ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR ENVIRONMENT AND DEVELOPMENT

Human wildlife conflict a case of Gunegedo District in Somali National Regional State, Ethiopia

By

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Thesis Submitted to the School of Graduate Studies of the Addis Ababa University in partial fulfillment of the Requirements for the MA in Environment and sustainable development

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APPROVAL SHEET

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LIST OF ACRONYMS AND ABBREVIATIONS

ASL	Above Sea Level
CITES	Convention on International Trade in Endangered species of wild Fauna & Flora
CSA	Central Statistics Agency
ETB	Ethiopian Birr
EWCA	Ethiopian Wildlife Conservation Authority
FGDs	Focus group discussions
HH	Household
HWC	Human wildlife conflict
IUCN	International Union for Conservation of Nature
PHH	Pastoral Household
SNRS	Somali National Regional State
SoRPARI.	Somali Regional Pastoral and Agro-Pastoral Research Institute
SPSS	Statistical Package for Social Sciences
SSIG	Sahelo-Saharan Interest Group
TLU	Tropical Livestock Unit
UNEP	United Nations Environmental Program
VIF	Variance Inflation Factor
WWF	World Wide Fund

Abstract

Conflicts between humans and wildlife have existed since the beginning of human history. It occurs and increases wherever factors that increase the overlap between humans and wildlife those are habitat loss, human activity, affecting communities near wildlife habitat and essential livelihoods. Conflicts threaten people's welfare, health, safety and the economy. To mitigate conflicts caused by human-induced environmental change realistic tools and Methods are required. Ethiopia's diverse wildlife threated by anthropogenic and raise conflict. The purpose of this study was identifying the existence and determinant factors of human wildlife conflict in the pastoral community of SNRS in Gunagado district in the selected kebeles. Among 261HH 178 (68%) confirmed that the existence of human wildlife conflict in the study area. The incident confronting 83% of the case human induced. Among the attack on livestock 64% of the event causes death. The results indicate that 34.8 % conflict occurred weekly and 67% of the case was happening during dry season when movement was mandatory in searching of water and pasture. Habitat loss was indicating that 83% aggravate incidences for conflict. The trend of human wildlife conflict 86.4 % shows that as it was increasing from previous time. Hyena was the most responsible for attacking livestock followed by Cheetah and goats attack was ranked first 45% as the result shows followed by cattle. The result shows that households' age, education status, livestock size and participating off farm activities are the most determinant factors for human wildlife conflict. It also shows that age, education status and participating off farm activities are the most determinant factors HH attitude towards wildlife conservation program. Improving household awareness, develop effective conservation strategies and alternative livelihood option helps to alleviate the challenge and betterment of household attitude towards wildlife conservation in the study area as well as throughout the region due to community having similar culture and livelihood option.

Keywords: Human wildlife conflict, livelihood, habitat loss, population, livestock, carnivores and pastoral

CHAPTER ONE

1. Introduction

1.1Background of the Study

Conflicts between humans and wildlife have existed since the beginning of human history. There was a conflict between humans and wildlife starting from the period when humans lived in caves. Slowly, with the relative advance in technology, man created traditional sharp material to defend himself from wildlife. During the Stone Age and iron periods, man gradually developed weapons such as axe and iron, which were first used to defend and terrify wildlife. In the last few decades with increasing human population, which resulted in pressure on land under cultivation has increased the degree of conflicts between humans and wildlife. Later on, human beings began to hunt wildlife for food and clothes (Eltringham, 1979).

The degree of human-wildlife conflict has increased in recent decades as the human population has grown, putting more strain on land under cultivation and livestock production. Rapid population expansion, investment in forest areas, deforestation, wetland draining for farmland areas, and settlement exploitation of forest edge are all more common in Ethiopia's southwest similar to the other parts of the country. These land pressures diminish the extent of primary habitat for wildlife, disrupt migration corridors, and increase the likelihood of encounters, potentially resulting in conflict between humans and wildlife (Quirin, 2005). Human-wildlife conflicts are a worldwide issue that affects many nations where humans and wildlife share common resources (Dickman, 2010; Hoffman and O'Riain, 2012). Conflicts between humans and wildlife affect a wide range of populations, especially those living near protected areas as well as habitats for those big extremely large herbivores and large predators (Newmark et al., 1994).

Carnivores attacking and killing livestock or humans, zoonotic disease exchange between livestock and wildlife, carcass poisoning, and revenge killing are all examples of human-wildlife conflicts (Thurgood et al., 2005; Madden 2008). Crop raiding is a regular and widespread example of human-wildlife conflict, and it has a direct impact on local people's support for wildlife protection (Hill, 1998). Due to their influence on cash crops and intensive agriculture, insects, rodents, birds, and

antelope are the most commonly noted in numerous literatures (Hill, 1997; Priston, 2005). As a result, the conflict may have an impact on human welfare, health, and safety, as well as economic expenses. The violence has also had significant societal consequences, including withdrawal and absence from school, absence from employment, increased labor expenses for crop guards, loss of sleep, anxiety, and travel restrictions (Hoar, 1992). The conflict now also poses one of the greatest threats to the persistence and survival of many species (Dickman, 2010). At the same time finding ways to manage and resolve these conflicts is vital for their long-term conservation (Heydon et al., 2010). Numerous incidents recorded from nations all over the world highlight the seriousness of human-wildlife conflict and call for a more in-depth investigation to better understand the issue and help vulnerable and potentially endangered species' conservation chances (Hill, 2000). Human-wildlife conflict is a rising worldwide issue that is not limited to a single geographical location or climate but affects all regions where wildlife and humans cohabit and share limited resources. In many nations, the greatest difficulty appears to be a dense human population close to a wildlife reserve and habitat where livestock and agriculture are essential aspects of people's livelihoods, and conflict intensifies. In developing nations, where livestock and agriculture are major aspects of rural people's livelihoods and income, human-wildlife conflict is more intense (Ogada et al., 2003). In many areas, competition for natural resources is extremely severe and competition between local inhabitants and wildlife raises as a result, local community and wildlife are at risk (Messmer, 2000). The pressure and conflicts between pastoralists and wildlife are likely to increase as long as there is a lack of incentive either economic or other alternative for pastoralists to participate in wildlife conservation (Weladji and Tchamba, 2003).

Human-carnivore conflict is a type of human-wildlife conflict that develops when the population of carnivores grows or when people invade their habitats as a result, carnivores come into contact with household livestock and humans. Such an interaction can put people at risk while also increasing economic losses and People frequently respond in retaliation to conflict by using poisoning, shooting, and trapping tactics that kill a large number of non-target species (Treves et al., 2003). Conflict is exacerbated by factors such as human activity and carnivore behavior. The killing of livestock by wild predators on occasion might result in unavoidable complications in a region where considerable livestock husbandry is leading to the problem of livestock predation is prominent (Oli et al., 1994). The presence of a small number of wild prey may encourage predation on livestock. Predator prey

selection is influenced by the availability and size of prey and predator numbers are most likely due to a shortage of wild prey (Vos, 2000). Human altering carnivore habitat or exploitation of carnivores has resulted in disputes due to a range of demographic, economic, and social pressures. Humans are responsible for the majority of carnivore deaths globally, as well as the majority of recent declines in carnivore populations (Treves and Karanth, 2003). For the huge predators, livestock offered a seasonally plentiful alternate prey source for example, an increase in the number of domestic animals degrading forest habitat and competing with wildlife food resources. The herders are frustrated because huge carnivores are compelled to kill cattle (Breitenmoser, 1998). One of the most controversial concerns in natural resource management is the killing of predators to guard livestock. As a result, there is a growing interest in using non-lethal measures to prevent predation.

Conflicts between humans and wildlife frequently have a long history. These are complicated issues that are unlikely to be resolved quickly and there is no single technical solution (Osborn, 2000). Attempts to resolve the issue in the past have failed in a variety of ways. Without site-specific information that is practical and acceptable in every circumstance in any place, no solution will function. To reduce conflicts resulting from human-induced ecological alteration, realistic instruments and procedures must be developed.

This phenomenon has repeatedly disrupted wildlife habitats, forcing wildlife to interact with humans, and resulting in conflict (Strum, 2010). Large carnivores and herbivores have been imposing considerable harm to livestock and crops in different regions of Ethiopia, as they have in other parts of the world (Demeke Datiko and Afework Bekele, 2011). However, in Ethiopia, a few researches on human-wildlife conflict have been conducted in a few particular places (Tewodros Kumsa and Afework Bekele, 2008). The same is true in Gunegedo District SNRS, in Ethiopia's eastern part, there was no study on human-wildlife conflict, and illegal activities on them have been conducted and a few carnivore species have highly decreased their number from most of the country. Even though there is a threat to their existence the region has a remarkable number of wildlife species as compared to other parts of the country. The carnivores that are found in the district such as cheetahs and lions even it is at risk as compared to other parts of the country due to human-wildlife conflict raised and the community assumed that capturing and selling carnivores' cubs for traffickers considered as compensation for the killed livestock. So, it needs immediate action and solution for it.

1.2 Statement of the Problem

Ethiopia is Africa's second most populous country which is estimated to be 110 million people (Ethiopia, 1992; CSA, 2013). This indicates that the country has productive man power and natural resources, as well as a vast agro ecological zone. This range allows for the existence of many species of fauna and flora, as well as endemic wildlife and plant resources. However, 85 percent of the population is estimated to be agriculturalists (crop production and livestock rearing) which leads to persistent natural resource degradation mostly due to human unsustainable land-use practices. Several studies indicate that land degradation affected severe agricultural crop productivity, critical food insecurity, famine, and dimensional pervasive poverty in Ethiopia (Tesfahunegn et al., 2016).

HWC is quickly becoming a severe threat to many endangered species throughout the world. It is found in all situations where wildlife and humans live and share limited resources. It is not restricted to certain geographical regions or ecological zone circumstances. In many nations, dense human populations close to natural resources or wildlife habitats appear to provide the major obstacles (Western and Pearl 1989). Wildlife habitats often featured sources of dry-season water and pasture that were formerly available to pastoralists' domestic animals (Western 1982). Locals frequently consider wildlife as belonging to the government, as they appear to be solely responsible for its protection (Berger 1989; Korfage 1985; Scott 1983). Wildlife agencies place a strong focus on law enforcement, administrative procedures, and conservation education, yet they are unable to manage or avert wildlife harm. In developing nations, where livestock are significant parts of pastoralist livelihoods, conflicts grow more violent. With the present rate of human population expansion, rising resource demand, and increasing need for land access, it seems obvious that human-wildlife conflicts will continue to be tricky in the foreseeable future. As a result, a greater awareness of conflict resolution and compensation for property losses caused by wildlife is critical. Human-wildlife conflict is described as circumstances in which humans and wildlife have a detrimental impact on one another. Recent studies, on the other hand, reveal that only a few models have been effectively applied and that many of the projects started with just a rudimentary grasp of the core causes of the risks to the protected areas that the studies intended to safeguard (Wells and Brandon 1992). Since the pastoralists rely on livestock rearing for their livelihood, they are constantly on the move and require

a large area to obtain grazing pasture and water which leads to sharing a similar resource with predators, conflict was inevitable.

Similarly, research in Ethiopia has revealed that the focus on the presence of conflict raised on crop-raiding species that harm crops given more concern. Attack on household livestock and create a variety of economic losses (Mesele Yihune, 2007; Mussa Adem, 2009). If these conditions do not improve, there will be a major problem in every aspect of society. The significance of choosing this topic is that in most developing nations, livestock and agriculture are key sources of income for rural communities and the economy is dependent on pastoral and agricultural goods (Musimbi, 2013).
To complete all of the aforementioned tasks, the problem should be researched scientifically and made available to those who are interested. There have never been any previous studies on human-wildlife conflict at SNRS. As a result, the goal of this study was to gather fundamental scientific information regarding human-wildlife conflict based on livestock, household perceptions and attitudes toward carnivores, and effective management of illegal wildlife activities in order to improve the species' future conservation and for their coexistence.

1.3Research Questions

Based on the specific objectives of the study, the study sought to answer the following research questions:
(a)What types of human-wildlife conflicts were experienced?
(b) What was households' attitude towards carnivores and wildlife conservation programs?
(c) What type of illegal activities are practiced and what mitigation methods for conflicting wildlife?

1.4Objectives

1.4.1 General objective

To examine types, presentation of the existing state of human-wildlife conflict and households' attitude towards wildlife conservation in the Gunegedo district of the Somali National Regional State in Ethiopia.

1.4.2 Specific objectives

- ✓ To assess household attitudes towards the carnivore conservation program and its determinants in the study area.
- ✓ To identify the type of human-wildlife conflict and its determinants.
- ✓ To assess mitigation measures to resolve human-wildlife conflicts and illegal activities practiced in the study area.

1.5 Significance of the study

Ethiopia is home to a range of diverse wildlife species and subspecies, of which many of them are threatened by anthropogenic activity, particularly big predators like the lion, leopard, and cheetah. Some carnivores are particularly troublesome in various parts of the nation, notably in pastoralist areas where livestock rearing is the main source of income. This study provides relevant information to improve household awareness of carnivore conservation. Furthermore, it helps to develop an effective conservation strategy and to identify future study springboard for researchers interested in wildlife research. Moreover, it is used to figure out what causes human-wildlife conflicts at this research site, with a focus on carnivores as well as how to coexist with wildlife and resolve difficulties. To respond to issues related to increases in human population, land subdivision, and changes in land use, policymakers will use as evidence for establishing and implementing policies, programs, and initiatives relevant to wildlife conservation and management. Results will be of benefit to scholars, researchers, and other people profound on conducting similar studies and also provide baseline data on human-wildlife conflicts and conservation challenges in the study area.

1.6 Scope of the Study

The study is limited Eastern part of SNRS where HWC and household attitudes towards wildlife conservation are threatened from time to time. The study targets household populations living in the selected SNRS district kebele. The scope of the study was restricted to human-wildlife conflict resulting and households' attitudes towards wildlife conservation programs. Thus, the research identifies HWC and current intervention measures on conservation challenges in the area and proposes interventions for adoption in the new policy framework where these problems are severe.

CHAPTER TWO

LITERATURE REVIEW

This section provides theoretical, methodological, analytical, and conceptual framework and empirical literature reviews of the research.

2.1Definition

Human-wildlife conflict (HWC) is defined differently by various scholars. HWC is described by the World-Wide Fund for Nature as "any interaction between humans and wildlife that harms human social, economic, wildlife population conservation, or on the environment" (WWF, 2005). HWC is described as a conflict by the International Union for Conservation of Nature as occurring "when human population desires overlap with those of wildlife, resulting in costs to both residents and wildlife (IUCN, 2005). Environmentalists refer to human-wildlife conflict (HWC) as a type of conflict when human demands and wildlife conflict, it costs both human beings and wildlife species when wildlife destroys human property or gets killed by humans (Osei-Owusu, 2008).

