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Diversity and Relative Abundance of Medium and Large-Sized Mammals and Human-wildlife Conflict in and around Wolete Petros Unity Monastery, Awi Zone, Northwest Ethiopia

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Unity Monastery, Awi Zone, Northwest Ethiopia**

By: Solomon Gedif

Advisor: Zewdu Kifle (PhD)

January, 2026
Bahir Dar, Ethiopia

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**A Thesis submitted to the Department of Biology for the partial fulfillment of
the requirements for the degree of Master of Science in Biology**

January, 2026
Bahir Dar, Ethiopia

Approval of thesis for defence

I here by certify that I have supervised, read and evaluated this thesis entitled “Diversity and Relative Abundance of Medium and Large Mammals and Assessment of Human-wildlife Conflict in and around Wolete Petros Unity Monastery, Awi Zone, Northwest Ethiopia” prepared by Solomon Gedif under my guidance. I recommended the thesis to be submitted for oral defence.

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Declaration

This MSc thesis that has been submitted to the School of post graduate Studies of Bahir -Dar University in partial fulfillment to the requirement for Master of Sciences in Biology is my original work conducted by my own, under the supervision of Dr. Zewdu Kifle and it has not been presented for a degree in this or other universities. All the sources of the materials used for this thesis and all people who gave support for this work are fully referenced and acknowledged.

Name _____

Signature_____

Date of submission _____

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ABSTRACT

*Ethiopia is recognized for its rich biodiversity, due to diverse ecosystems and varied topography. However, wildlife habitats face significant threats from various anthropogenic activities, leading to increased human-wildlife conflict (HWC). This study was conducted to investigate the diversity and relative abundance of medium and large-sized mammals and to assess the extent and causes of HWC in and around Wolete Petros Unity Monastery, Awi Zone, Northwest Ethiopia. Data were collected from June to August 2025 using block count method across 12 systematically selected blocks. Direct observations and indirect evidence, such as footprints, scats, and vocalizations, were used to record species occurrence. For the HWC assessment, a questionnaire survey was administered to 120 randomly selected households from eight villages, supplemented by direct observations and focus group discussions. A total of 15 medium and large-sized mammal species belonging to 4 orders and 8 families were recorded. The order Primates and Artiodactyla was the most diverse each contains (5 species, 33.33%), followed by Carnivora (3 species, 20%), and Rodentia, 2 species, 3.34%. A total of 158 individuals were counted, with the Olive Baboon (*Papio anubis*) being the most abundant species ($n=75$, 40.1%). The Shannon-Wiener diversity index ($H'=1.627$) and Simpson's index ($1-D=0.713$) indicated a moderate level of species diversity with relatively high evenness ($J = 0.487$). Forest habitats supported the highest species richness and abundance. HWC assessment revealed that habitat degradation (56.7%) and farmland expansion around forest edges (25%) were the primary causes of conflict. Crop damage was most severe in the forest zone (62.5%), with maize being the most frequently raided crop. Fruiting and vegetative stages of crops were the most vulnerable. Guarding (day and night) was the most common used mitigation strategy, primarily performed by children and men using stones and sticks. Species group composition was dominated by adults (46.2%), followed by juveniles (32.9%) and infants (20.9%). Klipspringer (አንቺቸካሳ), was a small mammal species of the family Bovidae found across a rocky and grass habitats of the monastery. It had a reddish-brown coat, straight male horns.*

Key words: Block Count Method, Human–Wildlife Conflict, Mammalian Diversity, Shannon-Wiener Index, Simpson's Index.

1. Introduction

1.1. Background of the Study

Wildlife is the basic components of biodiversity. It is a common term that strictly covers both flora and fauna. In popular use, wildlife mostly refers to animals in the wild and the most widely distributed organisms globally (Mesele Yihune and Adane Tsegaye, 2024). Ethiopia is one of the world's rich biodiversity countries. The variations in climate, topography and vegetation have contributed to the presence of a large number of endemic species. It possesses a diverse mammalian fauna of over 311 species grouped in 43 families of which 55 species are endemic (Lavrenchenko and Afework Bekele, 2017). The main factor responsible for such diversity and endemism in Ethiopia is the existence of diverse habitats, ecosystems, climate and other environmental variables that created favorable conditions for the persistence of such species (Misganu Abera, 2019). Mammals are the most important components of biodiversity all over the world. Particularly medium and large sized mammals are very important for the proper functioning of ecosystems. They are responsible for plant pollination, seed dispersal, nutrient recycling and balancing populations through predator-prey interaction (Fikadu Kebede, 2018). Mammals are quite diverse both structurally as well as functionally. There are more than 5,000 extant mammalian species recognized throughout the world (Tadesse Bitew, 2020). A total of 320 mammalian species currently recorded in Ethiopia, of which, 39 species are endemic and medium, and large sized mammals also comprises over 60% (Afework Bekele, 2014). Body weight is one parameter to categorize mammals in to medium and large-sized. Mammals weighing between 2 and 7 kg are considered as medium sized and above 7 kg are categorized under large-sized. Functional structures of medium and large-sized mammals are determined by the composition of functional traits. Such structures often vary along environmental gradients such as disturbance and resource availability (Hashim and Mahgoub, 2007). Globally, medium- and large-sized mammals represent an important component of biodiversity and play a central role in ecosystem functioning. High diversity and stable abundance of these mammals are associated with healthy ecosystems; however, recent global assessments indicate a widespread decline in both diversity and abundance of medium- and large-sized mammals, largely driven by habitat loss, fragmentation, overexploitation, and climate change (William *et al.*, 2014).

Africa supports some of the world's richest assemblages of medium- and large-sized mammals, with high species diversity and historically large population sizes. Despite this, the abundance and distribution of many mammal species have declined substantially across the continent. Rapid agricultural expansion, settlement growth, and infrastructure development have fragmented natural habitats and reduced suitable ranges for wildlife. Studies from different African landscapes show that while protected areas still harbor relatively high mammal diversity, populations outside these areas are increasingly restricted to small and isolated habitat patches, resulting in reduced abundance and altered species composition (Western *et al.*, 2009).

Ethiopia is recognized as one of Africa's biodiversity-rich countries, supporting diverse medium- and large-sized mammals. However, increasing human population pressure, deforestation, agricultural expansion, and settlement development have led to widespread habitat fragmentation, particularly in the highlands. Recent studies in different parts of Ethiopia have documented variations in mammal diversity and abundance among habitat types, with higher species richness often recorded in relatively undisturbed forests and lower abundance in heavily modified areas (Amanuel Agebo & Wondimagegnehu Tekalign, 2022). At the local scale, fragmented remnant forests surrounding rapidly growing towns provide important refuges for medium- and large-sized mammals. However, the diversity and abundance of these mammals are strongly influenced by forest size, habitat quality, and the level of human disturbance (Gadisa Tsegaye, 2015). In and Around Yegof National Forest Priority Area, Wollo, Ethiopia, ongoing land-use change, settlement expansion, and resource extraction are likely to affect mammal distribution and population size. Assessing the diversity and relative abundance of medium- and large-sized mammals in such fragmented forests is therefore essential for generating baseline information, identifying conservation priorities, and supporting sustainable land-use planning (Yohans *et al.*, 2025). Ethiopia own a large number of wildlife species with various ecology and unique environmental conditions. However, wildlife habitats has been degraded, fragmented, and lost in most parts of the country due to an immediate contact between the wildlife species and the people and they are largely limited over few protected areas (Ayenew Biset *et al.*, 2019).

The fauna and flora in the Ethiopian highlands are unique that makes it one of the planets diversity hotspots (Freilich, 2014). wildlife habitats has been degraded, fragmented, and lost in most parts of the country due to an immediate contact between the wildlife species and the people and they are largely limited over few protected areas (Ayenew Biset *et al.*, 2019). Human-wildlife conflicts were started since the beginning of the emergence of human beings (Mussa Adem, 2009). During the time people lived in caves there is a conflict between wild animals and human being. Slowly, with technological advancement it is man who invented traditional sharp materials such as hand axes during Stone age and Iron age to protect themselves from wild animals. Later on, human beings began to hunt wild animals for food and protection. The numerous cases reported from countries all over the world demonstrate the severity of human wildlife conflict and suggest an in depth analysis to understand the problem and support the conservation prospects of threatened and potentially endangered species (Belay Worku, 2016).

Human-wildlife conflict is interaction between humans and wild animals. It occurs when the needs and behavior of wildlife impact negatively on humans or when humans negatively affect the needs of wildlife (Sefi Mekonen, 2020). It is a critical problem created by the growing rural population in and around wildlife habitats (Amare Yilmato and Sereke Birhan Takele, 2019). It is a global problem, and occurring in many countries where human and wildlife requirements overlapping. It is the most concentrated in the developing countries, because most of the people live in the rural area incomes are centered on livestock holdings and agriculture. Increasing of HWC are a cause for increasing failure of wildlife conservation practice in the world and also the most significant threat to the existence of many wildlife species (Belayneh Ayecheew and Abraham Tolcha, 2020). These conflicts are becoming more predominant due to increasing human population near to the wildlife habitats. Human populations increase and the resulting changes in land use related to development results in wildlife habitat loss or fragmentation (Sefi Mekonen, 2020).

1.2. Statement of the Problem

Wolete Petros Unity Monastery (WPUM) is one of the potential sites that encompasses different mammalian species. The Monastery's forest is the habitat of small, medium and large-sized mammals as well as different bird species. However, the monastery is surrounded by human

settlements and farmlands. The local farmers grow different types of cereal crops surrounding the monastery. According to Dangila Woreda Culture and Tourism Office (2014 E.C. report), WPUM where very rich with a variety of fauna and flora. However, the biodiversity of the forest is seriously threatened by human factors. The status and diversity of wild animals are not known in the forest. The attitude of local people to wildlife has not been well assessed and documented in the area until now. Therefore, it is imperative to carryout studies to encourage positive perceptions of people for wildlife and to discourage negative perceptions of the local community. The study was designed to generate basic scientific information about human-wildlife conflict. It provided the first hand information on the diversity of wildlife and human interactions. This study was vital to maximize the understanding of people towards wildlife conservation through broad awareness creation and to plan an appropriate conservation strategy in the study area. This study is also important to provide methods of minimizing human-wildlife conflict in the area.

