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**HUMAN-WILDLIFE CONFLICTS IN AND AROUND HUWEN FOREST, LEKA
DULECHA DISTRICT, WESTERN ETHIOPIA**

By;

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ABBREVIATIONS AND ACRONYMS

AEZO : Agro-Ecological Zones Office

AWF : African Wildlife Federation

FAO : Food and Agricultural Organization

FGD : Focus Group Discussion

FTC : Farmer Training Center

HWC : Human Wildlife Conflict

IUCN : International Union for Conservation of Nature

LDAO : Leka Dulecha Agricultural Office

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ABSTRACT

The investigation on human-wildlife conflict was carried out in and around Huwen forest in Leka Dulecha district in Western Ethiopia in 2018/2019 around Huwen forest. The purpose of the study was to evaluate the human-wildlife conflict with its cause and effects in and around Huwen forest. Also to identify wild animal species that pose major conflict, to investigate the effect of wildlife on the livelihoods of the people, and to suggest some possible solutions to mitigate the problems caused by the human-wildlife conflict in the area. The research used descriptive method, data were analyzed using SPSS and the respondents' responses were described and compared by using Chi-square and correlation. The problem of Human-wildlife conflict in and around Huwen forest can be manifested through crop damage, livestock predation, and threats to the dwellers and the wildlife. The respondents reported that they utilized the forest as grazing land for their livestock and as a source of firewood. The majority (63.7%) of the respondents reported crop damage and (55.9%) of them reported livestock depredation as major causes of conflict between the inhabitants and the wildlife around Huwen Forest. The most crop raiders identified were anubis baboon, vervet monkey and wild Pig, and maize was the main crop vulnerable to raid by wild animals in the area. The respondents reported spotted hyena, Anubis baboon, jackal, leopards and lions as causes of threat to the livestock in the study area. Spotted hyena caused the most pronounced threat to livestock; whereas, the main domestic animals vulnerable to predators were sheep and chickens. Because of property loss due to the wildlife, the local community faced shortage of food, low income and guarding related problems. The inhabitants used guarding, chasing by dog, trap materials, scarecrows and hunting methods for preventing the wild animals. The community living adjacent to Huwen forest was more at risk of conflict. The raising status of problematic animals the problem of losing possession, and the expansion of human population, agricultural lands and modification of forest escalate the human wildlife conflict. The surrounding community was affected because of the negative interaction between the human beings and the wildlife. Human-wildlife conflict on the community resulted in low-income, food shortage through losing crops and livestock, rabies virus transmission and other guarding related problems. Thus, The Huwen forest Authorities and management agency could provide direct or indirect benefit or compensation to the areas affected by the wildlife through establishing community development projects, such as; schools, hospitals and other infrastructure.

Key words: *Human wildlife conflict, crop loss, livestock depredation, crop raider, community*

1. INTRODUCTION

1.1. Background of the study

Human–wildlife conflict refers to the interaction between wild animals and people and the resultant negative impact on people and their resources or wild animals and their habitat (Glionna, 2013). The conflict between human being and wildlife is occurred when the wild life cause threats and damage on human resources and a response given by people for protecting their resource against wildlife. It also involves the threat posed on wildlife by people and on people by wildlife that means human-wildlife conflicts (HWC) occurred when human beings take negative actions on wildlife and vice-versa (Gemeda and Meles, 2018). It occurs when growing human populations overlap with established wildlife territory, creating reduction of resources or life to some people and/or wild animals. As human population increased the need for a resources and competition also increased between human beings and wildlife for competing in limited resources. The conflict takes many forms ranging from loss and damage of crop plant, loss of life or injury to humans and animals both wild and domesticated, competition for scarce resources as well as loss and degradation of habitat (Cline *et al*, 2007).

Human wildlife conflict occurs in different ways such as when the needs and behavior of wildlife impact negatively on humans or when humans negatively affect the needs of wildlife, when wildlife damage crops, threaten, kill or injure people and domestic animals and when human and wildlife compete each other on both human and natural resources. Ocholla *et al*, (2013) stated that the conflict caused because of competition between human and wildlife for sharing limited resources. Human wildlife conflicts involve categories like livestock predation, disease, crop raiding and problems of human safety. These problems viewed as critical problems created by the growing rural population in and around wildlife habitats (Sukumar, 1989).

Human-wildlife conflict incidents are widespread but not evenly distributed because they are dependent on the proximity of wildlife (Mesele Yihune *et al*, 2009). In addition, different species cause different types of damage on both livestock and crop plants at different times of the year. A study by (Muloga *et al*, 2003) finds that the damage caused has variable effects on the livelihood security at the time of incident. One of the major causes of human wildlife

conflict is increasing human population adjacent to wildlife habitats. As human population increases the demand for resources grow, the frequency and intensity of such conflicts become increases (Newmark *et al*, 1993). These factors manifested by increasing encroachment to wildlife habitats. This means as human population cut and damage forest or wildlife habitat for expansion of agricultural land and for different purpose they cause different problems on wildlife and because their habitats increasingly altered or managed by humans and certain wild species or individual animals may cause a significant problem to humans, other animals or the environment (FAO 2008). As a result, the population of those species that are unable to adapt to altered habitats may invade the marginal habitats or decline in number (Newmark *et al*, 1993). Those species that are able to adapt to the changing ecology and survive in agricultural system become involved indirect competition with humans (Deresse, 2003). Concerning the causes of conflict increase in wildlife population in some areas considered as another cause of human wildlife conflict.

One of the major types of human wildlife conflicts is crop raiding, livestock depredation and killing wildlife. These types of conflicts are not a new phenomenon; it has most likely been occurring since human first settled down and started practicing agriculture, altering and damaging habitats of wildlife (Mesele Yihune *et al.*, 2009). Different wild animals target different crops and livestock. In some areas, crop raiding and livestock depredation by wild animals is a frequent cause of a major conflict between wildlife and villagers. This is especially true in areas close to protected areas that harbor large populations of wildlife. Human wildlife conflict has significant impact both on livelihood of local community and conservation of wildlife (Benjamin, 2018).

Thus, it is with this information that the researcher wants to conduct research, which focuses on the conflicts that occurs between human beings and wildlife in and around Huwen forest. Huwen forest is one of the known natural resource, highly threatened by the expansion of human activities and related human-wildlife conflict. However, there was no any scientific investigation conducted in an area to uncover the impact of such conflict on local population, wildlife population and wildlife conservation. Therefore, the proposed study was motivated to investigate human wildlife conflict and its causes in and around Huwen forest, Leka Dulecha district, East Wollega, Ethiopia.

1.2. Statement of the problem

According to Sillero and Switzer (2001), the people living in developing countries of Africa and Asia are suffering from the negative impact of human-wildlife conflict. Around protected areas, there are a wide range of problem associated with the conflict for sharing both human and natural resources, which affects both local community and wildlife. In Ethiopia, more than 40 protected areas are available at different levels and dedicated land to biodiversity and wildlife protection area which covers about 16.4% (186,000 km) of the county's land area (Tessema *et al.*, 2007). However, not all the important ecosystems in the country are represented in the existing proper protection zone. Besides this, the areas dedicated for wildlife protection are facing many problems. The major problems to protected areas in Ethiopia emanate from demographic pressure, settlement within the forest and park or adjacent to them. The other factors like deforestation, farm land expansion, grazing, fuel wood, illegal encroachment by people, fragmenting wildlife habitats, un controlled fire, soil erosion and hunting were a known factors and problems considered as the cause of human wildlife conflict from different ecosystem in the country.

Human wildlife conflicts have been raising and wildlife invading homes of locals, destruction of crops, livestock attack and even killing and injuring people. The community around protected areas faced many problems because of such conflicts. These problems are food shortage and low income due to loss of crop and livestock, lack of sleep and wastage of time for protecting wildlife from their own resources and other health problems during guarding situation (Belay worku, 2016).

Peoples live around Huwen forest were commonly practice agriculture as a result, the need of farming is increased from day to day. Hence, the local people forced to clear the nearby forest or wildlife habitat for expansion of agricultural land and for different purpose though this activity increase human-wildlife conflict in the area. Therefore, the present investigation was conducted to analyze the impacts and causes of human-wildlife conflicts in and around Huwen forest, Ethiopia. Huwen forest is located in high livestock production region and the poorest parts of the country. However, there was no any scientific investigation conducted in an area but there was high human-wildlife conflict in and around the forest. This finding aimed to evaluate the human wildlife conflict between local community and wildlife in and around Huwen forest, East Wollega, Ethiopia.

1.3. Objectives of the study

1.3.1. General objective

The general objective of this study was to evaluate the human-wildlife conflict between local community and wildlife in and around Huwen forest, East Wollega, Ethiopia.

1.3.2. Specific objectives

The specific objectives of this study were

- To determine the main causes of human-wildlife conflict around Huwen forest
- To identify wild animal species that pose major conflict around Huwen forest
- To investigate the effect of wildlife on the livelihoods of the local community
- To suggest some possible solution to mitigate the problem caused by human-wild life conflict in the study area.

2. LITERATURE REVIEW

2.1. Concept and Definition of Conflict

The word conflict derived from Latin word *conflictus*, which means; “to strike together, be in conflict from come- together” (Retrieved [https:// WWW. Google.com](https://WWW.Google.com)). Conflict is a serious disagreement or argument, typically a protected one, a fight, battle, struggle, especially prolonged struggle. It is although described as disagreement between two or more groups or individuals. Yasmi *et al.*, (2010), define conflict as differences or incompatibilities in interests, goals or perceptions. Human wild animal conflict is a term commonly used by conservationists to describe friction between wild animals and people (Roy and Sah, 2012). Human-wildlife conflicts defined by a complex mix of characteristics, which include instances of crop raiding, wildlife-livestock disease transmission, livestock depredation, the human safety, destruction of property by wildlife and killing of wildlife by people (Madden, 2006).

This is especially true in areas close to protected areas, which harbor large populations of wildlife. Human wildlife conflict has significant impact both on livelihood of low community and conservation of wildlife (FAO, 2009). Regardless of either situation, human behavior and the decisions made regarding human-wildlife interactions ultimately determine the outcome for both humans and wildlife (Castro and Nielsen, 2003). Dickman *et al*, (2011) point out that HWC is usually derived from groups of people holding different values; local people versus protected area authorities, or protection of species that are highly valued at a global scale but have little or even negative value at a local scale.

There are different categories of conflict between human being and wildlife in the protected areas such as human-crop raider wildlife conflict that is typically defined as any organisms that consumes crops during any stage of the agricultural cycle, from planting to post-harvest storage (Naughton Treves and Treves, 2005). Crop raiding is the act in which wildlife entering into a cultivated area which results in the consumption and/or destruction of domesticated plant life and the act of people for protecting crop raiding wild life is known as human crop raider conflict (Sillero Zubiri and Switzer, 2001).