2.2 Overview of the Concept of Human-Wildlife Conflicts

Conflict between humans and wildlife has occurred for as long as both share the same environments and resources. The conflict between humans and wildlife arises when the need for wildlife overlaps with human targets or when human needs alter the needs of wildlife. When wildlife damages crops, attacks or kills livestock, or threatens or kills individuals, conflicts may occur (IUCN, 2003). Although it is more common in the tropics and developing countries, where livestock and agriculture are important sources of income and subsistence for rural inhabitants, HWC occurs around the world. It develops mostly as a result of habitat loss, degradation, and fragmentation caused by human activities such as logging, animal husbandry, agricultural expansion, and development projects (Fernando et al., 2005).

Across Africa as human populations and demands for land increasing, human-wildlife conflict will continue to increase (Browne and Jonker, 2008). HWC has been the cause of serious problems for both humans and wildlife for years (Raini, 2009). It happens when both are close to one another. When wildlife attacks resources intended for human use, such as crops by herbivores and livestock by predators, conflict arises. HWC is on the rise in areas nearby to protected areas across the world, with serious consequences for both human beings and wildlife. A global overview of this problem reveals that human-wildlife conflict is a significant issue in Africa, particularly in East Africa, where human populations are increasing, and wildlife are struggling to survive in the face of development and climate change.

The world population is predicted to grow by over 50% in the next fifty years, from six billion in 2000 to over nine billion in 2050. The least developed nations of Latin America, Asia, and Africa are predicted to realize the majority of this rise (Hill, 2000). The need for agricultural and natural resources is growing along with the human population, which creates more possibilities for wildlife and people to interact and causes conflict (Naughton-Treves, 1998a). As wildlife needs interrelate with human needs, human-wildlife conflict now occurs in various forms all over the world and affects many different wildlife species (IUCN, 2005; Lamarque *et al.*, 2009).

It is argued that the increase in human-wildlife conflicts is attributed to a lack of effective ways to deal with it locally and a lack of inclusion of people living adjacent to protected areas in decision-making on conservation (Hill, 2004). External variables are also known to influence trends of human-wildlife conflicts in protected areas, including poaching, settlement, access restrictions, and regulations (Gillingham & Lee, 1999). Conservationists argued that the problem of human-wildlife conflict will worsen as the rural population grows and settles in or near to wildlife habitats. Further experts noted that this had led to crop damage and loss of lives for humans and livestock. (Distefano, 2005; Naughton-Treves, 1997). In Africa, the victims abandoned their farmland due to the high cost of recover and non-response to the damage caused by wildlife (Naughton-Treves, 1997). Human-wildlife conflict affects all continents and countries, developed or not, however developing countries are generally more vulnerable than developed countries (Fairet et al., 2012). The conflict between humans and wildlife creates one of the most serious threats to the existence of many wildlife species and a major challenge to wildlife conservation (Madden, 2008). It's a serious problem in Africa and

other Developing regions of the world, where fast-increasing human populations and expanding settlements are distracting wildlife habitat and increasing human-wildlife interactions. (Blair, 2008; Mwamidi *et al*., 2012).

2.2.1 Human carnivore conflict

Due to the development and increase of the human population, the frequency and magnitude of conflict between humans and carnivores is growing all over the world (Karanth et al., 1999). They also compete with expanding human populations and livestock due to their extensive land requirements and position at the top of the food chain (Myers and Bazely, 2005). Human change in carnivore habitat or the rising of carnivores has resulted in increased conflicts due to several demographic, economic, and societal pressures (Naughton-Treves et al., 2003). The vast majority of human-carnivore conflicts involving the depredation of livestock are caused by a local ecological imbalance. These carnivores attack humans and their livestock if the habitat they inhabit is not large enough to maintain them, with sufficient food supplies, and if human impact on the habitat increases (Treves and Karanth, 2005).

2.2.2 Impact of human-wildlife conflict on humans

In today's congested world, human-wildlife conflict is rising and it may have serious consequences for human populations. As the human population and the level of landscape modification grow, the possibility of resource conflict between humans and wildlife grows (Dickman, 2008). As the needs and activities of wildlife and humans become more similar, it has a detrimental influence on human targets and eventually lead to conflict. Wildlife may have major direct and indirect consequences on humans, ranging from direct economic impact to less obvious implications such as higher opportunity costs and reduced quality of life. Apart from the direct consequence of depredation, living near wildlife might cause other expenditures (Distefano, 2010).

2.2.3 Habitat factors resulting to human-wildlife conflict

The rise of human-wildlife conflict has been assisted by several global patterns about human populations, habitat deterioration, and wildlife distribution. Wildlife habitats can be significantly altered by anthropogenic activities such as logging, animal husbandry, and infrastructure development as well as the expansion of agricultural land, the intensive harvesting of forest products, overgrazing, and habitat fragmentation (Fernando et al., 2005; Kate, 2012). The length of the 'edge' for the contact between community and wildlife grows as habitat fragments, while wildlife populations get compacted in limited areas as a result, wildlife strive to meet their nutritional, ecological, and behavioral demands, more interaction and conflict with people occurs (Sukumar, 1990). In human history, the relationship between humans and wildlife has been marked by conflict (Heydon et al., 2010). However, during the last three centuries, the change of global landscapes from mostly wild to predominantly for human concern (Ellis et al., 2010) has seen increased conflict between humans and wildlife for space and resources (Siex and Struhsaker, 1999, Woodroffe et al., 2005, Hoffman, 2011). The nature of conflict between people and wildlife, particularly land use of forests and water indicates that raising a trend. Conflicts are manifested when people are killed or injured by wildlife, loss of livestock through predation, competition for pasture, wildlife invasion of crops in farms, and inadequate or lack of compensation for losses (Musimbi, 2013).

2.2.4 Competition for resources between people and wildlife

Because of the continuing loss and fragmentation of ecosystems due to growing of human demand, the conservation of environments is frequently small, isolated, and fenced (Bissonette and Adair, 2008). This limits wildlife numbers and among other things, can lead to localized overpopulation of a specific species (Van Aarde and Jackson, 2007). The ongoing loss of habitat highlights the need for ecosystem protection and an understanding of how wildlife uses ecosystems (Dougles-Hamilton et al., 2005). Many studies have discovered that wildlife adapts their range and feeding behavior, as well as their daily movement patterns, to avoid human-caused disturbance (Burke et al., 2008).

2.2.5 Mitigate measures taken to human-wildlife conflicts

Many governments in partnership with conservation groups and the local community are putting various measures into place to mitigate, manage, and resolve human-wildlife conflicts both inside and outside of protected areas (Sitati and Walpole, 2006). The success of the measures implemented has been documented in various studies indicated among them (Sitati,2003b; Sitati and Walpole,2006). Despite this, it is important to empower the local community in resolving conflicts. This is mainly done by training communities to select methods that can be adopted in a specific area by incorporating the local community on the issue to put their views as a permanent solution to resolve the problem. Various strategies to protect people have been adopted Bell (1984) and Sukumar, (1991) reported that African communities use different traditional methods to mitigate human-wildlife conflicts. However, it has been developed those conventional methods of protecting wildlife from livestock and farms, such as dogs, drums, fences, lighting fires, using scare crows, snaring, making noise/shooting, shining torches, and throwing stones, are ineffective because wildlife is habituated to them (Sitati, 2003a). These traditional methods have been used by local people to minimize wildlife damage for many centuries (Hoare, 2001).

In Africa and other parts of the world, management of human-wildlife conflict has been studied and documented. There are many techniques used to limit damage, as well as successful strategies and research findings that help to lessen human-wildlife conflict. African communities employ a variety of traditional techniques to reduce confrontations between people and wildlife. The pestilence discourses that can spread among marginalized communities living adjacent to dangerous wildlife, as well as the cultural, economic, and political circumstances and worldwide links that give rise to them, were emphasized by McGregor (2005). In relation to the implementation of conventional methods to control wildlife conflict, increased stakeholder diversity has produced new management approaches. Conventional measures adopted to prevent, mitigate, and manage HWCs are diverse and range from fencing to controlled shooting, translocation, and use of repelling methods. Studies conducted in other areas have shown that problem animal culling can generate revenue when combined with legal safari hunting for specific animals. However, this requires monitoring hunting activities to avoid manipulation of the quotas and ensure that the targeted animals are not affected by the reduction in

population. Culling problematic animals involves the periodic killing of targeted animals to reduce their population and maintain optimum land-carrying capacity through scientific monitoring (Hoare, 2001; Muruthi, 2005).

2.3 Theoretical Framework

This study utilized the Value – Belief – Norm (VBN) theory advanced by Paul Stern (Stern et al., 1988). This theory addresses the type of values that contribute to the moral obligation to environmentally responsive behavior in solving social and environmental problems. The theory reveals a chain of influence on the behavior of people to address environmental problems by protecting threats because of the awareness of adverse consequences on other people and thus instigates responsibility to help eliminate the problem. The interface between self-concept and collectivism, the theorists argue provides a good foundation for community-based management of natural resources and social relations.

To access and sustain land resources, this model identified variables impacting the complicated relationship between humans and wildlife. Because the interaction between humans and wildlife changes as the human population grows, changes in land use occur owing to competition for resources and clearance of wildlife habitats. This encroachment on wildlife habitats has an impact on wildlife conservation. Humans dominate in their power relationship to gain and keep access to land or places, causing varied disruptions to wildlife habitats. Subdivision of land to individuals, development of land for agriculture or other activities, changes in cultures and lifestyles of people, market forces, and policies. These factors have an impact on conservation by producing human-wildlife conflicts, which should be handled by separating humans from wildlife in protected and pastoral regions, as well as enacting rules or legislation to protect wildlife. Mitigating HWCs is necessary to control wildlife-caused conflicts and promote human tolerance of wildlife because wildlife resources are challenged by various actors with varying interests and values, they are the most powerful in influencing how conservation and management decisions are made. The conservation strategy is founded on the idea that wildlife should be protected by restricting areas and prohibiting people from living in or consuming resources from these areas. As a result, local people's needs and interests are overlooked. According to Kidegesho (2006), conflict emerges when people

are denied the opportunity to negotiate fundamental desires or values, resulting in antagonism that can be violent. It was believed that balancing human needs with conservation and development goals would go a long way toward encouraging human-wildlife coexistence as well as tolerance among local communities living adjacent to protected areas (Kidegesho 2006).

The theoretical concept provides a good foundation for community-based natural resource management and helps research by identifying variables such as human-wildlife resource competition, intensification and diversification of land use in wildlife habitats, and other factors that influence the complex relationship between people and wildlife. Institutions for conservation, government policies on mitigation measures, new technologies and levels of pastoralist development, and community support for conservation are all moderating variables. All of these factors had a significant impact on wildlife conservation in the study area and they contributed to the development of research because it was hypothesized that balancing human needs with conservation and development goals could go a long way toward promoting coexistence between humans and wildlife, as well as tolerance among local communities living near to protected areas and wildlife habitat. To keep the sustainability of wildlife resources in the area, as well as to improve the region's environmental, economic, and social well-being, a logical framework for peaceful cohabitation between wildlife and humans is required and significantly important.

2.4 Conceptual Framework

A conceptual framework is a network to interconnect variables in a relationship or phenomenon under study. It's also a set of interconnected ideas that help the study decide what variables to test and what links to look for. This study's conceptual framework discusses the link between the independent and dependent variables. The dependent variable is thought to be affected by an independent variable. A dependent variable is one whose result is determined by the independent variable's manipulation. This conceptual framework draws from the theoretical foundations previously demonstrated and used in this study. The researcher has developed a set of conceptual frameworks that are supposed to explain the primary reasons for human-wildlife conflict by using the theoretical model from the previous literature. The conceptual framework figure below illustrates how the independent variables impact

the dependent variable (human-wildlife conflict). An intervening variable is a variable that can impact the connection between the dependent and independent variables.

Moderating variable acts similarly to an independent variable in that it has a substantial contributing or contingent influence on the connection between the dependent and independent variables (Wildlife policies). The following schematic diagram explains the relationship between the independent variables and the dependent variable Change in the cultures and lifestyle of people also causes conflicts with wildlife due to lack of benefits from wildlife resources and inadequate or lack of compensation among others.

Changes in land use and mass movement of pastoralists in searching water and grazing land as well as subdivision of land among clans fragmentation of land hurting conservation and hence speeding conflict intensity, which varies based on proximity to the wildlife habitat, wildlife species, and seasonality. Other aspects include government policies for land development, new technology, varied group interests, perceptions and attitudes, conflict management interventions, laws, and regulations. A combination of these factors has led to an impact on wildlife resource conservation, as evidenced in this study by the types, intensity, and nature of human-wildlife conflicts in the area, their causes, illegal activities, and mitigation measures taken by both pastoralist communities and government agencies to resolve conflicts, as well as their challenges and limitation. The figure below shows the interaction between the above variables.

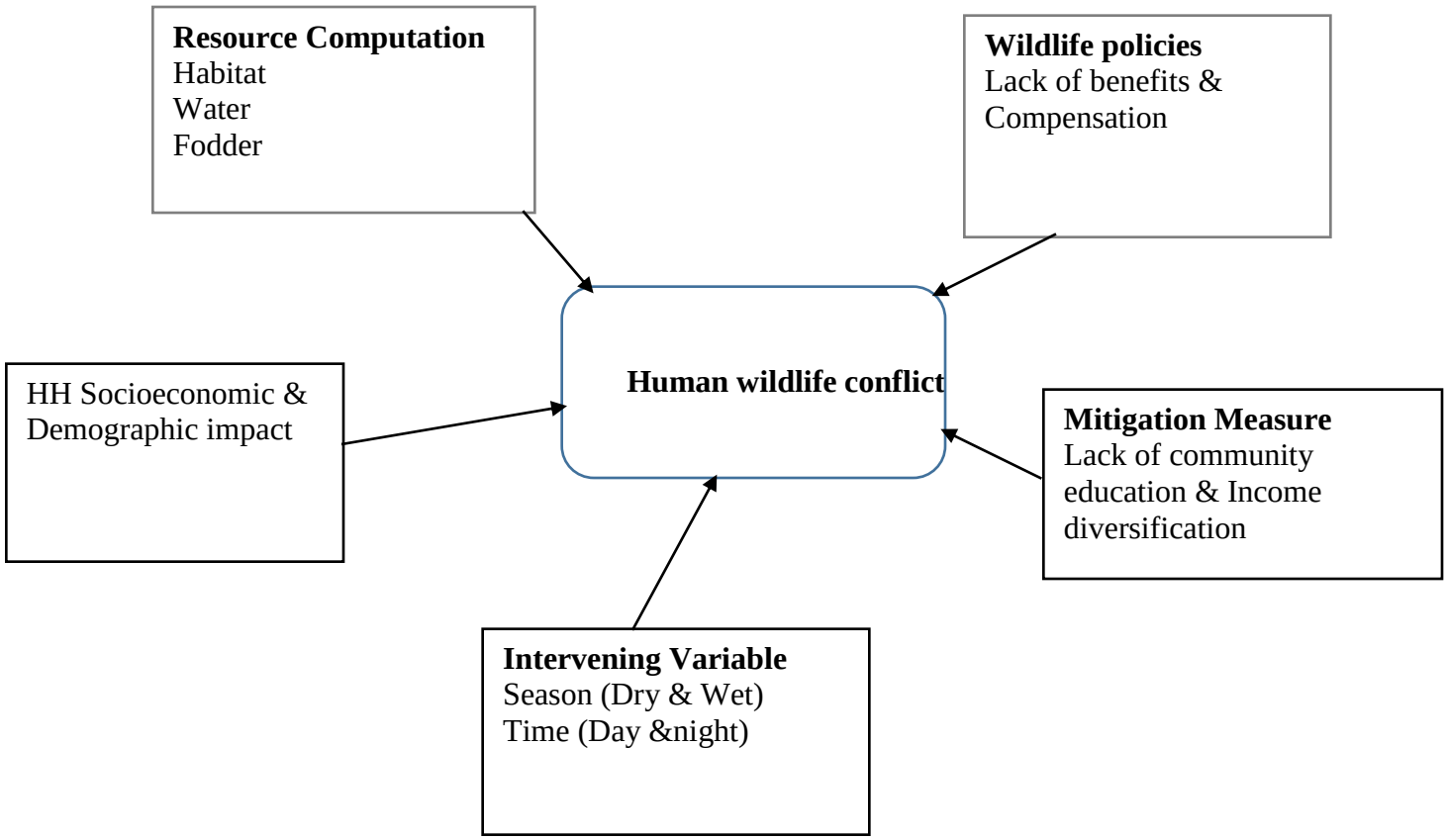

Figure 1. Conceptual framework of the study

CHAPTER THREE

Methods and Materials

This chapter describes the research design that was used to achieve the study objectives. The chapter described the study design, target population, sample size, and sampling procedures. It also describes the study instruments, their validity and reliability, collection procedures, data analysis techniques, and presentation procedures.

