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Wildlife Threats and Their Relative Severity of Eastern Ethiopia Protected Areas

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Abstract: Protected areas in Ethiopia faced a range of threats. However, little information is known about the type, pattern, and extent of these threats. Understanding these issues are crucial in prioritizing conservation strategies and to take appropriate mitigation measure for effective protection of wildlife. This study attempts to investigate the relative severity of threat to eastern Ethiopia protected areas and how these protected areas are threatened to the identified threats. A total of forty-five field officers from the five eastern Ethiopia protected areas were interviewed. Thirteen potential threats that affect the biodiversity of eastern Ethiopia were identified. The most important threats include grazing by domestic animal, shortage of funding, increased human population growth, expansion of invasive alien species, weak law enforcement, encroachment of human settlement, human wildlife conflict, lack of alternative livelihood activities and others. All of the protected areas are susceptible to most of the identified threats. Protected areas having acacia commiphora and scrub land a predominant ecosystem type and surrounded by settlement and agricultural land uses practice were the most susceptible to the threat factors. Babile elephant sanctuary and Yangudi-Rassa national park are the two most threatened protected areas. 58% of the threats showed strong positive and significant relationship with protected area relative threatened index. Thus, involvements of multi stakeholders including local community is essential to develop protected area management strategies by prioritizing the identified threats to reduce biodiversity loss in eastern Ethiopia protected areas.

Keywords: Protected Areas, Wildlife, Threats Factors, Conservation

1. Introduction

Ethiopia is one of the wildlife potential countries in Africa. The diverse habitat and variable topography and climate condition of the country have contributed to diversity of species [1]. The country, currently possesses 320 species of mammals of which 36 are endemic [2], 926 species of birds [3], 242 species of reptiles, 73 species of amphibians [4] and 6862 species of insect [5]. Globally wildlife is highly threatened by various natural and anthropogenic factors. As result, the loss of biodiversity in general and wild fauna in particular is a comprehensive global environmental challenge [6, 7]. Habitat loss, over-exploitation of wildlife and forest resources and climate change are major causes of biodiversity loss [8, 9]. The situation is most severe in the tropical regions [10]. Human population growth, particularly in developing countries, has intense effects on consumption patterns of land and wild resources, which is considered as an indirect driver of biodiversity loss [11, 12].

The fight against biodiversity loss has become a priority for both governments and nature conservation organizations worldwide [13], and various approaches are used to reduce biodiversity loss in the past few decades [14]. In situ conservation of viable wildlife populations in natural ecosystems is fundamental requirement for the maintenance of biodiversity [15]. In line with this, Ethiopia has so far

established several protected areas which include 21 national parks, 4 sanctuaries, 8 wildlife reserves, 20 controlled hunting areas, six open hunting areas, six community conservation areas and 58 national forest priority areas [16]. These protected areas have been playing key roles in economic, ecological and social structure of the community. Similarly, they have significant roles in conservation, recreation, eco-tourism and employment. For instance, the direct and indirect annual economic values of some protected areas are estimated at 1.5 billion USD [17].

However, biodiversity conservation challenges are evident in several protected areas in Ethiopia [18]. Ethiopia root cause of biodiversity conservation gaps are associated with lack of adequate capacity, commitment, organizational set-up and lack of monitoring of the implementation strategy on the status & trends of threats [19]. Furthermore, no organized information is available on the current threatening factors against biodiversity in protected areas of country in general and Eastern Ethiopia protected areas in particular. The lack of such information is critically affecting the prioritization of conservation strategies and mitigation procedures to address wildlife threats for better conservation of wild animals in protected areas.

The eastern Ethiopia protected areas are place where several IUCN Red lists of threatened species such as (Elephants, Gravy zebra, wild ass and others mammals) are conserved. However, currently these protected areas and their wildlife resources are facing a number of threatening factors. Invasive species, overgrazing, illegal hunting and land degradation are common problems in Babile Elephant Sanctuary, Yangudi-Rasa, Omo, Awash and Nechisar national parks [16]. It has been facing a great challenge in protecting the continuous decline of both faunal and floral of these areas [20].

Ecological threat monitoring refers to the systematic method of collecting information about some ecological variable or threat to the environment [21]. The protected areas (PA) of eastern Ethiopia (Awash national park, Aledeghi wildlife reserve, Yangudi-Rasa national park, Sororotergem or Kuni-Muktar Mountain Nyala sanctuary and Babile elephant sanctuary) are not ecologically analyzed in a way that leads to address the threat factors along their relative severity in advance. The effectiveness of wild animal conservation efforts is highly depending on careful identification of wild animal threatening factors existing in the protected areas. Moreover, wildlife management and species recovery plans will highly depend on measuring of the protected area susceptibility index to the threat factors [22]. However, the current trend of local natural resource conservation authorities' lacks proactive measures and they are poorly taking part in the intervention of avoiding severe threats facing protected areas.

