



**ADDIS ABABA UNIVERSITY**

**COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES**

**DEPARTMENT OF ZOOLOGICAL SCIENCES**

**ASSESSMENT OF HUMAN-WILDLIFE CONFLICT IN AND AROUND AWASH  
NATIONAL PARK, SOUTHEASTERN ETHIOPIA**

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**APPROVAL SHEET**

We, the undersigned, members of Board Examiners of the final open defense by Abdellah Mohammod Usmail ID.No .GSK/ 6735/11 have read and evaluated his thesis entitled *“Human-Wildlife Conflict in and Around Awash National Park, Eastern Ethiopia* This is, therefore, to certify that the thesis has been accepted in partial fulfillments of the requirements for the degree of Master of Science in Biology Compiles with regulations of University and meets the accepted standards with respect to originality and quality.

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## **Declaration**

I hereby declare that this Master Thesis entitled ''Assessment Of Human-Wildlife Conflict In And Around Awash National Park, Ethiopia'' is my original work. That is, it has not been submitted for the award of any academic degree, diploma or certificate in any other university. All sources of materials that are used for this thesis have been duly acknowledged through citation

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Date

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## **DEDICATION**

This thesis is dedicated to my beloved family, whose unwavering support, encouragement, and prayers have been the cornerstone of my academic journey. To my parents, who instilled in me the values of hard work and perseverance—this achievement is as much yours as it is mine.

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## **List of Acronyms**

ANP --Awash National Park  
CBD – Convention on Biological Diversity  
CBNRM – Community-Based Natural Resource Management  
CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora  
CSA – Central Statistical Agency (Ethiopia)  
EWCA – Ethiopian Wildlife Conservation Authority  
FAO– Food and Agriculture Organization of the United Nations  
FGD – Focus Group Discussion  
GIS – Geographic Information System  
HDWM – Human Dimensions of Wildlife Management  
HWC – Human–Wildlife Conflict  
IUCN – International Union for Conservation of Nature  
NGO – Non-Governmental Organization  
SDG – Sustainable Development Goals  
SES – Social–Ecological Systems  
UNDP – United Nations Development Program  
UNEP – United Nations Environment Program  
UNESCO – United Nations Educational, Scientific and Cultural Organization  
USAID– United States Agency for International Development  
WCS – Wildlife Conservation Society  
WWF – World Wide Fund for Nature

## **Abstract**

*Human-wildlife conflict is an increasing problem for both conservation and community growth worldwide. It's caused by things like habitat loss and changes in climate. In Ethiopia, near Awash National Park, there isn't much information about this conflict, even though it badly affects people's ways of life and the local animal and plant life. This research looks at the patterns, reasons, and effects of human-wildlife conflict in and around the park. It also explores how the local community deals with these conflicts and what they think about protecting wildlife. The study uses a mix of methods, like surveys with 222 households, interviews with important people, and group discussions. The data collected was studied using both statistics and qualitative analysis. The results show that crop raiding (77.9% of households) and livestock attacks (57.7%) are the most common conflicts. These mainly involve animals like baboons, warthogs, and hyenas. How close people live to the park affects how bad the conflict is. Households within 2 km lose the most, about 420 kg of crops and 3.2 livestock each year. Local ways of dealing with these issues, like guarding fields and using thorn bushes as fences, take a lot of work and don't fully solve the problem. Many people in the community have negative views about wildlife (59.5%) because of repeated losses and not enough support from organizations. This study shows that there's a need for better land-use planning, ways to compensate people for their losses, and conservation plans that involve the community to reduce conflict. These results can help Ethiopia reach its conservation targets and support wider international efforts by pushing for ways for people and wildlife to live together, balancing the need to protect nature with securing people's livelihoods.*

**Keywords:** *Human-wildlife conflict, Awash National Park, Ethiopia, crop raiding, livestock predation, conservation attitudes, coping strategies, spatial analysis, participatory management, biodiversity conservation.*

## **CHAPTER ONE: INTRODUCTION**

### **1.1 Background of the Study**

HWC is a pressing problem for both conservation and community well-being all over the world. It involves the negative interactions between people and wild animals that cause financial losses, property destruction, food insecurity, and sometimes, injuries or death to either humans or wildlife (IUCN, 2020; WWF, 2022). Globally, this problem arises from habitat loss, agricultural expansion, climate change, and increasing human populations, which intensifies the competition between humans and wildlife for resources like land and water (UNEP, 2021). The repercussions of HWC go beyond local communities, hindering biodiversity conservation, slowing progress on the Sustainable Development Goals (SDGs), and challenging international agreements like the Convention on Biological Diversity (CBD) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In Africa, HWC is particularly severe in areas where people live near protected areas. Common conflicts include animals raiding crops (primates, elephants), carnivores preying on livestock, and competition between wild and domestic animals for resources (WCS, 2019; Redpath et al., 2015).

Poverty, reliance on natural resources, and limited capacity to handle conflicts make this problem worse (UNDP, 2020). These issues can create negative attitudes toward conservation efforts, leading to retaliatory killings of wildlife and less support for conservation groups (community programs involving natural resources show mixed results, depending on community involvement). Ethiopia faces similar challenges. The Ethiopian Wildlife Conservation Authority (EWCA) manages a protected area system covering diverse environments, but it deals with growing human pressure. However, ANP is surrounded by rural communities that rely on farming and livestock. These communities often experience damage to their crops, livestock losses, and competition for resources caused by animals like hyenas, baboons, warthogs, and sometimes elephants. The ongoing HWC in and around ANP has serious consequences. It threatens income, food supplies, and livelihoods in rural areas (Bekele et al., 2022). It also creates resentment toward park management, weakens partnerships for conservation, and generates negative views of wildlife.

Furthermore, retaliatory killings can reduce animal populations, which hurts Ethiopia's ability to meet its obligations under the CBD and other international agreements promoted by groups like the UN, UNDP,

and FAO. The frequency and severity of HWC can vary depending on how close people live to the park, as well as factors like household size, education, and how people make a living (Dereje et al., 2023). Despite its importance, there's not enough evidence on the patterns, causes, and impacts of HWC in ANP. Existing studies offer helpful information, but local situations differ, which calls for specific local assessments. This study aims to address this by looking at the types and frequency of conflicts, the animal species involved, where incidents occur in relation to the park, and how local households, farmers, herders, and park staff are coping. It also looks at community attitudes toward conservation and how personal situations affect exposure to conflict and views on wildlife management. By investigating the dynamics of human-wildlife interactions in the region, this assessment can inform evidence-based conservation strategies that promote coexistence and sustainability.

## **1.2 Statement of the Problem**

HWC poses a serious threat to both rural livelihoods and biodiversity conservation in and around Awash National Park. Park staff report that pastoralists entering the park with livestock—practiced regularly by more than half of surveyed households—cause habitat degradation, overgrazing, and competition for resources, undermining ecosystem integrity and increasing wildlife disturbances (Abdi et al., 2024; Megersa et al., 2022). Additionally, clashes between community members and park authorities remain frequent, intensifying socio-institutional tensions (Abdi et al., 2024). Despite these recognized challenges, a research gap persists in understanding the patterns, drivers, and spatial distribution of HWC incidents in the ANP landscape. While studies have documented livestock–wildlife contact and land-use conflicts in Ethiopia (Dereje et al., 2023), they rarely provide spatial-temporal mapping of conflict types, species involvement, and coping responses at the household level. Furthermore, the influence of demographic variables such as education, livelihood type, and proximity to park boundaries on both conflict vulnerability and conservation attitudes remains underexplored (Yonas et al., 2023). This study addresses these gaps by assessing the patterns (types, frequency, species), causes (distance to park, land-use pressure, habitat changes), and impacts (economic losses, social costs, and attitudes) of HWC in and around ANP. By integrating geospatial analysis with socio-economic surveys, the research will provide a multi-dimensional understanding of HWC dynamics in this ecologically and culturally unique setting

### **1.3 Objectives of the Study**

#### **1.3.1 General Objective:**

To assess the patterns, causes, and impacts of HWC in and around ANP and to explore community coping mechanisms and attitudes toward wildlife conservation.

#### **1.3.2 Specific Objectives: To**

Identify the types and frequency of HWC experienced by local communities.

Examine which wildlife species are most commonly involved in conflicts.

Analyze the spatial relationship between conflict incidents and proximity to the park.

Assess the coping strategies employed by affected households.

Evaluate the attitudes of local residents toward wildlife and conservation efforts.

Explore how demographic variables influence conflict exposure and conservation attitudes.

### **1.4 Research Questions**

1. What are the common forms of human-wildlife conflict in the study area?
2. Which wildlife species are involved in these conflicts?
3. How does distance households from ANP influence the frequency and type of conflict?
4. What coping mechanisms do local communities use to mitigate conflict?
5. What are the attitudes of local people toward wildlife and conservation?
6. How do factors like education and livelihood affect people's attitudes and vulnerability?

### **1.5. Significance of the Study**

This research makes an original contribution by integrating ecological, spatial, and socio-economic dimensions into a single framework for analyzing HWC in the ANP context. Unlike earlier works that focus solely on quantifying losses (Megersa et al., 2022; Yonas et al., 2023), this study incorporates attitudinal dimensions, spatial conflict distribution, and demographic influences, providing a richer

understanding of the issue. From a practical perspective, findings will directly inform evidence-based management strategies. In other Ethiopian contexts, proximity to protected areas has been linked to higher conflict frequency and negative perceptions toward conservation (Abdi et al., 2024; Dereje et al., 2023). However, the long-term effectiveness of widely used coping measures such as guarding is contested (Bekele et al., 2022), underscoring the need for diversified and sustainable approaches. This study's results will be valuable for policy-makers, conservation agencies, and local communities, offering guidance for targeted interventions—such as spatially prioritized mitigation zones, community-managed buffer areas, and livelihood diversification programs.

## **1.6 Scope and Delimitation of the Study**

### **1.6.1 Scope of the Study**

This study will focus on rural communities located within three distance bands from ANP: very close (<10 km), close (10–15 km), and far (>15 km), as distance is a known driver of HWC intensity (Dereje et al., 2023). The research will document conflict types—such as livestock depredation, crop raiding, and disease transmission—and identify the primary wildlife species involved. These are expected to include spotted hyena (*Crocuta crocuta*), olive baboon (*Papio anubis*), and warthog (*Phacochoerus africanus*), which are among the most frequently cited conflict species in similar Ethiopian contexts (Bekele et al., 2022). Geographic Information System (GIS) tools will be used to analyze the spatial distribution of conflict incidents. Socio-economic data will be collected via household surveys and focus group discussions to examine coping strategies and conservation attitudes, with demographic variables—education level, livelihood type—treated as explanatory factors.

### **1.6.2 .Delimitation of the Study**

The research will exclude urban-adjacent park boundaries, focusing exclusively on rural agro-pastoralist and pastoralist communities around ANP. Wildlife population monitoring or in-depth behavioral ecology will not be covered, except as relevant to conflict dynamics. While psychosocial impacts such as trauma or fear will be acknowledged, the study's primary emphasis is on economic and social outcomes. Regional comparisons with other parks in Ethiopia will be discussed but not empirically investigated.

## **CHAPTER TWO : LITERATURE REVIEW**

### **2.1 The Concept of HWC**

HWC is a worldwide issue wherever people and wild animals share the same areas. It happens when interactions between them have negative results for either one, and it's a big problem for protecting nature today (IUCN, 2020; Redpath et al., 2015). This problem involves not only nature but also money, society, culture, and politics, because it changes how people in the countryside live, what's important for conservation, and how communities relate to the government. There are many reasons for HWC around the world. In poorer countries, where people in the countryside rely a lot on natural resources, HWC has a bigger impact. People living near protected areas often have their crops damaged, lose farm animals, and can't use their land as they want, which makes them angry about conservation efforts. Although ANP is a protected area (IUCN Category II), conflict has gone up by 40% since 2015 (ANP Annual Report, 2022).

People say that wild animals destroy 30-50% of their crops each season, which causes food shortages and leads to people poisoning animals in return, which has reduced the number of hyenas by 25% (Yirga et al., 2020). Ethiopia is one of Africa's most biologically diverse countries, with many kinds of environments that support big animals, unique species, and migrating birds. The EWCA manages its system of protected areas, including ANP, Bale Mountains National Park, and Simien Mountains National Park. These areas are very important for protecting the country's plants and animals and for tourism, but they are also places where HWC is common. This conflict is closely related to Ethiopia's social and economic situation, where people in the countryside depend a lot on farming and livestock, and where there is not enough land and the environment is under pressure, which makes people and wild animals compete even more (Bekele et al., 2022; Tessema et al., 2020).

### **2.2 Drivers and Causes and HWC**

HWC stems from complex causes influenced by ecological factors, land use, and governance. Obvious conflicts like crop damage or livestock losses are parts of bigger, ongoing issues. Near ANP, these causes fall into ecological, socio-economic, and institutional categories. Habitat loss, which comes from

farming, deforestation, settlements, and construction, is a key cause of HWC. A major reason is competition for resources. Ethiopia, which has a lot of different plants and animals, is one such place. Because the human population is growing, the land is getting worse, and the climate is changing, these conflicts are happening more often and are more intense (Gebresenbet et al., 2018). People and animals rely on the same water, grazing areas, or forest goods. This gets worse during droughts, pushing wildlife into villages or farms.

