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Research Article

Crop Loss and Damage by Primate Species in Southwest Ethiopia

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Crop damage is a major form of human-primate conflict that not only affects the livelihoods of farmers living close to forest areas but also threatens nonhuman primate conservation. This study aimed to investigate the causes of crop loss and foraging by nonhuman primates in southwest Ethiopia. For the purpose of gathering data, we used a questionnaire and direct observation. We employed simple random sampling techniques to select villages and respondents. From the nine selected villages, a total of 130 household samples were identified for the questionnaire. The primates responsible for crop damage were olive baboons and grivet monkeys. Maize, barley, teff, potatoes, sorghum, and other crops were among those foraged by the nonhuman primate species. Farmland close to the woodland boundary suffered more damage than farmland further away. The total amount of maize damaged by the olive baboons and grivet monkeys in the selected kebeles varied significantly. The majority of the respondents used guarding, and a few of them used scarecrows to protect crops from damage by primates. The highest crop damage occurred in the Atiro Tigre and Arigno Gefere villages, while the lowest occurred in the Sedecha villages. The flowering stage of the maize suffered the most, and the seedling stage suffered the least, from grivet monkeys foraging. The growth of crops that are less edible to nonhuman primates, especially on the forest edges, would lessen crop damage.

1. Introduction

Human-nonhuman primate conflict arises as a result of competition for shared natural resources, affecting both human food security and the nonhuman primates' welfare [1, 2]. Crop damage, destruction of human property by primates, and retaliatory killing of primates by the local population are all examples of human-primate conflict [2–4].

Crop damage is the most prevalent form of human-primate conflict across the African continent [5–11]. Primate damage to crops results in significant economic losses [12]. Crop-raiders are commonly thought of as creatures that engage in this behavior [13]. Damage by primates near protected areas is a serious problem that could jeopardize conservation efforts [14]. Crop damage affects rural farmers' subsistence, particularly in developing countries [11, 15, 16], leading to food and economic insecurity for rural farmers, who finally become vulnerable to poverty [17]. Since it is the most prevalent source of human-primate conflict, understanding which elements of damage events determine crop loss is critical when building and evaluating deterrents [7].

Because of their reliance on natural resources, developing countries, particularly those in sub-Saharan Africa, are more vulnerable than developed countries [17]. Throughout the Horn of Africa, including Ethiopia, human-primate conflict is a well-known phenomenon [9–11]. Positive encounters, coexistence, and attitudes of tolerance toward primates are all key components of solutions that optimize conservation effectiveness [18].

Primates are highly significant pests in tropical areas, particularly in Africa, where the local people are mainly subsistence farmers [9, 19, 20]. Certain primates are extremely effective crop raiders, with baboons being the most successful and destructive crop foragers [10, 11, 21–23].

Reducing human-primate conflict is an urgent conservation priority and is a key to coexistence between humans

and primates in the Horn of Africa. There are many human-primate conflicts in Ethiopia that need solutions, but there is not enough empirical study of this issue. Most studies on human-primate conflict and coexistence in the country have been limited to protected areas [2, 24, 25]. Only a few studies have been conducted on the human-primate conflict in human-modified landscapes [8, 10, 11, 26–28]. For the reasons described above, as well as massive anthropogenic pressures and primate effects, research into human-primate conflict and coexistence in communal areas is critical. The current study aimed to collect information on the types of crops lost, the primates most responsible for crop damage, the extent of crop loss, and the local farmer's prevention measures to prevent crop loss to primates in communities near the forest edge in southwest Ethiopia.

2. Methods

The study was conducted in and around Belete Community Based Conservation Forest, Shebe Sombo district, Oromia Regional State, Southwest Ethiopia. The area lies between 36° 15′E and 36° 45′E longitudes and 7°30′N and 7°45′N latitudes, and it has a total area of 3749.32 ha (Figure 1). The mean annual rainfall and temperature of the area are between 1800 and 2300 mm and 15°C and 22°C, respectively. The location of the forest is between the altitudinal ranges of 2000 and 2500 m a.s.l. The southwestern forests of Ethiopia are characterized as moist Montana forest ecosystems [29]. The community's sources of income are crop cultivation, livestock rearing, coffee plantations, and other business activities.