The other one is the conflict in terms of livestock or human carnivore conflict this form of conflict is when livestock predator attack, injure and kill livestock and human protect them

against their livestock, which affects both residents and wildlife (Acharya *et al* (2016). 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).

2.2. History and causes of human wildlife conflicts

Human-wildlife conflict has been in existence for as long as humans have existed and wild animals and people have shared the same landscapes and resources (Gizachew, 2016). 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 widest spread and complex challenge being faced by conservationists around the world (Belay, 2016). It arises mainly because of the degradation and fragmentation of habitats through human activities such as logging, animal husbandry, agricultural expansion and developmental projects (Fernando *et al.*, 2005).

Human-wildlife conflict is increasing across Africa. This is because in developing country there is an increased human population and associated needs for resources that are providing and using additional resources leading to competition between human beings and wildlife for limited resources. Browne and Jonker, (2008) reported that as human populations and demands for land and resources 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 because 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 (Belay, 2016).

2.3. The impact of crop raiding by wild animal to intensify conflicts

Crop raiding is not a new phenomenon and it has most likely been occurring since humans started practicing agriculture (Joseline, 2010). This problem is mainly occurring when people start to cultivate crop plant around protected areas. Lamarque *et al*, (2009), stated that the human primate species conflict is one of the most prevalent forms of HWC and particularly severe around forest and protected areas. In developing countries where the trend of human

population increased from time to time, conflicts between agriculturalists and primate herbivores have always existed. The raising of human population causes expansion of agricultural land, farming near to the habitat of wildlife, settlement around protected area (Mesele Yihune *et al.*, 2009). At the periphery of protected area, large wild animals wander in closer proximity to human settlements. This poses serious problem in terms of crop damage. In such areas, the integration of conservation with other land uses has become difficult. Various animals featured in varying degrees of crop raiding.

Pest primates often destroy harvested 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. Sometimes people around protected areas are forced to keep their farm uncultivated due to fear of crop raiders. Different crops and fruits of farmers are damaged and destroyed by wildlife such as maize, barley, sorghum, potato, wheat, bean, pea, banana etc. Kimega, (2003) mentioned that in Kenya, food items such as maize, cassava, beans, potatoes and fruits are target for animals like elephant, baboons, zebra and buffalo. Crop damage affects farmers directly through loss of their primary food and cash resources, and indirectly through a variety of social costs such as costs for school and hospital. Due to these losses, rural people express their fear or even sabotage development projects that deal with wildlife conservation (Hill *et al.*, 2000).

Wildlife damage to crops varies considerably from site to site and from season to season based on different factors. Encroachment of wild habitats by subsistence farmers in Africa leads to conflict (FAO, 2009). In addition to this, there are also many factors, which increase the causes of human crop raiding conflict around protected areas such as increased human population density around protected area, behavior of the animal and distance of the farmland from protected area (Lee, 1987). The change in the vegetation structure of lands closer to the protected areas may attract wild herbivores. Cultivated plants have characteristics of increased yield, rapid growth and resistance to disease, making them vulnerable to the herbivores of locally abundant wildlife populations. Crop raiding is the most likely occurring since humans first settled down and started practicing agriculture (Messmer, 2000).

Primates are one of the most frequently cited crop pests (Hill, 2000). That makes primates and humans potentially conflicting over crops. Particularly, anubis baboons (*Papio anubis*) and vervet monkeys (*Chlorocebus aethiops*) are among 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 Switzer, 2001). Habitat domination by humans and the associated compression, fragmentation and conversion of habitats (Strum, 2010), are the driving forces behind human primate conflict and one of the greatest threats to primate survival. 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 affected and require less conservation attention (Cowlshaw and Dunbar, 2000). However, In Africa, baboons (*Papio anubis*) and Vervets (*Chlorocebus spp.*) are the crop-raiding primates (King and Lee, 1987; Sillero-Zubiri and Switzer, 2001). Africa has the largest primate fauna in the world. There are 175 species and subspecies of primates listed in Africa (Grubb, 2006).

2.4. Human-predator conflict

In addition to human crop raider conflict human predator or carnivore conflict the other types of human wildlife conflict. This type of conflict is the disagreement between human being and predator wild animals for livestock (Gemed and Meles, 2018). Since, both wildlife and people lives close together wildlife in the forest wants to feed on livestock and human want to protect predating animals from their livestock. This practice causes conflict between predator animals and human beings. Across the globe, the frequency and extent of economic cost of conflict between human and carnivores is increasing due to the expansion and growth of human population (Karanth *et al.*, 1999). As a group, carnivores exert a profound influence on biological communities via predation and inter or intra specific competition. Carnivores often regulate or limit the number of both domestic and wild prey, thereby; altering the structure and function of the entire ecosystems and community (Adrian and Kullas, 2003).

The greater majority cases of human carnivore conflict through depredation of domestic animals reflect some type of imbalance in the local ecosystem. If the habitats in which they live consist of areas large enough to support them, with sufficient food resources and if the influence of human on the habitat decreases, these animals tend to avoid man and his domestic animals (Treves and Karanth, 2005). Human-carnivore conflict occurs when the carnivore population increases or humans encroach towards their habitats. Thus, Carnivores encounter more domestic animals and humans. Such encounter can cause loss and injury to human and livestock that lead the community in economic loss (Philip, 2016). People often respond to this conflict by poisoning food, shooting and trapping techniques. Controlling and preventing predating animals from their livestock in such way kill non-target animals in high proportion (Treves *et al.*, 2003).

The occasional killing of livestock by wild predators can cause inevitable problems. The problem of livestock predation is prominent in and around protected area where extensive livestock husbandry is practiced (Oli *et al.*, 1994). For example, an increasing number of domestic animals destroy the forest habitat and compete with the wild ungulates. The large carnivores are forced to kill livestock, which leads to frustration of the herds men (Breitenmoser, 1998). According to Breitenmoser (1998), carnivores respond to human activities based on the response to environmental changes.

Human-carnivore conflict mostly occurs when the carnivore population increases or human encroaches into their habitats. Humans are the cause for most of the carnivore mortality worldwide and most of the recent reduction of carnivore population (Treves and Karanth, 2003). Besides, their large space requirements and position at the top of the food chain results in conflict with expanding human populations and domestic livestock (Myers and Bazely, 2005). Under a variety of demographic, economic and social pressure, human alteration of carnivore habitat or expansion of carnivores has led to escalated conflicts (Naughton-Treves *et al.*, 2003).

Besides, human activities (hunting, grazing, logging, draining land for farming), damaged habitat, increased carnivore populations, carnivore behavior, as a result of carelessness by the owner; when livestock is left in the field unattended, the method of keeping livestock by farmers. Many communities did not have well built houses and fences to protect their

livestock against predators, leading to increases of the risk of conflicts. The presence of dense vegetation appears to be a facilitator for livestock predation also another factor. According to Treves *et al* (2003), placing pasture around vegetated waterways may aggravate livestock predation by predators. Whenever humans settle, they disturb the large predators because of their threat to livestock. Other reasons for the substantial conflict are a large carnivore is habitat destruction and the expansion of cultivated land (Mark, 2015).

Besides, the many factors given above domestic cattle depredation may also be due to the presence of few numbers of wild preys. Many large carnivore species are adapted for ungulate predation but some individuals readily kill domesticated ungulates when they get the chance (Treves and Karanth, 2003). According to Vos (2000), prey selection by predators is related to the availability and size of prey. The declines in number of predator are probably related with the decrease in the number of livestock and lack of wild preys (retrieved on internet https://WWW.The_guardian.Com). The most known wild animals involved in attacking, injuring and killing of livestock and humans are lion, leopard, cheetah, jackal, hyena, anubis baboon and wild cat (Lydia, 2017).

2.5. Human-wildlife conflict and impact on wildlife species

Humans need many goods and services from nature to sustain their demand for food, fuel, water, medicine and fiber (Osvaldo *et al.*, 2017). Any development including construction of roads, dams and utilities support human beings to accomplish the daily activities. However, these activities weaken and affect the long-term sustainable development by propagating unintended environmental impacts (Gizacho, 2016). Development intended for simple industrial purposes often result in uncontrolled secondary human migration, illegal logging, and hunting and resource extraction in general (Anonymous, 2001). The greatest human vulnerability to environmental degradation is related to effects on water resources, health and land productivity. Water pollution mostly occurs in the industrialized countries and uses of high energy contribute lot to global climate change (FAO, 2009).

The different activities of humans have its own impact on wildlife by modifying the behavior of animals and species distribution (Rinjin, 2007). The disruption of behavioral patterns can affect their social; a key component in the evolution and dynamics of species. Thus, its disruption by human disturbance can have a considerable effect on population performance even if the disturbance does not directly affect the survival and reproduction (Manor and Saltz, 2003). Factors like noise, disruption of the physical environment including migration, fragmentation of habitat, alteration of the chemical environment, and introduction of exotic species are responsible for disturbing the regularity of wildlife (Lydiya, 2016). The ecological impacts of losses of habitat and redistribution of animals away from native areas may affect the foraging success or survival in areas beyond the initial zone of disturbance (FAO, 2009). This results in overgrazing, erosion, changes in predation pressure and breeding (Anonymous, 2001).

Increasing human population and the associated impacts such as habitat loss and hunting are the underlying factors for the decline of many of mammalian species. They are considered as species threatening factors and vary in intensity across the surface of the earth (FAO, 2009). Species that inhabit more heavily impacted regions expected to have a higher risk of extinction (Cardillo *et al.*, 2004). Illegal or traditional exploitation of wildlife within conservation areas for both subsistence and economic gain is common. Overexploitation, settlement in and around protected areas, fragmenting or collapsing wildlife habitat for different purpose and expansion agriculture (FAO, 2009). In general, humans either directly or indirectly influence the survival of wildlife or are responsible for the extinction of many species of wildlife across the globe (CITES, 2017).

2.6. Specific techniques of Human-wildlife conflict mitigation strategies

No single management strategy can prevent all the human wildlife conflict and hence, the goal of wildlife management should not only be to reduce the levels of conflicts but also to raise the tolerance level of conflicts between human and wildlife by lessening its impact to people (Sillero-Zubiri and Switzer, 2001). Any solution provided for reducing human wildlife conflict involves site-specific knowledge of what is possible, practical and acceptable in any particular area. Unfortunately, human-wildlife conflict situations are often complex so are unlikely to be resolved quickly and cannot be solved solely by technical means alone but community based solutions should be involved.

The communities' effective participation in wildlife conservation programmed 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).

There are basic approaches to mitigating human wildlife conflicts: prevention, protection and mitigation. A rather different approach is represented by changing attitudes to wildlife through education and by ensuring that affected communities and individuals are active participants in, and enjoy tangible benefits from, wildlife management (Philip, 2005). Although prevention is clearly the best option, at times reactive approaches are required after human-wildlife conflicts have occurred. The main approach under this heading is Problem Animal Control (PAC), most often undertaken by the national wildlife authority. The 'problem animal' can either be killed or captured for translocation (Philip, 2005).

