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CASE REPORT

Home Garden Crop Raiding and Attitude of Local Peoples Towards Wildlife Conservation Surrounding Yayu Coffee Forest Biosphere Reserve, Southwest Ethiopia

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ABSTRACT

Crop loss can undermine human welfare, health, safety, conservation efforts and have economic and social costs. This study was conducted to assess homegarden Crop raiding and attitudes of farmers towards wildlife conservation along distance gradient from the forest edge, to surrounding the agricultural landscape of Yayu coffee forest biosphere reserve, southwest Ethiopia . To conduct the data a total of thirty transects each 1km long, with 200m interval between transects, were laid out from forest edge towards agricultural landscape and 124 HHs were randomly selected for questionnaire survey. On each of the transects three to four homegardens were randomly selected to assess homegarden crop species composition; to know how crop raiding frequency affects crop species composition in homegardens. Here, in total, 90 homegardens (i.e., thirty home Homegardens from each location,) were used for the crop composition assessment. The perception of the respondents on crop raiding and wildlife conservation at different distances from forest edges were tested with Pearson's Chi-square test and the mean species richness in homegardens was tested with One-way ANOVA. The study result indicated that, there was a significant spatial variation of crop raiding across the landscape in home gardens ($p=0.001$), frequency of crop raiding shows decreasing trend with increasing distance from the forest edge, and it was severe close to forest edge. Majority of the farmers close to forest edge have negative feeling to wildlife's, due to heavy crop loss and to mitigate heavy crop loss caused by wild animals, farmers nearest to the forest edge should change their farming practices. Further study is needed to find alternative crop species, which is less palatable to crop raiders and could grow in the agro climatic condition of the area.

Keywords: Biosphere Reserve; Close to Forest; Crop Raiding; Ethiopia; Forest edge; Yayu

Introduction

"Crop raiding" refers to when wild animals come out of their natural habitats to the farm lands either crop fields or homegardens to raid the crops that the farmers have grown for their own and their families' consumption [1]. This could be directly affects local people's perception towards wildlife's or their habitats and support for conservation initiatives [2]. The conflicts between human and wildlife specially in the form of crop raiding around protected areas continue to be a growing challenge in contemporary conservation, especially when attempts are made to balance global environmental goals with local residents' livelihood activities [3]. As a result, several previous studies have indicated that human-wildlife conflict has become sever across the globe and need an in depth analysis to understand the socio ecological system related to this human-wildlife interaction in the way that such understanding will support the conservation of threatened and potentially endangered species [4].

Finding the effective human-wildlife conflict mitigation methods requires an understanding of the conflict patterns, species involved and attitudes of local people living along protected area boundaries, because the conservation of wildlife and their habitats requires giving priority for reducing conflict between wildlife and humans mainly in agricultural landscapes where people are densely populated and wildlife co-occur(Megaze etal.,2017). The transforming of natural landscapes to predominantly human modified landscapes triggers the degree of competition between humans and wildlife for space and resources [5]. In spite of diverse and unique nature of the Ethiopian landscape and ecological diversity, the natural resources of the country are declining by human activities. This has increasingly restricted wild animals' movement of the country to a few protected areas and this could be victims the farmers who are living surrounding protected areas or adjacent to the forest (Bekele et al., 2011). The frequency of crop damage due to wild animals crop raiders varies with distance from wild nature to human modified landscapes [6,7]. Moreover, the intensity and types of damage caused by wildlife vary with crop raider species, time of the year and type of crop species grown [8]. Nevertheless, in Ethiopia only few studies were carried out on crop raiding and attitude of local peoples on conservation in some specific regions of the country in general (Kumssa and kBekele ,2008) and in south western part in particular. Therefore, this study was conducted in view of bridging this gap and come up with recommendations for future research and policy intervention to reduce the problem. The result of the study may also provide information to planners, researchers, extension organizations, development institutions and individual farmers to enhance farming process.

Materials and Methods

Description of the Study Area

The Yayu Coffee forest Biosphere reserve (Figure 1) is located at about 560 km from Addis Ababa in southwest Ethiopia within the Illubabor Zone of Oromia National Regional State, within altitudinal range from 1140 to 2562 m a.s.l [9]. It lies between 8°10'0"N-8°20'0"N Latitude and 35°40'00"E-36°0'00"E Longitude. Yayu forest was designated as Yayu coffee forest biosphere reserve in 2010 by

