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# Impacts of Wildlife on the Livelihood of Communities Living Near Protected Areas in Ethiopia, Control Measures and Its Implication for Conservation

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**Abstract**
Even though, the conflict between human and wildlife occurs worldwide, it is intense in the developing countries like Ethiopia, where livestock rearing and agriculture are important parts of rural people's livelihoods and income. Particularly, increasing human population has resulting pressure on land under cultivation and increased the degree of conflicts between human and wildlife. Hence, the livelihoods of communities living adjacent to protected areas have been affected because of destruction and damage of property and infrastructure; like agricultural crops, plantations, grain stores, fencing, livestock depredation and transmission of disease to domestic animals and leading to additional labor costs for guarding farm lands and livestock's. Therefore, to reduce the negative impacts of wildlife on human; governmental and non-governmental organization, conservation organizations, the scientific community, wildlife managers, tourism industry operators, rural communities living clos to protected areas and other stakeholders should collaborate to safeguard rural livelihoods, reduce their vulnerability, and counterbalance losses with benefits and practice the implementation of community-based participatory conservation approach.
**Keywords/Phrases**: Ethiopia, Human-wildlife conflict, protected area, Wildlife impact,
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## 1. Introduction

Protected areas are one of the important biodiversity conservation centers and main tourism attraction for a nation, particularly for developing countries like Ethiopia through providing sustainable benefit to the local community while supporting for the maintenance and rehabilitation of the protected areas themselves (Stephens *et al*., 2001; Aramde *et al*., 2012). Ethiopia is one of African countries which is a home for highly diversified faunal and flora species composition (Shimelis and Afework, 2008). Even though, different efforts were made in Ethiopia for wildlife conservation, human activities like habitat loss and fragmentation, habitat degradation, hunting and land clearance for farming and settlement, land degradation due to overgrazing and illegal encroachments to the conservation areas are the most series problem of this century (IBC, 2007).

Because of the aforementioned reasons impacts of wildlife on the livelihoods of local communities or conflicts between human and wildlife is one of the most challenging issues regarding conservation of protected areas. Human-wildlife conflict for resource is not a new phenomenon; it has started since the beginning of the human era. As indicated by Smile and Shaun (2002), among the early forms of the ancestors of prehistoric man were predated by a number of predators of the Miocene such as Saber-toothed cats, leopards, spotted hyenas amongst others. The beginning of farming and animal husbandry of the Neolithic revolution increased the range of conflict between humans and animals. Moreover, the crops and the produced formed an abundant and easily obtained food source for wild animals (Parker *et al*., 2007). However, gradually, with technological development, man invented weapons such as axe and iron during stone and iron ages to frighten wild animals, initially (Parker *et al*., 2007).

Particularly, in the last few decades increasing human population in developing countries like Ethiopia, has resulted pressure on land under cultivation and increased the degree of conflicts between man and wildlife (Ahmed, 2017; Dejene and Demeke, 2018). Rapid increase of population growth, investment in forested area, deforestation, wetland draining for cropland areas, and usage of forest edge for coffee plantations is more experienced in Ethiopia. These posed pressures on land, reduce the area of core habitat for wild animals and eliminate corridors for migration and increase the probability of contact, and possibly created conflict between domestic animals, farmers, and wild animals (Quirin, 2005; Dejene and Demeke, 2018).

Human-wildlife conflicts are a global problem, and are occurring in many countries where human and wildlife requirements overlapping (Dickman, 2010; Hoffman and O'Riain, 2012; Ahmed, 2017). Conflicts between people and wildlife are encountered by a diverse group of communities, particularly those residing close to protected areas containing large to very large herbivores and large carnivores (Newmark *et al*. 1994). According to Madden (2008), Human-wildlife conflicts can take various forms, including carnivores attacking and killing livestock or humans, species raiding crops, competition for game and /or resources, disease exchange between livestock and wildlife, and revenge killing. Crop raiding is a widespread and common example of the human wildlife conflict, which

directly influences local people's perception of support for conservation of wildlife (Habtamu, 2016).