Therefore, it is necessary to investigate wild animal threats and their relative severity for ecological monitoring and to improve measures to be taken to minimize the effects major threats in eastern Ethiopia protected areas.

2. Objectives

2.1. General Objective

To investigate key wildlife threatening factors based on their relative severity for ecological monitoring of protected areas in eastern Ethiopia

2.2. Specific Objectives

(1) To identify the key wildlife threats factors in the selected protected areas
(2) To identify the susceptibility of dominant ecosystem of protected areas with surroundings land use practice to the threat factors
(3) To rank protected areas based on the relative severity of threat factors
(4) To determine the seriousness of each of the threat factors across the protected areas
(5) To propose possible management plan or strategies

3. Materials and Methods

3.1. Description of the Study Areas

This study was focused on threats to wildlife conservation within the current network of Ethiopian protected areas located in eastern part of the country. The study sites include Awash National Park, Kuni-Muktar (Sororotergm and Muktar) Mountain Nyala Sanctuary, Babile Elephant Sanctuary, Yangudi-Rassa National Park and Aledeghi wildlife reserve.

Awash National Park is located at coordinate of 8°54'N and 39°56' E in the Awash valley approximately 250 km to the east of Addis Ababa. This is a semi-arid area of Ethiopia where pastoralism is the principal livelihood strategy of local populations.

Kuni-Muktar Mountain Nyala Sanctuary is located in Oromia national regional state, Eastern Ethiopia. It is found at 8°59'13"N and 40°51'3"E. Kuni and Muktar are two villages, and each has a patch of native forest associated with it. To the west of Kuni there is a steep ridge from 2300 m to 3074 m a.s.l. *Juniperus* and *Podocarpus* species are dominate up to 2009 m with *Dombeya* the commonest species on the summit [23].

Babile Elephant Sanctuary is located in the Eastern Hararghe Zone of the Oromia National Regional state, south of Babile town. The sanctuary is situated with a central latitude and longitude of 8°45′N 42°38′E / 8.750°N 42.633°E. It covers a total of 6,982 square kilometers, the Sanctuary embraces the valleys of the Erer, Daketa and Fafen as well as the Gobele and Borale rivers; all are tributaries of the Shabelle River. Elevations range from 1000 to 1750 meters above sea level, with the lowest elevations at the southern part of the protected area. The Sanctuary was created for the conservation of the native elephant sub-species (Loxodonta africana oleansie), and is also home for the black-maned lion.

Yangudi-Rasa National Park is found in the centre of Afar

national regional state in the northern section of the Rift Valley between the towns of Gewane and Mille, and 500 km away from Addis Ababa. Its 4730 square kilometers of territory include and includes Mount Yangudi near the southern border and the surrounding Rassa Plains, with altitudes from 400 to 1459 meters above sea level. Sandy semi-desert and wooded grassland cover the majority of the park's area. Park lies between the territory of Afar and Issas communities.

Aledeghi wildlife reserve is found in the centre of Afar National Region State in the northern section of the Rift Valley around the towns of Awash-Arba 435 km away from Addis Ababa. It is bordered by Afar, Somali and Oromiya national regional states. It lies an altitudinal range of 800m-2506m a.s.l. It has grassland plain with high mountains rising on the eastern border.