1.3 Significance of Study

The present study maximizes the understanding of people towards human-wildlife conflict and also shows how it was bring the conservation and socio-economic stability of the farmers who are suffering from attacking of wild animal found nearby (Abere *et al*, 2024).The result of this study was also thought to give baseline information for further large scale studies on the same problem on the diversity and relative abundance of medium and large mammalian spices as well as human-wildlife conflict. The findings of this study was vital for decision makers and conservationist to design conservation strategies and management plans in the region and provide data on the diversity and relative abundance of medium and large size mammals (i.e., species with a body weight of over 5 kg; (Stephens *et al.*, 2001) inhabiting the Wolete Petros Unity Monastery forest.

1.4 Objectives of the Study

1.4.1 General Objective

The aim of the present study is to assess the diversity and relative abundance of medium and large-sized mammals and evaluate the extent and nature of human-wildlife conflict in and around Wolete Petros Unity Monastery, Awi Zone, Northwest Ethiopia.

1.4.2 Specific Objectives

- ✓ To determine the diversity of medium and large-size mammalian species in the site
- ✓ To assess the relative abundance of mammals in the study site
- ✓ To identify the causes and impacts of human-wildlife conflict
- ✓ To design strategies for wildlife conservation and human-wildlife conflict mitigation in the Wolete Petros Monastery

2. LITERATURE REVIEW

2.1 Diversity and Relative Abundance of Medium and Large-sized Mammals

Mammals are among the most diverse and ecologically significant vertebrates, performing essential roles in ecosystem functioning, such as seed dispersal, and nutrient recycling. Globally, there are approximately 6,399 mammal species, with medium- and large-sized mammals having particularly strong influences on food webs and habitat structure due to their size and ecological roles (Kassahun *et al.*, 2021). Globally wildlife populations are experiencing dramatic declines, with a stark of 73% average reduction of vertebrate species, including mammals, (Carrington, 2022). Biodiversity hotspots such as tropical forests in South America, Southeast Asia, and parts of Africa are biodiversity-rich regions for medium and large mammals. However, human impacts have reduced local species richness by approximately 20%, with mammals among the most affected taxa (Eawag, 2025). Africa is home to some of the world's most remarkable collections of medium- and large-sized mammals, supported by a wide variety of ecosystems, including savannas, deserts, and montane forests (Girma Gizachew *et al.*, 2025).

In Africa, mammalian diversity is exceptionally high, with more than 1,150 species, many of these are medium and large mammals that contribute to some of the continent's most iconic wildlife communities. Their richness and distribution are influenced by habitat heterogeneity, resource availability, and human pressures (Tamenut Desalegn and Belayneh Abeb, 2023). Within African context, Ethiopia stands out as a biodiversity hotspot, hosting around 320 mammal species across 14 orders and 39 families. More than 60 % of these are medium and large mammals, including endemic and highly specialized species such as the Ethiopian wolf (*Canis simensis*) and Walia ibex (*Capra walie*) (Abere Wondimu *et al.*, 2024). Mammal population trends vary widely across Africa. In South Sudan, aerial surveys conducted the world's largest terrestrial mammal migration, with nearly six million antelopes traversing the Boma Badingilo ecosystem, about three times the size of the Serengeti migration (The Guardian, 2024). These observations highlight the resilience of mammal populations when expansive, connected habitats are preserved. In contrast, elephants, which play a crucial ecological role, have experienced dramatic declines. A multi-country study reported a 77% decline in elephant

populations between 1964 and 2016, with forest elephants declining by 90%, primarily due to poaching and habitat loss (Reuters, 2024).

Protected areas throughout Africa play a critical role in conserving mammalian diversity. In West Africa, Pendjari National Park supports the region's largest elephant population, along with buffalo, antelope, and various primates (Bene *et al.*, 2013). In Central Africa, Zakouma National Park is home to roughly 60% of the world's Kordofan giraffes, highlighting the impact of focused conservation efforts (Mekuriaw Zewudie and Getahun Tassew (2024). Despite this, these protected areas face ongoing threats from agricultural expansion, hunting, and climate change, which continue to fragment habitats and reduce wildlife populations. Overall, Africa presents a dual narrative on one hand, the continent retains some of the richest mammal communities globally, with migration spectacles and large carnivore guilds unparalleled elsewhere, on the other hand, rapid biodiversity loss particularly among elephants and specialized species signals escalating ecological risks (Heydon *et al.*, 2010).

Conservation initiatives that emphasize landscape connectivity, community-based management, and boundary collaboration remain essential to safeguarding the diversity and abundance of Africa's medium and large size mammals (The Guardian, 2024; Reuters, 2024). Ethiopia is considered one of Africa's richest countries in terms of biodiversity, largely because of its varied landscapes and diverse ecosystems. Ethiopia is strongly influenced by habitat diversity, conservation measures, and levels of human activity. Although threats such as farming expansion, deforestation, and hunting persist, the country still harbors both endemic and globally important mammal species that play essential roles in ecosystem functioning (Fikadu Kebede, 2018). Field studies in Ethiopia highlight this diversity at finer scales: for example, the Michole Community Protected Forest supports 17 medium and large mammal species, with Shannon-Wiener diversity indices (H') reaching 2.35 in riverine forests. Similarly, Mago National Park recorded 28 species, with H' values ranging from 2.50 to 2.96 across different habitats, indicating clear variation in species richness depending on habitat type (Girma Mengesha, 2022). Relative abundance patterns further reveal the ecological dynamics of these mammals. Generalist species such as olive baboons (*Papio anubis*), crested porcupines (*Hystrix cristata*), and common duikers (*Sylvicapra grimmia*) are often numerically dominant in both forests and savannas, whereas habitat-specialist or disturbance-sensitive species, including apex predators like Ethiopian

wolves and lions, are observed far less frequently (Eden Tsegaye and Girma Mengesha, 2023).

Surveys carried out in the Harego Forest of South Wollo between 2020 and 2021 revealed 15 species and more than 260 individuals of medium-and large-sized mammals were recorded (Gezahegn Getachew and Dereje Yazezew, 2024). Community-managed areas are also crucial for conserving Ethiopia's mammalian diversity. In the Michole Community Protected Forest in southern Ethiopia, surveys were conducted between 2019 and 2020 which documented about 17 mammal species (Amanuel Agebo and Wondimagegnehu Tekalign, 2022). Gambella is an area of high ecological and conservation importance, although expanding agricultural activities and infrastructure development in recent years have increasingly posed threats to its mammal populations (Tsegaye Gadisa, 2021).

2.2 Biodiversity and Importance of Mammals in Ecosystems

Mammals are fundamental to biodiversity and are vital to the health and stability of ecosystems all around the planet (Nimona *et al*, 2024). According to a worldwide assessment conducted in 2025, the loss of biodiversity due to pollution, habitat conversion, and climate change directly jeopardizes the ecological roles of mammals and threatens the resilience and productivity of ecosystems (Eawag, 2025). Seed dispersal is another ecosystem service strongly mediated by mammals. Many primates, ungulates, and rodents transport seeds over long distances, enhancing forest regeneration and plant genetic diversity. Recent research shows that habitat fragmentation and the loss of mammalian dispersers greatly reduce both the quality and quantity of seed dispersal, impairing forest resilience under climate stress (Perez-Mendez *et al.*, 2023).

2.3 Human-wildlife Conflict

Human-wildlife conflict (HWC) is defined as any interaction between humans and wildlife that results in negative impacts on human. The conflict between humans and wildlife is a global issue, happening both in developing and developed countries. HWC conflict is a serious global issue in the developing world where expansion of settlements and human population growth are reducing wildlife habitats and increasing the HWC. Crop cultivation and livestock rearing in developing countries are the main sources of rural income and livelihood, which shrink the habitat of wildlife and lead finally to HWC (Anteneh Worku, 2025).

HWC is a significant challenge for biodiversity conservation and sustainable development worldwide. It arises when interactions between humans and wildlife result in harmful outcomes, such as animals damaging crops, attacking livestock, injuring humans, or destroying property. These incidents often lead to economic losses and increased poverty, the conflicts frequently occurs near protected areas or along migration routes where wildlife habitats intersect with agricultural land. These socio-economic consequences can negatively influence perceptions of people towards wildlife (Teklay Girmay and Zeyede Teshome, 2015).

Human-wildlife conflict is a serious issue in Africa and other developing areas of the world where rapidly growing human populations and expanding settlements are reducing the areas left for wildlife habitat and increasing the interactions between humans and animals. As the human population keeps expanding, there is an increasing demand for agricultural land and natural resources for industry, leading to increased contact opportunities for wildlife and people, resulting in conflict. Crop damage affects farmers directly through loss of their primary food and cash resources, and indirectly through a variety of social costs such as costs for school and hospital. (Habtamu Debalke, 2016)

HWC occurs worldwide; however, it is intense in the tropics and in developing countries where livestock rearing and agriculture are important parts of rural people's livelihoods and income has become one of the most pressing global issues for both conservation and human well-being, especially in areas where human settlement and wildlife ranges. In many parts of Asia and Africa, elephants have been responsible for recurrent crop destruction and property damage, which often resulted in significant financial losses and occasional human casualties (Shaffer *et al.*, 2023). In South America, apex predators such as jaguars had frequently attacked livestock, fostering hostility toward conservation efforts and prompting retaliatory killings (Castaneda *et al.*, 2024). Likewise, in Europe and North America, the resurgence of large carnivores like wolves and bears had triggered renewed disputes with pastoralists and rural communities who viewed them as threats to domestic animals and personal safety (Treves and Santiago-Ávila, 2023). At a global scale, these conflicts have escalated due to rapid land-use changes such as agriculture, deforestation, and urban sprawl, which continually reduce wildlife habitats and pushed animals closer to people (Eawag, 2025). Although HWC had long been understood as an unavoidable aspect of human-nature interactions, it increasingly posed serious risks to

biodiversity conservation, rural livelihoods, and food security worldwide.

In Ethiopia, HWC is widespread around protected areas where people depend on small-scale farming and livestock. For example, in Alitash National Park (Northwest Ethiopia), 59.6% of households reported wildlife damage, with crop raiding by warthogs, porcupines, and baboons being the most common problem, alongside livestock predation and 18 reported human attacks (Mekuriaw Zewudie and Getahun Tassew, 2024). Similarly, in Chebera Churchura National Park (Southwest Ethiopia), between 2019–2021, almost all households (99.2%) reported crop damage and 67.8% reported livestock loss, with maize being the most vulnerable crop and olive baboons the main raiders (Mesele Yihune and Adane Tsegaye, 2024).

