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COLLEGE OF AGRICULTURE ANDNATURAL RESOURCE

DEPARTMENT OF WILDLIFE AND ECOTOURISM MANAGEMENT

HUMAN PRIMATE CONFLICT IN BORENA SAIYNT NATIONAL PARK, SOUTH WOLLO, ETHIOPIA

SENIOR RESEARCH *SUBMITTED TO DEPARTMENT OF WILDLIFE AND ECOTOURISM MANAGEMENT, COLLEGE OF AGRICULTURE AND NATURAL RESOURCE, WOLKITE UNIVERSITY FOR THE PARTIAL FULFILLMENT OF THE COMPLETION OF BSC DEGREE IN WILDLIFE AND ECOTOURISM MANAGEMENT*

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DICLARATION

I hereby declare that this senior research project entitled “Human primate conflict in Borena Saint National Park south wollo Ethiopia. Submitted to the department of Wildlife and Ecotourism management; Wolkite university, collage of agriculture and natural resources, in partial fulfillment of the requirements for the BSc degree in Wildlife and Ecotourism management, is a recorded of original work done by me under the supervision of Mr. Belete Tilahun.

Name_____

Place_____

Date of submission_____ Signature_____

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LIST OF ABBREVIATION AND ACRONYMS

BSNP……... Borena Sayint National Park

ENMS…….. Ethiopian National Meteorology Service

FAO…… Food and Agricultural of the United Nations

FGD ……..... Focus Group Discussion

HPC……..... Human Primate Conflict

HWC……Human Wildlife conflict

IUCN…….. International Union for Conservation of Nature

WWF ……..World wide fund

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ABSTRACT

Human primate conflicts in Africa have been increasing due to increased human population growth and the resulting competition for park resources. The Primate species compete for resource with human being and in conflict with each other. Crop raiding by baboons, vervet monkey and other herbivores seriously affect poor farmers. Therefore, this study was aimed to assess Human Primate Conflicts in Borena Saint National Park. The Data for This Study Was Collected Primary and Secondary Sources. The target group was selected Borena district purposively. Which is adjacent frequently or closely related to Borena Saint National Park. 50 respondents were selected purposefully based on their extensive knowledge, experience, local elders, scout and involvement with in the study area. The data was analyzed by using descriptive statistics. 40% of respondent responded that main cause of Human Primate Conflict was Agricultural Expansion while the lowest was 10% of the respondents responded that fire wood collection. 36% of the respondents were responded that gelada baboon was major crop raiding which followed by Anubis baboon while Grivet monkey was the lowest crop raiding. 28% of the respondents were responded Wheat was the most vulnerable crop to raiders which followed by barley while legume was the last vulnerable crop to damage caused by primate in the study area. 30% of the respondents were responded that Guarding was the most popular method followed by fencing while smoking was the lowest protecting crop raiders from crops. Based on these reasons to reduce or minimize agricultural practice inside and outside the national park.

Key Word: Human Primate Conflict, Crop Raiding, Borena Sayint National Park.

1. INTRODUCTION

1.1. Background of the study

Human–primate conflict has been a recurring problem in Africa due to increased human population and the resulting competition for forest resources (Hockings, and Sousa, 2012). The conversions of primate forest habitats to agricultural crops have impacted primates and other wildlife through habitat loss and fragmentation (Baranga, *et al*., 2012). Habitat destruction also decreases the amount of available habitat, leading to restricted animal movement between habitable patches of land and decreasing gene flow between populations. Thus, inbreeding increases and genetic drift accelerates (Hockings, and Sousa, 2012). Extension deforestation of native trees that are main food sources for primates and the planting of commercial tree species that do not provide food sources have also contributed to increased primate crop depredation, further exacerbating human–wildlife conflicts (Sillero-Zubiri, and Swetzer, 2001).

Primates that destroy agricultural cereals, fruit, and crops may be beaten, injured, and killed by the local community (Peterson, *et al*., 2010). Species conservation depends on the interaction of social and ecological factors; a better understanding of the perceptions of local people toward wildlife is a prerequisite in designing species management and conservation strategies (Chauhan and Pirta, 2010). Ecological factors include destruction of natural habitat, isolation of forest areas, and agricultural expansion (Ahsan and Uddin, 2014). Social factors include changing knowledge, attitudes, and traditional subsistence habits. Increased human–primate conflicts may pose a conservation threat for primate populations. Thus, the perception of local people toward the natural resources and the effects of interaction of people should be studied (Sharma *et al*, 2011).

In Ethiopia, human–primate conflicts have been previously studied in Semien Mountains National Park where crop raiding by Gelada baboon (*Theropithecus gelada)* seriously affects farmers (Mesele, *et al*, 2008), reported that the conversion of primate habitats into agricultural land, near the Bale Mountains National Park, resulted in increased crop depredation by the Bale monkey (*Chlorocebus djamdjamensis*) as their native foods were replaced by agricultural crops. Linkie *et al*. (2007) stated that crop damage by wild animals can make communities antagonistic and intolerant toward them, which may result in retaliation on the problem species. However, few studies have been conducted in northern Ethiopia where the conflict may be severe due to a

high rate of forest degradation and restriction of primates to patches of habitat surrounded by agricultural fields. No published paper is available about public perception of human–primate conflict in patch forests particularly for the primate species in Ethiopia.