For example, baboon and warthogs might damage crops, or hyenas and leopards might kill livestock, leading to retaliatory killings. Deforestation, overgrazing, and expanding settlements break up habitats and reduce wildlife territory. As the number of people grows quickly, farming expands, forests disappear, infrastructure is built, and the climate changes, wild animals have less natural living space. They are forced to find food and shelter in areas where people live (UNEP, 2021; WWF, 2022). In pastoral areas, livestock and wildlife compete for food and water. Climate changes, like frequent droughts, worsen these problems by forcing people and animals to gather around scarce resources like rivers and grazing spots. This often causes problems like animals eating crops, attacking farm animals, damaging property, competing for water and grazing land, and sometimes hurting or killing people (Pooley et al., 2017).

### **2.3 Patterns of HWC**

(HWC) takes different forms depending on land use, environment, and community livelihoods. Around ANP, the main issues include crop damage, livestock predation, disease transmission, property destruction, and risks to human safety. Baboons, warthogs, and monkeys often raid crops like maize and sorghum, while carnivores such as lions, hyenas, and jackals attack livestock, reducing household income and fueling hostility toward conservation (Mamo et al., 2023; Mekonen, 2020). Poor land-use planning, weak park boundary enforcement, and settlements near or inside park borders intensify conflicts (Redpath et al., 2021). Ecological drivers, such as seasonal migrations, prey depletion, and habitat degradation, further push wildlife into human areas. Socio-economic pressures and limited awareness among local communities exacerbate these challenges, making HWC a persistent threat to both livelihoods and conservation goals



## **2.4 Impacts of HWC**

### **2.4.1 Economic Impacts on Local Communities**

HWC can clearly cause economic harm through damaged crops, loss of livestock, and property destruction. Farmers near protected areas often say they lose important crops like maize and vegetables to animals such as warthogs and elephants (Hill, 2000; Gebresenbet et al., 2018). This damage tends to happen right before harvest, which causes financial worry and food shortages for families. Large carnivores like lions and hyenas also kill livestock, which is both financially and emotionally difficult. Research in Ethiopia and East Africa shows that even losing a few animals can seriously affect those who depend on their herds for survival (Yihune et al., 2009; Dickman, 2010). An average annual loss of 3–4 small ruminants per household equates to substantial reductions in wealth, as livestock are critical assets in pastoral and agro-pastoral systems. Livestock serve as both productive capital (milk, meat, draft power) and social insurance against drought and crop failure. Studies in Kenya (Kissui, 2008) and Tanzania (Hemson et al., 2009). Guarding fields or building fences also creates extra work and uses what would be free-time. This can mean less time for education or other activities (King et al., 2017). Also, fear of conflict might prevent communities from farming fertile land near protected areas, so farmland is underused.

### **2.4.2 Social and Psychological Impacts**

HWC has major social and psychological impacts in addition to material costs. Repeated encounters with dangerous animals, like carnivores or elephants, can cause trauma and anxiety. In some areas, kids stay home from school to protect farms, or people have trouble sleeping because wildlife comes at night (Kebede et al., 2021). Conflict can also cause tension between communities and park authorities if people think conservation policies care more about animals than people's safety (Treves and Karanth, 2003). In Ethiopia, some people feel left out of decisions, which hurts trust and cooperation in conservation (Gebresenbet et al., 2018). If wild animals kill people, it can cause lasting trauma and widespread fear and hatred of wildlife (Distefano, 2005). These incidents often lead to retaliatory killings, which hurts animal populations and makes human-wildlife tensions even worse.

### **2.4.3 Conservation and Ecological Impacts**

From a conservation perspective, HWC presents a big danger to endangered and keystone species. Retaliatory killings—through poisoning, spearing, or shooting—are a frequent response to livestock loss or crop damage. This has been seen in Ethiopia and elsewhere in sub-Saharan Africa, causing carnivore and megafauna populations to drop (Woodroffe et al., 2005). Also, these conflicts can cause the public to view conservation programs and protected areas negatively. If local people don't see any personal gain from wildlife conservation, they might go against park rules, fight conservation efforts, or get involved in illegal activities like poaching (Dickman, 2010; Hoare, 2015). Over time, HWC can upset the balance, as the loss of top predators because of retaliatory killings can set off trophic cascades, which impacts prey populations, vegetation, and the larger ecosystem (Ripple et al., 2014). Similarly, if elephants or other herbivores are moved or killed, it changes seed dispersal, the structure of the landscape, and forest regrowth.

### **2.4.4 National and Policy-Level Implications**

HWC obstructs progress toward conservation and development goals at the national level. Ethiopia relies on ecosystem services and ecotourism for its development strategy, similar to other countries with rich biodiversity. Yet, ongoing conflict with wildlife weakens biodiversity targets and rural development (Kebede et al., 2021). The lack of compensation for those affected by this conflict adds to feelings of neglect. Poor policies and limited institutional ability to address these incidents make it harder to gain long-term community support for conservation (Treves and Karanth, 2003).

## **2.5 Management Strategies and Mitigation Measures**

### **2.5.1 Physical and Technical Barriers**

Physical deterrents are among the most common methods used to reduce direct encounters between wildlife and humans. These include electric fences, trenches, stone walls, and fortified kraals. Electric fencing has proven effective in Kenya's Amboseli and Tsavo National Parks for mitigating elephant crop raiding, though the costs of construction and maintenance limit its feasibility in rural Ethiopia (Hoare, 2012). In Awash National Park, where predators like hyenas threaten livestock, fortified enclosures using wire mesh or strong wooden poles can significantly reduce night-time attacks. While physical barriers are

effective, they often require external financial support, making their sustainability dependent on partnerships between government, NGOs, and local communities (Sitati et al., 2003).

### **2.5.2 Land-Use Planning and Buffer Zones**

Spatial planning techniques aim to separate human and wildlife activities by creating buffer zones, wildlife corridors, and land-use zoning systems. Buffer zones around protected areas can serve as transitional spaces where regulated human activities occur without threatening wildlife habitats (Lamarque et al., 2009). In Tanzania and Kenya, zoning approaches that allocate land for grazing and farming away from core wildlife habitats have reduced crop raiding and livestock predation. In Ethiopia, the absence of formal buffer zones around Awash National Park exacerbates HWC, as farms and settlements directly border the park. Introducing buffer zones and designated wildlife corridors could reduce conflict while providing alternative livelihood opportunities through sustainable resource use and eco-tourism (Mekonnen et al., 2020).

### **2.5.3 Community-Based Approaches**

Involving local communities in conservation and conflict mitigation ensures long-term sustainability. Community wildlife scouts, village response teams, and participatory monitoring programs empower local people to take ownership of conflict management (Madden, 2004). In Namibia and Zimbabwe, Community-Based Natural Resource Management (CBNRM) schemes have successfully reduced conflicts by linking wildlife conservation with tangible community benefits (Jones & Murphree, 2001). Around Awash National Park, engaging local pastoralists and farmers in conflict reporting and patrols could improve response times and rebuild trust between park management and surrounding communities. Such approaches not only reduce conflict but also foster positive conservation attitudes.

### **2.5.4 Compensation and Insurance Schemes**

Economic losses from crop damage and livestock predation often fuel resentment toward wildlife. Compensation programs seek to reimburse farmers for damages, while insurance schemes distribute risks across households or communities. Successful examples are documented in India and Kenya, where rapid-response compensation funds reduced retaliatory killings of predators (Nyhus et al., 2005). However, in many African countries, including Ethiopia, such schemes are criticized for bureaucratic

delays, corruption, and inadequate coverage. Designing transparent, community-managed compensation or insurance systems around ANP could help reduce hostility and encourage coexistence, though sustainability would require strong institutional support and funding.

### **2.5.5 Education and Awareness Programs**

Raising awareness about the ecological and economic importance of wildlife is crucial for changing negative attitudes. Conservation education programs in schools, awareness campaigns via radio, and farmer training workshops can enhance tolerance and promote coexistence. Studies show that higher education levels are correlated with more positive conservation attitudes (Dickman, 2010). In Ethiopia, integrating environmental education into local curricula and using community gatherings for awareness-raising could help mitigate conflicts around ANP. Education also empowers communities to adopt innovative deterrent methods, such as using chili plants or beehive fences, which have been shown to repel elephants effectively in East Africa (King et al., 2017).

### **2.5.6 Ecological and Habitat Management**

One of the root causes of HWC is the depletion of resources inside protected areas, forcing wildlife to venture into human settlements. Management strategies such as establishing artificial water points, restoring degraded habitats, and reducing illegal grazing inside parks can help retain wildlife within park boundaries (Distefano, 2005). For ANP, which is located in an arid ecosystem, developing sustainable water sources and protecting riverine habitats could minimize seasonal wildlife movement into villages. Habitat management not only reduces conflict but also enhances biodiversity resilience under climate change pressures.

### **2.5.7 Policy and Institutional Measures**

Long-term resolution of HWC requires strong institutional frameworks and supportive policies. This includes developing national HWC strategies, enforcing wildlife protection laws, and integrating conflict management into regional land-use planning. In Ethiopia, the Ethiopian Wildlife Conservation Authority (EWCA) has acknowledged HWC as a major challenge but faces resource and capacity limitations (EWCA, 2015). Establishing park-community conflict resolution committees and embedding conflict-sensitive approaches into local governance can improve trust and collaboration. Strengthening legal

frameworks for benefit-sharing and compensation would further promote coexistence in and around national parks such as Awash. Managing HWC around national parks requires a multi-faceted approach that combines short-term technical solutions with long-term institutional and community-based strategies. Physical barriers can provide immediate protection, but sustainable coexistence depends on land-use planning, education, compensation, and participatory governance. For Awash National Park, a combination of livelihood-specific interventions (e.g., livestock enclosures for pastoralists, crop protection for farmers), improved community involvement, and policy reforms offers the most promising pathway toward reducing conflict and ensuring conservation goals are met.

## **2.6 Challenges in Addressing HWC**

Dealing with human-wildlife conflict is tough because of ecological, socio-economic, institutional, and attitude-related issues. Wildlife's ability to adapt, habitat breaking up, poverty, weak institutions, and bad feelings from the community all keep the conflict going. To fix these problems, we need to use a complete, multi-level strategy that includes handling ecological concerns, supporting livelihoods, making institutions stronger, and using community-based natural resource management. If we don't fix these basic problems, our attempts to reduce HWC will only be partly helpful and won't last.

## **2.8 Theoretical and Conceptual Framework**

### **2.8.1 Theoretical Framework**

HWC is a complicated issue that sits at the nexus of ecology, means of living, government, and social dynamics. Several conceptual viewpoints offer helpful lenses through which to examine HWC around Awash National Park. Social–Ecological Systems. Theory emphasizes the interdependence of human and natural systems, hence stressing feedback loops between ecological processes and social responses (Berkes et al., 2018). Within the framework of ANP, HWC results from the convergence of human livelihood practices (e.g., rain-fed farming, pastoralism) with ecological dynamics (e.g., baboon crop-raiding, hyena predation). Because it shows how factors like population expansion, drought, and land-use changes aggravate system pressures to generate conflict at the human-wildlife interface, the SES view is especially relevant. For ANP, where demographic factors include education, family size, gender, and income type influence not only exposure to conflict but also tolerance of wildlife, this lens is quite

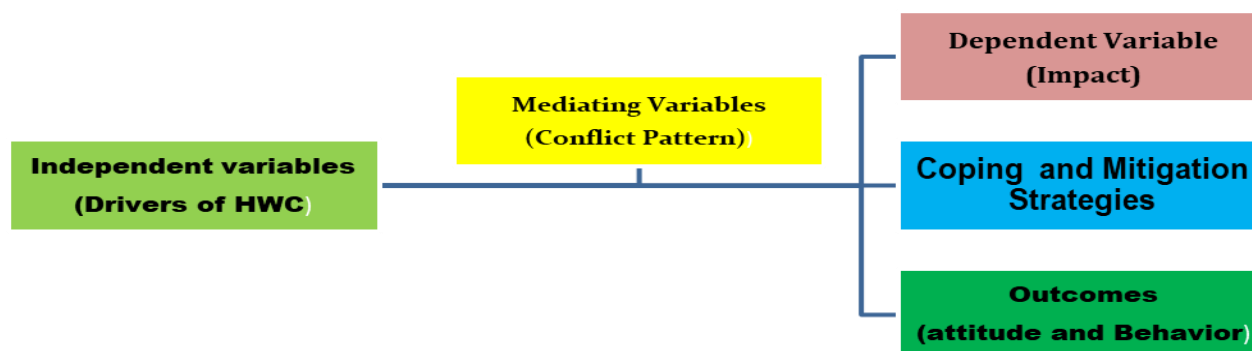
important. Comprehending these aspects of people clarifies the local support for or opposition to environmental initiatives' variation.

Based on sociology, conflict theory holds that social unrest is caused by rivalry over limited resources. Particularly in drought-prone environments like ANP, humans and animals compete for land, food, and water in HWC. By emphasizing devolution of resource rights and responsibilities to local communities, Community-Based Natural Resource Management promotes coexistence via benefit-sharing and participatory governance (Taylor, 2009). Experiences from Namibia and Kenya show that attitudes toward wildlife improve when communities get real benefits from conservation. Applying CBNRM principles to ANP implies that empowering local people by means of participatory management and fair benefit distribution might help to reduce conflict and encourage tolerance. Together, these ideas highlight that HWC in ANP is not only an environmental problem but also a socio-ecological one driven by social dynamics, economy, and governance.

