



## Assessment of the wildlife and ecosystem status of Choke Mountain, North Western Ethiopia

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### Abstract

The natural vegetation of Ethiopian Highlands has been altered and destroyed by intensive human use over millennia and now only fragments are left. Choke Mountain is one of the areas among the different topographic and climatically varied areas of Ethiopia and harbors many endemic wildlife. But nowadays, the forest/vegetation is changing into farm lands and wild animals become threatened. Thus, assessment of the status and distribution of wildlife in Choke Mountain was carried out in October 2016. Data was collected using semi-structured questionnaire and analyzed using SPSS software version 20. In the current study, 24 Mammalia species, 52 bird species, three amphibian species and one chameleon species were recorded in the mountain. Choke, like other afro alpine mountains of Ethiopia, was the home of Ethiopian wolf which is endemic to Ethiopia. But, now a day due to habitat fragmentation and other factors, it is extinct from the area. From the descriptive statistics analysis, 12 % of the respondents reported that there is an illegal wild animal hunting which threatens wild animals in the area. However, there is significant difference among Kebeles on illegal wildlife hunting (Pearson chi-square value=25.727a, df=14, and p-value=0.02). Habitat destruction due to agricultural expansion and firewood collection is the most frequently reported threats followed by overgrazing. Interventions so far carried out to conserve and sustainably utilize the ecosystem is not so effective. Therefore, awareness creation, promoting community involvement, linking conservation activity with livelihood improvement through ecotourism are important actions to be taken to control agricultural expansion and illegal hunting for conservation and sustainable utilization of the ecosystem and its wild animals.

**Key words:** Choke Mountain, ecosystem status, diversity, wild animal

### 1. Introduction

Mountains are hotspots of biological diversity. Many mountain ecosystems have high biodiversity, in terms of species richness and degree of endemism, in comparison with adjacent lowlands (CBD, 2003; Kohler, 2014). Tropical and subtropical mountains are major centers of plant and animal species diversity, including areas in Costa Rica and Panama, the tropical eastern Andes, the subtropical Andes, the Atlantic forests in Brazil, the eastern Himalaya– Yunnan region, northern Borneo, New Guinea and East Africa (Kohler, 2014). Biodiversity in the mountains is one of the most valuable natural resources for humankind (Stone, 1992). The montane and alpine zone together cover nearly 5% of the global terrestrial land area (Korner, 2002). Its conservation provides benefits at various levels-local, national and global. However, it is under imminent threat of environmental degradation and loss.

Ethiopia is rich in natural resources, including a vast species of wildlife. Because of its species' richness, endemism and ecosystem diversity, under the Convention on Biological Diversity Ethiopia is categorized as one of the 20's like-minded mega-diverse country. A combined set of attributes make Ethiopia rich biologically. These include variability in climate, topography, diversity in ecosystems and habitats ranging from mountain ranges (Ras Dejen mountain which is 4620m above sea level) to lowland arid areas (Dallol which is 126m below sea level). Each of these ecosystems requires different conservation priorities and measures

From the total of 320 mammals found in Ethiopia, 55 are endemic to the country (Afeework Bekele, personal communication), 64% of which are specific highland forms. There are about 63 globally recognized endemic bird sites in Ethiopia, mostly in the central highlands, the southern highlands, and the Juba-Sheballe Valley. Although least has

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been done on Ethiopian amphibians, there are about 73 species known. Out of this 30 species are endemic to the country and most of them are inhabited with high lands (Abeje K 2014, unpublished document).

The natural vegetation of Ethiopian Highlands has been altered and destroyed by intensive human use over millennia and now only fragments are left (WWF, 2015). In the Ethiopian highlands, overgrazing accounts for 20 percent of the country's annual soil erosion (Lemlem et al., 2013), and vital plant species are disappearing from pastures mainly because of open-access grazing. Due to their habitat fragmentation, wild animal species also highly threatened. Efforts to better manage access to communal pastures can support biodiversity conservation.

Choke Mountain is one of the areas among the different topographic and climatic varied areas of Ethiopia. It is the main water sheds of Blue Nile where many springs and rainfall water flows towards Blue Nile gorge. However, due to rapid population growth and expansion of farming land, there is high rate of deforestation and soil erosion. The study area is also known for its forest coverage and home of Ethiopian endemic red wolf (Belay et al. 2012; Young, 2012). But nowadays the forest is changing into farm land. Therefore, assessment of the current distribution and conservation status of wildlife of Choke mountain and adjacent areas is essential to propose conservation plan.