3.1. Description of the Study Area

This study was conducted in the Somali Region (SNR) of Ethiopia borders with Ethiopian regions of Afar, Oromia, and Dire Dawa city to the west, as well as Djibouti to the north, Somalia to the east, and Kenya to the southwest. The region has an approximately 350,000 square kilometers ‘in area coverage and is the second largest region in Ethiopia next to the Oromia region in terms of land mass and the region is located in the east and southeast part of the country.

According to the Central Statistical Agency of Ethiopia's (CSA) 2007 Census, the Somali Region had a total population of 7,445,219 people living in the region, from these 3,472,490 were males and 3,972,729 females and 1,489,044 people, or 20% of the population, lived in urban centers. From the total population 80 percent, or 5,956,175, were pastoralists and agro-pastoralist. An area estimated 21.27 individuals live in a square kilometer area of about 1, 685,986 households were tallied for the entire region, with urban households having an average of 6 and rural households having an average of 6.5.

Somalis make up the majority of the population (90.2%), followed by the remaining ethnic group accounts with Amhara (0.06%), Oromo (0.46%), Somalis with foreign ancestry (0.20%), and Gurages (0.08%). The region is organized into 11 administrative zones, with a total of 93 woredas (districts), six town administrations, and 1,224 kebeles.

Jarar zone is among the 11th zone of Ethiopia's Somali Region. Most of the pastoralists in the Jarar zone community’s economy rely on livestock rearing (SSIG, 2006). In the past, it was named as the Degehabur zone because its main city was Degehabur. Korahe, Nogob, Fafan Zone, the southeast of Dollo, and Somaliland all have borders with Jarar Zone on its southern, southwest, northwest, and

northeast sides. The Jarar Zone is divided into ten districts and one special zone, including the districts of Daror, Gashamo, Aw-bare, Ararso, Yoale, Birqod, Degehamedo, Gunagado, Dig, and Bilcil. According to the Central Statistical Agency of Ethiopia (CSA) 2007 Census, there were 478,168 people living in this Zone overall of these 44% were females, and the remaining 56% were males. Out of these, 415584 (86.9%) were pastoralists, while 62,584 (13.1%) lived in urban centers.

According to a 2004 World Bank memorandum the average rural land holding in Jarar was 1.5 hectares of land (compared to the national average of 1.01 hectares and an average of 2.25 for pastoral Regions), 1.5 heads of livestock and 28.2% of the population involved in non-agricultural occupations. There are two altitude-thermal or agro-climatic zones in the Somali region. The Ogaden's lowland is divided into two zones: the "Bereha" zone is allocated to the southern and eastern parts, while the "Kolla" zone is responsible for the northern and western portions. The region's north and west are both covered by hilly Upper Kolla, which has heights between 900 and 1700 masl. After a steep descent into the hilly Lower Kolla, the ground gradually descends towards the level "Bereha" region, with an average elevation of about 500 meters above sea level. A mean temperature of 25 to 30 °C is recorded in the upper elevations. The temperature in the Eastern and Southern lowlands exceeds 30 °C (SSIG, 2006).

According to Amaha et al. (2012), the Somali region makes up more than 50% of Ethiopia's 0.7 million km2 of rangeland, with a mix of bush lands (35%), bush grasslands (30%), grasslands (25%) and bare lands (5%). The Somali region is renowned for its diverse flora and fauna. There are large herbivores and carnivores in the animal kingdom. Among the common carnivores are cheetah, leopard, lion, hyena, caracal, and serval cat, and from the herbivores which are found in the area are the gerenuk, dik dik, giraffe, oryx, and kudus are some of the lists of species found in the area.
The Gunagado district was found 76 km from Degehabure city to the east direction and the district capital city was named Gunagado. the district has a total population of 175,230 and 19 kebeles are found in the district among them 4 kebeles are in Gunagado City and the remaining 15 kebeles are o
According to Amaha et al. (2012), the Somali region makes up more than 50% of Ethiopia's 0.7 million km2 of rangeland, with a mix of bush lands (35%), bush grasslands (30%), grasslands (25%) and bare lands (5%). The Somali region is renowned for its diverse flora and fauna. There are large herbivores and carnivores in the animal kingdom.

The district depends on a pastoralist economy, with livestock production being a major source of income for many households. It has also been affected by recurrent drought in recent years. Besides livestock rearing, since the district was bordered by Somaliland off-farm activities such as trade and transportation are important economic activities in Gunagado district as well.

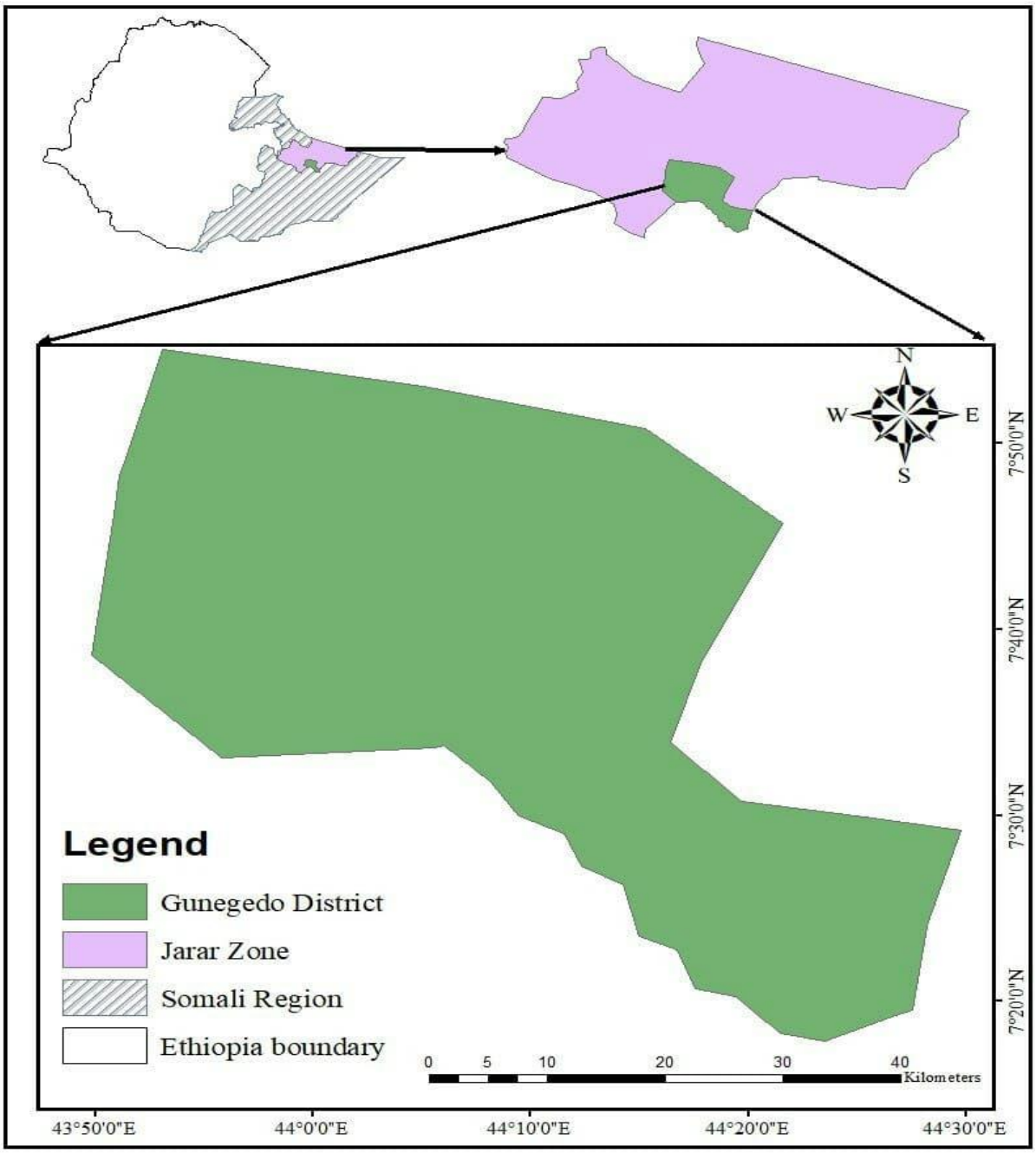

Figure 2. Map of the study area indicating Gunegedo district and its Relative location in Ethiopia

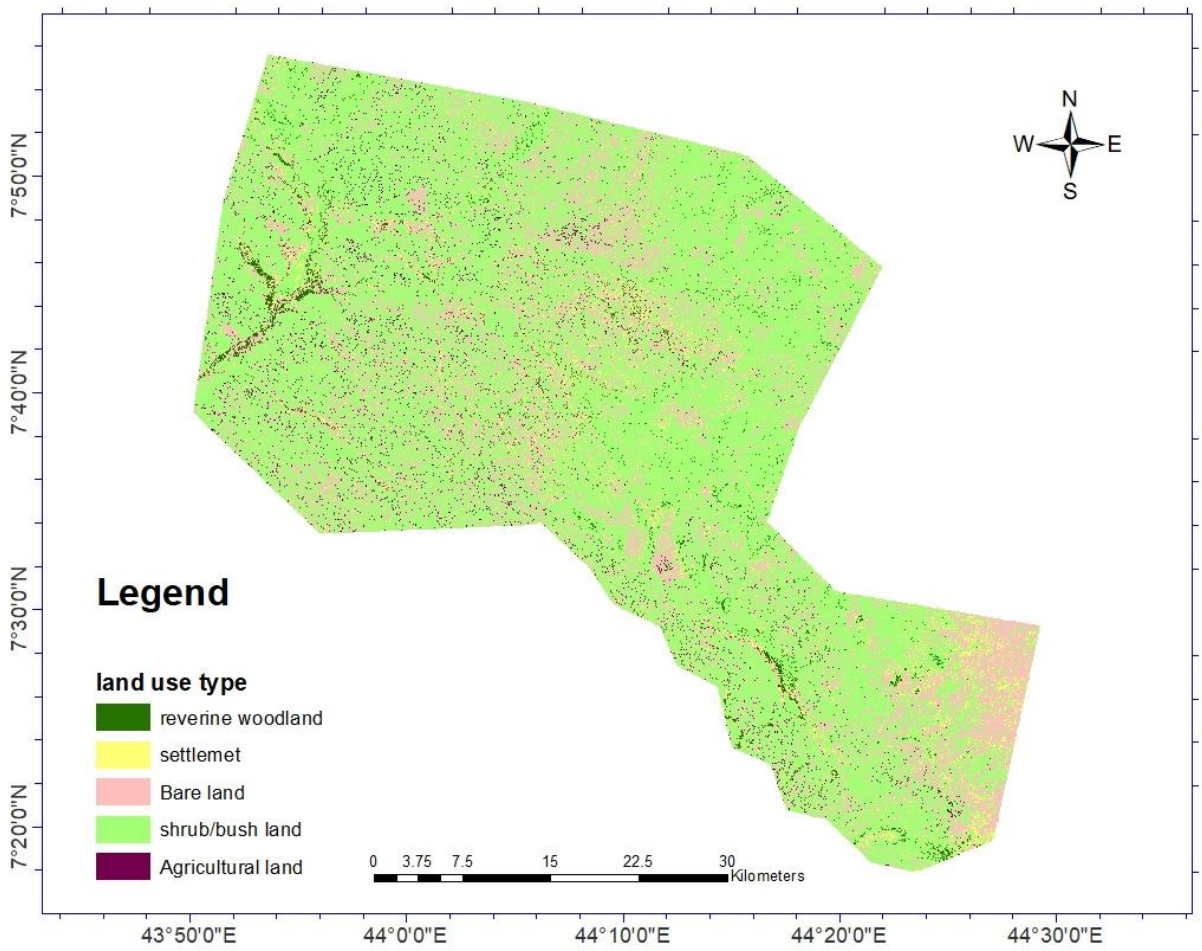

Figure 3. Map of Land use /land cover / type of Gunagado district

Table 3.1:**land use/land cover/ type of the study area**

Land cover types	**Area (km^2)**	**Area (%)**
Bush / Shrub / land	1696.08	69.98
Bare land	513.09	21.2
Settlement	115.56	4.77
Riverine wood land	51.07	2.1
Agriculture land	47.65	1.96
Total	**2423.45**	**100**

Source: Land sat map of Land use land cover type of the District (2022)

3.2 Research Design

Research design is the plan and structure of investigation to obtain responses to formulated research questions. It is actually an outline or a scheme used to generate answers to the research question. This study followed the scientific method, which entails monitoring and describing a subject's behavior without in any way altering it. By providing details on what is in existence concerning the conditions or variables that are discovered in a specific context, the design is also used to methodically describe a situation, problem, phenomenon, service, or product to define the what, how, and why of the study (Kothari, 2004). This study used a descriptive survey research design, which produced information on factors influencing human-wildlife conflict positively or negatively. The design was appropriate for the study because it shows the variables like types, causes of HWC, and mitigation measures implemented that contribute positively or negatively to human-wildlife conflict. Further, it enabled the researcher to undertake a scope of observation on the phenomena under study, and the design provided for accurate descriptive analysis of the characteristics of a sample which can then be used to make inferences about populations (Kothari, 2004). However, the research design had drawbacks since the sociological and sample surveys conducted could not provide long-term solutions to sociological problems and issues relevant to the study as well as the inability to obtain information not known by respondents and where respondents avoid questions that check on their honesty. However, before the interviews respondents were informed of the importance of research and the confidentiality of information given to assure them. Data were collected in three weeks followed by data coding, analysis, and interpretation. Data was collected from randomly selected respondents under a quantitative and qualitative (mixed) approach with key informants taking part in focus group discussions (FGDs). A well-semi-structured questionnaire was administered to ensure both internal and external validity were attained as explained hereunder.