Subsistence agriculture is the main economic activity of the community. Major crops grown in this district are maize (*Zea mays*), sorghum (*Sorghum bicot*), barley (*Hordeum vulgare*), teff (*Eragrostis tef*), and leguminous plants such as peas (*Pisum sativum*) and beans (*Phaseolus vulgaris*). Olive baboons (*Papio anubis*), grivet monkeys (*Chlorocebus aethiops*), lions (*Pantheraleo*), leopards (*Panthera pardus*), warthogs (*Phacochoerus africanus*), wild pigs (*Sus scrofa*), crested porcupines (*Hystrix criststa*), and African civets (*Civettictis civetta*) are the large mammalian species that inhabit the forest.

Based on a preliminary survey, the Shebe Sombo *woreda* was purposefully selected due to the presence of serious human-primate conflict in the area. Among the existing kebeles (the smallest administrative unit) that have links with Belete Forest, three kebeles (Sebeka Debiye (west and southwest directions), Atiro Gefere (northeast direction), and Sombo Der (east direction) were selected by using random sampling techniques. From those kebeles, nine villages were selected, three from each kebele, ranging from 0 to 2.5 km away from the boundary of the forest: Arigno Gefere, AtiroTigre, and Negade (Sebeka Debiye kebele); Bore Gefere, Basiro, and Wake Sepere (Atiro Gefer kebele); and Yabo, Toli Defera, and Sedecha (Sombo Deru kebele). Each village found in the selected three kebeles was classified into three groups based on their closeness to the forest edge: near (0.2–0.5 km), medium (0.5–1 km), and far (1–2.5 km), with one village from each group. The total number of household heads dwelling in the selected three kebeles was 2225. The total sample size was determined by using a probability sampling technique following the work of Cochran [30].

$$\text{i.e.} n_0 = \frac{z^2 * (p)(q)}{d^2}, \qquad n_1 = \frac{no}{1+N}, \tag{1}$$

where n_1 = population correction factor with a finite population of less than 10,000. z = standard normal deviation (1.96 for a 95% confidence interval). $p = 0.1$ (proportion of the population to be sampled, i.e., 10%). $q = 1 - p$ (i.e.0.9). d = the degree of accuracy desired (0.05). N is the total population.

A total of 130 sample households were selected using simple random sampling techniques. The distribution of sample households among each selected kebele was proportional to the number of household heads dwelling in each selected kebele.

The data for this study was collected from June 2020 to November 2020 through a questionnaire and direct field observation. Prior to the data collection, permission was obtained from the district authorities and local administrative offices to conduct the research. Similarly, respondents have also indicated their willingness to participate in the household interview after hearing an explanation of the aim of the study. Most data were acquired through open-ended (semi-structured) and closed-ended (structured) questionnaires. The questionnaire was given to the sampled household heads starting from the age of 20 years and beyond. The questionnaire was translated from the English language into the local language (Afan Oromo).

In addition to the questionnaire, we estimated crop loss using direct observation and indirect evidence (e.g., footprints, fecal drops, etc.) of the primates in the three selected villages based on the severity of the crop damage and the distance from the forest. The distances of Arigno Gefere, Atiro Tigre, and Yabo villages from the forest edge were 0.2–0.5 km, 0.5–1 km, and 1–2.5 km, respectively.

On each farm (one farmland from each village), an area of 50 m × 50 m was measured with a meter tape. Five 4-by-4-meter plots were placed randomly within each farm and observed three times a week for a total of six weeks during the study period to count the crop feeding events. For this study's purpose, the maize crop was selected since it is one of the main cultivated crops growing in the study area. In each of the cultivated lands, the condition of the maize crop before the damage and the area of the eaten part were recorded. To estimate the number of stands of the maize crop, the percentage crop losses for each farm were taken into consideration.

Observations were conducted from the time that crops were seedlings up to maturation. During the seedling, flowering, and maturation stages of development, eight-hour observations were made for three days in each farmland. In each of the maize growth stages, eight-hour observations were made for six days per farm.

Local farmers, assistants, and trained agriculturalists, in addition to the researcher, identified signs of crop damage on the crops, and the farm owners or other neighbors were trained and assigned to each farm to track and record the number of damaged maize crops and the responsible primates on the data collection sheet. The data was organized and examined using SPSS version 20. The Chi-square tests were performed to determine the amount of crop damage and the separation between the villages and the forest boundary, the amount of maize damaged by the primate species, the relationship between crop raiders and the damage occurrences, and the responders' approaches to controlling crop-damage primates. Significance was established with a p value of 0.05 or lower. The descriptive portion of the study made use of percentages and frequencies.