The main objective of this study is to assess the wild animal distribution and ecosystem status of Choke mountain and to describe the distribution of wild animal in the Choke mountain, the conservation status of the choke mountain, and assess the presence of Ethiopian wolf in choke mountain and adjacent areas.

## 2. Materials and methods

### 2.1 Study Area

Choke Mountain is found in the highlands of East Gojjam, in the northwest parts of Ethiopia (Figure 1). It is located between 37° 43.80' E and 10° 42.84' N. Climatically, Choke Mountain region is found within six climatic zones (Belay *et al.*, 2013). It is the main water sheds of Blue Nile where many springs and rainfall water flows towards Blue Nile gorge. The mountain range is located on a plateau that rises from a block of meadows and valleys. The central peak is located at 10°42' N and 37°50' E; the whole mountain area extends over 10°41' to 10°44' N and 37°50' to 37°53'E and covers an area of about 173,443 km<sup>2</sup> (Belay *et al.*, 2013). Its topography is sloppy and mountainous nature, which is sensitive to climatic hazards especially with rainfall variability and intensity. Mean monthly temperature of the area were 17.6°C. In the last ten years the average annual rainfall was 1377.6 mm (ENMSA, 2014).

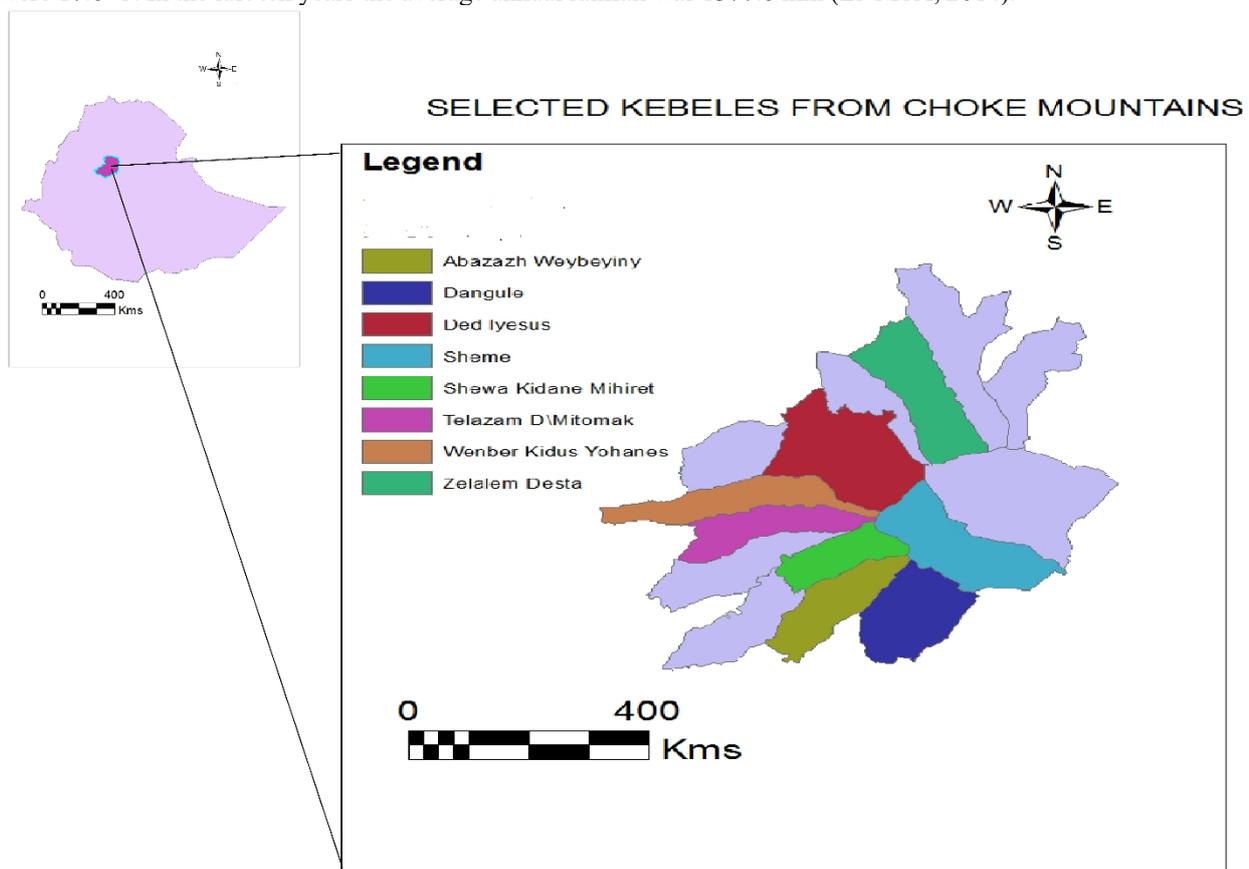


Figure 1. The map of the study area

## 2.2 Data collection and Sampling design

Data was collected from primary and secondary information sources. A total of 50 people were interviewed using questionnaire by making purposive selection. Of these, 34 respondents were males and 16 were females. The questionnaire included both open and close ended questions. Open ended questions were included to elicit information on knowledge about wildlife in the area, whether the wild animals posed any problem in the community and to identify the attitude of the local people towards the wild animals.

A pilot survey was conducted to check the appropriateness of the questionnaire. There are about 24 kebeles (lower administrative areas or villages) and 9 woredas (districts) that found in /around Choke Mountains range. 8 kebeles were selected from 5 woredas (districts) by systematic random sampling and purposively 50 respondents were taken from the selected kebeles (lower administrative areas or villages). Besides with interview, data were collected by direct observation in the assessment.