Borena-Sayint National Park, the former Denkoro Forest is one of the recently declared National Parks of the country. The major objective of this study is therefore, to assess human primate conflict in Borena-Sayint National park and to recommend the conservation measures for primate distribution of the study area.

1.2. Statement of the problem

There is a human-primate conflict in our country as well as in Borena Sayint National Park. Crop raiding by baboons, vervet monkey and other herbivores seriously affect poor farmers. Primates are the most frequently identified crop raiding animals. This is because of the renowned crop raiding behavior of the species. However, in areas where more primate animals found a major part of the crop may be lost in a single night (Naughton-Treves, 2008). Crop raiding has most likely been occurring since humans first settled down and started practicing agriculture. Different types of food items are targeted by primates from cereals to fruits and from vegetables to trees (Sillero-Zubiri, and Swetzer, 2001). The current study area, food items such as maize, sorghum, teff, wheat, barley, beans and potatoes are damaged by primates like baboon vervet monkey. However, still the issue of human-primate conflict is remaining not assessed in the study area so far and adequate development enhancing information is lacking. Hence this study was conducted to fill this gap.

1.3 Significance of the study

The significance of the study is to maximize the understanding of people towards the primate conservation. To plan appropriate conservation strategy, and indicates future research areas for those who will like to conduct researches on primate. The data may be used as secondary data for researchers who working in the study area. Moreover, this study was serve as ideal or standard information for the current human primate conflict in Borena Sayint National Park and able to give base line information for local community and researchers. The local community and other organizations are benefited from the study by getting how to conserved or managed the primate species in additional to ensure positive coexistence between people and primate in the interest of

human and environmental wellbeing. Hence this study is paramount importance method of minimizing the human primate conflict in the area.

1.5. OBJECTIVES

1.5.1 General objective

The general objective of this study was to assess human-primate conflict in Borena Sayint National park, South Wollo, Ethiopia

1.5.2. Specific objective

- To identify cause of human primate conflict in the study area.
- To identify major crop raiding primate found in the study area
- To identify the major human primate conflict management option.

1.4. Research questions

1. What type of crop is most consumed by primate in the study area?

2. What are causes of Human primate conflict problem in the study area?

3. What are the management options of human primate conflict?

1.6. Scope of the study

In Ethiopia, there are many national parks, but this study was basically focused in Borena Sayint National Park. The study was to assess human primate conflict with specially focus in Borena Sayint National Park.

2. LITERATURE REVIEW

2.1. Meaning of Human wildlife conflict

Different scholars define Human-wildlife conflict (HWC) in different ways. The World Wide Fund of Nature (WWF, 2005) defined HWC as "any interaction between human and wildlife that results in negative impact on human social, economic, on conservation of wildlife population or on the environment". The International Union for Conservation of Nature (IUCN, 2005) defines HWC as a conflict occurring "When human population requirements overlap with those of wildlife, resulting in costs to both residents and wild animals." HWC is the term commonly used to conservationists to describe friction between wild animals and people. The conflict emergence when wildlife and human requirement overlap with consequential costs to humans and wild animals, destruction of property by wildlife and killing of wildlife by people (Osei-Owusu, 2008). The term Pest is typically defined as any animal that consumes crops during any stage of the agricultural cycle, from planting to post harvest storage (Naughton-Treves, and Treves, 2005).

Human-wildlife conflict has been in existence for as long as humans have existed and wild animals and people have shared the same land scapes and resources. Human-wildlife conflict or negative interaction between people and wildlife has recently become one of the fundamental aspects of wildlife management as it represents the most wide spread and complex challenge currently being faced by conservationists around the world. It arises mainly because of the loss, degradation and fragmentation of habitats through human activities such as logging, animal husbandry, agricultural expansion and developmental projects (Fernando *et al.,* 2005). Human-wildlife conflicts are increasing across Africa. As human populations and demands for land increase throughout the continent, human-wildlife conflict will continue to increase. Human-wildlife conflict has been the cause of serious damage to both humans and wild animals for years (Raini, 2009). It occurs as a result of occurrence of both parties in close proximity. The conflict usually starts when wild animals consume resources meant for human Consumption; crops by herbivores and livestock by carnivores. In addition wild animals that have Massif body size like elephants, rhinos and hippos cause structural damage to fences, electric posts and water pipes as they raid within settlement areas. In addition such large animals could cause significant damage to crops by trampling (Dudley *et al*, 2008).

2.2. Human Primate Conflict

Primates are one of the most frequently cited crop pests (Naughton-Treves, 2008). So primates and humans are always in potential conflict over crops. The *genera Papio* and *Cercopithicus,* particularly, baboons and vervet monkeys are one of the most serious crop raiders because of their aggression, adaptability, wide dietary range, complex social organization and intelligence of the animal to recognize the absence of guards and the immediately rushes into the plantation fields forming different groups in different direction (Sillero-Zubiri and Swetzer, 2001). Pest primates often destroy unharvest farms causing economic losses to farmers. Crop damage is becoming serious for many residents around protected areas. Due to this reason in developing countries intervention in the name of conservation can generate considerable resentment and hostility in local communities. Establishments of protected areas are a major form of government intervention with local people as it leads to conflict with wildlife. Sometimes people around protected areas are forced to keep their farm uncultivated due to fear of crop raiders.

