involved a wide variety of animal taxa (Torres *et al.*, 2018). The expansion of human population into or near to areas inhabited by wildlife and modification of the natural environments for agricultural or other economic activities escalate HWC (Hockings and Humle, 2009; Knight (2000). In different parts of Ethiopia, there are wide varieties of pest herbivores, primates, small and large herbivore and carnivore mammals have been causing damage to agricultural crops and plantations and effect on the livelihood of local community (Demeke and Afework, 2011). However, there are only few studies were carried out on human-wildlife conflict in some specific regions of the country (Tewodros and Afework, 2008). Different type of food items are targeted by wild animals from cereal crops to fruits and from vegetables to trees (Sillero and Switzer, 2001).

The reason why this topic has been selected that most of the developing countries economy is based on agricultural products and Ethiopia is a country with about 85% of the people are farmers and the economic policy of the country is mainly agriculture based. So to carry out the stated policy, agricultural products especially crops should be protected; the wildlife which damage crops should be addressed and stakeholders should search possible solution. No research conducted on Human-wildlife conflict in Gibe Sheleko National Park before. Therefore, this study was focused on the impact and the driving force of Human-wildlife conflict with emphasis on crop damage wild animals in the area. In and around the study area the conflict between local communities and wildlife is existed and a serious problem. We heard and observed that more than 50 hippopotamuses were massacred in last year. It is enough to understand the presence of HWC in the study area. Therefore, assessment of impact and driving force of HWC in the area are very crucial to identify the driving force, impact of the conflict, and put possible solution.

2. MATERIALS AND METHODS

2.1. Description of the study area

Gibe Shelleko National Park is newly emerged national park of Ethiopia and managed by Southern Nation Nationality and People Regional State. The study site is located in Gurage Zone, 178 and 18km far from south west of Addis Ababa and Wolkite respectively. It is geographically located between 7054' 00" N to 8021' 30" N and 370 27' 00"E to 370 45' 00" E (Fig. 1). It covers an area of 360 square km and it is bordered within three districts of Gurage Zone namely Cheha, Abeshigie and Enemurena-Ener in Eastern part and Gibe River in western side. Average rainfall ranges from 960–1400 millimeter and altitudinal ranges 1050 to 1835 m above sea level. The study site is classified in climatic zone of Woyna- Dega based on traditional Ethiopian classification and dissected by deep gorges of the Gibe and Wabe rivers.