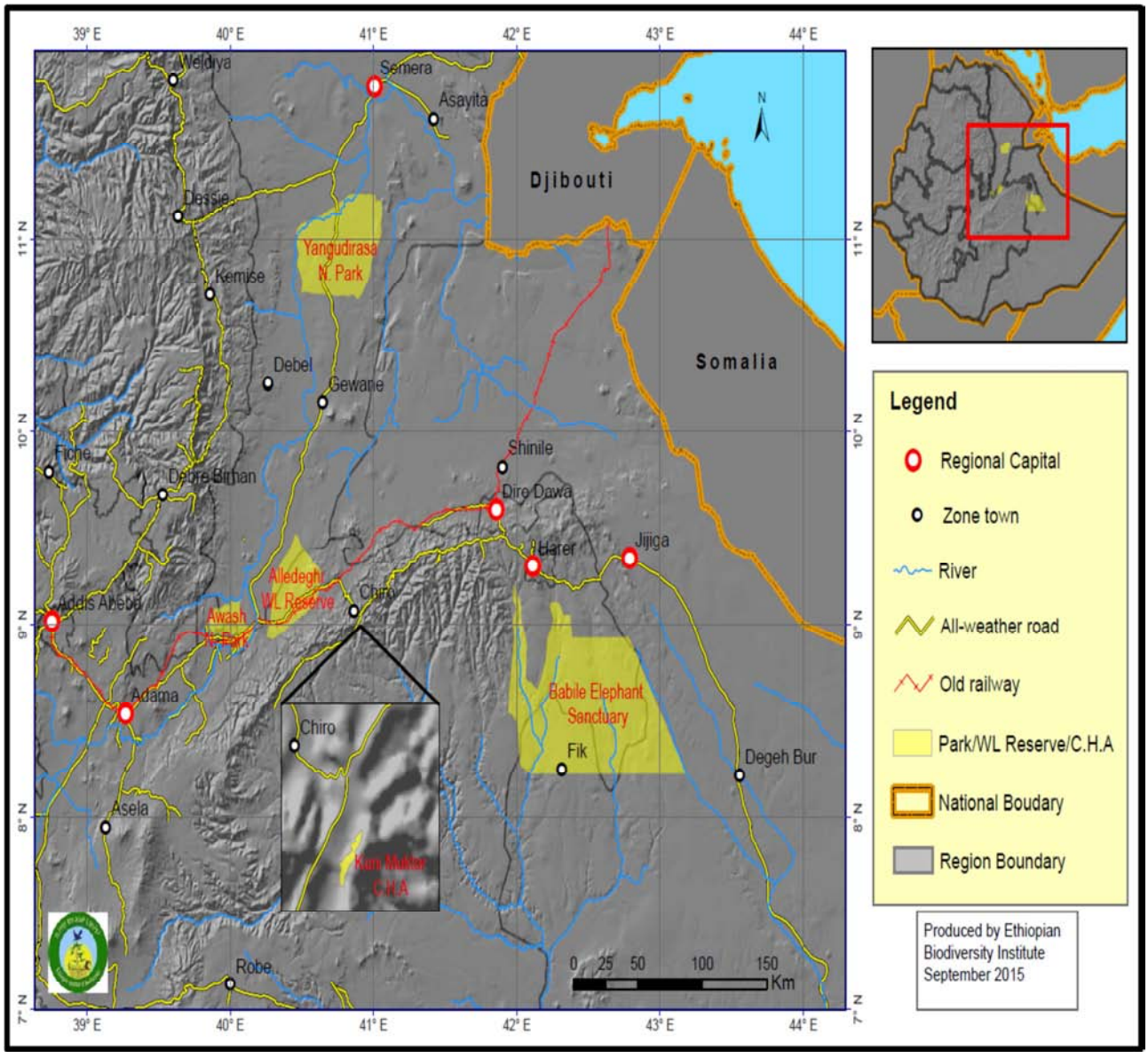

Figure 1. *Map of the study area not to scale but to locate only [24].*

3.2. Methodology

3.2.1. Study Design

Cross sectional study was conducted from November 27 to December 13, 2016 to investigate wild animal threats and their relative severity in the Eastern Ethiopian protected areas. Preliminary survey was carried out to identify the main threatening factors of wildlife management and the total number of field personnel working in each protected areas. This was done by listing out literature based threats factors along with previously identified threat factors existing in the study areas. Then, the key threatening factors were sorted for ranking of the level of severity.

Information about the Key wildlife threat factors in the study areas was identified from field officers during the initial preliminary survey. According to Kiringe and Okello, (2007) the four protected area field officers was asked, independent of each other, to rank from one (lowest threat level) to five (highest threat level) on the sorted key threat factors. In this study, nine field officers were participated.

Each protected area officers were provided ranks for the threat factors on the protected areas under which they served. Scoring for each threat factor on ordinal scale by protected area officers was assumed to be adequate for the purpose of assessing status and threat index of each protected area.

3.2.2. Sampling Technique

Purposive sampling method was used. The protected area field personnel who were interviewed through the questionnaire were considered knowledgeable in view of their involvement in protected area management over time. The individuals who made ranking of the threat factors was selected based on their expertise on related field of study and recommendation from long serving protected area wardens. Accordingly, individuals were included in the process of ranking the threats factors existing in their conservation sites.

3.2.3. Data Collection Procedure

Data was collected by using semi-structured questionnaire and observation checklist. Questionnaires were filled with face- to- face supervision of respondents. Furthermore, the selected key field personnel were given wildlife threat and severity score sheet to get filled.

3.3. Statistical Analysis

According to Kiringe and Okello, (2007) a tally of the threat factors identified for each protected area was computed and the proportion of the sum of the threat factors in each protected area out of the total (identified by preliminary survey) was considered a measure of the Protected Area Susceptibility Index (PASI) to the threat factors.

The following were calculated as indicators of how serious a threat factor was against wildlife within the protected areas, and vulnerability of protected areas to these threats:

Mean Score of each Threat Factor, MSTF = (Sum of all the scores for that particular threat factor) / (the total number of respondents, 45).

