Review of Key Wildlife Threats Factors from Literature and Observation Perspectives: A Way forward for Sustainable Wildlife Genetic Resource Conservation Practices in Ethiopia

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Abstract
Wildlife threat is an issue with off-putting role in our effort to conserve and sustainably utilize the biological capitals. However, the wildlife biodiversity and conservation practices are still at low attention. Therefore, this review was aimed at identifying key wildlife threats factors operating against our natural capital. Moreover, a way forward for sustainable conservation practices of wildlife genetic resource was also drawn. The information presented in this review was collected from previous studies of existing ecological literatures and personnel observation of the authors in the issue being reviewed. As well, fact sheets, full length manuscripts, review articles, country reports and various valuable WebPages were used. The review paper discusses briefly internally consistent scenarios that explore aspects of key wildlife threats and their conservation implications in the light of sustainable wildlife management programs. There are encouraging efforts in Ethiopian protected areas system. However, there are also certain national parks belonging as paper parks due to lack of the intended schemes of wildlife conservation practices. Thus, sustainable wildlife conservation schemes can help to protect genetic resources of the country. As well, sustainability can be secured through community participation and supporting the economic wellbeing of the largest society. Therefore, enhancing sustainability through participatory approaches and stake in various sectors should be a future direction of conservation. In the presence of threats it is challenging to pledge sustainable development agendas. Hence, mainstreaming wildlife conservation practices to school clubs, the largest community and stake in to different sectors is vital tool of enhancing sustainable conservation.

Keywords: Threat factors, Wildlife trafficking, Road kill, Sustainable Conservation

1. Introduction
Biodiversity is the variety of life, in all of its many manifestations encompassing all forms, (Plants, animals and microorganisms) and at all levels of biological organizations which includes genetic diversity, species diversify and ecosystem diversity (CBD, 2012) [6]. The earth’s biodiversity constitutes valuable natural resources in economic, aesthetic, scientific and educational terms, providing enormous amount of both monetary and non-monetary benefits to human kind (Kolahi et al., 2012) [21]. 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. The interaction between human being and nature was started before million years ago when human being was created. Their relationships have been increased and more intense during the hunt and gathering. Currently, the term wildlife includes all living organisms that are not domesticated and found in the wild, even those that are not used for sport hunting (non-game species).
Therefore, wildlife refers to the variety of all living organisms inhabiting in the wild, at the genetic, species and ecosystem levels on earth. There are fundamentally two reasons for conserving wildlife biodiversity. The first is the moral justification and the second is the value to human existence. Moreover, biodiversity is essential to human development because of the goods and services it provides. An estimated 40 % 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.

Little information is available on wildlife threats and their relative severity in protected areas of Ethiopia. The emphasis given to threats halting conservation is not monitored along the existing human developmental efforts. However, ecological monitoring of threats in a manner that allow park mangers to respond effectively is a central constituent of realistic conservation of wildlife. Thus, there is a need to review key wildlife threats factors from literature and observation perspective: A way forward for sustainable wildlife genetic resource conservation practices in Ethiopia.

2. Status of Wildlife Biodiversity in Ethiopia
Ethiopia has great geographic diversity, and macro- and micro-climatic variability. The country has ten ecosystems, and 18 major and 49 minor agro-ecological zones. As the result, the country is endowed with great diversity of plant, animal and microbial genetic resources. Ethiopia is one of biodiversity rich countries in the world. It hosts two of the biodiversity hotspots of the world, namely: the Eastern Afromontane and the Horn of Africa hotspots (EBI, 2014). There are between 6500 and 7000 higher plant species of which about 12 per cent are endemic. With regard to animals, there are known to be 284 wild mammal, 861 bird, 201 reptile, 63 amphibian, 188 fish and 1225 arthropod species with about 10, 2, 5, 54, 0.6 and 21 per cent of endemism respectively (EBI, 2014). However, wildlife conservation and management have been facing many social and ecological problems in Ethiopia. Several authors have identified some of the factors affecting biodiversity conservation in Ethiopia, including land clearing for agriculture and uncontrolled logging, gathering of firewood (EBI, 2014).

Ethiopia is known for faunal and floral diversity with an estimated 6500-7000 species of plants of which 20% are considered endemic (Melaku Tefera, 2011).