### **2.8.2 Conceptual Framework**

This study's Conceptual framework, drawing from the theories above, seeks to understand patterns, causes, and effects of HWC near ANP, along with local community reactions. Figure 2.1 shows the main factors and how they relate. The framework suggests that closeness to ANP and community traits affect how often HWC happens and what kind it is, which then changes the money and social situations of homes. These changes then shape how locals feel about wildlife and conservation groups.

Coping methods, both old and new, help change these results, possibly lowering conflict and helping people and animals live together. But how well they work relies on having resources, good management, and community involvement. This model also considers how people's lives and animal numbers are tied together through give-and-take. It also adds ideas about attitudes and group differences, while suggesting that involving people in charge could turn problems into chances to help protect nature.



**Figure 1** Conceptual framework for HWC in and around ANP

## 2.9 HWC Studies in Ethiopia (2010–2023)

Studies conducted in different regions of Ethiopia demonstrate that human–wildlife conflict (HWC) is both widespread and context-specific, reflecting the diversity of ecosystems, wildlife species, and livelihood systems in the country. Research consistently shows that conflicts manifest in crop raiding, livestock depredation, competition for resources, property damage, and even human injuries or fatalities, and that the intensity of these conflicts is shaped by proximity to protected areas, livelihood type, and institutional capacity (Ayalew & Melese, 2022; Thapa, 2016).

In the Alitash National Park, Ayalew & Melese (2022) reported significant losses for local communities due to crop destruction, livestock predation, and even human casualties caused by wildlife. Crop-raiding species such as baboons and warthogs were identified as major culprits, while larger carnivores like hyenas and lions were responsible for livestock attacks. The study highlighted that local people often developed negative attitudes toward wildlife, perceiving it as a direct threat to their food security and safety. Similarly, in the Alage area, human–wildlife conflict was found to be a major concern, with elephants and baboons being the primary species responsible for crop damage and livestock losses. These findings underline that conflict is not confined to any single ecological zone but cuts across diverse landscapes in Ethiopia.

Further north, in the Simien Mountains National Park, Bekele et al. (2011) assessed the experiences of 300 households and found that crop raiding and livestock predation were the most prevalent forms of conflict. Species such as Gelada baboons, Walia ibex, and common jackals were identified as particularly problematic. Interestingly, the study reported a negative correlation between perceived benefits from the

park and experiences of conflict: households that experienced higher levels of conflict were less likely to view the park positively. This finding emphasizes the importance of ensuring that conservation provides tangible benefits to local people to offset the costs of living near wildlife.

In the Bale Mountains National Park, which harbors some of Ethiopia's most important biodiversity, studies have shown that crop raiding by primates and ungulates, livestock predation by carnivores, and competition for grazing resources are the dominant sources of conflict. These pressures have substantial economic consequences, especially for farming and pastoralist households that depend almost entirely on natural resources for their livelihoods. The Bale study also revealed that communities often use traditional coping mechanisms, such as night guarding and scare tactics, but these measures are labor-intensive and insufficient to address recurring losses (Yihune & Bekele, 2012).

Other regions also provide similar evidence. In Afar and Somali pastoralist areas, hyenas and lions are major predators, sometimes causing entire herd losses (Mekonnen et al., 2020). In Nechisar and Omo National Parks, elephants, antelopes, and primates are reported to cause severe crop losses, while human encroachment and grazing pressure exacerbate conflicts (Tessema et al., 2010). Around Awash National Park, baboons, warthogs, and hyenas have been documented as the most conflict-prone species, with households closest to the park boundary suffering disproportionately (Yohannes et al., 2017; Gebresenbet et al., 2018).

Collectively, these findings reveal several important patterns: Crop damage and livestock predation are the most common forms of conflict across regions. Proximity to protected areas strongly determines conflict intensity, with households closer to park boundaries facing greater risks. Different species dominate conflict in different regions: baboons and warthogs in highlands, elephants in lowlands, and hyenas and lions in pastoralist areas. Perceptions of conservation are negatively influenced when people experience frequent conflict without receiving benefits. Traditional coping mechanisms remain widespread but are often inadequate without institutional support.



## **CHAPTER THREE: METHODOLOGY**

### **3.1 Research Design**

This study employed a descriptive survey research design combined with mixed methods to examine the patterns, causes, impacts, and management strategies of HWC in and around Awash National Park. The descriptive survey design was appropriate because it enabled systematic collection of both qualitative and quantitative data from a relatively large population, allowing for an in-depth understanding of the nature, extent, and perceptions of HWC among local communities. As Kothari (2004) notes, descriptive designs are particularly suitable when the objective is to describe existing conditions, attitudes, and behaviors without manipulating variables. In this case, the aim was not to alter the dynamics of human–wildlife interactions but to document how they manifest and are perceived by households, pastoralists, and park staff. The use of a mixed-methods approach integrated structured household surveys with qualitative interviews and focus group discussions. Quantitative data provided measurable evidence on the prevalence, types, and impacts of HWC, while qualitative insights captured nuanced perceptions, cultural values, and local coping strategies that could not be adequately explained by numbers alone.

This methodological triangulation increased both the reliability and validity of findings, reducing the risk of bias that might arise from relying solely on one data source (Creswell & Plano Clark, 2018). The combination of methods also aligned with the multidimensional nature of HWC, which involves ecological, economic, and socio-cultural dimensions. Furthermore, a cross-sectional design was adopted, whereby data were collected at a single point in time across five localities: Sabure, Fentale, Metehara, Awash Sebat Kilo, and surrounding pastoralist settlements. This approach was practical given resource and time constraints, yet it provided a snapshot of the prevailing situation of HWC in the study area. According to Bryman (2016), cross-sectional surveys are particularly effective in identifying associations between variables such as demographic factors, livelihood strategies, and exposure to wildlife conflict. The selected research design also ensured a clear thematic alignment with the study objectives and research questions. For example: Objective 1 (to assess patterns of HWC) was addressed through quantitative surveys documenting frequency and types of wildlife incursions.

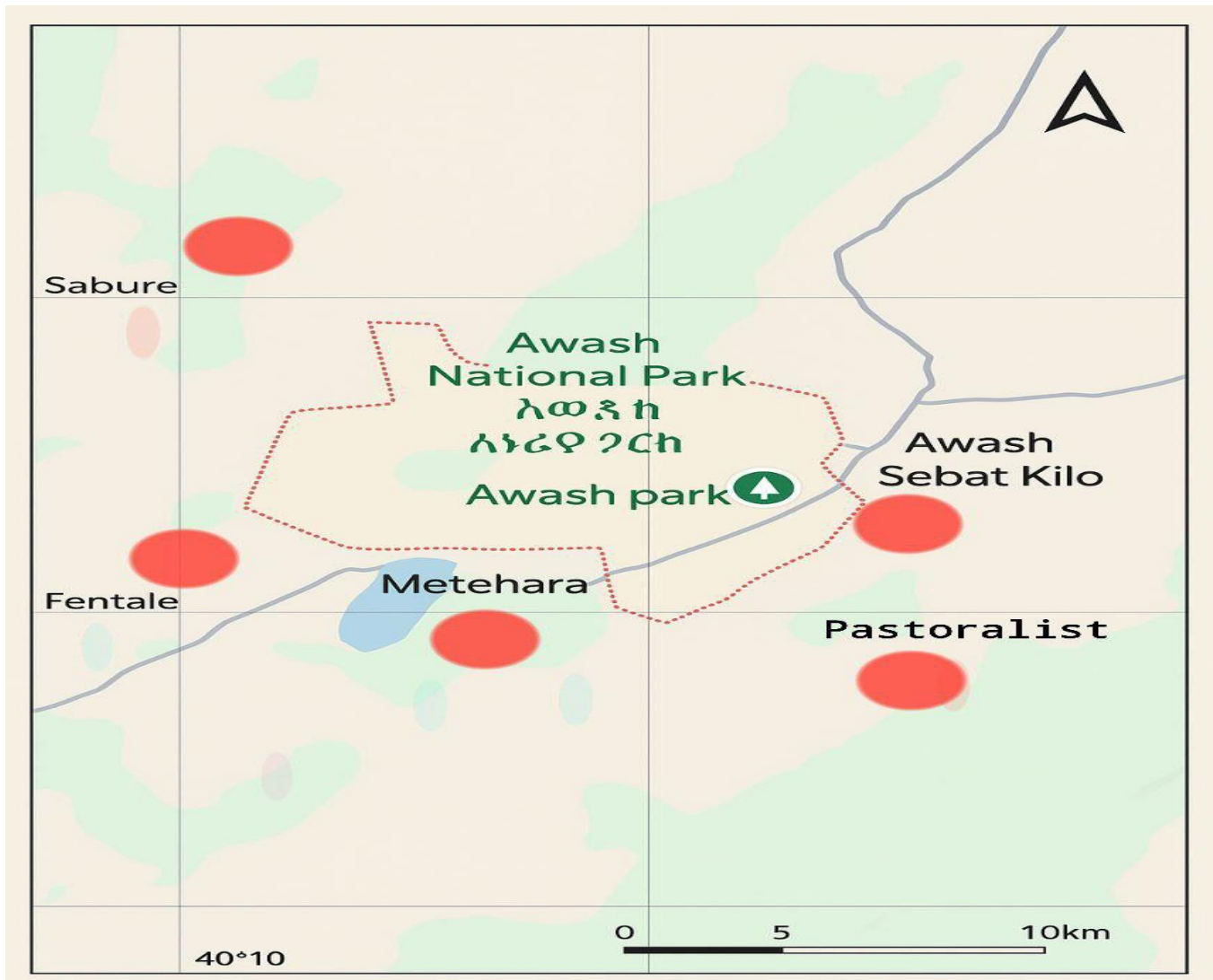
Objective 2 (to identify causes) required both survey questions and qualitative narratives on land use change, livestock grazing, and conservation policies. Objective 3 (to analyze impacts on livelihoods) depended on descriptive statistics of crop and livestock loss as well as testimonies from affected households. Objective 4 (to examine community responses and attitudes) necessitated integration of quantitative Likert-scale data and qualitative perspectives from elders and leaders. This alignment allowed the research design to serve as a framework connecting data collection methods with the analytical needs of the thesis. Similar designs have been applied in other HWC studies in Ethiopia, such as Yihune et al. (2009) in Bale Mountains and Tessema et al. (2010) in Mago National Park, demonstrating that descriptive survey approaches are effective in capturing the complexity of human–wildlife relations in community–protected area interfaces. In summary, the descriptive, cross-sectional, and mixed-methods research design adopted in this study was well-suited to investigating the multifaceted dynamics of HWC in and around Awash National Park. It not only allowed for statistical representation of households but also ensured contextual depth through qualitative insights, thereby providing a comprehensive understanding of the challenges and opportunities in managing human–wildlife coexistence.

### **3.2 Description of Study Area**

Awash National Park (ANP) is one of the most prominent and historically significant protected areas in Ethiopia. It is situated in the Great Rift Valley, spanning the administrative boundaries of Fentale Woreda in East Shewa Zone (Oromia Region) and Dulecha Woreda in Administrative Zone 3 of the Afar Regional State. Astronomically, the park lies between 8°45' to 9°15' N latitude and 39°40' to 40°05' E longitude (EWCA, 2020). Relatively, Awash National Park is located about 225 kilometers east of Addis Ababa, along the Addis Ababa–Djibouti highway, making it one of the most accessible national parks in the country (Hillman, 1993). The park was officially established in 1966, making it Ethiopia's first national park, with the objective of conserving the unique semi-arid savanna ecosystem and its diverse wildlife (Yalden *et al.*, 1996). Awash National Park covers an area of approximately 756 square kilometers (EWCA, 2020). Altitude within the park varies significantly, ranging from 750 meters above sea level in the northeast lowlands to about 2,000 meters on Mount Fentale, a dormant volcano that dominates the western edge of the park (Hillman, 1993; Friis *et al.*, 2010).

Climatically, the area is semi-arid, with an average annual rainfall of 619 mm, distributed irregularly over two rainy seasons — the main rains (June–September) and the short rains (March–April). The mean annual temperature ranges from 21°C to 32°C, with peak daily temperatures often exceeding 40°C during the dry season (MoA, 2000; Belayneh & Bekele, 2011). Ecologically, Awash National Park features a mosaic of habitats, including acacia woodland, open savanna grasslands, bushland, and riverine forests along the Awash River. These ecosystems support a wide range of biodiversity. The vegetation is dominated by species such as *Acacia tortilis*, *Acacia senegal*, *Balanites aegyptiaca*, and *Commiphora africana* (Friis *et al.*, 2010). The park is home to over 80 species of mammals, including flagship species like Beisa oryx (*Oryx beisa*), greater kudu (*Tragelaphus strepsiceros*), Soemmerring’s gazelle (*Gazella soemmerringii*), Hamadryas baboon (*Papio hamadryas*), Anubis baboon (*Papio anubis*), and African lion (*Panthera leo*).

In addition, more than 450 species of birds have been recorded, making it a critical site for ornithological diversity (Yalden *et al.*, 1996; Mengesha *et al.*, 2014). The buffer zone surrounding the park is inhabited by a diverse set of communities, primarily Afar pastoralists and Oromo agro-pastoralists, who depend heavily on livestock rearing and small-scale crop farming for their livelihoods. Major livelihood activities include cattle, camel, and goat herding, as well as the cultivation of sorghum, maize, and vegetables during the rainy season. According to local administrative reports and estimates from EWCA (2023), the human population living within a 5–10 km buffer zone around the park exceeds 30,000 people, exerting increasing pressure on the park’s resources due to settlement expansion, livestock grazing, and agricultural encroachment.