2.4 Causes of Human-Wildlife Conflict

The world human population is predicted to grow by over fifty percent in the next fifty years, from six billion in 2000 to over nine billion in 2050 and the increment in both wildlife and human population create competitions on fixed natural resources which leads to conflict (Sillero-Zubiri and Switzer, 2001). Almost all human societies survived through hunting and gathering approximately ten thousand years ago (Musyoki, 2007). When people started cultivating land for agricultural purposes and tamed animals, reliable food resource base was gained throughout the year but this faced new threats of crop damage by wild animals.

In Africa a large percentage of the population depend on nature for their source of livelihoods. Deforestation or clearing of the forest areas for crop production destroys the natural habitats of wildlife. These increased the competition between growing human population and wildlife for the same declining living spaces and resource (Madden, 2008; Kumara *et al.*, 2012). The encroachment of people into the forests of the Democratic Republic of Congo has led to the cutting down of hardwood trees to make charcoal and cause conflict with mountain gorillas that live in the forest (Anderson, 2008).

Human population growth, habitat changes, and animal distribution and behavior have contributed to an increase in human-wildlife conflict worldwide. Human activities including logging, animal husbandry, agricultural expansion, and development projects are mostly to blame for the loss, degradation, and fragmentation of ecosystems that result in HWC (Fernando

et al., 2005). As habitat becomes fragmented and animal populations isolated refuges become overcrowded. Wild animals encounter and clash with humans more frequently as they attempt to meet their dietary, ecological, and behavioral needs (Heydon *et al.*, 2010).

The nature of conflict indicates a growing trend of conflict between wildlife and humans over the use of natural resources, including water, forests, and land. Conflicts arise when wild animals kill or damage people, when cattle are lost due to predation, when pastures are contested, or when wildlife invades farm crops. The distance between the farm and the forest boundaries and the number of neighboring farms is highly likely to affect vulnerability to crop-raiding by wildlife. In addition, HWC arises mainly because of fragmentation, degradation, and loss of habitats through human activities such as agricultural expansion, settlement, and animal husbandry (Fekadu Mekuria, 2017).

The extent and intensity of damage also vary depending on the cropping patterns, wildlife population density and behavior, and food availability in wild habitats. Crop-damage depends also on the species that are involved in this activity. Indeed, different species may specialize on different types of crop and different plant parts or development stages and certain species may cause more damage than others. Crop raiding is severe and poses difficult situations for both farmers and wildlife manager (Zewdu Kifle *et al.*, 2013). Livestock grazers are also one of the important links in human wildlife conflict (Kagiri, 2000). The destruction of forest areas for food and crop production eliminates the natural habitats of wildlife, leading to the primary reason for human-wildlife conflict globally, which arises from the competition for dwindling living spaces and resources between expanding human populations and wildlife (Madden, 2008; Kumara *et al.*, 2012).

2.5 The impact of Human-Wildlife Conflict

HWC is a growing problem in today's crowded world, and can have significant impacts on human population. As human population and the extent of landscape transformation increase the competition for resource between human being and wild animals. Agriculture and livestock holdings are a significant part of rural people's livelihoods in Ethiopia. Locals with a low level of living as well as agropastoralists, who rely solely on the production and income from their land, are particularly vulnerable (Hailemariam Alemu *et al.*, 2017).

In Ethiopia, the damage caused by various wild animals varies from place to place, and the nature of the conflict is dependent on the species involved in the type and level of damage (Hailemariam Alemu *et al.*, 2017). HWC affects farmers directly through loss of their primary food and cash resources, and indirectly through a variety of social costs (Dickman, 2010).

As the need of wildlife and human being become close to each other, it impact negatively the goals of human and finally create conflict between them. Wild animals can have very significant impacts up on human directly and indirectly these impacts range from clear cut economic hardship to less tangible effects such as increased opportunity costs and decreased quality of life. Living along side of wild animals can incur variety of additional costs aside from the direct impact of depredation (Distefano, 2010). Human deaths and injuries are less common than crop damage however, the hippopotamus was long considered to be responsible for more deaths than any other large animal in Africa. Large mammalian carnivores are responsible for numerous fatal attacks on humans, and large herbivores, such as elephants, are also involved in human deaths every year (Fernando, 2005).

2.6 Attitude of People towards Wildlife

The attitude of local communities towards wildlife and its conservation is very important. A negative attitude can affect people's behavior and may harm animals, such as poisoning or killing them. However, when local people directly benefit from wildlife, their attitude becomes positive and supportive. Therefore, strengthening the relationship between local residents and wildlife, and linking it with benefits, helps conservation institutions to achieve better results. In general, people's knowledge and attitude have a great influence on their behavior and their interactions with wildlife. This is also essential for ensuring sustainable conservation in the future (Gezahegn Getachew and Dereje Yazezew, 2024).

2.7 Methods Used By Local People to Prevent Crop Damage

Local communities employ a variety of methods to prevent crop damage caused by wild animals. Guarding remains the most common and widely practiced method, particularly during the harvesting season when crops are highly vulnerable. Farmers often spend long hours in their

fields, using shouting, noise-making, or stone-throwing to deter herbivores (Esayas Embaye Kidane *et al*, 2024). In addition to guarding, chasing and fencing are considered the second and third most important measures. Farmers construct temporary fences using local materials such as thorny bushes to limit the movement of wild animals into farmlands. Scarecrows and the use of strange scents are also employed, though their effectiveness is often short-lived as animals eventually adapt to them. Another strategy involves shifting cropping patterns, where farmers plant less palatable crops along field borders or adjust planting times to minimize overlap with peak wildlife activity. Although these measures reduce losses, they are often labor-intensive and require considerable time and financial investment from households (IUCN, 2023). Overall, while these traditional methods contribute to reducing crop damage, they are not fully effective and highlight the need for more sustainable, community-based approaches to human wildlife coexistence.

3. MATERIALS AND Methods

3.1 Study Area

The study area is found in Awi Zone, northwestern Ethiopia. The study was specifically conducted in Dangila woreda Awi Zone. According to Dangila Woreda Road Authority office Wolete Petros Unity Monastery is about 503 km from Addis Ababa, the capital city of Ethiopia, and 95 km from Bahir Dar, the administrative center of the Amhara-region and 17 km northwest of Dangila Woreda, Tumuha District, at Wondefy Kebele. It is a historical and religious place. It is one of the oldest and most historic Monasteries in Awi Administrative Zone, like Agew Gimja Bet Mariam (1671), Zurzur Kidane Mihiret (1668), and Sigade kidus Michael Monastery. This historical and ancient Monastery was founded 400 years ago during the reign of Emperor Susinius in the 16th century from 1607-1632 A.D.

The study was conducted in and around Wolete Petros Unity Monastery in Wondefy Kebele, Awi Zone, north western Ethiopia. Since WPUM is situated within a mountainous landscape that supports diverse wildlife species and rich vegetation. The landscape is characterized by a variety of undulating and mountainous or gently rolling hills, small valleys, streams, riverine forest, and dense forest interspersed with agricultural fields and grazing lands. Seasonal streams and forest patches enhance habitat heterogeneity and serve as movement corridors for medium- and large-sized mammals. Vegetation is heterogeneous, ranging from dense forest patches dominated by large trees such as *Syzygium guineense*, *Ficus vasta*, and various *Acacia* species. The area is not legally protected and experiences moderate to high levels of human disturbance, including crop cultivation (teff, barley, wheat, peas, and beans), livestock rearing, and small-scale timber and fuel wood collection. The river systems in the area are moderately accessible, providing essential water resources for both wildlife and local communities. This combination of diverse vegetation and water availability supports a rich community of medium and large sized mammals.

The total area coverage of WPUM is about 236.5 hectare (2.365 km²).The main source of income for the monastery are agricultural products such as Teff, Peas, Sorghum, Barley, Finger Millet, Wheat, Beans. WPUM surrounded by Mountains areas that homes diverse wildlife species. The dominant plant species in the study area include Myrtaceae (*Syzygium guineense*), Moraceae (*Ficus vasta*), Moraceae (*Ficus sur*), Rosaceae (*Rossa abyssinica*), Fabaceae (*Acacia nilotica*), Apocynaceae (*Carissa spinarum*), Combretaceae (*Combretum collinum*), Sapindaceae (*Dodonaea viscosa*), Fabaceae (*Faidherbia albida*), Euphorbiaceae (*Clusia abyssinica*), and many more plants. There are also dominant wild animal species found in the study area including, *Tragelaphus scriptus*, *Sylvicapra grimmia*, *Oreotragus oreotragus*, olive baboon (*Papio anubis*) and black and white colobus monkey (*Colobus guereza*), which mainly utilize forest interiors and edges.

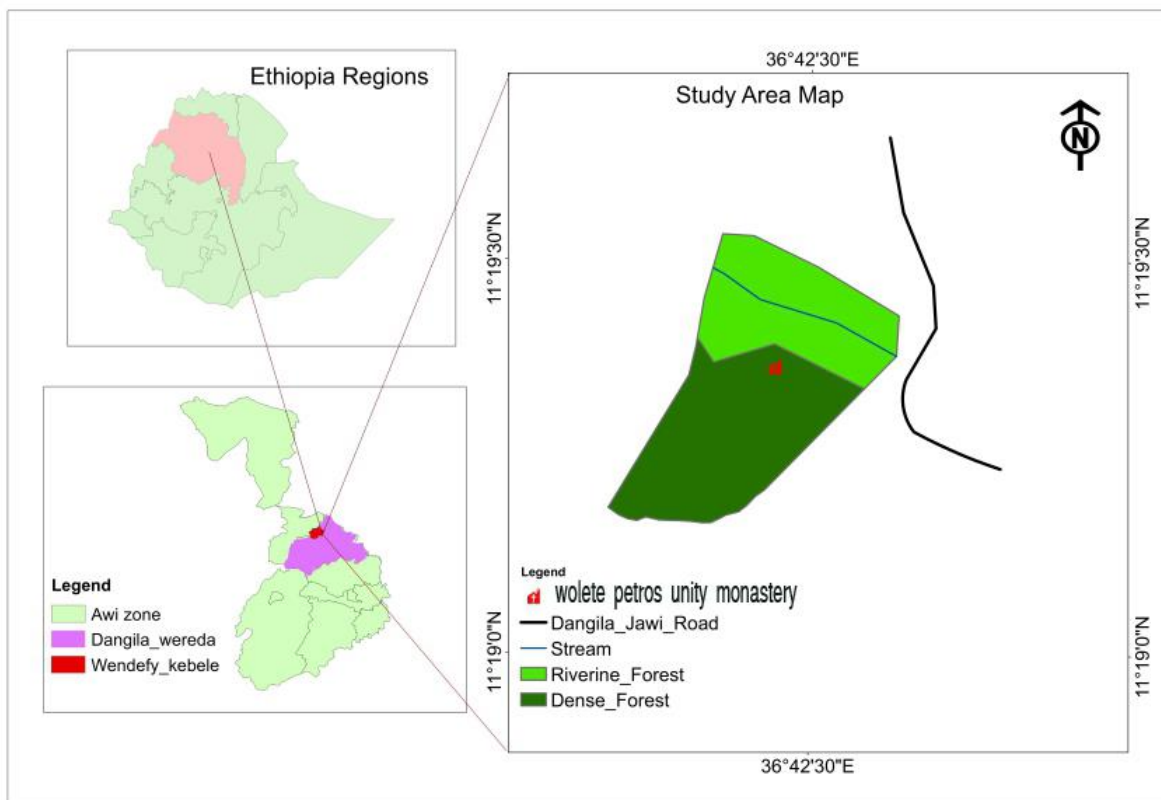


Figure 1 (Location Map of WPUM (Adopted From Serkalem Gizachew,2025)