## 2.3 Data analysis

Data were analyzed by descriptive statistics in the form of percentage and frequency through bar graphs to describe the species composition and threat factors. Chi-square SPSS software version 20 was used to analyze the data.

## 3. Results

The major natural habitats of the choke mountain are moist moorland, montane grasslands and meadows, cliffs and rocky areas. Choke mountain harbors more than 85 shrub and tree species. Of which, the dominant plant species are *Acanthus sennii*, *Echinops ellendekii*, *Eryhrina brucei*, *Euryops pinifolius*, *Lobelia rhynchopetalum* (photo plate (d)), and *Kniphofia foliosa*.

In the current study, 24 Mammalia species (Table 1), 52 bird species (Table 2), three amphibian species and one chameleon species were recorded. There are many unidentified mole rat and rat species in the study area. In addition to the above wild animals, 8 orders from class insect were recorded. Choke mountain is also the home of many endemic birds. Choke, like other afro alpine mountains of Ethiopia, was the home of Ethiopian wolf which is endemic to Ethiopia. But, now a day due to habitat fragmentation and other factors, it is extinct from the area. The local peoples reported that Ethiopian wolf was extinct about 30 years ago from choke mountain.

Table 1. Mammals recorded from choke mountains

No.	Common Name	Scientific name
1	Abyssinian Black And White Colobus	<i>Colombus guereza</i>
2	Anubis Baboon	<i>Papio Anubis</i>
3	Ardvark	<i>Orycteropus afer</i>
4	Bat	<i>Different bat sp.</i>
5	Black Back Jackel	<i>Canis mesomelas</i>
6	Bush Pig	<i>Potamochoerus laryatus</i>
7	Caracal	<i>Caracal caracal</i>
8	Common Bushbuck	<i>Tragelaphus scriptus</i>
9	Common Duiker	<i>Sylvicapra grimmia</i>
10	Common Jackal	<i>Canis aureus</i>
11	Egyptian Mongoose	<i>Herpestes ichneumon</i>
12	Hare	<i>Not identified</i>
13	Honey Bagger	<i>Mellivora capensis</i>
14	Klipspringer	<i>Oreotragus oreotragus</i>
15	Leopard	<i>Panthera pardus</i>
16	Mole Rat	<i>Tachyorcyte splendon</i>
17	Porcupine	<i>Hysrix cristata</i>
18	Rat	<i>Different rat sp.</i>
19	Rock Hyrax	<i>Procavia bruceipo</i>
20	Serval Cat	<i>Leptailerus serval</i>
21	Skung	<i>Ictonyx striatus</i>
22	Spotted Hyena	<i>Crocota crocuta</i>
23	Stripped Hyena	<i>Hyaena hyaena</i>
24	Vervet Monkey	<i>Cercopithecus aethiops</i>

