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Socioeconomic Impacts of Human–Wildlife Conflict and Conservation Challenges in and Around Ambessa Chaka Protected Area, Bambasi District, Beni Shangul Gumuz Reginal State, Ethiopia

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ACRONYM AND ABBREVIATION

BGRS: Beni Shangul Gumuz Regional State

BMNP: Bale Mountains National Park

ETB: Ethiopian Birr

CSA: Central statistics agency

EWCA: Ethiopia Wildlife Conservation Authority

EWPS: Ethiopian Wildlife Policy and Strategy

FGD: focus group discussion

GPS: Global Positioning System

HH: House hold

HWC: Human Wildlife Conflict

IUCN: International Union for Conservation of Nature

KII: key Informant Interview

LULC: land use land cover

NGO: Nongovernmental Organization

NP: National Park

PA: Protected Area

USD: United States Dollar

TABLE OF CONTENT

Table of Contents

DECLARATION 2
ACRONYM AND ABBREVIATION 4
TABLE OF CONTENT 5
LIST OF TABLES 7
LIST OF FIGURES 8
ABSTRACT 9
1. INTRODUCTION 1
1.1. Background of the study 1
1.2. Statement of the problem 2
2. MATERIALS AND METHODS 3
2.1. Study Area 3
2.1.1. Population of Bambasi woreda 5
2.1.2. Climate of study area 6
2.1.3. Rainfall of the study Area 6
2.1.4. Soil and Vegetation type of Ambessa Chaka 6
2.2. Materials used 6
2.3. Preliminary survey 7
2.4. Study Design and sample size determination 7
2.4.1. Data collection 8
2.5. Data Analysis: 9
2.6. Ethical consideration 10
3. RESULTS 12
3.1. Demographic profile of the respondents 12
3.1.1. Gender 12
3.1.2. Age 12
3.1.3. Educational background 13
3.1.4. Roles in households 14

3.1.5. Livelihoods and land use of the respondents 14
3.2. Proximity to the forest edge 15
3.3. Socio-economic activities and income source of household 16
3.4. Damage type and dynamics of human wildlife conflict around 17
3.5. Crop preference and forest dependency of the respondent 18
3.6. Human wildlife conflict Prevalence and Temporal Patterns 19
3.6.1. Anthropogenic and geographic drivers of human wildlife conflict 19
3.6.2. Type of wildlife crop raiders 20
3.6.3. Extents of crop damage in the study area 24
3.6.4. Frequency of crop raiding 25
3.6.5. Types of crops prone to crop raiding wildlife's 27
3.6.6. Tendency of crop raiding and livestock attacking at study area 28
3.6.7. Livestock lofted during last 4 year around the Ambessa Chaka 29
3.6.8. Estimation of crop loss by crop raiders and impacts on farmers 29
3.7. Traditional methods of protecting crop raiding and livestock attacking 31
3.8. Attitude of the farmers towards wildlife conservation 32
3.9. Conservation challenge of Ambessa Chaka protected area 34
4. DISCUSSION 37
5. Conclusion and Recommendations 40
5.1. Conclusion 40
5. REFERENCES 42

LIST OF TABLES

Table 1 : Education Background of the respondents 25
Table 2: Livelihoods and land use of respondents 27
Table 3: Damage type observed in the study area 29
Table 4: Crop preference and Natural resource dependence of the respondentsT 30
Table 5: Human wildlife conflict prevalence and temporal pattern 31
Table 6: Drivers of human wildlife conflict 32
Table 7: Most Crop raider and Livestock attacker wildlife species in the study area 33
Table 8: Species specific crop damage 34
Table 9: Some identified wild animal in ambessa chaka 35
Table 10: Damage extents of crop raider across three study kebeles 37
Table 11: Frequency wildlife visit farmland in month of the year 37
Table 12: Tendency of crop raiding and Livestock attacking at study area 40
Table 13: Livestock loss of the study area 41
Table 14: response of farmers on crop yield loss 42
Table 15: crop loss estimation at field 43
Table 16: Traditional crop and Livestock protection technique 44
Table 17: Attitude of respondents toward protected area and its wildlife among distance from farmland 45
Table 18: Residents attitude toward Ambessa chaka protected area and wildlife in it 46

LIST OF FIGURES

Figure 1: Map of the study area.....17
Figure 2: Sex distributions of the respondents 24
Figure 3: Age ranges of respondents 25
Figure 4: Roles of individuals in household.....26
Figure 5: Distance range of respondent's farmland and forest edge 28
Figure 6: The main household income activities in the study area.....29
Figure 7: Image of scat, track and live of wild animals recorded and identified in the study area 36
Figure 9:(A). Filing of questioner survey and (B)focus group discussion at mender 47 39
Figure 10: Distinctive rank of wildlife crop preference 40
Figure 12: Conservation challenges of Ambessa Chaka 47
Figure 13: Burned area of Ambessa Chaka 48

ABSTRACT

This study aimed to assess the socioeconomic impacts of human-wildlife conflict and to evaluate the key conservation challenges in and around the Ambessa Chaka Protected Area, in Bambasi District. A mixed-methods research design was employed. Structured questionnaires were administered to 180 households, selected using systematic random sampling from three purposefully selected kebeles. Qualitative data were collected through 15 Key Informant Interviews and 6 Focus Group Discussions, involving a total of 48 individuals. To evaluate agricultural loss, a field assessment was conducted using nine systematic sampling plots (each 20 m × 20 m) established along a 1 km linear transect. Descriptive statistics, Pearson correlation (r), and chi-square tests were used to analyze the relationship between damage types and locations, while linear regression was employed to examine factors affecting community attitudes toward wildlife conservation. The findings indicate that the mean crop loss due to wildlife damage was 363.3 kg across the three study kebeles. Additionally, 78 livestock heads were lost within 4 years, resulting in an estimated loss of 1,952,500 Ethiopian birr in local markets. Proximity to the forest boundary was identified as a key indicator of conflict ($r = -0.357$, $p < 0.001$), meaning that as farmland became closer to the forest edge, the intensity of human-wildlife conflict increased, and vice versa. Olive baboons (*Papio anubis*) were recognized as the main crop raiders, while lions (*Panthera leo*) were noted as the primary livestock predators. Traditional crop and livestock protection methods used in the study area included guarding, shouting, the use of dogs, scarecrows, smoking, and clearing surrounding natural vegetation. Education level ($\beta = 0.194$, $p < 0.001$) was a strong predictor of local attitudes toward wildlife conservation, implying that higher levels of formal education encourage greater support for conservation. Conversely, the distance between farmland and the protected forest ($\beta = -0.081$, $p = 0.014$) significantly affected local residents' emotions toward wildlife. To mitigate human-wildlife conflict, this study recommends implementing species-specific deterrent strategies, alongside clearly demarcating protected area boundaries, reforesting habitat and establishing wildlife corridors. Furthermore, local agricultural extension services should provide targeted visual training to farmers, while development initiatives should facilitate alternative, wildlife-deterrent livelihoods.

Keywords: Ambessa-Chaka, conflict, Crop raiders, Human-wildlife, predator

1. INTRODUCTION

1.1. Background of the study

Human-wildlife conflict has been present since the beginning of documented human history. Several predators from the Miocene, including saber-toothed cats, leopards, and spotted hyenas, predated early human ancestors The(Gaynor & Green, 2026) Neolithic Revolution's introduction of farming and animal husbandry expanded the range of animal-human (Kidane Esayas *et al*., 2024)Conflict between humans and wildlife can be broadly defined as a negative relationship in which the needs and behaviors of wildlife affect or impede human needs, or, on the other hand, when humans negatively affect the necessity of animals, leading to detrimental outcomes for both (Kachulu *et al*., 2025). This inaction poses serious obstacles for conservationists and impedes the achievement of crucial international objectives like the Aichi Biodiversity Targets and the Sustainable Development Goals (SDGs) (Abrahms *et al*., 2023). Conflict between humans and wildlife is a major worldwide issue, particularly in underdeveloped continents like African countries, including Ethiopia, where rural populations often rely on natural resources (Frank & Glikman, 2019). According to research findings of (Shah *et al*., 2021) Human-wildlife conflict, which is characterized by increased rivalry between humans and wildlife for scarce natural resources, is progressively increasing in Ethiopia. The majority of people in the nation are farmers who depend on cattle ranching and subsistence farming to survive. In addition to causing financial losses, food insecurity, and increased poverty, this dependence emphasizes how serious the problem is(Salahadin Merkebu and Dereje Yazezew, 2021) According to reports of (Ayenew Biset, 2019) Borena Sayint National Park in Ethiopia is home to a variety of species. This includes the gelada baboon and the Ethiopian wolf, which local communities view as crop raiders and livestock killers. The frequent problem of human-wildlife conflict is a significant issue for development that extends beyond usual conservation challenges. Moreover, the behavior of human wildlife conflict in Ethiopia demonstrates that there is a cycle of self-correction and negative feedback(Ayenew Biset, 2019). Along with few other sources of income, this economic loss can reduce local support for conservation projects and, in serious cases, encourage harmful actions against wildlife (Mishra et al., 2017; Nyhus, 2016). Poverty leads to conflict, which aggravates poverty and makes it harder to protect wildlife. Therefore, it is essential to find solutions that help both people and wildlife. This situation creates a cycle that reinforces itself (Gaynor & Green, 2026). In and around Ambessa Chaka a region known for its diverse wildlife and farming population that depends on subsistence,

conditions are getting worse as competition for limited natural resources increases. Beni Shangul gumuz region has a high level of human wildlife conflict, particularly around community forests and protected areas. In Bambasi District of the Assosa zone around Ambessa Chaka wild animals like lions sometimes cause human fatality in addition to depredating the local community livestock. Also, crops are raided by wild animals, In reverse local community kill wild animal and destroy their habitat in order to move the animal to other far areas(EBI, 2024). Despite the growing evidence of its widespread effects, understanding of the factors, such as ecological, socioeconomic outcomes and effective methods to reduce human-wildlife conflict in the Beni Shangul gumuz Region is still limited. This study primarily aims to assess the socioeconomic impact of human-wildlife conflict and the conservation challenges in and around Ambessa Chaka protected area.

1.2. Statement of the problem

Even though there are more reports of conflict between humans and wildlife in Ethiopia, there is limited empirical evidence on the socioeconomic impacts and conservation challenges specific to the Ambessa Chaka Protected Area(EFCCC, 2019) Previous studies have mainly focused on crop and livestock losses, with no emphasis on household-level livelihood impacts, community attitudes, or the effectiveness of existing mitigation strategies (Ango *et al*., 2017).

Furthermore, there are no baseline studies to guide context-specific management interventions in the Beni-shangul Gumuz Region. Currently, there is a conspicuous absence of studies documenting the nature, frequency, or socio-economic impact of human-wildlife conflict in the area(EBI, 2024). As the results of no documented data about human wildlife conflict local government lack knowledge and have not taken any action to safeguard the local community and biodiversity of the area. Without foundational data, any attempted mitigation strategies are merely speculative. (Guadu Tadesse Berhane *et al*., 2026)The lack of effective management strategies and clear coexistence policies has created a cycle of economic hardship for; it also poses a serious risk to biodiversity in the area. This type of conflict is particularly severe in and around Ambesa Chaka, yet it remains understudied and undocumented. Hence the current study was conducted to answer or fix the above problem

2. REVIEW OF RELATED LITERATURE

2.1. Human wildlife conflicts

The term "wildlife" lacks a single, universally binding legal definition, but globally it is understood through two primary lenses; ecological and institutional. In its broadest ecological sense, wildlife encompasses all undomesticated living organisms that exist in a wild state, free from direct human control(CITES, 2002). While historically limited to hunted birds and mammals, modern science expands this definition to include all wild fauna, flora, fungi, and even microscopic organisms that form the fabric of natural ecosystems.

Institutionally, global bodies narrow this definition to serve specific legal and conservation frameworks. The Food and Agriculture Organization(FAO, 2019) focuses primarily on wild terrestrial vertebrates for management and food security purposes. In contrast, the Convention on International Trade in Endangered Species(CITES, 2002) the world's leading wildlife treaty defines wildlife comprehensively as any specimen of wild fauna or flora, including any readily recognizable parts or derivatives like timber, ivory, or seeds, to strictly regulate international trade. Conservationists frequently refer to the interactions between people and wild animals as "human-wildlife conflict," which can take many different forms worldwide and is more prevalent in poorer nations(Ridwan Qamer *et al*., 2023),Various definitions about the term have been forwarded by different researchers and organizations working on the area.

The United States Geological Survey (USGS, 2023) defined it as: Human-wildlife conflict occurs when the needs and behavior of wildlife impact negatively on the goals of humans or when the goals of humans negatively impact the needs of wildlife. The International Union for Conservation of Nature defined HWC as a conflict occurring when human population requirements overlap with those of wildlife, resulting in costs to both residents and wild animals (Haris, 2025)

2.2. Drivers and Root Causes of Human-Wildlife Conflict

Human-wildlife conflict in Ethiopia is mostly caused by growing human strain on natural landscapes and is influenced by both environmental and anthropogenic factors(Temesgen Zelalem, 2025). these pressures typically manifest as increased agricultural production, human settlement encroachment, habitat degradation and fragmentation, and competition for natural resources that pushes wildlife closer to human populations. As a result, wildlife must engage with human

communities more regularly(Abie Getahun *et al*., 2024). As stated by(Mengistu Yohans Ayalew, 2025) The main causes of conflict between humans and wildlife in Ethiopia are habitat disruption brought on by the growth of subsistence farming close to forest borders and the proximity to natural forests.