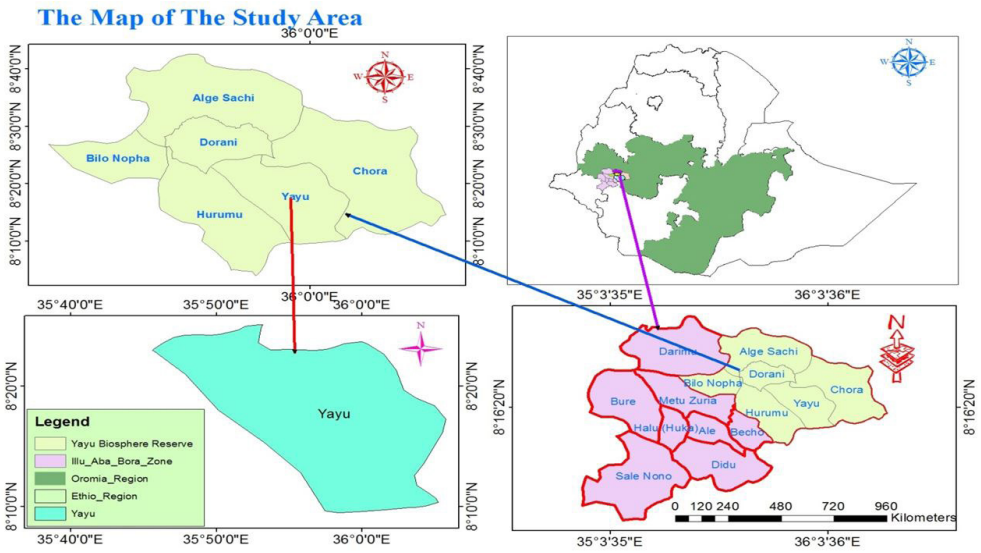

Figure 1: Map of the Yayu coffee forest biosphere reserve

United Nations Educational, Scientific and Cultural organization (UNESCO) for the in-situ conservation of wild Arabica Coffee [10]. The total area of YCFBR is about, 167,021ha and the area forms the dispersal area for agriculture and most conducive to livestock grazing, wild animal conservation and tourism. The YCFBR consists of three zones including core zone amounts to 27,733 ha-is undisturbed natural forest area, buffer zone (21,552 ha)-consists of mainly semi-forest coffee and where controlled use of forest resources is exercised by local communities and transitional zone-covers the area 117,736ha which is comprised different land use types, such as, crop land, plantations, grasslands, wetlands, managed coffee forests, and settlements [11].

The YCFBR has bordering with six districts namely; Yayu, Hurumu, Doreni, Bilo -nopha, Alge-sachi and Chora. From these six districts found in the reserve, based on the preliminary information gathered during scoping survey on the level of human-wildlife conflict, from(ILAGNRMO), Yayu district was purposively selected for the study, because of the presence of serious HWC in the area. Correspondingly, out of five kebeles included into YCFBR, from the district two kebeles, namely, Bondao-magela and Geci were selected. In the next Villages found in the selected two kebeles were categorized (stratified) into three groups based on their proximity to towards to forest edge as -Bondao and Dogi-villages close to forest edges (<0.5km), -Magela and Geci-Intermediate villages (0.5-1km) and Agaro and Leku- villages far from the forest edges (>1 km) following the method used by [12, 13]. In total, six villages were selected.

The area is crossed by three major rivers, i.e., Geba, Dogi and Sese (Gole et al., 2008). The dominant soil of the area includes nitosols, acrisols, vertisols, and cambisols [14]. It has hot and humid climate, with the mean annual temperature of around 20°C oscillating between the average extremes of 12°C and 29°C. The area exhibits a uni-modal rainfall pattern with mean annual precipitation of 2100 mm, with high disparity from year to year, and ranging from 1400 to 3000 mm (Gole et al., 2008). It is rich in flora, avifauna and animal species. There are, about, 450 higher plant species, 50 animals, 200 birds and 20 amphibian species, of which over 100 species of plants, birds and animals are only found in this reserve area (Gole et al., 2009).About 154, 300 permanent residents live in the transition areas of YCFBR, and mainly relying on agriculture [16].

For more than 90% of the population of the study area agriculture is considered to be main source of livelihood and it is characterized by mixed farming systems run by smallholders (Gole et al., 2009). The mixed farming system comprises coffee and cereal crop production, animal husbandry, beekeeping and spices. The major cereal crops include; maize, sorghum, teff, wheat, burley and millet. Coffee is the major cash crop accounting for over 60% income (Gole, 2003).The agricultural landscapes of surrounding Yayu Biosphere reserve, is of mosaic type and forests cover most of the area, and consist of four major variations, namely undisturbed natural forest, semi-forest coffee systems, fully managed forest for coffee production, and old secondary forests (Gole et al., 2009).

Methods

Sampling Design

To study the homegarden crop damage in relation to distances from the forest edge to surrounding the agricultural landscape of Yayu coffee forest biosphere reserve, transects were laid out from forest edge towards agricultural landscape and three complementary data collection methods namely questionnaire survey, focus group discussion and direct observation were used along the transects.

