



**Original Article**

## **Biodiversity Threats and their Impacts on Eco-tourism in Yabello Wildlife Sanctuary, Southern Ethiopia**

Meseret Chane\* and Dereje W. Yohannes

Department of Biology, College of Natural and Computational Sciences, Dilla University, P.O Box 419, Ethiopia

### **ARTICLE INFO**

**Corresponding Author:**

Meseret Chane  
meseret.chane2009@gmail.com

**How to cite this article:**

Chane, M., and D.W. Yohannes. 2014. Biodiversity Threats and their Impacts on Eco-tourism in Yabello Wildlife Sanctuary, Southern Ethiopia. *The Journal of Agriculture and Natural Resources Sciences*. 1(3):195-204.

**Article History:**

Received: 6 November 2014  
Revised: 30 November 2014  
Accepted: 2 December 2014

### **ABSTRACT**

The study on biodiversity threats and their impacts on eco-tourism in Yabello Wildlife Sanctuary were conducted from July, 2013 to September, 2014. Five core wildlife areas were randomly selected to investigate the existing biodiversity threats. A total of 100 villagers, 20 from each core wildlife area were participated in ranking the severity of the biodiversity threats. In addition, 15 protection staff of the sanctuary filled a questionnaire prepared for sowing some management gaps that they encounter. Secondary data like the number of tourist flow and revenue collected was obtained from the head quarter office. Threat indexes were used to analysis the quantitative data and qualitative date were narrated. About nine major biodiversity threats were identified in the sanctuary. The sanctuary is faced by threat factors operating at relatively higher mean relative threat factors severity index (RTFSI) of  $0.55 \pm 0.01$ . In addition, insufficient funding and undefined demarcation of the sanctuary are the major management problems affecting conservation of biodiversity. Implications of these on ecotourism activities of the sanctuary are low level of tourist inflow and revenue generated by the sanctuary as well as low benefit accruable to the local economy and the economy of the country as a whole. It was proposed that to reduce the spate of biodiversity threats, conservation awareness aimed at changing local people's attitude, the provision of essential infrastructural facilities and improvement in peoples' living conditions should be embarked upon by the management of the sanctuary and government.

**Keywords:** Biodiversity, conservation, eco-tourism, Yabello Wildlife Sanctuary.

Copyright © 2014, World Science and Research Publishing. All rights reserved.

## **INTRODUCTION**

Biodiversity is the wealth of life forms found on earth-animals, plants, and microorganisms in their millions and their differences, the gene they contain and the intricate systems they form. There are fundamentally two reasons for conserving biodiversity. The first is the moral justification and the second is the value to human existence. Biodiversity is essential to human development because of the goods and services it provides. An estimated

40 percent of the global economy is based on biological products and processes (Christ *et al.*, 2003). However, on a global scale, biodiversity is being lost at a rate many times higher than that of natural extinction. This is caused by a number of factors, including uncontrolled land conversion, climate change, pollution, unsustainable harvesting of natural resources and introduction of invasive species (Christ *et al.*, 2003).

Ceballos-Lascurian (1991) defines eco-tourism as tourism that involves travelling to relatively undisturbed natural areas with the objective of admiring, studying and enjoying the scenery and its wild plants and animals, as well as any cultural features that may be found there. Tourism, when properly managed and directed, can contribute to biodiversity conservation and poverty reduction, both directly by capitalizing on biodiversity assets and indirectly by reducing the vulnerability of the poor to environmental degradation through biodiversity conservation (Christ *et al.*, 2003).

The basis of Ethiopia's tourism product is cultural, historical and natural sites where the biggest challenge currently is to preserve the historic sites from natural decay and the national biodiversity reservoirs from degradation by the communities that live around or inside them. The biodiversity reservoirs like parks and sanctuaries face challenges with the existence of communities in and around the reservoirs that are engaged in agriculture that is destroying the natural environment (World Bank, 2006). Yabelleo Wildlife Sanctuary is located in southern lowland of Ethiopia which is protected for many plants and animal species is highly threatened by pastoralist. The need to identifying biodiversity conservation problems and their impacts on eco-tourism activities in the Yabelleo Wildlife Sanctuary, which is supposed not well managed and threatened is very crucial.

## METHODOLOGY

### Description of the study area

Yabelleo Wildlife Sanctuary is one of the protected areas and Wildlife Sanctuaries in southern Ethiopia. It is located in the Borena Zone of the Oromia Region, east of the town of Yabelleo. It was established in 1979 E.C. with an area of 2496 km<sup>2</sup> for conservation of endemic and other birds as well as mammals, which are found in the sanctuary. The Sanctuary is 17 km away from the nearby town Yabelleo, 205 km far from the border town of Moyale, about 100 km from Konso and 245 km from Dilla. The physical features of the Sanctuary is dominated by bush and range land (Figure 1).