3.3 Target Population

The target population defines all individuals and groups that make up the study universes (Kothari and Garg, 2014). The group that the intervention is intended to study and take conclusions from is known as the target population. When performing the cost-effectiveness of the research, it is important to provide a detailed description of the target population's characteristics as well as those of

any subgroups. The target population for the study area was made up of households with a total of 1452 members from three kebeles in an area with a repeated incidence of human-wildlife conflict based on the information accessed from the district.

3.4 Sampling Procedure

A simple random sampling procedure was employed during the data collection exercise. The sample size was determined using a percentage of the total population of 1452 which was secondary data collected from the Gunagado district administrative archive. The sampling method ensures an equal probability chance of individuals being selected. Random sampling was adopted to ensure that the population in each location got equal representation without bias. The proportion of the sample selected within the kebele was based on the population found in each.

From the total population under study, 261 households were randomly selected and interviewed. Where a respondent randomly selected for interview in a sampling unit refused to be interviewed, a second visit was made to ensure that the interview was held. Gunegedo district was purposively selected for this study as the area encounters frequent human-wildlife conflicts in the area. Among 19 kebeles, in district 3(three) kebeles namely Mirta, Megala add, and Adadiheyoga were selected using the Purposive sampling technique because the district identifies the kebeles where repeatedly human wildlife conflicts were happened and since the area is near to boarder wildlife trade and trafficking is of common practice. Each village found in the selected kebeles was categorized into three groups based on their proximity to forest and shrubland edge as near, medium and far. Random sampling technique was employed to select a representative sample from each pastoralist household in the kebeles.

Table 3. 2 **Distribution of Sample Size**

Target Villages	**Target population**	**Sample size**	**Percentage**
Mirta	600	97	37.2
Megala add	400	78	29.9
Adadiheyoga	452	86	32.9
Total	**1452**	**261**	**100**

Source: Gunagado District Administrative Office archive (2022)

3.5 Method of Data collection

A researcher is required to design instruments for data collection Orodho (2012) stated that instrumentation discusses the instruments used for data collection from respondents. The study used questionnaires and an interview guide as the tool for data collection. A questionnaire involves questions that are close-ended and open-ended. During data collection, this study used a questionnaire survey to collect quantitative data. The questionnaire was directly administered to the respondents in their locality by the interviewer. A checklist was used to collect qualitative data. This guideline helped in asking key informants questions during focus group discussions. To achieve the objectives of the study, both primary and secondary data were used, primary data included local views, perceptions, and options concerning human-wildlife conflicts in the area. The data was obtained from primary stakeholders such as households, and at various levels of community organizations as well as institutions with key opinion of the issue.

The secondary data on the other hand included published and unpublished information on the causes of human-wildlife conflicts in SNRS and study areas. The report was reviewed so as to propose recommendations for human-wildlife conflict resolution a management and gaps not addressed in the study area and locality facing similar phenomena.

Literature on government policy and legislation related to the sustainable management of human-wildlife conflicts and general wildlife conservation were equally analyzed to understand the gaps that needed to be addressed in wildlife management and resolving human-wildlife conflict. The secondary data was used to provide information on the background to the problem as well as to confirm the information obtained from the primary data. Primary data was obtained from sampled households and government institutions, all these pieces of information were obtained through the administration of both household and institutional questionnaires. This was collected through oral interviews, observation guides, and focus group discussions. On the other hand, secondary data was gathered from previous research on human-wildlife conflicts at the global, regional, and local levels. Such information was obtained from published and unpublished reports which included books, journals, books, and newsletters. Brochures,

annual and quarterly reports, magazines, national and district development plans, thesis, relevant documentation, and the internet. Directly administered questionnaires to 261 household heads have been covered for the interview. Focus group discussion, observation guides, and photographic techniques are instruments that were employed during the collection of data. Both household and institutional questionnaires were administered randomly to the selected households and institutions within the EWCA evidence. Most of the questions were kept open-ended to enable the responded to give answers that manifest their accurate opinions and perceptions. Questions requiring specific answers are to be equally included. The oral interview was carried out with responded whose lines of duty were considered relevant to the study. Observation-guided and photographic techniques were also used to capture scenes as they appeared to support the information extracted from the questionnaires. To supplement the information obtained using the aforementioned instruments, secondary data was used to serve this purpose.

3.6 Data analytical technique

Data analysis requires categorizing, ordering, manipulating, and analyzing raw data to get answers to the research questions (Kothari, 2004). Quantitative data was analyzed using descriptive statistics using the Statistical Package for Social Sciences (SPSS) version 23 and using percentages, means, standard deviations, and frequencies. Data was presented by the use of tables. Using content analysis, patterns, and trends were identified in the qualitative data that the study's interview guide had generated. The coefficients from logistic regression analysis were used to determine the relationship between resource competition, human invasion, conservation efforts, and human-wildlife conflict; the relationship was considered significant if the p-value was less than 0.5 and the relationship was considered not significant. If the p-value was greater Then 0.5 it was significant.

3.6.1 Descriptive methods

Descriptive statistics specifically, mean, variance, standard deviation, percentage, and frequency were used to describe pastoral households' conflict, attitude toward wildlife conservation, and their socio-economic and biophysical status. Besides, inferential statistical tests t-tests chi-square tests for categorical variables, and F-statistics were used to compare key variables for pastoralists in different categories.

3.6.2 Econometric model for Human-wildlife Conflict

Applying mathematical statistics to economic data in order to produce numerical results is referred to as econometrics (Gujarati, 2004). To achieve the objectives of the study, a binary logistic regression model was employed to identify determinant factors that affect human-wildlife conflict in the study area. In other words, it was used to determine the relative influence of the independent variables on the dependent variable. In this study, human-wildlife conflict was treated as dichotomous variables. The human-wildlife conflict dependent variable is therefore; a dummy dependent variable that does not satisfy the assumption of the linear regression model. The most widely used approaches to estimate dummy dependent variables regression models are the logit, the probit, and the Tobit models (Gujarati, 1995).

3.6.2.1 Model specification - The Logit Model

Following Gujarati (2004) the functional form of the logit model (logistic) distribution function for the human-wildlife conflict can be specified as follows:

$$Pi = \frac{1}{1+ e^{-(\beta_0 - \beta_1 X_i)}} \quad \text{……………………………..…...……..…… (1)}$$

For ease of expression, we can write equation (1) as follows:

$$Pi = \frac{1}{1+ e^{-zi}} \quad \text{……………………...........……………...…………… (2)}$$

Where, Pi is the probability of human-wildlife conflict for the i^{th} pastoralist and that ranges from 0 to 1 in both objectives. It is the observed response of the i^{th} pastoralist (i.e., the binary variable, P=1 for the existence of human-wildlife conflict, P=0 for no human-wildlife conflict. The probability that a given household has conflict with wildlife on expressed by **(2).**

$$Z_i = \beta_0 + \beta_1 X_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots\dots\dots\dots\dots + \beta_n X_n$$

β_0 = is an intercept/constant

$\beta_1, \beta_2, \beta_3$……………………………, βn = are slopes of the equation

X_i= n explanatory variables or X_1 ……………… X_n are independent/explanatory variables

If Pi, the probability of the existence of conflict is given by equation (**2**), then:

$$1 - Pi = \frac{1}{1+e^{zi}} \quad \text{……………………………..……..………...…………} (3)$$

Therefore, we can write: $\frac{Pi}{1-Pi} = \frac{1+e^{zi}}{1+e^{-zi}} = e^{zi}$ ……………………………………. ………… (4)

Then, $\frac{Pi}{(1-Pi)}$ is simply the odds ratio in favor of PHHs human-wildlife conflict (i.e. the ratio of the probability a household head had conflict to the probability a household had not conflict with wildlife in the study area). Finally, taking the natural logarithm of the equation **(4),** we obtain:

Li= in $\frac{Pi}{(1-Pi)}$= Z_i= β_0+ $\beta_1 X_i$...……………(5)

If the disturbance term (Ui) is introduced, the logit model becomes or for estimation purposes, we write equation **(5)** as follows:

Li= in $\frac{Pi}{(1-Pi)}$= Z_i= $\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_n U_i$...(6)

Xi= Vector of a relevant explanatory variable

Li= is a log of the odds ratio, which is not only linear in X_1 but also (from the estimation view point) linear in parameters. L is called the logit, and hence the name logit model for models like equation (**5**).

Similar procedures have been followed to design the households' attitudes toward the conservation program.

3.6.3 Estimation procedure

3.6.3.1 Testing multicollinearity problem

Before the estimation of the model parameters, it is crucial to look into the problem of multicollinearity among the potential hypothesized independent variables. The reason for this is that if multicollinearity turns out to be present, regression results obtained might not be used to make valid policy recommendations. In a binary logit regression model, all the independent/hypothesized explanatory variables were checked for the existence of multicollinearity problems among them using the Variance Inflation Factor (VIF).

According to Gujarati (2004), VIF can be defined as VIF (X_i) = $\frac{1}{1-R_i^2}$, Where R_i^2 is the coefficient of determination when the variable *Xi* is regressed on the other explanatory variables. A statistical package known as SPSS version 23 was employed to compute these values. Once R^2 values were obtained, the VIF values can be computed using the formula. As a rule of thumb, if the VIF of a variable exceeds 10 (this will happen if Ri ^{2} exceeds 0.95), the variable is said to exhibit collinearity (Gujarati, 2004). Thus, it is quite essential to omit the variable with a VIF value exceeding 10. Similar to quantitative variables, qualitative variables may interact, which can result in the multicollinearity issue. Coefficients of contingency were estimated to identify this issue.

The contingency coefficient was computed as follows: $C=\sqrt{\frac{\chi^2}{n+\chi^2}}$

Where, C is the coefficient of contingency, χ^2 is the chi-square test, and n = total sample respondents. As a rule of thumb, a variable with a contingency coefficient below 0.75 shows weak association with others and is recommended. The value above 0.75 indicates strong association of variables and should be omitted.

3.7 Definition and Hypothesis of Variables

Once the analytical procedures and their requirements are known, it is necessary to identify the potential explanatory/independent variables and describe their measurements. Accordingly, key variables that were expected to have an influence on human-wildlife conflict and households' conservation attitudes were explained below.

3.7.1 Dependent/Explained Variables

Operational definition: The following terms were defined according to the meaning they have in this study.

The dependent variable operationalized for this study is whether or not the household had a conflict with wildlife and did households had developed positive or negative toward wildlife conservation programs in the study area. In this study, both conflict and attitude of households are treated as a dichotomous dependent variable, i.e., it takes the value 1 if the household had a conflict with wildlife and 0 otherwise and also takes the value 1 if the household had a positive attitude with wildlife

conservation program and 0 otherwise. Therefore, in both study objectives equations, the information categorizes households with conflict with wildlife and non-conflict groups, and in the second objective households those who had positive attitudes and those households who had negative attitudes toward wildlife conservation programs in the study area.

Definition, measurement, and hypothesis for independent variable affecting human-wildlife conflict

Age : The age of the housed is measured in years. In the traditional community age is one of the most variables influencing social, environmental, and economic situations providing knowledge and wisdom to control their environment. Empirical evidence indicates that as age increases farmers, semi-pastoralists and natural communities develop mitigation strategies to reduce their wildlife conflict. Therefore, it is hypothesized that human-wildlife conflict reduces as the age of the household increases.

Sex of the household head : Sex of the household is measured being male or female which is a categorical variable. In east African countries in general and in Ethiopia in particular, female headed households are more prone to wildlife conflict compared to male household heads. This is because; female households are not able to protect their livestock and crops so that their resources are attacked by wildlife. However, from the female household side the retaliation is minimum compared to male household heads. Female household suppose has positive attitude towards wildlife conflict as compared to male household.

Marital status : The marital status of the households is measured in married (monogamy/ polygamy) or single (divorced) which is categorical in nature. Marriage creates household strength and resource protection from wildlife. On the other hand as a married household has more family size that participates in livelihood activities on natural resources that compete for wildlife habitat, the probability of conflicting with wildlife increases. Therefore, marital status has both a negative and positive relationship with human-wildlife conflict in the study area.

Education level of the household head: It is measured as no education if he/she cannot read and write primary, secondary, and tertiary education level categories. Mostly education provides a general understanding and awareness of why, when, how, and the mitigation/adaptation strategies of human-wildlife conflict before high risk occurs. Therefore, as the household head's educational level increases, it is assumed that his conflict with wildlife decreases in the study area.

Livestock attack size : In the study area livestock rearing is the most dominant economic activity that determines the status of the household. A household with more livestock is respected compared to a household that owns less livestock household. From time to time, the monetary value of the livestock is increasing leading to a serious conflict when livestock are killed or injured by wildlife even a single young goat that worthies not less than 1700 Birr in the area. In the contemporary situation, in Ethiopia, natural resource degradation is increasing human-wildlife conflict in the pastoral areas. Therefore, a household with more livestock attack size was expected to conflict with wildlife in the study area.

Off-farm income source: Participation in off-farm income-generating activities is a dummy variable that measures whether a household participated in off-farm income generation activities or not. A household that has participated in different nonagricultural (non-pastoral) income-generating activities has more annual income less likely to participate in utilizing natural resources including wildlife. The income that households receive off-farm income diversification is the pursuit of any income-earning activity besides livestock rearing. Since the area is close to the border, many different types of petty trade take place there, such as charcoal production, the harvesting, and sale of non-timber forest products (such as honey gum and resin), farming, livestock products, food and non-food items, wage employment, and daily laborers. Therefore, it was expected that household participation in off-farm income-generating activities would have a positive effect on human-wildlife conflict.

Period of living In the area: The period living in the area determine the length of time living in an area less than or more than ayear can be explain in terms of temporar or permanent . It has significantly influence on an individual's perception of wildlife. Long-term exposure to wildlife can lead to increased familiarity and understanding of their behavior, which can positively influence perceptions. There for households who had lived in areas with wildlife for a longer period were more likely to have positive attitudes towards wildlife species

Table 3. 3 . **Summary of independent variables and hypothesized signs of human-wildlife conflict**

No	Variables code	Variable Type	Variables and measurement	The expected sign of the variables
1	Age of the household head	Continuous	Years	-
2	Sex of the household head	Categorical	1= Male, 0=female	+/_
3	Marital status	Categorical	1= married (monogamy/ polygamy) =, 0= divorced , widowed or separated	+/_
4	Education level of the household head	Categorical	0=Illiterate,1=read &write 2= primary, 3= secondary, 4= tertiary, 5= religious	_
5	Livestock attack size	Continuous	Tropical livestock unit (TLU)	+
6	Participation in Off-farm activities	Categorical	1= yes participated ; 0= No participation	_
7	Period of living In the area	Categorical	1=Permanent 0=Temporary (< 1year)	+/_

Source: Own construct, 2023

3.7.2 Independent/Explanatory Variables

The independent/explanatory variables of the study are those which are expected (hypothesized) to have a relationship/association with and to explain as determinants to influence human-wildlife conflict and the attitude of households to wildlife conservation programs. The household livelihood system is assumed to be a major conflict and shapes the household and wildlife conservation program attitude. It is, thus, hypothesized that the age of the household head, marital status, education level of the household head, Family size, non-pastoral income source, and Livestock size ownership were assumed to affect dependent variables. The following subsections define how independent variables affect the dependent variables.