**Figure 2: Map of Awash National Park and Study Kebeles**

Map showing distribution of studied localities (*kebeles*) around Awash National Park, Ethiopia. From: Perception and attitude of pastoralists on livestock-wildlife interactions around Awash National Park, Ethiopia: implication for biodiversity conservation

### 3.3 Target Population

The study population included households living in selected kebeles adjacent to Awash National Park, local farmers, and pastoralists affected by HWC. Park management staff and community leaders were

also included as key informants. The target population was chosen due to their direct exposure to wildlife and their experiences with conflict.

### 3.4 Sampling Technique and Sample Size Determination

A multi-stage sampling technique followed a stratified random sampling and purposive approach based on proximity (within 10 km) to the park, exposure to wildlife, livelihood type, and administrative accessibility. In the first stage, the study area was stratified into two broad administrative units, Fentale Woreda (Oromia Region) and Dulecha Woreda (Afar Region). These two districts were purposively selected because they directly border Awash National Park and have historically experienced intense human-wildlife interactions (Belayneh & Bekele, 2011; EWCA, 2020). In the second stage, a total of five kebeles (villages) were selected using purposive criteria, including Geographical proximity, Known history of human-wildlife conflict, Livelihood characteristics. A total of 222 respondents were targeted for the questionnaire survey, based on time, cost, and human resource.

The selected kebeles represented a mixture of high, medium, and low exposure zones to wildlife movement corridors. This stratification helped capture variability in conflict intensity and types across the landscape. Within each kebele, households were randomly selected using a stratified random sampling technique proportional to population size, as recommended by Yamane (1967). This ensured that each village was fairly represented in the total sample size of 222 households. The final sample distribution was coordinated with kebele officials and community representatives to avoid selection bias and to gain local trust and cooperation during the data collection process.

$$n = : \frac{N}{1+N(e)^2} \text{ where}$$

N = total number of households in selected kebeles  $\approx 500$

e = desired margin of error (0.05 for 95% confidence level)

$$n = \frac{N}{1+N(e)^2} = \frac{500}{1+500(0.05)^2} = \frac{500}{1+1.25} = \frac{500}{2.25} \approx 222$$

**Table 1: Sample Distribution of Respondents by Village**

| Locality/Village        | Estimated Households | % Population | Allocated Sample Size |
|-------------------------|----------------------|--------------|-----------------------|
| Sabure                  | 120                  | 24%          | 53                    |
| Fentale                 | 100                  | 20%          | 44                    |
| Metehara                | 90                   | 18%          | 40                    |
| Awash Sebat Kilo        | 70                   | 14%          | 31                    |
| Pastoralist Settlements | 120                  | 24%          | 54                    |
| Total                   | 500                  | 100%         | 222                   |

### 3.5 Data Collection Methods, Sources and Types

To achieve the objectives of this study, both quantitative and qualitative data collection methods were employed, following a mixed-methods approach that ensures triangulation and enhances the credibility of findings (Creswell & Plano Clark, 2018). The use of multiple methods allowed the study to capture not only the measurable extent of human-wildlife conflict but also the perceptions, attitudes, and coping strategies of local communities. Structured household questionnaires, key informant interviews, and field observations are Primary Data, whereas Published reports, park records, policy documents, and academic literature relevant to HWC in Ethiopia are Secondary Data:

#### 3.5.1 Household Surveys

Structured questionnaires were translated into Amharic and Afaan Oromo, administered to 222 randomly selected households across the five sampled kebeles: Sabure, Fentale, Metehara, Awash Sebat Kilo, and surrounding pastoralist settlements. The household survey was designed to generate data on socio-demographic characteristics of respondents, frequency and types of wildlife-induced damages, perceived

causes of conflict, and existing coping mechanisms. Closed and semi-open questions were included to ensure comparability while still allowing space for detailed responses (Kothari, 2004).

### **3.5.2 Key Informant Interviews**

In-depth interviews were conducted with park staff, local administrators, and community elders who possess long-term knowledge of human-wildlife interactions. These informants provided valuable insights into the historical trends of conflicts, institutional responses, and policy implications. This method was particularly useful in addressing the research objective on identifying local management strategies (Bryman, 2016).

### **3.5.3 Focus Group Discussions**

FGDs were selected by random separately with men, women, and youth groups to capture diverse community perspectives. Each group consisted of 8–10 participants, enabling interactive discussions on experiences of crop raiding, livestock depredation, and attitudes toward conservation. FGDs complemented household surveys by allowing deeper exploration of community narratives and perceptions (Morgan, 1997).

### **3.5.4 Direct Field Observation**

Direct field observations were undertaken to document wildlife activities around crop fields, livestock grazing areas, and homesteads. This method was essential to validate household reports and provide visual evidence of conflict scenarios (Newing et al., 2011). Observations were recorded systematically using field notes and photographs. By integrating these data collection methods, the study ensured robust evidence to answer the research questions on the patterns, causes, and impacts of human–wildlife conflict, as well as the management strategies employed by local communities.

## **3.6 Method of Data Analysis and Presentation**

The data analysis strategy was guided by the study’s research objectives and questions, integrating quantitative and qualitative approaches. Quantitative data from the household surveys were coded, entered, and analyzed using SPSS version 25. Descriptive statistics such as frequencies, percentages,

means, and standard deviations were used to summarize socio-demographic characteristics, types of HWC, and coping strategies. Inferential statistics, including chi-square tests and correlation analysis, were applied to explore relationships between variables such as distance from the park, education level, livelihood type, and conflict exposure. This directly addressed research questions three and six, which examined spatial influence and demographic factors. Qualitative data from interviews and FGDs were transcribed, translated into English where necessary, and thematically coded. Themes were developed around patterns of conflict, causes, impacts, coping mechanisms, and conservation attitudes. Thematic analysis enabled identification of community perceptions that either reinforced or explained patterns found in the quantitative data (Braun & Clarke, 2006).

Findings from quantitative and qualitative analyses were integrated in the results chapter to provide a holistic picture of HWC. Tables, graphs, and charts were used to present statistical results clearly, while verbatim quotes from participants illustrated key themes and gave voice to community perspectives. According to Miles, Huberman, & Saldaña (2014), such integration enhances the credibility and richness of research findings. This approach ensured that the data analysis not only quantified the patterns and impacts of HWC but also captured the lived experiences of local communities. It also provided strong evidence to answer the study objectives: identifying conflict types, species involved, spatial trends, coping strategies, attitudes, and socio-demographic influences.

### **3.6.1 Quantitative Data Analysis**

Survey data collected from households were coded, entered into SPSS version 25 for analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviations were computed to summarize socio-demographic variables, frequency of wildlife conflicts, and the types of damages reported. To assess relationships between variables (e.g., household characteristics and likelihood of conflict), inferential statistics such as chi-square tests and cross-tabulations were applied (Field, 2018). These analyses supported the first two objectives concerning the patterns and causes of human–wildlife conflict.

### **3.6.2 Qualitative Data Analysis**

Qualitative data obtained from interviews, FGDs, and field notes were analyzed thematically. Thematic coding involved transcribing interviews, categorizing responses into emerging themes (e.g., “attitudes



toward wildlife,” “coping strategies,” “perceived causes”), and interpreting them in light of the research objectives (Braun & Clarke, 2006). NVivo software was used to facilitate coding and ensure reliability of interpretations.

### **3.6.3 Integration of Quantitative and Qualitative Results**

Findings from quantitative and qualitative analyses were integrated during the interpretation phase to provide a holistic perspective. For instance, statistical trends on crop raiding frequency were compared with narratives from FGDs to understand how households perceive and adapt to these challenges. Such integration enhanced the validity of conclusions and allowed a nuanced discussion of the impacts and management strategies, thereby addressing all the study objectives (Creswell & Plano Clark, 2018).

### **3.7 Ethical Considerations**

All participants were informed about the purpose of the study, their right to withdraw at any time, and the confidentiality of their responses. Verbal consent was sought from all respondents, as many were from rural or low-literacy backgrounds. Interviews with park staff were conducted respectfully, and their institutional roles were not linked to any specific responses in the analysis. The study adhered to all national ethical research standards and the university’s guidelines on research involving human participants. Prior informed consent was obtained from all respondents. Participation was voluntary, and confidentiality of responses was assured. Interviewees were allowed to withdraw at any time. Due to time and budget constraints, the study was limited in both its geographic and sample coverage. Some respondents were reluctant to answer questions about conflict due to fear of legal consequences or distrust in authorities. Additionally, due to seasonal mobility of pastoralists and access issues in remote areas, certain groups may have been underrepresented. Despite these limitations, the findings provide a reliable overview of the human-wildlife conflict situation in the area.

## CHAPTER FOUR: RESULTS

### 4.1 Socio Demographic Characteristics

Understanding the socio-demographic profile of respondents is crucial because factors such as age, gender, education, and livelihood strategies strongly influence how households experience and respond to HWC. Table 2 summarizes the main characteristics of the 222 surveyed households drawn from Sabure, Fentale, Metehara, Awash Sebat Kilo, and surrounding pastoralist kebeles.

**Table 2: Socio-Demographic Characteristics of Respondents (n = 222)**

| Variable                 | Category                  | Frequency | Percentage (%) |
|--------------------------|---------------------------|-----------|----------------|
| Gender of household head | Male                      | 175       | 78.8           |
|                          | Female                    | 47        | 21.2           |
| Age group (years)        | 18–30                     | 41        | 18.5           |
|                          | 31–45                     | 83        | 37.4           |
|                          | 46–60                     | 65        | 29.3           |
|                          | 61 and above              | 33        | 14.8           |
| Education level          | No formal education       | 102       | 45.9           |
|                          | Primary                   | 69        | 31.1           |
|                          | Secondary                 | 37        | 16.7           |
|                          | College and above         | 14        | 6.3            |
| Main livelihood          | Crop farming              | 86        | 38.7           |
|                          | Livestock rearing         | 70        | 31.5           |
|                          | Agro-pastoralism (mixed)  | 56        | 25.2           |
|                          | Other (trade, wage, etc.) | 10        | 4.6            |

**Gender:** The majority of households (78.8%) were male. However, the 21.2% female households highlight the role of widows, divorced women, and women managing households during male migration, which may affect vulnerability and coping strategies. **Age:** Respondents were predominantly in the productive middle age groups (31–45 years = 37.4%; 46–60 years = 29.3%). Younger households (18–30 years) made up 18.5%.

## 4.2 Patterns of HWC

### 4.2.1 Types and Frequency of Conflict

Table 3 summarizes the major forms of HWC reported by the 222 surveyed households across the five localities. The most frequent conflicts were crop raiding, livestock predation, property damage, and, in rare cases, direct human attacks.

Table 3: Types and Frequency of Human–Wildlife Conflict

| Type of Conflict    | Households Reporting (n) | Percentage (%) | Causes                       |
|---------------------|--------------------------|----------------|------------------------------|
| Crop raiding        | 173                      | 77.9           | Baboon, Warthog              |
| Livestock predation | 128                      | 57.7           | Hyena, Lion, Leopard, Jackal |
| Property damage     | 61                       | 27.5           | Baboon, Warthog              |
| Human attack/injury | 19                       | 8.6            | Lion, Leopard                |

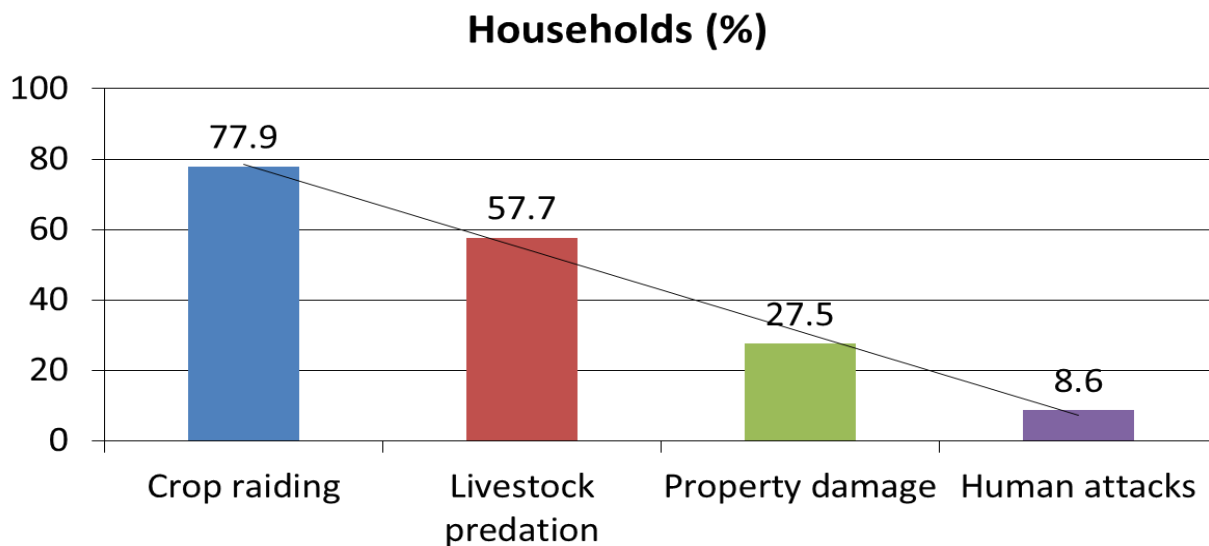


Figure 3: Frequency of Reported Human–Wildlife Conflicts

Crop raiding is the most common type of conflict, affecting nearly 4 out of 5 households (77.9%) by Baboon, Warthogs. Livestock predation by Hyena, Lion, Leopard and Jackal is also widespread (57.7%), particularly among pastoralist households. Property damage (27.5%) includes destruction of fences,

water points, and stored food by baboons and warthogs. Although relatively rare (8.6%), human attacks were reported, mostly linked to hyenas and, occasionally, lions. This directly addresses RQ1 by identifying the most common forms of conflict (Table3).