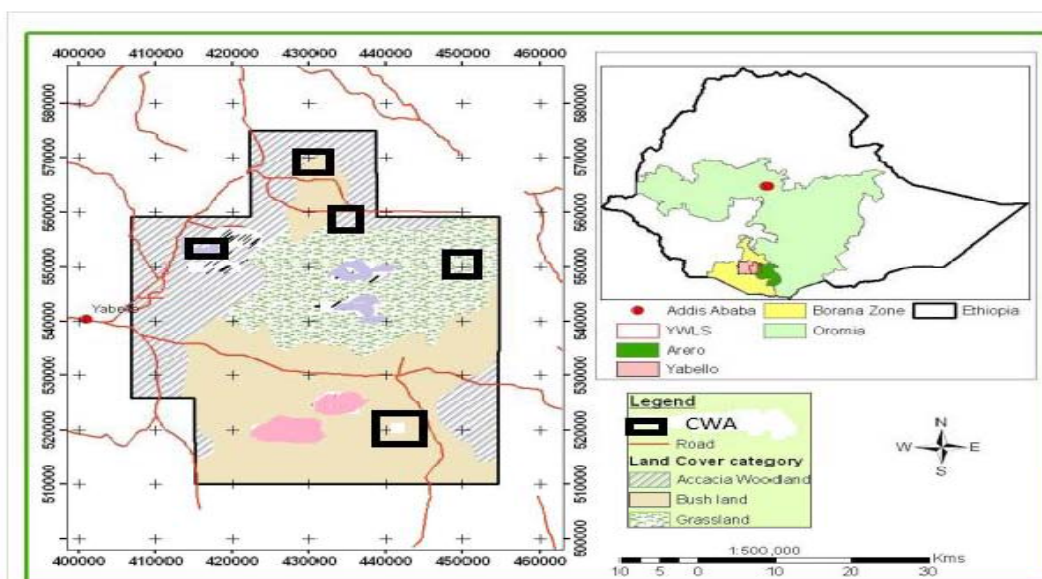


Figure 1: Map of study Area modified but adopted from Reta Regasa *et al*, 2014

The rain fall regime in Borana dry lands is bimodal with two rainfall seasons. The main rainy season, known as the long rainy season is between March and May with the peak in April, and short rainy season is between September and November, with peak in October. Generally, rainfall decreases towards the southeast with increase in temperature and decrease in altitude. The major rainfall characteristics of the rangelands of Borana or low rainfall areas of East Africa in general are tremendous variability that occurs between years and localities (Agrotec-C, 1974). Such variability makes the rainfall arithmetical mean a very unsatisfactory way of expressing rainfall probabilities. The mean annual rainfall for the period 2000- 2009 was 612.36 mm. The peak mean monthly rainfall was in April (152.9mm) and October (127.6mm). The least mean monthly rainfall was in January (17.6mm). The hottest months were from January to February and temperature fluctuates between 27.9 to 28.9OC. The weather remains pleasant between June-August. The mean annual maximum temperature was 28.9<sup>o</sup>C. The mean annual minimum temperature was 12.2 <sup>o</sup>C (Reta Regasa *et al.*, 2014)

## Methods

Ground survey was made on different parts of the sanctuary using random sampling techniques. Five core wildlife areas among the eleven have been selected to investigate the existing wildlife threats. During the six days of field observation, and discussion with local people and scouts of the sanctuary most of the biodiversity threats of sanctuary were identified and categorized in to nine major groups. These were illegal killing of wildlife for their bush meat for the local or regional markets, large mammals poaching for international commercial purpose, direct and indirect danger to biodiversity arising from nature and intensity of human-wildlife conflict, Loss, conversion and degradation of wildlife migration and dispersal corridors important for the protected area, Human encroachment in terms of their densities and distribution around protected area, unsustainable use, demand and exploitation of natural resources (e.g. water, plant resources and minerals) by local communities surrounding protected area, recent agricultural expansion and other incompatible land use changes to biodiversity requirements, pollutants from external sources of a protected area that harm biodiversity directly or indirectly and negative and persistent tourism impacts to the welfare of biodiversity and their habitats.

Information on threats to sanctuary was collected from field officers and villagers as a first preliminary step in five Wildlife core areas. This work was followed up by a deeper probing of the opinions of the core wildlife areas villagers on magnitude of each of the threat factors to their core wildlife area using a brief questionnaire and interview through translation into local language. Five core wildlife areas were randomly included in this survey and a total of 100 villagers, 20 for each core wildlife area were participated. The villagers who were interviewed or who provided information through the questionnaire were considered knowledgeable in view of their involvement in perceiving the changes on sanctuary over time. The primary five core wildlife areas villagers were asked, independent of each other, to rank from one (lowest threat level) to five (highest threat level) the key nine threats to core wildlife areas identified from an initial preliminary survey . Each villager was only allowed to provide ranks for the threat factors on the neighbouring core wildlife area. Scoring for each threat factor on ordinal scale by villagers was assumed to be adequate for the purpose of assessing status and threat index of each core wildlife areas. In addition, questionnaires were designed for fifteen sanctuary protection staffs. The questionnaire for staffs comprised the illegal activities and manegemetal gaps that they have encountered in the sanctuary and (Meduna *et al.*, 2009).