Definition, Measurement, and Hypothesis for Independent Variables

Age of the household head : This is a continuous variable measured in years. As the age of the household head increases, his/her experience and knowledge of environmental degradation or improvement perception increase. Older respondents were more likely to have positive attitudes

toward wildlife conservation than their younger counterparts (Bandara & Tisdell et al., 2003) as was to be expected, elder respondents had spent more time interacting with wildlife than younger ones. The fact that older respondents may have participated in more traditional behaviors involving the use of animals than younger respondents may potentially be a contributing factor to the substantial influence of age on attitudes toward wildlife conservation (Browne-Nunez, 2010; Tessema et al., 2010). Therefore, the older the household head the more hypothesized to perceive the extremely degradation extent of their environment and Age has a significant positive correlation with conservation perceptions (Tessema et al., 2007; Snyman, 2012).

Sex of the household head: It refers to a male or female household head. Gendered components of human-wildlife conflict have not been sufficiently identified or studied. While the fact that women are frequently the main users of forests is now well known (Dankelman and Davidson, 1988; Badola and Hussain, 2003). Few studies conducted in Africa have addressed the role that gender plays in determining attitudes toward wildlife and vulnerability to problems related to wildlife (Kuriyan, 2002; Bauer, 2003). Men and women in the study area adhere to traditional gender norms that position women at the center of the agricultural system, despite the fact that women and men in forest dependent areas prefer to use and interact with the environment in gender-specific ways (Pokhriyal, 1994).Women are typically involved with agricultural and domestic duties including care of livestock, children and elders, and collection of water, fuel wood, fodder, and other minor forest products and Visit the forest frequently as part of their duties. Thus, it is hypothesized that female households would have a positive relationship with the perception of wildlife conservation.

Marital status : It was measured in dummy variables whether a household was married, single, and divorced. The relationship between the perception of the extent of wildlife conservation and marital is priory inconclusive because of its complex nature. Most households perceive the extent of wildlife habitat to their interest so that married bear more children and have a large family size that requires more grazing land for their livestock, food, and other living expenses for leading their livelihood. Therefore, coupled hypothesized that negative attitude towards wildlife conservation compared to single in marital status.

Education level of the household head : Education affects many aspects of life, including how individuals relate to and perceive nature and its wildlife resources. Procedure that enables people to investigate environmental problems, work on solutions, and improve the environment. It suggests that educated individuals may be more knowledgeable of conservation-related concerns, which may have come about as a result of extensive engagement at educational institutions and media exposure (Shibia et al., 2010). People have more knowledge of environmental issues as a result, they are more equipped to make responsible decisions. This finding supports the hypothesis that there is a strong relationship between perceptions and attitudes of local communities towards wildlife conservation (Kideghesho et al., 2007; Manyama et al., 2014; Masud & Kari, 2015; Mutanga et al., 2015). Higher education may help individuals understand the value of protected areas for conservation and the

environmental advantages they provide, according to research on the relationship between education and conservation attitudes (Tessema et al., 2010; Allendorf et al., 2012). According to Biru et al. (2017), education has the greatest impact on the local community's perceived carnivore population in Ethiopia. Education level has been used to convey perspectives on species-specific population abundance and trends and to raise community knowledge of wildlife conservation (Mitchell et al., 2019). This finding agrees with which stated that the more enlightened the people, the higher the tendency to support the park and be involved in the conservation of natural resources (Osunsina et al.,2016). Thus, it is hypothesized that education in households would have a positive relationship with the perception of wildlife conservation.

Livestock attack size : It refers to live animals in‟ pastoral households‟ kept as an asset, measured in tropical livestock units (TLU). The main source of income had attacked by wildlife the household with more livestock attack negatively considered conserving wildlife; households who were mostly dependent on agriculture or livestock husbandry were less likely to support wildlife conservation. They may have lost their primary source of income owing to livestock losses in the past; this is why there is a negative association. Furthermore, personal experience with wildlife damaging crops or predation on livestock had a strong detrimental impact on considers toward wildlife conservation. The findings concur with those of (Hariohay et al., 2018), who found that crop loss and predation had a detrimental impact on residents' attitudes toward the conservation of wildlife. Due to its detrimental effects on pastoral communities' wealth status, predation has been shown to encourage local communities' negative views toward wildlife protection (Manoa & Mwaura, 2016). Human-wildlife conflicts may arise as a result of anti-conservation actions and negative attitudes toward wildlife conservation (Rao et al., 2002). Contrarily, disputes between people and animals may also generate negative perceptions (Ntuli et al., 2019). When locals suffer losses as a result of frequent property destruction without getting compensation, support for the conservation of wildlife declines (Alexander. R. & Lindsey. A., 2005a; Romanach et al., 2007). This may lead to a lack of support to protect wildlife on community lands due to the economic losses incurred as a result of predation community’s livestock (Gadd, 2005). This agrees with the research of (Muriuki et al., 2023) which indicates that the depredation of their livestock by wildlife, leads to a lack of support for wildlife conservation on community lands. The severity of the costs of depredation and the variety of livelihood options available at the interface, among other things, determine how much of an influence they have on households (Chaminuka et al., and McCrindle, 2012). When assessing the effects of wildlife conflict or depredation, all these variables should be taken into account (Jones and Barnes, 2006). Other expenses related to depredation, such as those incurred in building safe animal cages and the opportunity costs of labor related to intense livestock guarding and herding, should also be taken into consideration (Chaminuka et al., and McCrindle, 2012). Therefore, in this study, it is expected that a household that owns livestock and has attacked a large number of livestock has a negative attitude and low support of wildlife conservation activities.

Participation in off-farm income-generating activities : It is the categorical variable that measures a household member who had participated in off-farm income-generating activities in one category and those who did not participate in other categories. It is believed that households with diverse sources of income tend to have more favorable conservation attitudes than those with fewer sources of income. This is because varied sources of income spread out the risk associated with conservation expenses such as agricultural and property damage, livestock loss, movement restrictions, and competition for resources with wildlife. Previous study indicates that economic activities influence local communities' opinions and attitudes regarding the conservation of wildlife. Usually, households engaged in non-farm activities in Kenya favored conservation compared to those who depended solely on crop production for their livelihood options. Similar results were presented from other areas of East Africa (Newmark et al., 1991; Infield et al., 1988). Therefore, in this study, it is expected that a household that participates in off-farm income is expected to have a positive attitude toward wildlife conservation programs than households who were not participating in off-farm income-generating activities.

Period of living In the area : the length of time living in an area can influence an individual's perception of wildlife by fostering familiarity, understanding, get experience of mitigation measure and shifts in attitudes over time. Research suggests that attitudes towards wildlife are shifting towards more protectionist views. For example, a study in New York found that public attitudes towards wildlife are becoming more positive and supportive of conservation efforts (Jessica S. et al., 2006). Therefore, in this study, it is expected that a household that live in an area for long time resident(permanent) as compaire to those of temporary resident it is expected to have a positive attitude toward wildlife conservation programs.

Table 3. 4 **. Independent variables and hypothesized signs on HH's attitude to wildlife conservation**

No	Variables code	Variable type	Variables and measurement	The expected sign of the variables
1	Age of the HH	Continuous	Years	+
2	Sex of the household head	Categorical	1= Male, 0=female	+
3	Marital status	Categorical	1= married (monogamy/ polygamy) =, 0= divorced , widowed or separated	–
4	Education level of HH	Categorical	0=Illiterate,1=read&write,2= primary, 3= secondary, 4= tertiary 5=religious	+
5	Off-farm activities	Categorical	1= yes participated ; 0= No participation	+
6	Livestock attack size	Continuous	Tropical livestock unit (TLU)	–
7	Period of living In the area	Categorical	1=Permanent 0=Temporary (< 1year)	+

Source: Own construct, 2023

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

This chapter discusses data analysis, interpretation, presentation, and discussion. The purpose of this study was to find out the factors on the human-wildlife conflicts and the community attitude towards human-wildlife conflicts in SNRS specifically selected kebeles from the Gunagado district. The study was organized based on the objectives of the study and presented results obtained from the questionnaire survey, interviews, discussions, and other participatory research methods. The findings encompass the types, causes, and consequences of human-wildlife conflicts, as well as the implications for conservation and mitigation methods suggested. The responses were examined and presented in tables as frequencies, percentages, and means.

4.1 Demographic Information

The background information of households concentrated on their gender, age, marital status, educational level, and period of living in the area. The researcher began with a general analysis of the demographic data obtained from the respondents which included; - their gender, age, period of living around, level of education, and the respondents' occupation.

Table 4.1 gives a summary of the results of respondents' socio-demographic information.

Table 4. 1. **Respondents (HH) Gender**

Gender	Frequency	Percentage
Male	**259**	**99.2**
Female	**2**	**0.2**
Total	**261**	**100.0**

The findings in Table 4.1 indicate that (99.2 %) of the respondent HH were male and (0.2%) of the respondents were female so it did not imply that each gender was well presented in the study which indicates that it was difficult to suggest their idea on HWC in the area.

Table 4. 2. **Age of Respondent (HH)**

Age	Frequency	Percentage
15-24 years	20	7.7
25-54 years	176	67.4
55-64 years	43	16.5
Above 65 years	22	8.4
Total	**261**	**100.0**

Source: Ethiopian Age Structure Index (2021)

Findings in Table 4.2 show that (7.7%) of the respondents were aged between 15-24, /67.7%/ of the respondents were aged between 25-54 (16.5 %) respondents were aged between55-64 and 8.4% respondents were aged above 65 years. This shows that the majority of the respondents were between 25-54 years.

Table 4. 3. **Period of living around (In the Kebele)**

Period of living	Frequency	Percentage
< 1 year	7	2.7
1-10 years	6	2.3
11-20 years	23	8.8
21-30 years	141	54
Above 30 years	84	31.9
Total	**261**	**100.0**

The results in Table 4.3 show that /54 %/ of the residents have lived in the area for between 21-30 years /31.9%/ of the HH lived around Above 30 years in the Kebele for the remaining /8.8%/ 11- 20 years and /2.7%/ of the lived below 1 years and they live temporary bases . This shows that the residents had lived in the area for a considerable number of years so they can understand and know the factors influencing human-wildlife conflict and how it was challenging or not in the area.

Table 4. 4. **Educational Level HHH**

Category	Frequency	Percentage
No Education	77	29.5 %
Religious	68	26%
Primary	52	20 %
Secondary	47	18 %
Tertiary	17	6.5 %
Total	**261**	**100%**

From the findings, 29.5% of the respondents who can not read and write had no education (illiterate), 26 % had a religious education, 20 % attained primary education level, 18% of the respondents indicated that they had reached secondary education level and 6.5 % had reached tertiary level.

Table 4. 5. **Household head marital status**

Marital status	Frequency	Percentage
Married	234	89.7
Single	27	10.3
Total	**261**	**100**

The result shows that the marital status of the household heads indicated the majority (89.7%) of the sampled household heads were married and the remaining /10.3%/ were single either divorced or widowed as indicated in the above table.

Table 4. 6. **Activity carried out (Occupation)**

Occupation	Frequency	Percentage
Pastoralists	213	81.6
Pastoral & Cultivation	17	6.5
Pastoral and petty trading	31	11.8
Total	**261**	**100**

The findings show that 81.6 % of the respondents indicated that their livelihood depends on rearing livestock and were purely pastoralist, 6.5 % of them, besides rearing livestock, was practicing small farming and cultivating maize and cereal crops, while 11.8 % of the respondents indicated that they involve in pastoralist and small petty trade since the area is near to border beside rearing livestock.

4.2 Existing HWC in the Study Area

During this study, when the respondents were asked to indicate whether there was any prevailing Human-Wildlife Conflict (HWC) in the study area, 178 of them (68.2 %) affirmed the existence of conflict and the remaining 83 households (31.8 %) of the respondent did not affirm the existence of conflict. When they were asked about the most prevailing HWC in the area, they referred to wildlife confronting humans (83%) of all the responses and 17 % of the respondents indicated the type of conflict to be human confronting wildlife.

Table 4. 7. **Prevailing of HWC in the Area**

Respondents' choices	Respondents	Percentage
Existence of HWC	178	68.2
Not confirmed HWC	83	31.8
Total	**261**	**100**

Table 4. 8. **Confronting of HWC in the Area**

Respondents' choices	Respondents	Percentage
Human confronting	30	17
Wildlife confronting	148	83
Total	**178**	**100**

Table 4. 9. **Effect of HWC in the Area**

Types	Frequency	Percentage
Human Injury	12	6.7
Human life loss	9	5.1
Livestock Killing	114	64
Livestock Injury	43	24.2
Total	**178**	**100**

According to the findings regarding the cause of human-wildlife conflict (HWC) in the area, 64% of the respondents indicated that the HWC resulted in livestock deaths, 24.2 % in livestock injuries, 6.7% in human injuries, and 5.1% of the results indicated that they encountered human deaths as a result of HWC, as shown in the table.

Table 4. 10. **Incidence of HWC in the Area**

Occurrence	Frequency	Percentage
Annually	28	15.7
Monthly	44	25
Weekly	62	34.8
Daily	44	24.5
Total	**178**	**100**

About 15.7% of the respondents indicated that incidence of the conflict occurred annually, 25% of the respondents reported that the conflicts occurred monthly, 34.8% of the respondents indicated that the

conflicts occurred weekly and 24.5% of the respondents indicated that the conflicts occurred daily and faced the problem on daily basis.

Table 4. 11. **Seasonal occurrence of wildlife damage in the Area**

Season	Frequency	Percentage
Dry	119	67
Wet	59	33
Total	**178**	**100**

According to Table 4.11's results, there was a seasonal variation in wildlife damage, attacks, and occurrence. The respondent indicated that during the dry season, 67% of the damage occurred due to moving a considerable distance from their village in search of water and grazing land during this time exposed them to wildlife attacks. The remaining 33% of the wildlife attacks occurred during the wet season.

4.3 Human-wildlife conflict in the Area

During this study, the respondents were asked to indicate whether there was any prevailing Human-Wildlife Conflict (HWC) in the study area and the main causes of human-wildlife conflict in the area as well as the existence, type, occurrence, and mitigation method of human-wildlife conflict illustrated in the tables below.

4.4 Habitat loss on Human-Wildlife Conflict

This section assesses the influence of habitat loss or encroachment of the area, and human invasion of wildlife habitat on human-wildlife conflict. Households were asked whether they had observers from their village loss/degradation/ of the habitat contribute to the incidence and occurrences of HWC in the area. The findings are presented below.