#### 4.2.2 Wildlife Species Involved in Conflicts

Conflicts in Awash National Park involve a range of wildlife species that affect local livelihoods differently. Some species are predominantly crop raiders, while others are livestock predators. Table 4: summarizes the major species reported by respondents and the types of conflict associated with them.

Table 4.: Wildlife Species Reported as Responsible for HWC

| Wildlife Species                          | Main Type of Conflict             | Households Reporting (n) | Percentage (%) | Rank |
|-------------------------------------------|-----------------------------------|--------------------------|----------------|------|
| Olive baboon ( <i>Papio anubis</i> )      | Crop raiding                      | 139                      | 62.6           | 1    |
| Warthog ( <i>Phacochoerus africanus</i> ) | Crop raiding                      | 112                      | 50.5           | 2    |
| Spotted hyena ( <i>Crocuta crocuta</i> )  | Livestock predation               | 97                       | 43.7           | 3    |
| Lion ( <i>Panthera leo</i> )              | Livestock predation, human attack | 29                       | 13.1           | 5    |
| Greater kudu & other antelopes            | Crop raiding                      | 24                       | 10.8           | 6    |
| Other (jackals, monkeys, etc.)            | Mixed                             | 17                       | 7.7            | 7    |

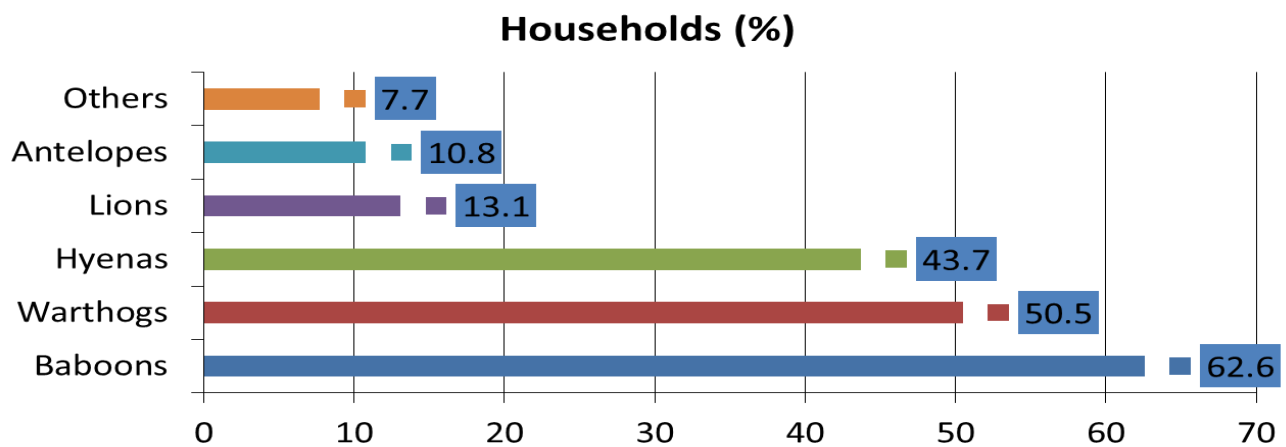


Figure 4: Wildlife Species Most Frequently Involved in Conflicts

Baboons (62.6%) are the most problematic species, primarily through crop raiding of maize, sorghum, and fruits. Warthogs (50.5%) are the second most significant crop raiders, particularly destructive to root and tuber crops. Hyenas (43.7%) are the leading livestock predators, mainly targeting goats, sheep, and calves. Lions (13.1%) are less frequent but highly impactful, sometimes attacking cattle and, rarely, humans. This directly addresses RQ2 by identifying the key wildlife species driving HWC in Awash (Table:4).

#### 4.2.3 Spatial Relationship with Park Proximity

The study examined how household proximity to the park boundary influenced the occurrence and severity of conflicts. Results show a clear distance–decay effect, where households closer to Awash National Park experience disproportionately higher levels of crop and livestock losses compared to those further away.

Table 5: Mean Annual Crop and Livestock Losses by Distance

| Distance from Park | HH (n) | Avg. Crop Loss (kg/household/year) | Avg. Livestock Loss (head/household/year) | % of Households Reporting Any Loss | Main Kebeles in This Zone (Proportion %)                   |
|--------------------|--------|------------------------------------|-------------------------------------------|------------------------------------|------------------------------------------------------------|
| 0–2 km             | 74     | 482                                | 3.2                                       | 91.9%                              | Sabure (53 HH),<br>Awash Sebat Kilo (21 HH )               |
| 2–5 km             | 83     | 280                                | 1.9                                       | 78.3%                              | Fentale (44 HH)<br>Metehara (39 HH )                       |
| 5–10 km            | 65     | 182                                | 0.8                                       | 56.9%                              | Pastoralist<br>Settlements (54 HH ),<br>Remaining (11 HH ) |

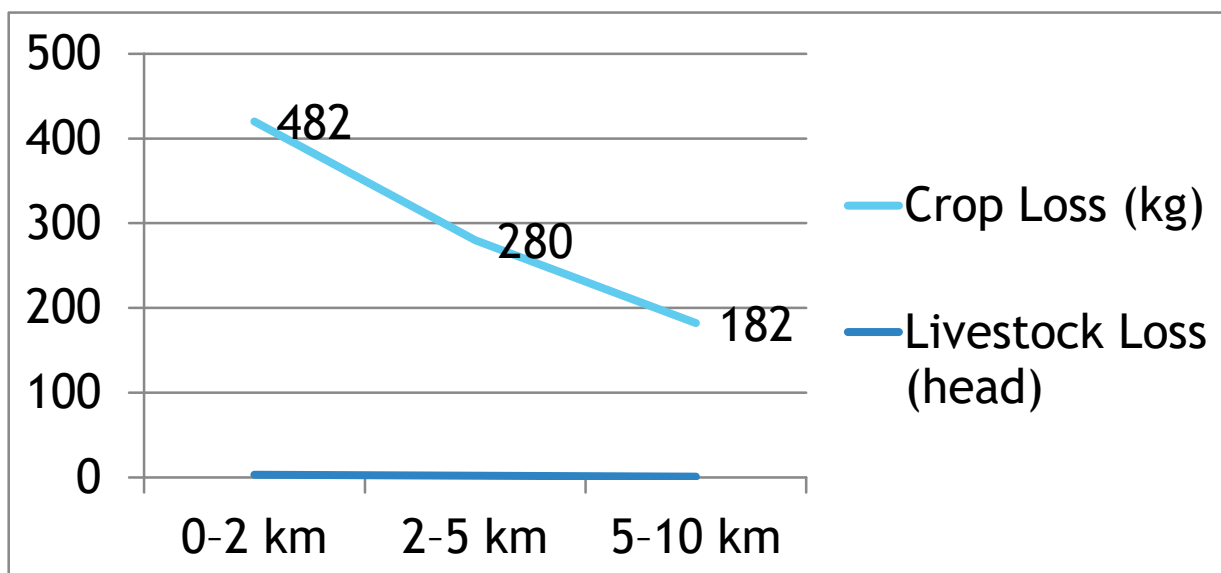


Figure 5: Distance–Decay Pattern of Human–Wildlife Conflict

Households within 0–2 km of the park face the highest average losses: 482 kg of crops and 3.2 livestock annually, with over 90% reporting some form of conflict. Losses decline with distance: households 5–10 km away lose significantly less (182 kg crops and less than 1 livestock annually). Statistical tests (ANOVA,  $p < 0.001$ ) confirm these differences are significant.

### 4.3 Causes of Human–Wildlife Conflict

Conflicts in and around Awash National Park arise from a combination of ecological pressures, seasonal patterns, and human livelihood activities. Respondents identified multiple causes, ranging from wildlife behavior (migration, feeding habits) to human-induced factors such as farming expansion and grazing inside park boundaries.

Table 6: Reported Causes of Human–Wildlife Conflict

| Reported Cause                                    | Households Reporting (n) | Percentage (%) |
|---------------------------------------------------|--------------------------|----------------|
| Expansion of farmland into wildlife habitat       | 147                      | 66.2           |
| Free grazing/livestock incursions into park       | 132                      | 59.5           |
| Seasonal food shortages for wildlife (dry season) | 119                      | 53.6           |
| Drought and water scarcity                        | 101                      | 45.5           |
| Human population growth/settlement expansion      | 83                       | 37.4           |
| Weak enforcement of park regulations              | 52                       | 23.4           |

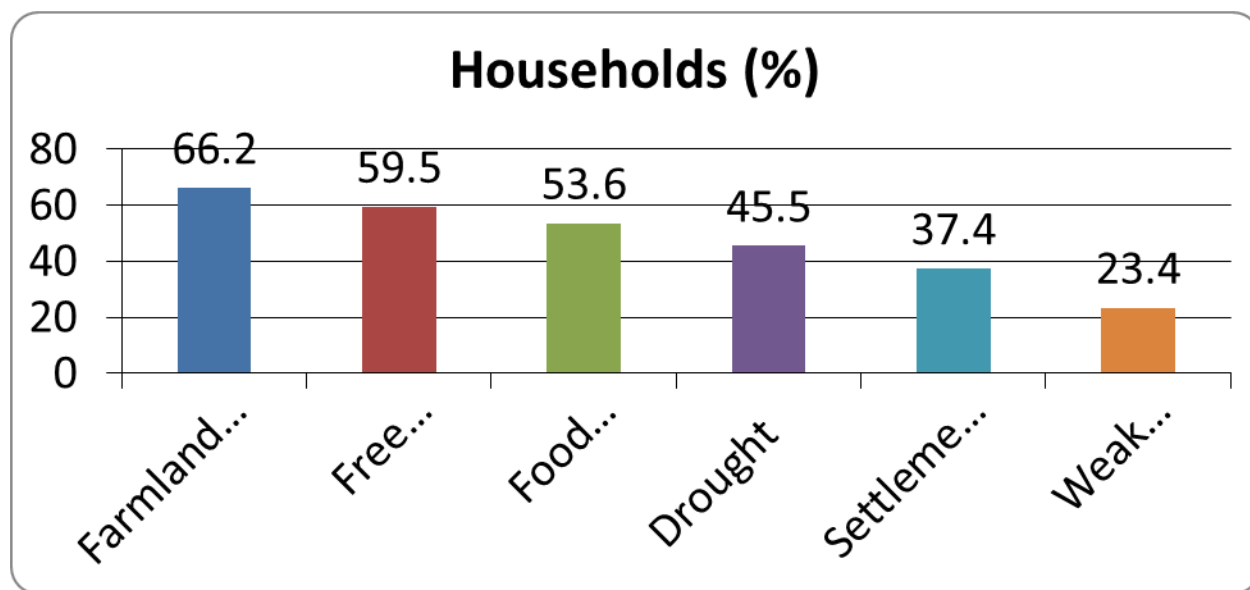


Figure 6: Major Causes of Human–Wildlife Conflict

The leading cause (66.2%) is the expansion of farmland into wildlife habitats, which increases direct crop raiding and habitat overlap. Free grazing (59.5%) inside the park brings livestock into direct contact with predators. Seasonal shortages (53.6%), particularly during the dry season, force wildlife to forage closer to villages. Drought (45.5%) exacerbates competition for water and pasture.

## 4.4 Impacts of HWC

HWC in Awash National Park has multiple consequences for household food security, income, and wellbeing. Respondents reported significant crop losses, livestock predation, property destruction, and in some cases human injury. These impacts directly threaten the livelihoods of farming and pastoralist households, who depend on rain-fed agriculture and livestock rearing.

### 4.4.1 Impacts on Crops

Crop raiding is the most widespread impact, with households reporting substantial annual losses. The main crops affected were maize, sorghum, and groundnut.