At the end of each developmental stage, the extent of damaged plants was added up, summarized, and recorded. The overall crop damage was estimated by comparing the initial number of plants in the farmland with the number of damaged plants and calculating a percentage. At each of the growth stages, the amount eaten by the primates was calculated as the total of the maize crops. The current market cost of the damaged maize crop yield in Ethiopian money (birr) was also estimated, and the price was converted to USD. After the yield was obtained, information about the price of the crop was obtained from the district agricultural office. Thus, the amount of yield loss per hectare was estimated. Local farmers were involved in the identification of the crop-damaging primates and the extent of the damage.

3. Results

Of the total respondents, 77.7% ($N = 101$) were males and 22.3% ($N = 29$) were females. Among the ages of respondents, 34.6% ($N = 45$) were between 20 and 40 years old, 49.2% ($N = 64$) were between 41 and 60 years old, and 16.2% ($N = 21$) were between 61 and 80 years old. The educational status of the respondents was illiterate ($N = 30$, 23%), informal education ($N = 20$, 15.4%), elementary school (1–8 grades) ($N = 52$, 40%), high school (9–12 grades) ($N = 22$, 16.9%), and 4.6% ($N = 6$) were college-educated or above. The respondent's own farmland size ranged from 0.5 ha to greater than 5 ha. Twenty percent ($N = 26$) had a 0.5–1 ha farm, 66% ($N = 86$) had a 1–2.5 ha farm, 13% ($N = 17$) had a 2.5–5 ha farm, and 1% ($N = 1$) had a farm larger than 5 ha. The main sources of income were crop production ($N = 78$, 60.0%), livestock rearing (12.3%, $N = 16$), and both crop production and livestock rearing (27.7%, $N = 36$).

The distance of the respondents' farmland to the forest edge was near (57.7%, $N = 75$), medium (25.4%, $N = 33$), and far (16.9%, $N = 22$). The majority of respondents indicated that crop damage was greater for those living near the forest edge than for the rest. The amount of crop damage was significantly greater for farms nearer the forest boundary ($\chi^2 = 61.194$, $df = 2$, $p = 0.000$).

The types of crops damaged by the primates in the villages were maize ($N = 77$, 59.2%), barely ($N = 17$, 13.1%), sorghum ($N = 12$, 9.2%), teff ($N = 11$, 8.5%), potatoes ($N = 8$, 6.2%), and other crops ($N = 5$, 3.8%). The highest crop loss occurred in the Atiro Tigre ($N = 20$, 15.4%) and Arigno Gefere ($N = 19$, 14.6%) villages, while the lowest occurred in Sedecha village ($N = 8$, 6.2%) (Table 1).

We investigated the extent of the crop damage caused by the olive baboon and the grivet monkey on the maize crop (Figure 2). The total estimated number of maize plants damaged by the olive baboon in different growing stages of the study area was 33,000, i.e., seedling ($N = 5{,}000$), flowering ($N = 13{,}000$), and ripening ($N = 15{,}000$) stages. The damaged maize crop in each kebele by the olive baboon was 36.4% in Sebeka Debiye, 34.8% in Atiro Gefere, and 28.8% in Sombo Deru kebele (Table 2). The total amount of maize damaged by the olive baboons and in the selected kebeles varied significantly ($\chi^2 = 93.485$, $df = 4$, $p = 0.001$). The total amount of maize damaged by grivet monkeys in all the study kebeles in various growing stages was 16,125 plants, i.e., seedlings ($N = 2{,}375$), flowering ($N = 9{,}000$), and matured ($N = 4{,}750$).

The damaged maize crop by the grivet monkeys in each kebele was 38% in Sebeka Debiye, 35.7% in Atiro Gefere, and 26.3% in Sombo Deru kebeles. The total amount of maize damaged by the grivet monkeys varied significantly between the selected kebeles ($\chi^2 = 35.421$, $df = 4$, $p = 0.031$). The grivet monkey attacked the crops in the following stages of development: Sebeka Debiye (12% at seedling, 47% at flowering, and 41% at ripening); Atiro Gefere (17% at seedling, 46% at flowering, and 37% at ripening); and Sombo Deru (15%, 82%, and 3% at seedling, flowering, and ripening, respectively) (Table 3).