2.2.1. Human Population Growth and Settlement Expansion

The rivalry between expanding human populations and wildlife for the same dwindling living areas and resources is the primary cause of human-wildlife conflict globally(Gayo, 2025). As the population grows, there is a greater need for land for agriculture and habitation, which pushes people farther into wildlife habitat and increases the frequency and severity of direct conflicts between humans and wildlife(Kidane Esayas *et al*., 2024). The fast rise in human numbers has increased demand for land to build homes and grow crops(Baral, 2023). It has also boosted livestock and wildlife populations. These shifts cause clashes between people and animals, as seen in Gurage Zone's Midre-Kebid Abo Monastery (Yilmato Amare, 2019). Rising human numbers force settlements deeper into lands once held only by wildlife. Dhidhessa Wildlife Sanctuary offers a clear case(Girma Gizachew, 2021); The government placed drought-hit groups there, big farm projects, like sugar factories, took hold too; these steps invaded hippo areas and broke them apart and harsh human-hippo fights broke out (Dereje Yazezew, 2022).

2.2.2. Agricultural Expansion and Land Use and land cover change

From the beginning of farming, humans and wild animals have clashed because agricultural crops are a valuable food source for both wildlife and humans(Chepkirui & Minja, 2025). Wild herbivores contend with livestock for grazing land and can carry diseases that affect livestock. Additionally, livestock serve as an easy target for predators(Bharathy et al., 2022). Consequently, due to changes in land use that have altered habitats, people have eradicated numerous indigenous animal species from agricultural regions, either by direct action or indirectly(Temesgen Zelalem, 2025) Among(Ayalew Mekuriaw Zewdie & Melese Getahun Tassew, 2025) report The excessive expansion of farmland is consistently recognized as a major factor contributing to conflicts between humans and wildlife throughout Ethiopia.

In the Gumera Watershed, the area of cultivated land and human settlements increased by 21.99% over 48 years, leading to significant decreases in forest (85.30%), shrubland (91.39%), grassland (76.15%), and wetland (72.54%) areas(Dereje Yazezew, 2022). In the same way, the Wondo Genet Catchment saw a significant decrease in its original forest area, dropping from 13% in 1977 to only 2% in 2000.(Fenta Muluken Mekuyie, 2014). As stated by (Kidane Esayas *et al*., 2024). Apart from direct land conversion, the deterioration and splitting up of animal habitats are significant contributors to conflicts between humans and wildlife. In 2003, approximately 3575.79 hectares (equivalent to 10.84% of the area) of new lands surrounding the Chebera Churchura national park (around 2 hectares for each household) were taken over due to settlement in Isera district. (Acha Alemayehu Temesgen, 2017)Another cause of habitat loss that pushes wildlife into human areas is wildfires in the Chebera Churchura national park

2.2.3. Competition for Shared Resources

according to(Kidane Esayas *et al*., 2024) The conflict between humans and wildlife primarily stems from their competition for crucial, frequently scarce, resources like grazing land, water, crops, and animals. Excessive grazing by domestic animals, especially in and near protected regions, worsens habitat deterioration and adds to the shortage of resources available to wildlife (Zelalem Temesgen *et al*, 2022) As a result, shortages of food escalate tensions between people and wildlife, with animals potentially turning to human resources when their usual food becomes scarce.(Kidane Esayas *et al*., 2024)

2.2.4. Climate Change and Resource Scarcity

According to (Getahun Shanko & BekeleTona, 2022)Global climate change is increasingly recognized as an aggravating factor for human-wild life conflict. Prolonged droughts, a consequence of changing climate patterns, can catalyze resource-based conflicts by severely degrading natural resources like pasture and water points(Gizachew, 2021; Salahadine Mekonen, 2020) This scarcity can force carnivores to prey on domestic livestock due to a decline in their natural wild herbivore prey(Salahadine Mekonen, 2020). Furthermore, rainfall deficits and limited access to water points are cited as factors compelling communities to alter their traditional livelihoods, which can indirectly contribute to increased conflict by intensifying pressure on remaining resources(Getahun Shanko & BekeleTona, 2022)

2.2.5. Proximity to Protected Areas

The positioning of human communities and animal habitats plays a crucial role in limiting the level of conflict between humans and wildlife(Islam & Wang, 2024). Studies consistently indicate a strong connection between the frequency and seriousness of human-wildlife conflicts and the closeness of human settlements to forest boundaries and conservation zones(Sefi Mekonen, 2020). Crop raiding has been found to be much worse in villages closer to forest edges(Fenta Muluken Mekuyie, 2014; Salahadine Mekonen, 2020; Temesgen Zelalem, 2025)

2.3. Impacts of Human-Wildlife Conflict

2.3.1. Crop Damage

It is documented by (Zelalem Temesgen *et al*, 2022) that Crop raiding is the most frequent and well-recorded form of HWC in Ethiopia which affecting a high percentage of households in conflict situations. According to(Ayalew Mekuriaw Zewdie & Melese Getahun Tassew, 2025) report In Chebera-Churchura National Park, 99.2% of the interviewees reported that they had experienced crop damage. Similarly, over 75% of the people were hit by crop raiders in Wondo Genet district(Fenta Muluken Mekuyie, 2014), while crop raiding contributed to 84.31% of the occurrence of conflicts in Banja Woreda(Derebe Binega *et al*, 2022). In Chebera Churchura National Park, the total estimated cost of crop loss amounted to 320,515.00 Ethiopian Birr (approximately 6410 USD) over a two-year study period, In another specific context, a loss of 26,406 USD per annum was reported due to HWC in a garden area(Dereje Yazezew, 2022).

According to(Sime Demelash *et al*., 2022) various wildlife species have been cited as significant crop raiders include Grivet monkeys (*Cercopithecus aethiops*) by (Fenta Muluken Mekuyie, 2014) and Geladas (*Theropithecus gelada*)(Salahadin Merkebu and Dereje Yazezew., 2021). Other notable crop raider are warthogs and bush pigs(Ayalew Mekuriaw Zewdie & Melese Getahun Tassew, 2025). Rodents and other animals such as Porcupine (Hystrix cristata) by(Tamrat Misganaw *et al*., 2020) Giant mole rat (*Tachyoryctes macrocephalus*) by (Fenta Muluken Mekuyie, 2014), However, there is widespread vulnerability across agricultural systems. This is shown by the significant damage suffered by other important crops like sorghum, faba bean, pea, barley, wheat, enset, potato, sugar cane, and teff (Sime Demelash *et al*., 2022) (Derebe Binega *et al*, 2022)

2.3.2. Livestock Predation

According to (Ayalew Mekuriaw Zewdie & Melese Getahun Tassew, 2025) Livestock predation constitutes another significant problem in Chebera-Churchura National Park.

2.3.3. Human Attacks and Injuries

Human attack and injure are reported In Dhidhessa Wildlife Sanctuary by (Dereje Yazezew, 2022)and Chebera-Churchura National Park by (Acha Alemayehu Temesgen, 2017). As of reported by(Acha Alemayehu *et al*., 2018) there was seven human attacks by lions, five by hyenas and six injuries by leopard at different times in survey villages of chebera churchra NP from 2007-2011. This conflict was occurred when it's natural food sources, including livestock, become scarce, the spotted hyena often engages in conflict with humans, occasionally attacking individuals (Salahadine Mekonen, 2020; Temesgen *et al*., 2022). Additionally, hippos are to blame for bodily harm, threats, and even fatalities (Dereje Yazezew, 2022).

2.3.4. Disease Transmission

According to(Alemu Hailemariam *et al.*, 2017) report around Gemeshet forest and Chebera-Churchura National Park, disease transfer between domestic animals and humans or wildlife is another serious effect of HWC. In order to address such complex concerns, interdisciplinary approaches that incorporate ecological, social, and economic frameworks are essential (Schell *et al*., 2021). A large wild herbivores and carnivores can act as reservoirs for livestock diseases, like Rabis, Mulberg virous, HIV, bird flu and COVD19 thus endangering both human health and livelihoods and animal health(Fagre *et al*., 2022)

2.3.5. Socio-Economic and Psychological Impacts

Food security and livelihood opportunities are undermined by crop damage and livestock predation, which directly cause food crises and large economic losses(Derebe Binega *et al*, 2022). Crucially, these monetary losses are rarely reimbursed, which makes the impacted communities' financial struggles worse(Temesgen Zelalem, 2025). As stated by (Tamrat Misganaw *et al*., 2020) Villagers are forced to change their daily routines due to the pervasiveness of HWC, which can involve adults giving up sleep to protect cattle or children drop from school to safeguard crops. Vulnerable rural communities bear a disproportionate amount of the burden of human wild life

conflict(Kidane Esayas *et al*., 2024) These communities are frequently referred to as the hardest hit by the conflict due to their heavy reliance on livestock and subsistence farming.

2.3.6. Ecological Impacts

Human wild life conflict can push fragile populations to the brink of extinction. It plays a significant role in the decline of animal species, especially when combined with other environmental challenges(Getahun Shanko & BekeleTona, 2022). Wild animal populations are directly impacted by the loss of habitats caused by human activities like deforestation and agricultural expansion(Temesgen *et al*., 2025). Local people often kill wild animals in retaliation. This results from the inability to reduce losses and the lack of compensation plans(Ayalew Mekuriaw Zewdie & Melese Getahun Tassew, 2025; Kidane Esayas *et al*., 2024) The management of wildlife and the long-term survival of species are seriously challenged by this retaliatory conduct.

2.4. Mitigation Strategies and Management Approaches

2.4.1. Traditional and Local Mitigation Measures

Traditional techniques are commonly used by local populations throughout Ethiopia to keep wildlife away from their crops and cattle, the most popular technique is guarding which frequently thought to be successful in protecting both crops and livestock (Sime Demelash *et al*., 2022). Other common practices include chasing animals away from crops(Gizachew Girma., 2021) using scarecrows for crop protection(Geleta Taye Lemma., 2025) and constructing physical barriers such as fences for both crops and livestock (Frank & Glikman, 2019). Other strategies include restraining livestock close to homes(Kidane Esayas *et al*., 2024), smoking, using dogs, patrolling and using loud noises or flashes of light (Blair, 2008). These local tactics by themselves are inadequate to handle the expanding scope of HWC, as the trend of conflict frequently keeps raising.(Dereje Yazezew, 2022).

2.4.2. Community-Based Approaches

To reduce human wildlife conflict, community involvement is vital. Awareness-raising campaigns and educational programmers are key to the improvement of understanding by local communities on HWC variables, how local conflict resolution skills can be materialized, and how pro-wild life

conversations can be inculcated(BizunehTufa *et al*., 2018). According to studies of (Adams & Hutton, 2007) a crucial step in guaranteeing sustainable coexistence is active community participation in conservation efforts, which includes the adoption of community-based natural resource management models.

Ethiopia has put legal systems in place to tackle human-wildlife conflicts and look after its wildlife(Geleta Taye Lemma., 2025). The EWCA focuses on cutting down conflicts between people and wild animals, encouraging responsible use, and getting the word out about why conservation matters(IUCN, 2005). But here's the snag there aren't clear rules for compensating people when wildlife causes them losses, That missing piece just makes people resent wildlife even more, sometimes leading to retaliation and the killing of animals (Sekhar *et al*., 2018)

2.4.3. Innovative and Integrated Solutions

Promoting alternative livelihoods, such as shifting from vulnerable agricultural practices to perennial plantations or animal husbandry, or providing alternative employment opportunities, can reduce communities' dependence on conflict-prone resources and alleviate pressure on natural habitats, Community-based ecotourism is also recommended as a way to provide economic benefits from wildlife, thereby fostering positive attitudes(IUCN, 2005) .

Compensation plans that pay people back for their losses go a long way toward changing how folks feel about wildlife(Seifu Mesfin and Beyene Fekadu., 2014). And, honestly, any planning or management needs to think about what's good for both people and wildlife(Distefano, 2005; Woodroffe *et al*., 2005)

2.4.4. Policy and institutional responses

In Ethiopia, human-wildlife conflict (HWC) has historically been managed through reactive and often uncoordinated measures(Kufa Chala Adugna and Debella Habte Jebessa., 2019). But Ethiopia has recently overhauled its environmental and wildlife policies to address the gaps in the previous 2005 wildlife policy (Geleta Taye Lemma., 2025) this includes National Human-Wildlife Conflict Management and Coexistence Strategy (2026–2035) and National Biodiversity Strategy and Action Plan (NBSAP) 2025–2030: Launched in late 2025, this framework includes 19 specific targets that integrate wildlife protection with sustainable development. Unlike the 2005 version,

the updated policy explicitly addresses HWC as a "Policy Issue," authorizing strategies for coexistence and alternative livelihoods for victims of wildlife damage(Woolaston *et al.*, 2021), While the 2008 Wildlife Regulation (No. 163/2008) allowed for the hunting of "problem animals," newer directives are shifting toward relocation and conservation hunting only as a last resort. Institutional Responses Management in Ethiopia is decentralized, involving federal, regional, and local stakeholders(Park, 2020).