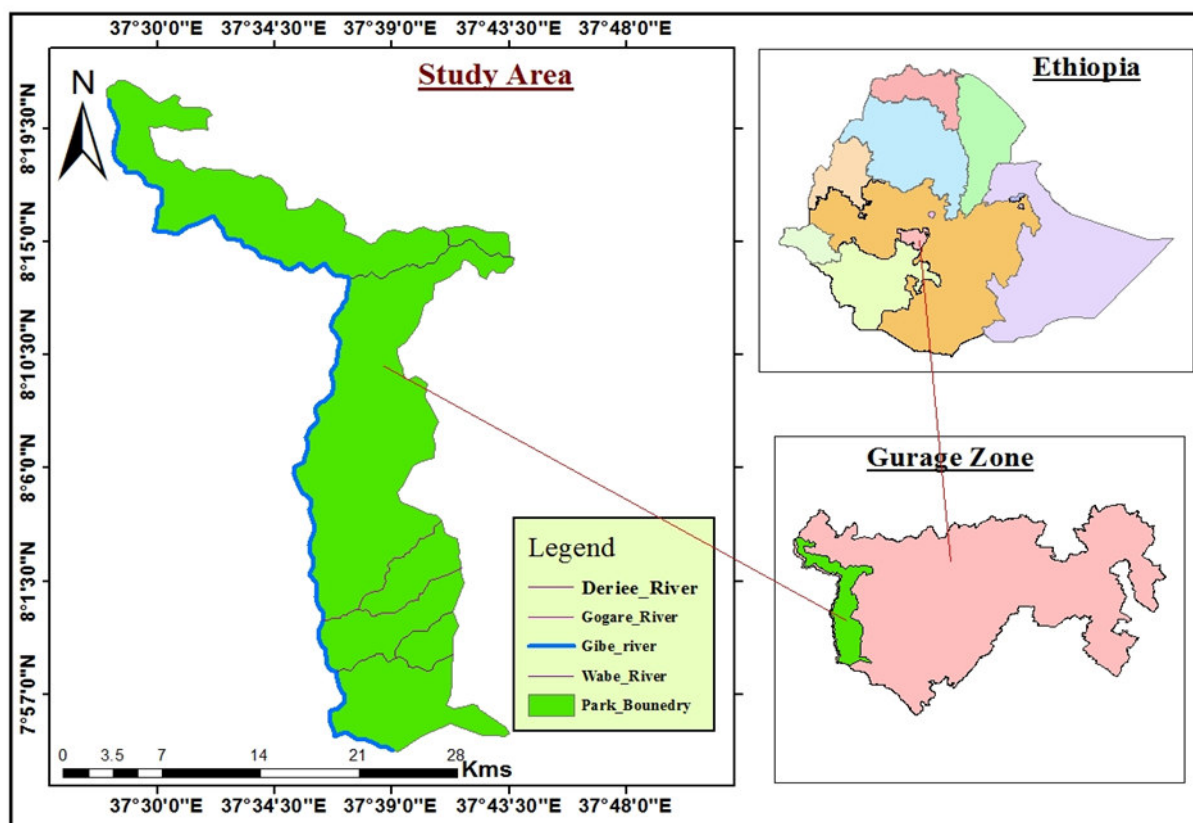


Figure 1: Location map of the study area Source: Hailu *et al.*, (2018)

2.2. Methods

Purposive sampling technique was employed to select the sample kebeles from the selected districts based on the recommendation of the park officials by considering the level interaction, distance and dependency on the national park. The target groups were the three districts of Gurage zone (Cheha, Abeshigie and Enemorenaener districts). Four kebeles, out of the selected districts (Tawula, Gibe, Borer, and Serite) from Abeshigie, two kebele (Luke and Gerenbo) from Cheha and four kebele (Jatu, Guntana, Gonchebete, and Shimuro) from Enmorenaener district were selected to collect data. The sample size of the respondents was 5% of the total households from each selected kebele. Sample size of the study was determined based on formula adapted from Israel (1962) as follows:

$n = \frac{N}{1 + N(e)^2}$ Where; N = the total population; n = the required sample size; e = the precision level which is = ($\pm 5\%$), where confidence interval is 95% at $p = + 5$ (maximum variability) which is = ($\pm 5\%$) $n = \frac{3048}{1 + 3048(0.05)^2} = 354$ accordingly, from the total (3048) population of selected kebele's.

The respondents were selected purposively based on their ability, awareness, adjacent to an area and knowledge contributes to the overall research objectives. Semi- structured interview was employed with closed and open-ended questions. It was helps to eliciting information from respondents regarding demographic data (such as age, sex, marital status, family size and educational status), crops grown, acreage, damage caused to crops livestock, species of wild animals' responsible for damage, type of crop more affected, type of crop raiding wild animals that causes more damage, perceived wild animals' population trend, protection measures practiced, attitudes of local communities towards wild animals' management, and causes of HWC(Mesele *et al.* 2008 and

Fairet *et al.*, 2012).

Discussions were made with 6-10 sample respondents in each village under the guidance of a moderator. Key informant interviews; It was strengthen the information was collected using questionnaire and to have a detailed in sight about HWC in the areas, in-depth interviews and discussion covering about cause, consequences, type, density and history of top ranked damage causing wild animals, farming system and cropping season of the study area was hold. Direct observation; direct observation was another method used to collect primary data and carry out through systematic observation. After completing relevant data collection, the data was arranged, coded and analyzed by using Microsoft office excel and SPSS version 20. Descriptive statistical analysis was used to analyses the socio-economic profile of the respondents. While comparing the causes, impacts and traditional conflict controlling mechanisms of HWCs in the study area at 95% confidence level.