3. Wildlife Conservation and Protected Area in Ethiopia
Ethiopia is a signatory party of the Convention on Biological Diversity (CBD) thereby, has been undertaking efforts in biodiversity conservation (EBI, 2001). Similarly, Ethiopia has developed a national biodiversity strategy and action plan with the objectives of conserving representative examples of remaining ecosystems through a network of effectively managed protected areas under sustainable use and management by 2020 (EBI, 2014). However, a significant biodiversity conservation challenge was evident in several protected areas (Alemneh Amare, 2015).

Protected area can play critical roles in safeguarding biodiversity and maintaining a sustainable world. Wildlife conservation is the science of analysis and protecting the Earth’s biological diversity, which is the variation of life form within a given ecosystem, or for entire Earth. Wildlife conservation is also defined as the process by which individuals and organizations protect and preserve the species through conservation policy, which entails preservation of habitat and management of wildlife species (Idowu et al., 2011).

In Ethiopia, 40 protected areas cover roughly 16.4% of the country’s land area (186,000 km2). These areas face many challenges due to growing populations, border conflicts, and recurring drought. A chronic and growing issue for Ethiopia’s largely pastoral rural people is local access to grazing lands (Ashenafi and Leader-Williams, 2005). As in other parts of the developing world, increased concern over the burden that conservation often places on local communities has led to efforts to incorporate development goals into conservation practices (Hulme and Murphree, 2001). Residents living in the highlands in and around Bale Mountains National Park raised horses, sheep, donkeys, and cattle. In contrast, lowland residents in and around Abijata-Shalla Lakes National Park, Awash National Park, and Senkelle Swayne’s Hartebeest Sanctuary raised goats, sheep, donkeys, camels, and cattle (Mekbeb Tessema et al., 2007).

4. Role of Protected Areas for Livelihoods Improvement in Ethiopia
Protected areas safeguard biological and cultural diversity, help to improve the livelihoods of local communities, provide the homelands for many indigenous peoples and bring countless benefits to society in general (Sandwith, 2001). Biodiversity underpins all ecosystem goods and services responsible for providing food and water, buffering the impacts of...
climate change, controlling the outbreak of diseases and supporting nutrient cycling. Biodiversity also serves as the foundation of many spiritual, recreational and cultural benefits (CBD, 2013) [7].

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 (Young, 2012) [32]. In Ethiopia, protected areas cover 19% of the country. They play key roles in economic, ecological and social structure of the community. Similarly, they have significant roles in conservation, recreation, eco-tourism and employment. Direct and indirect annual economic values of some protected areas are estimated at 1.5 billion USD (EBI, 2014) [12].

Fig 1: Role of Protected areas for socio-economic improvement of adjacent community (Bale National Park)

5. Paper Parks in Protected Area Systems of Ethiopia

Due to the less emphasis given to our protected areas most of Ethiopian national parks are facing severe threats. The protected areas are showing some sort of conservation improvements. However, there are paper parks devoid of the intended schemes of conservation and management practices. Therefore, we need to scale up the practical conservation than listing the areas in paper. Thus, supporting sustainable development through mainstreaming conservation approaches in tourism and stake in to various sectors working in similar endeavor.
Severely threatened protected areas in Ethiopian protected areas system (Abijata Shalla lakes national park) shown in (figure 2) might possibly belongs to paper park. This is in consideration of large scale settlements, school and expansion of other infrastructural services inside the park.

6. Overview of physically healthy protected parks in Ethiopia

Ethiopian protected area system is much of less protected due to limited resources, skilled manpower and other infrastructural services in support of sustainable conservation and management of biological diversity. However, there are some typical representations of physically healthy protected areas with mega biological diversity. Thus sites are shown in (figure 3). Currently, more than 161, 991 areas have been reported as protected area in the world data base of protected areas and the number continues to increase (Kolahi et al., 2013) [22]. PA has long been the only way to conserve ecological regions from the other form of land use (EEA, 2010) [14]. Protected areas are therefore the cornerstone of most national strategies to protect biodiversity and national resources (Laverington et al., 2010) [23].
7. General facets of Key wildlife Threat Factors
There is a growing evidence of critical biodiversity breakdown both inside and outside of many Pas. Accordingly many Pas are presently being degraded and destroyed (Dudley et al., 2004) [10]. In most developing countries, Pas are under pressure from anthropogenic activities and lack proper management and maintenance (Kolahi et al., 2012) [21]. Overpopulation and overconsumption (Kolahi et al., 2012) [21], habitat loss, fragmentation, and invasive species (Meduna et al., 2009) [24], associated with socioeconomic problems and policy failures, week government structure, policy, and legislation, low morale, and inadequate funds are underlying causes of biodiversity loss (Eldredge, 2010) [12].