Grivet monkeys were a well-known problematic primate species that frequented farmland during the blossoming stage and were difficult for guardians to keep track of. The flowering stage suffered the most damage of all the kebeles, while the seedling stage suffered the least in Sebeka Debiye and Atiro Gefere kebeles. The olive baboon, on the other hand, caused more harm during the ripening stage than during the blossoming stage.

According to the respondents, the distance of farmland from the forest edge was an important factor that determined the amount of crop damaged by primates. Based on direct observation and respondent responses, the damage was more severe nearest the forest edge. The respondents indicated that the trend of crop damage by primates in the study area was increasing (76.2%), decreasing (16.2%), and unknown (7.7%), respectively (Table 4).

The amount of crop damage was different depending on the distance of the village from the forest edge and the type of primate that caused the crop damage. Out of these villages, the highest crop damage events were recorded in Sebeka-Debiye (39.9%) (near), Atiro-Gefere (35.1%) (medium), and the least was in Sombo-Deru (28%) (far). As observed during the study, the farmlands of two study areas, Sebeka-Debiye and Atiro-Gefere, were closest to forest edges. This might be due to the exposure of farmlands to forest edges, where the primates are more attracted to visiting and damaging crops. The forest also provides the primates with a safe refuge (a place to flee), so they feel more comfortable near the forest edge. There was a substantial correlation between primates and the damage occurrences recorded in all kebele ($\chi^2 = 12.325$, $df = 2$, $p = 0.00$) (Table 5).