Relative Threat Factor Severity Index, RTFSI = (The mean score for a particular threat factor) / (The maximum possible score, 5).

Protected Area Relative Threatened Index, PARTI = (Total score of the threat factors from the interviewed officers of a given protected area) / (Total responses, 216).

A ranking system based on RTFSI was used to show which of the threat factors was more serious across protected areas, while a ranking based on PARTI was used to show which protected areas was the most vulnerable to the identified threat factors.

Analysis was done using SPSS (Version 20) software. The association of each of the 24 threat factors with the protected area relative threatened index (PARTI) was determined by performing a non-parametric Spearman Rank Correlations [25].

4. Results

Eastern Ethiopia protected areas were prone to a number of threats (Table 1), (Figure 2). The threat factors were affecting the protected areas with an average a relatively higher an average threat factor severity level (RTFSI) of 0.70 ranging from 0.69 – 0.81.

Table 1. *Mean score and severity index of the threat factors that affect the wildlife in eastern Ethiopia protected areas.*

No	Identified key threat Factor that affects the Biodiversity conservation	Mean score of the threat factors	Relative Threat Factor Severity Index (RTFSI)
1	Shortage of funding for PA management affects biodiversity conservation	4.16 ± 1.1	0.83
2	Inadequate and poor capacity of PA staffs in protecting the biodiversity	3.62 ± 1.5	0.72
3	Lack of integration of PA conservation policy with local community	3.27 ± 1.6	0.65
4	Lose communication b/w field and main office staffs to solve PA problems	3.76 ± 1.3	0.75
5	Lack of well-organized law enforcement/Customary rules to punish people who violates the PA rules and regulations	3.84 ± 1.4	0.77
6	Lack PA impact assessment and monitoring by concerned bodies	3.78 ± 1.4	0.76
7	Domestic animal grazing in PAs by local communities	4.31 ± 1.1	0.86
8	Agricultural expansion in or around PA affects wildlife	3.47 ± 1.5	0.69
9	Firewood and charcoal harvesting from PA destroys wild animal habitat	3.76 ± 1.3	0.75
10	Illegal tree cutting for timber or local house construction in PA	3.13 ± 1.3	0.63
11	Illegal hunting of wild animals for bush meat or cultural reasons from PA	2.47 ± 1.4	0.49
12	Wild animal poaching for local or international commercial purpose	2.27 ± 1.6	0.45
13	Encroachment of human settlement in or around PA	3.84 ± 1.2	0.77
14	Loss and degradation of wildlife migration and dispersal corridors	3.82 ± 1.5	0.76
15	Destruction of wild animal habitats as result of increased human population of nearby community	3.93 ± 1.4	0.79
16	Increase pressure of Human wildlife conflict in/around PA communities	3.84 ± 1.1	0.77
17	Developments of road, railway etc. across the PA that kills wild animals	3.42 ± 1.5	0.68
18	expansion agricultural or industrial investments in or around the PA	2.8 ± 1.4	0.56
19	Lack of awareness by local community about the uses of conserving biodiversity	3.71 ± 1.2	0.74
20	Lack of alternative livelihood activities for the people who rely on the PA for survival	3.84 ± 1.4	0.77
21	Release of pollutants in or around the protected areas affects wildlife	2.24 ± 1.5	0.45
22	Negative attitudes of local community towards wild animals in the PA	2.96 ± 1.4	0.59
23	Lack of equitable sharing of money/resources generated by the PA among the nearby community	3.73 ± 1.6	0.75
24	Expansion of invasive alien species in protected areas	3.93 ± 1.4	0.79
	Mean Value (± SE)	3.5 ± 0.031	0.70 ± 0.11

Figure 2. *Photo of different wildlife threat observed in eastern Ethiopia protected area.*

From the threat factors affecting protected areas, grazing by domestic was found to be the highest (0.86) threat factor index while shortage of funding for PA management and habitats as result of increased human population and expansion of invasive alien species in protected areas had a threat index of 0.83 and 0.79 respectively (Table 1). Weak law enforcements, encroachment of human settlement, human-wildlife conflict and lack of alternative livelihood activities had a threats index of 0.77 each. Fifty eight percent of the threat factors had a threat index 0.75 and below.

All the five eastern Ethiopian protected areas were susceptible to most of the threat factors identified in this study. Babile elephant sanctuary was most susceptible followed by Yangudi-Rassa National Park and Awash National Park having PASI of 0.96 and 0.88 respectively (Table 2).

Regarding, the protected area relative threatened index, Babile elephant sanctuary was the most threatened followed by Yangudi-Rassa National Park which had a relative threatened index of 4.16 and 3.82 respectively (Table 2). In this study Babile elephant sanctuary and Yangudi-Rassa national parks were the most vulnerable protected areas having both PASI and RTFSI greater than 0.8.