Most primate populations today face on going habitat disturbance, but not all primate species respond to disturbance in the same way while many primate species experience declines in population density when their habitats are disturbed, several primate species are not threatened and these species will generally require less conservation attention (Cowlishaw and Dunbar, 2000). Reported that, habitat had the greatest influence on baboon occurrence, followed by distance from water, slope and the altitude. Among the topographic variables the probability of baboon occurrence increased significantly with increasing distance from water, increasing slope and decreasing altitude (O'Riain, 2010).Within the habitat predictor variable and relative to natural habitat, the probability of baboon occurrence increased significantly in agricultural habitat and decreased in urban habitat. The greatest difference between the two models was the magnitude of the coefficient estimate for urban habitat (O'Riain, 2010).

Africa has largest primate fauna in the world. There are 175 species and subspecies of primates listed in Africa (Grubb, 2006). even though there are 12 species, subspecies of primates occur in Ethiopia such as anubis baboon (*Papioanubis),* colobus monkey (*Colobusabyssinicus),* vervet monkey *(Chlorocebusaethiops),* wild pig (*Susscrofa*), Spottedhayna *(Crocutacrocuta*), hippopotamus*(Hippopotamusamphibius*),hamadryasbaboon(Papiohamadryas),warthog(*Phacoch oerusafricanus),* plain zebra(*Equus quagga)* and lion(*Pantheraleo*) (Kingdon, 1997). A more general conservation issue for primate populations relates to the potential for indirect conflict

between primates and livestock that forage on similar resources, where people increase stocking rates in relation to natural vegetation availability, to enhance returns of meat, milk and other animal products, primates may be squeezed out or suffer reduced 9 reproductive rates by the far more effective off take of human managed livestock movements through the area. While the human herders may not have a perception of monkeys as pests the indirect competition can drive monkeys into habitats such as forests or plantation (Ciani *et al*., 2001) where they cause significant damage and become pests.

Habitat domination by humans and the associated compression, fragmentation and conversion of primate habitats are the driving forces behind human primate conflict and one of the greatest threats to primate survival. The use of space has thus become a central theme in primate studies, with conservationists relying on patterns of habitat use and minimum resource requirements for the effective conservation and management of various primate populations (Arrowood *et al*, 2003). This is particularly true for those inhabiting small, isolated and fragmented habitats. Within primates, baboon (Papioanubis) is among the species exhibiting the greatest degree of spatial overlap with humans (Hill, 2005). This success is attributed to their agility, dexterity, high levels of sociality and co-oper Impact of human-wild animals' conflict on humans.

2.3. Cause of human Primate Conflict

The population rate of human and primate increase with overlaps in geographical areas using increasing their interaction thus resulting to increase physical conflict. Existence of human offers opportunity for primate in the form of food and habitat interference and destructive threat for both human and primate competition for food source also occurs when human and endeavor to reap natural resources such as forest, grassland pasture and primate (Mulholland and Eagles, 2002).When human and livestock move in to a conserved area for primate to access the resource that they need and lack in their surrounding Example water and pasture that brings about human primate conflict. When primate move in their protected area that is their habitats in to the community land either to feed on crops or their migration to their feeding and reproducing areas, during their movements they can lead to injure or kill people, eat or destroy crops on the farm, kill or injure livestock, transmit diseases or disease causing parasites to livestock, utilize the grazing resource meant for community livestock.

2.4. Impact of primate conflict on human

Human primate conflict is a growing problem in today's crowded world, and can have significant impacts on human population. As human population and the extent of landscape transformation increase the probability of competition for resource between human being and wild animals also increase (Dickman, 2008). As the need and behavior of primate and human being become close to each other, it impact negatively the goals of human and finally create conflict between them. Primate can have very significant impacts up on human directly and indirectly these impacts range from clear cut economic hard ship to less tangible effects such as increased opportunity costs and decreased quality of life. Living along side of wild animals can incur variety of additional costs aside from the direct impact of depredation combined with dietary and behavioral flexibility (Swedell, 2011).

2.5. The impacts of crop raiding primate

Wildlife destruction varies significantly from site to site and farmers have uneven capacity for preventing losses (Messmer, 2000). Farmers themselves are sometimes, the cause for crop loss because they continuously charge the vegetation structure of the land closer to the protected areas. This changed vegetation probably become attractive to wild herbivores Crop raiding is a serious problem as crop raiding primate can have a devastating impact on the standard of living of peasants whose entire survival is dependent on subsistence agriculture. For example, different research stated that the major crop raiding primate around Borena sayint based on respondent's response Gelada baboon, hamadryad's baboon, grivet monkey, other primate damaged their crops in different ranks. Human-primate conflict is an increasingly significant difficulty to the conservation of primate (Madden, 2008).

Human being can be developing a range of options for attempting to lessen conflict with primate. The options include reducing the livelihood of attacks through livestock guarding dogs, electric fencing, improved construction of livestock enclosure, toxic collars, disruptive stimuli and other aversive techniques. All these can have substantial impact on the primate population (Dickman, 2008).