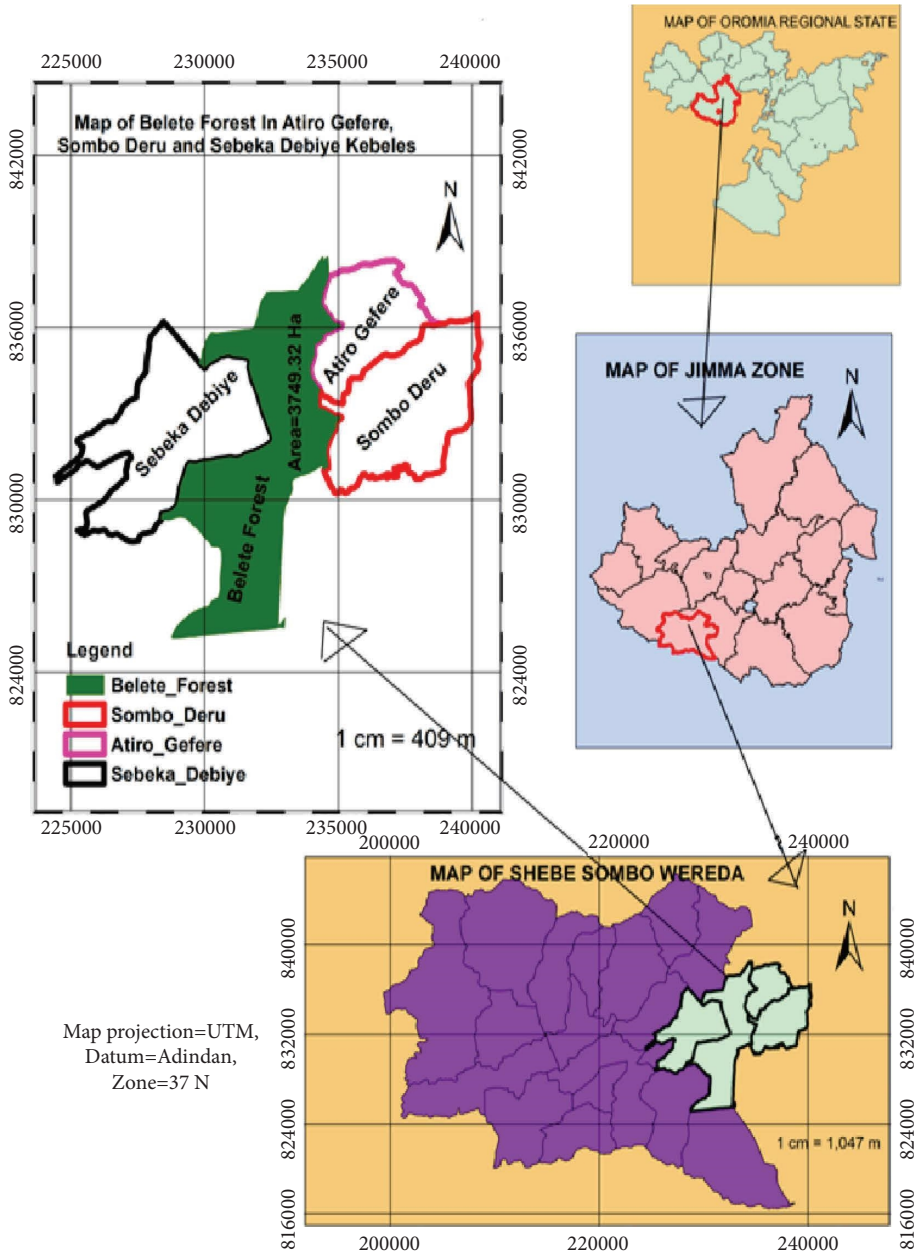

Figure 1: Map of the study area (source: from GIS satellite by Taso Asefa).

Table 1: The types of crops fed on by primates in the study villages.

Villages	Distance	Crop feeding events						Total
		Maize	Barely	Teff	Potatoes	Sorghum	Other	
Yabo	Far	0	10	1	0	0	0	11
Toli Defera	Far	2	0	8	0	0	0	10
Arigno Gefere	Near	5	4	1	8	1	0	19
Negade	Near	3	2	0	0	9	0	14
Sedecha	Far	1	0	0	0	2	5	8
Bore Gefere	Medium	16	0	0	0	0	0	16
Atiro Tigre	Near	19	1	0	0	0	0	20
Waku Sepera	Medium	17	0	1	0	0	0	18
Basiro	Medium	14	0	0	0	0	0	14
Total		77	17	11	8	12	5	130

Figure 2: Anubis baboons damaging crops in the study area.

Table 2: The number of damaged plants and percentage of maize crop fed by olive baboons at each development stage per hectare.

Kebeles	Growing stage			Total	Mean	Percentage
	Seedling	Flowering	Mature			
Sebeka Debiye	1625	5125	5250	12000	4000	36.4
Atiro Gefere	2000	4375	5125	11500	3833.3	34.8
Sombo Deru	1375	3500	4625	9500	3166.7	28.8
Total	5000	13000	15000	33000	11000	100
Mean	1666.7	4333.3	5000	11000		
Percentage	15.2	39.4	45.4			

Table 3: The number of plants damaged and percentage damaged by grivet monkey feeding on maize crops at each stage of development per hectare.

Kebeles	Growing stage			Total	Mean	Percentage
	Seedling	Flowering	Ripened			
Sebeka Debiye	750	2875	2500	6125	2041.7	38
Atiro Gefere	1000	2625	2125	5750	1916.6	35.7
Sombo Deru	625	3500	125	4250	1416.7	26.3
Total	2375	9000	4750	16125	5375	
Mean	791.7	3000	158.3			
Percentage	14.7	55.8	29.5			

Table 4: The approximate distance between farmland and forest, as well as the trend of crop feeding by primates.

Kebele	Distance from the forest	Frequency	Increase	Decrease	Unknown
Sebeke Debiye	0.2–0.5 km	62	54	5	3
Atiro Gefere	0.5–1 km	41	29	7	5
Sombo Deru	1–2.5 km	27	16	9	2
Total		130	99	21	10
Percentage			76.2	16.2	7.7

Table 5: Feeding events by different primate species in each kebele.

Kebele	Crop feeder		Total	Percentage
	Olive baboon	Grivet monkey		
Sebeke Debiye	96	49	145	36.9
Atiro Gefere	92	46	138	35.1
Sombo Deru	76	34	110	28
Total	264	129	393	
Percentage	67.2	32.8		

The overall damaged area of the maize crops by the olive baboon in all of the study kebele in different growing stages was 10552 m^2, out of the total size of the farmed area (14520000 m^2), i.e., seedlings ($N = 1602.5\ m^2$), flowering ($N = 4162.5\ m^2$), and ripening ($N = 4787\ m^2$). The total area of the maize crops damaged by olive baboons in each kebele was 36.4% in Sebeka-Debiye, 34.8% in Atiro-Gefere, and 28.8% in Sombo-Deru (Table 6).

The total area of maize crops damaged by grivet monkeys in all of the study kebeles in different growing stages was 4795 m^2, i.e., seedlings ($N = 662.5\ m^2$), flowering ($N = 3237.5\ m^2$), and ripening ($N = 795\ m^2$). The total area of maize crops damaged by grivet monkeys was different in Sebeka-Debiye (33.2%), Atiro-Gefere (38.2%), and Sombo-Deru (28.5%) kebele (Table 7).