Table 2. Birds recorded from choke mountain

No.	Common Name	Scientific Name
1.	Abyssinian Long claw	<i>Macronyx flavisollis</i> *
2.	Augur buzzard	<i>Buteo rufofuscus</i>
3.	Baglafaecht weaver	<i>Ploceus baglafaecht</i>
4.	Black kite	<i>Milvus migrans</i>
5.	Black roughwing bulbul	<i>Psalidoprocne holomelaena</i>
6.	Black-winged Lovebird	<i>Agapornis taranta</i>
7.	Blue-breasted bee eater	<i>Merops variegatus</i>
8.	Brown Capped weaver	<i>Ploceus insignis</i>
9.	Brown-rumped seedeater	<i>Serinus tristriatus</i>
10.	Cap rook	<i>Corvus capensis</i>
11.	Cattle egret	<i>Bubulcus ibis</i>
12.	Cormorant	<i>Phalacrocorax sp.</i>
13.	Crested Lark	<i>Galerida cristata</i>
14.	Dusky turtle-cove	<i>Streptopelia lugens</i>
15.	Egyptian goose	<i>Alopochen aegyptiaca</i>
16.	Egyptian Vulture	<i>Neophron percnopterus</i>
17.	Erckel's Francolin	<i>Francolinus erckelii</i>
18.	Ethiopian Siskin	<i>Serinus nigricaps</i> *
19.	Fan-tailed Raven	<i>Corvus rhipidurus</i>
20.	Great Spotted Eagle	<i>Clanga clanga</i>
21.	Hammerkop	<i>Scopus umbretta</i>
22.	Harwood's Francolin	<i>Francolinus harwoodi</i> *
23.	Hooded vulture	<i>Necrosyrtes monachus</i>
24.	Lammergeyer	<i>Gypaetus barbatus</i>
25.	Moorland chat	<i>Cercomela sordid</i>
26.	Nyanza swift	<i>Apus nianse</i>
27.	Parasitic weaver	<i>Anomalospiza imberbis</i>
28.	Pied crow	<i>Corvus albus</i>
29.	Ring-necked dove	<i>Streptopelia capicola</i>
30.	Rüppell's chat	<i>Myrmecocichla melaena</i> *
31.	Rueppell's Robin-chat	<i>Cossypha semirufa</i>
32.	Ruppel's long-tailed starling	<i>Lamprotornis purpuropterus</i>
33.	Ruppel's vulture	<i>Gyps ruppellii</i>
34.	Slender-billed starling	<i>Onychognathus tenuirostris</i>
35.	Southern banded snake eagle	<i>Circaetus fasciolatus</i>
36.	Speckled pigeon	<i>Columba guinea</i>
37.	Splendid Glossy Starling	<i>Lamprotornis splendidus</i>
38.	Spot-breasted Lapwing	<i>Vanellus melanocephalus</i> *
39.	Streaky seedeater	<i>Serinus striolatus</i>
40.	Striped swallow	<i>Herundo daurica</i>
41.	Swainson's sparrow	<i>Passer swainsonii</i>
42.	Tacaz sunbird	<i>Nectarina tacazze</i>
43.	Tawny eagle	<i>Aquila rapax</i>
44.	Thick billed Raven	<i>Corvus crassirostris</i>
45.	Trilling Cisticola	<i>Cisticola woosnami</i>
46.	Wattled Ibis	<i>Bostrychia carunculata</i> **
47.	White backed vulture	<i>Gyps bengalensis</i>
48.	White-Billed Starling	<i>Onychognathus albirostris</i> *
49.	White collared pigeon	<i>Columba albitorques</i> **
50.	White fronted bee eater	<i>Merops albicollis</i>
51.	Woolly necked stork	<i>Ciconia episcopus</i>
52.	Yellow vented bulbul	<i>Pyconotus barbatus</i>
*Endemic		
** Near endemic		

Some (12 %) of the respondents told us there is illegal wild animal hunting in the study area. However, there is significant difference among kebeles on illegal wildlife hunting (Pearson chi-square value=25.727<sup>a</sup>, df=14, and p-value=0.02). Among selected kebeles, illegal wild animal hunting was reported from Ded-Eyesus, Kidus Yohannes and Dangule kebeles and not reported from others. This may be due to awareness and law enforcement gap between kebeles. All respondents have been looking wild animals once in the choke mountain like the common jackal (**photo plate (b)**) while they have been practicing their livelihood work.

Habitat destruction (agricultural expansion, firewood collection) is the most reported threat for the choke mountain (**photo plate (c)**) and overgrazing is followed by agricultural expansion and firewood collection.