2.6.1. Lethal problematic animal control

In lethal control, it is obviously desirable to focus on those individuals actually causing the problem (the culprits) or at least to target the group of animals whose home range includes the site where the problem is occurring. In reality, often the problem animal is not identified, but rather the aggrieved community, especially in the case of loss of human life or the killing of livestock kills any individual to satisfy the demand for action and revenge. In such a situation, the action by the wildlife authority rangers may have public relations value but in all probability, the culprit will survive and continue to inflict damage. Generally, shooting a problem animal is believed to be the best way to show the others to stay away, but it is often difficult for wildlife managers to obtain permission to shoot an animal quickly, thus making killing the culprit virtually impossible. Problem Animal Control is especially difficult when endangered species are implicated – in that case translocation may be a preferable option (Philip, 2005).

2.6.2. Translocation

Translocation has been used to remove individual animals responsible for depredations and crop raiding also, in some cases, to reduce populations in specific areas by removing relatively large numbers of animals. Translocation can be an appealing method to the public, especially those who are particularly concerned about animal welfare, as they perceive that it gives the affected animal a second chance at a new site. Unfortunately, the reality is often not so positive and translocation can be a controversial means of resolving human-wildlife conflicts, associated with a number of problems (Conover, 2002). Following translocation, immigration of new animals may occur to take advantage of empty territories, so that the problem can persist. The translocated animals can also recreate the same problem at their release site.

For species such as large carnivores and elephants there needs to be a large area, up to hundreds or thousands of square kilometers, without potential for conflict with people, where the individuals can be released for the strategy to work (Stander, 1990). If no such areas exist, management efforts should concentrate on reducing potential conflict, and if this is not practical, the only option left is lethal control for repeat offenders to reduce challenges.

2.6.3. Winning Hearts and Minds

The third approach to dealing with human-wildlife conflict involves changing the attitude of affected communities through education, consolation payments and broader sharing of benefits associated with the presence of wildlife (Philip, 2005).

2.6.4. Compensation and Benefit Sharing

An approach popular with communities adversely affected by wild animals is payment of compensation in the event of loss. This approach is usually confined to a specific class of loss, for example livestock killed by elephants or predators. The schemes are often funded by a conservation organization, although government schemes also exist. All are designed to prevent the affected communities taking direct action themselves, which would have usually involved hunting down and killing the individual elephants, lions or other species involved. Although compensation schemes meet the demand of local people to be financially compensated for the loss, they have their own problems (Philip, 2005).

2.6.5. Protection and prevention

Protection and prevention are implemented when the conflict is certain to happen or has already occurred to avoid the conflict occurring in the first place and take action towards addressing its root causes (Hill *et al.*, 2002).

2.7. Public attitude towards wildlife

Human attitudes towards wildlife are becoming increasing importance in the areas of conservation and welfare. It has long been taken for granted that our attitudes are influenced by the degree of biological or behavioral similarity between a given species and ourselves. Now days the conflict between local people and wildlife is taken as the major conservation issue (Newmark *et al.*, 1993). The conservation attitude of rural people living near to the protected area is highly influenced by the problem associated with wildlife people living surrounding the protected areas who are unable to control the losses caused by wildlife are likely to develop negative attitude toward wildlife (Newmark *et al.*, 1993; 1994). In Communities with subsistence economy, small losses can generate strong negative attitude toward wildlife (Oil *et al.*, 1994).

Human attitudes and values about wildlife vary both among and within different sectors of the society. The views of rural residents about wildlife may not differ from urban residents except that they personally experience more of the benefits and problems caused by wildlife (Belay Worku., 2016). However, farmers are one sector of the society whose attitudes about wildlife continue to be different from other stakeholders. They continue to view in terms of its importance and tend to be more concerned about how wildlife affects them economically (Messmer, 2000). Public understanding of the general environment and population related issues is critical for successful conservation efforts.

2.7.1. Attitude towards crop raiding wild-animals

According to Hill and Wallace (2012), human primate conflict affects conservation efforts in Africa. Because of these conflicts human beings have a negative impact on the conservation of wildlife in the wild since the people has disliked the species because of property loss that contributes for food insecurity and poverty. Human wildlife conflict has become more frequent, severe and other species. Similarly, profound changes to the local flora and landscape can occur because of eliminating elephants. Consequently, eradication attempts

have a mixed record of success, in part due to lack of adequately understanding the species' interactions with its environment and the natural resources valued by humans, serious obstacles to conservation efforts in Africa (Eniang *et al.*, 2011).

Local people living in and around protected areas and at the edge of forest, who are unable to control the crop losses caused by wild crop raiders, are likely to develop negative attitude and those who get benefit from the wildlife those not affected by crop raiders develop positive attitude towards pest crop raiding wildlife (Belay Worku, 2016). One fundamental influence on perceptions of local people towards primates is the general cultural attitude. Levels of tolerance, acceptance and demand for interactions vary with cultural context (Biquand *et al.*, 1992). Cultural perceptions towards primates vary enormously and have shifted over time. Historically primates were sacred as guardians of human settlements, as spirits of ancestors, or as an embodiment of sexuality, wisdom and fortune in some areas (Belay Worku, 2016). In some societies, monkeys may even be incorporated into the kinship or cosmological belief system (Cormier, 2002). Monkeys and apes are kept as pets, sharing household areas, food and acting as surrogate infants or dolls or exploited for their entertainment value. This may be a converse of the human companion animal relationship (Serpell, 1981).

2.7.2. Attitude of peoples towards wildlife animals

The most common attitude of people towards animals is the utilitarian one, with little consideration of the consequences (Belay Worku, 2016). In South Africa, for example, traditional healers (Smart *et al.*, 2005) more intensively use some species of reptiles. Birds can be important for seed dispersal, biological control of pests and aesthetic values; which leads to positive attitude towards some bird species. Concerning snakes, majority of local people showed low knowledge in believing that most snakes are non-poisonous, so local people perceived snakes as being dangerous animals (Lopez-del-Toro *et al.*, 2009). However, the perception of local people has been positive towards those species used as food and negative towards those species that cause some level of damage. Negative attitudes also revealed towards rodents that damage crops (Belay Worku, 2016).

The negative perceptions towards bats like vampire bats are possibly linked to the damage that these animals may cause to livestock, for example, vampire Bats. However, the damage or benefit obtained from a group of animals is not the only factor shaping the attitude of local people. For example, some bird species can cause damage to their crops and yet their attitudes towards birds in general were overwhelmingly positive (Lopez-del-Toro *et al.*, 2009). Animals that cause higher levels of damage are disliked and when the damage is small or moderate, the attitudes of people are more positive (Kaltenbornet *et al.*, 2006). Thus, in the case of bats and to some extent also in the case of snakes and others, many of the negative perceptions and attitudes can probably be attributed to lack of knowledge and the prevalence of culturally inherited beliefs. Generally, the attitude and perceptions of local people are positive for birds, intermediate for non-flying mammals and lower for snakes, rodents, pest insects and bats (Lopez-del-Toro *et al.*, 2009).

3. MATERIALS AND METHODS

3.1. Description of study area

The present study was conducted in and around Huwen forest of Jarso Fododo kebele, Leka Dulecha district, East Wollega Zone of Oromia Regional State. The physical distance of this kebele from Addis Ababa is about 358 km to the west. The Huwen forest is found in Leka Dulecha Woreda in Jarso Fododo kebele, which is located at 18 km from Getema town to the western side. The Huwen forest represents one of the most outstanding natural scenic areas. It has a unique landscape and rich biodiversity with a variety of species. It situated at longitude of 036°26'14"E and 08°57'14"N latitude. The Huwen forest covers an area of 197.56 hectares. Altitudinal of the area ranges from 1600 and 2261 meter above sea level. There are three agro-ecological zones (AEZO) in Leka Dulecha Woreda namely, Woina Dega, Kolla and Dega (LDAO, 2009). The largest portion of the Woreda falls under Woina Dega (47%) and Kola (44%), the remaining 9% of the ecological zone is recognized as Dega. The area of the study is found in Woina Dega zone. It gets mean annual rainfall, which covers 7 months from April to the beginning of December ranging from the maximum rainfall 2200mm to the minimum of 1,500 mm. This Woreda has daily average minimum and maximum temperature of 20⁰ c and 28⁰ c (LDWCO, 2009).

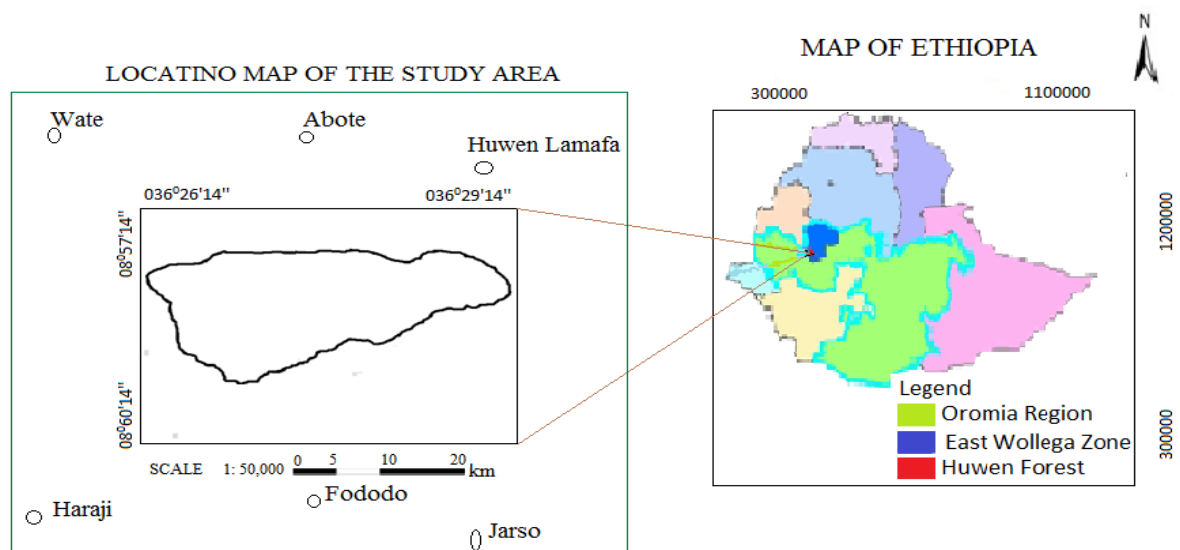


Figure 1. Map of study area

The forest includes both natural and plantation. During derg regime the natural forest was protected by government whereas, the plantation one protected by private sector then the private sector cut out the forest and cultivated maize crop and the crop was damaged by crop raiders as a result of this damage they left the area uncultivated. After that, the government altogether managed both types of forest. Then one of the Swedish sector planted eucalyptus and Juniper surrounding the natural forest as a buffer zone. The presence of eucalyptus and Juniper around natural forest helped as a means of protection for the natural forest.