2.6. Human primate conflict Resolution

Human primate conflict (HPC) can be managed through a variety of approaches. Prevention strategies endeavor to avoid the conflict occurring in the first place and take action towards

addressing its root causes (Hill, 2002). Protection strategies are implemented when the conflict is certain to happen or has already occurred. Mitigation strategies attempt to reduce the level of impact and lessen the problem. The main difference between the options is the moment at which the measure is implemented. By definition, management techniques are only cost-effective if the cost of implementing the technique is less than the value of the damage, taking into account the fact that a short period of active management may have a continued effect, by instating longer-term protection of crops or herds (FAOUN, 2010).

The various management possibilities are presented according to the characteristics of conflict whether they relate to humans, production, animals and the environment, rather than according to their ability to prevent or mitigate damage (Lamarque *et al*., 2009). According to (Hill, 2002). Conflict resolution/management methods have the following possible goals: reducing the amount of crop losses to wildlife; improving local people's attitudes and perceptions towards protected area and its wildlife; helping affected farmers to improve agricultural production; increasing the amount of crops being harvested locally. Through improved local yields and reducing levels of poaching. Once the individual goals have been established and the availability of the necessary resources determined, then discussion with the communities can important. Communities living around forest areas are different from those in other areas as they often receive a disproportionate amount of interest from the conservation and development contributor. This can influence people's expectations with respect to who should take responsibility for developing, implementing and/or maintaining any control scheme. Those wise it is very important that farmers be involved in the process of developing new solutions from the beginning (Hill, 2002). Not only does this foster a sense of commitment and involvement amongst them, but it is also vital that they be involved from the beginning. Because they understand how the situation affects them and what kinds of intervention are likely to be acceptable and feasible within the local culture, providing there is adequate representation from the different types of stakeholder involved (Pankhurst, 2006).

3. MATERIAL AND METHODS

3.1. Description of study area

Borena Sayint National Park (BSNP) is found in South Wollo Zone (Amhara Regional State) and lies between $10^{o}50‟45.4”$-$10^{o}53‟58.3”$ latitude and $38^{o}40‟28.4”$-$38^{o}54‟49”$ longitude. The Park is located in the north eastern part of Ethiopia about 600km far from Addis Ababa, 205 km from Dessie and 16km from Mekane Salam, the capital of Borena Woreda. The park is situated among three Woredas as namely Borena to the south, Sayint to the north and Mehal Sayint (a newly established Woreda) to the east. Borena Woreda on south (with its seven Kebeles) and southwest (with its two Keble's), Saint on the north (with one Kebele) and Mehal Saint on the north (with its two Kebeles) and on the west with one Keble). Mehal Saint is located bordering the two Woreda Borena and Sayint. The largest portion of the Park is found in Borena Woreda**.** It has relic biodiversity with significant natural forest and high altitude grassland flora and fauna. It is restricted to a mountain ridge top in highly degraded, eroded and isolated ecosystem in South Wollo Zone of Amhara Regional State in northern Ethiopia and the area has attracted the interest of the National and Regional Government, but with limited biological information.