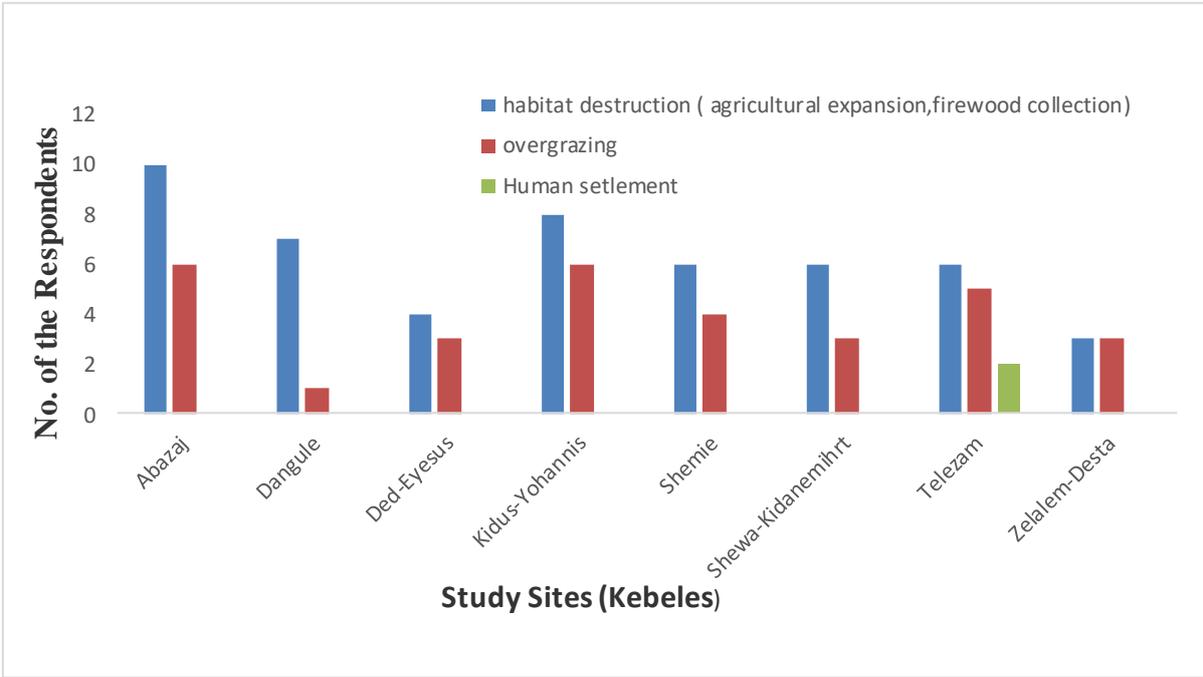


Figure 2. The major threats of the choke mountain

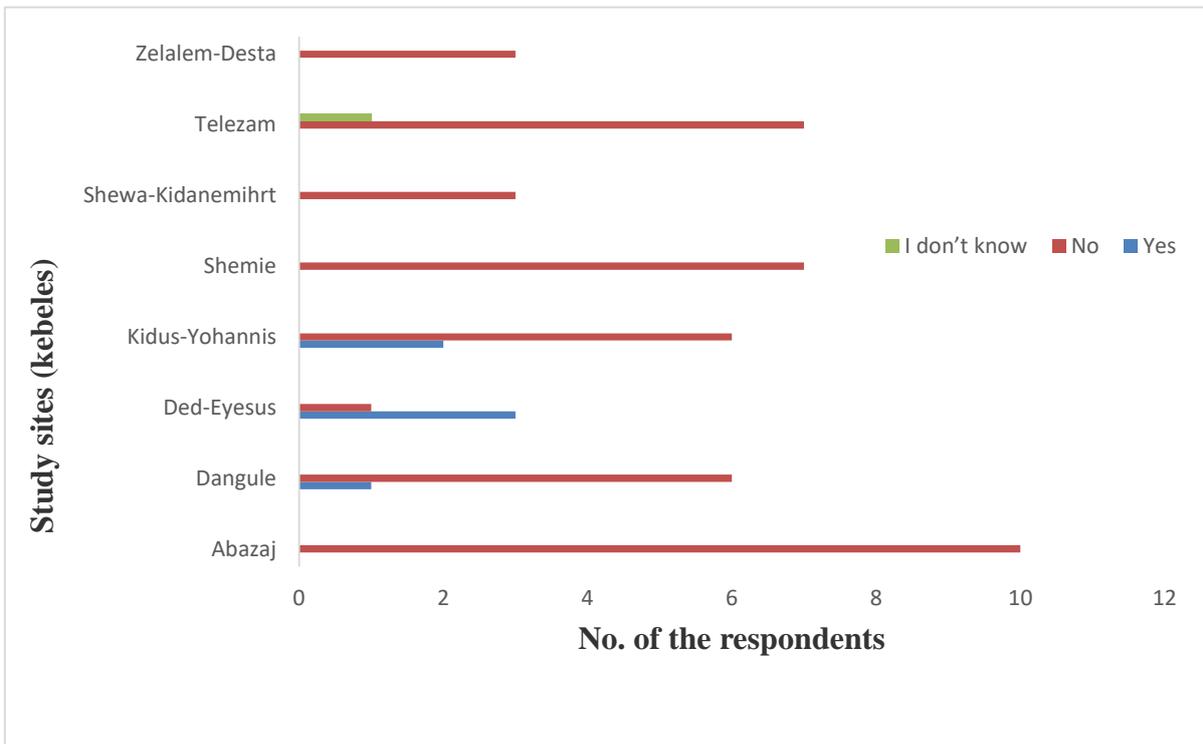


Figure 3. The illegal wild animal hunting in the study area

Most (68%) of the respondents reported as the current status of wild animals in the choke mountain is decreasing and they are not observing them frequently in the area. However, the Common Jackal (photo plate (b)), Hyena, Porcupine, Monkey, Rats and Mole Rat are animals that are always seen by the community in the choke mountain. The local communities think that the wild animals are conserved in the area, the main reason is that no one can kill wild animals due to the existence of rule and regulation of the government towards wild animals. About 46% of the respondents believed that wild animals are not important while 42% believed importance of wild animals and the remaining 12% believed wild animals are both important and harmful (Figure 4).