3.2. Study Design

Across sectional survey was used to collect data on Diversity and Relative Abundance of Medium and Large-Sized Mammals and Human-wildlife Conflict in and around Wolete Petros Unity Monastery, Awi Zone, Northwest Ethiopia. Block count method was used to determine the Diversity and Relative Abundance of Medium and Large-Sized Mammals in and around WPUM. Since the area of the forest is about 236.5 hectare (2.365 km²), The study comprises 12 blocks which includes, Daflit, Zirdibay, Kintir afit, Wolete ber, Gimel terara, Medihaniyalem, Asech ber, Leba ber, Bishitani, Set gedam, Warka ber, Mofer bet. The study areas were divided into different sites to the convenient of block measurement for easy count. The age of respondents was collected as a categorical variable and grouped into predefined age classes (13–25, 26–35, 36–55, and >55 years) to facilitate analysis. Frequencies and percentages were calculated for each age category to describe the age structure of respondents, and age groups were used in comparative analyses to examine differences in wildlife knowledge, perception, and exposure to mammals among age classes. The educational level of respondents was recorded during the questionnaire survey and categorized into five groups: illiterate (no formal education), primary education, secondary education, technical or vocational training, and higher education. The data were summarized using descriptive statistics and presented as frequencies and percentages.

3.4 Data Collection Methods

3.4.1. Mammalian Species Survey

I used the block count method to census the medium and large size mammals. The block count method is important to determine how many individuals of a particular species of mammals live in an area. I divided the area into 12 counting blocks I counted four times each block to increase the accuracy of the data of each mammal in the study area. During data collection, I recorded the species name, group size (number), GPS point (latitude and longitude), and habitat type (forest, grassland, bushland). In addition to direct observation, indirect evidence such as spines for porcupine, footprints, burrows, fecal droppings, and vocalizations, and were collected to confirm the presence of mammals that are active at night and shy of human.

3.4.2. Questionnaire Survey

Human-wildlife conflict was assessed using questionnaire survey. The questionnaire was a closed-ended questions with different variables. It was designed to collect information on the attitudes of the local community towards wild mammals; the cause and effect of conflicts, crop protection methods, household size, age, sex, livestock size and level of education were gathered from each respondents. Respondents were selected opportunistically on the basis of chance encounter (Newmark *et al.*, 1993; Zewdu Kifle and Afework Bekele, 2020).

3.4.3 Direct Observations

Observation was one of the methods to collect data on wild animals in the area, housing standards of the local people, crops grown, observing the extent of crop damage, and other observable features through systematic observation. Eight study villages namely Janhoy, Gimel, Asech Ber, Wolete, Tekeste, Bishtani, Daflit, Moferbet was observed. Species identification was achieved through, direct observation, footprints, fecal deposits, characteristic sounds, and distinctive features such as quills. Within the selected farmlands of each site, four different types of crops, mainly Bean, Teff, Barley and Maize were grown. Direct observation was made in each study site for a total of 11 days for 6 hrs each day. Some nocturnal animals do not damage during the day time, therefore, it requires marks left by the animals such as dung, foot print, diggings and other remains such as spines.

3.4.4 Focus Group Discussions

A Focus group discussion were conducted in each village to investigate their perspectives on human-wildlife conflict and the consequences for their livelihood. This method helps to acquire useful and detailed information about human-wildlife conflict. It was carried out to collect qualitative information from the selected villages. Discussions were made with randomly selected 3-5 respondents in each village under the guidance of a moderator. This technique was used to explore what they know or think about the research problem that the questions would cover.

3.5. Sample Size Determination

The sample sizes of the respondents were selected based on the total population of the eight villages (901 individuals), the Cochran formula (Cochran, 1977) was used to get a representative sample size from the total study population. The questionnaire survey was conducted among residents of villages surrounding the Wolete Petros Unity Monastery forest, including Janhoy, Gimel, Asech Ber, Wolete, Tekeste, Bishtani, Daflit, and Moferbet, which are the closest settlements to the study area. A total of 116 respondents from the monastery community and 785 from the adjacent villages participated in the survey. Respondents were selected from villages located at varying distances from the forest, ranging from 0.4 km to 1 km, in order to capture differences in exposure to wildlife and human–wildlife interactions. Male respondents outnumbered females mainly because interviews were conducted during daytime hours when many men were engaged in farming and off-farm activities, whereas women were more available in the villages. Thus, the desired sample size and the adjusted sample size was calculated or determined by using probability sampling. $no = \frac{Z^2 pq}{d^2}$ and $n1 = \frac{no}{1 + \frac{(no-1)}{N}}$ Where: no = desired sample size Cochran's (Cochran, 1977) n1= adjusted sample size for finite population correction factors ((Cochran, 1977) less than 10,000. Z= standard normal deviation (1.96 for 95% confidence interval). P= 0.1 (proportion of population to be included in sample i.e. 10%). q = 1- p (i.e. 0.9), d = degree of accuracy desired (0.05). N= total population of all the villages (901).

$$\text{Hence, } no = \frac{(1.96)^2(0.1 \cdot 0.9)}{(0.05)^2} = 138.2976 \text{ and } n1 = \frac{138.2976}{1 + \frac{(138.2976-1)}{901}} = 120$$

The percentage of the sample size was computed by using $C = \frac{n}{N} * 100$ where C = percentage of sample size of the population, n = total number of selected sampled of the population, and N = total population in the study area, $C = \frac{120}{901} * 100 = 13.3\%$. Therefore, the sample size of the respondents was 13.3% of the villagers (901).

Table 1. Total population and sample size in each village

Village	Total population			The sample size			
	Male	Female	Total	Male	Female	Total	Percentage
Janhoy	54	56	110	10	7	17	14
Gimel	49	47	96	9	5	14	12
Asech Ber	60	58	118	8	8	16	13
Wolete	57	59	116	4	3	7	6
Tekeste	62	64	126	8	4	12	10
Bishtani	52	50	102	7	3	10	8
Daflit	43	52	95	5	7	12	10
Mofer bet	66	72	138	18	14	32	27
Total	443	458	901	69	51	120	100%

3.6. Method of Data Analysis

Mammalian species diversity was measured using Shannon–Wiener index, H' , and evenness was assessed by the evenness index, J (Krebs, 1999). The questionnaire data were coded and entered into a spreadsheet and analyzed using descriptive statistics, including frequencies and percentages, to summarize respondents' perceptions of mammal presence, abundance, and human–wildlife interactions. Mammal abundance data collected from all study blocks were compiled by species and block, and relative abundance was calculated based on the total number of detections or observations recorded during surveys. Chi-square test was used to determine whether the proportions of respondents, the collected data were analyzed by descriptive statistics using Statistical Package for Social Sciences (SPSS) version 20. The significance is determined at p -value less than 0.05.

3.7. Ethical Consideration

Ethical clearance for the study was obtained from Dangila Woreda Culture and Tourism Office. After proposal acceptance, a letter of support was written to Wolete Petros Unity Monastery Forest for data collection.

4. RESULTS

4.1. Socio-Demographic Characteristics of the Respondents

From 120 respondents, the majorities were young, as 47.5% were between 13–25 years of age and 31.7% were within the 26–35 years, while only 13.3% fell in the 36–55 year range and a small proportion of 7.5% were above 55 years. The gender composition of respondents revealed that males (57.5%) slightly outnumbered females (42.5%). In terms of educational level, 25% were illiterate, more than one-third (35.8%) of the respondents completed primary education, About 23.3% completed secondary education, 11.7% received technical or vocational training, and only 4.2% attained higher education. In terms of economic indicators, particularly livestock ownership, 40% of the respondents owned between 1–12 animals, and 34.2% owned 13–15 animals. A smaller proportion (18.3%) had 16–20 animals, while only 7.5% owned 20 or more (table 2).

Table 2.Socio-demographic characteristics of respondents

Variables	Categories	Frequency	Percent
Age	13-25yrs	57	47.5
	26-35yrs	38	31.7
	36-55yrs	16	13.3
	above 55yrs	9	7.5
	Total	120	100
Gender	male	69	57.5
	female	51	42.5
	Total	120	100
Attending school	yes	90	75
	no	30	25
	Total	120	100
Level of school	illiterate	30	25
	primary	43	35.8
	Secondary	28	23.3
	Technical/vocational	14	11.7
	Higher level	5	4.2
	Total	120	100
Family members	from 1-6	72	60
	from 7-9	37	30.8
	from 10-11	7	5.8
	12 and above	4	3.3
	Total	120	100
Livestock number	from 1-12	48	40
	13-15	41	34.2
	16-20	22	18.3
	21 and above	9	7.5
	Total	120	100

4.2. Diversity of Medium and Large-Size Mammals

A total of 15 medium and large-size mammal species belongs to four orders and eight families were identified in the study area. Among these, order primates accounted for five species of the total, order carnivora comprised three species, order Artiodactyla included five species of the total. Finally, the order Rodentia was represented by two species. Primates and Artiodactyla were equally the most diverse orders, while Carnivora followed, and Rodentia was the least represented in the area (Table 3).