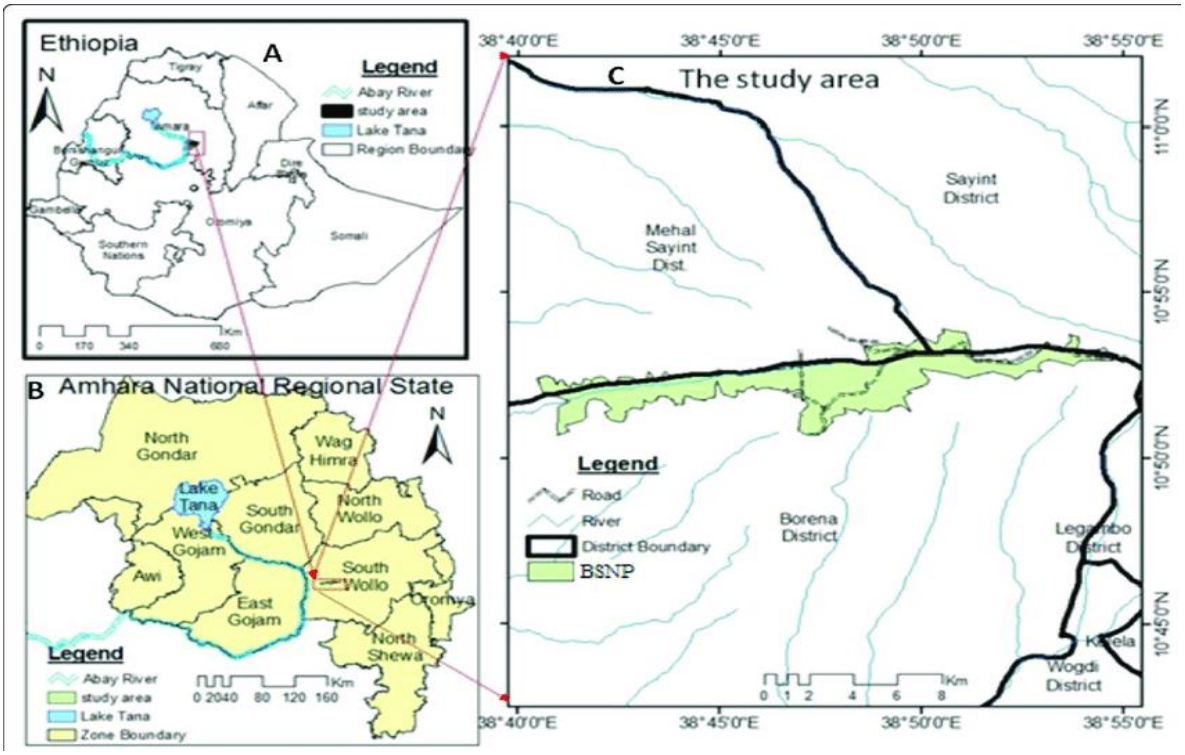


Figure 1 Map of the Study Area (Source BSWNP Office, 2019)

3.1.2. Wild Life

Borena Sayint National Park (BSNP) is a central high land area that is reach in biodiversity. It harbors various species of wild animals including mammals, birds, invertebrates, and amphibians. There are about 23 larger mammals, 77 bird species and rodents are concentrated in the national park. The larger endemic mammals found in the park are Ethiopian Wolf, Minilik bushbuck, Gelada baboon, Strakes hare. Abyssinian Genet *(Geneta abyssinica*) has been recorded as endemic species for the park. But, it is not listed as endemic species of Ethiopia in any achieves and documents. in addition to one or more endemic bats or chiroptera species. Is or are believed to occur in the area as there are many species in the various caves.

3.1.3 Climate

Rainfall and temperature data were recorded in Mekane Selam meteorological station, 16km away from the study area. This station is the closest of all other stations that record rainfall and temperature and has altitude and weather conditions close to the study area. These data were taken from the Ethiopian National Meteorology Service Agency (ENMSA).

3.1.4 Topography

The Park has different topographical features ranging from low land to highland mountains. The altitude ranges between 1900m to 3699m asl. The park is generally characterized by rough topography with mountains, deep incised valleys, escarpments and plateaus. South Wollo is in most parts covered by volcanic rocks mainly basalt of tertiary age According to EFAP, the land area of Denkoro forest (now Borena Sayint National Park) was 80km^2. Currently it covers only an area of only 4375km^2, which makes it the smallest Park among the National Parks of Ethiopia.

3.1.5 Population

Population pressure is the major threat of the development of the Park. There is high number of population in three bordering Woredas of the Park. According to Federal Republic of Ethiopia Central Statistical Agency the population of Borena, Sayint and Mehal Sayint Woredas was 158,920, 144, 937 and164, 964, respectively of the Three Woredas.

3.2 Methodology

3.2.1 Sample design and Sampling Technique

The park is situated among three Woredas as namely Borena to the south, Sayint to the north and Mehal Sayint to the east. For this specific study, the target group was selected Borena district purposively. Which is adjacent frequently or closely related to Borena Saint National Park. Purposive sampling technique was employed to select the two samples Keble's namely (Anferfra and Chirochorkos,) from the selected districts based on the presence of high Human primate conflict. Kebele means the smallest governmental administrative unit of the district in the study area. 50 respondents were selected purposefully by considering the level interaction, knowledge and experience, distance, and dependency on the national park. Who was have perceived to be aware of detailed points raised during the survey and to select local communities from near to Borena Saint National Park. The sampling size of the study was determined based on the formula adapted from Israel (1992) as follows. $n = N/1+N\,(e)^{2=50}$

Where: - n= the sample size

N= the total population size

e = the precision level which is = ($\pm$ 5%)

Where confidence interval is 95% at p=+5 (maximum variability) which is = (±5%)

3.2.2. Data Collection Methods

The Data was collected through primary and secondary methods. Primary data was collected from house hold using questionnaires, interview and observation. Secondary data was collected from rural development Agricultural office reports, Internet, interview.

A. Key informant interview

Key informant interviews were conducted with selected informants who were depending on park resources. These include eight male local people (four from each kebele, another eight females from local people representing each kebele, from park management department. Moreover, in-depth interviews were also conduct with local government official within selecting Kebele.

B. Field observation

The study area was conduct by the researcher using digital photo camera, in order to substantiate the data, document analyses was also employ.

C. Questionnaires

The study was based mainly on sample kebeles household cross sectional survey using pre-test structure questioner organizing in logical order of presentation. The survey generated qualitative and quantitative data pertaining to demographic characteristics, aspects of participation, park resource use and dependence questionnaires.

D. Focus group discussion

Focus group discussion is also another qualitative method of data collection instrument which is used in this study. Accordingly, one FGD from one selected kebeles and another one focus group discussion with non-user household members was hold. A total of 8 to 10 participants in each focus group are participate. Discussions were leave for the researcher to trigger issues for discussion and promote active group perception.

3.2.3 Data analysis

The data was analyzed by using descriptive statistics. The data was analyzed by using descriptive statistics such as mean percentage and the data was present on tables, charts, picture and percentage also further represented by using graphs and other diagram in order to analyses more information about our research study.