Sample size determination

The sample size of the households to be tal[illegible] was calculated using the formula [15] based on the total numbers of household head living in the two kebeles which is 1265 acc

$$no = \frac{Z^2 * (P)(q)}{d^2} \qquad n_1 = \frac{no}{(1 + no / N)}$$

Where: no= desired sample size when population greater than 10000
n1 = finite population correction factors less than10000

Z = standard normal deviation (1.96 for 95% confidence level)

P = 0.1 (proportion of population to be included in sample i.e. 10%)

q =is 1-P i.e. (0.9)

N = is total number of population

d =is degree of accuracy desired (0.05)

$$n_1 = \frac{(1.96)^{2*}(0.1)\ (0.9)\ = 138.29}{(0.05)^2}$$

n1= 138.29

138.29 → = 138.29/1265=0.11+1=1.11=138.29/1.1=124

1+1265

Based on [15] population correction factors, a total of 124 (61 from Bondaomagela and 63 from Geci) sample household were selected for questionnaire survey, using simple random sampling techniques from the total population of 1265(625 from Bondaomagela and 640 from Geci) for present study. Then after the HHs were proportionally selected from each stratified villages, as village (close to forest edge 48, intermediate 38 and far from the forest 38).

Data collection

A total of thirty transects each 1km long with 200m interval between transects (ten close to forest, ten intermediate and ten far from the forest edge) were laid out from the forest edge towards agricultural landscape and all of the data were collected by walking along these transects. Farmers were randomly selected from each of the transects and questionnaire survey were held along the transect .

Questionnaire survey

Questionnaire survey were used to acquire information on demographic aspects of the respondents, types of wild animal crop raiders, types of crops prone to crop raiding, frequency of crop raiding, attitude of farmers towards wildlife and their habitat conservation.

Questionnaire were prepared in English language and translated into Afan Oromo since the majorities of the respondents were Afan Oromo speakers.

Homegarden crop species composition assessment

On each of the transect three to four homegardens were randomly selected to assess homegarden crop species composition. Here, in total, 90 homegardens (i.e., thirty homehomegardens from each location,) were used for the crop composition assessment (Appendix I).

Focus Group Discussion

To explore the spatial extent of homegarden crop damage due to crop raiding, or to debate, share and verify the study subjects' responses and to obtain deep and validate data, focus group discussion was held with 8-12 households selected from each village using the checklist prepared for open discussion.

Direct Observation

In addition, direct observation and assessment were made on the extent of crop damage to identify the types of crops damaged by crop raiders . To identify the type of crop raiders based on the different signs of attack marks(their feeding sign) from damaged crops and foot marks of these crop raiders were used, the method used by [16].

Data analysis

The homegarden crops mean species richness in homegardens at different distance from forest edges (i.e., among the three locations) was tested with One-way ANOVA. Moreover, the response of farmers on attitude towards wildlife conservation was tested using the Pearson's Chi-square test. The data on the demographic information of the respondents was analyzed using descriptive statistics. All data were analyzed using R-statistical program (version 4.0.2).

Result

House hold characteristics of the respondents

The general information about the demographic data obtained from the respondents which include the gender, age and education level was identified before conducting the research.

Gender

From the data collected of 124 respondents, the finding, indicated that 98(79%) of the information were received from males and 26 (21%) of the response were received from females as indicated.

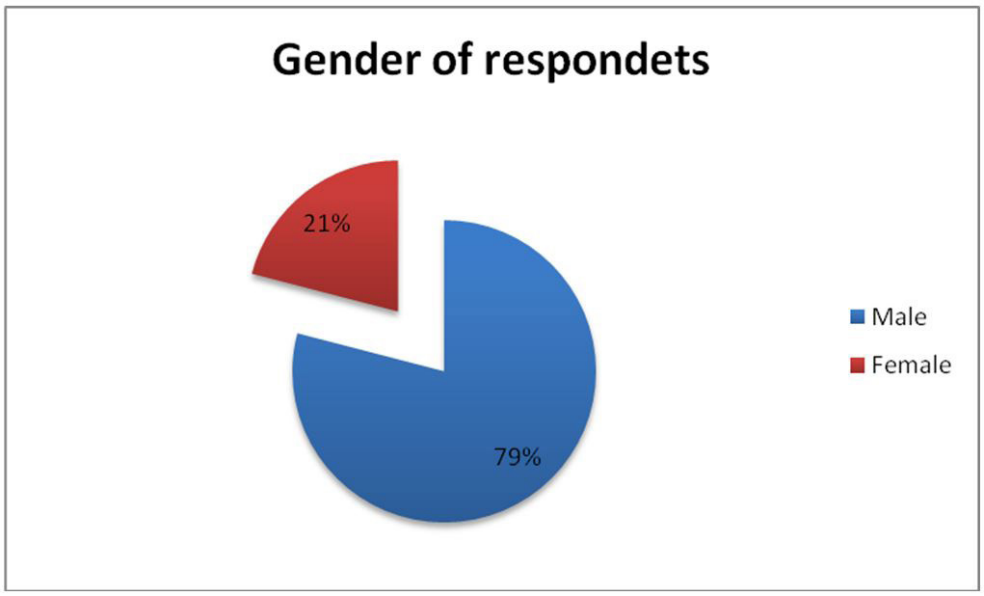

Figure 2: Gender of respondents

Age

The respondents were classified in age range of 18-30 years with 24 (19.4%), followed by age groups of 31-45 years with 51 (41. 3%), 46-60 years with 40 (32.3%) and above 61 years were 9 (7. 3%).The majority of the respondents were living along the forest edge and who were living for a long period of time in the study area. Respondent farmers for the administered questionnaire survey were in the maturity age and they had an experience in agricultural activities and also trained in the challenges and crop raiding activities.