7.1. Wildlife Conservation Threats operating in Protected Area System of Ethiopia
Ethiopia biodiversity threats and analysis of their root causes shown that, 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 (EBI, 2014) [12]. Invasive species, overgrazing and land degradation are common problems in Babile Elephant Sanctuary, Yangudi-rasa, Omo, Awash and Nechisar national parks (Young, 2012) [32]. Scattered bushland which is the most important habitat for the wild animals of Awash national park are declined drastically. In the park a number of animal and plant species are reported to be endangered or critically endangered. It has failed to protect the continuous decline of both faunal and floral communities (Young, 2012) [32].

Ethiopian wildlife biodiversity has shown dramatic decline in type and size. This decline of nature value is accelerated at a rate faster than what was then due to the key threat factors operating against it. As well, the rapidly growing infrastructural expansion like road, trans boundary trade are done without staking biological diversity present in public land of the country. From the commonly observed problems road spatial setting (figure 4), road kill (figure 6) (figure 7)
wildlife trafficking along transit routes of the country are the threats.

7.1.1. Spatial Ecology of Roads Passing Through Protected Areas in Eastern Ethiopia

Highway extended from Awash to Galafi transit is the biggest economic corridor with uppermost traffic flow in the country. Further, with the recent economic growth of the country, the traffic intensity may possibly increases considerably. However, within the highway there are three protected areas, namely Awash National Park, Yangudi Rasa National Park and Allideghi Wildlife Reserve set aside for wildlife conservation (Figure 4).

The road is passing in the fragmented landscape of the projected areas exclusive of wildlife crossing structures. Besides, ecological safety management of wildlife vehicle collision is poorly designed so that, it is causing mortality of wildlife of conservation interest. During our incidental survey, we observed considerable road kill of wild animals. As well, the road is also too crowded with heavy vehicles in the 24 hours. The arid climatic condition of the highway makes the drivers to frequently travel during active hour of the wild animals. Such kind of traffic concordance may aggravate the rate of wildlife road kill in the selected sites. On the other hand, conservation efforts on road ecology are not practically feasible due to weak law enforcement and lack of multi sector involvement before and after construction plan. Thus, such threats are leading the conservation efforts problematic.
7.1.2. Road kills of Wildlife along Highways in Protected Area System of Ethiopia

Road sector is an imperative tool for the developmental endeavor of a given nation infrastructural extension. However, biological resources found adjacent to highway of economic corridor must be vigilantly planned in both pre and post construction impact assessment practices. If the developmental agendas are not stake in road sector, it causes road kill of various wildlife species. Some of the observed road kills records in Eastern Ethiopia protected areas are shown in (Figure 5).
7.1.3. Wildlife Trafficking As a Conservation Threat in Protected Area System of Ethiopia
Nationally transboundary illicit trafficking of body parts of wild animals is unnoticed concern. Based on our preliminary survey the current pragmatic focus of customs authority is on electronic devices and other goods. But, such sites are also prone to trafficking of trophy and skull of wild animals which have commercial importance in the global illicit market. The conservation crime monitoring system practiced by law enforcement agents in the checkpoint of Awash transit routes neglects checking local passengers passing through the highway from Addis Abeba to Eastern destinations. Poachers can take this opportunity to traffic wildlife along the transnational transboundary sites. Globally the fight against transboundary wildlife crime received a boost at the G8 meeting held from 17 to 18 June 2013 at Lough Erne. G8 Leaders recognized the need to tackle criminal trafficking and strengthen border security, including in relation to illicit trafficking of wildlife noting the links to governance and the rule of law and sources of funding for terrorists (EWCA, 2014) [13].

Fig 7: Problems associated with wildlife trafficking in various parts of Ethiopia

7.1.3. Protected areas land conversion
Land use conversion due to increasing human and livestock population is a common experience in protected areas of most Eastern African countries (Pomeroy et al., 2003) [29]. Such a conversion of natural vegetation cover to other use types such as farmlands, grazing lands, human settlements and urban center has been shown to be a cause to loss of biodiversity, deforestation and land degradation (Milner et al.,2006) [12]. Moreover, such changes, from forest to various land use types, in East Africa, including Ethiopia, were ranked as the highest in Africa at a rate of 0.94% (1990-2000) and 0.97% per year (2000-2005) (FAO, 2007) [18].