4. RESULT AND DISCUSSION

4.1. Demographic characteristics of respondents

According to the demographic characteristics respondents of the study have been mentioned in table 1.below. We are including different category such as: sex, age and education status. According to sex category (80 %) of male and (20 %) Female were participated. According to education status illiterate (20%), literate (40%), 1-4 (0%), 5-9 (10%), >10 (30%) was participate. According to age category 20-35 were (70%), 36-50 were (20 %) and > 51 were (10 %) was identified.

Table 1: Distribution of respondent demographic characteristic (n=50)

Demographic character	Category	No of respondents	Percent (%)
Sex	male	40	80
	female	10	20
Age	20-35	35	70
	36-50	10	20
	> 51	5	10
Education status	Illiterate	10	20
	Literate	20	40
	1-4		
	5-9	5	10
	>10	15	30

4. 2 Cause of human-primate conflicts in the study area

According to the respondent during data collection the main cause of Human primate conflict (40%), of respondents responded that agriculture expansion while the lowest was fire wood collection were deforested in the study area (Figure 2). This result was agreement with find out the causes that made primate species forced to crop raiding which create conflict between farmers and primate Species, variables such as deforestation, distance of farm land from

residence, grazing livestock and farm land expansion to park area were assessed using interview(Figure 3).

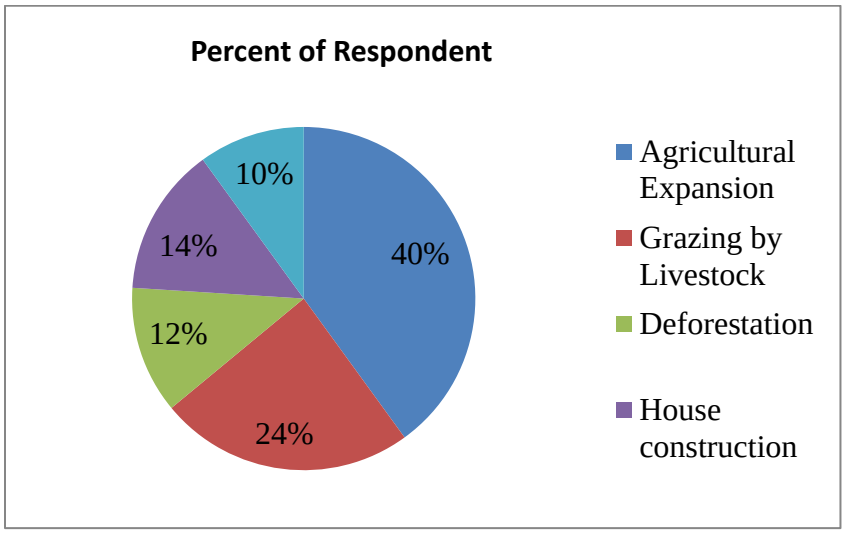


Figure 2. Cause of Human primate conflict around the study area





Figure 3; Agriculture Expansion and livestock grazing of the study area

4.3 Major crop raiding primate found in the study area

The respondents reported that there was the problem of crop damage by primate species problem causes crop damage and there was problem. Most of the respondents (36% of the respondents) were responded the gelada baboon was major crop raiding which followed by Anubis baboon while Vervet monkey was the lowest crop raiding.

Table 2: farmers ranked crop raiding primate

Primate Species	Scientific name	Frequency	Percent (%)	Rank based on damage the cause
Gelada baboon	*Theropitheals gelada*	18	36	1
Anubis baboon	*Papio Anubis*	12	24	2
Vervet monkey	*Cercopithecus aethiops*	8	16	3
Scarred Baboon	*Papio hamadryads*	7	14	4
Grivet Monkey	*chlorocebusaethiops*	5	10	5
Total		50	100	

The result of this study showed that there was a strong conflict between these primates and the local community. The competitions for resources cause conflict between wild animals and

people. This result is in line with the study of who reported that the primates increasing year to year which is due to competitions for resources between primates and human populations. Because of the destruction of natural habitat of the animal by human activities the natural diet of the primate was lost in the area. As a result primates move to the farmland in search of food and caused damage (figure4). This practice forces wild animals to engage in crop damage and distraction of other valuable material. Similar studies was worked by (Mesele, *et al*, 2008) in Bale and around the Semen Mountains National Park the people destroying forest for the purpose of fire wood, cattle grazing and other benefit engages primate to raid crops.



Figure 4; crop raiding of the study area

4.4. Impacts of HPC found in the study area

It is recognized that humans have profoundly impacted primate and the environment in many ways, through habitat loss, illegal hunting, Environmental degradation, pollution, poverty and drought, overexploitation, and climate change. The incidents of Human- primate conflict highlight forms as the current study area are crop destruction, killing of domestic animals and property.

4.4.1. Crop Destruction

The result showed that not all crops were equally affected by crop raiders. Most of the respondents (28% of the respondents) were responded Wheat was the most vulnerable crop to raiders which followed by barley while legume was the last vulnerable crop to damage caused by primate in the study area. Regarding the variation of damage in the developmental stages of wheat, large amount of damage was recorded during the matured stage by gelada baboon, vervet

monkey and the least amount was recorded during the seedling stages by both primates in the study sites. The result of the study shows these primates caused a great damage to wheat more than other crops, because of easy handling of wheat than other crops.