The conflict may also affect human welfare, health and safety, and have economic costs. It also poses negative social impacts such as withdrawal and absence of children from school, absence from work, additional labor costs for crop guards, loss of sleep, fear and restriction of travels (Hoar, 1992; Habtamu, 2016). As everybody aware, in most of the developing countries agriculture is a major means of livelihood for rural people and economy is based on agricultural products. Similarly, Ethiopia is a country with more than 80% of people is farmers and the economic policy of the country is mainly agriculture based. So agricultural products especially crops and livestock's should properly protected; wildlife's which damaging crops and livestock should be identified and mitigation measures should forwarded for sustainable conservation.

Therefore, the main objective of this review paper is to compile scientific information's on the impacts of wildlife on the livelihood of farmers living near protected areas in Ethiopia, control measures and its implication for conservation. Specifically, overview of protected areas in Ethiopia, means of livelihoods of communities living around protected areas in Ethiopia, sources and types of conflicts between human and wildlife, wildlife impact control measures and future implication for wildlife conservation of the country were reviewed. Therefore, the review gives ways to local, national and international institutions that may develop appropriate measures to reduce wild animal's impact on livelihood of the communities living near the protected area in Ethiopia.

## 2. Overview of protected areas in Ethiopia

Regarding the history of protected area establishment; the first protected area (PA) in the world is Yellowstone, in 1872, for the response from the western civilization to uncontrolled degradation of biodiversity and ecosystem services (Pretty and Smith 2004; Chape *et al*. 2008). Staring from that time, the number of PAs around the world has increased in avery fast rate. According to the statement of Chape *et al*. (2008), in 2005, the world reached a total of 144,296 protected sites, covering an area of 19,381,000 km², or 12.9% of the earth's land area. Which can be considered as good achievement, but establishment of PAs alone cannot safeguard continuation of biodiversity (Pretty and Smith 2004; Hayes 2006)

However, the beginning of the modern wildlife conservation movement in Ethiopia begins in the 1960's to laid down a foundation for the birth of modern concepts of nature and natural resource conservation, including the thought of cultural conservation in the country (IBC, 2014). Conservation of habitat diversity leads to conservation of species and genetic diversity. The major Ethiopia's ecosystems include: Afroalpine and subafroalpine, Montane dry forest and scrub, Montane moist forest, Acacia-Comiphora woodland, Combretum-Terminalia woodland, Lowland humid forest, Aquatic, wetland, Montane grassland, and Desert and semidesert ecosystems (Husen *et al.,* 2012).

By this time Ethiopia has 21 national parks, 20 controlled hunting areas, 4 biosphere reserves, 80 national priority forest areas, 2 wildlife sanctuaries and many other commercial ranches, botanical gardens, community conservation areas, and also wildlife reserves (Young, 2012). In addition, Young (2012) also indicated that, protected areas in Ethiopia are gifted with unique wildlife; amazing topographic land features with accompanying cultural manifestations that are compatible for wildlife tourism and wildlife conservation; which in return help keep the functioning and healthy ecosystems that are essential for sustained development, especially with regards to providing the services that the current and future generations depend on for survival.

Ethiopia's wildlife potential is estimated to consist of 277 terrestrial mammals, over 861 bird species, 63 species of amphibians and 150 Species of fish and about 201 species of reptiles.

Among these, 31 mammals are believed to be endemic (found only in Ethiopia) and out of these 20 are considered highland forms. Among birds, Ethiopia owns about 32 endemic species (IBC, 2014). Some of the endemic large mammals found in the country are; Canis *simensis,* Theropithecus *gelada gelada,* Theropithecus *gelada obscurus,* Capra *walie,* Capra *ibex,* Capra *nubiana,* Eurus *assinus africanus,* Equus *assinus somalensis,* Alcelaphus *buselaphus swaynei,* Tragelaphus *baxtoni,* Tragelaphus *scriptus meneliki,* Loxodonta *africana knochenhaui* and Panthera *leo abyssincum* (Melaku, 2011). However, according to the International Union for the Conservation of Nature's Red List (IUCN, 2007), Ethiopia has 6 critically endangered, 23 endangered, and 70 vulnerable species of wild animals. From the mammalian species, that require urgent conservation action includes Walia Ibex (*Capra walie*), Gelada Baboon (*Theropithecus gelada*), Mountain Nyala (*Tragelaphus buxtoni*), Ethiopian Wolf (*Canis Simensis*) and Starck's Hare (*Lepus starcki*).