Table 3. Taxonomic diversity of medium and large-size mammals identified from the study area

No	Order	Family name	Common name	Scientific name	Local name	Body size	IDE
1	Primates	Cercopithecidae	Patas Monkey	<i>Erythrocebus patas</i>	አግረዱ/ቀይ ጦጥ/	Larger	Visual
2	Primates	Cercopithecidae	Blue Monkey	<i>Cercopithecus mitis</i>	-----	Medium	visual
3	Primates	Cercopithecidae	Grivet Monkey	<i>Chlorocebus aethiops</i>	-----	Medium	visual
4	Primates	Cercopithecidae	Olive Baboon	<i>Papio anubis</i>	ዝንጀሮ	Larger	visual
5	Primates	Cercopithecidae	Colobus Monkey		ጉሬዛ	Medium	visual
6	Carnivora	Hyaenidae	Hyena	<i>Crocuta crocuta</i>	ጅብ	Larger	Foot print, Feces
7	Carnivore	Mustelidae	Honey badgers	<i>Mellivora capensis</i>	ቀፎ ደፊ	Medium	visual
8	Carnivore	Felidae	Leopard	<i>Panthera pardus</i>	ነብረ	Larger	Feces, sound
9	Rodentia	sciuridae	Squirrel	<i>Rock hyrax: Procavia capensis</i>	እሽኮኮ	Medium	Feces
10	Rodentia	Hystriidae	porcupine	<i>Hystrix cristata</i>	ጃረት	Medium	Spine(quill)
11	Artiodactyla	Bovidae	Bushbucks	<i>Tragelaphus scriptus</i>	ድኩላ	Larger	visual
12	Artiodactyla	suidae	Common warthog	<i>Phacochoerus africanus</i>	ከረከሮ	Larger	feces
13	Artiodactyla	Bovidae	Common duiker	<i>Sylvicapra grimmia</i>	ሚዳቋ	Larger	visual
14	Artiodactyla	Suidae	wild boar	<i>Sus scrofa</i>	አሳማ	Larger	feces
15	Artiodactyla	Bovidae	Klipspringer	<i>Oreotragus oreotragus</i>	አንቺቸከሳ	Larger	visual

4.3. Relative Abundance of Mammals and Richness by Habitat

The total number of individuals observed across all blocks was 158 individuals. The block with the highest total abundance was Gimel terara (24 individuals), followed by mofer bet (20 individuals each). The block with the lowest abundance was Bishitani (3 individuals). Species richness, representing the number of different species per block, varied considerably. The highest richness was recorded in Warka ber (7 species), while the lowest was in Set gedam, bishitani, and daflit (2 species). Species distribution varied between habitat types. The highest richness and abundance were recorded in forest habitats which supported large groups of olive baboons, grivet monkeys, and Patas Monkeys. Gimel terara block harbor a total of 24 individuals including 11 Olive Baboons, 7 Grivet Monkeys, 4 Patas Monkeys, and smaller numbers of other species. Similarly, Mofer Bet supported 20 individuals, dominated by Olive Baboons and Grivet Monkeys, at Asech Ber block, 16 individuals were recorded. In Wolete Ber, 11 individuals were observed, again dominated by Olive Baboons. At Medihaniyalem and Leba Ber block, 13 individuals were observed; they are dominated by Olive Baboons and Grivet Monkeys (Table 4).

Table 4. Relative Abundance of Mammals and Richness by Habitat

Blocks																Group Size
	Patas Monkey	Rhinomony	Grivetmonkey	Olivebaboon	Colombusmonkey	Hvna	Porcupine	Honey Badgers	Leopard	Wild Boar	Bushbucks	Common Warthog	Common Duiker	Squirrel	Klipspringer	
Dafit	-	-	2	4	-	-	-	-	-	-	-	-	-	-	-	6
Zirdiba	-	-	5	6	-	-	-	-	-	-	2	-	1	1	-	15
Kintir	-	2	1	2	3	-	-	-	-	-	1	-	-	-	-	9
Wolete	-	2	-	8	-	-	-	-	-	-	-	-	1	-	-	11
Gimel	4	-	7	11	-	-	-	-	-	-	1	-	-	1	-	24
Mediha	1	-	4	3	5	-	-	-	-	-	-	-	-	-	-	13
Asech	2	-	-	13	-	-	-	-	-	-	-	-	1	-	-	16
Leba	-	-	2	7	-	-	-	-	-	-	-	-	-	2	2	13
Bishitani	-	-	-	2	-	-	-	-	-	-	-	-	1	-	-	3
Set	-	-	4	5	-	-	-	-	-	-	-	-	-	-	-	9
Warka	-	-	3	8	3	-	-	-	-	-	1	-	1	1	2	19
Mofer	1	1	5	6	4	-	-	-	-	-	-	-	3	-	-	20
Total	8	5	33	75	15	-	-	-	-	-	5	-	8	5	4	158

4.4. Abundance of Species Richness and dominant species of mammals

The Olive Baboon was the dominant species across the study area. It was identified as the most numerous and frequent species species in 10 out of the 12 blocks (83.3% of sampled locations). The highest single-species count in the dataset at Asech ber (13 individuals). Columbus monkey was the dominant species in the two blocks (Kintir afit and Medihaniyalem). Species richness did not show a clear linear relationship with total abundance; for instance, Warka ber had a high richness (7 species) with 19 individuals, while Gimel terara had a lower richness (5 species) but a higher total abundance (24 individuals)(Table 5).

Table 5.Total Individuals, Species Richness, and dominant species per block

Blocks	Name	Total Individuals	Species Richness	Dominant Species	Count
Daflit		6	2	Olive Baboon	4
Zirdibay		15	4	Olive Baboon	6
Kintir afit		9	5	Colobus Monkey	3
Wolete ber		11	3	Olive Baboon	8
Gimel terara		24	5	Olive Baboon	11
Medihaniyalem		13	4	Colobus Monkey	5
Asech ber		16	3	Olive Baboon	13
Leba ber		13	4	Olive Baboon	7
Bishitani		3	2	Olive Baboon	3
Set gedam		9	2	Olive Baboon	5
Warka ber		19	7	Olive Baboon	8
Mofer bet		20	6	Olive Baboon	6

4.5. Diversity Index of species

Simpson's diversity value ($1 - D$) was 0.713, which implied that there was about 79.3 % chance that two randomly selected individuals' belonged to different species. Among the recorded species, the Olive Baboon had the highest relative abundance ($P_i = 0.475$) and contributed the largest share to the Simpson's index ($D = 0.225$). The Shannon diversity index (H') was found to be 1.627 which indicated a moderate level of diversity. In ecological communities, values of H' are often between 1.5 and 3.5, and the result fell within this range. Simpson's diversity index (D) was calculated as 0.287, representing the probability that two randomly chosen individuals belonged to the same species. Evenness was computed as 0.487 on a scale from 0 to 1, which showed that the community had relatively high evenness (Table 6).

Table 6. Diversity Index of species in all blocks

Diversity Index of species in all blocks

Species name	Total number in all blocks	Proportion (P_i)	Shannon Diversity Index (H') = $(-\sum p_i * \ln(p_i))$	Simpson's Index (D) = $\sum p_i^2$	Simpson's Index of Diversity ($1 - D$)	Evenness (J) = $H' / \ln(S)$
Patas Monkey	8	0.051	0.151	0.003	0.997	0.055
Blue Monkey	5	0.032	0.109	0.001	0.999	0.040
Griwet Monkey	33	0.209	0.032	0.044	0.956	0.011
Olive Baboon	75	0.475	0.354	0.225	0.775	0.130
Colombus Monkey	15	0.095	0.224	0.009	0.991	0.082
Bushbucks	5	0.032	0.109	0.001	0.999	0.040
Common duiker	8	0.051	0.151	0.003	0.997	0.055
Squirrel	5	0.032	0.109	0.001	0.999	0.040
Klipspringer	4	0.025	0.093	0.001	0.999	0.034
Total	158	$\Sigma = 1.000$	$\Sigma = 1.627$	$\Sigma = 0.287$	0.713	0.487

4.6. The causes of human–wildlife conflict

Regarding to the causes of conflict, the respondents indicated that farmland expansion around forest edges accounted for 25%, conflicts through habitat degradation was 56.7%, while increasing of wildlife population was 18.3%. There was a statistically significant variation among the causes of human–wildlife conflict ($\chi^2 = 30.20$, $df = 2$, $p < 0.001$)(table 7).

Table 7.The respondent responses that causes of human wildlife conflict

Variable	Categories	Frequency	%	χ^2	df	p-value	Remark
cause of conflict	Farmland expansion around forest edge	30	25				
	Habitat degradation	68	56.7				
	increasing of wildlife population	22	18.3				
	Total	120	100	30.2	2	< 0.001	Significant

4.7. Attitudes of the local people towards large mammals and human wildlife conflict

The results of wildlife conflict and related factors showed that wildlife species had significantly varied in their level of conflict with the local community ($\chi^2=61.42$, $df=4$, $p < 0.001$). Similarly, the preferred time of wildlife to attack crops was found to be significantly different ($\chi^2 = 9.80$, $df = 2$, $p < 0.01$). The majority of crop damage occurred during the daytime. The tendency of crop damage from time to time was also statistically significant ($\chi^2=17.60$, $df=1$, $p < 0.001$). Most respondents reported that crop damage had been increasing, while a smaller proportion indicated that it was decreasing. More than half of the respondents perceived that the wildlife population had been increasing, whereas others reported a decrease, and a few had no idea about the trend.

The attitudes of local people towards wild animals, especially to carnivores 42.5% of respondents held positive attitudes and 57.5% held negative attitudes. However, the difference was not statistically significant ($\chi^2 = 2.70$, $df = 1$, $p = 0.10$). For livestock loss, 28.3% of

respondents reported losing livestock to wildlife, while 71.7% reported no loss. The chi-square test revealed a highly significant difference from the expected equal distribution ($\chi^2 = 22.54$, $df = 1$, $p < 0.001$), indicating that most households did not lose livestock. The chi-square test revealed a highly significant difference from the expected equal distribution ($\chi^2 = 22.54$, $df = 1$, $p < 0.001$), indicating that most households did not lose livestock. The respondents' response showed different responses on the importance of conserving wildlife. About 53.3% respondents responded yes and 46.7% respondents answered no. The chi-square result ($\chi^2 = 0.54$, $df=1$, $p=0.46$) showed no significant difference, meaning that responses were nearly balanced (Table 8).