The record, cattle encroachment and the number of tourists flow and total revenue collected for 5 years to the sanctuary were obtained from the sanctuary head quarter office.

A tally of the threat factors mentioned for each core wildlife areas was computed. The following were calculated as indicators of how serious a threat factor was against core wildlife areas, and vulnerability of core wildlife areas to these threats (Okunlola & Tsujimoto, 2009).

- **Mean score of each threat factor** = (sum of all the scores for that particular threat factor) / (the total number of respondents, 100)
- **Relative Threat Factor Severity Index, RTFSI** = (The mean score for a particular threat factor) / (the maximum possible score, 5)
- **Core Wildlife Area Relative Threatened Index, CWARTI** = total score of the nine threat factors from the interviewed villagers of a given core wildlife area) / total responses (45)

A ranking system based on RTFSI showed which of the threat factors was more serious in the sanctuary, while a ranking based on CWARTI showed which core wildlife areas were most vulnerable to the identified threat factors. The relationship of the each of the nine threat factors with the core wildlife area relative threatened index (CWARTI) was determined by performing a non-parametric Spearman Rank Correlations (Zar, 1999) to determine key threat factors that influence the threat vulnerability of the core wildlife areas. Comparisons of core wildlife area vulnerability in terms of dominant ecosystem types they have, was done by a non-parametric Kruskal–Wallis test followed by a Bo–and–whisker Multiple Comparison Procedure (Zar, 1999). Descriptive statistic like percentage and figures charts were used to expresses socio-demographic characteristics of the respondents. The comparison mean threat factors among the core wildlife areas of the sanctuary were done by using different statistics with SPSS software based on data size. Qualitative data obtained using direct observations, were analyzed in narrative way.

## RESULTS AND DISCUSSIONS

The total respondents were 100. Out of these 58 (58%) were males and 42(42%) were female. The number of males was not significantly higher than females ( $\chi^2 = 2.56$ ,  $df=1$ ,  $P>0.05$ ). 26% of the villagers' age was less than 25, while 25%, 27% and 22% were range from 26-35, 36-50 and greater than 50 respectively. There was significance difference among the age groups of the villagers ( $F_{4,95}=15.124$ ,  $P< 0.01$ ). Furthermore, the dominant occupation in the study area was livestock rearing (52%) followed by farming (27%), while civil servant, trading and students account 12%, 2% and 7% respectively (Fig.4). There was significant difference among occupation of the villagers with ( $\chi^2 = 81.5$ ,  $df=4$ ,  $P<0.01$ ). This study showed that most (72%) of the interviewed villagers' were illiterate, 17% had informal education, 9% had primary education and 2% had diploma. There was significance ( $\chi^2 = 119.79$ ,  $df = 3$ ,  $P < 0.001$ ) in educational status among the interviewed villagers.

### **Threat factors that exist against biodiversity in Yabellow Wildlife Sanctuary and their perceived threat index and prevalence**

The sanctuary is faced by threat factors operating at relatively higher relative threat factors severity index (RTFSI) level of 0.55, and range from 0.54 to 0.56. In specific, the threat index of direct and indirect danger to biodiversity arising from nature and intensity of human-wildlife conflict was the highest (0.94) across the wildlife core areas (Table 1). This result is a little bit less than the result obtained in Kenya which was higher relative threat factor severity (RTFSI) level of 0.57, and ranging from 0.51 to 0.63 (Kiringe and Okello, 2007). So in relative speaking the sanctuary is in a better condition than most of the protected areas of Kenya.

Recent agricultural expansion and other incompatible land use changes to biodiversity requirements had the threat index of 0.84, followed by human encroachment in terms of their

densities and distribution around sanctuary that had the relative threat index of 0.79. Unsustainable use, demand and exploitation of natural resources (e.g. water, plant resources and minerals) by local communities surrounding protected area had a threat index of 0.7, while illegal killing of wildlife for their bush meat for the local or regional markets had threat index of 0.49. Other threats had a threatened index less than 0.4 across core wildlife areas (Table 1). According to Newmark *et al.* (1993), in Africa the major problems facing the protected areas were the increase in human settlement of adjacent lands and unauthorized harvesting of resources within the protected areas. Controlling human encroachment and associated activities is a difficulty endeavour (Osemeobo, 1993), yet critical in avoiding insularization of protected areas (Western & Semakula, 1981). Further, human – wildlife conflicts which is a function of human population increase and encroachment to protected areas, arises from conflicts between human and wildlife needs. KWS (1994) showed that incidences of these conflicts are now considered the biggest threat to protected areas.