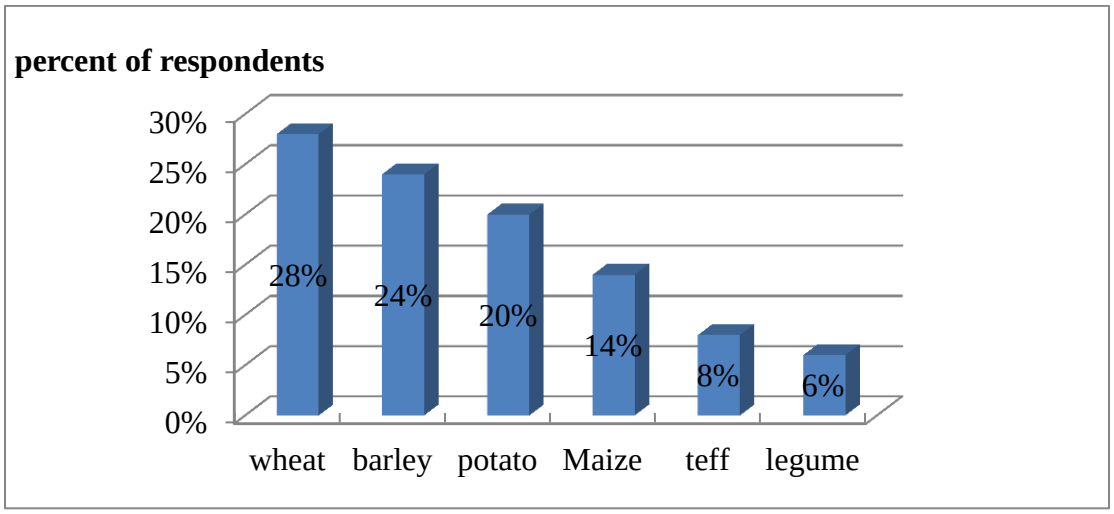


Figure 5. Rank of crops in the order of destruction by crop raider

4.5. Traditional methods used by Farmers to Defend Crop Raiders

The farmers used different methods to defend crop raider from their crops. Most of the respondents (30% of the respondents) were responded Guarding was the most popular method followed by fencing while smoking was the lowest protecting crop raiders from crops. Guarding was popular method in different parts of Africa (Sillero-Zubiri and Swetzer, 2001). Chasing and fencing were also the second and the third important methods respectively. Smoking and scarecrow was also used to as supplementary. Who founds that guarding and chasing away of animals was ranked first and second in protecting crop raiders from crops.

Table 3:- controlling Techniques of primate species in the study area

Controlling Techniques of crop raiding	Frequency	Percent (%)	Rank
Guarding	15	30	1
Fencing	12	24	2
Chasing	8	16	3

Scarecrow	10	20	4
Smoking.	5	10	5
Total	50	100%	

4.6. Management or Mitigation Measure of Human Primate Conflict in the study area

This study reinforces that sustaining primate populations outside of protected areas were requires adaptive management strategies to reduce human primate conflicts. These strategies must address human needs and wildlife needs to make it effective over the long term. Based on these reasons, mitigation strategies are very essential to reduce human primate conflict. These studies suggest that conservation programs and conservation areas lead to crop-raiding conflict rather than benefits to local communities. Therefore, local communities reduce their support for an agreement with conservation policy and practice. Alleviating conflict and reducing damage caused by primate would likely increase acceptance of conservation and management actions in the park (Lamarque *et al*., 2009). Thus, it may be bitter provide alternative fuel sources for villagers such as biogas technology or solar and wind energy to reduce illegal cutting of trees and wildlife disturbance in the park area. Additionally, communities could increase crop production of alternative crops that are unpalatable to crop raiders, to reduce or minimize agricultural practice inside and outside the national park, reduce deforestation by formulate rules and regulation for performed local communities, relocate agricultural activity out of the national park.

5. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This study revealed that the cause of Human Primate Conflict was (40%), of respondents responded that agriculture expansion while the lowest was fire wood collection was deforested in the study area. Most of the respondents (36% of the respondents) were responded the gelada baboon was major crop raiding which followed by Anubis baboon while Grivet monkey was the lowest crop raiding. Crop raiders cause significant loss on farmers' production. Wheat was the highest vulnerable crop to damage whereas sheep and goat were the most vulnerable livestock. On bases of the present study identified Gelada Baboon and Anubis baboon as the main damage Agricultural crops. Gelada Baboon, Anubis baboon and Vervet Monkey was cause damage day time. Most of the respondents (28% of the respondents) were responded Wheat was the most vulnerable crop to raiders which followed by barley while legume was the last vulnerable crop to damage caused by primate in the study area. Most of the respondents (30% of the respondents) were responded Guarding was the most popular method followed by fencing while smoking was the lowest protecting crop raiders from crops. This indicated that there is an immediate need for a sweeping primate conservation education program to educate farmers or create awareness of the local community living in and around the study area about the purpose and benefits of primate conservation, the cause of human primate conflict and method for reducing various forms of conflict.

5.2. Recommendations

Based on the present study, the following points are recommended to mitigate the human-primate conflict in the study area.