Table 8. Attitudes of the local people towards large mammals and human wild life conflict

Variable	Category	O	E	χ^2	df	p-value	Remark
Wildlife more conflict with the local community	Monkey	42	24	61.42	4	<0.001	Significant
	Porcupine	14	24				
	White and black colobus	13	24				
	Leopard	4	24				
	Total	120	120				
Preferred time for wildlife to attack crops	Day	54	40	9.8	2	<0.01	Significant
	Night	40	40				
	Day and night	26	40				
	Total	120	120				
The tendency of the crop damage from time to time	Increasing	83	60	17.6	1	<0.001	Significant
	Decreasing	37	60				
	Total	120	120				
Feeling on the population of wildlife in the natural forest	Increasing	32	40	20.46	2	<0.001	Significant
	Decreasing	63	40				
	No idea	25	40				
	Total	120	120				
Human-wildlife conflict problem	Severe problem	24	30	12.46	3	0.006	Significant
	Moderate problem	46	30				
	No problem	29	30				
	Do not know	21	30				
	Total	120	120				
Attitude towards wild animals especially carnivores	Positive	51	60	2.7	1	0.1	Not significant
	Negative	69	60				
	Total	120	120				
Any livestock lost by wildlife	Yes	34	60	22.54	1	<0.001	Highly significant
	No	86	60				
	Total	120	120				
Feelings on conserving wildlife	Yes	64	60	0.54	1	0.46	Not significant
	No	56	60				
	total	120	120				

4.8. Economic Benefits That Local Communities Perceived From the Use of Natural Resources

Local communities depend on the forest for several key functions, including grazing land, firewood, fodder, and wood for house construction. Among these, firewood was the most frequently used resource, reported by 52 respondents (43.3%), followed by fodder with 30 respondents (25%), and grazing land with 23 respondents (19.2%). Wood for house construction was the least reported resource, mentioned by only 15 respondents (12.5%). According to the respondents, the utilization of forest resources for different purposes was statistically significant variation among the different categories ($\chi^2 = 25.26$, $df = 3$, $p < 0.001$) (Table 9).

Table 9. Local communities use natural resources from the forest

Variables	Categories	frequency	%	χ^2	df	p-value	Remark
Resources from the forest	Grazing land	23	19.2	1.63	3	<0.001	Significant
	Fire wood	52	43.3	16.13			
	Fodder	30	25	0			
	Wood for house construction	15	12.5	7.5			
	Total	120	120	25.26			

4.9. Impacts of Human–Wildlife Conflict

There was no significant variation among the Impacts of human–wildlife conflict ($\chi^2 = 4.09$, $df = 4$, $p = 0.62$). In contrast, the crop growing stages that were most attacked by wildlife showed a highly significant variation ($\chi^2 = 37.1$, $df = 4$, $p < 0.001$). Fruiting and vegetative/flowering stages were attacked more frequently than sowing and harvesting stages. Similarly, the types of problems caused by wildlife varied significantly ($\chi^2 = 18.6$, $df = 3$, $p = 0.04$). Crop damage and disease transmission were reported more often compared to water sharing and grazing

competition. The crop types damaged by wildlife also showed a strongly significant difference ($\chi^2 = 33.8$, $df = 3$, $p < 0.001$). Maize was reported as the most frequently damaged crop, followed by barley, beans, and teff. Finally, domestic animals attacked by wildlife also varied significantly ($\chi^2 = 10.9$, $df = 3$, $p = 0.02$). Sheep and goats were more frequently attacked compared to cattle and hen (table 10)

Table 10. The respondents' responses to the impacts of Human–Wildlife Conflict

Variable	Categories	O	E	χ^2	df	p-value	remark
Opportunity outgoings of human–wildlife conflict	Less sleep	18	24	4.09	4	0.62	Not significant
	Travel restriction	30	24				
	Termination of children from schooling	23	24				
	Loss of energy during throwing	21	24				
	Physical injury	28	24				
	Total	120	120				
Major Crops damaged by wildlife	Sowing	9	24	37.1	4	0.001	Significant
	Seedling	20	24				
	Vegetative/flowering	27	24				
	Fruiting	48	24				
	Harvesting	16	24				
	Total	120	120				
Problems caused by wildlife	Crop damage	46	30	18.6	3	0.04	Significant
	Sharing drinking water	28	30				
	Grazing pasture	33	30				
	Transmission of disease	13	30				
	Total	120	120				
Crops most damaged by wildlife	Bean	22	30	33.8	3	0.001	Significant
	Teff	16	30				
	Barley	25	30				
	Maize	57	30				
	Total	120	120				
Domestic animals most attacked by wildlife	Sheep	38	30	10.9	3	0.02	Significant
	Goat	36	30				
	Cattle	31	30				
	Hen	15	30				

4.10 Controlling Techniques of Crop Raiding Animals

The techniques used to reduce crop damage (Table 6) indicated that there was a statistically significant difference among the different methods employed ($\chi^2 = 48.59$, $df = 4$, $p < 0.001$). According to the respondents guarding day and night (40% respondents) was the most frequently practiced method, followed by Using dogs (27.5% respondents), and while the least used technique was smoking (4.2%). (41.7% respondents) and (32.5% respondents) said that children and men were more frequently involved in crop guarding respectively than women (13.3% respondents). Similarly, the analysis of tools used to kill crop predators revealed a significant difference ($\chi^2 = 60.86$, $df = 3$, $p < 0.001$). The respondents showed that use of stone and stick (64% respondents) were the most commonly used tools, while poison (4.2% respondents) was the least used method. Regarding hours spent guarding crops, the result also showed a statistically significant variation ($\chi^2 = 42.86$, $df = 3$, $p < 0.001$). A majority of respondents (47.5%) reported guarding for 12 hours, followed by 27.5 % guarded for 9 hours, while only 8 respondents guarded for 2 hours (Table 11).

Table 11. Controlling techniques of crop raiding animal

variable	categories	Frequency	%	χ^2	Df	p-value	remark
techniques used to reduce crop damage by crop raiders	Guarding day & night	48	40	48.59	4	<0.001	Significant
	Using dogs	33	27.5				
	Hunting	22	18.3				
	Scarecrow	12	10				
	Smoke	5	4.2				
	Total	120	100				
by whom crop guarded	women	16	13.3	30.06	3	<0.001	Significant
	children	50	41.7				
	men	39	32.5				
	women and children	15	12.5				
	Total	120	100				
A tool used to kill crop predators	stone/stick	64	53.3	60.86	3	<0.001	Significant
	gun	27	22.5				
	snare	24	20				
	poisons	5	4.2				
	Total	120	100				
hours to keep the crop from wild life damage	2 hours	8	6.7	42.86	3	<0.001	Significant
	6 hours	22	18.3				
	9 hours	33	27.5				
	12 hours	57	47.5				
	Total	120	100				

5. DISCUSSION

The majority of respondents were young and mostly males, which reflects an active working population. However, education levels were generally low. Many people had only primary schooling or illiterate. This could limit their awareness and ability to adopt better practices. Most households were large and depended heavily on owning small to medium livestock. This indicates a strong reliance on livestock-based livelihoods and potential strain on local resources.

Community attitudes toward wildlife, especially carnivores, were mostly negative, though this difference was not statistically significant. This negativity likely stemmed from the economic losses incurred. Interestingly, opinions about the importance of wildlife conservation were nearly evenly split. This indicated a complex understanding among respondents, who likely recognized the value of biodiversity despite its challenges. Similarly, the study conducted by Tadesse Bitew (2020) in Tirba Forest, Awi Zone, major wild animals namely, Olive baboon, grivet monkey, wild pig, warthog and porcupine were identified in the study area as they cause crop damage which in turn results for the local people to have negative attitude towards primate conservation.

During the study, a total of 15 species were identified using direct and indirect evidence. The ecological survey recorded a moderately diverse community of 15 medium and large-sized mammal species belong to four orders and eight families. This in line with the study conducted by Tamenut Desalegn *et al* 2023 in DebreLibanos Monastery Forest that a total of 11 medium and large sized mammal species belong to 6 orders and 8 families were identified. The most diverse orders were Primates and Artiodactyla. The main strategy for reducing issues was guarding, typically done by men and children, but it was labor-intensive and not sustainable. The diversity indices provided a quantitative summary of the community structure. Simpson's Index ($1-D = 0.713$) and Shannon Index ($H' = 1.627$) indicated a moderate level of diversity. The high evenness value (0.487) suggested that despite the dominance of Olive Baboons, the community was not overly controlled by a single species, and many other species contributed to the overall balance. In this study, Patas Monkey, Blue Monkey, Grivet Monkey, Olive Baboon and Colobus monkey (*Colobus guereza*) are found to be the common primate species inhabitants of wolete petros unity monastery. This result agrees with the study conducted by Tadesse Bitew (2020) in Tirba Forest, Awi Zone that Primates occupy different habitats. Olive baboon, grivet monkey and colobus monkeys are primates found in the study area.

Human-wildlife conflict mainly arose from habitat loss and farmland expansion near forests. In addition, HWC arises mainly because of fragmentation, degradation, and loss of habitats through human activities such as agricultural expansion, settlement, and animal husbandry. Few respondents reported crop damage, but it was most severe in the forest zone. This shows that the conflict is focused on specific areas. Human-wildlife conflict had different effects on crops, livestock, and human well-being. According to the respondents responses Maize was the most commonly damaged crop, followed by barley, beans, and teff. Livestock losses were also significant, with sheep and goats suffering more than cattle and hen. Beyond economic losses, conflicts caused social issues like sleep loss, travel restrictions, disruptions in schooling, and lower energy for daily activities. Crop raiding affects farmers directly through loss of their primary food and cash resources, and indirectly through a variety of social costs such as costs for school and hospital. This study in line with the study conducted by Habtamu Debalke, 2016 in Gimbo Woreda, Kafa Zone.

The local community depended heavily on natural resources for its livelihood, leading to greater vulnerability to wildlife losses. The result found that habitat degradation was the main cause of human-wildlife conflict (HWC). This was followed by farmland expansion and increasing wildlife populations. The main reasons for conflict between humans and wildlife were habitat loss at 56.7% and agricultural expansion at 25%. Local communities seemed to view changes in the environment and encroachment into wildlife areas as key factors in this conflict. The effect of the conflict were varied. The opportunity costs, such as loss of sleep and travel restrictions did not differ significantly. When it came to livestock, sheep and goats were attacked more often than cattle and poultry. Their smaller size made them easier targets for mid-sized carnivores and primates. Most households did not report livestock loss, suggesting that while it was a serious issue for some, it did not affect everyone.