2.5. Conservation challenge of protected area in Ethiopia

2.5.1. Attitude of local peoples towards wildlife

Conservation can no longer be considered in isolation from the economic and social interests of people, Perceptions influence attitudes towards wildlife(St John *et al*., 2012), attitudes can be useful indicators of behavioral; As such, people ‘s perceptions and expectations underpin human-wildlife interactions and shape their responses to conflict with wildlife(Hill, 2004).

According to (Shah *et al*., 2021) Majority of respondents did not like wildlife and want to eradicate them, the reason behind the disliking of wildlife was that wildlife cause high damage to life and property of humans in the study area. If local people attach a negative value to wildlife, they will not support its continued existence in the region(Megaze Aberham *et al*., 2017), and conservation depends on local community support. A number of studies have revealed that age, gender, ethnicity, level of education, landholding size, and period of residency all influence attitudes towards wildlife(Gifford & Nilsson, 2014). Nowadays the conflict between local people and wildlife is taken as the major conservation issue(Megaze Aberham *et al*., 2017). The conservation attitude of rural people living near to the protected area is highly influenced by the problem associated with wildlife people living surrounding the protected areas who are unable to control the losses caused by wildlife are likely to develop negative attitude toward wildlife(Shah *et al*., 2021). They continue to view in terms of its importance and tend to be more concerned about how wildlife affects them economically(Messmer Terry A, 2020)

2.5.2. Human encroachment and Habitat fragmentation and losses

Studies indicate that by 2050, many of the presently abundant types of wildlife species will begin to disappear as the number of people in contact with wildlife increases(Elisa *et al*., 2024). An increased human population around eastern Ethiopia protected areas caused high pressure in

protected area resources via cutting trees, charcoaling, hunting, farmland and settlement expansion and others activities, the situation is more serious in Babile elephant sanctuary, Awash national park and Serotonergic or Kuni-Muktar Mountain Nyla sanctuary(Wale Mengistu *et al*., 2025) Agriculture and settlement expansion fragmented and narrowed the size of these protected areas(Wale Mengistu *et al*., 2025). This fragmentation of this buffer zone by human creates close contact between wild animals and the human population(Bizuneh Tufa *et al*., 2018) As a result, most dwellers near PAs have developed resentment towards wild animals and viewing them as not valuable assets(Demeke Datiko and Afewerk Bekele., 2013)

2.5.3. Forest fire

Although the cycle of events that leads to the destruction of forest resources involves many varying factors, those initiated by humans using fire to access and remove forest resources is the most severe(Tesfaye Getachew *et al*., 2004). Forest fires in Ethiopia are becoming serious problems due to many factors including climatic and socio-economic issues(Tesfaye Getachew *et al*., 2004). Farmers in BGRS use fire to clear lands for agriculture (Kidemu & Anjulo, 2016).People in the region deliberately burn natural vegetation to clear off the grassland for crop cultivation, renew pasture for livestock, remove insect pests and as a wildlife control measure(Desta Semeneh Bessie., 2016).

2.5.4. Inadequate Funding and allocation

Numerous protected areas in Ethiopia encounter financial difficulties due to restricted funding (Berhanu Kassegn and Teshome Endalkachew., 2018) The lack of explicit regulations for administrative and financial processes obstructs the sustainable management and advancement of wildlife resources in the nation (Aneseyee *et al*., 2022). Limited financial resources and inadequate infrastructure additionally hinder efficient conservation initiatives as a whole(Tessema *et al*., 2010). This establishes obstacles to fostering co-management with local communities and results in financial loss in wildlife regions (Mekonen *et al*., 2017).

3. MATERIALS AND METHODS

3.1. Study Area

As illustrated in figure 1 below the Study was conducted at Ambessa Forest which is situated in Bambasi District, Asossa zone Benishangul gumuz Region of Ethiopia. Bambasi is one of the 22 districts in the Benishangul gumuz Region of Ethiopia. It's part of the Assosa Zone, bordered by Mao-Komo special woreda in the southwest, Asossa in the northwest, Oda buldigilu in the northeast, and by the Oromia Region in the southeast. Geographically, Anbessa forest is situated at 9°50'3"-9°58'21"N longitude and 34°34'25"- 34°45'12" E latitude at an altitude of 1554 m asl. The area is 745 km far northwest of Addis Ababa(Dereje Mosissa *et al*., 2019). The Bambassi District covers about 221016 ha having land features of plain 95492 ha, Valley/gorges 6922 ha, mountains 38347 ha, water body 8675 ha and others land 71553 ha (BWANRO, 2019b). The Ambessa Forest, otherwise referred to as the Ambessa Chaka, represents an ecosystem that is ecologically significant but increasingly threatened (EFCCC, 2019), ecologically, this forest exhibits a uniquely heterogeneous ecosystem composition, which has been classified mainly as a Combretum-Terminalia woodland. The floral assessments of the ecosystem indicate that there is high diversity within the plant composition, with over 118 species of plants within 93 genera and 46 families(Ferede Guyu and Anjulo Aduwa., 2023). These include a number of endemic plants. Plant diversity within the ecosystem is demonstrated by the different layers, including trees (33/%), herbs (43/%), shrubs, and climbers, leading to a number of different plant community layers(Ferede Guyu and Anjulo Aduwa., 2023). Despite the diverse composition of this ecosystem, there are certain homogeneous parts of this ecosystem, especially owing to the presence of large monotypic stands of lowland bamboo (*Oxytenanthera abyssinica*)(Sertse Demissew *et al*., 2011)

The wild animals most commonly flourishing in Anbessa Chaka are primates and versatile medium-sized mammals, which have best adapted to the forest's thick canopy and shifting boundaries(Mosissa Dereje *et al*., 2020). Primates rule the ecosystem; the tree-dwelling Mantled Guereza (Colobus monkey) and the quick Patas monkey access the upper branches and bushy borders, whereas the highly social Olive Baboons and Grivet monkeys often search for food along the ground and peripheries(Mosissa Dereje *et al*., 2020), Under the canopy, small hoofed animals such as the elusive Bushbuck and Common Duiker move through the dense underbrush with Bushpigs, which tirelessly dig in the ground searching for food. Although the lion that gives the

forest its name is now extremely rare, the ecosystem continues to host powerful carnivores, mainly the elusive Leopard, which hunts using the thick vegetation, along with nocturnal Spotted Hyenas and smaller predators like the African Civet that roam the forest edges at night(Ferede Guyu and Anjulo Aduwa., 2023).

This highly ecologically diverse habitat is facing a lot of degradation due to increased human disturbances from the surrounding communities, who use the forest as the source of their household income(Mosissa Dereje and Teshome Endalew., 2026) The reasons for forest degradation include rapid expansion of agriculture, over-cutting of bamboo trees, and the gathering of wood fuel(Sertse Demissew *et al*., 2011). In addition to that, this environment faces a lot of disturbance from overgrazing, recurrent forest fires caused by humans, and the development of gold mining activities, thus resulting in the fragmentation of the habitat(Dereje Mosissa *et al*., 2019)Profiles for spatial analysis and environmental monitoring in the Bambasi District show that the distance of these resettlement villages to the Anbessa Forest differs slightly based on community arrangement, with each village having a specific distance to the forest boundary(EFCCC, 2019). Mender 47 has a direct, zero-kilometer border on its western side where active farming areas immediately about the forest line, whereas its main residential village center is located approximately 1.5 to 2.5 km distant. Mender 48 is situated just set back from this frontline, with its outer communal boundaries ranging from 0.5 to 1.5 km from the forest edge and its compact residential hub found 2.5 to 3.5 km away. Ultimately, Mender 49 borders the southern-central forest extensions and the Mima watershed streams, situating its agricultural areas between 0 to 1 km from the woodland edge, while its residential developments lie about 2.0 to 3.0 km distant(EFCCC, 2019; Guyu Daie Ferede and Aduwa Tunkala Anjulo., 2020). The other protected area found in Assosa zone is Tsore alimetema community forest. This community forest is found on the distance of 68 km far from Ambessa Chaka(EFCCC, 2019).

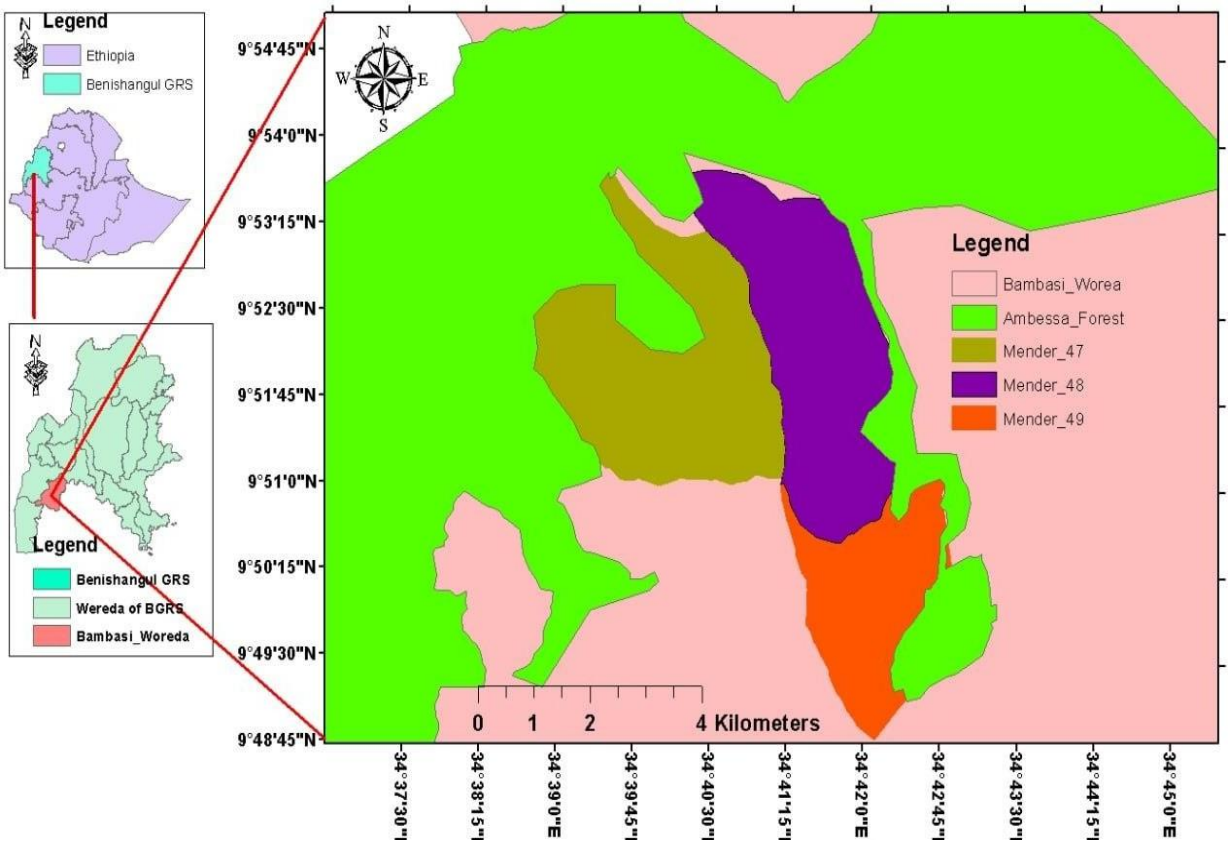


Figure 1: Map of the study area

3.1.1. Population of Bambasi woreda

Based on 2022 projections from the Central Statistical Agency of Ethiopia, the total population of the Bambasi woreda in the Benishangul-Gumuz Region is approximately 79,558, consisting of 40,357 males and 39,201 females. In terms of religious affiliation, the majority of the inhabitants are Muslim (66.69%), while 29.26% practice Ethiopian Orthodox Christianity and 3.83% are Protestant. The district features a diverse ethnic makeup, with the six largest groups being the Amhara (52%), Berta (33.8%), Oromo (32.3%), Fadashi (12.3%), Tigray (5.7%), and Mao (3.7%). This cultural diversity is mirrored in the local languages, where Amharic is spoken as a first language by 42.7% of the population, followed by Berta at 33.7%, Fadashi at 13.4%, Afan Oromo at 12.2%, Tigrigna at 5.6%, and Mao at 3.7% (BWANRO, 2019b).