Table 4. 12. **Contribution of Habitat Loss on Human-wildlife conflict**

	Frequency	**Percentage**
Yes	148	83
No	30	17
Total	**178**	**100**

The findings shown in Table 4.12 indicate how habitat degradation contributes to conflicts between wildlife and humans. 83% of the respondents agreed that poaching and the capture of live lion and cheetah cubs for trade to obtain money together with the degradation of wildlife habitat that is vital to the village's livelihood and ability to conduct diverse economic activities, are factors contributing to the conflict. 17% of respondents indicate that habitat loss or invasion contributes nothing to HWC; as the results can be seen in the table above.

The respondents were asked to what extent habitat loss has contributed to HWC and the results are presented in the Table below.

Table 4. 13. **Extent of habitat loss Contributed to HWC**

Extent	**Frequency**	**Percentage**
Very great extent	110	74.3
Great extent	12	8
Moderate extent	2	1.4
Low extent	24	16.2
Total	**148**	**100**

About /74.3%/ of the respondents indicated that habitat loss contributed to HWC to a very great extent. This indicates that the loss of wildlife habitat through, temporal settlement for searching of water and grazing land, deforestation, and poaching has led

to human-wildlife conflict. This finding agrees that an increase in economic activities like cattle raring inside and boundaries of wildlife habitats and protected areas escalating and causing human-wildlife conflict in the area. it also indicates that 16.2 % of the respondents' habitat losses contribute to human-wildlife conflict at a low level.

4.5 Trend of Human-Wildlife Conflict

The study tries to find the trend of human-wildlife conflict in the study area in general for the last ten years from the community indicated in the Table below.

Table 4. 14. **Trend of Human-Wildlife Conflict**

Trends	Frequency	Percentage
Increasing	154	86.4
Decreasing	9	4.9
Not changing	15	8.7
Total	**178**	**100.0**

The findings indicated that about, 86.4% of the respondents reported that human-wildlife conflict showed an increasing trend in the last ten years and 4.9% of the respondents indicated a decreasing rate. The remaining 8.7 % of the respondents responded there was no change and they did not consider the case as a problem.

4.6 Wildlife Species Involved in Human-Wildlife Conflict

The study sought to find out the main wildlife species (problematic wildlife) that are mainly involved in human-wildlife conflict and the trend of wildlife population in the areas from a previous perspective. From the findings, respondents indicated that problematic wildlife species and the population trend of the wildlife responsible for conflict are indicated in the table below.

Table 4. 15. **Population size of Wildlife species Responsible for HWC**

	Increased		Decreased		No Change		
Species	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Total Res.**
Hyena	59	33.1	2	1.1	12	6.7	41%
Jackal	53	29.8	9	5.1	37	20.8	56%
Cheetah	55	30.9	3	1.7	15	8.4	41%
Caracal	11	6.2	23	12.9	67	37.6	56.7%
Lion	0	0	68	38.2	24	13.5	51.7%
Leopard	0	0	73	41	23	12.9	53.9%
Total	**178**	**100**	**178**	**100**	**178**	**100**	

According to the study's findings, the population trends of the most problematic wildlife that attack livestock and human beings include hyenas, cheetahs, and jackals, which were growing respectively and were viewed on a daily walk. Those that decreased their population trend from their previous status were Leopards and lions viewed rarely even though they are seen once in year. Those who did not show any changes from their previous population were caracals and jackals viewed regularly.

Table 4. 16. **Most Wildlife species Responsible for human Wildlife Conflict**

Respondents' choices	**Frequency**	**Percentage**
Hyena	53	30
Jackal	45	25
Cheetah	46	25.6
Caracal	12	6.9
Lion	14	8
Leopard	8	4.5
Total	**178**	**100**

The finding indicates that wildlife most problematic and attacked livestock and human beings the results show that hyenas, cheetahs, and jackals are considered as they were the most problematic wildlife and they are responsible and account together 80.6 % of the attacks. The remaining 19.4 % of attacks are undertaken by caracals, lions, and leopards as indicated in the table above.

4.7 Livestock Attacked by wildlife

The study sought to find out that livestock is mainly attacked by wildlife species (problematic wildlife) which results in human-wildlife conflict. From the findings, livestock that are mostly attacked by wildlife and lead to conflict are indicated in the table below.

Table 4. 17. **Livestock Most Attacked by wildlife**

Respondents' choices	Frequency	Percentage
Goat	80	45
Cattle	38	21.3
Camel	32	18
Sheep	28	15.7
Total	**178**	**100**

This finding shows that the most affected livestock by wildlife, and the results obtained from respondents indicate which livestock were mostly attacked by wildlife. The results show that goats attacked at a higher rank and accounted for 45%, cattle 21.3% followed by camel and sheep at 18 %, and 15.7% respectively as shown in Table 4.17.

Table 4. 18. **Duration of Time Livestock attacked by Wildlife**

Respondents' choices	Frequency	Percentage
During day time	72	40.4
During night time	106	59.6
Total	**178**	**100.0**

The study further explored the duration of time that wildlife attacked livestock, with the results indicating that most attacks on livestock occurred 59.6 % at night and the remaining 40.4% of the attacks occurred during the day time at grazing areas.

Table 4. 19. **Time of Livestock attacked**

During day time	**Frequency**	**Percentage**
Cattle	13	18
Camel	11	15
Goat	39	54
Sheep	9	13
Total	**72**	**100**
During night time	**Frequency**	%
Cattle	34	32
Camel	29	27
Goat	22	21
Sheep	21	20
Total	**106**	**100**

The finding indicates that livestock attacks happened during the daytime 54 % of the attacks occurred on goats followed by cattle at 18 %. It also indicates that livestock categories attacked occurred during the night time cattle attacks account 32 % ranked first and camel, and goat followed by 27 and 21 % respectively. Even during the night time, it was observed that the goat attack was at a higher rank as compared to the other.

4.8 Humans Attacked by Wildlife

The study also intended to identify the trend of wildlife attacks of human beings caused by human-wildlife conflict and the primary factors causing conflicts between humans and wildlife, including human attacks that resulted in human deaths or serious injuries from wildlife (problematic wildlife). According to the results, it indicates that people have been assaulted by wildlife, as shown in the table below in the past 10 years, either injured or killed.

Table 4. 20. **Trend of Human Attacked by Wildlife**

Trends	Frequency	Percentage
Increasing	77	42.3
Decreasing	52	29.2
Not changing	49	27.5
Total	**178**	**100.0**

The findings, 42.3 % of the respondents indicated that wildlife attacks on human beings has been increasing from time to time in the past ten years which leads to an increase in human-wildlife conflict in the study area. As the result shows 29.2 % of the respondents indicated that wildlife attacks on human beings were decreasing and the remaining 27.5 % of them replied that there was no change from the previous years.

Table 4. 21. **Types of Wildlife Attack Human**

Types	Frequency	Percentage
Human Injury	131	73.6
Life loss(killed)	47	26.4
Total	**178**	**100.0**

From this finding, 73.6% of the respondents indicated that a wildlife attack on humans caused an injury and 26.4 % of the respondents indicated that a wildlife attack on human beings was causing life loss (killed).

Table 4. 22. **Time of Human attacked by Wildlife**

Respondents' choices	Frequency	Percentage
During day time	72	40.6
During night time	106	59.4
Total	**178**	**100.0**

The study explored that wildlife attacked humans mostly during the night time which covers 59.4 % and the remaining 40.6% of the attacks happened during the daytime at the herding site.

Table 4. 23. **Types of Wildlife attacked Human beings**

Respondents' choices	**Frequency**	**Percentage**
Hyena	63	35.4
Lion	60	33.7
Leopard	32	18
Cheetah	18	10.1
Caracal	5	2.8
Total	**178**	**100**

According to the study, hyenas account for the largest proportion of wildlife species responsible for attacking humans /35.4%/, followed by lions /33.7%/, leopards /18%/, cheetahs /10.1%/, and caracals /2.8%/ as the results of the study are shown in the table above.

Table 4. 24 **Livestock attacked by wildlife per HH in one year**

Livestock types	Livestock attacked	Frequency HH*	Average attack per HH
Cattle	17	14	1.2
Calf	39	28	1.4
Camel	11	9	1.2
Sheep & goat adult	102	83	1.2
Sheep &goat young	78	52	1.5
Total	**247**	**186**	

Multiple responses given *

The study explored the number of livestock attacked within one year by wildlife the respondents were asked to indicate the number of the respondent 135 HH lost goats and sheep adult or young either one or both on average one HH lost nearly two of them killed(predate) by carnivores. The attack was happen either around the village or grazing and when movement in searching for water areas based on their age most of the time the younger attacked in the village. The camel as compared to the other livestock less likely attacked by lions and hyenas are wildlife species responsible for attacking. From the findings, each household head had at least one livestock lost within a year.

Table 4. 25 **TLU Attacked by wildlife**

Livestock types	TLU	Average price (ETB)	Monetary loss (ETB)
Cattle	17	27500	467,500
Calf	9.75	10500	102,375
Camel	13.75	52000	715,000
Sheep & goat adult	13.26	3600	47,736
Sheep &goat young	4.68	1700	7,956
Total	**58.44**		**1,340,567**

Own construct,Market price of the district 2023

The study assessed 247 incidences of wildlife attacks on livestock. Due to wildlife attacks on livestock and expenses incurred by household heads, 58.44 TLU has been lost. From this TLU 1,340,567 ETB monetary lost has been occurd as aresult of wildlife attack. Cattle had the highest TLU value (17) among the livestock types followed by camels at 13.75. The average unit price of livestock in the local market varies, from the lower goat and sheep young price on average 1700 ETB per head to the higher average unit price of camel.

Table 4. 26. **Estimated Economic losses incurred per year in study Area**

Respondents' choices	**Frequency**	**Percentage**
0- 10,000	2	1
10,000 – 30,000	26	14.6
30,000 – 50,000	64	35.7
50,000 - 70,000	42	23.6
70,000 – 100,000	20	11.4
>100,000	24	13.7
Total	**178**	**100**

The findings show that 14.6 % of the respondents incurred economic losses of approximately 10,000 to 30,000 ETB per year per head as a result of wildlife damage, while 35.7 % of the results show that they lost 30,000 to 50,000 ETB per year per head, 23.6% of the respondent lose approximately from 50, 000 - 70,000 ETB per year, 11.4 % of the household heads incurred cost 70,000 – 100,000.00 and those get higher economic loss above 100,000 ETB of the total household it accounts 13.7% of the respondents and those with minimum loss up to 10,000 ETB per year as indicated in the table above it accounts 1 % of the respondents.

Table 4. 27**. HH Attitude towards Conservation Wildlife conservation**

Respondents' attitude	**Frequency**	**Percentage**
Support (positive)	95	53.4
Not support (negative)	83	46.6
Total	**178**	**100**

The Study results indicate that their attitude towards wildlife conservation programs in general 53.4 % of them even if they face conflict with wildlife they support conservation and have a positive attitude towards it. The remaining 46.6% of the results indicate that they didn't support or negative attitude towards it and they considered it as if they were enemy them due to conflict with them.

4.9 Mitigation Methods

The study sought to identify what the community knowledge adopts through experience to minimize and defend wildlife damage most local pastoralists apply methods to guard their livestock against attacks from problematic wildlife. From the findings, respondents indicated that the pastoral communities use various types of cultural mitigation methods in an integrated way to be efficient otherwise a single didn't bring a solution as indicated in the result below.

Table 4. 28. **Mitigation Methods used by pastoralist**

Mitigation Methods	Frequency	Percentage
Accompanied by herder	142	79.8
Fence	137	77
Making fire	124	69.7
Flashlight	76	42.7
Making noise	72	40.4
Killing	67	37.6
Throwing stones	62	34.8
Snaring	35	19.7
Scarecrows	24	13.5

Multiple responses given *

From the findings, the majority of the respondents applied multiple mitigation measures by integrating more than one mitigating measure to tackle conflicting wildlife and keep their livestock from wildlife attacks. The common and most of the households' applying method was Making fire, fencing, and accompanying by herder was utilized widely practiced methods, and above 60% of the respondents used them by combining. The results indicate that several cultural methods were combined to achieve better results. Scarecrow mitigation measures used by 13.5 % of the respondents were practiced and it was the listed concern of cultural mitigation measure used in the study area to resolve livestock attacks by wildlife as shown in the table above.

4.10 Determinates of human-wildlife conflict and attitude toward conservation program

4.10.1 Determinants of human-wildlife conflict

The result of the losgistic regression with dataset consists of 178 observations result showed that the F-statistic is 57.45 with Less than 1% p-value indicates that the model is statistically significant. The result of the R-squared (R^2) is 0.733 value represents the proportion of variance in the response variable (human-wildlife conflict) explained by the predictor variables inducated that approximately 73.11% of the variability in the conflict can be explained by the model.

Age of Household : The result of the logistic regression indicates that there is a negative relationship between the age of the household head and the wildlife conflict. Furthermore, the result also indicates, that as the age of the household increases by one year, the probability of wildlife conflict decreases by 1%. This may be because, as the age of the household increases, he/she has more wildlife managing or mitigation adaptation strategies that reduce the conflict. This result is in line with the work of Browne-Nunez& Tessema (2010) the strong effect of age on wildlife conservation attitudes may also be attributed to the fact that older respondents may have been involved in many traditional practices that involved the use of wildlife than younger respondents in resolving conflict. It is also consistent with the work of Tessema (2007) and Snyma, (2012) the older the households head the more hypothesized to perceive the extreme condition of their environment.

Education status : The result of the logistic regression also indicated that education status negatively and significantly affected household and wildlife conflict. This means that as education increases by one category, the probability of human-wildlife conflict decreases by 5%. This is because education enables households' environmental management including wildlife management and helps them understand the trend of environmental degradation and its consequences as well as overall impacts on their wellbeing. Education status has been used to increase community awareness of wildlife conservation and provide perceptions of species-specific behavior (Mitchell et al., 2019). Respondents with less education are more likely to work in agriculture and rely on native wildlife habitats for their living which leads to conflict with wildlife. It is widely acknowledged that a higher level of education provides alternative livelihoods such as job opportunities (Lozano et al., 2019; Young et al., 2020). Having Such alternative activities tend to reduce livelihood activities related to habitat loss and encroachment on native wildlife habitat (Lozano et al., 2019). This indicates that repeated household contact with wildlife has been minimized which leads to conflict. This result supports the hypothesis that people are more likely to support wildlife habitats and engage in resource conservation if they are more informed (Osunsina et al., 2016). This result was consistent with the prior hypothesis and findings.

Livestock attack size : The result of the logistic regression also indicated that livestock size was negatively and significantly affected household and wildlife conflict. This means that as livestock attack size increases by one TLU, the probability of human-wildlife conflict also increases by 4%. This is because, in households with large numbers of Livestock attack, their contact with wildlife

increases and frequent livestock predation occurs more than in families with fewer livestock attacks. As a result of the repeated and greater amount of livestock loss by predators leads to increase human-wildlife conflicts (Rao et al., 2002). Another reason was that households owning a large size of livestock might give more priority to the extent to which the costs of depredation impact households depending on their magnitude and the range of livelihood options at the interface, amongst other factors (Chaminuka et al., 2012; McCrindle et al., 2012). In addition to the number of livestock losses the value related to individual animals, long-term contributions of livestock such as milk, dung, and draft power to livelihoods are lost without compensation worsening the conflict. Other costs with the increased number of livestock associated with depredation, such as expenses incurred in constructing secure animal pens and the opportunity costs of labor associated with intensive guarding and herding of livestock for example, should also be considered (Emerton 2001; Mburu and Birner 2002). Therefore, in this study, respondents who owed more livestock tend to lose a greater proportion of their livestock when a predator attack occurs. This leads to increased human-wildlife conflict as a result of an increasing number of livestock attack . The result agrees with other scholars which are indicated above.