**Table 1: Threat factors that operate against biodiversity in Yabello wildlife sanctuary, their threat index and prevalence**

Threat factors identified	Mean threat factor score (Mean $\pm$ SE)	Relative threat Factors Severity index (RTFSI)
Illegal killing of wildlife for their bush meat for the local or regional markets (Tf <sub>1</sub> )	2.43 $\pm$ 0.09	0.49
Large mammals pouching for international commercial purpose ( Tf <sub>2</sub> )	1.58 $\pm$ 0.06	0.32
Direct and indirect danger to biodiversity arising from nature and intensity of human-wildlife conflict (Tf <sub>3</sub> )	4.70 $\pm$ 0.05	0.94
Loss, conversion and degradation of wildlife migration and dispersal corridors (Tf <sub>4</sub> )	1.79 $\pm$ 0.05	0.36
Human encroachment in terms of their densities and distribution around protected area (Tf <sub>5</sub> )	3.97 $\pm$ 0.07	0.79
Unsustainable use, demand and exploitation of natural resources (e.g. water, plant resources and minerals) by local communities surrounding sanctuary (Tf <sub>6</sub> )	3.48 $\pm$ 0.08	0.70
Recent agricultural expansion and other incompatible land use changes to biodiversity requirements (Tf <sub>7</sub> )	4.2 $\pm$ 0.07	0.84
Pollutants from external sources of a protected area that harm biodiversity directly or indirectly (Tf <sub>8</sub> )	1.09 $\pm$ 0.03	0.22
Negative and persistent tourism impacts to the welfare of biodiversity and their habitats( Tf <sub>9</sub> )	1.29 $\pm$ 0.05	0.26
<b>Mean value (<math>\pm</math>SE)</b>	<b>2.73 <math>\pm</math> 0.06</b>	<b>0.55 <math>\pm</math> 0.01</b>

In the table 2 below, the mean threat factor score of illegal killing of wildlife for their bush meat for the local or regional markets (Tf<sub>1</sub>) varies from (3.00  $\pm$  0.29) in Buya to (1.8  $\pm$  0.61) in Diidatuyrae. Tf<sub>1</sub> showed a significant vibration (F= 7.72, p < 0.01) along core wildlife areas of the sanctuary. Similarly, the mean threat factor of large mammals pouching for international commercial purpose (Tf<sub>2</sub>) ranges from 1.75  $\pm$  0.14 (Buya) to 1.35  $\pm$  0.11 (Tulawayu). Tf<sub>2</sub> showed insignificant variation among the core wildlife areas of the sanctuary at (F=1.23, P > 0.05). The direct and indirect danger to biodiversity arising from nature and intensity of human-wildlife conflict (Tf<sub>3</sub>) had the highest mean threat factor score ranges from 4.95  $\pm$  0.05 (Angae) to 4.5  $\pm$  0.12 (Tulawayu), while the least mean threat factor was recorded for pollutants from external sources of a sanctuary that harm biodiversity directly or indirectly (Tf<sub>8</sub>) which varies from 1.20  $\pm$  0.09 (Tulawayu) to 1.05  $\pm$  0.05 (Buya and Tabé). Tf<sub>3</sub> showed significant variation, while Tf<sub>8</sub> had insignificant difference across wildlife core areas of sanctuary at (F=2.30, P<0.05) and (F=1.03, P >0.05) respectively. The result from this study showed that direct and indirect danger to biodiversity arising from nature and intensity of human-wildlife conflict is the leading threat and severely affects the sanctuary which was the third leading threats in protected areas of Kenya (Kiringe and

Okello, 2007). In addition, this study ranked pollutants from the external sources of the sanctuary is the least threat because there are any industrial firms and other source of pollutants in the study area. More ever, in agreement with this result, the findings by Okello *et al.*, (2001) revealed that the tourism industry, often times strongly accused to have negative impacts on biodiversity in protected areas seemed to be a less important threat factor. This indicates that tourism is low in the sanctuary similar to most of the protected areas of Ethiopia.

**Table 2: Variation in mean threat factor scores along different Core Wildlife areas of Yabello Wildlife Sanctuary in 2013/2014**