3.1.2. Climate of study area

The meteorological data obtained for Assosa station indicated that temperature variability has been steadily increasing from year to year. Over the analyzed period, the recorded average minimum temperature dropped to its lowest point at 21.2°C in 2007, while the average maximum temperature peaked at 36.9°C in both 2005 and 2018. Overall, the long-term historical average temperature for the area stands at 28.3°C, establishing a notable temperature range of 15.7°C between the extreme observed values (BWANRO, 2019c)

3.1.3. Rainfall of the study Area

Bambasi District features a predominantly sub-humid tropical climate characterized by a distinctly unimodal pattern of rainfall, where the major rainfall period is between April and October, followed by a pronounced dry spell(Amante Morka and Tesgera Hika., 2020). According to local weather analysis and records, the amount of annual rainfall in the region usually lies between 1350 mm and 1450 mm(Abera Merkuz *et al*., 2023). However, taking into account the bigger hydrological sub-basin and regional discrepancies, annual rainfall may vary from 1000 mm to 1800 mm owing to different topography and elevation changes (Biru & Yahya, 2022). The majority of rainfall comes during the rainy season and accounts for the greater part of the annual rainfall total, which maintains rain-fed agricultural practices in the region(BWANRO, 2019c).

3.1.4. Soil and Vegetation type of Ambessa Chaka

Bambasi district with specifically Ambessa forest area is dominated with Sandy and clay soils type. The vegetation type in Ambessa Chaka is dominated by broadleaved deciduous trees, much of which is intact. The most common tree species are *Anogeissus leiocarpa; Balanites aegypticus, Boswellia papyrifera*, *Combretum collinum* Fes, *Dalbergia melanoxylon*, *Lannea fruticosa*, *Lonchocarpus laxiflorus*, *Piliostigma thonningii*, *Stereospermum kunthianum*, *Terminalia laxiflorus*, *Hyparrhenia Andersson(*Awas Tesfaye *et al*., 2010*)*

3.2. Materials used

GPS, Voice recorders, Camera traps and field guides for wildlife identification were used during the study period.

3.3. Preliminary survey

A preliminary survey was conducted to identify major crops and establish a general understanding of the landscape and agricultural status of the villages surrounding Ambessa Chaka. Prior to formal data collection, the questionnaire was pre-tested with 12 selected individuals from adjacent kebeles and were excluded from the final sample. Therefore, it was help to ensure the clarity and logical sequencing of the questions. Based on the findings of this preliminary phase, the instrument was revised to resolve any potential misunderstandings. During this preliminary survey out of 12 participants selected above 50% was uneducated that means they cannot read and write. As a result, a question prepared for questionnaire survey was rearranged for interview for those who cannot read and write and filled by the researcher during the final data collection.

3.4. Study Design and sample size determination

A mixed-methods research design approach was employed, which combined quantitative data from household surveys and qualitative data from focus group discussions, key informant interviews, and field observation to provide a comprehensive understanding of the issue. Qualitative and quantitative data were connected through a triangulation method approach. The qualitative data were used to build upon and strengthen the data collected by the questionnaire survey. To ensure the study was representative, three kebeles (Mender 47, Mender 48, and Mender 49) were selected purposefully from a total of seven kebeles found around Ambessa Chaka. The selection was based on high occurrences of human-wildlife conflict according to the district's agricultural office information and proximity to the edge of the Ambessa Chaka protected area (BWANRO, 2019a). Villages from each kebele were stratified based on distance categories of very near (<0.5 km), near (0.5-1.5) Medium (1.5 to 2 km) and Far (> 2 km). Following this, two villages from each distance category were randomly selected. A total of six villages (two villages from each study kebele) were selected for the study. After obtaining the total number of households (HH) living in each neighboring kebele, the sample size was determined using the simplified formula developed by Yemane (Umar & Wachiko, 2021) and reviewed by (Israel, 2012**)**, with a precision level (e) of 7% and a confidence level of 93%. According to the kebele administration offices, the total number of household heads living in these three study kebeles were 1,884. The sample size was determined by the formula of (Yemane 1967).) as follows;

$$n = \frac{N}{1+N(e)2} = = \frac{1884}{1+1884(0.07)2} = 180$$

Where:

N = population size

n = sample size

e is margin of error

The choice to employ a 7% margin of error, instead of the standard 5%, was arises from various practical and methodological factors, including logistical limitations and geographic spread (Stern *et al*., 2014). A 7% margin of error allows for a practical sample size that guarantees the research and help to being finished within the designated timeline and budget while maintaining data integrity. A 5% margin is typical in high-precision studies, but a 7% margin is still considered acceptable for community surveys, offering a trustworthy representation of viewpoints with a 95% confidence level (Rahman, 2023)

3.4.1. Data collection

The primary data collection was executed through a mixed-methods approach, integrating household questionnaire surveys or interview, focus group discussions (FGDs), and field surveys. The household survey utilized semi-structured questionnaires with both closed-ended and open-ended questions, which were developed to be specifically answerable and testable in relation to the research objectives. The questionnaires were prepared in English, translated into Amharic, and then back-translated into English following the interviews to ensure data integrity.

To maximize respondent confidence and the quality of information gathered, interviews were conducted at the homes of participants who were at least 18 years of age. The questioner survey and focus group discussion was conducted from March 25/ 2026 to April 5/2026 while key informant interview and document signing were conducted from April 15 to 25/2026. Respondents from the study villages were selected using systematic random sampling, and all sampled households were successfully interviewed.

In addition, 15 key informants including local government officials, academic experts, community elders, environmental protection, developmental agents, religion leader and youth association purposefully selected for in-depth interviews to provide historical and policy context regarding conflict trends and conservation challenges. Furthermore, six FGDs (comprising two groups per kebele with eight participants each) were organized for male farmers, female household heads, and youth to discuss shared experiences on impact of HWC, wild animal status, anthropogenic factor fuel the conflict and reality of crop loss by local community and proposed solutions to the conflict. The study also incorporated systematic field observations and the documentation of signs from the local government agricultural office, focusing on crop damage, habitat overlap, and animal footprints. To confirm the crop loss by wildlife raider collected from the participants nine plots were established across the edge of forest in the farmland of the farmer and damage data were collected or observed on the farm land. The Nine plots were used each 20 meters by 20 meters along the edge of the forest from April 30 to may10/ 2026. Each of these areas was 400 meters or

0.04 hectares. So, in total 0.36ha were looked across all nine areas, where people were growing maize, mango, banana, sorghum, sugarcane and cabbage. Then crop lofted over was estimated by comparing this estimated amount of the measured area to the number of crops that people usually get in this region. Around here people usually get between 1,250 and 1,500 kilograms of maize per hectare. Problematic wildlife identification was conducted via sign surveys along 10 transects one-kilometer near to conflict sites, utilizing tracks, scat, and damage patterns in April 25 to May 1/ 2026. For the quantitative analysis, Cronbach's alpha was employed to measure the internal consistency and reliability of the Likert-scale questions. Finally, ethical approval was obtained from Assosa biodiversity center to ensure the protection and rights of both the human respondents and the animals involved in the research process.

3.5. Data Analysis:

Statistical software SPSS version 20 was employed for all quantitative data analysis. All problematic wildlife species identified as causing damage to crops, livestock, or humans were documented in Excel and analyzed using descriptive statistics. The relationship between specific animal species and the types of damage occurred was analyzed using Chi-square tests, where crop damage, livestock attacks, and human injuries served as dependent variables, and the animal species causing these effects served as the independent variables. The main drivers of human-

wildlife conflict were identified and ranked, while the total amount of economic loss was determined through descriptive statistics. Economic values were calculated based on the local market rates for crops and livestock at the time of the study. Crop and livestock losses were calculated on a per-household basis to determine the financial impact in Ethiopian Birr (ETB). The total economic loss was derived by multiplying the price of the crop by the total weight lost, or by calculating the difference between potential and actual yields per hectare. Mean loss (ML) was determined by dividing the total mean by the number of plots sampled (n). For this purpose, nine plots (three plots per kebele) were utilized, and their relationship to various distances among the study kebeles was determined using Chi-square analysis. Additionally, multiple linear regression was used to investigate how socio-economic factors, such as education level, income source, and landholding size, influenced the community's attitudes toward wildlife conservation. To complement the quantitative findings, qualitative insights gathered from Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were analyzed using thematic and narrative analysis approaches. Means that the data collected from questioner survey were narrated and triangulated with the information generated, coded and interpreted from FGD and KIIS. This study employed a mixed-methods triangulation approach, where quantitative data provided statistical breadth and qualitative data offered depth and context. Integration occurred at the interpretation stage, where thematic narratives were used to validate or explain the statistical significance of the regression and Chi-square results. This integrated approach strengthened the overall findings and ensured the accuracy of the results gained from the quantitative data analysis.

3.6. Ethical consideration

The study was conducted in accordance with internationally recognized research ethical guidelines for environmental and social science research involving local communities. Ethical principles such as voluntary participation, prior informed consent, confidentiality, respect for local culture, and protection of respondents' privacy were strictly followed throughout the assessment of human–wildlife conflict. Before data collection, the objectives of the study were clearly explained to all participants, and interviews were conducted only after obtaining verbal consent from respondents. Moreover, during data analysis and reporting, all obtained data were anonymized by removing individually identifiable information and use non-identified codes like 001, 002...0180 to protect participant confidentiality.

The research methodology was designed to minimize any social, cultural, or environmental disturbance during field activities. Information obtained from respondents was used solely for academic and conservation purposes, and no personal identifiers were disclosed in the analysis or reporting of results. Furthermore, this study did not involve the use, handling, experimentation, capture, or manipulation of live animal subjects. Data were collected primarily through household surveys, key informant interviews, field observations, and secondary information sources related to human wildlife interactions. Therefore, no animal ethical approval was required for this study. The research procedures were implemented following internationally accepted ethical standards for biodiversity conservation and socio-ecological research, including the principles outlined by the International Union for Conservation of Nature (IUCN) and standard social science research ethics guidelines. For tool reliability, a pilot test comprising 7% of the sample size was conducted outside the primary study area to identify ambiguous phrasing, while standardized training for field assistants was required to ensure high inter-rater reliability.

This study did not include human clinical trials, health interventions, or human subjects needing trial registration, rendering clinical trial compliance and registration procedures irrelevant to this research. Moreover, this study did not obtain any specific grant or financial backing from any funding organization in the public, commercial, or non-profit sectors, as it relied entirely on standard institutional resources.

4. RESULTS

4.1. Demographic profile of the respondents

General information regarding the respondents' demographic data, including gender, age, educational background, and household income, has been obtained and is presented as follows.

4.1.1. Gender

Data were collected from a total of 180 respondents, of whom 145 (80.6%) were identified as male and 35 (19.4%) as female as indicated in Figure2.

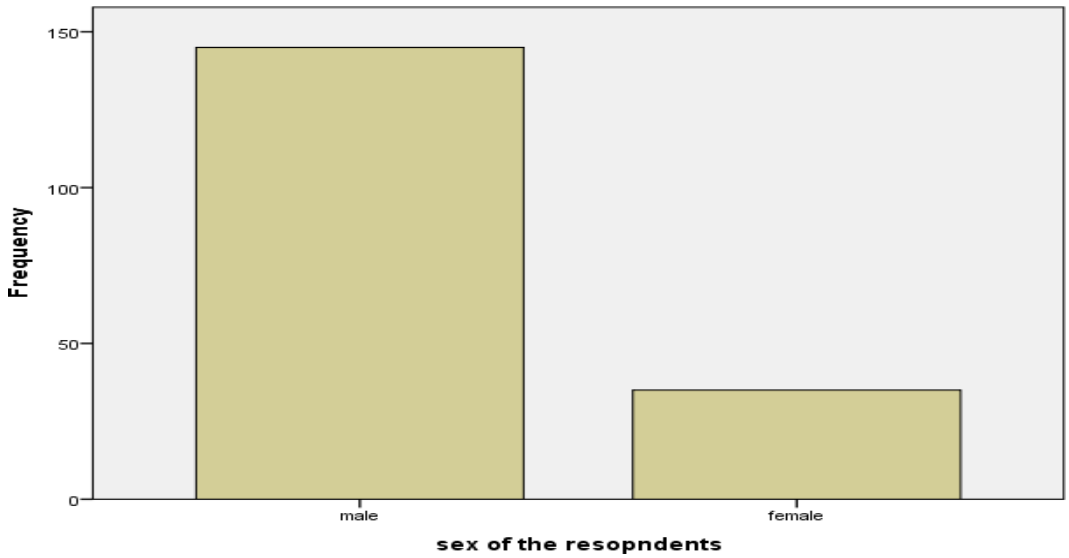


Figure 2: Sex distributions of the respondents

A Pearson Chi-square test ($X^2 = 0.008$, df = 1, p = 0.917) showed no significant difference between the attitudes of male and female respondents in the study area (Table 1). Although fewer female respondents were included than male participants, this was attributed to the fact that the majority of residents in the study area are adhered to Islamic traditions, where interaction with unfamiliar individuals is generally discouraged.

4.1.2. Age

As illustrated in Figure 3, the participants were categorized into age groups, with 31 (17.2%) identified as 18–19 years old, 46 (25.6%) aged 19–30 years, 57 (31.7%) aged 31–45 years, 34

(18.9%) aged 46–55 years, and 12 (6.7%) aged over 56 years. The forest-adjacent areas were resided in by most participants, and an extended period of residence in the research area was reported. The farmers surveyed were found to be of mature age, experienced in farming, and knowledgeable about the challenges and crop damage caused by wildlife. A Spearman's rank-order correlation was conducted to assess the relationship between the age of respondents and their perception regarding the presence of the surrounding protected area. A negative correlation between respondents' age and their perception was revealed by the analysis ($r_s = -0.115$, $p = 0.124$). It was indicated that as the age of respondents increases, a tendency toward a negative perception is observed.