Table 2. *Eastern Ethiopia protected areas and predominant ecosystem type and adjacent land use they have with their respective vulnerability index.*

No	Eastern Ethiopia protected area	PASI	Protected Area Relative Threatened Index (PARTI), (Rank)	Predominant ecosystem type	Adjacent predominant land use
1	Awash National Park	0.88	3.70(3)	Accacia-Comiphora & grassland	Traditional Pastoralism
2	Aledeghe wildlife reserve/ Haledeghe-Asebot proposed national park	0.71	3.15(4)	Grassland	Traditional Pastoralism
3	Yangudi-Rassa National Park	0.88	3.82(2)	sandy semi-desert and wooded grassland	Traditional Pastoralism
4	Kuni-Muktar Mountain Nyala Sanctuary /Sororotergem & Muktar	0.67	2.62(5)	Dry-evergreen montane forest	Agriculture & settlement
5	Babile Elephant Sanctuary	0.96	4.19(1)	Accacia-Comiphora scrup land	Agriculture & settlement pastoralism

There was a strong positive and significant correlation between PARTI and the following threat factors: Lack of well-organized law enforcement/Customary rules to punish people who violates the PA rules and regulations ($r(4) = 1$, $p = 0.00$), Illegal tree cutting for timber or local house construction in PA ($r(4) = 0.9$, $p = 0.037$), Illegal hunting of

wild animals for bush meat or cultural reasons from PA (r(4) = 1, p = 0.00), Wild animal poaching for local or international commercial purpose (r(4) = 1, p = 0.00), Encroachment of human settlement in or around PA (r(4) = 1, p = 0.00), Loss and degradation of wildlife migration and dispersal corridors (r(4) = 0.9, p = 0.037), Lack of awareness by local community about the uses of conserving biodiversity (r(4) = 0.9, p = 0.037) and Lack of equitable sharing of money/resources generated by the PA among the nearby community (r(4) = 0.9, p = 0.037), Inadequate and poor capacity of PA staffs in protecting the biodiversity (r (4) = 0.975, p = 0.005), Lose communication between field and main office staffs to solve PA problems (r (4) = 0.9, p = 0.037). The remaining 54 percent of threat factors showed a positive relationship with PARTI but not significant.

Protected areas having acacia commiphora and scrub land a predominant ecosystem type and mainly surrounded by settlement and agricultural land uses was the most susceptible to the identified threat factors and the least with dry evergreen montane forest, surrounded by agriculture and human settlement land use practices.

5. Discussion

Identifying protected areas threats factors and their relative severity is crucial for wildlife conservation and develop protected areas management strategies. In line with this view, the present study attempted to identify the wildlife threats and their relative severity in eastern Ethiopia protected areas.

From a total of twenty-four identified threats, the study identified the following thirteen major threats that affect the biodiversity eastern Ethiopia protected areas. These include: Domestic animal grazing in, Shortage of funding for PA management, Destruction of wild animal habitats as result of increased human population, Expansion of invasive alien species in protected areas, Lack of well-organized law enforcement/Customary rules to punish people who violates the PA rules and regulations, Encroachment of human settlement in or around PA, Human wildlife conflict in/around PA communities, Lack of alternative livelihood activities for the people who rely on the PA for survival, Loss and degradation of wildlife migration and dispersal, Lack PA impact assessment and monitoring by concerned bodies, Firewood and charcoal harvesting from PA destroys wild animal habitat, Lose communication between field and main office staffs to solve PA problems, Lack of equitable sharing of money/resources generated by the PA among the nearby community and Lack of awareness by local community about the uses of conserving biodiversity. Almost all of the five protected areas are susceptible to most of the identified threat factors. However, managing the major threats mentioned above would ensure protection of the eastern Ethiopia protected areas.

Grazing by livestock has been an important issue for the management of the national parks and protected areas. Most studies have revealed that grazing has negative impact on the ecological stability of the grazing area, at varying levels [26]. This is a case in eastern Ethiopia protected areas particularly in Awash national park, Yangudi-Rassa national park and Aledeghi wildlife reserve where population of cattle, sheep and goats of the pastoralist are flooding in these protected areas. As result the wildlife are stressed by disturbance, and shortage food

Inadequate funding is one of the major threats affecting biodiversity conservation [27]. Obviously, for effective protection of protected areas allocating enough budget is crucial. In this case, all of the eastern Ethiopia protected areas didn't have enough logistics, transports, and others due to shortage of budgets. According to the scouts, Yangudi-Rassa national park is far from the office, at Gewane town, no patrolling was done throughout the year since no field car available. Except Awash national park and to some extent Aledeghe wildlife reserve the remaining eastern Ethiopia protected areas lack suitable road access inside the park for patrolling and watching for tourist. There are no lodges available for tourist except Awash national park.