Off-farm income-generating activities : The result of the logistic regression indicates that there is a negative relationship between having off-farm income-generating activities of the household head and the wildlife conflict. Furthermore, the result also indicates, that as household heads participate in alternative off-farm income-generating activities, the probability of wildlife conflict decreases by 2 %. This may be because, as the income source of the household head increases, he/she depends on natural resource utilization dependency is less likely as compared to that household non-participating off-farm income generating activities. This result is in line with the prior expectations and empirical findings of similar studies. For instance, Deraje (2016) found that households generating better income from different sources of farm activities have adequate assets and are placed better to adapt because of adaptive capacity. Therefore, participating in off-farm income-generating activities creates an alternative source of revenue for the household more likely to decrease dependency on livestock which leads to a decrease in human-wildlife conflict in the area.

Table 4. 29. **Logistic Regression result of HH on human-wildlife conflict**

Variables	Coef.
Age of the household head	-0.01*** (0.02)
Gender of the household head	-0.05 (0.07)
Marital status	-0.03 (0.02)
Education level	-0.05*** (0.01)
Participating off-farm activities	0.02** (0.01)
Livestock attack size (TLU)	0.04*** (0.01)
Period living In the area	0.01 (0.01)
Constant	-0.47*** (0.13)

Value in the brackets is standard errors. ***, ** and * at 1%, 5% and 10%, respectively.
Source: Own computation, 2023.

4.10.2 Determinants of HHs' attitude toward wildlife conservation program

The number of onservation was farm household heads data used in the logistic regression analysis. The result of the computed mean VIF value for all explanatory variables was 1.69 and that all the VIFs values are less than10, which implies that there, is no multicollinearity problem among explanatory variables used in the model. The result of the logistic rgerssion output was F (8, 169) was significant at less than 1% implies that the data was fit to the model and the model was the R squared was 0.5457 implies that indepemndenet variables were explained about 55% of the depemndenet variables implies that the fitness of the model. Based on the moderl result, indepemndenet variables entered in tjo the model effect on the indepemndennet the human wilelife confleict stataus (negative or positive) and level of effcts are explained in the following sub sections.

Age of household head : The result of the logistic regression indicates that the age of the household had a positive and significant effect on the conservation program attitude. The result also inducted that as the age of the household increases by one year being other factors held constant, positive attitude develops by 1%. This is because, as the age of the household head increases, his/her

experience and knowledge of environmental biodiversity ecosystem conservation perception and understanding increases. This result is in line with the findings of Bandara and Tisdell et al.,(2003), which shows older respondents are more likely to have positive attitudes towards wildlife conservation programs than the younger counterparts. On the other hand, older people may have diversified livelihood assets including social networks compared to younger households‟ (Gutu et al., 2012). Therefore, the older the household's head develops more tolerant and positive significant correlation with conservation (Tessema et al., 2007; Snyman, 2012).

Education status of household head : The result also, indicated that households' education has a positive and significant relationship with conservation programs. This means as the household head's education increases by one category, the probability of a positive conservation attitude increases by 2.5%. This is because, education either formal or informal increases the knowledge and understanding of the household head on different aspects of life, including how people interact with the local environment, conserve nature sustainably, and understand the national and regional conservation policy programs so that it develops positive attitude. This result is in line with studies conducted by Shibia et al., (2010). Kideghesho et al., (2007; Manyama et al., (2014; Masud and Kari, 2015), and Mutanga et al., 2015) that educated individuals may be more knowledgeable of conservation-related program policies and result from extensive engagement at educational institutions and media exposure People have a deeper understanding of environmental issues as a result, and they are more equipped to make responsible decisions. The association between education and conservation programs suggests that those with higher levels of education are better able to comprehend the importance of conservation as well as the environmental benefits they offer.

Off-farm income source : The result of the logistic regression indicates that having an off-farm income source for the household had a positive and significant effect on the conservation program. The result also inducted that as household heads participate in alternative off-farm income-generating activities, the probability supporting wildlife conservation increases by 3 % compared to household heads with no option of off-farm income source. This may be because, as the income source of household heads increases and diversifies, household dependency on natural resource utilization will be minimized as compared to household heads non-participating in off-farm income-generating activities. This result is in line with studies conducted by Norsida,(2009) It has been considered as an alternative income source for the agricultural sector and as an essential way to increase overall rural economic activity and employment in many developing countries.

Therefore, participating in off-farm income-generating activities create an alternative source of income for the household head this leads to a decrease in dependency on natural resource as a result decrease human-wildlife conflict in the area which boosts household attitude towards conservation program.

Table 4. 30. **Logistic Regression result of HHs' attitude to wildlife conservation program**

Variables	Coef.
Age of the household head	0.01*** (0.03)
Sex of the household head	-0.01(0.10)
Marital status	-0.02(0.03)
Education level	0.025***(0.01)
Participating Off-farm income	0.03***(0.10)
Livestock attack size	0.02 (0.12)
Period living In the area	0.01 (0.01)
Constant	-0.30 (0.18)

Value in the brackets is standard errors. ***, ** and * at 1%, 5% and 10%, respectively.
Source: Own computation, 2023.

CHAPTER FIVE

Discussion

This chapter discusses the findings of the study guided by the objectives of the study. The discussion is enriched with citations from past studies to show the study findings concur with them. Many authors have documented incidences of human-wildlife conflicts, although they have tended to concentrate more on the perceptions of the people and give emphasis for the types and extent of HWC, causal factors, and effectiveness of measures used to mitigate the conflicts. This study examined the occurrences of HWC in the district. The section will present information a summary of the findings, discussion, conclusions, and recommendations for possible actions and suggestions for future research on human-wildlife conflict in SNRS of Gunagado district as well as other pastoral communities in the region.

The respondent staying Period or living around the kebele in the district was vital in understanding the study area very well and correlated to develop either positive or negative attitudes towards wildlife. Almost 97% of the respondents lived or stayed in the study area for more than ten years which enabled them to understand their locality deeply. This made the respondent to know what type of conflict exists and how to resolve the problem and coexist together.

According to the study result, 68.2% of the respondents reported having conflicts with wildlife as a result of their daily activities, even though these conflicts varied depending on how close they were to a wildlife habitat. The group frequently comes into contact with wildlife, such as hyenas and cheetahs, which are based in an area close to their village and sometimes result in violent attacks and conflicts. According to Musyoki (2007), coexistence between humans and wildlife was never strained as natural resources were abundant in terms of quality and quantity. When people started to rear livestock and wanted to access basic needs gained throughout the year they faced new threats of livestock damage by wildlife. The study revealed that a human population has led to an expansion of human activities up to the edges of wildlife habitat and marginal land that were their home ranges 83 % of the respondents responded that habitat loss is one of the major contributing factors of human-wildlife conflict. The trend of human-wildlife conflict was increasing from time to time and 86.4 % of the respondents confirmed that. Similarly, according to Naughton-Treves (1998), humans have suffered losses in livestock and crops due to livelihood activities.

The study revealed that the majority (81.6 %) of the respondents indicated that livestock rearing was the main economic activity and purely pastoralist and even the remaining take part in other income-generating activities besides livestock rearing. the district almost all of the pastoralists need a large area for grazing and searching water points for their livestock as well as for domestic use significantly large tracts of land for animal migration to a great extent create an opportunity for overlapping with wildlife in search of food and water for their livestock.

The study realized that communities living adjacent to the wildlife habitat were mainly involved in using the forest resources for basic subsistence needs including grass, firewood, poles, capturing of Lion and cheetah cubs for trade, and most disturbing the recent beginning of charcoals making within the wildlife habitat boundary makes it the conflict forceful. These unsustainable and unregulated activities would lead to further degradation and prevent degraded areas from recovering the result directing them so as to need to use undiscovered and marginal land for their survival.

The study result also showed that people's attitudes and perceptions toward wildlife conservation, their lack of the required education or training, their lack of compensation for livestock attacks, and their inability to respond quickly enough to such attacks led to negative feelings. As a result, people chose not to report any wildlife conflicts or attacks to the government institutions, leaving that decision to the wisdom of the village elders.

The country has no compensation policy and law allow for livestock attack by wildlife in the study reveal that some of the community capture cheetah and lion cubs to sell them to get money as compensation when their livestock are attacked by wildlife even in some area few of the community leader allow for them to do so. There is a broker who facilitates those cubs captured in the community for trade and traffickers take them outside the country or neighboring country, especially to Somali land crossing the border. These are the major challenges faced in undertaking conservation measures.

5.1 Socio-demographic Characteristics and their Implications to HWCs

A discussion on key socio-demographic characteristics investigated and their impact on local people’s attitudes towards human-wildlife conflict, perceptions towards conservation, and involvement in mitigating HWCs in this study consisted of 261 respondents randomly sampled from three kebeles from 178 household respondents /68.2%/ confirmed that the existence of human-wildlife conflict in the district under study.

As the age of an individual increases, it is known to influence decisions made in relation to respondents' perceptions and attitudes towards conservation and their role in determining the household head's involvement in conflict resolution activities since it determines the experience acquired in mitigation measures and tolerance of conflict was developed. Further, the age of an individual is also known to influence conflict resolution and reporting HWC cases such as problematic animals to Government institutions, encroaching on wildlife habitat and resources harvested from these areas.

The education status is one of the determinant factor because it affects how someone gathers, synthesizes, and interprets information and understand issues pertaining to decisions on the use of natural resources, resolving conflict, and improving attitude toward wildlife conservation, and mitigation measures, the education level was considered an important factor that deserves attention. Communities in the research area with access to education, formal or informal, were more likely to embrace and had a better grasp of how to deal with and coexist with environmental problems in their area. There is a connection between a respondent's education level, information utilization, and making judgments regarding tolerance, resolving conflict, and reducing HWCs as compared to the other.

5.2 Types and Nature of Human-Wildlife Conflicts

The findings indicated that several types of HWCs are encountered in the study area and its surroundings. It was also evident that HWCs have intensified in recent years in the area. These conflicts are due to increases in human activities in searching for livestock grazing land and water. Other factors that have either directly or indirectly contributed to the occurrence of HWCs include types of livestock rearing, seasonal changes, and distance from the wildlife habitat. The study further revealed that there were diverse conflicts experienced in and around the study area since the area's livelihood depends directly or indirectly on keeping livestock due to this the dominant conflict type was human-carnivore type as the result conflict confronted by wildlife accounts 83% and the remaining was conflicts caused by people to wildlife.

5.3 Livestock predation

Results revealed that incidents of livestock predation 88.2% of the respondents responded that it was a significant factor in human-wildlife conflicts. Several distinct species were responsible for livestock predation in the research area, which resulted in significant economic losses. As was previously mentioned, the research area saw high levels of cattle depredation because pastoralism was an important source of income for the locals. The results concur with those of Dickman (2008). The aforementioned issue is widespread throughout the world and is brought by several species. Since more livestock are killed as a result of predator attacks, the number of livestock decreased, which results in significant economic losses for the owners. In the study area, the dominant conflicting wildlife responsible for livestock predation was hyenas; cheetahs and jackals repeatedly attacked the most among the others. As a result, they protested by killing the predators to reduce their population. Large carnivore species such as leopard, lion, and caracal had experienced major declines in the study area due to retaliatory killings because of high distraction within a single attack. Almost all pastoralists do not report such killings, many predators were killed using snares and weapons. This finding is similar to what Woodroffe et al (2005b) reported in Northern Kenya where Samburu communities killed predators outside protected areas to protect their livestock. In their study, Ogada et al (2004) further report that perceived or real threat to livestock was the driving force for the widespread removal of cheetahs in ranches in Kenya.

In the current study area, the level of livestock depredation greatly influenced the attitudes of residents towards carnivores. Hyena was the most feared predator followed by cheetahs and jackal. Most of the respondents reported that the level of predation was high during dry seasons compared to the wet seasons due to long-distance movement from the vicinity in searching grazing land and water for their livestock this exposed them to attack and high during the night as compared to daytime since there was limited protection during the night due to poor visibility, inadequate protection by night guards who could fall asleep. Most livestock attacked by carnivores were goat, cattle, and camel high as compared to the other.

Households were protecting livestock by monitoring their grazing during the day and defending their hut at night using vigilant groups and Besides this, the most popular mitigation methods were

implemented such as fences, flash lighting, fire, Making noise and dogs use these so as enable them to minimize the attack.

5.4 Human death and injuries

Results showed that 11.8 % of the wildlife attacks were a threat to human lives. Interviews with the respondents revealed that there were occasions of humans were killed or injured by wildlife when trying to protect their livestock from attack. However, these incidences were reported to be fewer when compared to other conflict types. In the study area, attacks on humans by wildlife caused significant threats and a lot of hostility towards wildlife conservation and aggravated conflict. death of people or injuries by wildlife were the most significant type of HWC since they brought emotions that were critical to determining levels of tolerance towards wildlife.

Human death and injury caused by wildlife results in public outcry than human death caused by other accidents (Sukumar,1991). In the study area, the majority of the respondents responded that hyenas and lions were the most feared wildlife and ranked first for the case in the study area. Results revealed that although attacks on people occurred throughout the year, they were generally high during dry seasons and nighttime. As Dickman (2008) argued, because of the lack of appropriate solutions to mitigate the problem, more studies are required to investigate the causes of human attacks and reduce the problems in order to promote co-existence between people and wildlife.

5.5 Resource use

The majority of communities living around protected areas in rural Africa are struggling with several problems such as high population growth, numerous tropical infectious diseases, extreme poverty, and environmental degradation. As a result, these communities require basic resources that are found in wildlife habitats to meet their subsistence needs. Wildlife competed with livestock for water and pastures both inside and outside wildlife habitat. The intensification and diversification of land use in wildlife habitats, mass movement of pastoral communities to pastoral lands, fragmentation of wildlife habitats, and the increased interface between people with wildlife led to the intensification of HWC inside and outside wildlife habitats. By obstructing wildlife migratory routes and dispersing regions

and resulting in further rapid habitat destruction owing to clearing the land and rising human-wildlife conflicts, those mass movements and temporary settlements have exacerbated HWC. These results were consistent with earlier research on the subject by Thouless (1995), who found that increased settlements and movement of people in Northern Kenya's Laikipia District led to an increase in confrontations between humans and wildlife there.