Core Wildlife Areas	Threat factors								
	Tf <sub>1</sub>	Tf <sub>2</sub>	Tf <sub>3</sub>	Tf <sub>4</sub>	Tf <sub>5</sub>	Tf <sub>6</sub>	Tf <sub>7</sub>	Tf <sub>8</sub>	Tf <sub>9</sub>
Buya	3.00 <sup>a</sup>	1.75 <sup>a</sup>	4.70 <sup>ac</sup>	1.85 <sup>ac</sup>	4.10 <sup>ac</sup>	3.75 <sup>a</sup>	4.60 <sup>a</sup>	1.05	1.10 <sup>a</sup>
Diidatuyurae	1.80 <sup>b</sup>	1.60 <sup>a</sup>	4.65 <sup>ac</sup>	1.85 <sup>ac</sup>	3.95 <sup>bc</sup>	3.55 <sup>ab</sup>	4.65 <sup>a</sup>	1.05	1.55 <sup>bc</sup>
Angae	2.65 <sup>a</sup>	1.50 <sup>a</sup>	4.95 <sup>a</sup>	1.70 <sup>ac</sup>	3.55 <sup>b</sup>	3.60 <sup>ab</sup>	4.20 <sup>ac</sup>	1.10	1.50 <sup>bc</sup>
Tulawayu	2.65 <sup>a</sup>	1.35 <sup>a</sup>	4.5 <sup>bc</sup>	1.55 <sup>a</sup>	3.70 <sup>bc</sup>	3.50 <sup>ab</sup>	3.95 <sup>bc</sup>	1.20	1.30 <sup>ac</sup>
Taba	2.05 <sup>b</sup>	1.70 <sup>a</sup>	4.8 <sup>ac</sup>	2.00 <sup>bc</sup>	4.55 <sup>a</sup>	3.00 <sup>b</sup>	3.60 <sup>b</sup>	1.05	1.00 <sup>a</sup>

Means within a column followed by the same letter are not significantly different from each other according to Tukey HSD (p<0.05)

Table 3 showed that all of core wildlife areas in Yabello wildlife sanctuary had a relative threatened index of 0.52 and above. The highest relative threatened index was 0.58 (Buya) followed by 0.55 (Angae), while 0.54 and 0.53 were in Diidatuyurae and Tulawayu. But the smallest relative threatened index was 0.52 (Taba). This study identified the highest relative threatened index of 0.58 which is less than the findings obtained in Kenya protective areas (0.84) by Kiringe and Okello (2007). Okello *et al.*, (2001) stated that prioritization of parks most affected should be done based on a threatened status using indices such as PARTI, rather than on susceptibility which is simply a catalogue of threats recorded without considering its magnitude or severity is crucial. So Buya needs strong attention than others core wildlife areas of the sanctuary.

**Table 3: Threats and their relative severity to core wildlife areas of Yabello Wildlife Sanctuary**

Core Wildlife area	Core area Relative Threatened Index, CWARTI (Rank)	Predominant ecosystem type	Adjacent predominant land use
Buya	0.58(1)	Acacia woodland	Traditional settlements, pastoralism, agriculture and
Diidatuyurae	0.54(3)	Acacia woodland	Governmental settlements, ranching, agriculture and
Angae	0.55(2)	Bush land	Traditional agriculture, pastoralism, settlements and
Tulawayu	0.53(4)	Grassland	Traditional agriculture, pastoralism, settlements and
Taba	0.52(5)	Bush land	Traditional agriculture, pastoralism, settlements and

The ranks of core wildlife areas in terms of relative threatened index, were not different (paired Wilcoxon signed Rank test, T=2.03, n=5; p=0.42) from their ranks based on the mean threat factor score.

The severity of threat factors (CWARTI) were not differ (Kruskal-Wallis, KW=1.4, p>0.05) among core wildlife areas classified as Acacia woodland (0.56 ± 0.28), Bushland (0.54 ± 0.02) and Grass land (0.53) (Table 2). But the study conducted in Kenya protective areas showed the ranking difference was observed among protected areas classified as Savanna Rangelands, Inland Wetlands, Forested and Montane Ecosystems (Kiringe and Okello, 2007). So the threat factors exist regardless of ecosystem type of the sanctuary.

Positive and insignificant correlation was shown between sanctuary threat indexes (CWARTI) with the following threat factors: Illegal killing of wildlife for their bush meat for the local or regional markets (Tf<sub>1</sub>) (r =0.62, p =0.27), large mammals pouching for international commercial purpose ( Tf<sub>2</sub>) (r =0.3, p =0.62), direct and indirect danger to biodiversity arising from nature and intensity of human-wildlife conflict (Tf<sub>3</sub>) (r = 0.20, p =0.75), agricultural expansion and other incompatible land use changes to biodiversity requirements (Tf<sub>7</sub>) (r = 0.7, p = 0.19) and negative impact of tourism ( r =0.30, p= 0.65). Negative and insignificant correlation was shown in loss, conversion and degradation of wildlife migration and dispersal corridors (Tf<sub>4</sub>) (r =-0.205, p = 0.74), human encroachment in terms of their densities and distribution around sanctuary (Tf<sub>5</sub>) (r = -0.30, p=0.62) and pollutants from external sources of a protected area that harm biodiversity directly or indirectly (Tf<sub>8</sub>) (r =0.11, p=0.86). There was positive and significant correlation in unsustainable use, demand and exploitation of natural resources (e.g. water, plant resources and minerals) by local communities surrounding sanctuary (Tf<sub>6</sub>) (r= 1, p < 0.01) (Table 4).