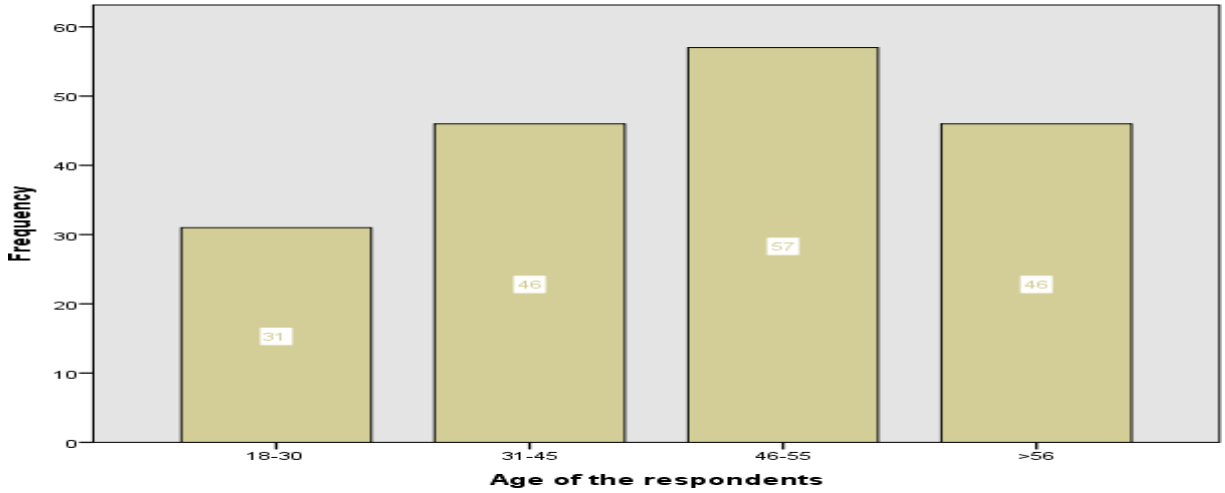


Figure 3: Age ranges of respondents

4.1.3. Educational background

As reported in the Table1 below, educational background of the respondents of the study area was classified as 74(41.1%) illiterate, 57(31.7%) were able to read and write, 32(17.8%) attended Elementary school, 9(5%) those who had attended high school and 7(3.9%) individuals have college or university diploma.

Table 1 : Education Background of the respondents

Education status of respondents	Number of respondents	percentage

Illiterate	74	41.1%
Read and write only	57	31.7%
Complete elementary school	32	17.8%
Complete high school	9	5%
Other/ have degree or diploma	7	3.9%

4.1.4. Roles in households

As indicated in the Figure 4 the breakdown of household responsibilities among the 180 participants shows a notable predominance of household heads, accounting for 153(85.0%). On the other hand, the number of children was relatively lower at 20(11.1%), whereas those that identified themselves as farmers/laborers formed the lowest percentage at 7 (3.9%). Overall, from the data obtained, it can be concluded that the respondents were mostly the older members of the household.

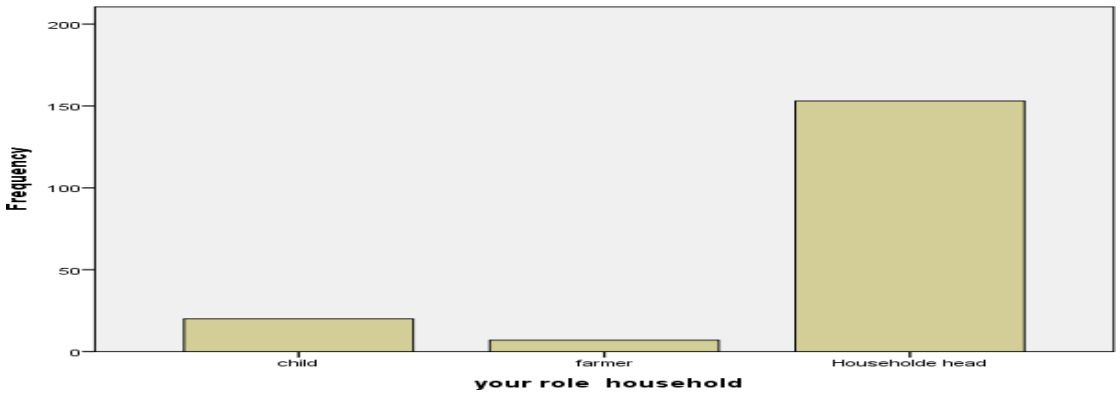


Figure 4: Roles of individuals in household

4.1.5. Livelihoods and land use of the respondents

As illustrated in Table2, there was universal land access in this group as 180(100%) of respondents reported owning farmland. However, the size of these holdings varies as 160(81%) of the population manages farms between 0.5 and 1.5 ha. Only 15(8%) manage very small plots (0.5ha), while 20(11%) manage the largest recorded plots (1.5–2ha). It is evident from the information that there is a very stable population, which has been residing here for many years. About 49(27%) of

people have been living in the same place for 20 years and above, while the maximum percentage, 55(31%), have stayed there for 30 years. Whereas, 45(25%) have been residing in the same area for 50 years and 10(6%) 0f the respondents live in the areas greater than 50 years.

Table 2: Livelihoods and land use of respondents

Owning farmland	**Yes**	**180**	**100%**
	No	0	0%
Farm land size	0.5ha	15	8%
	0.5-1ha	75	42%
	1-1.5ha	70	39%
	1.5-2ha	20	11%
How long do you live in this area?	10 years	21	12%
	20 years	49	27%
	30 years	55	31%
	50 years	45	25%
	> 50 years	10	6%
Total		**180**	**100%**

4.2. Proximity to the forest edge

As indicated in the figure 5 below, a dominant 155(86%) of the 180 respondents are situated in close proximity to Ambessa Chaka forest edge. Over 80(44%) of the respondents categorized as being very near and 75(42%) as nearby. In contrast, only a small fraction of the participants, as just 20(11%) report a medium distance and a marginal 5(3%) are situated far from their land. the preason correlation was conducted to test whether the distance between farmland and forest edge have impact on the precipitin of local community, and it revealed that negative correlation (r= -0.118, p=0.115), this means as distance between farmland and forest edge increase the severity of crop loss and livestock attack was decreased. Out of 180 respondents 86% have negative filling or attitude towered the surrounding protected area.

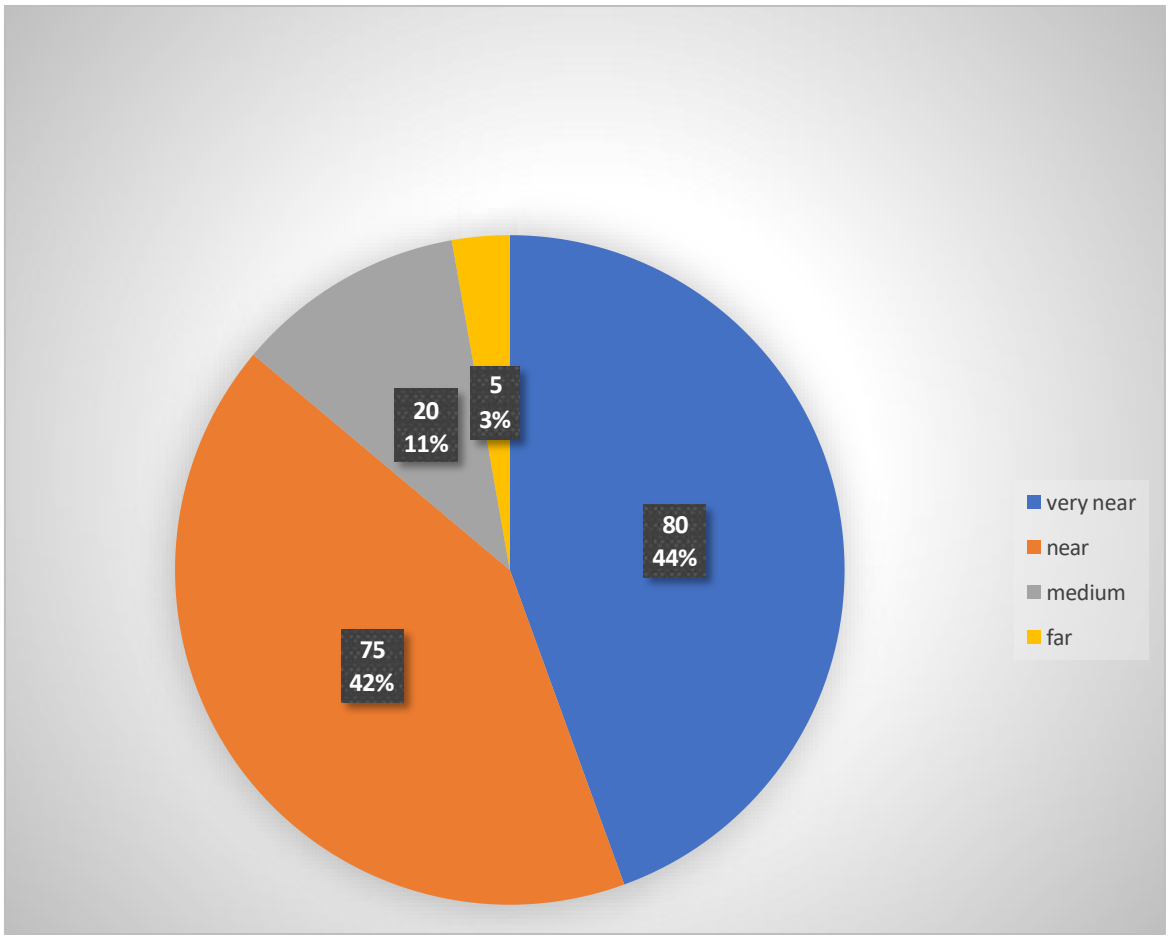


Figure 5: Distance range of respondent's farmland and forest edge

4.3. Socio-economic activities and income source of household

From the socio-economic survey results, it was established that about 140 (77.8%) respondents practice diversified agriculture through the cultivation of crops and rearing of livestock (see Figure 6). About 8(4.4%) indicated that they practice farming only through cultivation of crops, while 18(10%) farms only by rearing livestock. Moreover, there were 14(7.8%) who stated that they derive their main income through farming crops and practicing other economic activities.

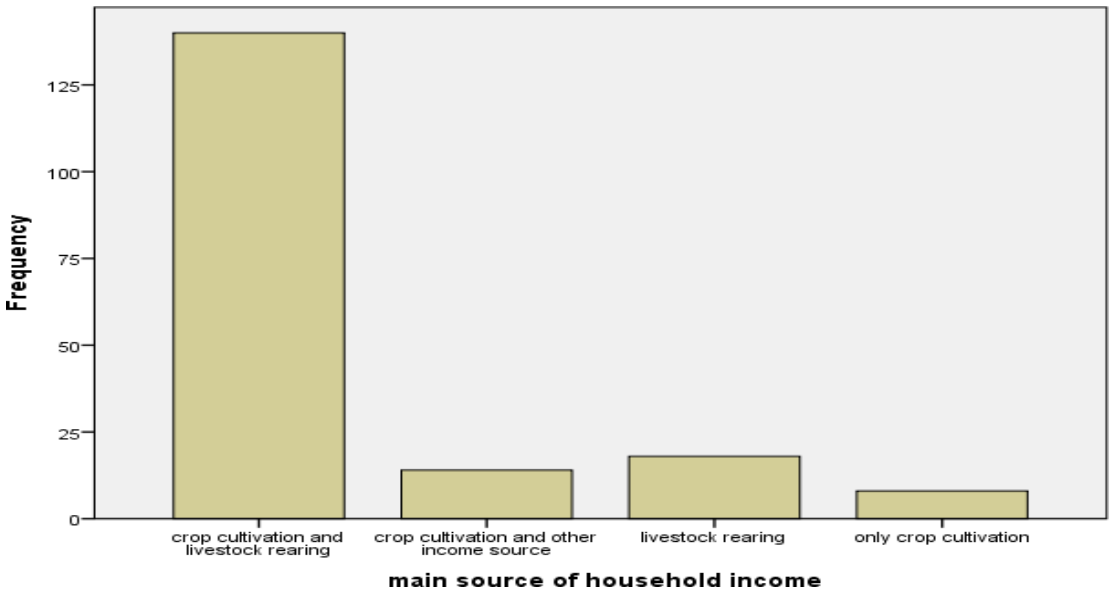


Figure 6: The main household income activities in the study area

4.4. Damage type and dynamics of human wildlife conflict around

As illustrated in the table 3 Over 88 (48.9%) of the respondents respond crop raiding was the highest damaged by the wild animals in the area. About 69(38.3%) of the respondents mentioned the threat of the wild animals includes both the raids on the crops and livestock attacks, while 16(8.9%) of the respondents have encountered livestock attacks only. Only 7(3.9%) among all 180 participants did not have encountered any challenge with wildlife.