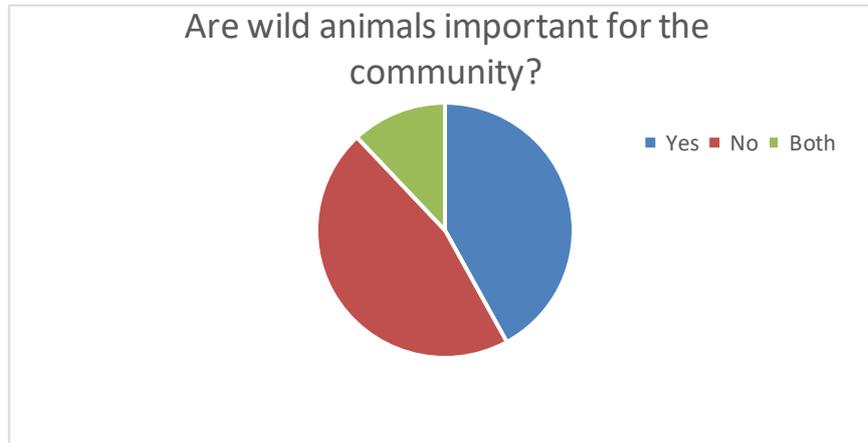


Figure 4. The pie chart showing community attitude towards importance of wild animals

Although most (54%) of the people had negative attitude towards wild animals due to the presence of conflict between domestic animals (sheep, goats...) (see photo plate below) and wild animals, they responded as both the community and the government would be responsible for the conservation of wild animals found in the choke mountain. People in the study area have different beliefs and perception towards wild animals. During our personal communication with the respondents, almost all of them said that “hyena is not only important for scavenging dead animal bodies but also to eat the devil.” The community believed that if there were no hyena which eat Devil (our enemy) at night, it will be difficult to live.