**Table 4: Spearman Rank Correlations between threat factors and CWARTI**

Threat factors	Tf <sub>1</sub>	Tf <sub>2</sub>	Tf <sub>3</sub>	Tf <sub>4</sub>	Tf <sub>5</sub>	Tf <sub>6</sub>	Tf <sub>7</sub>	Tf <sub>8</sub>	Tf <sub>9</sub>	
CWARTI	R	0.62	0.30	0.20	-0.205	-0.3	1.00**	0.70	-0.11	0.30
	Sig.	0.27	0.62	0.75	0.74	0.62	0.00	0.19	0.86	0.62

\*\* Correlation is significant at 0.01 levels (2-tailed).

**Domestic animals and households that have a direct impact on the sanctuary**

Record obtained from the head quarter office of the sanctuary showed that the core wildlife areas are highly under pressure by the number of households and domestic animals living around. The majority livestock rearing by the local community are cattle, goats and sheep, camels, donkeys and dogs. Cattles are the dominant livestock in the study area with mean number (2.563E<sub>4</sub>±1.015E<sub>4</sub>). The mean number of households, goats and sheep, camels, donkey and dogs are 1.305E<sub>3</sub> ± 0.352E<sub>1</sub>, 1.575E<sub>4</sub> ± 0.701E<sub>3</sub>, 5.476E<sub>3</sub> ±2.884E<sub>3</sub>, 1.287E<sub>3</sub> ± 0.535E<sub>3</sub> and 1.328E<sub>2</sub> ± 0.493E<sub>2</sub> respectively ( Table 5). The number of households and domestic animals living in the adjacent areas of the sanctuary is significantly differ at (F=3.92, p<0.05). Tukey test also showed that the mean number of cattle is significantly higher than donkeys and dogs with (p< 0.05) in the sanctuary. This result indicated that the local communities with their domestic animals are the major threats of the sanctuary (Plate 1). The same conflict can be viewed when the community move into the protected areas with livestock to graze and also to collect fire wood and hunting game animals affect the welfare of the wild animals in Tsavo West National Park, Kenya (Waweru and Oleleboo, 2013).

**Table 5: The mean number of households and domestic animals living around Yabello Wildlife Sanctuary**

Wildlife core area	Households	Cattle	Goats and sheep	Camels	Donkeys	Dogs
Buya	442	7500	5011	840	82	80
Diidatuyurae	1142	16 000	9000	2000	125	130
Angae	2569	48200	22420	6710	2552	70
Tulawayu	1396	52045	40360	16250	2438	324
Taba	979	4620	1978	1580	1238	60
Mean ± SE	1.305E <sub>3</sub> ± 0.352E <sub>1</sub>	2.563E <sub>4</sub> ± 1.015E <sub>4</sub>	1.575E <sub>4</sub> ± 0.701E <sub>3</sub>	5.476E <sub>3</sub> ± 2.884E <sub>3</sub>	1.287E <sub>3</sub> ± 0.535E <sub>3</sub>	1.328E <sub>2</sub> ± 0.493E <sub>2</sub>

Source (Yabello wildlife Sanctuary Head quarter office, 2014)

**Management problems affecting the biodiversity conservation in Yabello Wildlife Sanctuary identified by protection staffs**

The result obtained from the protection staff (Table 6) revealed that of the protection staff ranked insufficient funding was judged first by 100% of the staff as management problems affecting biodiversity conservation in the park and was followed by undefined demarcation

of the sanctuary (93%); which was also ranked second. Inadequate staffing which was ranked 6<sup>th</sup> was the least management problem facing conservation by 53.3 % of the staff. According to WWF (2007), putting representative protected area networks in place and managing them requires money. Few countries have managed to define and establish ways to provide long-term, sustainable financing and this funding gap is particularly acute in developing countries (WWF, 2007). Also, annual expenditure on protected areas in many developing countries is extremely low (James *et al.*, 1999) and protected areas in tropical regions are under-funded even though they require resources for annual operating budgets, capital investment, staff training, community development and public awareness among a wide range of other activities (James *et al.*, 1999). Ogunjinmi *et al.*, (in press) reported low pay as one of the variables hindering rangers (protection staff) in Yankari Game reserve's satisfaction with their job leading them to low commitment to protection activities.