3. Results and Discussion

3.1. Demographic Characteristics of Respondents.

The over whole information about the demographic data obtained from the respondents (i.e.; gender, age, education level, HH economy and farm land size) was identified before conducting the research. Among 354, respondents 83.6% (n=296) were males and the rest 16.4% (n=58) of the respondents were females (Table 1). The majority of the respondents 167 (47.2%) were between 31 and 45 years. Statistically, there is a significant difference in sex ($\chi^2=109.149$, $df=1$ $P\leq 0.001$). The size of farmlands owned by sampled household (HH) ranged from 0.5 to ≥ 5 ha with the overall mean of 3.26ha. There was significant difference among HH in sizes of farmland ($\chi^2=190.494$, $df=3$, $P\leq 0.001$).

Table 1: Demographic characteristics of sampled population.

Demographic characteristics	Frequency	Percent
Sex	Male	296
	Female	58
Age	15-30	76
	31-45	167
	46-55	77
	56-65	25
	66-85	9
Educational level	illiterate	30
	Able to read and write	129
	Elementary school	127
	High school	64
	Diploma level	4
Household economy	Crop production	122
	Both crop productions	124
	And animals rearing	
	Crop productions and	108
	Other income sources	30.5
Farmland size	0.5-1 ha	41
	2-3 ha	90
	4-5 ha	140
	>5 ha	83

Respondents that live near to the forest edge are highly faced HWC than those community far from the forest (Table 4). This result is agreed with the study of Datiko and Bekele[14]and Merkebu and Yazezew [18] who reported that those communities who live near the park faced frequent crop damage.

Human-Wildlife Conflict. Among the total respondents interviewed, about 43.5% reported that there was both the problem of crop damage and livestock predation by wild animals (Table 2). Both kinds of damage caused by wildlife were associated with interactions between humans and wildlife. The responses of respondents from each kebele were not significant regarding different types of conflict, namely, crop raiding, livestock predation, and both caused by wild animals in the study area ($\chi^2=38.333$, $df=30$, $P= 0.141$).

The occurrence and frequency of HWC were dependent on various conditions such as the activity of humans on a farm, the availability of food sources, the type of crop grown, and ripened time. The current study is in line with different studies in Ethiopia (Amaja *et al.* [11], Yirga and Bauer [12], and Teklay and Zeyede [13]) who reported the cause of HWC was both crop damage and livestock predation. Damaged crops include wheat, maize, teff and barley while the depredated livestock were cattle, sheep, and goats. Among different predators, warthog and wild pig were considered as more problematic to the community they live in and around the study area than others. Muluken [17] also reported that, in Ethiopia, wildlife such as bush pigs, warthogs, common monkey, and porcupine were common agricultural pests in villages near to forest areas.

The result of the current study have shown that there was a strong conflict between wild animals and farmers living in and around the Gibe Shelleko National Park, especially tawula, gibe, borer and serite among. According to the respondents list, six major wild animals namely, Anubis baboon, Vervet monkey, wild pig, warthog, Civet cat and crested porcupine were identified in the study area as the main cause for crop damage. Similar result was reported in different parts of sub-Saharan countries which revealed that wild animals posed great causes to crops (Hill, 1997; Rugunda, 2004). Wild pig and warthog were the most commonly reported crop raiders and ranked first and second followed by baboon. Similar result has been reported by Kate (2012) who reported that Warthog, wild pig and baboon were listed as the most crop raiders in Uganda; Tweheyo (2011) also reported that warthog was ranked as first and wild pig as second crop raiders. Both studies are in line with the current study.