Huwen forest has different plants species and home for many wildlife. The local people around Huwen forest are agro-pastoralists and their household economy depended exclusively on agricultural and livestock production. Almost all the respondents depended on land to generate income. Most of the community around Huwen forest produces maize, teff, sorghum, barley, wheat, bean and pea as staple food crop. The community around Huwen forest is also involved in animal breeding. The dwellers known in breeding animals like sheep, poultry, cattle, goats, horse and donkey. Resource availability in and around Huwen forest is a cause of conflict between local community and wildlife in the forest.

3.2. Sampling design

This research implemented a combination of both qualitative and quantitative methods for both data collection and analysis. Human-wildlife conflicts in and around Huwen Forest were described by possession owner and problematic animals in the forest and the researcher believes that these approaches are appropriate to answer the research questions related to human-wildlife conflict. The study district was purposively selected to include the areas of highest case scenarios in human-wildlife conflicts and to evaluate the extent of HWC in different villages based on their distance. Accordingly, six rural villages near to Huwen Forest were selected based on their proximity to forest edge as near, medium and far. Among these villages Wate and Haraji are relatively far from the area (>7 km), Jarso and Abote are found between 3-5 km and Fododo and Huwen lamafa are found adjacent to the present study area.

3.3. Target population of the study area

The target population is comprised of 1015 households from six rural villages surrounding Huwen Forest. After getting the total number of household heads living in each selected village, following Mugada and Mugea (2003) who asserted that 10 to 30% of population is adequate for such study, 10% of the households were included in this study. 102 households from the selected villages were taken as respondents in the study. Simple random sampling technique was used to select the households for the study (table 1).

Table 1 Target population and sample size

Target villages	Target population	Sample size	Percentage
Fododo	203	20	10%
Jarso	192	19	10%
Huwen lamafa	176	18	10%
Abote	212	21	10%
Wate	96	10	10%
Haraji	136	14	10%
Total	1015	102	10%

3.4. Data collection methods

A useful data required for this research were collected through different data collecting instruments like questionnaire, interview, observation and focus group discussion. A questionnaire survey was conducted from 2017-2018 to see the magnitude of human-wildlife conflicts. Before starting the actual data collection, a pilot survey was conducted on 24 individuals who were randomly selected and interviewed to see the appropriateness of the survey and whether the questionnaire could be understood easily. Then, the actual data collection was carried out on 102 individuals from separate households using a semi-structured questionnaire. Therefore, the questionnaire survey was carried out between July 2017 and March 2018 among the local community and strictly in all the six villages. The questionnaire includes both open-ended and close-ended questions. The questionnaire is designed to check the causes of human wildlife conflicts, to check the effect of wildlife on livelihood activity, to understand the magnitude of the conflict, to find out which species are problematic in the areas as well as to suggest some possible solution for the problems of human-wildlife conflict. Open-ended questions were included to obtain information on knowledge about wildlife in the area and to identify whether or not wildlife has posed problems to the community.

In addition to the questionnaire, data also gathered through semi-structured interview. Interviews held with respondents to establish in depth information about the impact of human-wildlife conflict in and around Huwen forest. The information gathered through interviews are important to identify wild animals that pose major conflict in the areas and to investigate the effect of wildlife on the livelihoods of the people in the selected villages.

Direct observation was also involved while identifying the practical conflicts and the animal species responsible for the damage of crops. For nocturnal animal like (Bush pig and Hyena) marks left such as teeth marks, dung, feeding, footprints and diggings were used (Strum, 1994). In additions to these, it was also used to determine which factors (crop plants damaged by wild animals, size of livestock, livestock attacked by predators and size of farmland) might be important in determining and distinguishing the problems caused by wildlife and in providing factors that are responsible for the problem of human wildlife conflict. The observation in and around the forest was made based on a checklist which focus on the human-wildlife conflict in and around Huwen Forest.

To estimate crop loss by crop raiders, field visit and direct observation of damaged crop were mainly used to identify the particular problem, and animal species responsible for the damage was identified through assessing the teeth marks left on the damaged plants and footmarks of the animals. Four plots of 6mx6m were placed randomly within the crop stands of 8 farmers in the village and observed two times a week on each stage to count the crop damage from 0.5 ha of the eight farmers and to identify the type of animal that cause the damage. The farm was nearer to the forest and observed based on information of severity of the human primate conflict.

The seedlings of the maize in each four plot were counted from total area of the farm to extrapolate the total number of plants in the measured farm. The maize crop was selected because it was the main crop cultivated compared to other types of crops in this particular study area. The observation was conducted during wet and dry season, starting from July 2017 to March 2018. The seedling stage was carried out for 12 hours' observation. However, more emphases were given in the time of flowering and maturation. In the time of visit all the damaged crop were recorded on the same day. The photograph of the event was taken by using digital camera. Finally, total yield loss of each site added up and summarized in percentage.

A small gathering of participants who are related to the phenomena of interest particularly those who have farmland, livestock and guards of Huwen forest can be divided in groups. They discussed in the topics of impacts of wildlife in surrounding community, causes of HWC in an area, Method of protecting their crop and livestock from problematic animal and possible solution for mitigating the problems of HWC.

After gathering type and amount of damaged crop and livestock loss, the average household crop and livestock losses to household crop and livestock production models were estimated. Barnes and Nhuleipo (2005), who conducted a specific study in Namibia analyzing the impacts of HWC on household livelihoods and communities, As Barnes and Nhuleipo (2005), this research analyzes the average annual value for lost livestock were estimated per households. Accordingly, the average value for livestock loss per livestock producing household of Huwen areas was estimated. The values represent the average amounts by which rural household gross incomes are reduced.

3.4. Data analysis

The collected data was analyzed by using Statistical Package for Social Sciences (SPSS) version 16. The questionnaire was coded and run to SPSS and responses were compared using chi-square test, frequency and percentage. Then, the analyzed data were presented by using tables, charts, graphs and the data was organized in Microsoft Office 2007. Whereas, the data collected by interview, focus group discussion and observation will supplement and strengthen the information obtained from questionnaire and were analyzed qualitatively by using narrative form and logically interpreted to answer the research questions.

4. RESULTS

4.1. Demographic information

The background information of residents is presented below based on their gender, occupation, marital status and distance from Huwen Forest. Accordingly, gender analyses revealed that about 61% of were male, while 39% of them were female (Table 2). This implies that both gender were well represented in the study which indicates that Huwen Forest as a public entity has fulfilled one-third gender rule.

Table 2 Sex ratio of respondents

Sex	Villages						Fr	%
	Fododo	Jarso	Huwen lamafa	Abote	Wate	Haraji		
Male	12	11	10	12	7	10	62	61
Female	8	8	8	9	3	4	40	39
Total	20	19	18	21	10	14	102	100

Regarding the educational background of the respondents, about 35.3% of them were illiterate, 40.2% of them were able to write and read, 15.7% of them have attended elementary school and about 8.8% of the respondents have attended high school and above (Table 3).

Table 3-Educational background of respondents

Villages	Educational background				Total
	Illiterate	Read and write	Elementary	High school and above	
Fododo	9	8	2	1	20
Jarso	6	7	4	2	19
Huwen lamafa	7	8	2	1	18
Abote	8	9	2	2	21
Wate	2	4	3	1	10
Haraji	4	5	3	2	14
N	36	41	16	9	102
%	35.3	40.2	15.7	8.8	100

The occupational background of the respondents showed that 80 (78.43%) of them were farmers, 12 (11.76%) of them were merchants, 6 (5.9%) of them were civil servants, 4 (3.92%) of them were craft makers (Table 4).

Table 4-Employment opportunity

Villages	Employment opportunity				Total
	farmer	Merchant	civil servant	craft maker	
Fododo	16	2	1	1	20
Jarso	14	3	1	1	19
Huwen lamafa	16	0	1	1	18
Abote	17	3	1	0	21
Wate	6	2	1	1	10
Haraji	11	2	1	0	14
N	80	12	6	4	102
%	78.43	11.76	5.9	3.92	100

Marital status of the respondents indicates that 88 (86%) of them were married, 6 (6%) of them were widowed, 5 (5%) were single and 3 (3 %) were divorced (Table 5).

Table 5-Marital status of the respondents

Villages	Marital status				Total
	Widowed	Married	Divorced	Single	
Fododo	2	16	1	1	20
Jarso	1	17	0	1	19
Huwen lamafa	0	17	1	0	18
Abote	2	18	0	1	21
Wate	1	8	0	1	10
Haraji	0	12	1	1	14
N	6	88	3	5	102
%	6	86	3	5	100

Among the respondents, 38.2% of the respondents live adjacent to Huwen forest or were less than 2Km away from the forest, 39.2% were about 2 to 5 km away from the forest and about 22.6% had beyond 7 km distance from the forest (Table 6). Villages also significantly differed ($\chi^2=1.612$, $df=10$, $P<0.001$) in terms of their distance from the forest.

Table 6-Distance of sample villages from forest

Distance from forest	Villages						Fr	%
	Fododo	Jarso	Huwen lamafa	Abote	Wate	Haraji		
less than 2 Km	19	2	17	1	0	0	39	38.2
3-5Km	1	16	1	20	1	1	40	39.2
more than 7km	0	1	0	0	9	13	23	22.6
Total	20	19	18	21	10	14	102	100

4.2. Human wildlife conflict and its causes

The respondents around Huwen forest were asked whether human-wildlife conflict exists in their areas and their responses were shown in (Table 7). Accordingly, among the respondents, all of Fododo and Huwen lamafa, and most of Jarso and Abote people have agreed on the occurrence of conflict between people and wildlife around Huwen forest; whereas, most of respondents from Wate and Haraji revealed that there is no conflict between human beings and wildlife around Huwen forest. Over all, about 71.6% of respondents indicated that there was human wild life conflict in the area, however, a few of respondents 28.4% indicated that there was no Human wildlife conflict in their area. There was a significant difference ($\chi= 34.77$, $df =5$, $p < 0.001$) among the villages in terms of occurrences of Human wildlife conflict in the area.

Table 7-The occurrence of human wildlife conflict around Huwen forest

		Villages						N	%
		Fododo	Jarso	Huwen lamafa	Abote	Wate	Haraji		
HWC	Yes	20	13	18	14	2	6	73	71.6
	No	0	6	0	7	8	8	29	28.4
Total		20	19	18	21	10	14	102	100

4.2.1. Types of conflict around Huwen forest

The conflict between human wildlife was caused in different ways such as in case wild animals damage crops, when wildlife cause threat to livestock and the people and also when people poses threat on wildlife (Table 8). The threat includes crop loss, livestock depredation and human safety. Most of the respondents from Fododo, Huwen lamafa and Abote who live near Huwen forest have noted that crop loss was the major type of conflict between human being and wildlife. Among the respondents who claimed the occurrence of human wildlife, conflict (63.7%) of them indicated that crop loss was a major cause of conflict around Huwen Forest, and (55.9%) was reported threat to livestock. The occasion of the problems about HWC on livestock was associated with the distance of the villages from the forest. For the villages which are near to the forest the problems of such conflict are worse, whereas those villages which are far from the forest the rate of the conflict occurred in the community was less.