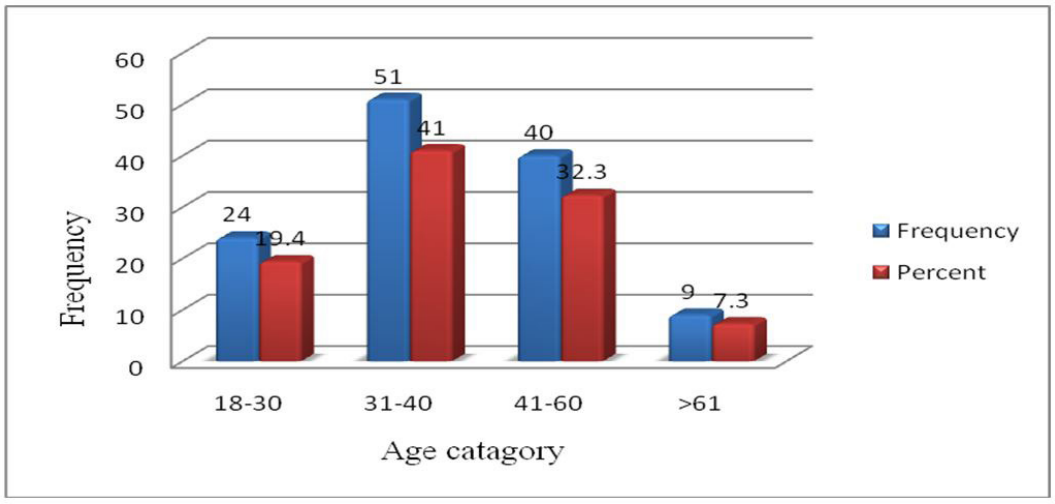

Figure 3: 3 age of respondents

Educational back ground of the respondents

Educational background of the study area were identified as follows;32(25.8%) cannot read and write,51 (41.13%) were able to read and write,24 (19.4%) attended primary level (1-8) 17(13.7%) those who had attended secondary level (9-12).