5.6 Variables Determining Human-Wildlife Conflict

Age of household : The age of the respondents was one of the most important and significant characteristics in understanding their Perception of wildlife and resolving conflict. age indicated the level of maturity of individuals in that sense age became more important to examine the responses. It was important in determining whether young people were more positive towards wildlife than old people or not. In this study, all the respondents were mature persons aged 18 and above. As the age of the household increases by one year, the probability of wildlife conflict decreases by 1% and a positive attitude develops towards conservation by 1%. This is because as the age of the household increases, his/her wildlife managing or mitigation adaptation strategies that reduce the conflict and knowledge of environmental biodiversity ecosystem conservation perception and understanding increases. The study in line with a survey of the environmental attitudes among parents and teenagers in Finland revealed that teenagers were less concerned about the environment than their parents (Leppenen et al, 2012).

Educational status of household : Education can change people's attitudes and knowledge towards wildlife and conflicts. Research has shown that education can be effective in changing attitudes, behavioral intents, and knowledge towards wildlife and conflicts. Educational status either formal or informal was significant and important and positively correlated with perceptions towards wildlife conservation and conflict resolution. From the respondents, 44.5 % of them take formal education and 26 % of them have a religious education. The study indicates that educational levels influenced the views of the respondents concerning human-wildlife conflict and attitudes toward wildlife conservation. In any of the cases, either formal or informal education in many cases correlated with more positive attitudes towards wildlife in general natural resource management.

The result this of paper concurs with the work of Santiago Espinosa & Susan K. Jacobson (2012) environmental education reducing human-wildlife conflicts can improve knowledge and attitudes towards wildlife conservation.

Livestock attack size : Human-wildlife conflict is a significant issue in pastoral communities, particularly where ecologically and economically important wildlife impacts the livelihoods of humans. Livestock predation is a common issue with predators such as hyenas, cheetahs, jackals, caracals, and lions being the main problematic wildlife in the study area. The impact of the number of livestock on human-wildlife conflict in pastoral communities can be significant. Since the major economic activities were pastoralists and highly dependent on the wildlife habitat resources to sustain their livestock production, they turned the natural resources into a source of basic needs to lead their life. As a result, livestock predation is a significant issue cattle, sheep, goats, and camel are the main targets of predators. Overall, the number of livestock can have a significant impact on human-wildlife conflict in pastoral communities this imply that household with a large number of livestock faces competition for the same resources more as compared to a household with fewer numbers of livestock. This lead to, a household with a large number of livestock their contact with predators increases and frequent livestock predation occurs more than in families with fewer livestock owner. As a result, repeated and greater amounts of livestock loss by predators which incur economic losses on the owner can result in retaliatory killings of wildlife by humans which tend to increase human-wildlife conflicts in the study area.

Off-farm income-generating activities : The result indicated that 84.4 % of respondents incurred 30,000 to 100,000 birr per year economic losses per household as a result of livestock depredation by wildlife which purely led to conflict and negative attitude towards wildlife conservation. Off-farm income-generating activities can help improve human-wildlife conflict by reducing economic burden. The economic shocks of losing livestock by carnivores can be high and harm a household's annual income. Engaging in off-farm income-generating activities, households can diversify their income sources and reduce their dependence on livestock, thereby reducing the economic burden of human-wildlife conflict and reducing their dependence on natural resources that may lead them to conflict with wildlife. Households engaging in off-farm income-generating activities can improve livelihoods and increase their incomes which reduces their vulnerability to poverty traps.

CHAPTER SIX

Conclusion and Recommendation

6.1 Conclusion

The study concluded that human-wildlife conflicts in the area are tangible and serious. Different types of conflicts were experienced in the area and it was a complex and interlinked problem, it is not easy to solve it in a short time. The existing conflict impact affects both humans and wildlife negatively this enables the case so as not to stop and continue as a daily life event and threat to livelihood. The escalating pressure for access and demand for natural resource use in the study area force human-wildlife conflict is one of the major challenges due to communities' engagement in pastoral modes of life made more complex by problems like poverty and recurrent drought occurrence in the area. The study also concludes that the major factors that incite human-wildlife conflict include human invasion of wildlife habitat and sharing of resources like land, water, and pasture, which contribute to human-wildlife conflict in communities near wildlife habitat. Households that come to wildlife habitats daily to collect firewood as well as engage in economic and unlawful activities harm wildlife habitats, which increases their contact and instigates serious conflict. The most common human-wildlife conflict in the area, is human-carnivore types since the area is dominated by pastoral economic activities and there is no human herbivore (crop raider) conflict has occurred in the area. Even if the severity and rank of the attack vary depending on livestock type all the livestock found in the study area (goats, cattle, camel, and sheep) were preyed by wildlife but Goats and cattle are mostly found to be attacked. Wildlife which is responsible for the attack hyena, cheetah, and Jackal the ranked first, respectively, as compared to the other species. The conflict between humans and wildlife is causing some species that were previously abundant and seen easily in the area go decline at an alarming rate and driving others to the point of extinction. As observed from the study area lack of community-based conservation programs to promote human-wildlife conflict reduction and biodiversity persistence conflict seriously affects the livelihoods, safety, and

wellbeing of communities and can undermine conservation efforts by decreasing support for conservation programs.

Long-term solutions to the adverse effects of human-wildlife conflict extend much beyond the immediate effects on wildlife and communities. As the natural world gets more crowded, there will always be human-wildlife conflict, but with effective management, it may be minimized and reduced over time. Long-term conflict reduction and minimization can be achieved by effective, well-planned management and holistic, integrated approaches.

It is also concluded that the local communities lacked the necessary skills or training in wildlife habitat management, conservation education, and conflict resolution. It also concluded that respondents were not compensated for the livestock losses. providing and facilitating of fund resources for biodiversity conservation and the management of human-wildlife conflict is one of the most pressing issues and significant roles facing human-wildlife conflict and conservation in general. Lack of focus and encouragement on the implementation of wildlife tourism activities as alternative livelihood programs for communities affected by human-wildlife conflict is one of the main challenges. Interactions between humans and wildlife resulting in negative impacts are among the most pressing conservation challenges locally, and addressing these challenges requires collaboration across different actors.

Due to human-wildlife conflict in the area, cheetah and lion cubs were vulnerable to being targeted and illegally caught to make up for the livestock that had been attacked by wildlife as compensation. These cubs were sold to traffickers who came from abroad. These species will eventually go extinct in the area if the illegal trade and trafficking in their abundance persists, especially in the district due to its proximity to the border.

The study also found a lack of participation in developing strategies related to managing wildlife resources and human-wildlife conflicts in immediate response to complaints, as well as working closely with local communities to understand their perspectives and address their concerns to foster positive attitudes towards wildlife and promote sustainable conservation efforts.

The study concluded that due to cultural and religious concerns empowerment and participation of women were almost non it was one of the crucial points to know their attitude towards wildlife conflict and conservation programs it was a significant issue that was missed because women are front-line users and contact on daily base with wildlife and natural resource products.

6.2 Recommendations

- For the pastoral communities crucial in affected by livestock loss and injury, the government and stakeholders should focus on establishing a substitute alternative livelihood option and on diversification of income source program.
- Appreciate, accept, and incorporate different stakeholder values, and attitudes, and integrate to enhance local community engagement and the success of wildlife conservation and human-wildlife conflict reduction.
- Give awareness and training for those religious and clan leaders to easily publicize and communicate the community-based conflict mitigation measure together by integrating with culturally implemented.
- Implementing local conflict resolution (mitigation) combined and using strong fencing for those exposed easily and at their early stage of livestock to minimize conflict and predation.
- Water points (source) are the major sources of conflict due to inadequate for their livestock and wildlife watering points should be developed in the community nearby to the residents to minimize conflict.
- There is no protected area around or near to the area endowed with an abundance of wildlife resources regional wildlife sectors should establish community conservancies to regulate open pastoral community movement and supplement their income by facilitating ecotourism activities to develop a sense of ownership.
- Implement and enhance holistic, integrated, and effective community-based wildlife management approaches that can resolve conflict and build trust in conservation and co-benefits of both.
- Enhance and encourage women's participation in wildlife conflict resolution and conservation programs.
- Conducting research and assessments to understand the historical, social, and ecological factors contributing to human-wildlife conflict, and involving experts from various fields to provide a comprehensive understanding and to address the root cause of resource use conflict.

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8. APPENDIX

Appendix 1: **Key Informant Interview Questionnaire**
Human wildlife conflict in Somali Regional State Gunagado District, Ethiopia

Section A: Interviewee Information

Interview #: _____ Date: _____

Respondent's Full name_____

District Name : _____

Village name: _____

GPS reading: Longitude: _____Latitude:_____

How long living at this location (in year)_____ Permanent/Temporary

Age: _____ Years

Gender: Male / Female

Marital status: _____

Education Level _____

Occupation: _____

Section B: Livestock Information

Do they keep any of the following (tick as appropriate):

Cattle		Camels		Goats/Sheep		Donkeys		Chickens		Other?	

Do they grow crops (Yes/No)?

Section C: Wildlife Information (Increase, Decrease or no Change)

Species	Lion	Leopard	Wild Dog	Cheetah	Hyena	Caracal	Serval	B.B Jackal
Trend								
Reason								

1. Which above mentioned carnivore species are most increased in the area? ((From the earlier)) – Mention 1- 3:

1. _____

2._____

3._____

2. **Which above mentioned carnivore species are decreasing in trend in the area (from the earlier) mention 1 to 3:**

1. _____

2._____

3._____

3. Trend of human wildlife conflict in the area

1. Increased _____

2. Decreased _____

3. No change _____

4. **Occurrence of human wildlife conflict**

1. Daily _____
2. Weekly _____
3. Monthly_____
4. Annually _____

5. Would you think habitat loss (degradation) contribute to human wildlife conflict?

Yes ___

No _____

If **yes** to what extent

To what extent

Very high_____

High _____

Low _____

No _____

6. **What is your estimation of economic loss incurred as a result of livestock attacked by wildlife annually in ETB?**

1._____

2._____

Section D: Additional Information:

Occurrence of wildlife (carnivores) and rank of their problem in the area

Tick relevant problem in the boxes below

(1 = animals that are no problem; 2 = animals that are a small problem; 3 = animals that are a big problem.)

Species	Identification			Does species occur in cell (within 1 days walk)? Yes / No	Problem?			
	Correct (Yes/No/ NA)	Name unknown?	Species confused with…		Big	Small	No Prob	Unknown (not in area)
1. Spotted hyena								
2. Golden/Common Jackal								
3. Wild dog								
4. Cheetah								
5.Leopard								
6. Striped hyena								
7. Lion								
8. Wild cat								
9. B.B Jackal								
10. Caracal								

Most recent observations of key species When was the last time you SAW … in this survey cell? (Within one day walk)

	Lion	**Leopard**	**African wild dog**	**Cheetah**	**Spotted hyaena**	**Striped hyaena**
When (year and month if possible)						
Season: dry or wet?						
How many individuals?						
For lion, how many adult male/female?						
Where young animals present? If so, how many?						
How often do you see these species (Once a Day/Week/Month/6 Months/Year/Rarely/Never (D/W/M/6/Y/R/N)						
Have you heard …. ?						
If so when? (year and month if possible)						
Season: dry or wet? Day/Night?						

Which wild animals are important in your area?

(1 = animals that have no importance; 2 = animals that have a little importance; 3 = animals that have a high importance)

No.	**Species**	**Rank/importance order (1 – 3)**	**Can you explain why?** (Medicinal, Skin, Recreations and others?)
1	Spotted hyena		
2	Golden/Common Jackal		
3	Wild dog		
4	Cheetah		
5	Leopard		
6	Striped hyena		
7	Lion		
8	Wild cat		
9	Black-backed Jackal		
10	Caracal		
11	Serval		

Have you been taught about wildlife? Yes / No

_____

Can you explain who taught you the most about wildlife?

Would you like to know more about wildlife? Yes / No

_____

Most recent predators ever attacked your livestock by wildlife?

	Lion	**Leopard**	**Cheetah**	**Spotted hyena**	**Striped hyena**	**Black back Jackal**
Has this species attacked your livestock?						
When was the most recent attack (year and month or season if possible)?						
Was it during the day or during the night?						
Where did it take place? (location)						
Season: dry or wet?						
What was attacked? (cattle, donkeys, goats, sheep, other – specify whether young or adult)						
How many livestock were killed? How many injured? Specify type and whether young or old						
Were the livestock attacked at the kraal, at pasture, travelling, at water or lost?						

Where do they usually keep their animals at night (enclosed or free-ranging)?

_____

Are livestock usually accompanied by a herder? Yes/No

Explain why

_____

10. If you lost livestock, did you report these losses? Yes / No

- If yes, to whom?

To which Government office _____

Clan leaders_____

Elders_____

Other_____

If yes how did they respond?

_____

If you didn't report losses, please can you explain why?

_____

11. Have you ever killed any predators? Yes / No

_____

If yes, which species?

_____

If yes, can you describe when you last killed this species, and how you killed it?

_____

_____

Did you report the killing of the predator? Yes / No_____

To Whom?

Government office _____

Clan leaders_____

Elders_____

Other_____

12. What is the community's usual response to predators killing of livestock?

_____

13. What is the community's response when finding predators attacking livestock?

_____

14. Do you know someone in the community ever attacked by a predator?

	Lion	**Leopard**	**African wild dog**	**Cheetah**	**Spotted hyena**	**Striped hyena**
Has this species ever attacked you or members of your household/in your vicinity?						
When was the most recent attack (year and month if possible)?						
Was it during the day or during the night?						
Where was the most recent attack?						
Was it the same as the last sighting or conflict described above?						
Season: dry or wet?						
Who was attacked? (elder man, elder woman, young man, young woman, boy or girl)						
How many were killed or injured? (I/K)* We expect lethal attacks to be rare – if one happened, please ask for a narrative about what happened.						
Did the attack take place at the boma, herding livestock, gathering firewood, collecting water, or other (describe)						

***NB**: "I" denotes = Injury and "K" denotes = Killing

Section E: Trade in cheetah and other large carnivores

15. Do people capture cheetah (or other predators) cubs in your community? Yes / No

(Their trading importance orders 1 = animals that have no trafficking; 2 = animals that have a medium trafficking; 3 = animals that have a high trafficking.)

No.	Species	Rank cubs capturing order (1 – 3)	Who capture them?		Why they capture them?	Where do they take them?	Why do they take them there?
			inside the community	outside the community			
1	Lion						
2	Cheetah						
3	Leopard						

Do you know where they sell them? _____

Do you know where the buyers send them? _____

Which route do you think they follow to take them there? (Mention towns/ villages they pass)

_____

16. Traditional (local) Mitigation methods Used by community to avoid (minimize) Human wildlife conflict and most important order in the area?

1.
2.
3.
4.
5.
6.

Thank you for participating in this interview

Appendix 2 : **Table Conversion factors TLU**

Animal Category	TLU
Calf	0.25
Donkey (young)	0.35
Weaned Calf	0.34
Camel	1.25
Heifer	0.75
Sheep and goat (adult)	0.13
Cow and ox	1.00
Sheep and goat (young)	0.06
Horse	1.10
Chicken	0.013
Donkey (adult)	0.70

Source: Storck et al. (1991)

Appendix 3: **Result of Variance Inflation Factors**

Variable	**VIF**
Marital status of the household head	1.86
Education level	1.49
Age of the household head	1.26
Livestock attack size	1.23
Participation in off farm income generating activities	1.12
Mean VIF	1.44