A few respondents (16.7%) noted that threat to the surrounding communities by wildlife was the other causes of human wildlife conflict. There was no significant difference ($\chi^2=6.408$, $df=10$, $p>0.05$) in terms villages with types of conflict (Table 8). However, the information collected through observation and interviews showed that local people through trap materials and shooting killed two hyenas. Also four anubis baboon were killed by local people particularly, in Fododo village a mother of anubis baboon entered in to the person's house as because of this the mother baboon was killed by local people and they caught the juvenile or young anubis baboon.

Table 8-Type of conflict around Huwen forest

Types of conflict	Villages						N	%
	Fododo	Jarso	Huwen lamafa	Abote	Wate	Haraji		
Crop loss	20	12	18	11	2	2	65	63.7
Threat to livestock	18	10	13	12	1	3	57	55.9
Threat to human	7	2	6	2	0	0	17	16.7

N.B each type of conflict counted independently

4.2.2. Sharing Forest resources

Respondents were asked to indicate whether sharing forest resources between wildlife and communities surrounding Huwen forest caused human wildlife conflict. About 85.3% of the residents feel that sharing of resource with wildlife caused human wildlife conflict and the remaining respondents (15.7%) revealed that they do not use resources from the forest and there was a significant difference ($\chi^2=25.527$, $df=5$, $p<0.001$) in terms of resource utilization with the distance of villages from the forest. Almost all respondents in Fododo, Huwen lamafa, Jarso and Abote reported that they use different resources from the forest, which means since they live close to the forest they compete more on resources.

Table 9-Participant's response about using forest resource

		Villages						Fr	%
		Fododo	Jarso	Huwen lamafa	Abote	Wate	Haraji		
Sharing resource	Yes	20	18	18	17	5	8	87	85.3
	No	0	1	0	4	5	6	16	15.7
Total		20	19	18	21	10	14	102	100

4.2.2.1. Benefits derived from the forest

The local people need to get benefit from the forest in some way if they are to manage common pool resources to meet the border social goal of environment. The survey on the households indicated that access of the forest for free grazing, fuel wood, for construction materials, fodder, and bush meat and as farmland. The result from (Table10) indicated that (34.3%) of respondents used the forest for grazing of their livestock to a very high rate and the majority of the respondents (44.1%) utilized the forest as a source of firewood to a very high rate and (20.6%) of respondents used the forest as source of construction materials to a very high extent. Whereas, few of them involved in using forest as fodder, bush meat and farmland. There was a significant difference ($\chi = 385.189$, $df = 5$, $p < 0.001$) in using different forest resources in villages based on their distances.

Especially, villages found near to the forest used a mentioned forest resource more than relatively far away villages. The observation conducted in the forest showed that a lot of Juniper plant cut from the forest borders that act as a buffer zone for wildlife in the forest for commercial purpose by forest and wildlife authorities. The lost Juniper cannot restore during re plantation due to lack of protection because local community used the area for grazing their livestock (Table 10).

Table 10-Types of benefit derived from the forest

Types of benefit		Responses				
		Very high	High	Moderate	Low	Very low
Grazing	N	35	24	19	13	11
	%	34.3	23.5	18.7	12.7	10.8
Firewood	N	45	23	15	10	9
	%	44.1	22.6	14.7	9.8	8.8
Fodder	N	7	8	20	40	27
	%	6.9	7.8	19.6	39.2	26.5
Bushmeat	N	7	6	17	36	36
	%	6.9	5.9	16.8	35.2	35.2
Farmland	N	7	7	12	42	34
	%	6.9	6.9	11.8	41.1	33.3
construction materials	N	21	20	22	18	21
	%	20.6	19.6	21.6	17.6	20.6

Based on the resource derived from the forest, about (62.8%) of the respondents claimed that using resource from the forest was a source of conflict between human being and wildlife and (37.2%) of the respondents showed that no conflict with the wild animals occurred as they get resources from the forest (Table11).

Table 11-Information on conflicts occurred when the residents use resources from forest

Opinion	Villages						N	%
	Fododo	Jarso	Huwen lamafa	Abote	Wate	Haraji		
Yes	38	11	16	11	3	6	64	62.8
No	3	8	2	10	7	8	38	37.2
Total	20	19	18	21	10	14	102	100

4.3. Possible reasons for crop raiding by primates

As reported by respondents the causes of crop raiding was the expansion of farmlands (22.5%), poor protection of the crop (24.6%), farming near the forest (22.5%), abundance of crop raider (18.7%) and limitation of food in the forest pushes for crop raiders into agricultural farms (11.7%). Over all, crop raiders considered poor protection of crop as the major cause of crop loss and limitation of food in their habitat is the least factor for causing crop loss in the area.

Table 12-Resident's opinion on causes of human primate conflict

Factors	Villages																			
	Fododo				Jarso				Huwen				Abote		Wate		Haraji		N	%
	N	%	N	%	N	%	N	%	N	%	N	%	N	%						
Expansion of farm land	4	3.9	5	4.9	4	3.9	5	4.9	2	1.9	3	2.9	23	22.5						
Poor protection of crop	4	3.9	4	3.9	4	3.9	6	5.9	3	2.9	4	3.9	25	24.6						
Farming near forest	6	5.9	4	3.9	5	4.9	4	3.9	1	1	3	2.9	23	22.5						
Abundance of primate	4	3.9	3	2.9	3	2.9	4	3.9	2	1.9	3	2.9	19	18.7						
Shortage of food items	2	1.9	3	2.9	2	1.9	2	1.9	2	1.9	1	2.9	12	11.7						

4.4. Livestock depredation and its causes

According to their extent, the finding the respondents confirmed that about (15.7%) expansion of wild-animals, (15.7%) when livestock grazed in the forest, (14.7%) carelessness of livestock owner, (12.7%) human encroachment and (12.7%) poor protection of the livestock were the main causes of the threat posed on livestock by wild animals in the forest (Table13).

Table 13-Causes of livestock depredation by wild animals

Factors	Frequency	Percentage
Human encroachment	18	17.7
Expansion of wild animals	22	21.6
Poor protection of the livestock	19	18.6
Carelessness of livestock owner	21	20.5
When livestock grazed in the forest	22	21.6
Total	102	100

4.5. Wildlife threats on people

The information from (Table-14) indicated that wild animal's causes threats to the people. Among wild animals cause threat on people anubis baboon was the most (43%) frustrating and problematic wild animal in the area. The data collected through interview, FGD and observed injured body part revealed that in 2014G.C anubis baboon killed one child from Fododo village in the forest and injured 3 children and one woman while they were chasing away the baboon from their crops in Huwen lamafa. Bush pig ranked in the second place (37%) as a threat to the people in the area. Similarly, data from interview and observed part of injury showed bush pig injured 2 people during the nighttime in Fododo and Huwen lamafa while they were driving away the pest from their crop. The level of threat posed on human beings by other wild animals namely leopard (6%) and lion (5%),

Table 14-Wild life cause threats on people

	Wild animals							
	Anubis baboon		Bush pig		Leopard		Lion	
	killed	injured	killed	injured	Killed	injured	killed	injured
No of humans	1	4	0	2	0	0	0	0
N	44		38		6		5	
%	43		37		6		5	

4.6. The major crop raiding wild animals around Huwen forest

Farmers around Huwen forest ranked those crop raiding wild animals from the one causing the great damage to the one that causing the least damage. (43.1%) of respondents ranked anubis baboon as number one crop raider, (35.2%) of them ranked vervet monkey on the second, (15.7%) of them labeled bush pig third, (2%) of them placed porcupine and civet as fourth level crop raiders, and (1%) of the respondents considered as the least crop raiding wild animals. Specifically, in Fododo, Huwen lamafa and Abote anubis baboon and bush pig destroy a large mass of crop within a single visit (Table-15).

Table 15-Identified crop raiders

	Crop raider animals responsible for crop damage						Total
	Anubis baboon	Bush pig	Vervet monkey	porcupine	Bush buck	Civet	
Frequency	44	16	36	2	1	2	102
Percentage	43.1	15.7	35.2	2	1	2	100

4.6.1. Amount of damaged crop by crop raiders

The damaged maize varied according to its growth stage and types of crop raiders feed on the crop. During observation the highest damage counted for anubis baboon 2804 (5.99%) at its maturation stage and for vervet monkey 2516 (5.37%) at the flower stage. Out of the 46771 maize plants, the maize damaged during seedling, flowering and maturation shows that 4648 (9.93%) were damaged by anubis baboon, 4544(9.71%) were damaged by vervet monkey 1824(2.58%) were destroyed by bush pig and 1209(2.58%) were damaged by crested porcupine at all stages.

A lot of damage was observed during the maturation stage with 6025 (12.92%) maize plants damaged followed by flowering 4583(9.77%). Moreover, there was a significant difference between the amount of damaged crop at different developmental stage and a type of crop raiders. ($\chi^2=5.363$, $df=3$, $p<0.001$) at seedling, ($\chi^2=5.595$, $df=3$, $p<0.001$) at flowering stage and at maturation stage ($\chi^2=1627.343$, $df=3$, $p<0.001$).

Generally, from the total 32 plots of 6mx6m, damages caused by above mentioned animals were counted and recorded at different developmental stages. Accordingly, out of the 46771 maize plants, 12225 (26.12%) was damaged and destroyed by listed crop raiders from 0.5ha of 8 farmers (Table 16).

Table 16-Amount of crop damaged by crop raiders

Animal	The developmental stage of maize crop							
	Seedling		Flowering		Maturation		Total loss	
	Number	%	Number	%	Number	%	Number	%
Anubis baboon	605	1.29	1239	2.64	2804	6	4648	9.93
Vervet monkey	651	1.39	2516	5.37	1377	2.94	4544	9.71
Bush pig	0	0	503	1.07	1321	2.82	1824	3.9
Porcupine	183	0.39	325	0.69	701	1.49	1209	2.58
Total	1439	3	4583	9.8	6203	13.3	12225	26.1

**Figure 2 Maize crop destroyed by bush pig****4.6.2. The common crops raided by crop raider around Huwen forest**

The result from (chart 3) showed that crop raiders did not equally affect all crops, during the present study. The respondent claimed that maize was the most susceptible (75%) crop to crop raiders, followed by teff (65%), sorghum (63%), barley (61%), potato (48%), pea (44%) and bean (42%). Whereas, 34% of the respondents reported that wheat was the least susceptible crop to be damaged by wild life.