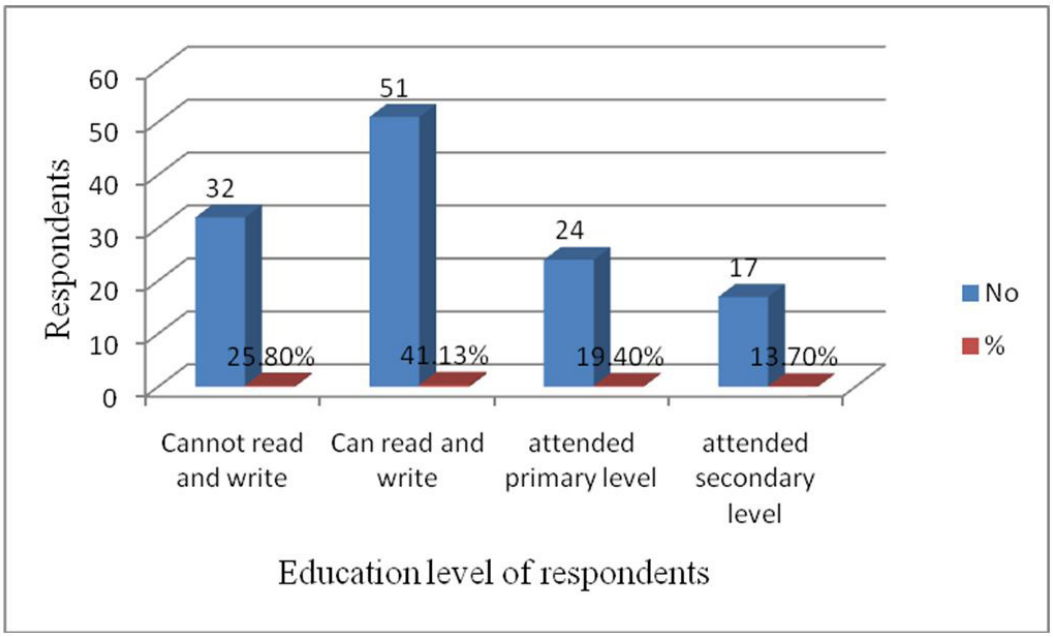

Figure 4: Educational backgrounds of respondents

Homegarden crop composition and level of their susceptibility to crop raiders

Crop species ranging from fruits, vegetables, spices, root crops and cereal crops, totally about 54 crop species representing to 32 families with a maximum number of 24 and a minimum of 4 species were identified in the assessed Homegarden (Appendix I). The mean number of species per homegarden was 12.35 (range, 4–21) close to forest edges, 13.85, at intermediate (range 7-22) and 14.9 (range 8–24) far from forest edges(figure 5). The result was in line with [7] who were reported that the mean number of species per homegarden was 10.9 (range, 5–22) close to forest edges and 12.3 (7–21) far from forest edges. The present finding showed that the distribution/diversity of homegarden crop species richness shows increasing trend with increasing distance from the forest edge (Figure 2). However, there was no significant difference among the sampled locations (F=3.042, p= 0.08), (Figure 6).

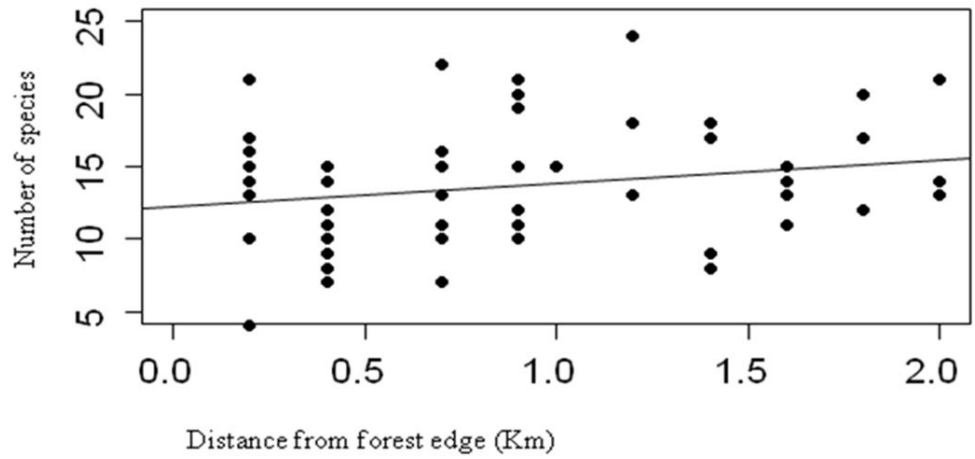

Figure 5: Homegarden crop species richness at different distance from the forest edge

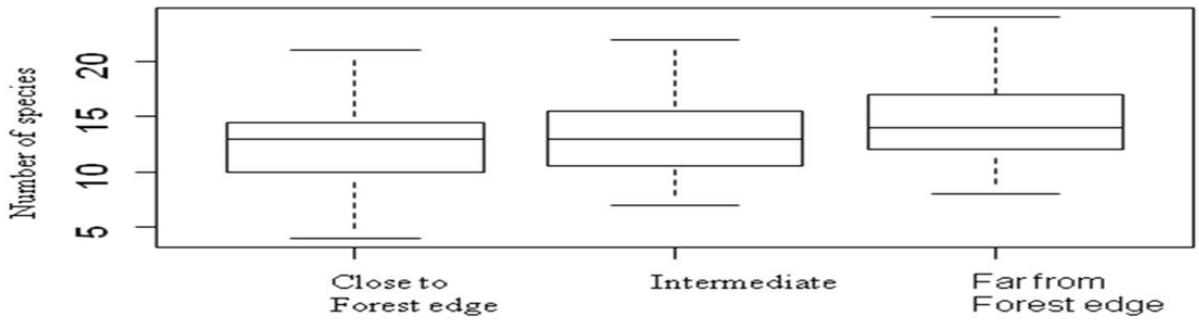

Figure 6: Homegarden crop species grown in the sampled locations across the landscape

The significant spatial variation of crop damage (p-value=0.001) by wild animal crop raiders at different parts of the landscape was found in the study area. Crop raiding frequency was showed that decreasing trend with increasing distance from the forest edge or increasing trend with decreasing distance from the forest edge (Figure7). However, the distribution of the crops was observed that most homegarden crop species were grown with the similar frequency in all sampled locations or farmers' crop growing practices at different parts of the landscape was similar. Similar study were conducted in Gera district southwest Ethiopia by, Hylander *et.al*, (2014) who were observed that farmers close to the forest grow the same crops in approximately the same frequency as farmers at some kilometers from the forest edge.