The conflict between wild animals and farmers around Gibe Shelleko National Park forest involved crop raiding and livestock predation, most of the respondents reported problems with wildlife. Based on discussion with focused group discussion and interviewed households who reported problems caused by wildlife: 42.37% reported crop damage, 37.1% reported both crop damage and livestock predation whereas the rest 20.62% reported the loss of livestock. Similar findings were observed from the study conducted in Tanzania on the human wildlife conflict Joseline (2010) and Edward (2012). According to the current study all crops were not equally affected by crop raiders. Maize was the most vulnerable crop to crop raiders, because of easy handling of maize cobs than other crops. The result was agreed with finding of Warren (2008) who reported that maize was the most frequently eaten crop by crop raiding in West Africa. In particular maize seems to be targeted and damaged by Anubis baboons, vervet monkeys, wild pigs and porcupines. The competitions for resources cause conflict between wild animals and local people, this was in agreement with the study of Hill (2000) who reported that the wild animals increasing year to year which is due to competitions for resources between wild animal and human population.

Based on the respondent reports many crops are damaged by crop raiders at specific stages of development, for example at germination, seedling, flowering, harvesting and fruiting stages. Regarding the variation of damage in the developmental stages of maize, the highest amount of damage was recorded during the ripened stage by Anubis baboon and during the flowering stage by Vervet monkey, the least amount were recorded during seedling stages by both pest primates in the study area. This result was similar with finding of Warren (2008) who reported that during seedling stage the farmland was clear and the guard can control the pest easily by watching them from farm distance in Nigeria. As reported by Naughton Treves *et al* (1998), primates were the most often identified problem in crop raiding in many African parks. The result of the study shows that the causes of human wild animals' conflict were expansion of subsistence agriculture around forest edge, wild animals' habitat disturbance, deforestation and increment of wild animal's population. Habitat destruction is through fragmentation of natural habitats, cultivation and settlement near primate habitat. This has resulted in human wildlife conflicts around Gibe Shelleko National Park. This result was in line with Joseline (2010) and Edward and Frank (2012) who reported increased habitat disturbance as major causes of HWC in Uganda and Priston *et al.*, (2012) who reported deforestation was the main causes of HWC in Indonesia.

This result agreed with finding of Oli *et al.*, (1994) who reported that Anubis baboon to kill livestock in most parts of its range. The present study showed that farmers developed different strategies to defend their crop from crop raider. Guarding was a most method used by large number of farmers in protecting their crop from damage by crop raiders and also guarding was common especially during the harvest season, during this time, farmers guard crops even during the morning and night time. This result agreed with the finding of Sillero-Zubiri and Swetzer (2001) in different parts of Africa. Also making scarecrow, chasing and smoking was common methods which were used in the study area.

Table 2: number of respondents on types of conflict by wild animals in each kebele.

Kebeles	No	Crop damage only	Livestock predation only	both crop damage and livestock predation
Tawula	38	14	8	16
Gibe	36	11	7	18
Borer	35	12	9	14
Sarite	39	16	8	15
Luke	34	13	6	15
Gere	32	14	7	11
Jatu	38	16	10	12
Guntana	32	10	6	16
Gonchebet	37	15	5	17
Shimur	33	10	7	16

Table 3: Response rate on animals that cause HWC in the study area.

Animals that cause HWC		Kebeles									
Shimuro	Tawla Total	Gibe	Borer	Sarite	Luke	Gerenbo	Jatu	Guntana	Gonchebte		
Warthog	11	9	10	5	4	5	3	4	7	5	63
Wild pig	9	7	5	6	9	7	4	5	6	7	65
Porcupine	9	8	7	8	5	4	7	5	5	5	63
Anubis baboon	8	8	9	5	4	5	8	3	6	7	63
Civet cat	5	5	7	5	6	3	7	5	4	5	52
Columbus monkey	6	7	5	3	3	6	5	4	2	7	48
Total	48	44	43	32	31	30	34	26	30	36	354

Table 4: Response rate on approximate distance from the forest and trends of HWC in the last five years.