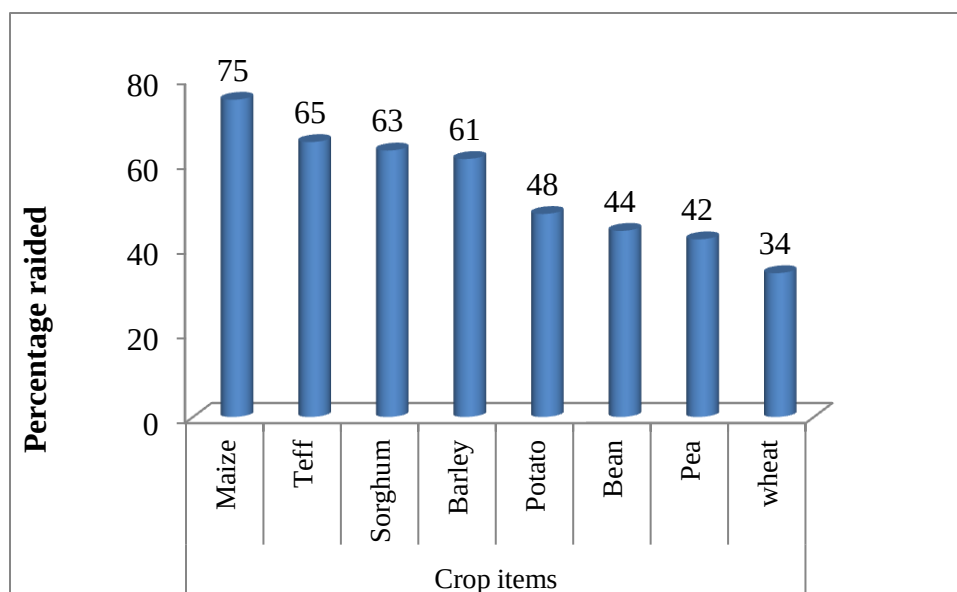


Figure 3-The main crop damaged by crop raider around Huwen Forest

4.7. Livestock depredation conflict

The main prey items predated in the study area by wildlife were sheep. The main predators that feed on sheep were anubis baboons, hyena, jackal, leopard and lion. Because of this (48) sheep were lost during the study time in selected villages. There was a significant difference between damages ($\chi^2=22.583, df=3, p<0.001$) in terms of sheep loss and other livestock loss in respondents. The average of sheep loss to each household was 0.47 this represents the average amounts by which rural household gross incomes are reduced through sheep loss. Next to sheep, respondents reported that loss of chickens (44) in the area. The main predators, which feed on chicken, were wildcat, anubis baboons, jackal and leopard. The average loss of chicken per year per household was 0.43 and there was highly significant difference ($\chi^2=22.583, df=3, p<0.001$) between pouter loss and other damages in respondents.

Other respondents reported the (25) loss of cattle by large predator animals and the average loss of cattle-wildlife per year per household were 0.24. Mainly hyena, lion, and leopard predated them. There was highly significant difference ($\chi^2=40.407, df=3, p<0.001$) in terms of cattle loss and other damages between respondents. Similarly, they reported that about (23) goat were eaten by hyena, anubis baboon, leopard and jackal. The average loss of goat per household was 0.22 and there was an insignificant difference ($\chi^2=6.739, df=3, p>0.05$) in terms of goat loss and other damages in respondents. The remaining respondents claimed that

about (11) donkey losses to hyena and the average loss of donkey to per household was 0.1 and hyena ate (2) horses. Generally, hyena poses a major conflict and problems related to the livestock depredation in all season. In the day time during wet season when there is rain and fog hyena poses threat to their livestock and at the nighttime hyena predaes on cows in their fence.

According to the degrees of predation on different livestock, the respondents ranked that spotted hyena on the first rank, anubis baboon ranked in the second stage and leopard, jackal, wildcat and lion, follows the rank. Lion visits the area once a year in a season when fire occurs in Didesa valley and poses attack particularly to the community's cattle and other livestock. In 2019 within one week, 2 cows and one ox were lost to lion in Jarso and Abote a Villages. Because of this, the local community fear and kill one Lion by trap and shooting with gun.

Table 17-The number of livestock depredated conflict

Predator	Frequency of lost livestock						Time of depredation
	Cattle	Sheep	Goat	Horse	Donkey	Chicken	
Anubis baboon	0	17	6	0	0	5	Day
Jackal	0	12	1	0	0	5	Day and night
Hyena	21	13	6	2	11	0	night
Lion	3	1	0	0	0	0	Day and night
Leopard	1	5	9	0	0	16	Day and night
Wild Cat	0	0	0	0	0	18	Day and night
Total	25	48	22	2	11	44	



Figure 4-Lion killed by local community in the forest (A) Sheep depredated by jackal in Fododo (B)

4.8. Method of protecting Problematic wildlife by local communities

The information from Table-18 indicates different strategies used by local communities to defend wildlife from their possession. Farmers utilized various methods to keep their resource from crop raider wildlife and livestock predators. Most (33.3%) of the respondents reported that permanent guarding is a very effective method in protecting wildlife. The other respondents (20.6%) using poisonous and traps materials as well trapping and shooting. The (26.5%) of the respondents defend wild beast from their resources through chasing by dog. The remaining respondents remove and protect problematic animals by scarecrows (12.6%) and (6.9%) of them defend wild beast by hunting to protect their possession and there was more hunting of wild animals like antelope and bushbuck. There was a significant difference between different protection method applied to wildlife by local community ($\chi^2=22.706$, $df=4$, $p < 0.001$). The other more effective protection methods observed in some farm area were plant barriers, which reduce damage of both crop and livestock.

Table 18-Wildlife protection strategies

Method of Protection	Frequency	Percent
Guarding	34	33.3
Using poisonous and trap materials for killing	21	20.6
Chasing by dog	27	26.5
Scarecrow	13	12.7
Hunting	7	6.9
Total	102	100



Figure 5 Killed Hyena by trap and gun in Huwen lamafa village (A) and Killed Bushbuck by hunting in the forest (B)



Figure 6 Plant species most commonly used for fencing in the area

4.9. Effects of wildlife on livelihoods of the people

The result from below pie chart showed that respondents' opinion regarding the problems occurred due to loss of property by wildlife in and around Huwen forest. The problems occurred were related to low income and productivity, food shortage and other guarding related problems of their crops and their livestock. Specifically, most of the family members become absent from works, market and other social life activities like burial grave, and students become absent from school, and wastage of time and health problems occurred during permanent guarding. Accordingly, about 37% of the respondents indicated that the loss of crop and livestock around Huwen forest lead to food shortage and about 41% of the respondents said that low income and lower productivity encountered them due to the lost resources by wildlife. The remaining respondents (22%) agreed that guarding related problems occurred in attempt to keep the useful resources. There is no significant difference between respondents based on the effect caused by wildlife on the local community ($\chi^2=3.377$, $df=2$, $p>0.05$). In addition to this the data collected through interview and FGD shows that a serious disease like rabies virus is known to be transmitted by wildlife to domestic livestock and possibly also to humans. Accordingly, from the study area rabies virus cached 12 dogs and 3 cows.

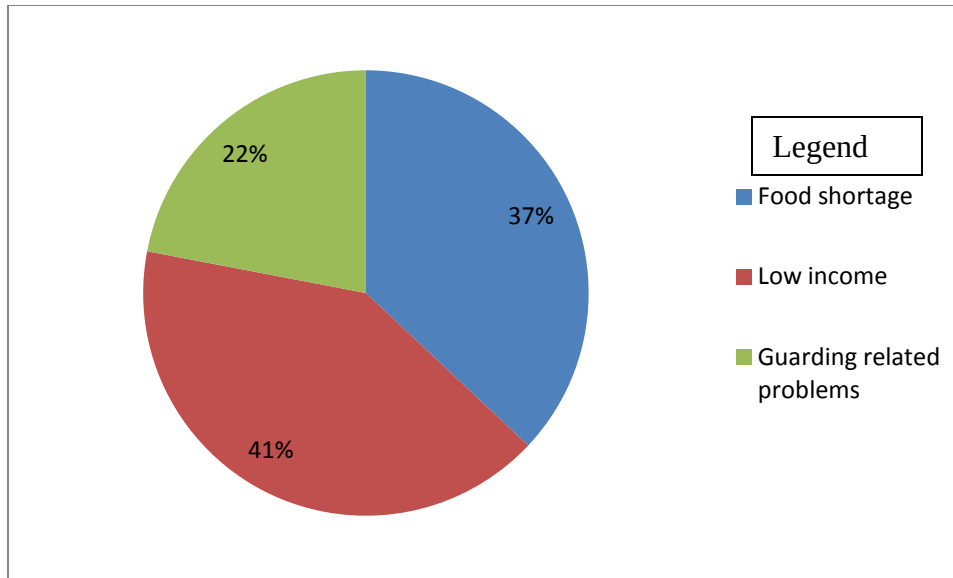


Figure 7-Effects possession loss by wildlife

4.10. Trends problematic wild animals and caused problems by wildlife

The information in Table 19 showed that (54%) of the respondents reported that population of the problematic wild animals were increasing and about (14%) of the respondents indicated the population of wild-animals were declining from time to time. The rest of respondents agreed on the unknown population status of problematic wild animals. Specifically, the respondents in Fododo and Huwen lamafa revealed that the number of problematic animal population increased than those relatively far from forest. There was a significant difference ($\chi^2=26.372$, $df=10$, $p<0.05$) in terms of villages with population status of problematic wild animals

Regarding, the tendency of crop damage and livestock depredation about (50%) of the respondent reported that the tendency possession loss to wild animals from time to time was increasing and about (15.7%) of them indicated decreasing from time to time. The rest (34.3%) of respondents reported that the rate at which possession loss to wild animal is unknown. The rate at which, the human property damaged by wildlife is associated with distance of villages from the forest. For the villages closer to the forest their properties were more damaged by wild animals than those relatively far from the forest were and there was no significant difference ($\chi^2=13.667$, $df=10$, $p>0.05$) between villages and the amount of possession loss by problematic wild animals (Table-19)

Table 19-Population status of problematic animals and trends of causing threat on people

Population status	Villages						N	%
	Fododo	Jarso	Huwen lamafa	Abote	Wate	Haraji		
Increasing	16	8	15	9	3	4	55	53.9
Decreasing	0	4	0	2	3	5	14	13.7
Unknown	4	7	3	10	4	5	33	32.4
Total	20	19	18	21	10	14	102	100
Problems by wildlife	Fododo	Jarso	Huwen lamafa	Abote	Wate	Haraji	N	%
Increasing	12	8	14	10	3	4	51	50
Decreasing	1	3	2	3	3	4	16	15.7
Unknown	7	8	2	8	4	6	35	34.3
Total	20	19	18	21	10	14	102	100

4.11. Attitudes of the respondents towards wild-animal conservation

Majority of the respondents 66 (64.7%) expressed a negative attitude toward wild animal conservation, whereas only 12(11.5%) of the respondents expressed positive attitude toward wild animal conservation. The wild-animals constantly devastating their possession and the absence of compensation for wild animal induce damage. Thus, the result indicated the most of the local people considered the wild-animals as a potential enemy to their well-being.