- ✓ To reduce the dependency of the local people on the park, it is better to encourage the local people to plant trees for their various types of utilization.
- ✓ Crop damage depends on the taste of the cereal crop plants. For example in the study area, porcupine totally feeds on wheat crops. Therefore, the food habit of primate should be systematically studied and encouraged societies to grow less preferable and unpalatable crop to primate.
- ✓ Giving awareness among the local people to develop the knowledge about the issue of environmental degradation and its overall impact as well as sense of ownership of natural resource.

- ✓ Most of landless youngster of the study area uses the park as better sources of farmland. To solve the problems, the government should encourage and organize youngsters in different organizations for creating job opportunity instead of damaging the for park agricultural purposes.
- ✓ Stakeholders should reduce human settlements around the park, expansion of farmland and cattle grazing in the park.
- ✓ Encouraging farmers to protect their crops farms cooperatively from crop raiders.
- ✓ The local community should protect and conserve the natural habitat of animals.
- ✓ Encouraging the development of ecotourism which benefits local resident and primate species without harming one another.

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7. APPENDIX

WOLKITE UNIVERSITY

COLLEGE OF AGRICULTURE AND NATURAL RESOURCE

DEPARTMENT OF WILDLIFE AND ECOTOURISM MANAGEMENT

Part I: Personal Information

I am Tesfaye Abye graduate student at Wolkite University. Currently I am conducting a research study on Human primate conflict in Borena sayint national park north wollo zone; amhara, Ethiopia. For the case of in partial fulfillment of degree of Bachelor of Science of Wildlife and Ecotourism management. I require your help to spend some minutes of your time with us for interview. The purpose of this Interview is to gather information about the Human-Primate conflict in this area. I can assure you that any information that provide in this interview will be kept confidential. Your kind cooperation would be greatly appreciated and is great importance for the successful completion of this study.

Thank you!!!

Appendix I: The survey questionnaire for Borena Saint National park office on Human-Primate conflicts in Borena Sayint National Park South Wollo zone, Amhara, Ethiopia.

Appendix I: <u>Demographic characteristics</u>

1. Name of village (kebeles) _____
2. General information
3 Household types (Male headed ☐ female headed) ☐
4 Age, A/20-39 years B/ 40 -59 years C/60 and above
5. Marital status Married ☐ Widowed ☐ Divorced ☐
Separated ☐ unmarried ☐
6. If married, what is the nature of marriage in your household?
Polygamous ☐ Monogamous ☐
7. Educational status literate ☐, illiterate ☐
8. If literate, what is the level of your education?

Read and write only ☐ First cycle ☐

Second cycle ☐ High school ☐

Certificate ☐ Diploma ☐

Degree or above ☐

9. Religion: Orthodox Christian ☐ Protestant ☐ Muslim, ☐ Other ☐

10 Occupational statuses

Governmental employee ☐

Business men ☐ Farmer ☐ Others

11. For how long have you been living in the area

1-5 years ☐ 6-10 years, ☐ 11-20 years ☐ >20 years ☐

12. What are your livelihood activities? (Multiple choices is possible)

A) Crop production B) Livestock keeping C) Mixed Farming (Farming and livestock keeping

D) Crop production and other income E) other (mention)

13. What is the nature of your land security from wild animal damage?

A) Secured B) not secured

14. What type of crops you grow in your farm land? Put in order to know which one is the most?

A) Potato B) barley C) legume D) wheat E) teff F) maize G) others (Specify)

15. How much is the distance of your cultivation land from forest edge?

A) Near-bounded B) medium C) far

16. Do Primate cause damage to your crops? Yes/ No.

17. What is the cause for the happening of HPC in your area?

A) Agriculture expansion B) Grazing livestock

C) Fire wood collection D) House construction

E) Other specify

18. Which Primate is more responsible for crop damage?

A) Gelada Baboon B) Vervet monkey C) Ape D) Rabbit E) others specify

19. Which are more responsible for crop damage during day time on which crop?

A) Potato B) barley C) legume D) wheat E) teff F) maize G) others (Specify)

20. Which type of crop is more damage by Primate?

A) Potato B) barley C) legume D) wheat E) no damage in general

21. Which type of crop is least damage by Primate?

A) Potato B) barley C) legume D) wheat E) Teff E) No damage in general

22. What is the cause of human Primate Conflict in the study area?

A) Deforestation B) population growth C) Human Settlement D) Others

23. What control measures have been taken to safeguard your crops from Primate?

A) Guarding B) Chasing C) Fencing D) Smoking E) scarecrow F) Other Specify

24. Which of the techniques are most effective?

1.....

2.....

25. Which of the techniques are least effective?

1.....

2.....

3.....

Appendix II. Questiniories for key informant interview (rural agricultural development office, local community)

1. Name _____ Date _____

2. Education status _____ your profession_____

3. How long have you studied in the area?

4. Is there any HPC around this area?

5. What are the major factors that cause HPC in the study area?

6. What are the gaps between farmers and development actors in addressing Human Primate Conflict?

7. Do you know the importance of the national park?

8. How to mitigate or minimize the impacts of HPC in this national park?

9. Which Primate are more responsible for crop damage?