7.1.4. Border conflicts among local communities
Ethiopia protected areas may have many challenges some of which are results of border conflicts among local communities (Ashenafi and Leader, 2005) [2]. Such factors have threatened the existence of many parks in the country (Belay et al., 2012) [3]. The increasing livestock population and illicit exploitation of resources have impacted resources in Nechisar National Park (Demeke Datiko, 2011) [9].
Although Simen Mountain National Park was reported to show some positive development, infrastructural expansion in the surrounding area, deforestation, agriculture, hunting, and livestock grazing contributed to the deterioration of the park (Hurni et al., 2008) [18]. In Alatish National Park, habitat destruction to expand grazing land, poaching and forest fire were marked as primary contributing factors to the decline biological diversity (Girma and Afework, 2008) [16].

7.1.5. Invasive species
Invasive species cause biodiversity loss by competing native species for feed and habitat and altering the physical environment in a way that excludes native species. So far, close to 35 invasive weed species are identified in Ethiopia, and they are posing negative impacts on native. Biodiversity, agricultural and range lands, national parks, water ways, lakes, rivers, power dams, road sides and urban green spaces with huge economical as well as social consequences. Some of these species include: mesquites (Prosopis juliflora), parthenium weed (Parthenium hysterophorus), water hyacinth (Eichhornia crassipes), lantana weed (Lantana camara), Acacia species, and other weeds such as Orobanche and Cuscuta species that are identified as major plant invaders. Recent surveys found also emerging plant invaders such as Cryptostegia grandiflora, Parkinsonia aculeata, Mimosa diplorotricha and Nicotiana glauca (Rezene (EBI, 2014) [13].

7.1.6. Unsustainable utilization
Unsustainable utilization (over grazing/browsing, harvesting and hunting) of biological resources is one of the major threats to biodiversity and ecosystems in Ethiopia. Overgrazing/browsing by livestock in many ecosystems has also contributed to the degradation of rangelands and forest ecosystems. The consequences of these impacts include ecological disturbance, loss of species and ecosystem services thereby affecting livelihoods of local communities. Farmers found within the lake watershed were pumping water unsustainably to irrigate chat (Catha edulis), the main commercial crop in the area. This eventually resulted in the disappearance of the lake affecting the livelihood of the people that have been dependent on the lake (Brook Lemma, 2011) [8].

8. Sustainable Conservation Practices of Wildlife Genetic Resource
Sustainable conservation of wildlife resources has been one of the core objectives of wildlife managers and biologists in many countries in Africa. For centuries, wildlife has been utilized not only for subsistence but also for commercial purposes. However, as human population expands, wildlife resources are increasingly subjected to severe pressure, which threatens their existence and sustainability (Milner et al., 2006) [27]. Apart from consumptive utilization, other anthropogenic activities such as agriculture have indirectly influenced the survival of wildlife species through manipulation of their habitats (Kideghesho et al., 2006) [28]. Since most local communities have a historical interaction with wildlife in rural areas, efforts to ensure sustainability have been focusing on involving local people in conservation. Many governments have adopted a participatory approach to conservation as a result of pervasive loss of wildlife species and the challenges of a “fences and fines” approach (Nishizaki, 2004) [29]. Countries in the southern part of Africa such as Namibia, Botswana, Zambia, and South Africa have had a good experience in community-based conservation (Tfnr, 2008) [31]. In the rest of Africa, for example in East Africa, participatory conservation has been confronting some challenges. This has led to a considerable concern over community-based conservation initiatives in this wildlife-rich part of Africa (Saito, 2007) [30]. Sustainable wildlife conservation practices are best choice of the management strategies enabling national development to be integrated with biodiversity conservation efforts. Thus, we need to harmonize conservation practices so as to make use it in the developmental agenda of our Country.

9. Conservation Implications
The above listed key wildlife threat factors has a wider conservation implication for reducing the operating threats. In the presence of threats it is challenging to assure sustainable development agendas. Moreover, the above reviewed fundamental threats can decline the wildlife biodiversity under protection. Hence, mainstreaming wildlife conservation to school clubs, the largest community and stake in to different sectors is vital tool of sustainable development.