Overall, 157(86.3%) of all documented cases included some type of crop damage. Even with the frequent occurrence of these interactions, the widespread exposure to such events indicates that conflict has become a regular part of rural life in this area. A Pearson Chi-Square test was conducted to evaluate the relationship between damage type difference along different study kebles (N = 180). The analysis revealed no statistically significant association between the two variables, (X^2 = 1.85, df =6 p = 0.933)

Table 3: Damage type observed in the study area

Damage type	Frequency	Present

Crop raiding	88	48
Both crop raiding and livestock attack	69	38.3
Livestock attack	16	8.9
No any damage	7	3.9

4.5. Crop preference and forest dependency of the respondent

As it is indicated in table.4 below, 53(29.4%) of the respondent replay that maize is the most common crop, while a substantial 52(28.9%) of the 180 respondents practice integrated farming by growing all identified crop type and fruits, 35(19.4%) and 30(16.7%) of the respondents cultivate only sorghum and teff with fruit on their farm land respectively. All of the respondents reported that they cultivate fruit plant in their farm land, though specialized vegetable production remains low at only 10(5.6%). Crucially, the data highlights a near-universal dependency on forest resources, with 171(95%) of households relying on the local ecosystem for essential needs.

Table 4: Crop preference and Natural resource dependence of the respondentsT

Types of crops grown in the farm land	**Number of respondents**	**present**
Maize and fruit	53	29.4%
Sorghum and fruit	35	19.9%
Teff and fruit	30	16.7%
vegetables	10	5.6%
all crop type	52	28.9%
How would you describe your household relationship with the surrounding natural environment? Do you depend on the forest for firewood, grazing, construction, wild food harvesting etc.		
Yes	171	95%
No	9	5%

4.6. Human wildlife conflict Prevalence and Temporal Patterns

As illustrated in Table 5, human-wildlife conflict (HWC) is pervasive within the study area, with 169(93.9%) of respondents reporting negative interactions compared to only 11(6.1%) who reported no. Participants reached 99(55%) confirm that conflict intensity peaks during the wet season, while 49(27.2%) of the participant respond human wildlife conflict happened during both dry and wet season and 32(17.8%) of the respondent replayed that it occurs during the dry season. In particular, the olive baboon (*Papio anubis*) and grivet monkey (*Chlorocebus aethiops*) were found to be among the principal competitors of maize and sorghum, with the level of damage being higher at the early maturity phase compared to when the crops matured and were harvested. In addition, 180(100%) of the interviewees stated that livestock attacks happen throughout the year but become pronounced during the dry season. Over 180(100%) of the interviewees stated that the wildlife species attack their crops and livestock around the clock, although they differ from each other based on their daily activity periods,

Table 5: Human wildlife conflict prevalence and temporal pattern

Conflict experience	**Response**		
Have you or your household experienced any conflict with wildlife?	Yes	No	
Number of respondents	169	11	
Present (%)	93.9%	6.1%	
In which seasons do you experience the most frequent conflicts?	Wet season	Both wet and dry season	Dry season
Frequency	99	49	32
Present	55%	27.2%	17.8%

4.6.1. Anthropogenic and geographic drivers of human wildlife conflict

From the data presented in Table 6 below, it can be seen that the main reasons for HWC are associated with land use changes and habitat destruction. The majority of respondents, 72 (40%), considered the expansion of subsistence farming and invasion by individuals to be the major

contributors to such conflicts. The destruction occurs not only because of the local population but because of the resettlement of individuals and investments carried out near the protected areas, which interfere with their natural habitat. The location of farmlands in relation to the natural habitat of wildlife animals also plays a significant part in HWC intensity as 90(50%) of respondents noted. Interestingly, biological and environmental factors such as perceived increases in wildlife populations 10(5.6%) and general habitat disturbance 8(4.4%) were cited significantly less often. This response which received from the local farmer was confirmed by the statements of Key informant interviewers and FGD.

Table 6: Drivers of human wildlife conflict

Driver/ cause	**Number of respondents (frequency)**	**Present (%)**
Expansion of agricultural activity	72	40%
Proximity of farm land to forest edge	90	50%
Wildlife population increments	10	5.6%
Wildlife habitat disturbance	8	4.4%

Primary data was obtained using 15 Key Informant Interviews (KIIs) and six Focus Group Discussions (FGDs), comprising 48 people who were purposively selected because of their expertise and their long last experience in natural resources management and their future vision on human-wildlife interactions. The findings from both samples unequivocally indicate that HWC has increased, mainly owing to the expansion of human activity into secured ecosystems. The increase in HWC can be attributed to several factors, including illegal acquisition of land by indigenous and investors, entry of livestock into secured regions, and rapid deterioration of habitats as a result of deforestation and agricultural expansion.

4.6.2. Type of wildlife crop raiders

In the study area, 61(33.9%) of the respondents identified olive baboon (*Papio anubis*) as the primary culprit for damaging crops. Following this, 55(30.6%) of them mentioned grivet monkey

(*Chlorocebus aethiops*) as the main crop raiders, while common warthog (*Phacochoerus africanus*) was indicated by 54(30%) of the respondents as the third most significant cause of crop destruction. Local residents also pointed out bush pigs (*Potamochoerus larvatus*), Crusted porcupine (*Hystrix cristata*), bush back, birds, and rodents as animals that damage crops, as shown in Table 7. The majority of these wildlife pests caused harm by consuming and trampling a range of crops in open fields and household gardens. Baboons inflicted harm on maize throughout its growth stages, particularly in villages close to the forest boundary, affecting open fields. Grivet monkeys also damaged maize and fruits to varying extents in all examined areas. Warthogs and olive baboons primarily caused harm to maize during its flowering and ripening phases. Among the respondents, over 91(50.5%) identified the lion (*Panthera leo*) as the primary predator of livestock, while 89(49.4%) of the respondents pointed to spotted hyenas (*Crocuta crocuta*) as threats to livestock and human safety.

Table 7: Most Crop raider and Livestock attacker wildlife species in the study area

Most crop raider and livestock predator wildlife species	**Number of respondents /frequency/**	**Present (%)**	**Rank**
Papio Anubis	61	33.9%	1st
Chlorocebus aethiops	55	30.6%	2nd
Phacochoerus africanus	54	30%	3rd
Potamochoerus larvatus	7	3.9	4th
Tragelaphus Scriptus	3	1.7	5th
Livestock predators			
Panthera leo	91	50.5%	1st
Crocuta crocuta	89	49.4	2nd

Respondents divide crop raider wildlife species to crop specific damage (Table 8). Among 35(19.4%) respondents' response maize was damaged by olive baboon, 27(15%) of the

respondents confirmed that maize was damaged by common warthog, 23(12.8%) of the total respondents replayed maize were damaged by gravity monkey in the study area, while 3(1.7%) and 2(1.1%) of the respondent's confirmed maize was destroyed by bush pig and bush back, respectively. On the other hand, 17(9.4%) of the respondents replayed that grivet monkey highly damage sorghum and 16(8.9%) and 15(8.3%) of the participants stated that sorghum was damaged by olive baboon and common warthog, respectively. Chi-square test was conducted to examine if there were significant difference among crop raider wildlife species and type of crop, ($\square^2$ =13.38, df=20, p value = 0.86) imply that there is no significant difference across different crop variety damage by different wildlife species.

Table 8: Species specific crop damage

	Crop raider wildlife species				
Crop type	Bush back	Bush pig	Grivet monkey	Olive baboon	Warthog
Banana	0	0	1	1	1
Maize	2	3	23	35	27
Mango	0	1	6	1	2
Sorghum	0	3	17	16	15
Teff	1	0	5	4	5
Vegetable	0	0	3	4	4
Total	3	7	55	61	54

The number of different crop raiders and predators moving from the forests to farms differed greatly among the villages visited during the study (Chi-squared test: $\square 2 = 65.712$, df = 16, p value < 0.001). About one-third 61(33.9%) of the respondents indicated that the olive baboon is the predominant crop raider, followed by the grivet monkey, which was reported by 55(30.6%) of the respondents. The warthog came in third place among the crop raiders with 54(30%) of the respondent report, followed by the bush pig 7(3.9%) and bush back 3(1.7%) as the least probable wildlife species raiding the crops, along with birds and rodents (Table 8). The lion is the dominant predator of the domestic animals, followed by the hyena based on the responses response of 91 (50.5%) and 89 (49.4%) people, respectively. The results of KII and FGD confirmed that olive baboons, grivet monkeys, and common warthogs are the main crop raiders in the study area, while

lions are the primary predatory carnivores attacking the local livestock. To validate and complement the questioner survey data, field assessments were conducted from April to May 2026 across ten systematic transects. Along each transect, 50 m x 50 m plot area was placed at one-kilometer intervals along the boundary line of the farm and forest. In the survey, animal sign, which includes scat, spoor, and crop damage pattern, was recorded. Species presence was confirmed via camera trap imagery. This was done by capturing visual drop, bourse and live animals during filed survey by Woking on foot and dichotomous identification keys. The fauna diversity recorded during the survey period included two carnivore species, three primate species, one insectivore species, and six herbivore species (Table 9).

Table 9: Some identified wild animal in ambessa chaka

Common name	**Family**	Species name
Olive baboon	Cercopithecine	*Papio anubis*
Bush back	Bovidae	*Tragelaphus scriptus*
Bush pig	Suidae	*Patomochoreus larvatus*
Warthog	Suidae	*Phacochoerus africanus*
Crested porcupine	Hystricidae	*Hystrix cristata*
African Civet cat	Viverridae	*Civtticties civetta*
Spotted hyena	Hyenidae	*Crocuta crocuta*
Aardvark	Orycteropodidea	*Orycteropus afer*
Grivet monkey	Cercopithecoidae	*Chlorocebus aethiops*
Ground squirrels	Sciuridae	*Xerus erythropus*
Mantled guereza	Cercopithecidae	*Colobus guereza*
Bush duiker	Antilopinae	*Sylvicapra grimmia*



A, droplet of civet cat, B. hyena scat, C. hole of common warthog, D. face of olive baboon and E. bush duiker

Figure 7: Image of scat, track and live of wild animals recorded and identified in the study area

4.6.3. Extents of crop damage in the study area

According to the data presented in Figure10 below, all respondents except a small margin 7(3.9%) of local farmer experienced crop damage by wildlife crop raiders with different degrees. The level of crop damage varied at different villages. Out of a total of 180 respondents, 64 (35.6%) reported high damage to their crops and livestock, while 85 (47.2%) described the damage was medium, and 31 (17.2%) was low damage. The Pearson chi-square test was carried out to determine the relationship between the chosen Kebeles and the magnitude of damages caused to the crops by the wildlife. The results of chi-square test reveal a significant difference relationship between the two variables, with ($\square^2$ = 31.76, df=4, $p < 0.001$. As per the descriptive statistics from the cross tabulation (see Table 10), mender 47 kebele was found to be affected most, as 36(60%) of the participants reported "high" damage. Most of participants of mender 48 kebele 35(58.3%)

experienced medium damage. On the contrary, mender 49 kebele experienced the least damage, where only 18.3% (n=11) reported high damage while the largest number was under low. An agricultural area over 1km away from the forest boundary experienced reduced harm from crop plundering and livestock attacks. This difference in damage variation was observed because of distance between farmers farmland and wildlife habitat as well as income activity and source of the household impacts the response of the respondents.

Table 10: Damage extents of crop raider across three study kebeles

sampled kebeles		Number of respondents			Total respondents
		High	Low	Medium	
Mender	47	36	4	20	60
Mender	48	17	8	35	60
Mender	49	11	19	30	60
Total		64	31	85	180

4.6.4. Frequency of crop raiding

During the survey, farmers were asked about the frequency of crop raiders and livestock predators that visit the farmlands and domestic animals at various distances from the forest edge to the agricultural landscape and the responses of the respondents indicated in (Table 11). 59.99% of the respondents indicated that significant crop pests like the olive baboon visit the nearest farm land to the forest edge every day of the month, while grivet monkey and common warthog visit it 5 and 15 days in a month. 17% of the respondents respond as farmland which is greater than 1.5 km far from forest edge visited less 5 days in a month by olive baboon and 1day a month by grivet monkey. Therefore, the findings of the current research indicate the frequency of crop raiders invading farmland plots and causing crop damage reduced with an increase in the distance from the edge of the forest. In contrast, the intensity of crop damage was greater in the buffer zone since crop raiders preferred to prey on crops near the edge of the forest.

Table 11: Frequency wildlife visit farmland in month of the year

Keble	Types of crop driver wildlife species					Mean
Mender 47(distance less than <0.5km to 1km from farmland to forest age	*P. anubis*	C. aethiops	P. africanus	Bush back	P. larvatus	
Frequency/month	30	5	15	1	15	13.5
Mender 48 (distance between 1km to 1.5km from farmland to forest edge						
Frequency/month	26	3	12	1	10	11.2
Mender 49 (distance >1.5km from farmland to forest edge						
Frequency per month	5	1	10	1	2	6.6

There was a moderate correlation between these variables ($r = -.357$, $N = 180$, $p < .001$). This indicates that as one move farther away from the forest edge, the number of wildlife visitations drastically reduces, with distance accounting for about 12.7% of the variation in the frequency of visits. As the research sites got farther away from the forest edge, there was less crop raiding, and vice versa. The space between farmland and the forest boundary was a crucial factor in forecasting the harm to crops on farms near Ambessa Chaka. Crop plundering by wildlife was common when agricultural land was adjacent to the forest edge. With an increase in this distance, both the frequency and severity of crop plundering decreased.