As calculated based on the five sampled plots of maize crop farmland, about 198.4 quintals (19,840 kg) of maize yield was expected in the study area per year. The total yield loss of the maize crop in all the kebeles was about 57.4 quintals (5740 kg, 28.93%), out of which 38.6 quintals (3860 kg, 19.46%) were lost by the olive baboon (Table 8) and 18.8 quintals (1880 kg, 9.47%) by the grivet monkey (Table 9). In monetary terms, the overall loss of farmers' crop yield in the study area was estimated at about 80360 ETB (Ethiopian Birr money currency) (the equivalent of about 1,610.41 USD), of which 54040 ETB (1,082.96 USD) was lost by the olive baboon and 26320 ETB (527.45 USD) was lost by the grivet monkey.

The respondent's attitude towards conservation of the primates in the study area was positive ($N = 77$, 59.2%), negative ($N = 49$, 37.7%), and neutral ($N = 4$, 3.1%). The respondents asserted that it is the government's responsibility to conserve the primates ($N = 41$, 31.5%), the society's ($N = 15$, 11.5%), both the government and the society's ($N = 71$, 54.6%), and the NGO's ($N = 3$, 2.3%).

During the survey, respondents utilized several measures to defend their crops against primates, including guarding ($N = 113$, 86.9%), smoking ($N = 12$, 9.2%), constructing scarecrows ($N = 2$, 1.5%), and others ($N = 3$, 2.3%). The respondents' approaches to controlling crop damage by primates varied greatly ($\chi 2 = 31.282$, $df = 10$, $p = 0.05$). Crop guarding was the most efficient means of preventing primates from stealing harvests. Respondents cited guarding ($N = 94$, 72.3 percent), leaving a buffer zone ($N = 24$, 18.5 percent), chasing and scaring ($N = 7$, 5.4 percent), and fencing ($N = 5$, 3.8 percent) as the most effective methods for reducing crop damage.

4. Discussion

The findings of the study suggest that human-primate interaction is posing a serious problem for the livelihood of the local community living around the Belete Forest in southwest Ethiopia. The majority of the respondents in the study area had a low level of education, which might be a major factor in obtaining better employment opportunities and subsequent alternative sources of income. The level of crop feeding by primates was severe in the villages near the forest edge when compared to the villages farther from the forest edge. Demeke and Afework [31] showed that the village's distance from the park and the damage caused by primates are important factors in determining crop losses. According to the study conducted by Mwakatobe et al. [32], crop feeding is a serious source of conflict in the communities adjacent to protected areas.

From the time of germination through the ripening stage, maize was the most favoured and seriously attacked crop by primates in the research region. This could be related to the crop's environmental adaptability and suitability, as well as its sugary nature, which attracts primates more than other crops. On the other hand, the tassel and ripening stages of maize offered abundant food energy and were suitable for the primates to hide on the farm. Hill [21] explained that the pleasant character of every portion of maize makes it superior to other crops for monkeys. Warren [33] discovered that the most regularly eaten crop by crop-damaging animals in West Africa was maize (ripe and dry). Crop raiders did not cause similar harm to all crops [34]. Maize was the most vulnerable crop in the research area, followed by barely, teff, potatoes, and sorghum. Gobosho et al. [35] found that maize is one of the most vulnerable crops in southwestern Ethiopia and that it is heavily impacted by crop-damaging species during the growing season. An FAO assessment in 2009 indicated that crop loss was the most common form of human-wildlife conflict across the African continent. Farmers' grain output in Ethiopia's Cheha District has been endangered by wild animals [36].

The olive baboon and grivet monkey were identified as major crop-damaging animals in the study area. A similar study by Gobosho et al. [35] showed that olive baboons and grivet monkeys were among the most commonly identified crop-foraging wild animals on the crops in the Gera district, Southwest Ethiopia. Similarly, the work of Kebede et al. [37] indicated that grivet monkeys and olive baboons were among the major wild animals that frequently damaged crops.

Table 6: Maize crops fed on at different stages in m^2 by the olive baboons.

Kebele	Growing stage			Total	Mean	Percentage
	Seedling	Flowering	Ripened			
Sebeke Debiye	525	1637.5	1675	3837.5	1279.1	36.4
Atiro Gefere	640	1400	1637	3677	1225.7	34.8
Sombo Deru	437.5	1125	1475	3037.5	1012.5	28.8
Total	1602.5	4162.5	4787	10552	3517.3	
Mean	534.2	1387.5	1595.7			
Percentage	15.2	39.4	45.4			

Table 7: Maize crops fed on at different stages in m^2 by the grivet monkeys.