**Table 6: Management problems identified by protected staff (n=15)**

Variable	Frequency	Percentage	Rank
Insufficient funding	15	100	1 <sup>st</sup>
Lack of equipment	9	60	5 <sup>th</sup>
Inadequate staffing	8	53.3	6 <sup>th</sup>
Lack of infrastructure	11	73	3 <sup>rd</sup>
Poor salary for protection staff	10	66.7	4 <sup>th</sup>
Undefined demarcation of the sanctuary	14	93	2 <sup>nd</sup>

Multiple responses are recorded

### **Tourist Inflow and Revenue Generated from 2010-2014 in Yabello Wildlife Sanctuary**

Five years data on the number of tourists and the revenue generated from 2010 to 2014 G.C were collected from the head quarter of Yabello Wildlife Sanctuary and showed an increase trend. This record revealed a total of 1,334 tourists from inside and outside visited the sanctuary and generated revenue of 130,360 Ethiopian birr. This income is only from the individual and vehicles entrance fee. Large amount of money is also generated for the hotel accommodation, transport service, tour operation and other similar activities which increase the country's national GDP. The year 2013/ 2014 had the highest visitation with 300 (22.49%) tourists, followed by the year 2012/13 with 294 (22.04%) tourist while the year 2011/2012 had 270 (20.24%) tourist. However, the year 2009/2010 had smallest visitation with 220 (14.49%) tourists, while the year 2003 had 250 (18.74%) tourists. Aramde *et al.*, (2012) indicated that tourist flow is progressively increasing to other many parts of the country and the trend showed linear increase of foreign visitors for the year 1995-2005.

The highest revenue was generated in the year 2013/2014 with 27,000EB followed by the year 2012/2013 with 26, 760EB, while the smallest was generated in year 2009/2010 G.C with 19,800EB. Similar study conducted in Nech Sar National Park showed that a total of 2728 tourists visited Nech Sar National Park between November first of 2007 to January 31, 2008 for a three consecutive months and \$25,169 was collected (Aramde *et al.*, 2012). Comparing Yabello Wildlife Sanctuary with Nech Sar National Parks in terms of entrance fees, the revenue from Nech Sar was by far greater than the Yabello Wildlife Sanctuary. This is because of access, undefined demarcation and limited advertisement of the Sanctuary for tourists.

### **Impact of Biodiversity conservation problems on Ecotourism in Yabello Wildlife Sanctuary**

The major casualties of biodiversity conservation problems in Yabello wildlife sanctuary are overgrazing, human settlement, agricultural expansion and bush encroachment. Tourist inflow to a destination is determined by site attractions in the form of fauna and flora, cultural and historical materials as well as morphological and geo-morphological features. An average tourist to Africa is interested in observing wild animals in their natural state particularly the



big game such as elephant, buffalo, lion, leopard, cheetah, and large antelopes (Eltringham, 1984). For example, Eagles (1992) reported that the travel motives of the Canadian ecotourists are attraction-oriented, with tropical forests, wilderness, and wildlife highly ranked. Many tourists prefer to see and interact with wild species in their habitats and experience a much more intimate closeness to authentic habitat (Shackley, 1996). In cases where appreciable numbers of wild animals were not observed by tourists, the tendency to visit such destination in the future diminishes, leading to reduced tourist inflow.

Yabello Wildlife Sanctuary was created to protect a small population of the endemic Swayne's hartebeest. Other species inhabiting the sanctuary, mostly covered by acacia savanna, are Burchell's zebra, greater and lesser kudu, gerenuk, Grant's gazelle and Guenther's dik-dik. The sanctuary is of particular interest for birders, two endemic species are limited to a small area around Yabello: Stresemann's bush crow and the white-tailed swallow. The low level of animal populations could be traced because of hunting, which is the traditional occupation of the inhabitants of the surrounding settlements and the roles of wild animals in some cultural ceremonies and tradition. Now a day's Swayne's hartebeest nearly extirpated from the sanctuary and endemic birds are limited to restricted region. In addition, large mammals are driven to neighbouring country of Kenya because of all the biodiversity threats. So these ultimately reduce the number of tourist flow to the sanctuary. Eagle (1992) also indicated that ecotourism industry is critically dependent upon the long-term viability of the management of the natural environment by government agencies. Since visitation thrives on tourists' experience, and income on the other hand relies on visitations, has not enjoyed high income or revenue from ecotourism activities; thus depends solely on annual subventions from government for conservation activities which are always inadequate and insufficient.

## CONCLUSIONS

This study identified nine major categories of biodiversity threats that faced on Yabello Wildlife Sanctuary. The sanctuary is under high pressure by pastoralists. Livestock are grazing in the area extensively. Pastoralists move their cattle from one locality to the other in response to the change in environmental factors. However, this tradition has been changed to a kind of sedentary with the increase in human population and livestock, resulting in habitat changes due to overgrazing. Agricultural field and water source inside the boundary of the Sanctuary has attracted many pastoralists to settle around these conservation areas. This has, partly contributed to the reduction of important wildlife species in the Sanctuary. Monitoring these threats using ecologically acceptable measures and avoiding bush encroachment is essential.

The sanctuary has head quarter office in Yabello town, which is not furnished and even hide for most touristic coming to the sanctuary. Insufficient funding, lack of equipment, inadequate staffing, lack of infrastructure, poor salary for protection staff and undefined demarcation of the sanctuary are management gaps that are highly affect the biodiversity of the sanctuary.