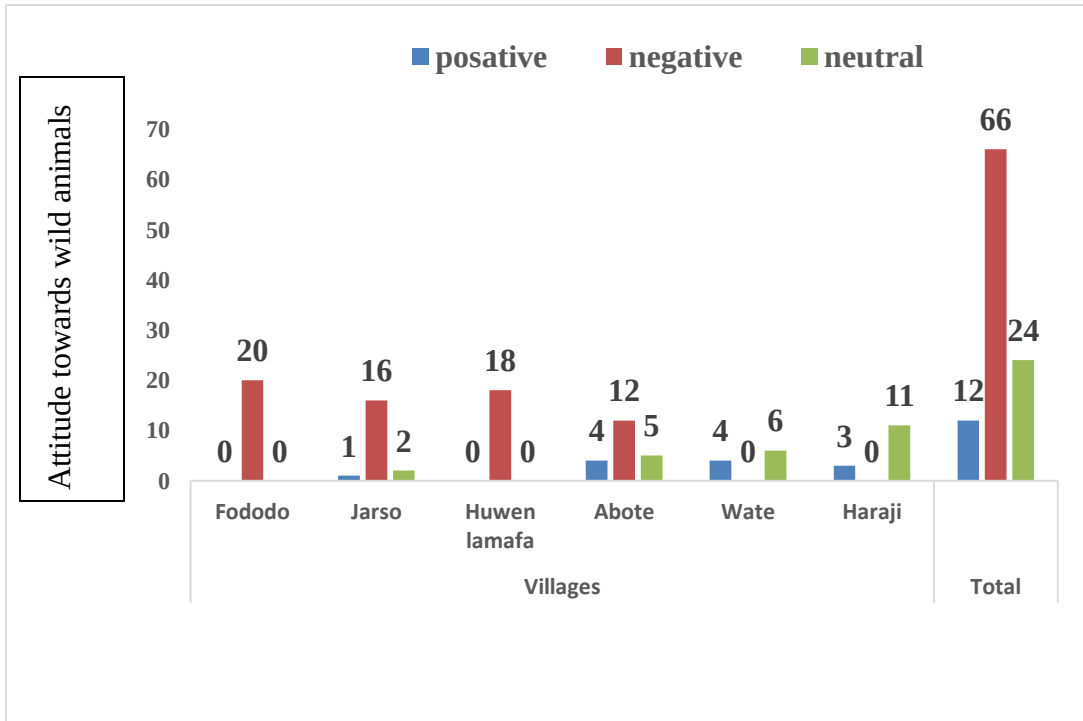


Figure 8- Respondent opinion towards conservation of wild animals

5. DISCUSSION

Villagers near Huwen forest were more at risk of conflict with wild animals. Fododo and Huwen lamafa are found adjacent to Huwen forest and all of the respondents selected from these villages reported the existence of Human wildlife conflict in their areas. Similar the current study agrees with the study of Gizacho Girma (2016) showed that being near protected areas has its own contribution for the conflicts caused between dwellers and wild animals.

The conflict between human and wildlife was expressed in different ways such as crop damages, livestock depredation, killing and injuring of people and threats posed by the people on wildlife. The human behavior and the decisions made regarding human-wildlife interactions ultimately determine the outcome for both humans and the wildlife. It also involves the threat posed on wildlife by people and on the people by the wildlife. This negative interaction leads to loss of life from both Human beings and the wildlife. Madden, (2006) reported that human-wildlife conflicts can be defined by a complex mix of characteristics which include instances of crop raiding, livestock depredation, the human safety, destruction of property by wildlife and killing of wildlife by people.

The community around forest uses the natural resource such as firewood, for grazing or animal food, construction materials, farming land, fodder and bush meat. A similar survey in SNNPR in Gamo Gofa Zone revealed that the households access of the park for free grazing, fuel wood, for construction materials, fodder, bush meet, farm land, for forest resource such as honey (Negese N., 2014). These attributes could cause some conflicts between the wildlife and the local community. The amount of time for grazing livestock in the forest and fuel wood collection from the forest is correlated with the distance from the forest. Inhabitants those who are closer to the forest graze their livestock and collect more firewood than those lived far away from the forest. The finding by Mesele, *et al.* (2009) in a related way displays that the duration of grazing in the park was correlated with distance from the park.

Sharing the same and limited resource with wildlife and the struggle for space and resource in and around Huwen forest could be the main factors of contributing Human wildlife conflict. The result found by Lydiya. N (2016) similarly showed that sharing resources with wildlife implies that human and the wildlife compete on the limited resources, which creates

conflict. The finding was in agreement with that of Madden (2008) that showed the major source of human-wildlife conflict globally is the struggle amongst the increasing human population and the wildlife for the same scarce natural resources.

Among reported types and causes of Human-wildlife conflicts, the majority of the respondents reported crop loss and livestock depredation due to wildlife was the major type of conflict. Similarly finding by FAO showed that crop damage and livestock depredations are the most prevalent form of HWC across African continent (FAO, 2009). Crop raiding is one of the most common conflicts between the people and the wildlife in developing countries poor protection of crop and livestock, expansion of human population and problematic animals adjacent to wildlife, farming near forest and carelessness of possession owner considered as the reasons and causes of human wildlife conflict. Degradation of wildlife habitats due to expansions of agricultural lands around protected areas probably forces wildlife into crop raiding. This result is in line with the study of Gemedu and Meles. (2018) which concludes the expansion of human population into or near to areas inhabited by wildlife and modification of the natural environments for agricultural activities escalate human-wildlife conflict. The problem of human-carnivores conflict in area mainly caused because of the expansion of predating wild animals, when livestock graze in the forest, the poor protection of the livestock, human encroachment to wildlife habitat and carelessness of livestock owners. Related result was obtained by Karanth *et al.*, (1999) which indicated that across the globe, the frequency and the extent of economic cost of conflict between human and carnivores is increasing due to the expansion and growth of human population.

The threat on human being is mainly occurred when people protect their possession from the wildlife and when the people entered in to the wildlife habitat for using different resources from the forest. Consequently, this practice leads to injury and death of dwellers because of animal bite, claw, gore, or otherwise direct attack of the people. The threat on wildlife occurs due to crop raiding, livestock depredation, killing by the people, which lead to HWC like Killings of the wildlife. The wildlife in Huwen forest also posed different threats on the surrounding people through crop raiding, livestock depredation and killing or injuring people. In addition to this, different threats faced the people in the study area. Anubis baboon killed one child and injured 4 persons, bush pig injured 2 people and colobus gureza injured

three children in the study area. Likewise, the finding from a study in GGNP (Nigeria) described that baboons prey on domestic chicken and sometimes baboon will attack women and children even at their homes and sometimes kill fowls (Eniang *et al.*, 2011).

Most of the respondents reported some degree of crop losses as a result of damage by wildlife and a total of six wild animal species were reported to raid crops around the study area. According to the respondent responses, anubis baboon was the most commonly reported crop raider on the farmland causing much damage. They damage crops early in the morning and in the evening when the people are away from farmlands. The Farmers ranked the pest animals around the study area from the one causing the great damage to the one causing the least damage as vervet monkey, bush pig, porcupine, civet, bushbuck, and colobus guereza, this result agrees with finding of Kate (2012) who reported that baboons were ranked number one crop raiders in Uganda. Quirin (2005) revealed that baboons and vervet monkeys are determined to be the most problematic pest primates among other animals, which were responsible for the damage of crops in Illubabor Zone. According to Sillero-Zubiri and Switzer (2001) anubis baboons (*Papio anubis*) and vervet monkeys (*Chlorocebus aethiops*) are among 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 that they immediately rush into the plantation fields forming different groups in different direction.

Through observation, Maize (*Zea mays*) damaged by anubis baboons, vervet monkeys, bush pig and porcupine throughout its growth stages seedling, flowering and maturation were counted and estimated in percentage. Based on observation conducted in the study area to estimate the amount of maize crop loss, more different crop raiders in Huwen Forest recorded damage at its maturation stage than flowering and seedling stage. In the same way, a study by Belay Worku (2016) pointed out that a lot of damage was observed during the ripening stage. The main crops damaged by raiders around Huwen forest were maize, teff, sorghum, barley and potato. FAO (2009) also revealed that wildlife could be a safety concern for people in rural areas such as maize, sorghum and millet, as well as fruits and some vegetables.

Another adverse effect of the human-wildlife conflict is the killing of domestic animals by predators. The respondents around Huwen forest claimed that there was the occurrence of livestock depredation in the area. The current study agrees with the finding of the study conducted around the Semien Mountains National Park in which 40% of the respondents from Mecheke-Tikurwuha reported loss of sheep and goats due to predator animals (Mesele, 2006). The number and type of domestic animals killed by wildlife varies according to the species and distance of villages from the forest. The main predators, which posed threats on the livestock of the community around Huwen forest, were hyena, anubis baboon, jackal, leopard, lion and wild cat. According to the degrees of predation that reported by respondents, spotted hyena placed in the first and anubis baboon in the second. leopard, jackal, wildcat and lion follow the rank. The comely predated livestock by predators around Huwen forest were sheep, chickens, cattle, donkey and horses. This finding is in line with (Yihune *et al*,2009) which pointed out that spotted hyena caused the most pronounced problems and the local communities loss their oxen, cows, donkeys, mules and horses by spotted hyena.

For controlling and avoiding problem causing wild animals, farmers utilized various methods to keep their farm from crop raiding and livestock predator animals. The local community around Huwen forest reported permanent guarding as a very effective method in all the villages followed by killing the wild animals using different techniques. Additionally, using trap materials, chasing by dog, scarecrows, hunting and plant barriers were applied against the problematic animals as defense techniques. A nearly the same result was reported by Sillero-Zubiri and Switzer (2001) that guarding, chasing, scarecrows, plastic flags, use of secant, fence, hunting, trapping and poisoning as some prevention methods of property damage in the study area. When the communities were protecting their property from wildlife, they cause different threats on wildlife because there is no compensation supports for their possession. In this study, different threats posed to wildlife were evident through observation and interviews. Accordingly, the local communities killed different wild animals. The known animals killed by the local communities around Huwen forest were hyena, Anubis baboon, lion and crown birds. In the same way, a study by Regmi *et al.*, (2013) reported that the inability to mitigate crop raiding and absence of compensation for crop losses lead to killing of animals.

The crisis of human-wildlife conflict causes different problems on the surrounding community due to loss of possession by the wildlife in and around Huwen forest. These problems include low income and productivity, food shortage and other guarding related problems for keeping their crops and their livestock. The result is in line with Hill (2000) who reported that crop damage affects farmers directly through loss of their primary food and cash resource and indirectly through a variety of social costs such as costs for school and hospital. In the same way, Gizacho Girma (2016) revealed that the impacts of wild large herbivore upon the local people cause food shortage and low income. Disease like rabies virus transmitted from wildlife jackal to domestic livestock and humans were the other impacts of wildlife on surrounding dwellers and this finding is in line with (FAO., 2009) and (Sukumar, 1989) wildlife responsible for a serious disease transmission to humans and livestock.