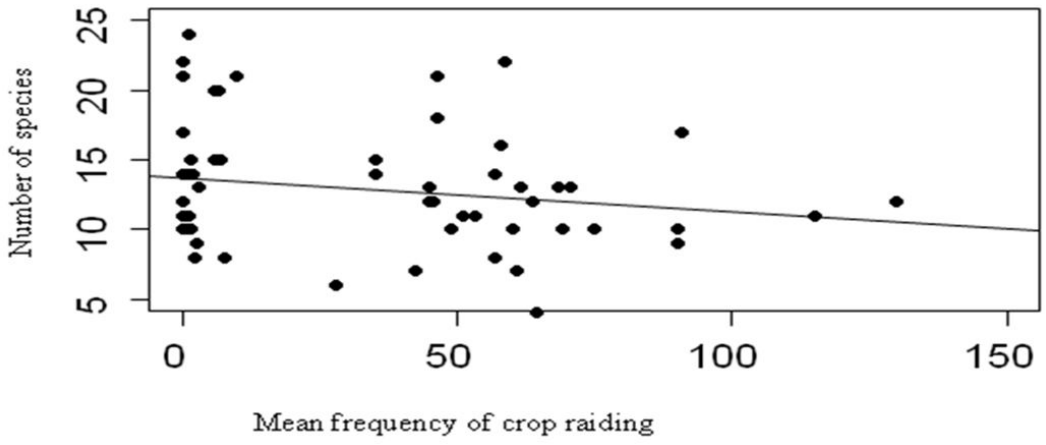

Figure 7: Frequency of crop raiding Vs crop species richness at different distance from the forest edge

Attitude of local farmers towards wildlife conservation

The attitude of the respondents towards wildlife conservation was assessed, depending on distance from the forest edge and it was showed that a significant difference (x2= 32.432, df = 5, p-value = 0.001) among the sampled locations towards wildlife conservation. According to response from the farmers 81.25% from a villages close to the forest edge, 65.8% from an intermediate distance from the forest edge and 52.6% from a villages which are located far away from the forest edge have negative attitude towards wildlife conservation (table 1).

Location	n	Negative attitude	%	Positive attitude	%
Close to forest	48	39	81.25	9	18.75
Intermediate	38	25	65.8	13	34.2
Far from forest	38	20	52.6	18	47.4
Total	124	84	67.7	40	32.3

Table 1: Attitude of farmers towards wildlife conservation

On the contrary, 18.75% from a villages close to forest edge,34.2% from intermediate distance from the forest edge and 47.4% from a villages which are located far away from the forest edge have positive attitude towards wildlife conservation in the present study area (Table 1). Majority of the farmers (67.7%) were argued that wildlife conservation had no importance. The main reason given for viewing wildlife conservation negatively was due to crop damage by wild animal crop raider species damages their crops.

Wild animal species responsible for damaging homegarden crops were Olive baboon (Papio Anubis),vervet monkey (Chloroaethiops) (L.), Bush pigs (Potamochoeruslarvatus and Crusted porcupine(Hystrixcristata)(L.) in the study area(table2).

Common name	Scientific name	Local name	Rank based on damage they cause
Olive baboon	Papio Anubis	Jldeessa	1
Vervet monkey	Chloroaethiops (L.)	Qamalee	2
Bush pig	Potamochoeruslarvatus	Booyyee	3
Crusted porcupine	(Hystrixcristata) (L.)	Xaddee	4

Table 2: Types of major wild animal crop raiders in the study area

According to respondents, high crop losses by wild animals were recorded in the closest villages (<0.5 km), and the least crop losses were recorded in the farthest villages (>1km). Response of the farmers in (table: 2) revealed that there was strong conflict between local farmers and wild animals in villages adjacent to the forest edge.

Farmers listed out that different kinds of crops including avocado, banana, mango, Potato, taro, haricot bean and different kinds of fruits and vegetable crops were lost from their homegardens by animals crop raiders in present study area although, not all crops were equally affected by these crop raiders. The types of crops damaged by wild animals crop raiders differed significantly among the surveyed villages (x^2=66.166, df =25, p<000,Table3). Avocado was the crop with the most reported damage (51), followed by banana (25), papaya (17), potato (15), mango (10) and taro (9) in the assessed homegardens. Taro was the least susceptible crop to be damaged by wild animals crop raiders in the study area. The result was agreed with Warren (2008), who was reported that banana and potato were the most frequently eaten crops by crop raiders in West Africa.

According to the response of farmers; Bush Pig and Crusted porcupine damaged crop during the night time (nocturnal). Olive Baboon and vervet monkey damaged crop during the daytime. Crusted porcupine caused damage mainly by trampling and feeding activities, Olive baboon and monkey caused damage mainly fruit crops such as potato, banana, avocado, mango and papaya in homegardens, baboon also damage root crops such as potato, porcupine affected crop such as taro, haricot bean and potato .These crop raiders mainly caused damage on avocado and banana specially baboon and monkey in the study area because these food crops were the most common cultivated crops in homegardens of the study area. Respondents also reported that mango were the least damaged crop from fruit crops and taro were the least damaged crop from tuber crops in homegardens to crop raiders, this might be due to taro is eaten only by porcupines and mango is the least cultivated crop in the area.