Table 7: Average Annual Crop Losses by Type of Crop and by Kebele proportion

| Avg.Loss/ kebele<br>Proportion<br>(kg/year) | Maize     |        | Sorghum   |       | Groundnut |       | Veg/Fruits |       | Total     |               |
|---------------------------------------------|-----------|--------|-----------|-------|-----------|-------|------------|-------|-----------|---------------|
|                                             | (kg)      | (ETB)  | (kg)      | (ETB) | (kg)      | (ETB) | (kg)       | (ETB) | (kg)      | (ETB)         |
| Sabure (24%)                                | 44.4      | 2664   | 34.1      | 2046  | 22.3      | 1338  | 14.9       | 894   | 115.7     | 6942          |
| Fentale (20%)                               | 37.0      | 2220   | 28.4      | 1704  | 18.6      | 1116  | 12.4       | 744   | 96.4      | 5784          |
| Metehara (18%)                              | 33.3      | 1998   | 25.6      | 1536  | 16.7      | 1002  | 11.2       | 672   | 86.8      | 5208          |
| Awash7K (14%)                               | 25.9      | 1554   | 19.9      | 1194  | 13.0      | 780   | 8.7        | 522   | 67.5      | 4050          |
| Pastorals(24%)                              | 44.4      | 2664   | 34.1      | 2046  | 22.3      | 1338  | 14.9       | 894   | 115.7     | 6942          |
| Total                                       | 185<br>Kg | 11,100 | 142<br>Kg | 8,520 | 93<br>Kg  | 5,580 | 62<br>Kg   | 3,720 | 482<br>Kg | 28,920<br>ETB |

Households lost an average of 482Kg of crops annually, equivalent to ETB 28,920 (approx. USD 241), a major share of subsistence food and cash income. Losses were highest for maize and sorghum, staple food crops, exacerbating household food insecurity. This mirrors findings from Yihune et al. (2020) in Nech Sar National Park and Mamo et al. (2019) in Bale Mountains, where staple crops were the most vulnerable to raiding.



#### 4.4.2 Impacts on Livestock

Livestock predation, especially among pastoralist households, was the second most severe impact. Hyenas were the dominant predators, followed by lions.

Table 8: Livestock Predation Losses in the Past 12 Months

| Livestock Type | Total Lost (head) | Sabure (24%) | Fentale (20%) | Metehara (18%) | Awash 7 Kilo (14%) | Pastoralist (24%) | Avg. Price (ETB/head) | Estimated total Value (ETB) |
|----------------|-------------------|--------------|---------------|----------------|--------------------|-------------------|-----------------------|-----------------------------|
| Goats          | 198               | 47.5         | 39.6          | 35.6           | 27.7               | 47.5              | 4,000                 | 792,000                     |
| Sheep          | 132               | 31.7         | 26.4          | 23.8           | 18.5               | 31.7              | 4,000                 | 528,000                     |
| Cattle         | 81                | 19.4         | 16.2          | 14.6           | 11.3               | 19.4              | 20,000                | 1,620,000                   |
| Donkeys        | 21                | 5.0          | 4.2           | 3.8            | 2.9                | 5.0               | 2,000                 | 42,000                      |
| Poultry        | 76                | 18.2         | 15.2          | 13.7           | 10.6               | 18.2              | 150                   | 11,400                      |
| Total          | 508               | 121.8        | 101.6         | 91.5           | 71.0               | 121.8             | 30,150                | 2,993,400                   |

Table 8 illustrates the extent of livestock predation losses experienced by households in the past 12 months, disaggregated by type of livestock and kebele. A total of 508 animals were lost, with goats (198 head) and sheep (132 head) being the most frequently preyed, reflecting their abundance and vulnerability in the study area.

#### 4.4.3 Impacts on Property and Human Safety

Apart from crops and livestock, respondents reported destruction of physical property and occasional human injuries.

**Table 9: Property Damage and Human Injuries Reported**

| Type of Impact               | Households Reporting (n) | Percentage (%) | Main Wildlife Involved |
|------------------------------|--------------------------|----------------|------------------------|
| Fence destruction            | 43                       | 19.4           | Baboons                |
| Water source destruction     | 28                       | 12.6           | Baboons                |
| Storage damage (grain, food) | 17                       | 7.7            | Baboons, warthogs      |
| Human injury/attack          | 19                       | 8.6            | Hyenas, lions          |

Fence destruction (19.4%) was the most frequent property-related impact, increasing exposure to further crop losses. Human attacks were rare (8.6%) but severe, mostly involving hyena bites or lion encounters. Crops are the most widely affected livelihood resource (77.9% households, avg. 482 kg annual loss). Livestock predation is the second most significant, especially for pastoralists (avg. 3–4 small ruminants annually).

#### 4.5 Local Coping and Management Strategies

Communities living adjacent to Awash National Park have developed various coping strategies to minimize the impacts of HWC. These strategies range from traditional household-level practices to collective community actions, though their effectiveness is mixed. The most common strategies reported by respondents are summarized in Table 10.

**Table 10: Local Coping Mechanisms Adopted by Households**

| Coping Strategy                                    | Households Reporting (n) | Percentage (%) | Type of Impact Targeted   |
|----------------------------------------------------|--------------------------|----------------|---------------------------|
| Guarding crops (day/night watch)                   | 138                      | 62.2           | Crop raiding              |
| Fencing with thorn bushes                          | 121                      | 54.5           | Crops, property           |
| Herding livestock in groups                        | 116                      | 52.3           | Livestock predation       |
| Night enclosures (bomas/kraals)                    | 97                       | 43.7           | Livestock predation       |
| Noise/fire/sling use as deterrents                 | 83                       | 37.4           | Crop raiding, predators   |
| Seasonal crop timing (harvest early/late planting) | 52                       | 23.4           | Crop raiding              |
| Reliance on park rangers/local government          | 29                       | 13.1           | Severe wildlife incidents |
| Retaliatory killing of wildlife                    | 21                       | 9.5            | Predators (hyenas, lions) |

The most used way to protect crops is guarding (62.2%). Using thorn bushes for fences (54.5%) is another way. For livestock, group herding (52.3%) and using night enclosures (43.7%) are common to avoid predators. Sometimes, people kill hyenas and lions in revenge (9.5%). People rarely count on park rangers or the local government (13.1%) because they don't trust them or think they help much.

#### 4.6 Attitudes of Local Communities Toward Wildlife Conservation

Local communities around Awash National Park display mixed attitudes toward wildlife conservation, strongly shaped by the severity of conflicts, perceived costs and benefits, and trust in park management. While some respondents recognize the ecological and cultural value of wildlife, the majority express negative or ambivalent attitudes, citing recurring losses from crop raiding and livestock predation. Respondents were asked whether they considered the presence of wildlife near their villages to be beneficial, harmful, or neutral.

Table 11: Household Attitudes Toward Wildlife Conservation

| Attitude Category  | Households (n) | Percentage (%) | Main Reasons Reported                                    |
|--------------------|----------------|----------------|----------------------------------------------------------|
| Negative           | 132            | 59.5           | Crop/livestock losses, fear of attack, lack of benefit   |
| Neutral/Ambivalent | 56             | 25.2           | Wildlife seen as natural but risky, no direct benefit    |
| Positive           | 34             | 15.3           | Tourism potential, cultural value, ecological importance |

A majority (59.5%) hold negative attitudes, linking wildlife to livelihood threats and insecurity. One-quarter (25.2%) expressed neutral views, acknowledging the inevitability of coexisting with wildlife but with no clear benefit. Only 15.3% were positive, often those engaged in tourism related activities (guides, handicraft sellers) or those valuing cultural traditions tied to certain species.

## CHAPTER FIVE DISCUSSION

This chapter interprets the findings of the study in light of the research objectives, situating them within existing literature and broader debates in HWC research. The discussion is organized thematically, reflecting the results presented in Chapter Four: patterns of conflict, livelihood impacts, local coping strategies, community attitudes, and overall synthesis. By examining both consistencies and divergences with prior studies in Ethiopia and elsewhere, the chapter highlights the implications for conservation practice, livelihood security, and sustainable coexistence.

### 5.1 Patterns of Human–Wildlife Conflict

The results show that the most common forms of HWC around Awash National Park are crop raiding (77.9%) and livestock predation (57.7%), followed by property damage and occasional human injury. These findings confirm that the ecological interface between rural livelihoods and wildlife conservation is highly contested. Crop raiding was reported primarily during the wet season, coinciding with the maturation of maize, sorghum, and groundnut. This temporal pattern suggests that wildlife responds opportunistically to agricultural cycles, a dynamic widely reported in African agro-pastoral systems (Hill, 2017; Nyhus, 2016). The dominance of primates, warthogs, and porcupines as crop raiders reflects species-specific foraging behaviors. Baboons (*Papio anubis*), in particular, are intelligent, adaptable, and capable of raiding fields during daylight despite human presence. Studies in Bale Mountains (Mamo et al., 2019) and Nech Sar (Yihune et al., 2020) similarly identify baboons as the most persistent raiders, reinforcing the notion that primates are especially challenging in human-modified landscapes. Warthogs (*Phacochoerus africanus*) and porcupines (*Hystrix cristata*) also exploit root crops and cereals, often at night, making them difficult to deter.

Livestock predation, meanwhile, was attributed primarily to spotted hyenas (*Crocuta crocuta*) and lions (*Panthera leo*). Hyenas, being opportunistic carnivores, readily target unattended goats and sheep. Comparable patterns are reported across East Africa: in Kenya's Maasai Mara, hyenas account for more than half of livestock predation cases (Kissui, 2008; Dickman, 2010). Lions, while less frequent, cause disproportionate concern because of their cultural salience and potential for catastrophic losses. This

resonates with Woodroffe et al. (2005), who note that even infrequent predation events by apex carnivores have profound impacts on community tolerance. Spatial analysis further demonstrates that households located within 2 km of the park boundary suffer significantly higher conflict levels. This finding aligns with ecological theory that conflict intensity declines with distance from protected areas (Woodroffe & Ginsberg, 1998). In Awash, porous boundaries and limited buffer zones create heightened overlaps between human activity and wildlife ranging behavior. This pattern mirrors findings from Serengeti, Tanzania (Holmern et al., 2007) and Queen Elizabeth National Park, Uganda (Hill, 2017), where proximity amplifies exposure to crop raiding and predation.

In sum, the findings confirm that HWC in Awash follows a spatially and temporally structured pattern, shaped by wildlife foraging ecology, seasonal resource scarcity, and human land use. These dynamics illustrate the classic “edge effect” of protected areas, whereby boundaries become zones of acute contestation between livelihoods and conservation (Treves & Karanth, 2003).

#### **5.1.1 Socio Demographic Influence**

This reflects that HWC mainly affects active farmers and pastoralists, who are responsible for livelihoods. Similar age profiles were reported in HWC studies around Bale Mountains (Yihune et al., 2009). Education: Nearly half of respondents (45.9%) had no formal education, while only 6.3% attained college or above. This low educational profile has implications for awareness of conservation policies and adoption of modern conflict-mitigation practices. Studies in Kenya (Nyhus, 2016) and Ethiopia (Temesgen et al., 2018) also show that households with lower education levels tend to rely on traditional, often less effective coping mechanisms. Livelihoods: Most respondents depended on crop farming (38.7%) and livestock rearing (31.5%), with 25.2% practicing agro-pastoralism (Table 2). These livelihood systems directly expose households to conflict—farmers face crop raiding, while pastoralists face livestock predation. The mix of livelihoods highlights the diversity of resource dependence in the Awash landscape, similar to patterns reported by Tessema et al. (2010) in Mago National Park. This section sets the baseline by showing the socio-demographic makeup of respondents, directly addressing the research design variables. It also provides context for later sections, where we analyze how demographic factors (education, livelihood type) influence both exposure to and attitudes toward wildlife (Objective 6, Research Question 6).

### **5.1.2 Types of Conflict and Species Involved**

The findings on Types of Conflict and Species Involved demonstrate that HWC in Awash is primarily resource-based (crops and livestock), which are central to local livelihoods. Human attacks, though less frequent, highlight the seriousness of safety risks. Similar patterns are reported in Bale Mountains National Park, where crop raiding and livestock predation were the leading conflicts (Mamo et al., 2019). In Nech Sar National Park, Ethiopia, crop damage by primates (especially baboons) was dominant (Yihune et al., 2020). Across East Africa, Nyhus (2016) notes that conflicts involving food security (crops and livestock) are the most prevalent, with human attacks occurring less frequently but drawing disproportionate attention. Crop raiding and livestock predation are the most pressing conflict types in Awash, threatening household subsistence and income security (Table 3). The results confirm that conflicts are species-specific: primates and ungulates dominate crop raiding, while carnivores dominate livestock predation (Fig.4). Similar findings are reported from Nech Sar National Park, where baboons were the leading crop raiders and hyenas the major livestock predators (Yihune et al., 2020). In Borena Sayint, Ethiopia, elephants were noted for severe but less frequent crop damage (Lemma et al., 2021), consistent with the pattern in Awash.

### **5.1.3 Distance–Decay Pattern of HWC**

This finding directly answers RQ3 by confirming that distance from the park is a critical factor shaping conflict intensity. Communities adjacent to the park suffer disproportionately high losses, highlighting the importance of spatial targeting in conflict-mitigation strategies. Similar distance–decay effects were reported in Bale Mountains National Park, where crop damage was highest within 2 km of the boundary (Mamo et al., 2019). In Nech Sar National Park, Yihune et al. (2020) also found that livestock predation risk declined sharply with distance. Across East Africa, Laurance et al. (2022) confirm proximity to protected areas as a universal driver of conflict exposure, reinforcing that this pattern is not unique to Awash. Conflict intensity in Awash is spatially uneven — households closest to the park carry the heaviest burden. This suggests that buffer-zone management and targeted interventions (e.g., fencing, deterrents, compensation) are most urgently needed within 2 km of the park boundary.