Concerning the population status of crop raiding wild animals in the area the majority of the respondents replied that the tendency of problematic animal is increasing from time to time and that the rising number of crop raiders is associated with trends of crop damage in the area. As problem, causing wild animals increased the problem of human-wildlife also increase. The majority of the respondents replied that the extent of conflict increasing from year to year. Moreover, most respondents additionally replied that the damage of crop was the highest near the forest zone. This result is in line with the study of Hill (2000), Belay Worku and Quirin (2005) who reported that the wild animals are increasing year to year and that competitions for resources between wild animals and human populations are evident.

The local communities around the protected areas developed negative attitude towards different wild animals and involved in killing of them because of limited access to cash and lack of compensation for losses of crop and livestock. The finding by Regmi *et al.* (2013) pointed out that the inability to mitigate crop raiding and absence of compensation for crop losses lead to the killing of animals. With the same token, Mojo *et al.* (2014) by the study conducted in Checha district of Gurage Zones in Ethiopia, shows that grivet monkey is one of the major wild animals that frequently damage crops and the local communities of

Ethiopia suffered more by the crop damaged by wild animals. Further, Hill (2002), the costs of destruction more often exceeded the benefit to community neighboring the park. Bitter feeling among these communities has eroded local tolerance for wildlife, resulting in negative attitudes toward conservation efforts and aggression towards wildlife.

6. CONCLUSION

The present study investigated to evaluate the human wildlife conflict between local community and wildlife in and around Huwen forest, East Wollega, western Ethiopia. This can be manifested through crop damage, livestock predation, threats to humans and wildlife. Farmers in the study area depend on the forest for different resources by destructing and destroying the habitat of wild animals for firewood, for grazing their livestock, fodder, bush meat, and wood for construction purpose and consequently competition between human and wildlife animals occurred. The trends of human wildlife conflict and using resource in the study area were associated with the distance of the forest from farming areas. Those lived near to the forest were more benefited in using forest resource and more at risk in terms of conflict occurred between human beings and wildlife. Human activities including expansion of human population, agricultural lands and modification of the forest like cutting tree for different purpose escalate Human wildlife conflict.

Crop-riding and livestock depredation by wild animals is the major causes for the conflict. Which undermines food security and tolerance of wildlife within neighboring human communities? Wildlife in Huwen forest poses significant damage on the community crops and livestock and the human activities like deforestation, expansion of farmland and hunting and other possession protection methods affect wildlife in the area. Human wildlife conflict has led to the loss and reduction of numerous species including human death, economic losses and shortage of food. However, the forest authorities like district management, village management, east Wollega forest and wildlife office has no any contribution in solving the problems of conflict.

The raising status of problematic wild animals lift the problem of losing possession and people around Huwen forest protect their crops and livestock through using different techniques like Permanent guarding, using poisonous and trap materials for well shooting to kill them, chasing by dog, scarecrows and hunting. This indicated that there is an immediate need for a sweeping wildlife conservation education program to educate farmers living around the Huwen forest about the purpose and benefits of wildlife conservation, the cause of human wildlife conflict and method for reducing various forms of conflict.

7. RECOMMENDATIONS

The impacts of Human wildlife conflict were negative and its impact affects both human and wildlife. From the result of this study, the following recommendations were made to reduce the human wildlife conflict in an area.

- ✓ Farmers cooperatively and strongly should keep their crop plants and their livestock against crop raiders and livestock predator's animals respectively to minimize loss of crop plants and livestock.
- ✓ Farmers changing their means of farming from the most damage crops to the least damaged crops. i.e. from crop like maize, barley, sorghum and wheat to cash crops like coffee and khat to reduce the challenges.
- ✓ Encouraging the societies to grow less preferable unpalatable crop to wild life or as they scale up livestock rearing and bee farm than most damaged crops.
- ✓ The Huwen forest authorities and management agency could provide direct or indirect benefit or compensation to the areas affected by the wildlife through establishing community development projects, such as; schools, hospitals and other infrastructure. The improved compensation will change the negative attitude of people towards wildlife
- ✓ Stakeholders should reduce human settlements around the forest, expansion of farmland, cattle grazing and firewood collection in the forest.
- ✓ Educating community and creating environmental conservation awareness.
- ✓ Guarding resources by strong adult men is important for protecting wild animals from their crops and livestock and the forest guard protects the human activities, which affect wildlife in the forest and problematic animals from Human possession.
- ✓ The forest authority should replant and restore deforested area and providing protection for replanted areas
- ✓ Farmers should improve the methods of keeping and protecting their livestock. When strongly attending livestock in the field and build strong houses and fences to protect their livestock from predators.
- ✓ The forest authorities should improve the measure to against the effect of human-wildlife conflict and the farmers need to be take responsibilities for protecting their own crops and livestock

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APPENDIX

RE: PERMISSION TO CONDUCT RESEARCH

I am a post graduate student at university of Wollega currently carrying out research on human wildlife conflict in and around Huwen forest. Huwen forest and surrounding villages has been selected as case study. I am therefore humbly requesting for your permission to gather the required information from your areas. The questionnaires will be specifically meant for this study and therefore no name of the respondents. The responses are strictly meant for this study.

Your assistance and support on this matter will be highly appreciated.

Thank you in advance.

Section A; demographic information

➤ Respondents' Sex ----- village_____ Age---

1. Educational back ground

☐ Illiterate B. Read and write only C. Elementary D. high School and above

3. Task of the respondents

A) Farmer B) Merchant C) Craft maker D) Civil servant E) Other

1. Marital status A. Widowed B. Married C. Divorced D. Single

2. Distance your farm land from forest?

A. Less than 2Km B.2-5Km C.5-6.9Km D. 7-8.9Km E. more than 9km

To determine the main causes of human-wildlife conflict around Huwen forest

1. Is there any conflict between you (local people) with wildlife in your area?

A. Yes B. No

➤ If yes, what forms of HWC are there? Tick it

- ☐ Crop loss
- ☐ Livestock depredation
- ☐ Human safety
- ☐ Threat to wildlife

➤ Do you expect any benefit from the park? 1. Yes 2. No

➤ If the answer is yes indicating the benefit gained from the forest use the following

	Rating				
Benefits	Very high	High	Moderate	Low	Very low
Grazing					
Firewood					
Fodder					
Bush meat					
Farmland					
Other product					

5. When you get resource mentioned above from the Huwen forest, are there the competition of resources between human and wildlife around Huwenforest?

A) Yes B) No

6. What are the main causes of Human primate conflict in your area?

A. Expansion of farm land B. Poor protection of crop C. Farming near forest D. abundances of primate E. limitation of food in the forest F. attractiveness of crop

7. What are the main causes of livestock predator's human conflict?

A. Human encroachment B. Poor protection of livestock
C. Abundance of predators D. limitation of food E. expansion of livestock

To identify wild animal species that pose major conflict around Huwenforest?

1. Which wild animals are more responsible for crop damage? Rank them

No	Crop raider animals	What crop they destroy or eat
1		
2		
3		
4		
5		
6		

2. What are the main types of wild animals cause threat to your livestock around your village? Rank them

No	Livestock predators animals	Which livestock they attack or eat
1		
2		
3		
4		
5		
6		

To investigate the effect of wildlife on the livelihoods of the people and the effect of surrounding community on wildlife in the area.

1. What main crops damaged by crop raiders in your area? Rank them

No	Crop item	Damaged or eaten by?
1		
2		
3		
4		
5		

2. What is the main livestock lost by predators in your area? Rank them

No	Livestock item	Eaten by?	How many of them in number in 1018-1019?
1			
2			
3			
4			
5			

3. When wildlife causes different problem in your areas what type of method do you use to remove wild life?

A. guarding B. Using poisonous and traps materials for killing of animals
C. Chasing by dog D. Scarecrow E. hunting

4. Which problem mainly faced due to crop and livestock loss and damage?

A) Food shortage B) Low income C) Guarding related problems

5. What is the tendency of problem caused by wildlife from time to time?

A. Increasing B. Decreasing C. No idea

6. What about the population problematic wild animal in your surrounding?

A) Increasing B) Decreasing C) Unknown

1. What is your attitude towards wildlife conservation?

A) Positive B) Negative C) neutral

To suggest some possible solution for human-wild life conflict in the area

1. What you suggest to reduce the effect of crop damage by wild animals?

2. What methods do you use to prevent crop damage from wild animals?

3. How do you minimize the loss of livestock in your areas?

4. How do you minimize the conflict occurs between crop raiders and human beings?

5. How do you minimize the conflict occurs between livestock predators and human beings?

7. Do you get help from other sources to solve HWC problem?

A. Yes B. No

If yes, from where do you get the help?

INTERVIEW FOR CONFLICT BETWEEN HUMAN WILD ANIMALS

1. What type of wild animals cause problems to the people in your areas?
2. How human possessions are loss to wildlife in your area?
3. What about the number of these problematic animals in your areas, is it increasing or decreasing? Explain the reason.
4. What is the main problem occurred in the community as a result of possession loss to wildlife?
5. What type of methods is applied to keep your crops and livestock by farmer or owner?
6. What type of methods is applied to conserve wildlife by surrounding community?
7. What type of strategies and methods you use to prevent wild animals those cause problems to the local community?
8. How you can mitigate and prevent the problem which occurs between human and wild animals cause threat around Huwen forest?

TOPIC OF DISCUSSION

1. What is the main conflict occurred between human and wild life in your areas?
2. What types of problematic animals are found in your areas?
3. How you can protect your possession from wild animals in your areas?
4. How you can mitigate the problem of conflict between human and wildlife around Huwen forest?

OBSERVATION

Data collection sheet for direct observation of crop loss and livestock attacked by wild life

Name of data collector_____

Place_____

Season_____

Distance of the field from the park boundary_____

No	Species observed	Types of human property damaged	Time of observation	Method to control wildlife	remark
1					
2					
3					
4					

Table 20-List of problematic wildlife in the study area

NO.	LOCAL NAME	COMMON NAME	SCIENTIFIC NAME
1	Jaldeessa	Anubis baboon	<i>Papio anubis</i>
2	Qamalee	Vervet monkey	<i>Cholorebusa ethiops</i>
3	Xaddee	Crested porcupine	<i>Hystix cristata</i>
4	Booyyee	Bush, pig	<i>Potamochoerus porcus</i>
5	Weenni	Colobus gureza	<i>Colobus abyssinicus</i>
6	Leenca	Lion	<i>Panthera leo</i>
7	Qeeransa	Leopard	<i>Panthera pardus</i>
8	Warabessa	Spotted hyena	<i>Crocota crocuta</i>
9	Wangoo	Jackal	<i>Canis mesomelas</i>
10	Waldigessa	Aard yark	<i>Orycteropus afer</i>
11	Quurroo	Crow bird	<i>Corvas brachyrhynchos</i>
12	Xirinyii	Civet	<i>Oreotragus oreotragus</i>