Type of most Crops raided	%.of respondents based on distance from the forest			
	Close to forest (<0.5km)	Intermediate (0.5-1km)	Far from the forest >1km)	Total
Avocado	24	14	13	51
Banana	9	4	12	25
Papaya	5	5	6	17
Mango	5	2	3	10
Potato	5	5	2	12
Taro	4	2	3	9
Total	53	42	39	124

Table 3: Types of crops most prone to crop raiders

Discussion

The transitional area of yayu coffee forest biosphere reserve is the potential area for growing different crops including homegardens which is very important for the livelihood of the local communities; in the other hand this reserve is a huge potential area of biodiversity (a home for different fauna and flora species);the farmers grows different crops on their farm land including homegardens; but crop damage was the major problem for farmers; because wild animals such as monkeys, baboons, pigs and porcupine raids their crops and causes heavy crop loss. Crop raiding by wild animals cause food insecurity and loss of income to forest adjacent communities; this could be reduces communities support for conservation (Quirin, 2005). Fruits and vegetables have the potential to contribute substantially to household livelihood. However, different challenges might limit the full productive potential of the homegardens. Wild animals crop damage is the important challenge for growing fruits and vegetables; Monkeys and birds feed on fruits and cause physical damage to fruit trees, which in turn causes a yield reduction for the following years (Hundera et al., 2018).

In this study I was found different crop raiding pattern by wild animals at different distance from the forest edge in the agricultural landscapes of yayu coffee forest biosphere reserve and similar crop growing practice of farmers. Even if this wild animals highly affects their crops, crop growing practice of the farmers close to the forest was the same with the farmers located at intermediate and far from the forest. This similar crop growing practice of the farmers at different distance from the forest edge, specially, farmers those who are settled nearest to the forest edge in the present study area might be they don't have alternative crop species which are less susceptible/palatable to these wild animal crop raiders' species in their agro eco-logical area. [17] was reported that the lack of differences in crop distribution between sites close to and far from the forest could be lack of alternative crop species that are not attacked and which could also grow in that agro-climatic condition. Although the farmers' crop growing practices have similar distribution pattern at different locations in the landscape, wild animal crop raiders were significantly affected the crops which are found at a distances close to the forest edge than other sites. Crop species richness was observed increasing trend with increasing distance from the forest edge or it is higher at far from forest edge, this indicates, that crop species richness shows increasing trend with decreasing crop raiding frequency and vice versa. The result is in line with [7] who were reported that even if the farmers have not changed their crop growing patterns it is clear that crop raiders affect their daily life and especially farmers close to the forests have invented many ways of protecting their crops.

Understanding the interactions between human and wildlife is necessary to guaranty a better coexistence between human and wildlife's and an improvement of wildlife conservation. The result from the table (1) shows that the majority of the farmers close to the forest edge have negative feelings about wildlife conservation. The result is similar with Mackenzie (2012) who was reported that in many parts of Africa, the conflict between local people and wildlife is one of the most serious problems where villagers are located adjacent to nature reserves. FAO (2009) reported that the adverse negative perception is particularly strong near protected areas where the presence of wildlife populations inflicts daily costs on local communities, which can erode local support and tolerance. In turn, local people can develop a negative attitude towards reserves and wildlife, exacerbating conflict and undermining conservation efforts. Due to negative feeling towards wildlife; farmers were undertook killing of wildlife's and some kind of vegetation clearing to decrease their habitat in the study area (Fig.8). Lemessa *et al*., (2013) reported that the negative effects of crop raiders may affect the attitudes among farmers toward forests and thereby affect forest cover [18-20].

Figure 8: clearing of scattered trees (Source: field observation, February, 2019)

As a result of clear-cutting of scattered trees (key-stone species), a lot of plants and animals become vulnerable to different factors: wild animals suffer from a lack of corridors, plants die due to lack of shade. This also has an adverse effect on the environment and wild animals, in turn loss of biodiversity. Tefera (2011) argued that some population of the endemic wild animals in the protected areas are declining due to human interference; this can serve as a proxy to estimate how much wild animals in unprotected areas are being threatened. In the other case the farmers response showed that there was a significant difference (x2= 14.782, df = 3, p-value = 0.002) between educational level of respondents in their conservation attitude towards wildlife. Educated farmers have more positive feeling than an educated farmers, because they have some awareness about the benefits of wildlife or/and natural resources, this implies that educating the community about the potential benefits associated with a wildlife conservation can be an important tool in avoiding and resolving the conflicts caused between local community and wildlife's. This finding is in line with Kumsa and Bekele (2014) who were reported that, Education is an important factor in understanding the role of protected areas and conservation in general [21-23].