On the other hand, rapid human population growth in developing countries like Ethiopia has a negative consequence in wildlife conservation. Studies indicate that by 2050, many of the presently abundant types of wildlife species will begin to disappear as the number of people in contact with wildlife increases [28]. An increased human population around eastern Ethiopia protected areas caused high pressure in protected area resources via cutting trees, charcoaling, hunting, farmland and settlement expansion and others activities. The situation is more serious in Babile elephant sanctuary, Awash national park and Sororotergem or Kuni-Muktar mountain Nyla sanctuary. Agriculture and settlement expansion fragmented and narrowed the size of these protected areas.

Nonnative or alien species pose a significant threat to protected areas by their direct and indirect impacts to native species, and by their effects on broader scale ecological patterns and processes [29]. The eastern Ethiopia protected areas mainly Awash and Yangudi-Rassa national parks and Aledaghe wildlife reserve are now invaded by *Prosopis juliflora*. Prosopis reduced rangeland and free movements of wildlife. Aledeghe wildlife reserve also invaded by herbaceous invasive species which reduced the rangeland of wild animals.

Human-Wildlife Conflict or negative interaction between people and wildlife has recently become one of the fundamental aspects of wildlife management as it represents the most widespread and complex challenges currently being faced by the conservationist around the world. It arises mainly because of the loss, degradation and fragmentation of habitats through human activities such as, logging, animal husbandry, agricultural expansion, and developmental projects. [30] reported that crop damages, livestock killing, human disruption and property destruction were cause of human-wildlife conflicts in Wondo genet district. This is in line with current study mostly in Babile elephant sanctuary, Awash national park, Kuni-Muktar mountain nyal sanctuary. The situation is more serious in Babile elephant sanctuary

where agriculture and settlements are expanded within the sanctuary. Here elephants are disturbed daily by either the poachers or local communities. Local communities chased elephants to protect their crops from elephant damage. On the other hand, according to scouts, poachers killed elephants by poisoned dart or shooting by guns, more than eight elephants were killed in 2016 in such away.

Assessments of 8000 protected area management effectiveness across the world showed about 40% are in major deficiencies. Strongest management factors recorded on average related to establishment of protected areas (legal establishment, design, legislation and boundary marking) and to effectiveness of governance; while the weakest aspects of management included community benefit programs, resourcing (funding reliability and adequacy, staff numbers and facility and equipment maintenance) and management effectiveness evaluation [25]. The eastern Ethiopia protected areas lacks many of the protected area management effectiveness indicators listed above and most of them need re-demarcation.

Law enforcement is the best way to prevent further biodiversity erosion, and is necessary to achieve proper management of PAs as a common good [31, 32]. However, lack of law enforcement one of the threats in eastern Ethiopia protected areas. Obviously, settlements, agriculture, poaching and others activities are illegal inside protected areas but no adequate law enforcement has been done to stop such activities in eastern Ethiopia protected areas. For instance, in Yangudi-Rassa national park, conflict in resources use between Issa (Somali) and Afar tribes resulted in the scrambling the park areas for grazing and settlement by chasing out the scouts. On the other hand, Arab peoples came from Djibouti to Afar in the name of aid and illegally hunt wild animals including wild ass by providing incentives to the local guides. These peoples were arrested around Serdo kebele while hunting soemmering gazelle in collaboration of the local community and taken into Semera however they were released without any punishment. Despite these foreign hunters in collaboration with local greedy guides, the local community had positive attitude towards wildlife in Yangudi-Rassa national park and Alededghe wildlife reserve. The community believed that no Gerenuk means no camel and no Soemmering gazelle means no goats in such away they are not hunt wild animals. These community believes saves the wildlife in or around these PAs in such poor law enforcement.

Similarly, in Babile elephant sanctuary, the scouts unable to punished the illegal poacher or individuals in the community due to lack of law enforcements. In 2016, one scout was killed while patrolling in the sanctuary. In the same year a poacher, who killed one elephant, arrested by scout and community participation was released without punishment. Such activities demoralized the scout and endangering the fates of elephants in particular and wildlife in general.

Lack of alternative livelihood and awareness creation are threats that affects the eastern Ethiopia protected areas. Moshi, [33] reported that households that were involved and benefited from the park supported park's existence compared to those that were not involved and received no benefits from the conservation activities. Education was significant in influencing an awareness of the benefits in local communities [34]. Similarly, local communities around eastern protected areas, particularly in Yangudi-Rassa national park and Aledeghe wildlife reserve are explicitly rely on livestock rearing. There are no any optional pastoral livelihood development efforts. This leads the locals to heavily depend on the protected area resources for grazing. However, Afar national regional state is one of the tourist destination region in Ethiopia. The three PAs Awash and Yangudi-Rassa national park and Aledeghe wildlife reserve are located in the tourist routes. Place where Lucy (our ancestor) discovered is also located in Yangudi-Rassa national park. Raising awareness within the community and abroad will contribute flow of tourist there by increase income to parks and local community. If the such alternative income generated to local community, they will be motivated to be engaged in protection. Therefore, the involvement of local people and alternative livelihood should be considered during the planning and management of PAs. PAs should encourage consistence education program as a way of creating awareness on conservation-related benefits, which will help to change local people attitudes and hence, achieve the long-term conservation goals.