## 5.2 Impacts on Livelihoods and Food Security

The impacts of HWC around Awash are economically and socially significant. The finding on crop raiding impacts revealed that households lose an average of 482 kg of crops annually, primarily maize and sorghum. The analysis of Crop Losses by Kebele (Table 7), shows that households in the study area experience an average annual crop loss of 482 kg per household, with maize (185 kg) and sorghum (142 kg) being the most affected staple crops, followed by groundnut (93 kg) and vegetables/fruits (62 kg). When disaggregated by kebele, the results reveal that Sabure and Pastoralist Settlements are the most heavily affected, each accounting for about 116 kg of average annual crop losses per household. This reflects their larger household share in the sample (24% each) and their closer proximity to the park, which increases exposure to crop-raiding wildlife such as baboons, warthogs, and elephants. Fentale (96 kg) and Metehara (87 kg) also report substantial losses, while Awash Sebat Kilo is the least affected (68 kg), although losses remain significant. These findings highlight that the burden of crop raiding is unevenly distributed across kebeles, with communities closest to the park suffering the greatest impacts. This suggests that site-specific mitigation strategies—such as crop protection measures and community-based wildlife management—should prioritize Sabure and Pastoralist areas, where food security risks are highest.

For subsistence farmers dependent on rain-fed agriculture, such losses are devastating, eroding both food availability and income potential. These results align with Lemma et al. (2021), who reported average crop losses of 300–500 kg per household per year in Borena Sayint. Across Ethiopia, Mekonen (2020) similarly notes that HWC constitutes a structural constraint to food security, rather than isolated events. An average annual loss of 3–4 small ruminants per household equates to substantial reductions in wealth, as livestock are critical assets in pastoral and agro-pastoral systems. Livestock serve as both productive capital (milk, meat, draft power) and social insurance against drought and crop failure. Studies in Kenya (Kissui, 2008) and Tanzania (Hemson et al., 2009) confirm that recurrent predation undermines household resilience and can push vulnerable families into poverty traps.

The finding on livestock losses illustrates the extent of livestock predation experienced by households in the past 12 months, disaggregated by type of livestock and kebele. A total of 508 animals were lost, with goats (198 head) and sheep (132 head) being the most frequently preyed, reflecting their abundance and

vulnerability in the study area. Cattle, although fewer in number (81 head), contributed the highest economic loss due to their relatively high market value, estimated at 1,620,000 ETB. Goats and sheep together accounted for 330 head, translating into an economic loss of 1,320,000 ETB, while donkeys and poultry contributed smaller proportions of the total loss. Overall, the estimated financial impact of livestock predation reached nearly 3 million ETB (2,993,400 ETB) within a year (Table:8). Hyenas were implicated in the majority of predation events, consistent with studies in Borena Sayint (Lemma et al., 2021) and Kenya (Okello et al., 2014).

Beyond material losses, the the finding on property damage and human injuries impact highlights property damage (19.4%) and human injuries (8.6%) as notable dimensions of HWC. Fences destroyed by elephants or baboons, damaged water points, and occasional human injuries generate costs that far exceed their direct economic value. They also impose significant psychological burdens, creating fear, stress, and resentment toward wildlife. Such non-material impacts are well documented in Uganda (Hill, 2017) and Zambia (Simms et al., 2020), where the perception of insecurity often shapes attitudes more strongly than actual loss values. These findings illustrate that the livelihood costs of HWC are multidimensional—encompassing direct material losses, opportunity costs, and psychosocial burdens. In Awash, the combined effect is a cycle of reduced productivity, heightened vulnerability, and antagonism toward conservation institutions. The evidence supports growing recognition that effective HWC management must address food security and poverty alleviation alongside biodiversity goals (Dickman, 2010; Nyhus, 2016).

### **5.3 Local Coping and Management Strategies**

Communities in Awash employ a wide array of traditional strategies to mitigate HWC. The most common include guarding crops (62.2%), constructing thorn bush fences (54.5%), group herding (52.3%), and night enclosures for livestock (43.7%). Deterrents such as noise, fire, and slings (37.4%) were also reported. These methods reflect indigenous knowledge systems, shaped by generations of coexisting with wildlife under resource-constrained conditions. However, these strategies are labor-intensive and only partially effective. Guarding, for example, requires continuous vigilance, often diverting children from education and women from household or economic activities. Hill (2017) documents similar trade-offs in Uganda, where guarding reduced school attendance and disproportionately burdened women. Thorn bush fencing, though widely used, is easily breached by



elephants and persistent primates. Group herding offers some protection but increases time spent on grazing, while night enclosures cannot prevent predation during daytime grazing.

The retaliatory killing of predators, though reported by only 9.5% of households, raises conservation concerns. Comparable findings from Bale Mountains (Mamo et al., 2019) and across Tanzania (Treves & Karanth, 2003) suggest that even low rates of retaliation can significantly impact predator populations. Retaliatory practices also deepen cycles of hostility between communities and conservation authorities, undermining collaborative approaches. Institutional support in Awash was reported as minimal: only 13.1% of households received assistance from park authorities. This lack of external intervention is consistent with broader critiques of conservation governance in Ethiopia, where enforcement is often prioritized over community support (Lemma et al., 2021). In contrast, successful programs in Namibia's communal conservancies (NACSO, 2018) and Kenya's Maasai Mara conservancies (Okello et al., 2014) illustrate the transformative potential of community-based conservation and benefit-sharing in reducing conflict.

Taken together, these findings reveal that while traditional coping mechanisms are adaptive, they impose high opportunity costs and fail to provide long-term solutions. Without institutional support, communities are left in a cycle of self-reliance and resentment, highlighting the urgent need for integrated approaches that combine local knowledge with external resources, compensation schemes, and participatory governance.

#### **5.4 Attitudes Toward Wildlife Conservation**

The study revealed predominantly negative attitudes toward wildlife (59.5%), shaped by recurring losses and perceived lack of benefits. This finding is consistent with numerous studies in Ethiopia and East Africa (Mekonen, 2020; Hill, 2017), where communities living adjacent to parks view wildlife primarily as competitors rather than assets. A smaller proportion of respondents (15.3%) expressed positive attitudes, often linked to participation in tourism-related activities such as guiding, handicraft sales, or cultural performances. This finding underscores the transformative role of economic incentives in shaping conservation perceptions. Similar dynamics are observed in Amboseli, Kenya, where revenue-sharing programs increased local tolerance of elephants (Okello et al., 2014), and in Namibia's conservancies, where benefit-sharing improved wildlife stewardship (NACSO, 2018).

Trust in institutions emerged as a critical dimension: only 18% of respondents expressed confidence in park authorities. This institutional distrust is echoed in studies across Africa (Redpath et al., 2015), where conservation agencies are perceived as prioritizing wildlife protection over human welfare. In Awash, the perception that “the park protects animals but not people” erodes legitimacy and undermines collaborative management. Gender and generational differences in attitudes add nuance to this picture. Men and elders, who bear the primary responsibility for guarding and herding, expressed stronger hostility. Women and youth, while also affected, were more ambivalent, with some acknowledging tourism’s potential benefits. This echoes findings from Uganda (Hill, 2017) and Tanzania (Barua et al., 2013), where women and youth sometimes perceive wildlife less negatively due to lower direct exposure or greater openness to new opportunities. The implications are clear: without tangible benefits and institutional trust, negative attitudes will persist, threatening the long-term sustainability of conservation initiatives. Conversely, the presence of a minority with positive views highlights the potential of targeted interventions—such as community tourism, revenue-sharing, and education—to shift perceptions.

## **5.5 Summary of Key Findings**

This chapter examined the nature, drivers, and impacts of HWC around Awash National Park, as well as the local coping mechanisms and community attitudes toward wildlife conservation. The findings can be summarized as follows: Patterns of HWC (Objectives 1–3; RQ1–3): The most common forms of HWC were crop raiding (77.9% of households affected), livestock predation (57.7%), and property damage (19.4%). Conflicts occurred most frequently during the wet season, coinciding with the maturation of crops. Baboons, warthogs, and porcupines were the dominant crop raiders, while hyenas and lions were the primary livestock predators. Households located within 2 km of the park boundary experienced significantly higher conflict incidence than those further away, highlighting spatial proximity as a key driver. Impacts of HWC (Objective 3; RQ1–2): Households lost an average of 482 kg of crops per year, with maize and sorghum being the most affected. Livestock predation caused an average loss of 3–4 small ruminants per household annually, with goats and sheep being the most vulnerable. Property damage (fences, water points, storage facilities) and occasional human injuries (8.6% of households) were also reported. Overall, HWC undermines food security, reduces household income, and increases vulnerability among farming and pastoralist communities.

Local Coping and Management Strategies (Objective 4; RQ4): Communities rely primarily on traditional and labor-intensive strategies, including guarding crops (62.2%), thorn bush fencing (54.5%), group herding (52.3%), and night enclosures (43.7%). Deterrents such as noise, fire, and slings were also common (37.4%). Institutional support from park authorities was minimal, with only 13.1% of households reporting assistance. Retaliatory killing of predators occurred in 9.5% of households, despite park regulations against such practices. While partially effective, these coping mechanisms impose heavy labor costs, particularly on children and women, and fail to provide long-term solutions. Attitudes Toward Wildlife Conservation (Objective 5; RQ5):

A majority (59.5%) of households expressed negative attitudes toward wildlife, citing recurring losses and lack of compensation. About one-quarter (25.2%) were neutral, while only 15.3% held positive views, mostly households linked to tourism-related activities. Trust in park authorities was low (18%), with most respondents perceiving that wildlife is prioritized over community welfare. Men and elders expressed stronger negative views, while women and younger respondents showed more ambivalent or slightly positive attitudes. Men expressed stronger negative views, as they directly face predators while herding or guarding crops. Women, though also burdened with crop guarding, showed more ambivalence, with some appreciating the tourism potential of wildlife. Younger respondents (18–30 years) tended to show more positive or neutral attitudes compared to elders, reflecting exposure to education, awareness programs, and potential employment in tourism.

## **5.6 Synthesis and Broader Implications**

The evidence from Awash demonstrates that HWC is not merely a conservation issue but a multidimensional livelihood challenge. Patterns of conflict are shaped by species ecology, spatial proximity, and seasonal resource availability. The impacts are profound, spanning food security, wealth, and psychosocial well-being. Coping strategies, though rooted in local knowledge, are insufficient and impose heavy burdens. The broader implication is that HWC in Awash reflects a structural misalignment between conservation and community welfare. Without addressing the economic and social costs borne by local people, conservation will face continued resistance. This mirrors global debates that stress the need for coexistence frameworks integrating ecological, economic, and social dimensions (Treves &

Karanth, 2003; Dickman, 2010; Nyhus, 2016). Specifically, the findings suggest three pathways forward: Integrated land-use planning to reduce spatial overlaps between agriculture, grazing, and wildlife ranges.

Participatory governance and trust-building to align conservation institutions with community priorities. In this sense, the study reinforces the principle that sustainable biodiversity conservation requires addressing human livelihoods as an inseparable component of ecological management. Awash National Park thus exemplifies both the challenges and opportunities of achieving coexistence in human-dominated landscapes. Overall HWC in Awash National Park is widespread, seasonal, and spatially concentrated near park boundaries, with significant consequences for local livelihoods. Traditional coping strategies dominate but remain ineffective and burdensome, while institutional support is weak. These challenges shape overwhelmingly negative community attitudes toward wildlife conservation, though small groups benefiting from tourism or cultural values show potential for more positive perceptions.

### **5.7 Perceived Benefits vs. Costs**

When asked whether the costs of living near wildlife outweigh the benefits, nearly three-quarters (72%) reported that costs exceed benefits. Only 11% believed benefits outweighed costs, while the rest (17%) felt the trade-off was balanced. Key reported benefits include Tourism-related income (guiding, handicrafts, local food sales). Ecosystem services (shade trees, grazing areas, cultural values of certain species). Key reported costs include Crop destruction, livestock predation, and water competition. Fear of predators and restricted land access due to park rules. Lack of compensation for losses. Low trust levels were recorded: only 18% of households expressed confidence in park authorities to manage wildlife conflicts fairly. Many (62%) felt park staff prioritize wildlife over people, while 20% were undecided. Lack of compensation schemes and weak enforcement of grazing/encroachment rules were cited as reasons for poor relations.

## CHAPTER SIX CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Conclusions

This study set out to examine the patterns, drivers, impacts, coping strategies, and community attitudes associated with HWC in and around Awash National Park, Ethiopia. Drawing on household surveys, focus group discussions, and secondary sources, the research generated new empirical insights while situating local dynamics within broader debates on conservation–livelihoods interactions. The findings confirm that human–wildlife conflict is both widespread and structurally embedded in the livelihood systems of communities adjacent to Awash National Park. The study revealed that the most prevalent forms of conflict are crop raiding (77.9%) and livestock predation (57.7%), followed by property damage and human injury. Crop losses occur primarily during the wet season, when cereals reach maturation, while livestock predation is most acute for goats and sheep grazed near the park boundary. The dominance of baboons, warthogs, and porcupines as crop raiders and hyenas and lions as livestock predators is consistent with species-specific foraging strategies and ecological opportunism. Conflict intensity is strongly correlated with proximity to the park boundary, underscoring the importance of spatial location and land-use overlap.