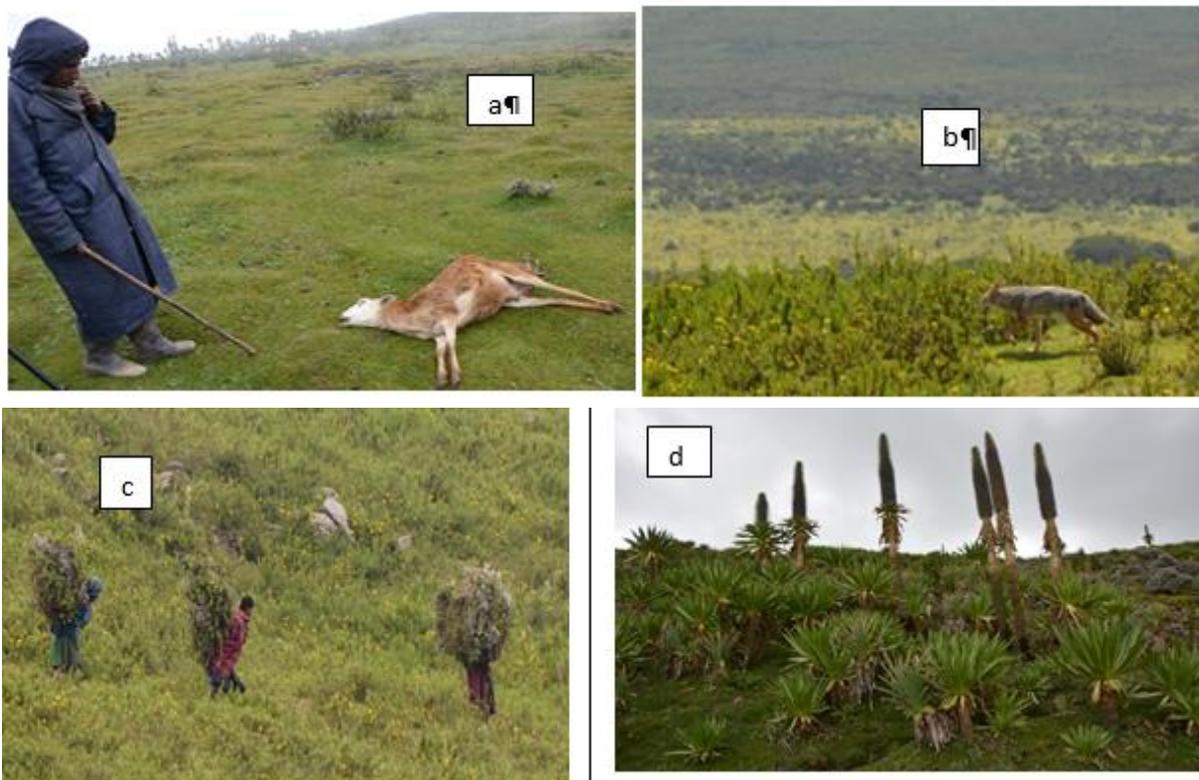


Photo plate 1. Some of the pictures taken from the choke mountain / a. The sheep bitten by the common jackal b/ The common jackal c/ Fire wood collection at the choke mountain d/ *Lobelia rhynchopetalum*.

#### 4. Conclusions and discussion

According to Mwendera *et al.* (1997), the highlands account for about 95% of all cultivated land and supports 88% of the total human population and 70% of the total live-stock population in Ethiopia. Many mountain ecosystems have high biodiversity (ICIMOD, 2009; Eastern Arc Mountains, 2015), in terms of species richness and degree of endemism, in comparison with adjacent lowlands (Saavedra, 2009). In more developed regions, this difference is accentuated by the extensive modifications that have been made to lowland ecosystems for agriculture, settlement and infrastructure (CBD, 2003). Mountains have great importance to human societies, the same is true in Choke mountain which is the source of 27 major rivers that are tributaries of the Blue Nile. The area also important for the home of herpeto-fauna, insects, 24 mammals and 52 avian species.

The Ethiopian mountains provide habitat and home of the endemic and endangered species (Alemneh A, 2015). In line with this study, choke mountain is the home of 9 endemics and near endemic bird species

According to McGinley (2009), the high plateaus of the Ethiopian Highlands are the locality of *Lobelia rhynchopetalum*. The current study also asserted that choke mountain is the home of giant lobelia, which is the home and food of many endemic animals.

Livestock rearing and farming are the major economic activities of people living in and around the Choke mountain. The major livestock kept by the community in the area are cattle, sheep and pack animals. The same is true for the communities living around and in the Semien Mountain National Park (Melese Y *et al.*, 2008) and Bale Mountain National Park (Temesgen G, 2015).

Ethiopia's highlands are among the most densely populated agricultural areas in Africa. Expanding agriculture, shifting cultivation, fires, and overgrazing are major threats to the biological diversity of these ecosystems (Saavedra, 2009). In line with this, overgrazing, illegal settlement are the major threats in the study area.

Choke mountain has a huge potential in conserving the biodiversity of Ethiopia because of its advantage of containing different ecosystems. It is the home of many bird and mammal species and endemism is also high. Nevertheless, it is one of the highly threatening areas of the country. The major threats are village expansion, agricultural encroachment, overgrazing, and firewood harvesting.