According to Ethiopians wildlife development, conservation and utilization regulations No. 163/2008, inside the national parks and wildlife sanctuaries, human activities including hunting, cultivating, grazing, settling in, burning vegetation, deforestation or exploiting other natural resources is strictly prohibited. Inside the rest of the protected areas, access to natural resources use may be allowed under regulatory procedures on sustainable basis. However, majority of the country`s protected areas are vulnerable to the traditional livelihood activities of local communities like subsistence agriculture, grazing, timber, etc which indicates the existence of unsustainable natural resource management (Young, 2012).

## 3. Means of Livelihoods

Ethiopia is the second most populous country in Africa next to Nigeria with over 100 million people and annual population growth rate of about 2%. As indicated on CRGE (2011), agriculture is the dominant economic sector providing employment for about 83% of the population, contributing 90% to the country's export value and 45% to the Growth Domestic Products (GDP). The per capita income is estimated at 380 USD. Coffee, sesame, leather, flower, gold and live animals are major export items. Similarly, livestock and their products play major roles in improving local livelihoods and the national economy.

In addition, it also provides food, household income, draught, farmyard manure and fuel, ecological and social functions. Furthermore, livestock's serve as sources of commodities for export such as live animals, meat and meat products, hides and skins, and honey and bees wax to earn foreign exchange. About 80% of Ethiopian farmers use animal traction to plough their fields. According to MoFED (2009), report contribution of livestock to the GDP in the year 2009, excluding ploughing services, was 25%. If the value of their ploughing services were included, however, their contribution to the GDP will rise to up to 45%.

On the other hand, forest biodiversity of the country provides ecosystem services including provisioning, regulating, supporting and cultural services although monetary values of the services were not precisely quantified. It also plays vital roles in ensuring food security and sustainable livelihoods for millions of households throughout Ethiopia. Forests contributes an estimated 4% to the GDP through the production of honey, forest coffee, natural gums and timber. Recent estimates indicate that about 26-30% of the total coffee production of the country originates from wild and semi-managed coffee forests and the value of wild coffee is estimated at 130 million USD/ annum (Mulugeta, 2009). Many wild edible plants originating from forests serve as a supplementary, seasonal and emergency food sources for a significant number of rural populations. For example from the nine regional states found in Ethiopia, in Benishangul Gumuz national regional state, wild edible plants were noted to have 30-40% contribution to food security during normal and times of food shortage (MoFED, 2010).

As described by IBC (2014), protected areas have both direct and indirect values. The direct values include recreation, eco-tourism and employment. In terms of environmental services, protected areas play pivotal roles in providing ecological functions such as watershed protection, soil stabilization and erosion control, provision of clean water and associated filtration and storage functions, climate stabilization and carbon sequestration. Protected areas that are managed by Ethiopian Wildlife Authority (EWCA) have an economic values estimated at 1.5 billion USD per year (EWCA, 2009).

Most scholars and institutions argue that protected areas should contribute for socioeconomic development of the local community. However, the livelihoods and well-being of rural poor people are more vulnerable to the establishment of protected areas particularly in developing countries including Ethiopia due to their livelihoods are dependent mainly on agriculture and on the available natural resources (Amin *et al*., 2015; Ahmed, 2017). The impacts of protected areas on local livelihood have been one of the focuses of studies (West *et al*., 2006; Roe, 2008). Positive and negative effects experienced by local community for the reason protected areas can influence attitudes towards conservation activities (Clements *et al*., 2014; Ahmed, 2017).