Kebele	Growing stage			Total	Mean	Percentage
	Seedling	Flowering	Ripened			
Sebeke Debiye	237.5	1275	80	1592.5	530.8	33.2
Atiro Gefere	325	837.5	675	1837.5	612.5	38.3
Sombo Deru	200	1125	40	1365	455	28.5
Total	762.5	3237.5	795	4795	1598.3	
Mean	254.2	1079.2	265			
Percentage	15.9	67.5	16.6			

Table 8: The amount of maize yield loss in terms of the market value caused by the olive baboon.

Kebele	Expected yield (kg)	Observed yield (kg)	Yield difference (kg/birr)	Market value (birr/kg)	Annual monetary loss (ETH birr/kg)	Percentage
Sebeka Debiye	6640	5240	1400	14	19600	36.3
Atiro Gefere	6570	5220	1350	14	18900	34.9
Sombo Deru	6630	5520	1110	14	1554	28.8
Total	19840	15980	3860		54040	
Percentage	100	80.5	19.5			

Table 9: The amount of maize yield loss in terms of the market value caused by the grivet monkey.

Kebele	Expected yield (kg)	Observed yield (kg)	Yield difference (kg/birr)	Market value (birr/kg)	Annual monetary loss (ETH birr/kg)	Percentage
Sebeka Debiye	6640	5930	710	14	9940	37.8
Atiro Gefere	6570	5900	670	14	9380	35.6
Sombo Deru	6630	6130	500	14	7000	26.6
Total	19840	17960	1880		26320	
Percentage	100	90.5	9.5			

Mwakatobe et al. [32] identified baboons as the most crop-damaging species, particularly in the areas surrounding Serengeti National Park in Tanzania.

The olive baboon and the grivet monkey were generating problems with people by damaging crops at all stages of growth, from germination to maturity. In crop-damaging activities around Belo-Bira Forest, Dawro Zone, and Southwestern Ethiopia, Shanko et al. [28] found similar results, with the olive baboon being the most commonly recognized primate species, followed by the grivet monkey. The olive baboon caused the most harm during the ripening stage of maize development, while the grivet monkey caused the most during the flowering stage. Hill [21] reported that baboons appeared to concentrate their crop-damaging activities primarily on maize throughout the year, even when other crops were present in the area.

During the survey, all respondents named the olive baboon and the grivet monkey as the most harmful animals to crops, in that order. Mwakatobe et al. [32] identified baboons as the most crop-damaging species, particularly in the areas surrounding Serengeti National Park in Tanzania. Grivet monkeys are well-known pest primates that congregate on fields during the blossoming season and are difficult to control. This could be owing to the farm fields' being close to monkey habitats, as well as the abundance of trees that help monkeys by giving them cover from guards.

So, to alleviate the existing problems, there is a need for sustainable education in the local community, and conservation management measures are needed by the concerned stakeholders.

4.1. Implications for Conservation. Conflicts between humans and primates exist in different forms all over the world, particularly in developing countries where people depend on agricultural activities. The recognized types of conflicts in the study area were crop damage, mainly by olive baboons, and grivet monkeys. More damage was recorded in the flowering stage by the grivet monkey and in the ripening stage by the olive baboon. The maize crop was the most susceptible to crop pest attacks. The amount of money lost on these crops by the aforementioned primate crop raiders was high and is affecting the livelihood of the people. The farmers of the study area are suffering from a shortage of food due to crop loss. This crop damage by primates not only affects the farmer's ability to feed his or her family but also decreases the ultimate growth of the country as a whole. Farmers who are closer to the forest or who are planting maize must be extra cautious of crop-damaging primates while on the lookout for different species at different phases of the crop's development. All the concerned stakeholders should work together to reduce illegal human settlements and the expansion of farmlands to the forest edge for the long-term livelihood of the local farmers who live in the forest area. This also gives opportunities for society to live in harmony with the existing primates.

Data Availability

The datasets generated and analyzed during the current study are included in this paper.

Ethical Approval

This study was conducted in accordance with the Declaration of Helsinki, which provides guidance for researchers to protect research subjects. The study was approved by the Institutional Research Review Board (IRB) of Wolaita Sodo University.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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