Figure 8:(A). Filing of questioner survey and (B)focus group discussion at mender 47

4.6.5. Types of crops prone to crop raiding wildlife's

As illustrated in figure 8 below, the data collected from the participant shows a distinct ranking of wildlife choices among the different crops grown in the study region. Maize was reported as the most susceptible crop, with 90 (50%) of farmers recognizing it as the main target for wildlife raiders. The second preferred crop for wildlife raider was sorghum as mentioned by 50 (28.3%) of the respondents (Fig.10). Combined, these two staple cereals account for almost 140(78%) of all documented wildlife harm. Only 15(8.3%) of respondents stated that teff had been affected. According to the Chi-square test, crop raiding damage categories differ in different villages ($\square 2 = 47.232$, $df = 4$, $p < 0.001$). There is a statistically significant relationship between the location of the village and the types of crops it raids.

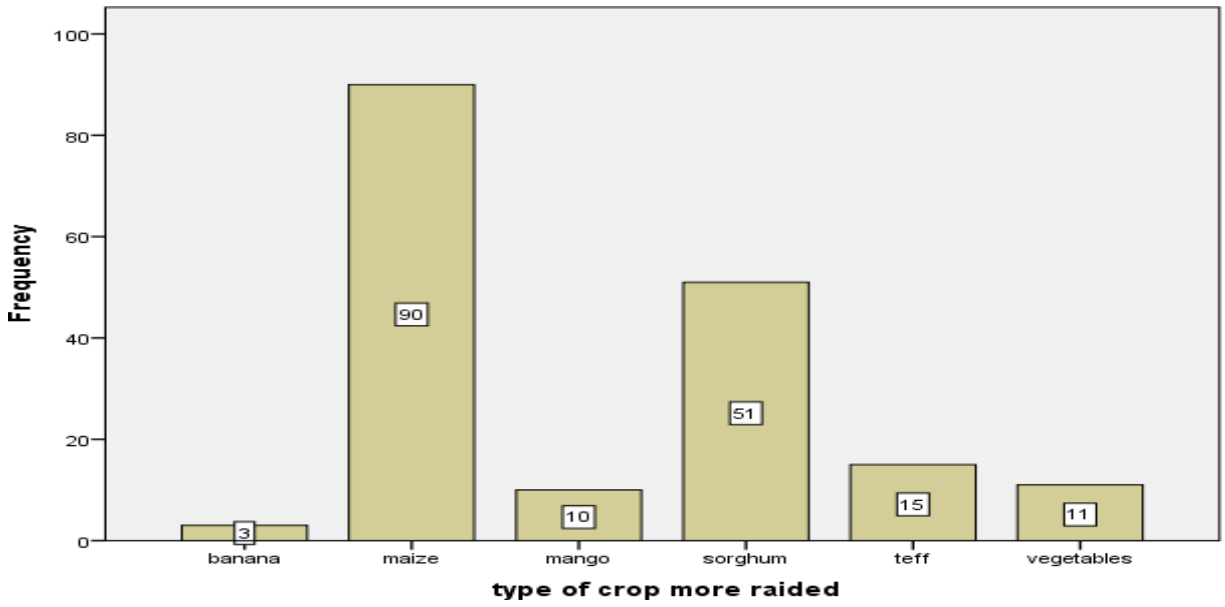


Figure 9: Distinctive rank of wildlife crop preference

4.6.6. Tendency of crop raiding and livestock attacking at study area

The majority of respondents 105 (58.3%) indicated that human-wildlife conflict was on the rise, while 51 (28.3%), claimed it was on the decline, and 24 (13.3%), said it was unknown. Lastly, the study's findings indicated that agricultural raiding is occasionally on the rise (Table 12). According to the results of the study, there was an actual dispute between the farmers and wildlife in the area around Ambessa Chaka especially around those settlements that were near the forest and not far from it because of predation and crop losses caused by the wildlife. The farmers explained that such wildlife decreases the yields of crops and the number of cattle.

Table 12: Tendency of crop raiding and Livestock attacking at study area

Tendency of crop raiding and livestock attacking	frequency	Present
Increase	105	58.3%
Decrease	51	28.3%

Unknown	24	13.4%

4.6.7. Livestock lofted during last 4 year around the Ambessa Chaka

As illustrated in the table 13 below, the three study kebeles, a survey involving 180 respondents was carried out to assess the incidence of livestock predation by carnivorous wildlife during consistence 4 years. This four-year data was collected from the respondent through questioner survey. The findings indicate that, even though the majority of the respondents 117 (65%) were not preyed upon by wild animals within this four-year period, a substantial number of people were affected, in which 45 (25%) respondents losing one animal, 15 (8.3%) respondents' loss two animals, and 3 (1.7%) loss three domestic animals. In total, these incidences resulted in the death of 78 animals. Poultry was the most predated species, with a total of 25 incidents of predation, followed by donkeys and sheep at 15 each and goats at 10. Cattle experienced the least impacted, with a total of 13 individual losses. From an economic standpoint, these losses impose a significant strain on the local community, amounting to an estimated 1,952,500 ETB or (13016.66 USD) according to local market assessments. The wildlife predators for the above livestock loss were lion, spotted hyena, olive baboon and cheetah.

Table 13: Livestock loss of the study area

Livestock breed	Number of attacks	Average Local cost per individual animal	Total economic loss in birr
Chicken	25	1500	37,500
Donkey	15	25000	375,000
Sheep	15	12000	180,000
Goat	10	12500	125000
Cattle	13	95000	1,235,000
Total	78	146000	1,952,500

4.6.8. Estimation of crop loss by crop raiders and impacts on farmers

As indicated in table 14 Below, the most significant element influencing the farmers' livelihoods in the study area is the crop loss caused by crop raiders. The majority of 46 (25.6%) respondents respond that crop raiders had destroyed about 300 kg of their total crop yield, 34 (18.9%) respondents reported 400 kg, 31(17.2%) respondents reported 350 kg, 29 (16.1%) respondents reported 450 kg, 19 (10.6%) respondents reported more than 500 kg, and 13 (7.2%) respondents

indicated less than 200 kg). the mean loss of the examined kebeles and 180 respondents were 363.3kg.

Table 14: response of farmers on crop yield loss

Distance from the forest									
Yield loss	Very near		Near		Medium		Far		Total %
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
200kg	0	0	1	0.5	0	0	12	6.7	7.2%
250kg	0	0	0	0	0	0	8	4.4	4.4%
300kg	2	1.1	9	5	16	8.9	19	1.6	25.6%
350kg	10	5.6	3	1.7	7	3.9	11	6.1	17.2%
400kg	9	5	4	2.22	15	8.33	6	3.33	18.9%
450kg	10	5.6	1	0.56	13	7.22	5	2.8	16.1%
500kg	10	5.56	1	0.56	7	3.9	1	0.56	10.6%
Total	41		19		58		62		100%

The linear regression analysis was conducted to examine the impacts of predictors on the dependent variable which was crop loss, identifies distance from the buffer zone forest edge as statistically significant predictor of crop loss at the 93% confidence level (the unstandardized coefficient (β = -10.600, p = 0.058) demonstrates an inverse relationship. Proximity to the forest habitat significantly intensifies wildlife-induced crop raiding. In this regard, the distance of a farm from the forest edge serves as a more dependable predictor of agricultural loss than either the size of the holding or the perceived frequency of animal incursions.

Table 15: crop loss estimation at field

Number of plots	Recorded crop variety	Hectare	Damaged area	Lost estimation in kg
001	Maize,	0.04	0.03	37.5
002	Maize	0.04	0.029	36.25
003	Maize	0.04	0.028	35
004	maize	0.04	0.025	31.25
005	Maize	0.04	0.023	28.75
006	Maize	0.04	0.02	25
007	Maize	0.04	0.02	25
008	Maize	0.04	0.019	23.75
009	Maize	0.04	0.01	12.5
Mean yield loss		0.36		255

A survey conducted over nine plots indicated that crop raider caused an average yield reduction estimation of (708 kg/ha or 7 quintals/ha), which accounts for 56.64% of the anticipated harvest for maize. The plot nearest to the forest edge (Plot 001) experienced estimated loss of 51.4% (37.5 kg), whereas the plot furthest along the transect (Plot 009) reported a significantly lower estimated loss of 18.1% (12.5kg). Perennial crops such as mango, banana, and sugarcane were damaged All year long table 15.

4.7. Traditional methods of protecting crop raiding and livestock attacking

From the findings of the study, there is high reliance on traditional methods involving intensive use of labor as a means of protecting oneself from animals. In a total number of 180 farmers surveyed, more than half 96(52.8%) cited human guarding as their primary method.

The remaining participants employed various specific traditional measures to reduce conflict. Tactics involving noise and biological assistance were prevalent, with 24(13.3%) utilizing shouting and 16(8.9%) using dogs to drive away intruders. Visual and environmental tactics were also depicted, such as employing scarecrows 16 (8.9%) and removing nearby vegetation19 (10.6%) to diminish shelter for incoming animals. A mere 10(5.6%) depended on smoke (Table 16). The Pearson's chi-square test was conducted to determine whether there is a significant difference in the usage of traditional protection methods across the selected Kebeles (N=180). The results revealed that there was no statistically significant association between the place (Kebele) and the type of protection method, ($\square^2$ =8, df=10, p=0.629). This implies that the choice and use of traditional protection methods are not dependent on the specific Kebele under study.

Table 16: Traditional crop and Livestock protection technique

Rank of Mitigation methods	Frequency	Present (%)
Guarding	96	52.8%
Chasing	16	8.9%
Making scare crows	16	8.9%
Smoking	10	5.6%
Lauding	24	13.3%
Clearing surrounding area	19	10.6%

According to (100%) respondents, it has been observed that women and children chased the grivet monkeys and wild animal raiders who damage crops from home garden and, all of the respondents' replayed men patrolled the night to keep the spotted hyena, bush pig and common warthog away from crop and livestock through yelling.

4.8. Attitude of the farmers towards wildlife conservation

For a better cooperation between humans and animals, and better conservation of wild animals, it is necessary to know how people live alongside the wildlife. According to the views of farmers,

64(35.6%) of villages that are located on the border of the forest, and 54(30%) of villages located at a moderate distance from the forest edge have negative attitudes towards the protected area. However, 62(34.4%) of respondents who live far from the forest edge have a favorable opinion of protected areas and the preservation of animals (Table 17). Chi square test was conducted to examine if there were a relationship between different kebele residents' attitude toward wildlife conservation. Therefore, there was no a significant difference (□2 = 17.194, df = 22, p-value = 0.753) in the respondents' attitudes toward wildlife conservation among the sampled areas based on the distance from the forest edge.

Table 17: Attitude of respondents toward protected area and its wildlife among distance from farmland

Distance from forest edge	Attitude	Frequency	Present
Near	Negative	64	35.6%
Medium	Negative	54	30%
Far	positive	62	34.6%

Most of the 118(65.6%) respondents responded that wildlife conservation is insignificant. Wildlife crop raider species that destroy crops were found to be the main reason for the negative attitude towards wildlife conservation (Table 18) The findings shown in the above table suggest that most farmers along the forest edge have unfavorable attitude towards the existence of protected area. This could lead to the locals developing hostility towards the conservation areas and wildlife, hence increasing hostility and weakening efforts at conservation. Farmers would kill wildlife and remove vegetation to minimize habitat as they did not have favorable attitude towards wildlife. Many plant and animal species become vulnerable for several reasons after the deforestation of key-stone tree species, whereby plants die due to lack of shade while wild animals suffer from lack of corridor. In another case, the farmer's attitude towards wildlife conservation showed that respondents' attitudes differ considerably based on their level of education (x^2= 8.184, df = 4, p= 0.85).

Linear regression model was used for the identification of socio-economic determinants influencing people's perception toward conservations of wildlife in their area, resulting in the creation of the model accounting for 18.2% (R^2 = 0.182) of the variation in the perceptions of the respondents. The number indicates that nearly 20% of the respondents' perception is influenced

by the determinants used. The regression results indicate that educational attainment is the strongest predictor of favorable attitudes toward the protected area ($\beta = 0.194$, $p < 0.001$), implying that increased formal knowledge encourages greater support for conservation. Notably, although closeness to the forest edge had a considerable impact on emotions ($\beta = -.081$, $p = 0.014$), In particular, conventional measures of human-wildlife conflict such as the financial losses from crop damage ($\beta = 0.000$, $p = .817$) and livestock attacks ($\beta = -0.013$, $p = 0.605$) indicated no significant effect on respondents' attitudes. These results imply a complexity in how communities view the Ambessa Chaka and its residents. One notable issue was raised during an interview at Mender 47 Kebele by a 29-year-old diploma holder; According to him, conservation programs and initiatives are actually more of a barrier than a blessing to the local communities. This observation is based on the fact that most of the residents are farmers who depend on the availability of land as their primary source of livelihood.