10. Conclusion
Wildlife threat is a factory with a negative role in our effort to conserve and sustainably utilize the biological capitals. Ethiopia has developed a national biodiversity strategy and action plan with the objectives of conserving representative examples of remaining ecosystems through a network of effectively managed protected areas under sustainable use and management by 2020. However, a significant biodiversity conservation challenge was evident in several protected areas. As well, due to the less emphasis given to our protected areas some of the national parks are paper parks devoid of the intended schemes of conservation and management practices. There is a growing evidence of critical biodiversity breakdown both inside and outside of many conservation areas. Accordingly
many protected areas are presently being degraded and destroyed. Highway passing through protected areas set aside for wildlife conservation are key wildlife threat factors operating in some of our conservation sites. Moreover, transboundary illicit trafficking of body parts of wild animals which have commercial importance in the global illicit market is a serious problem in some of custom border checkpoints. Land use conversion due to increasing human and livestock population is a common experience in our protected areas. Moreover, boarder conflicts among local communities such factors have threatened the existence of many parks in the country. The increasing livestock population and illegal exploitation of resources have impacted resources in protected areas. So far, close to 35 invasive weed species are identified in Ethiopia, and they are posing negative impacts on native Biodiversity, agricultural and range lands, national parks, water ways, lakes, rivers, power dams. Sustainable wildlife conservation practices are best choice of the management strategies enabling national development to be integrated with biodiversity conservation efforts. Thus, we need to harmonize conservation practices so as to make use it in the developmental agenda of our Country. In the presence of threats it is challenging to assure sustainable development agendas. Moreover, the above reviewed fundamental threats can decline the wildlife biodiversity under protection. Hence, mainstreaming wildlife conservation to school clubs, the largest community and stake in to different sectors is vital tool of sustainable conservation.

11. Way forward
Ethiopia is one of the biodiversity rich countries but utilization and conservation of the biota in a manner that sustains livelihood is poorly considered. Most of the wild biota belongs to Paper Park owing to the less emphasis given to the phenomenon. Thus, due consideration should be given to the natural facets of wildlife diversity in the physical geography of the states protected area system. Even though the economic, social and ecological value of wildlife biodiversity is known still conservation challenges are there. Moreover, the threats are challenging developmental efforts aligned with utilization of biota. If the sever threats facing wildlife is not monitored in a way of sustainability biodiversity will be a story to tell for generation than handing the resources. Therefore, there is a need to reduce the threats using timely ecological monitoring approaches so as to rescue the natural capital for our benefit and the future generation. Thus, such efforts should be supported by capacitating protected area personnel in ecological threat analysis and community based conservation practices.

Road infrastructure plays key role in economic development of a given nation. Hence, road networking activities should be supported with post and pre construction ecological impact assessments so as to reduce its effect on wild animals. Even though there are prominent efforts in road infrastructural development of Ethiopia some of the highways are of conservation challenge without staking biodiversity components. Thus, intensive survey on road kill of wildlife and identification of vulnerable sites should be done. Moreover, appropriate mitigation measures using digital sign post for both daytime and night time derivers should be installed along identified routes of conservation importance. Moreover, in view of the upcoming road network improvement and expansion in Ethiopia, specifically in Eastern Ethiopia, it is necessary to undertake wildlife vehicle mortality measures within protected areas.

Illicit wildlife trafficking cause’s severe conservation challenges on a state genetic biodiversity. This event can stand against the fair and equitable access of our genetic resources. However, the magnitude of the problem is much more common along the border point custom check point. Therefore, checkpoint located along border point should be institutionally capacitated of wildlife trafficking monitoring structures. As well, the intended capacity building training should be given of the dynamic conservation crime tactics. Moreover, community development frameworks and alternative livelihood approaches on the range states of trafficked animals should be a concern of future governmental directions.

Sustainable wildlife conservation can help to conserve, sustainably use resource, and pledge fair and equitable benefit from genetic components. Sustainability can be assured through community participation and supporting the economic wellbeing of the largest community. Therefore, sustainability of biodiversity is an issue of making use of participatory approaches and stake in various sectors. Moreover, making use of eco-technological solutions of developmental based threats factors should be included in Sustainability affairs.

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