Lack of communication between field (PA staffs) and main office staffs (Addis Ababa) to solve emerging PA problems in eastern Ethiopia protected areas. The situation is more serious particularly in Yangudi-Rassa national park and Babile elephant sanctuary. Ethiopian wildlife conservation authority officials are slow in reacting against PA threats and in assisting scouts in solving existing problems.

In this study Babile elephant sanctuary is the most threatened protected area followed by Yangudi-Rassa national park. Babile elephant sanctuary because of its geographic location, boarded by Oromia and Somalia national regional states, there is resource scrambling of local community in the sanctuary. In Oromia side, settlements, agriculture and human-elephant conflict is high inside the sanctuary while in the Somalia side pastoralism and poaching which is threatening the survival of the elephants in particular.

6. Conclusion and Recommendation

Threat factors are prevailing at varying degree in eastern Ethiopia protected areas with high relative threat factor severity index. Domestic animal grazing in PAs by local communities was the highest threat factor index in eastern Ethiopia protected areas followed by shortage of funding for PA management. Babile elephant sanctuary is the most threatened protected area followed by Yangudi-Rassa national park.

In order to alleviate the existing problem, the authors recommended that: (1) Urgent discussion with Ethiopian

wildlife conservation authority, scouts, local community, policy makers and other concerned bodies is important to have common understanding and establish PA management plan, (2) Since most protected areas has no clear demarcation at the ground level re-demarcation is important, (3) Sufficient budget has to be allocated to each PA, (4) Most PAs are surrounded by pastoralists to reduce the impacts of grazing alternative livelihood has to be created, (5) Immediate action has to be taken against poachers and hunters with strong cooperation military and federa police, (6) The Ethiopian wildlife conservation authority, has to respond urgently to the emerging issues raised by the scouts, (7) Awareness creation program has to be done to the local community about the importance of wildlife conservation and (8) Infrastructures like loges, roads and others has to be constructed to make PAs accessible to tourist and also easy patrolling.

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References

[1] Yalden, D. W. and M. J. Largen, (1992). The endemic mammals of Ethiopia. Mammal Rev., 22: 115-150.

[2] Vreugdenhil, D. Vreugdenhil, A. D., Tamirat Tilahun, Anteneh Shimelis, Zelealem Tefera (2012). Gap Analysis of the Protected Areas System of Ethiopia, with technical contributions from Nagelkerke, L., Gedeon, K. Spawls, S., Yalden, D., Lakew Berhanu, and Siege, L., World Institute for Conservation and Environment, USA. Wildlife Conservation Society International, New York, and Ethiopian Wildlife.

[3] Lepage, D. (2006). Avibase - Bird Checklists of the World-Ethiopia. http://www.bsc- eoc.org.

[4] Abeje Kassie (2017). Checklist of Herpeto-fauna of Ethiopia, unpublished document. Ethiopian biodiversity institute.

[5] Berehanu Beyene, (2016). Checklist for insect species in Ethiopian. unpublished document. Ethiopian biodiversity institute.

[6] Cardinale, B. J., Duffy, J. E., Gonzalez, A., Hooper, D. U., Perrings, C. Venail, P., Narwani, A., Mace, G. M., Tilman, D., Wardle, D. A. (2012). Biodiversity loss and its impact on humanity. *Nature.* 486: 59-67.

[7] Krause, T. and Zambonino, H. (2013). More than just trees-animal species diversity and participatory forest monitoring in the Ecuadorian Amazon. *International Journal of Biodiversity Science, Ecosystem Services & Management,* 9: 225-238.

[8] Brooks, T. M., Mittemeier, R. A., Mittemeier, C. G. and da Fonseca, G. A. B. (2002). Habitat loss and extinction in the hotspots of biodiversity. *Conservation Biology*, 16: 909-923.

[9] Baldus, R. D. (2008). Wildlife: Can it pay its way or must it be subsidized? In: R. D. Baldus, G. R. Damn and K. Wollscheid (eds.) Best practices in sustainable hunting- A guide to best practices from around the world. pp. 12-16.