Management of the sanctuary is almost non-existent and this conservation area only exists on paper. The amount of infrastructure and management that this site receives is very limited. Staff are very few and do not have the authority over the park. As a result there is rampant overgrazing, tree removal and settlement. Urban development is increasing from year to year and areas previously uninhabited are being taken up by new settlers. Even though water is scarce, cultivation is on the increase. This has resulted in the clearing of extensive areas of land that were pristine a decade ago.

The number of tourist in the sanctuary is low compare to other sanctuaries and national parks, because of lack of advertisement, infrastructures and the head quarter is inefficient in collecting the revenue from the tourist visiting the sanctuary. The fact that sanctuary are

experiencing low visitation is a pointer to the debilitating effect of these problems on ecotourism activities, economy of the local people and that of the country as a whole. And loss of biodiversity ultimately affect ecotourism of the area.

## ACKNOWLEDGEMENTS

Dilla University office of Research and Dissemination is highly acknowledged for financial assistance. Our special gratitude goes to Yabello Wildlife Sanctuary protection staff for their invaluable support from the very start of the study to end.

## REFERENCE

- A Agroteck, C. R.G. 1974. Southern range lands livestock development in imperial Ethiopian government. *Project 3*: 1- 3.
- Ceballos-Lascurian, H. 1991. Tourism, ecotourism, and protected areas. *Parks*. 2(3): 31-35.
- Christ, C., O. Hillel, S. Matus, and J. Sweeting. 2003. Tourism and Biodiversity: Mapping tourism's global footprint. *Conservation International*. p: 66.
- Eagles, P.F.J. 1992. The travel motivations of Canadian ecotourists. *Journal of Travel Research*. XI(2):3-7.
- Elrington, S.K. 1984. Wildlife resources and economic development. John Wiley and sons Inc. New York, p: 325.
- Fetene, A., T. Bekele, G.B.G. Pananjay, and K. Tiwari. 2012. The Contribution of Ecotourism for Sustainable Livelihood Development in the Nech Sar National Park, Ethiopia. *International Journal of Environmental Sciences*. 1:19-25.
- James, A.N., M.J.B. Green, and J.R. Paine. 1999. A global review of protected area budgets and staffing. WCMC-World Conservation Press, UK. p:46.
- Kenya Wildlife Service (KWS). 1994. Wildlife-human Conflicts in Kenya. – Report of the Five-Person Review Group - Kenya Wildlife Service Report, Nairobi.
- Kiringe, J.W., and M.M. Okello. 2007. Threats and their relative severity to wildlife protected areas of Kenya. *Applied Ecology and Environmental Research*. 5(2): 49-62.
- Meduna, A.J., A.A. Ogunjinmi, and S.A. Onadoko. 2009. Biodiversity conservation problems and their implications on ecotourism in Kainji Lake National Park, Nigeria. *J. Sustain. Develop. Afr.* 10: 59-73.
- Newmark, W.D., N.L. Leonard, H.I. Sarko, D.M. Gemassa. 1993. Conservation Attitude of Local People Living Adjacent to Five Protected Areas in Tanzania. *Biological Conservation*. 63: 177-183.
- Okello, M.M., B.E. Wishitemi, and A.M. Mwinzi. 2001. Relative importance of conservation areas in Kenya based on diverse tourist attractions. *The Journal of Tourism Studies*. 12(1): 39-49.
- Okunlola, L., and K. Tsujimoto. 2009. Relative severity of multidimensional threats to the protected areas of Tanzania. *Journal of Forest Research* 14: 421-431.
- Osemeobo, G.J. 1993. Impact of land use on biodiversity preservation in Nigerian Natural Ecosystems: A review. *Natural Resources Journal*. 33: 1016-1025.
- Regasa, R., and S. Yirga. 2014. Diurnal activity patterns of Burchell's zebra (*Equus guagga*, Gray 1824) in Yabello Wildlife Sanctuary, Southern Ethiopia. *Int. J. Biodiverse. Conserve*. 6:616-623.
- Shackley, M. 1996. Wildlife Tourism. International Thomson Business Press, London
- Waweru, F.K., and W.L. Oleleboo. 2013. Human-Wildlife Conflict. The Case of Livestock Grazing Inside Tsavo West National Park, Kenya.
- Western, D., and J. Semakula. 1981. The future of savanna ecosystems: ecological islands or faunal enclaves? *African Journal of Ecology*. 19: 7-19.
- World Bank. 2006. Ethiopia: Towards a Strategy for Pro-Poor Tourism Development, Report No. 38420 –ET.
- WWF. 2007. Problems with current protected areas. [www.wwf.org](http://www.wwf.org)
- Zar, J.H. 1999. Biostatistical analysis, 4th edition. New Jersey, Prentice Hall, USA.