Conclusions and Recommendations

Crop raiding by wild animals is well known to cause conflict between humans and wildlife's; and make communities intolerant towards wildlife protection .The present study has assessed crop raiding and attitude of local farmers towards wildlife conservation across distance gradient from the forest edge to surrounding the agricultural landscape of Yayu coffee forest biosphere reserve south west Ethiopia. Baboon, monkey, pig and porcupine were the most crop raiding wild animals in the study area. The distribution of homegardens crop species richness was observed increasing trend with increasing distance from the forest edge or crop species richness was higher at distances far from the forest edge and crop raiding was observed decreasing trend with increasing trend with distance from the forest edge. This implies that a spatial variation of crop raiding by wild animals across the landscape in homegarden crops or crop damage was sever at villages close to the forest edge than villages located at intermediate and far from the forest edge respectively and farmers close to the forest were victim to crop damage. To find the solution, farmers close to the forest should sow alternative crop species, which is less susceptible to crop raiders and could grow in the agro climatic-condition of the study area and a long-term study should be undertaken by scholars for sustainable solution.

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APPENDICES

Appendix I: Homegarden crop species identified in the study area

No	Scientific name	Common name	Local name	Family name
1	Brassica carinata	Abyssinian mustard	Abrango	Brassicaceae
2	Coccinia abyssinica	Anchote	Anchote	Cucurbitaceae
3	Malus domestica	Apple	Apple	Rosaceae
4	Persea americana	Avocado	Avocado	Lauraceae
5	Ensete ventricosum	Ensete	Qoccoo	Musaceae
6	Musa spp.	Banana	Muzi	Musaceae
7	Brassicaoleraceavar.capitat	White cabbage	Tikil Gomen	Brassicaceae
8	Brassica oleracea	Cabbage	Gomen	Vegetable
9	Daucus carota	Carrot	Carrot	Apiaceae
10	Annona cherimola	Cherimoya	Gishta	Annonaceae
11	Beta vulgaris L.	Beet root	Qey sir	Vegetable
12	Citrus medica L.	Citron	Turungo	Rutaceae
13	Coffea arabica	Coffee	Buna	Rubiaceae
14	Rhamnus prinoides	Dog wod	Gesho	Rhamnaceae
15	Ruta chalepensis	Fringedrue	Tena Adam	Ruta
16	Zingiber spp.	Ginger	Zinjible	Spice
17	Capsicum annum	Greenpepper	Qariya	Solanaceae
18	Psidium guajava	Guava	Zeytuna	Myrtaceae
19	haseolus vulgaris	Haricotbeen	Boloqe	Fabaceae
20	Curcuma longa	Turmeric	Erid	Zingiberaceae
21	Phaseolus lunatus	Lima bean	Adengure	Fabacea
22	Cicer arietinum	Chick pea	Shimbra	Fabaceae
23	Vicia faba	Faba bean	Baqela	Fabaceae
24	Catha edulis	Khat	Khat	Celastraceae
25	Citrus medica	Lemon	Lomi	Fruit
26	Zea mays	Maize	Beqolo	Poaceae
27	Mangifera indica	Mango	Mango	Fruit
28	Allium cepa	Onion	Qey shinkurt	Amaryllidaceae
29	Citrus spp.	Orange	Burtukan	Fruit
30	Ananas comosus	Pineapple	Ananas	Fruit

31	Solanum tuberosum	Potato	Dinch	Solanaceae
32	Carica papaya	Papaya	Papaya	Fruit
33	Cucurbita pepo	Pumpkin	Duba	Vegetable
34	Glycine max	Soybean	Akurater	Pulse
35	Saccharum officinarum	Sugar cane	Shenkora	Oil Crop
36	Helianthus annuus	Sunflower	Sufii	Asteraceae
37	Ocimum basilicum	Sweet Basil	Besobila	Lamiaceae
38	Colocasia esculenta	Taro	Godere	Araceae
39	Nicotiana tabacum	Tobacco	Tambo	Stimulant
40	Lycopersicon esculentum	Tomato	Timatim	Vegetable
41	Eleusine coracana	Finger millet	Dagusa	Poaceae
42	Dioscoreacayenensis Lam.	Yam	yam	Root crop
43	Casimiroa edulis La Llave	Kazmer	Kashmir	Rutaceae
44	Allium sativum	Garlic	Nech Shinkurt	Spice
45	Lactuca sativa	Lettuce	Selata	Asteraceae
46	Eleusine coracana	Finger millet	Dagusa	Poaceae
47	Linum usitatissimum	Flax	Telba	Linaceae
48	Citrus reticulate Blanco	Mandarin orange	Mederin	Rutaceae
49	Coriandrum sativum	Corinder	Dimblal	Apiaceae
50	Ipomoea batatas	Sugar beet	Sukar dinich	Convolvulaceae
51	Aframomum corrorima	Ethipian cardamon	Korerima	Zingiberaceae
52	Artocarpus heterophyllus	Jackfruit	Jackfruit	Moraceae
53	Pisum sativum	Garden pea	Aatarii	Fabaceae
54	Plectranthus punctatus	Potato Oromo	Dinicha romo	Solanaceae