The damage caused by various wild mammals varies and the nature of the conflict is dependent on the level of damage, this in line with the study conducted by Hailemariam Alemu *et al.*, 2017, Assessment of Human-Wildlife Conflict in and Around Gemshat. Education is important for conservation of primates and other wild animals. The most common approach to preventing crop raiding was guarding fields day and night. This labor-intensive task mainly fell to children and men. The tools used were simple and non-lethal, such as stones and sticks, while modern methods like poison were rarely used. This showed reliance on traditional, low-cost methods but also highlighted a significant investment of time and labor by household members, particularly children, which could affect their education and well-being. Similar study is done by Belay Worku (2016) in and around gendo guratirigni forest, gida ayana district; western Ethiopia found that men, women and children were the people who guarded the crop to protect from the damage by pest primates and other. During this time, farmers guard crops even during the morning and night time. Farmers, which had no children to guard their crops, chase wild animals away from the nearby area of the farm at certain interval.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The diversity of medium- and large-sized mammals and the level of human–wildlife conflict in and around Wolete Petros Unity Monastery were evaluated in this study. Fifteen medium- and large-sized mammal species spread across four orders and eight families were documented, with primates, particularly olive baboons being most present. Diversity indexes suggested a relatively balanced community. The result of the present study has clearly shown that there was a conflict between human and wildlife living in and around wolete petros unity monastery. The cause of human wildlife conflicts in the study area were linked to habitat loss and farmland expansion, among the different crops grown in the study area. Apart from economic loss, conflicts interfered with day-to-day life and education. The local communities relied on traditional guarding, which was child-based and sometimes labor-intensive. Overall, the monastery area continues to be ecologically important but is now subject to high human-wildlife conflict. Conservation needs to focus on reducing habitat loss, agricultural encroachment reduction, and community awareness.

6.2. Recommendation

Based on the results of the present study the following recommendations were forwarded.

- Awareness creation programs should be implemented in Wolete Petros and the surrounding community to discourage the illegal hunting of the animal Klipspringer or locally known as anchichiksa for food or meat purpose.
- Strengthen protection of the monastery forest to reduce further habitat loss and fragmentation.
- Introduce cropping strategies such as planting less palatable crops along farmland borders to minimize raiding.
- Collaborate with Dangila Woreda Agricultural and Tourism Offices to integrate HWC mitigation into local development plans.
- Educating the community in and around Wolete Petros Unity Monastery regarding the purpose and benefit of wildlife conservation, the causes of human wildlife conflict and method for reducing or eliminating various forms of this conflict.
- Integrate conservation education into local schools and religious institutions to foster long-term positive attitudes towards mammals.
- Explore the cultural and religious role of the monastery in biodiversity conservation to strengthen community-based stewardship.
- To reduce the dependency of local peoples on the forest, it is better to encourage the local people to plant trees for different utilization purposes.
- The stakeholders should be trained local communities to change people's perception towards coexistence between wildlife and tolerance of Human Wildlife Conflict.
- To solve wildlife habitat loss, youngsters should be educated not to depend on forest as a means of income. Instead, they should be organized and participated in different activities such as, coffee planting, bee hives management mutually with wildlife management.
- The stakeholders should organize and encourage youngsters in different organizations for creating job opportunities.
- Further research on Diversity and Abundance of Medium and Large Mammals and Assessment of Human-wildlife Conflict needed to create more reliable solutions than the existing ones.

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Appendix I Participant's Information Sheet and Informed Consent Form (English Version)

Good morning | after noon;

My name is Solomon Gedif I am studying master's degree at Bahir Dar university, college of science and I am working as a data collector for study being conducted in and around wolete petros unity monastery by me .I kindly request you give me your attention to explain you about the study and being selected as the study participants.

Title of the study:

Diversity and Abundance of Medium and Large Mammals and Assessment of Human-wildlife Conflict in and around Wolete Petros Unity Monastery, Awi Zone, Northwest Ethiopia

Purpose:

The purpose of this study is to write a thesis as a partial requirement for the fulfillment of master's degree and to design conservation strategies and management plans at local, regional and international level on the abundance of medium and large mammals and human wildlife conflict.

Procedure:

I will interview you using questionnaire to provide me with pertinent data that is help full for the study. So i kindly request you to spend this time for this interview.

Risk and benefit: The risk of being participated in this study is minimal, but only taking a few minutes of your time. There would not be any direct payment for participating in this study; however, the findings from this research may reveal important information for Dangila woreda agricultural office.

Rights: Participation in this study is on voluntary basis. You have the full right to refuse from participating in this research (you can choose not to respond some or all of the questions) If you do not wish to participate, and this will not affect you. You have also the full right to with draw from this study at any time you wish to, without losing any of your benefits which you otherwise are entitled.

Persons to contact:

If you have any question about the study, you can ask at any time using the following address Solomon Gedif: mobile number 0920773035 or E-mail:gedifsolomon@gmail.com

II. English version questionnaire

Questionnaires to study Diversity and Abundance of Medium and Large Mammals and Assessment of Human-wildlife Conflict in and around Wolete Petros Unity Monastery, Awi Zone, Northwest Ethiopia

Kebele_____village _____

Data collector name_____signature_____Date_____

Supervisor name_____signature_____Date_____

Part 1- Demographic and socioeconomic status of the respondents

1/ Age of the respondents_____(in years)

2/ 1 Sex of the respondents , male 2, female

3/ Have you ever attended school? 1. Yes 2. No

4 What is the highest level of schooling you attended?

1. Illiterate 2. Primary 3. Secondary 4. Technical/vocational 5. Higher level

5/ How many siblings (members) are there in your house? _____(in number).

6/ How many livestock do you have?_____(in number)

Part 2-The causes of human–wildlife conflicts

7/ What are the major causes human-wildlife conflict in your area?

A/Farmland expansion around forest edge B/Habitat degradation C/ increasing of wildlife population

Part 3- Impact of conflict between human and wild life

8/ What are opportunity outgoings of human-wildlife conflict

A/Less sleep B/Travel restriction C/Termination of children from education/disruption schooling
D/ Loss of energy during throwing E/ physical injure

9/ Under which stage that crops more attack by wild life?

A/ Sowing B/Seedling C/ Vegetative/flowering D/ Fruiting E/ Harvesting

10 / Which problem caused by wildlife? A/ crop damage B/Sharing drinking water B.grazing pasture D/ transmission of disease

11/ major crops damaged by wild life? A, bean B, teff C, barley D, Maize

12/Which domestic animals are most attacked by the wild animals?

A, Sheep B Goat Cattle D, Hen

Part -4 Attitudes towards large mammals and human wild life conflict

13/ Which wild life gets more conflict with the local community?

A/monkey B/ Porcupine C/white colombus D/ leopard (nebir)

14/ Which one is preferred time for wild life to attack crops? A/day B/night C/ day and night

15/ What is the tendency of the crop damage from time to time? A/ increasing B/ decreasing

16/ What do you feel on the population of wildlife in the natural forest in your surrounding?

A / Increasing B/ decreasing C/ No idea

17/ Do you think conserving wildlife is important? A. yes B, no

18/ Have you lost any livestock to wildlife? A/ Yes B/No

19/ What is your attitude towards wild animals especially for carnivores? A, positive B, negative

20/ To what extent is human wildlife conflict a problem?

A/Severe problem B/ Moderate problem C/ No a problem D/ Do not know

Part-5 controlling techniques of crop raiding animal

21/ Which Techniques used to reduce crop damage by crop raiders?

A/Guarding day & night B/Using dogs C/Hunting D/ Scarecrow E/ Smoke

22/ If permanently guarding is the method practiced in your locality, who is the guard?

A. women B. children C. men D. women and children

23/ What is the tool you use to kill crop predators? A.stone/stick B.gun C.snare D.poisons

24/For how many hours do you keep your crop from wild life damage?

A.2 hours B.6 hours C.9 hours D.12 hours

Part-6 Economic benefits that households perceived from the use of natural resources

25/ which of the following resources do you use from the forest?

A/ Grazing land B/ Fire wood C/ Fodder D/ Wood for house construction

Thank you!!

የተሳታፊ መረጃ መስጫ እና የፈቃደኝነት መግለጫ ቅጽ
እንደምን አደሩ /ዋሉ፤

እኔ ሰለሞን ገድፍ በባህርዳር ዩኒቨርሲቲ ሳይንስ ኮሌጅ የማስተር ስተማሪ ስሆን በወለተ ጴጥሮስ አንድነት ገዳም እና አካባቢዉ ለማካሂደዉ ጥናት መረጃ ሰብሳቢ ነኝ። እርስዎ በዚህ ጥናት ተሳታፊ እንዲሆኑ ስለተመረጡ ስለጥናቱ ትኩረት እንዲሰጡኝ በትህትና እጠይቃለሁ።

የጥናቱ ርዕስ፡

በወለተ ጴጥሮስ አንድነት ገዳም በዳንግላ ሰሜን ምዕራብ ኢትዮጵያ መካከለኛ ና ትላልቅ አጥቢ እንስሳት እና የሰዉ ልጅ የዱር እንስሳት ግጭት ግምገማ

አላማ፡

የጥናቱ አላማ ለዋና አጥኚ የማስተርስ ትምህርት የመመረቂያ ጽሁፍ ለመጻፍ እና በመካከለኛ ና በትላልቅ አጥቢ እንስሳት ና በሰዉ ልጅ የዱር ህይወት ግጭት ላይ በአካባቢ፣ በክልላዊ ና በአለም አቀፍ ደረጃ የጥበቃ ስልቶችን ና የአስተዳደር እቅዶችን ለመንደፍ

ሂደት፡ ለጥናቱ የሚጠቅመዉን መረጃ የምሰበስበዉ እርስዎን ቃለመጠየቅ በማድረግነዉ።ስለዚህ ቃለ መጠየቁን እንድጠይቅ ጊዜ እንዲሰጡኝ በትህትና እጠይቃለሁ።

ጉዳት እና ጥቅም፡

በዚህ ጥናት መሳተፍ ጊዜ ስለሚወስድ ትንሽ ጉዳት ሊደርስብዎት ይችላል።በጥናቱ ስለተሳተፉ ቀጥታ የሆነ ጥቅም ላገኙ ይችላሉ። ነገር ግን የጥናቱ ዉጤት ለዳንግላ ወረዳ ግብርና ጽ/ቤት ጠቃሚ የሆነ መረጃ ያስገኛል።

መብት፡ በዚህ ጥናት መሳተፍ በፍቃደኝነት ነዉ።በጥናቱ መሳተፍ ካልፈለጉ ሙሉ በሙሉ ወይም የተወሰነዉ ን ክፍል እምቢ የማለት መብት አለዎት፤ እንደዚህ በማድረግ የሚደርስብዎት ችግር የለም።