Solutions being taken are less effective in conserving the ecosystem from degradation. Therefore, controlling agricultural expansion, awareness creation, promoting community involvement, linking conservation activity with livelihood improvement through ecotourism, and private honey production are believed to be important. The solutions are interrelated, and it is therefore important not only to understand them individually but also to address them in a holistic fashion.

Nature based tourism offers high revenue away from agricultural production. The eco-region; montane and Afro alpine ecosystem, is the best tourism destination in Ethiopia. Nature-based tourism which serves dual purposes; protects the various unique wildlife species and improving the livelihoods of local communities. However, Choke mountain is under severe threat. Failure to conserve these areas will have dire consequences for biodiversity conservation. Therefore, federal and regional government and the local communities should have taken the responsibility to conserve this area for sustainable development.

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#### References

- Alemneh Amare (2015). Wildlife Resources of Ethiopia: Opportunities, Challenges and Future Directions: From Ecotourism Perspective: A Review Paper. *Natural Resources*, 6, 405-422. <http://dx.doi.org/10.4236/nr.2015.66039>.
- Belay Simane, Zaitchik, B.F., Mesfin, D. (2012). Climate resilience in the blue Nile/Abay highlands: A framework for action. *Int.J. Environ.Res. Publ.Health*, 9,610-631.
- CBD (2003). Status and trends of, and threats to, mountain biodiversity, marine, coastal and inland water ecosystems: Abstracts of poster presentations at the eighth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity. Montreal, SCBD, 127p. (CBD Technical Series no. 8).
- Eastern Arc Mountains (2015). Ecosystem Services in the Eastern Arc Mountains of Tanzania. Sourced online at <http://www.naturalcapitalproject.org/where/tanzania.html>
- ENMSA (Ethiopian National Meteorology Service) (2014). Meteorological report of ten years 2003-2013. Ethiopian National Meteorology Agency, Addis Ababa, Ethiopia.

- ICIMOD (International Centre for Integrated Mountain Development) (2009). Mountain Biodiversity and Climate Change. Available in electronic form at [www.books.icimod.org](http://www.books.icimod.org).
- Kohler, T., Wehrli, A. & Jurek, M., eds. 2014. Mountains and climate change: A global concern. Sustainable Mountain Development Series. Bern, Switzerland, Centre for Development and Environment (CDE), Swiss Agency for Development and Cooperation (SDC) and Geographica Bernensia.
- Körner Ch (2002). Mountain biodiversity, its causes and function: an overview. In: Körner Ch, Spehn EM (eds) Mountain biodiversity. A global assessment. Parthenon, Boca Raton.
- Lemlem Aregu, Darnhofer, I., Wurzinger, M. (2013). Does excluding women undermine the resilience of communal grazing land? A case study in Amhara region, Ethiopia. In European Society for Rural Sociology, ed. Rural resilience and vulnerability: The rural as locus of solidarity and conflict in times of crisis, Proceedings of the XXVth ESRS Congress, 29 July–1 August in Florence, Italy, pp. 283–284. Pisa, Italy, Laboratorio di studi rurali SISMONDI.
- McGinley M., (2009). Biological diversity in the Eastern Afromontane. Encyclopedia of Earth. Sourced online at <http://www.eoearth.org/view/article/150641/>
- Mesele Yihune, Afework Bekele and Zelealem Tefera (2008). Human-Ethiopian Wolf Conflict in and Around the Simien Mountains National Park, Ethiopia. International Journal of Ecology and Environmental Sciences 34 (2): 149-155.
- Mwendera, EJ, Mohamed Saleem MA and Woldu Z (1997). Vegetation response to cattle grazing in the Ethiopian highlands. Agriculture, Ecosystems & Environment. Volume 64, Issue 1, 15 June 1997, Pages 43–51.
- Saavedra, D. (2009). The Abune Yosef Massif. Birds and Mammals of a hidden jewel of Ethiopia.
- Stone, P.B. (ed.) (1992). The State of the World's Mountains: A Global Report, Zed Books, London.
- Temesgen Gashaw (2015). Threats of Bale Mountains National Park and solutions, Ethiopia. Journal of Physical Science and Environmental Studies, 1 (2):10-16.
- WWF (2015). Ethiopian montane grasslands and woodlands. Accessed on online 6/February/2017. [www.worldwildlife.org/ecoregions/at1007](http://www.worldwildlife.org/ecoregions/at1007)
- Young J. (2012). Ethiopian protected areas: A 'Snapshot'. A reference guide for future strategic planning and project funding.

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