[10] Leuschner, C., Moser, G., Hertel, D., Erasmi, S., Leitner, D., Culmsee, H., Schuldt, B. and Schwendenmann, L. (2013). Conversion of tropical moist forest into cacao agro forest: consequences for carbon pools and annual C sequestration. *Agroforestry Systems.* 87: 1173-1187.

[11] Michel, S. (2008). Conservation and use of wild Ungulates in central Asia- potentials and challenges. In: R. D. Baldus, G. R. Damn and K. Wollscheid (eds.) Best practices in sustainable hunting- A guide to best practices from around the world. pp. 32-40.

[12] Kideghesho, J. R. (2009). The potentials of traditional African cultural practices in mitigating overexploitation of wildlife species and habitat loss: experience of Tanzania. *International Journal of Biodiversity Science & Management,* 5: 83-94.

[13] Lambooy, T. and Levashova, Y. (2011). Opportunities and challenges for private sector entrepreneurship and investment in biodiversity, ecosystem services and nature conservation. *International Journal of Biodiversity Science, Ecosystem Services & Management.* 7: 301-318.

[14] Vatn, A., Barton, D. N., Lindhjem, H., Movik, S., Ring, I. and Santos, R. (2011). Can markets protect biodiversity? An evaluation of different financial mechanisms. Noragic Report No. 60. Norway: Norwegian University of Life Sciences.

[15] Convention on Biological Diversity. (1992). Preamble to the Convention on Biological Diversity. (Accessed from www.biodiv.org/ *convention/articles.asp on* 3 March 2015).

[16] Young J. (2012). Ethiopian Protected Areas A 'snapshot'. A reference guide for future strategic.

[17] OBf, 2009. Assessment of the value of the protected area system of Ethiopia, Making the economic case. Main report, volume II. Pp 42.

[18] Alemneh Amare. (2015). Conservation Challenges of Gibe Sheleko National Park, Southwestern Ethiopia. *Natural Resources*, 6, 286-289.

[19] EBI (2015). Ethiopia's national biodiversity strategy and action plan 2015-2020.

[20] Solomon, Belay, Amsalu, A. and Abebe, E. (2014). Land Use and Land Cover Changes in Awash National Park, Ethiopia: Impact of Decentralization on the Use and Management of Resources. *Open Journal of Ecology*, 4, 950-960.

[21] EWCA (2014). Awash National Park Ecological and Threat Monitoring Priorities and Plan. Addis Ababa, Ethiopia, pp 4-5.

[22] Kiringe and Okello. (2007). Threats and their relative severity to wildlife protected areas of Kenya. *Applied ecology and environmental research*, 5 (2): 49-62.

[23] James Malcolm and Paul H. Evangelista. (2005). The range and status of Mountain Nyala. Technical report. pp 26.

[24] Birdlife international. (2004). Towards an ecologically representative network of protected areas in Ethiopia Addis Abeba, Ethiopia. pp 1-2.

[25] Zar, J. H. (1999). Biostatistical Analysis. 5th Edition. Prentice - Hall Publishers, New Jersey.

[26] Wangchuk, S. (2002). Grazing management in national parks and protected areas: science, socio-economics and legislation. Journal of Bhutan Studies. Vol. 7, Pp. 61-81.

[27] Leverington, F., Costa, K. L., Pavese, H. et al., (2010). Environmental Management. Vol. 46, No. 5, pp 685–698. doi: 10.1007/s00267-010-9564-5.

[28] George, F. M., (2014). Human Population Growth and Wildlife Extinction in Ugalla Ecosystem, Western Tanzania. Journal of Sustainable Development Studies, Vol. 5, No. 2, 192-217.

[29] Cole, D. N., and Landres, P., B. (1996). Threats to wilderness ecosystems: impacts and research needs. Ecological Applications. 6 (1), 1996. pp. 168-l 84.

[30] Muluken Mekuyie Fenta (2014). Human-Wildlife Conflicts: Case Study in Wondo Genet District, Southern Ethiopia. Agriculture, Forestry and Fisheries. Vol. 3, No. 5, pp. 352-362.

[31] Gibson, C. C., J. T. Williams, E. Ostrom. (2005). Local enforcement and better forests. World Development 33/2: 273–284.

[32] Fischer, F. (2008). The Importance of Law Enforcement for Protected Areas: Don't Step Back! Be Honest Protect. Pp. 101–103.

[33] Moshi, S., B., (2016). Impacts of protected areas on local livelihood: a case study of saadani national park Natural Resources Management. Master's thesis in Natural Resources Management (Biology). Norwegian University of Science and Technology pp. 1-23.

[34] Gandiwa, E., et al. (2014). Local People's Knowledge and Perceptions of Wildlife Conservation in Southeastern Zimbabwe. Journal of Environmental Protection, 5, 474-485. http://dx.doi.org/10.4236/jep.2014.56050