According to the report of IBC (2014), unsustainable utilization (over grazing/browsing, harvesting and hunting) of biological resources is one of the major threats to biodiversity and ecosystems in Ethiopia. Overgrazing by livestock in many ecosystems has also contributed to the degradation of rangelands and forest ecosystems. The consequences of these impacts include ecological disturbance, loss of species and ecosystem services thereby affecting livelihoods of local communities. Hence, according to Kideghesho *et al*. (2007), knowing the factors which influence the relation between local people and PAs is crucial for achieving conservation and livelihood goals.

## 4. Impacts of wildlife on the livelihood of community living near protected areas

Besides livelihood impact; human-wildlife conflict is becoming a serious threat to the survival of many endangered species and posing socioeconomic problems on local communities in the world and a global problem experienced especially in areas where wildlife and human population co-exist and share limited resources and boundaries (Eniang *et al.*, 2011; Musimbi, 2013). Peoples living in developing countries like Africa and Asia are suffering from the negative impacts of human-wildlife conflict, such as crop damage and livestock predation (Hill, 2000).

Similarly, studies have been conducted in Ethiopia noted the presence of pest animals which damage crops, attack domestic animals and cause various economic loss (Mesele, 2007; Mussa, 2009). Primates are the worst pests of crop due to their adaptability, intelligence, agility, dexterity, and high levels of socialization and cooperation. So they are one of the causes for yield loss of farmers from time to time. If these conditions continue without mitigation there will be a great problem for the society. Different studies described that, the most common type of wildlife impact is crop raiding by wild animals, especially large mammals and birds outside their refugee. Wildlife impacts are a complex mix of characteristics, which include instances of invading, wildlife-livestock disease transmission, livestock depredation, and destruction of property by wildlife (Madden, 2006; Dejene and Demeke, 2018).

The conflict between human and wildlife increase when the needs and behavior of wildlife impact negatively on the goals of humans or when the goals of humans negatively impact the needs of wildlife. These conflicts may result when wildlife damage crops, injure or kill domestic animals, threaten or kill people (IUCN, 2003). Even though, human-wildlife conflict occurs worldwide, it is intense in the tropics and in developing countries like Ethiopia, where livestock rearing and agriculture are important parts of rural people's livelihoods and income. The relative impact of wildlife damage on farm production and house hold income varies greatly according to the amount of land owned and people's economic dependence on rural activities (Messmer, 2000).

Currently, there has been a large move towards the intensification of agriculture, and the resulting large monoculture can be very attractive to animals. A set of global trends has contributed to the acceleration of human-wildlife conflict world-wide. These may be due to human population growth, habitat loss, land use transformation, degradation and fragmentation. Moreover, concern for ecotourism and increasing access to nature reserves, increasing livestock populations and competitive exclusion of wild herbivores, abundance and distribution of wild prey, increasing wildlife population as a result of conservation program (Hill, 2000; Demeke and Afework, 2013). Crop damage due to wildlife may have various impacts on farming households. Which include high guarding investment, increased risk of injury from wildlife and increased risk of contracting diseases, disruption of schooling for children who have to help guard fields and loss of life, threats to economic security, reduced food security and livelihood opportunities (Hill, 2004; Habtamu, 2016).

A study conducted by Kassegn and Endalkachew, (2018), opportunities and Challenges for Wildlife Conservation: The Case of Alatish National Park, Northwest Ethiopia, also confirmed that wild animals such as ape (*Cercopithecus patas*), monkey (*Papio anubis*) and Warthog (*phacochoerus aethiopicus*) damage crops. In addition, leopard (*Panthera pardus*), lion (*Panthera leo*), hyena (*Hyaena*) and crocodiles are eating domestic animals.