ጥያቄ ሲኖር፡

ጥናቱን በሚመለከት ማንኛዉንም አይነት ጥያቄ ካለዎት በማንኛዉም ሰዓት በተቀመጠዉ አድራሻማግኘት ይችላሉ።**ሶሎሞንገድፍ..0920773035**ወይም**Email gedifsolomon@gmail.com**

በአማራጭ የተዘጋጀ ቃለመጠየቅ:

በወለተ ጴጥሮስ አንድነት ገዳም በዳንግላ ሰሜን ምዕራብ ኢትዮጵያ በመካከለኛ እና ትላልቅ አጥቢ እንስሳት እና የሰዉ ልጅ የዱር እንስሳት ግጭት ግምገማን በተመለከተ ለማጥናት የሚያግዝ ቃለ መጠየቅ፡፡

ቀበሌ_____ ጎጥ _____

መረጃ ሰብሳቢ ስም _____ ፊርማ _____ ቀን _____

ተቆጣጣሪ ስም _____ ፊርማ _____ ቀን _____

ክፍል አንድ-የተጠያቂው / ዋ/ አጠቃላይ ማህበራዊና ግላዊ መረጃን በተመለከተ

1/የተጠያቂው/ዋ/ ዕድሜ _____ (በአመት)

2/የተጠያቂው/ዋ/ ጾታ 1/ወንድ 2/ሴት

3/ ተምረዋል ? 1. አዎ 2. አልተማርኩም

4/የእርስዎ ትምህርት ደረጃ 2.አንደኛ ደረጃ 2. ሁለተኛ ደረጃ 4.ቴክኒክና ሙያ 5.ከፍተኛ ተቋም

5/ቤታችሁ ዉስጥ ስንት ሰዉ አለ _____ (በቁጥር)

6/ስንት እንስሳቶች አሉአችሁ _____ (በቁጥር)

ክፍል ሁለት-የሰዉ እና የዱር እንስሳት ግጭት መንስኤዎች

7/ በአካባቢዎ ለሚከሰተዉ የሰዉ ልጅ የዱር እንስሳት ግጭት ዋነኛዉ መንስኤ ምንድን ነዉ

ሀ/የእርሻ መሬት መስፋፋት በደን ዳርቻ አካባቢ ለ/ የመኖሪያ ቦታ መበላሸት ሐ/የዱር እንስሳ ቁጥር መጨመር

ክፍል ሶስት -በሰዉ እና በዱር ህይወት መካከል ያለዉ ግጭት ተፅዕኖ

8/ የሰዉ ና የዱር አራዊት ግጭት እድሎች ምንድን ናቸዉ

ሀ/እንቅልፍ ማነስ ለ/ የጉዞ ገደብ ሐ/ህፃናት ከትምህርት ገበታ መቅረት መ/በመወርወር ወቅት ጉልበት ማጣት ሠ/ አካላዊ ጉዳት

9/ የተኛው የእድገት ደረጃ ላይ ነው ሰብሎች በዱር ህይወት የበለጠ የሚጠቁት

ሀ/በዘር ወቅት ለ/በብቅለት ጊዜ ሐ/በአበባ ጊዜ መ/በሚያፈራበት ወቅት ሠ/በስብሰባ ወቅት

10/ በዱር አራዊት የተፈጠረው ችግር የተኛው ነው ሀ/ የሰብል ጉዳት ለ/ የመጠጥ ውሀ መጋራት ሐ/የግጦሽ መጎዳት መ/የበሽታ መተላለፍ

11/ በዱር እንስሳት በብዛት የሚጎዱ የሰብል አይነቶች የትኞቹ ናቸው

ሀ/ ባቂላ ለ/ ጤፍ ሐ/ ገብስ መ/በቆሎ

12/ በዱር እንስሳት በብዛት የሚጠቁ የቤት እንስሳት የትኞቹ ናቸው

ሀ/ በግ ለ/ ፍየል ሐ/ ከብት መ/ ዶሮ

ክፍል አራት-ለትልቅ አጥቢ እንስሳት ና ለሰዎች የዱር ህይወት ግጭት ያሉ አመለካከቶች

13/ ከአካባቢው ማ/ሰብ ጋር የበለጠ የሚጋጨው የትኛው የዱር አራዊት ነው

ሀ/ ዝንጀሮ ለ/ ጃርት ሐ/ጉሬዛ መ/ነብር

14/ የዱር አራዊት ሰብሎችን ለማጥቃት የትኛውን ጊዜ ይመርጣል ሀ/ቀን ለ/ሌሊት ሐ/ቀን ና ሌሊት

15/ በሰብሎ ላይ ከጊዜ ወደ ጊዜ የመጎዳት አዝማሚያ ምን ይመስላል ሀ/እየጨመረ ለ/እየቀነሰ

16/ በአካባቢዎ ባለው የተፈጥሮ ደን ውስጥ ስላለው የዱር አራዊት ምን ይሰማዎታል

ሀ/እየጨመረ ለ/እየቀነሰ ሐ/ ምንም ሀሳብ የለይም

17/ የዱር አራዊትን መጠበቅ አስፈላጊ ነው ብለው ያስባሉ ሀ/አዎ ለ/አይደለም

18/ በዱር አራዊት የጠፉ ከብቶች አለዎ ሀ/አዎ ለ/የለም

19/ ለዱር አራዊት በተለይ ስጋ በል እንስሳት ላይ ያለህ አመለካከት ምንድን ነው

ሀ/አውንታዊ ለ/አሉታዊ

20/ የሰዎች የዱር እንስሳት ግጭት እስከ ምን ድረስ ችግር አለው

ሀ/ ከባድ ችግር ለ/ መጠኛ ችግር ሐ/ ችግር የለም መ/ አላውቅም

ክፍል አምስት-ሰብል ላይ ጉዳት የሚያደርሱ እንስሳትን ለመከላከል የሚረዱ ዘዴዎች

21/ የሰብል ጉዳትን ለመቀነስ የሚረዱ ዘዴ የቱ ነው

ሀ/ቀንናማታ መጠበቅ ለ/ወሾችን መጠቀም ሐ/አደን መ/መስፈራረኝ የሰው ምስል ሠ/ማጨስ

22/ በዘላቂነት መጠበቅ በአካባቢያችሁ ያለው ዘዴ ከሆነ ጠባቂው ማን ነው

ሀ/ሴቶች ለ/ህፃናት ሐ/ወንዶች መ/ሴቶች እና ህፃናት

23/ ሰብል አውዳሚ የዱር እንስሳት ለመግደል የምትጠቀሙበት መሳሪያ የትኛው ነው

ሀ/ድንጋይ/ብትር ለ/ጠመንጃ ሐ/ ወጥመድ መ/መርዝ

24/ ሰብልዎን ከዱር እንስሳት ጉዳት ለምን ያህል ሰዓት ይጠብቃሉ

ሀ/2 ሰዓት ለ/ 6 ሰዓት ሐ/ 9 ሰዓት መ/ 12 ሰዓት

ክፍል ስድስት-አባወራዎች ከተፈጥሮ ሀብት አጠቃቅም የተገነዘቡት ኢኮኖሚያዊ ጥቅሞች

25/ ከሚከተሉት ሀብቶች ውስጥ የትኛውን ከጫካ ይጠቀማሉ

ሀ/ የግጦሽ መሬት ለ/የእሳት እንጨት ሐ/መኖ መ/እንጨት ለቤት ግንባታ

አመሰግናለሁ

Appendix IV: Some photos taken from study area during field work (by Solomon Gedif)



Figure 2. Wolete Petros Unity Monastery



Figure 3. Focus group discussion



Figure 4. The study site around medihaniyalem



Figure 5. The center of the forest with cavernous



Figure 6. Block identification



Figure 7. Hyena White scats



8. Squirrel and Leopard Faces

Figure 9. Forest fragmentation by roads



Figure 10. During the dry season, the local people set fire to the forest at night time to promote fresh grass growth for their livestock



Figure 11. permanent guarding of crops by monk at forest zone



Figure 12. permanent guarding of crops by children



Figure 13. Honey bee protected from Honey badgers by these method



Figure 14. Over grazing by livestock



Figure 15. Illegal hunting of Klipspringer or አንቺቸካሳ

Appendix V: Collaboration letter or ethical clearance for the study (የትብብር ደብዳቤ)

በአማራ ብሔራዊ ክልላዊ መንግስት
በአዊ ብሔረሰብ አስተዳደር
የዳንግላ ወረዳ ባህልና ቱሪዝም ጽ/ቤት
Fax- 0582210707
TEL-0582210707

THE ANRS AWI NATIONALITY ADM-ZONE
DANGILA WOREDA CULTURE & TOURISM OFFICE
ቁጥር:- 699/5-3/2001
Ref. No
ቀን:- 14/03/2014 ዓ.ም
Date

ለወሰኑ ጴጥሮስ ገዳም
ዳንግላ

በአማራ ብሔራዊ ክልላዊ መንግስት
በአዊ ብሔረሰብ ዞን የዳንግላ ወረዳ
ባህልና ቱሪዝም ጽ/ቤት

ጉዳዩ:- ትብብር እንዲደረግላቸው ስለመጠየቅ!

ከላይ በጉዳዩ ለመግለጽ እንደተሞከረው ሁሉ አቶ ሰሎሞን ገደፍ የተባሉ ተማሪ በባህርዳር ዩኒቨርሲቲ ትመህርታቸውን ለማጠናቀቅ የመመመረቂያ ጽሁፍ ለማዘጋጀት በገዳሚና ዙሪያው አካባቢ ጥናት የሚያደርጉ መሆናቸውንና አስፈላጊው ትብብር እንድናደርግላቸው ዩኒቨርሲቲው በቁጥር 19/2014 ዓ.ም በቀን 09/02/2014 ዓ.ም በተጻፈ ደብዳቤ የጠየቀን ስለሆነ አስፈላጊው ሁሉ ትብብር ይደረግላቸው ዘንድ በትህትና እንጠይቃለን።

ግልባጭ//
➤ ለአቶ ሰሎሞን ገደፍ
ባሉበት

አሰላምታ ጋር!!
ጋ/ሚካኤል ታደሰ ብርሃኑ
H/MICHAEL TADFSSF BIRHANU
የዳንግላ ወረዳ ባህልና ቱሪዝም
ጽ/ቤት ኃላፊ

ራዕይ:- የወረዳውን ህ/ስብ ያሳተፈና ተጠቃሚነቱን ያረጋገጠ ፈጣን ማህበራዊና ኢኮኖሚያዊ እድገት የሚያገናጽፍ ዘላቂ የባህልና ቱሪዝም ልማት ስፍና ማየት!!
-Tourism for rural development!"