This particular observation is rooted in the fact that since the locals mainly derive their income from farming, land is actually their biggest resource. Moreover, the educated youth find it difficult to acquire employment within the government sector or private enterprises due to a number of reasons. Hence, he strongly urged the government to allocate land in the protected area so as to provide opportunities for self-employment among those who have no other means of survival.

Table 18: Residents attitude toward Ambessa chaka protected area and wildlife in it

Education status of the respondents	**Attitude**		
	Positive	Negative	Total
Illiterate	0	74	74
Read and write	49	0	49
Elementary school	32	0	32
High school	9	0	9
Other	7	0	7

4.9. Conservation challenge of Ambessa Chaka protected area

The survey results shown in Figure10 indicate that Ambessa Chaka's conservation is under considerable threat from different human activities. Among 180 respondents, 49(27.2%) identified agricultural expansion as the main challenge. The Key Informant Interviews (KIIs) indicated that

there is a trend of consistent year-over-year rise in farming encroachment in the area. This was closely succeeded by unlawful land invasion, reported by 48(26.7%), and burning fires, mentioned by 43(23.9%) as a significant danger. Moreover, 17.8% and 4.4% of the respondents' response recognized investment expansion and human settlement as issues, respectively.

Although Focus Group Discussions (FGDs) and Key Informants commonly confirmed these findings, a notable difference arose concerning investment activities. While some members of the community view investment as a significant risk, Key Informants emphasized that no formal investment permits have been issued in or near Ambessa Chaka. Instead, they clarified that what is frequently seen as investment is in fact, individuals unlawfully deforesting land for agricultural purposes without legal permission. This indicates that although the effect on the forest is genuine, it arises from illegal land use instead of legitimate commercial development.

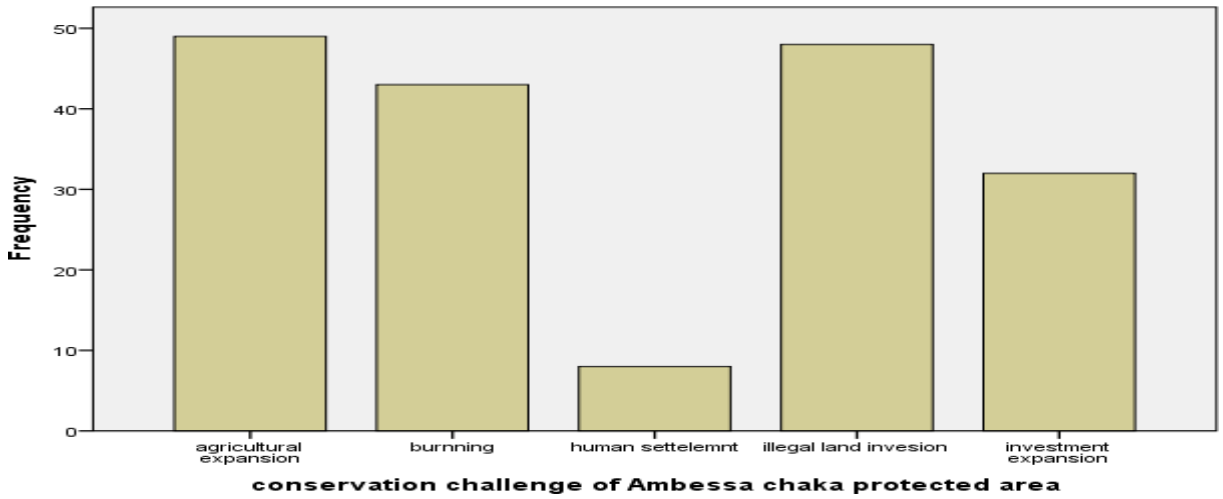


Figure 10: Conservation challenges of Ambessa Chaka



Figure 11: Burned area of Ambessa Chaka

5. DISCUSSION

In this study the involvement of males were the higher 145(80.6%) than the females 35 (19.4%) which is similar with the study of (Shanko & Tona, 2022) that males were 97 (64.2%), and females were 54 (35.8%). The farmers surveyed were in mature age, experienced in farming, and knowledgeable about the challenges and crop damage caused by wildlife and it is similar with the study findings of (Yilmato Amare, 2019). A majority (47.13%) of the respondents were in the age category between 21 and 40. The age categories of 41 to 59 and above 60 were also represented by 37.93 and 14.94% of the total respondents, respectively; No respondents of age category below 20 were found. A spearman's raking order correlation revealed negative correlation between respondents age and their perception. As the age of respondents increase their perception tends to negative.

In the present study, a large number 155(86%) of the respondents localized in close proximity to Ambessa Chaka forest edge. In the study area the respondents faced challenges with animals eating their crops. Almost half of the respondents 48.9% reported that crop raiding was the main challenge they faced. Then there were some respondents (38.3%), who reported that they had to deal with two problems at the time; crop raiding and livestock predation. The crop raiding was very common, in the study area. This study is similar to the research finding of (Matseketsa *et al*., 2019) conducted in Zimbabwe, Warda twenty-six, most respondents (n=18; 44%) indicated that they encountered crop damage. Similarly other study by (Shah *et al*., 2021) indicates out of 184 respondents 77% responded that crop damage was the main type of human wildlife conflict . A Pearson Chi-square test revealed no statistically significant association between the damage type and study kebeles. This indicates that the observed distribution of incidents across categories does not differ significantly which is similar with the study of (Temesgen Zelalem, 2025). The types of conflict experienced by the community showed no statistically significant difference across the study kebeles, in the other hand the current study was contradicted with the study of (Amaja *et al.*,2016) in Gera district which indicates the type of damage and magnitude by wildlife on the resources of the community significantly differ with from site to site. This contradiction raised due to homogenates of the study area geography, community farm profile and type of wildlife crop raider presents in forest around the study area.

The current survey results reveal a community with a diverse agricultural profile and a profound reliance on the surrounding natural environment for daily survival; including fire wood, construction material, itching grass and grazing area. It is similar with the study of (Bussa Bayisa., 2023) in Borana National Park, which conform that the local people make extensive use of any easily accessible areas of forest to satisfy their needs such as fire wood, charcoal and construction material. All the respondent confirmed that the conflict intensity peaks during the summer season, driven by wildlife seeking high-nutrient cultivated crops as anthropogenic resources. Specifically, the olive baboon (*Papio anubis*) and grivet monkey (*Chlorocebus aethiops*), common warthog, bush pig and bush back were identified as competitors for crop damage in and around Ambessa Chaka protected area of current study. This result is lined with study of (Alemayehu Mamo *et al*., 2021) which identified olive baboon (*Papio anubis*), grivet monkey (*Chloro aethiops*), bush pigs (*Potamochoerus larvatus*) and crusted porcupine (*Hystrix cristata*) were the most problematic crop raiding wildlife in the area. This implies that the magnitude of damage caused to crops due to wildlife is not consistent but rather variable depending on the Kebele's geographical location.The presence of various crop raiders and livestock predators moving from the forest to farmland varied significantly across the surveyed villages this were supported by the(Alemayehu Mamo *et al*., 2021) which states the occurrence coming of the different crop raiders from forest to the farmland.

Crop including maize and sorghum damage was notably more severe during the early maturation stage than during the post-maturation or harvest phases. Furthermore, all the respondents confirmed that while livestock predation occurs year-round, it intensifies during the dry season due to a localized scarcity of natural prey. Temporal patterns of crop raiding and predation are divided by species-specific activity cycles: primates, bush bucks, and avian species engage in diurnal raiding, whereas common warthogs, wild pigs, and hyenas primarily cause damage nocturnally. This is in line with the study of (Yilmato Amare, 2019) which conforms crop raiding and/or livestock depredation in the study area occurred both during daytime and at night. Most of the respondents reported that severe crop damage and/or livestock depredation occurred during the months of September to November (47.13%). However, 19.54, 5.75 and 27.6% of the respondents mentioned that the damage also occurred from December to February, March to May and June to August, respectively

Maize is highlighted as the most susceptible crop, with 90 (50%) of farmers recognizing it as the main target for wildlife "intruders." Next is sorghum, mentioned by 50(28.3%) of the respondents. Combined, these two staple cereals account for almost 78% of all documented wildlife harm. This is in consistence with the finding of(Ayalew Mekuriaw Zewdie & Melese Getahun Tassew, 2025). The highest value for the average crop damage was observed on Maize by different crop raiders in the study area such as due to grivet monkey.

The result showed crop damage vary among different villages. Given that present study indicated a highly significant relationship between the village's location and the particular crops that are being raided. The study showed the primary drivers of human-wildlife conflict in the study area are rooted in land-use changes and habitat encroachment. The result of this study indicated a significant portion of the participants 72 (40%) identified the expansion of subsistence agriculture and illegal land occupation as the leading causes of tension. Furthermore, the geographic positioning of agricultural plots plays a critical role in conflict frequency, with 90(50%) of respondents identifying the proximity of farmlands to the Ambessa Chaka Protected Area as the decisive factor in HWC intensity which is inline the study of (Woodroffe *et al*., 2005). Human proximity to park areas and subsistent agricultural has been perceived to be the major causes of human wildlife conflict.

As the results of the current study; over half (52.8%) of the respondents reported that guarding by human and dog was their leading and effective method, establishing it as the most prevalent defense strategy. This is consistent with the findings of (Temesgen Zelalem, 2025). Local communities used guarding, scarecrows, and killing problematic wild animals to protect their properties from damage. The majority of respondents reported guarding as the primary and most effective method, which included the use of guarding dogs, shouting at animals, and burning fires around crop lands. The majority of the 118 farmers (65.6%) agreed that wildlife conservation was unimportant. Crop damage caused by wildlife crop raider species was cited as the primary cause of the unfavorable perception of wildlife conservation which is similar with findings of (Alemu Hailemariam *et al*., 2017) who stated of all the informants, 244(97.6%) had negative attitude and 6(2.4%) were neutral for crop raiders. Similarly, 212(84.8%) of the respondents were negative to livestock depredators and 35(14.0%) were neutral while 3(1.2%) ware positive, the proportion of respondents' attitude was significant for both crop raiders and livestock predations.

6. Conclusion and Recommendations

6.1. Conclusion

The study shows that human-wildlife conflict (HWC) in the Ambessa Chaka protected area is a systemic problem largely driven by human-created alterations to the landscape and habitat division. Despite most of households experiencing negative interactions, the problems arise not from growing wildlife numbers but from a drastic decrease in forest coverage. The loss of habitat due to agricultural expansion and illegal encroachment has eliminated natural buffer zones, resulting in a widespread dependence on crop raiding among species like olive baboons (*Papio anubis*), grivet monkeys (*Chlorocebus aethiops*) and common warthogs. The current research revealed a significant negative correlation between the distance to the forest edge and the frequency of wildlife visits, indicating that proximity is the primary geographic risk factor. A typical annual loss of 363.3 kg per household, along with substantial predation from lions (*Panthera leo*) and spotted hyenas (*Crocuta crocuta*), poses a direct threat to both food security and personal safety for a community that depends on the forest resources, they are also fighting against with them. In addition to economic loss, local community are disturbed psychologically; during guarding time local farmers could not participate in any social activities in their village, this lined with feeling fear to move alone along forest edge and sending students to school alone.

Implication for Conservation

In addressing the socio-economic problems associated with human-animal conflicts and ensuring the ecological equilibrium in the Ambessa Chaka forest ecosystem, the following recommendations have been suggested:

- In the context that 41.1% of the respondents are illiterate, Benishangul gumuz reginal agricultural office should have to shift extension services from written information to more visual training and demonstrations emphasizing wildlife behavior and non-lethal methods of deterrence.
- The mitigation measures have to be unique to each type of wildlife. District agricultural and environmental protection office should have to adopt species specific mitigation strategy While primate species (*P. anubis* and *C. aethiops*) that are active during daytime need special attention at that time, the suidae and hyena species that are active at night need predator-proof bomas.
- The local government will need to clearly demarcate the boundary of the protected area with a 1 km consistent buffer zone. In this zone, energy-dense attractor crops such as maize and sorghum will be replaced by non-attracting crops such as Chilli or essential oil plants to minimize the edge effect.
- To minimize the high risk associated with the dependence on mixed farming, which amounts to 75%, local agriculture departments should facilitate livelihoods that are not only resistant to wildlife but are also deterrents to some wildlife such as beekeeping (apiculture).
- A systematic insurance or compensation framework needs to be evaluated by NGOS, and rural developmental sectors for high-risk household's farm land located within <400m of the forest edge, where farming losses significantly exceed the local average.
- Key investors and regional authorities must collaborate on reforestation efforts and the creation of "wildlife corridors" to connect fragmented forest regions, thereby reducing the necessity for wildlife to enter human-influenced areas for survival.
- Creating awareness about the importance of the protected area and its biodiversity is very mandator for elders than younger one; so that EWCA and EBI should create awareness on its importance.

Conflict of interest

The authors affirm that they have no conflicting interests of any kind financial or otherwise which may have influenced their research in any way.

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