Distance from forest	Trends of HWC			
	High	Medium	Low	Total
Near	163	109	14	286
Medium	43	19	2	64
Far	3	1	0	4
Total	209	129	16	354

Table 5: Response rate on the major causes of HWC in the study area.

Cause of HWC		Kebeles										
Shimuro	Total	Tawla	Gibe	Borer	Sarite	Luke	Gerenbo	Jatu	Guntana	Gonchebte		
Expansion of agriculture		18	12	5	7	6	7	14	4	8	15	96
Wildlife habitat disturbance		15	9	8	11	10	13	5	6	7	9	93
Deforestation		11	6	4	6	9	11	10	9	7	5	78
Increments of wild animal Population		13	7	11	5	8	13	7	7	10	6	87
Total		57	34	28	29	33	44	36	26	32	35	354

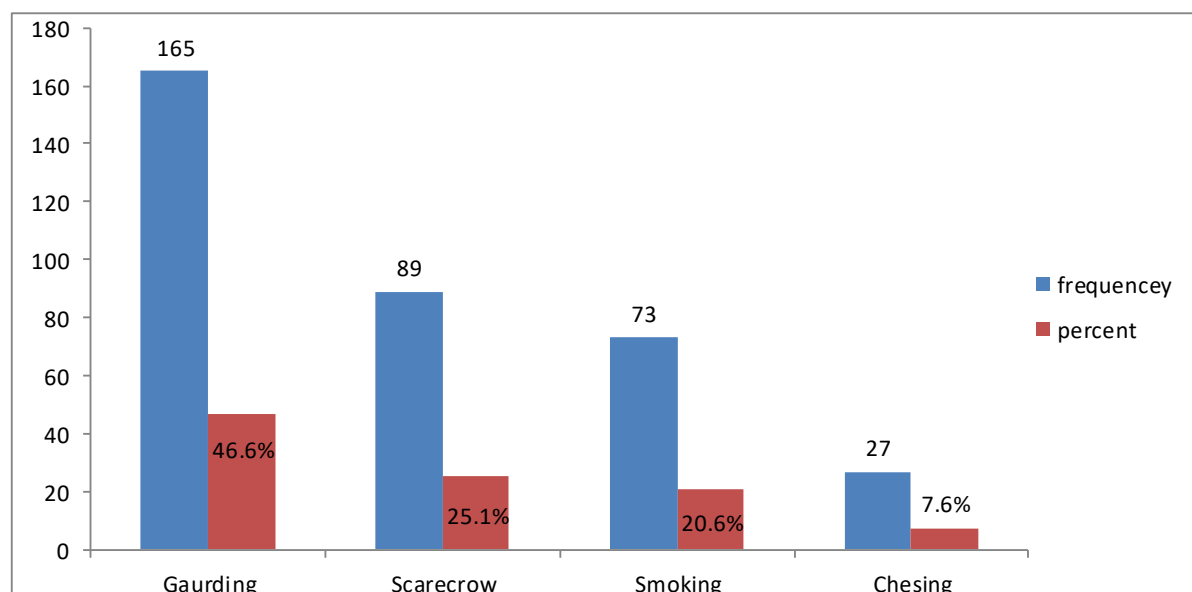


Figure1. Measures taken by local people to prevent their crop from wild animals.

Conclusion

According to the current study results, HWC can have adverse impacts on wildlife and humans. It indicates that both crop damage and livestock predation were the common problems for the conflict in the study area. Warthog, wild pig, and Porcupine were common wild animals that cause HWC. The increase in human population, habitat disturbance, proximity to natural forest, and competition between wild animals and livestock were the major causes of HWC, as described by respondents. Guarding, fencing, scarecrow, and chasing are some of the techniques used to reduce HWC in the study area. Therefore, we recommend that local communities should keep their farm against crop raiders to minimize crop loss by using the most effective method in an area, and crops such as wheat, maize, and teff should not be grown near the forest edge

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