This pattern resonates with the “edge effect” identified in other protected areas in East Africa, where boundaries become hotspots of contestation. Human–wildlife conflict imposes significant economic and social costs on local households. The average annual crop loss of 482 kg undermines food security, while livestock predation erodes wealth, insurance, and resilience among agro-pastoralists. Property destruction and human injuries add further costs, while psychological burdens such as fear, stress, and resentment deepen the social impact. These findings highlight that HWC is not an occasional nuisance but a structural livelihood threat, exacerbating poverty and vulnerability in already marginal settings. Communities rely primarily on traditional strategies such as guarding crops, thorn bush fencing, group herding, and night enclosures. While reflecting rich local knowledge, these strategies are labor-intensive, time-consuming, and only partially effective. They impose opportunity costs, particularly on women and children, by diverting time from education, household, and economic activities. Retaliatory killing of predators, though less common, illustrates the escalation of conflict when losses become intolerable and institutional support is lacking.

The near absence of assistance from park authorities (only 13.1% reported support) underscores a governance gap, whereby communities are left largely on their own to manage conflict. More than half of respondents expressed negative attitudes toward wildlife, reflecting both the material losses incurred and the perception that wildlife is prioritized over people's welfare. Institutional distrust is particularly acute, with only 18% of households expressing confidence in park authorities. However, a minority (15.3%) of respondents—primarily those engaged in tourism-related livelihoods—expressed positive views, highlighting the potential for economic incentives and benefit-sharing mechanisms to shift perceptions. Gender and generational differences were also evident, with men and elders generally more hostile, while women and youth exhibited more ambivalent or cautiously positive views.

Taken together, the findings demonstrate that HWC in ANP is not merely a local nuisance but a systemic challenge at the interface of conservation and livelihoods. The evidence shows that conflicts are driven by ecological, spatial, and institutional dynamics, with profound impacts on household welfare and community attitudes. Without meaningful interventions that align conservation goals with community needs, HWC will continue to erode local support for biodiversity protection and threaten the ecological integrity of the park. In conclusion, this study affirms that sustainable conservation in Awash requires rethinking the relationship between wildlife and people, moving from a protectionist model toward a coexistence framework that integrates ecological management with livelihood security, institutional trust, and participatory governance.

## **6.2 Recommendations**

The findings of this research provide a strong basis for developing policy, management, and research interventions aimed at reducing HWC and fostering coexistence in ANP.

### **6.2.1 Policy and Management Recommendations**

**Strengthen land-use planning and buffer zones.** Implement clear buffer areas between agricultural fields, grazing zones, and wildlife habitats. Encourage agroforestry and controlled grazing schemes in areas adjacent to the park to reduce direct overlap with wildlife.

**Introduce compensation and insurance mechanisms.** Develop transparent, community-based compensation schemes for verified crop and livestock losses. Explore livestock insurance models (as piloted in Kenya and Namibia) to reduce vulnerability to predation.

**Promote community-based conservation and benefit-sharing.** Establish participatory co-management frameworks where local communities share decision-making authority. Expand tourism benefit-sharing programs (e.g., community lodges, guiding, cultural enterprises) to incentivize positive attitudes toward wildlife.

**Enhance conflict mitigation infrastructure.** Support communities with cost-effective and scalable deterrents (solar-powered fences, predator-proof enclosures). Provide training on modern guarding techniques and integrate these with indigenous practices.

**Build institutional trust and dialogue.** Increase transparency and accountability in park management. Create regular forums for dialogue between park authorities and communities to address grievances and co-develop solutions.

**Mainstream education and awareness.** Integrate HWC mitigation and conservation awareness into local schools and community programs. Foster intergenerational knowledge-sharing on coexistence strategies.

By pursuing these strategies, policy and management actors can reduce livelihood losses, improve community attitudes, and foster more sustainable coexistence around Awash National Park.

### **6.2.2.Recommendations for Further Research**

**Longitudinal studies on conflict dynamics.** Future research should track HWC over multiple years to capture interannual variation, particularly in relation to climate change and land-use dynamics.

**Quantitative valuation of economic costs.** Rigorous cost–benefit analyses are needed to quantify the direct and indirect costs of HWC at household and community levels, and to compare these with potential benefits from conservation.

**Evaluation of mitigation strategies.** Pilot and assess the effectiveness of modern deterrents (solar fences, chili fences, improved enclosures) relative to traditional methods. Investigate how combining traditional knowledge with technological solutions can improve outcomes.

**Institutional and governance dimensions.** Examine how trust, legitimacy, and community participation influence the success of HWC interventions. Comparative studies across Ethiopian parks could generate lessons for scaling up co-management frameworks.

**Socio-cultural and gendered perspectives.** Future research should explore how gender, age, and cultural identity shape experiences and perceptions of HWC, in order to design interventions that are socially inclusive.

**Wildlife ecology and spatial modeling.** Detailed ecological studies on the movement patterns of baboons, warthogs, hyenas, and lions would help in designing spatially targeted interventions. GIS-based modeling could identify high-risk conflict hotspots and guide preventive measures.

In sum, future research should move beyond documenting conflict to **testing solutions and informing adaptive management**. By combining ecological, economic, and institutional perspectives, research can generate evidence-based pathways toward coexistence.



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## **Appendix A** Household Questionnaire (English Version)

### Section A: Demographic Information

1. Gender: ☐ Male ☐ Female
2. Age: \_\_\_\_\_ years
3. Education Level: ☐ None ☐ Primary ☐ Secondary ☐ Above Secondary
4. Occupation: ☐ Crop Farmer ☐ Pastoralist ☐ Mixed ☐ Other: \_\_\_\_\_
5. Marital Status : ☐ Married ☐ Single ☐ Widowed ☐ Other
6. Distance from park boundary: \_\_\_\_\_ km

### Section B: Human-Wildlife Conflict Experience

7. Have you experienced wildlife conflict in the past year? ☐ Yes ☐ No
8. Type of conflict: ☐ Crop Damage ☐ Livestock Predation ☐ Property Damage ☐ Human Injury ☐ Other: \_\_\_\_\_
9. Animals involved: ☐ Baboons ☐ Hyenas ☐ Warthogs ☐ Others: \_\_\_\_\_
10. Frequency of conflict: ☐ Daily ☐ Weekly ☐ Monthly ☐ Occasionally

### Section C: Coping Mechanisms

11. How do you respond to wildlife threats?  
☐ Night Guarding ☐ Fencing ☐ Scare Tactics ☐ Report to Park Staff ☐ Other: \_\_\_\_\_
12. Is your method effective? ☐ Yes ☐ No ☐ Sometimes

### Section D: Attitudes Toward Wildlife and Conservation

13. Rate your attitude toward wildlife conservation (1 = Very Negative, 5 = Very Positive): \_\_\_\_\_
14. Should wildlife be protected even when it causes damage? ☐ Yes ☐ No

**አፕንዲክስ A: የቤተሰብ መጠይቅ (በአማርኛ)**

ክፍል A: የህዝብ መረጃ

1. ፆታ: ☐ ወንድ ☐ ሴት
2. እድሜ: \_\_\_\_\_ ዓመት
3. የትምህርት ደረጃ: ☐ ያልተማሩ ☐ የመጀመሪያ ☐ የሁለተኛ ☐ ከሁለተኛ በላይ
4. ሥራ/የኑሮ : ☐ እርሻ ☐ እረኛ (Pastoralist) ☐ ተዋሃድ ☐ ሌላ: \_\_\_\_\_
5. ጋብቻ ሆኔታ: ☐ ያገባ ☐ ያላገባ ☐ ሌላ:
6. ከፓርክ ድንበር ርቀት: \_\_\_\_\_ ኪ.ሜ

ክፍል B: ዱር እንስሳ እና ሰጪ ግጭት ልምድ

6. በባለፈው ዓመት ከዱር እንስሳ ጋር ግጭት ተፈጥሯል? ☐ አዎ ☐ አይደለም
7. የግጭት አይነት: ☐ የእርሻ ጉዳት ☐ የእንስሳት ጉዳት ☐ የንብረት ጉዳት ☐ የሰው ጉዳት ☐ ሌላ: \_\_\_\_\_
8. የተሳተፉ እንስሳት: ☐ ዚንጀሮ ☐ ጅብ ☐ ከርከሮ ☐ ሌላ: \_\_\_\_\_
9. የግጭት ብዛት: ☐ በየቀኑ ☐ በየሳምንቱ ☐ በየወሩ ☐ አንዳንድ ጊዜ

ክፍል C: የመከላከያ ዘዴዎች

10. ከዱር እንስሳ አደጋ እንዴት ታስቀምጣለህ/ሻለሽ?  
☐ የሌሊት ጠባቂ ☐ አጥር መስራት ☐ ማስፈራራት ☐ ለፓርክ ሰራተኞች መመለስ ☐ ሌላ: \_\_\_\_\_
11. ዘዴህ ውጤታማ ነው? ☐ አዎ ☐ አይደለም ☐ አንዳንድ ጊዜ

ክፍል D: አመለካከት ስለ ዱር እንስሳት እና ጥበቃ

12. ስለ ዱር እንስሳት ጥበቃ አመለካከትህን አውርድ (1 = በጣም አሉታዊ, 5 = በጣም አዎንታዊ): \_\_\_\_\_
13. ዱር እንስሳት ጉዳት ቢያስከትሉም መጠበቅ አለባቸው? ☐ አዎ ☐ አይደለም

## Appendix A: Gaaffii Maatii (Afaan Oromoo)

### Kutaa A: Odeeffannoo Demograafii

1. Saala: ☐ Dhiira ☐ Dubartii
2. Umuriin: \_\_\_\_\_ waggaa
3. Sadarkaa Barnootaa: ☐ Hinbaranne ☐ Sadarkaa 1ffaa ☐ Sadarkaa 2ffaa ☐ Ol'aanaa
4. Hojii: ☐ Qonnaan Bultoota ☐ Horsiisee bulaa ☐ Qonnaa fi horsiisa ☐ Kan biraa: \_\_\_\_\_
5. Haala Gaa'ila: : ☐ Fuudhe/Heerumte ☐ Hin fuune/heerumne
6. Fageenya daangaa bosonaa irraa: \_\_\_\_\_ km

### Kutaa B: Muuxannoo Walitti bu'iinsa Bineensa Bosonaa fi Namaa Waliin

7. Walitti bu'insa bineensota bosonaa fi namaa waggaa darbe keessa simudateeraa? ☐ Eeyyee ☐ Lakki
8. Akaakuu WB: ☐ Midhaan Barbadaa'e ☐ Horii Ajjeesame ☐ Qabeenya Barbadaa'e ☐ Namni Miidhame ☐ Kan biraa: \_\_\_\_\_
9. Bineensota hirmaatan: ☐ Jaldeessa ☐ Warabeessa ☐ Karkarroo ☐ Kan biraa: \_\_\_\_\_
10. Baay'ina walitbu'iinsaa: ☐ Guyyaa guyyaatti ☐ Torbanii torbaniitti ☐ Ji'a ji'aan ☐ Yeroo muraasa

### Kutaa C: Mala Ittisa

11. Akkamitti balaawwan bineensotaa ittisaa?  
☐ Halkan Eeguu ☐ Dallaa ijaaruu ☐ Sodachiisuu ☐ Hoggansa Bosonaatti himuu ☐ Kan biraa: \_\_\_\_\_
12. Mala kee sun ni hojjeta? ☐ Eeyyee ☐ Lakki ☐ Darbee

### Kutaa D: Ilaalcha Bineensota Bosonaa fi Kunuunsaa irratti

13. Yaada kee waa'ee eegumsa bineensota bosonaa irratti kenni (1 =Hamaa, 2 = Gaarii): \_\_\_\_\_
14. Bineensonni eegamuu qabu yoo miidhaa geessisan iyyuu? ☐ Eeyyee ☐ Lakki

## Appendix B: Interview Guide for Key Informants

1. What are the most common human-wildlife conflicts here?
2. Which animal species are mostly involved?
3. How has conflict affected local livelihoods?
4. What measures do people take to protect their resources?
5. How do local people feel about wildlife conservation?
6. What support does the park provide to affected communities?
7. What recommendations do you have for reducing conflict?



## Appendix C: Sample Data Entry Format (SPSS/Excel)

| Variable Name      | Variable Label                                 | Type    | Values (Coding Example)                           |
|--------------------|------------------------------------------------|---------|---------------------------------------------------|
| Respondent_ID      | Unique ID number                               | Numeric | 1, 2, 3, ...                                      |
| Gender             | Gender of respondent                           | Numeric | 1 = Male, 2 = Female                              |
| Age                | Age in years                                   | Numeric | (Actual values: 18, 24, 35, etc.)                 |
| Education_Level    | Educational background                         | Numeric | 1 = None, 2 = Primary, 3 = Secondary, 4 = Above   |
| Livelihood_Type    | Main source of income                          | Numeric | 1 = Crop, 2 = Livestock, 3 = Mixed, 4 = Other     |
| Distance_to_Park   | Distance from park (in km)                     | Numeric | 0.5, 1.0, 5.0, etc.                               |
| Conflict_Type      | Most frequent type of conflict                 | Numeric | 1 = Crop Damage, 2 = Livestock Loss, 3 = Other    |
| Conflict_Frequency | Number of conflicts in past 12 months          | Numeric | 0, 1, 2, 3, ...                                   |
| Wildlife_Species   | Wildlife most often causing conflict           | Numeric | 1 = Baboon, 2 = Warthog, 3 = Hyena, etc.          |
| Coping_Mechanism   | Most used method to deal with conflict         | Numeric | 1 = Fencing, 2 = Guarding, 3 = Chasing, 4 = Other |
| Attitude_Score     | Score (1-5 scale) toward wildlife conservation | Numeric | 1 = Strongly Negative → 5 = Strongly Positive     |