Further, study conducted by Dejene and Demeke (2018), on trophy hunting and human-wildlife induced conservation threats to wildlife of Hanto controlled hunting area, southeastern Ethiopia, has identified, Spotted hyena (*Crocuta crocuta)*, Leopard (*Panthera pardus)*, Anubis Baboon (*Papio Anubis)* and Common Jackal (*Canis mesomelas)* as major predator of livestock; whereas Mountain nyala (*Tragelphus buxtoni),* Menelik's bushbuck (*Tragelphus scriptus Meneliki),* Common warthog (*Phacochoerus africanus),* Bush pig (*Potamochoerus larvatus)*, Bohoor Reedbuck (*Redunca redunca)*, Grey duiker (*Sylvicapra grimmia)*, Porcupine (*Hystrix cristata),* Vervet monkey (*Chlorocebus pygerythrus)* and Anubis baboon (*Papio Anubis)* were the most common crop riding wild animals that highly impacting the livelihood of local community.

## 5. Traditional methods used to reduce wildlife impacts

Local communities have been using different method to prevent crop raider and predators from their crops and livestock's. Among the methods are: using physical barriers; guarding and fear-provoking stimuli around the farmland are common one (Demeke and Afework, 2013). For example studies conducted by Habtamu (2016), on the Assessment of Human-Wildlife Conflict in Gimbo Woreda, Kafa Zone Southern Nations Nationalities and Peoples Region (SNNPR), Ethiopia; from 121 respondents 68.6% of them responded permanent guarding, 10% chasing by dogs, 8.3% placing scarecrow, 9.09% trapping, and 4% responded digging trenches round the farm as wildlife impact control measures.

From all of these methods guarding the crop and livestock permanently was noted as an effective method. When the communities use methods like chasing, some wild animals run to forest and frequently turn back and others like vervet monkey hide themselves in the bush and branches of trees. Therefore, according to Habtamu (2016), persons who guarded the crop permanently faced problems like: absence from meeting and other social relations, absence or withdraw from school and absence from market and other journeys, broke their social relation such as participating in wedding ceremony, visiting sick and sorrow person, participating and resolved from business activities.

## 6. Conclusion and way forwards

Generally, based on the reviewed scientific findings, it is possible to conclude that, the livelihoods of communities living near/adjacent protected areas have been affected because of destruction and damage of property and infrastructure; like agricultural crops, plantations, grain stores, fencing, livestock depredation and transmission of disease to domestic animals and leading to additional labor costs for guarding farm lands and livestock's. In addition to these, the local communities are facing negative social impacts including absence of the children's from school, loss of sleep and employment opportunities, also develops fear restriction of travel. These issues are among the impacts communities living near/adjacent protected areas are facing. Therefore, knowing/ getting better information, on the actual problem, prior to implementing any conservation practice and conflict mitigation strategy are indispensable.

Further, communities perceptions towards the protected areas from a diversity of contributing factors including less or absence of income generated from the parks, loss of access to resources and, exclusion from

participation in decision-making, planning and management fueled with low levels of awareness about the importance of wildlife conservation and communities with a subsistence economy can generate negative attitudes towards wildlife and protected areas. These implies, unless wildlife-induced damage to human property is controlled or compensated, negative local attitudes towards conservation and wildlife resources become one of conservation challenges for the future.

Hence, as crop damage by wildlife and livestock depredation are the main sources of economic losses for the community; relocation of voluntary households, where alternative land, resources and socio-economic opportunities are available (suitable for living) may be one of the solution that helps sustainable livelihood and biodiversity conservation in Ethiopia. In addition, federal and regional governments should provide compensation for lost means of livelihood and improving living standards of the local people may help to reduce their dependence on resources from the protected area.

Further, Governments, need to provide awareness raising activities though education and training in schools or in adult education centers and farmer training center (FTC) which will help for disseminating innovative techniques for impact minimization, building local capacity in conflict resolution and increase public understanding of the conflicts between people and wildlife also the role of wildlife in the ecosystem functioning, its economic, ethical, as well as its aesthetic and recreational importance. Over all, governmental and non-governmental organization, conservation organizations, the scientific community, wildlife managers, tourism industry operators, rural communities living clos to protected areas and other stakeholders should collaborate to safeguard rural livelihoods, reduce their vulnerability, and counterbalance losses with benefits and practice the implementation of community-based participatory conservation approach.

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