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# The Status of Ecosystem Resources in Ethiopia: Potentials, Challenges and Threats: Review Paper

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**Abstract**

Vegetation type is the major element to categorize Ethiopian ecosystem. The objective of this article is to describe the status and potentials of Ethiopian vegetation and associated threats for ecosystem resources. Furthermore, it also identifies the challenges and treats and future directions to put into practice. The analysis is based on theoretical considerations and overviews on the existing resources. Ethiopian agroecology includes the highest altitude, Ras Dashan in Simien mountain chains which is 4533 meters above sea level to the low depressions of 110 below sea level Dallol depression which is one of the warmest place in East Africa and a unique ecosystem in Ethiopia the place is found in Afar Regional state where different fauna and flora bio diversities are engaged. Classification of agroecosystem and agrobiodiversity is important in planning watershed management activities and conservation of biodiversity.

**Keywords:** Biodiversity; Ecology; Ecosystem; Resources; Species

## Introduction

Ethiopia possesses enormous traditional, cultural and natural diversities with different range of latitudinal position and topography. East African rift valley which extends from Afar junction to the Southwest direction possess various arrangement of flora and fauna. The country has also mountain, medium and flat topography with different elevations which creates variation in climate conditions and diverse biodiversity [1].

Edaphic difference phenomenon is the cause for wide biodiversity of the nation. The massive highlands possess different gorges and major river valleys. The run of water is estimated around 122.19 billion cubic meters annually of which 74% is part of major rivers [2].

Ethiopia is a central place of biological diversity with large endemism due to large ecological ranges. In most forest ecosystems expansion of large farm plantations, lumber extraction, investors and small-scale farmers interest in agricultural lands, new settlement program and fire hazards are the most prominent factors for the depletion of the resources. The ecosystem endowment is represented by cultural diversity with Varity of fauna and flora but frequent encroachments by man resulted in widespread destruction of wildlife and their habitats. Therefore, this paper reviews the potentials, challenges and treats of ecosystem resources observed in Ethiopia.

## Natural Ecosystem in Ethiopia

Diversity of vegetation types in the country is considered as ecosystems. Various vegetation in different agro-ecology shows clear ecosystem strata with several animals, plants with macro and microbial species [3,4]. The resource needs due attention of conservation and handling to use for long periods. Anthropological interference, free grazing and over utilization of resources are the common cause for the natural resource degradation. Land use land cover (LULC) statistics in Ethiopia indicates that woody vegetation's including high forests cover over 50% of the area [5]. According to FAO [6], definition Ethiopian vegetation coverage which is considered as forest are natural high forests, woodlands, plantations and bamboo forests, with an estimated area of 35.13 million ha. If the shrub lands are added and the estimated cover is over 50% (61.62 million ha). The next largest land use type is cultivated land with 18.6% cover (Figure 1).

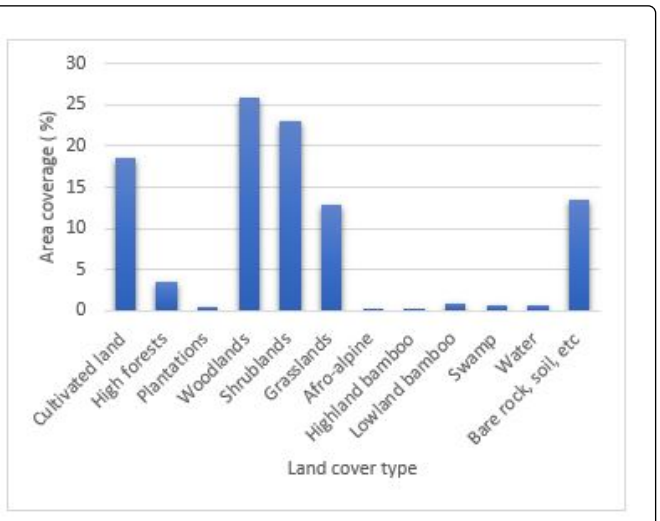


**Figure 1:** The land-cover types of Ethiopia and their magnitude/ proportion (WBISPP, 2005) Ethiopian vegetation is a large and significant storage of carbon (C), because forest contains more C per unit area than any other land cover. About two-third of the global terrestrial C, exclusive of that sequestered in rocks and sediments, is sequestered in forest ecosystems [7].

### Afroalpine and sub- afroalpine ecosystem

Afroalpine ecosystem includes areas higher than 3500 meters above sea level while sub-afro-alpine areas found in the range of 3200 to 3500 meters above sea level. Giant Lobelia, Erica Arborea Lobelia species, and dwarf shrubs are the feature of the ecosystem [8]. The mammals in this ecology comprises Walia Ibex, Ethiopian Wolf and Red Chest Gelada Baboon, Mountain Nyala and Mole Rat. Different Birds like Golden Eagle, Chough, Spot-breasted Plover, Blue winged Goose, Lammergeyer and Wattled Crane are common [9]. Afroalpine area has cold temperature throughout the year with frequent snow. Community which resides in this area cultivates crops like barley, oat, potato and flax. It grows variety of grasses and shrub flora and succulent stem weeds which is grouped in Crassulaceae family. Anthropological interference and free grazing in the niches are the major causes of the reduction of flora and fauna biodiversity. Soil fertility depletion is observed due to continuous farming and high leaching. This condition needs due attention to restore and conserve the remaining resources [10].

### Montane grassland ecosystem

This ecosystem has physiognomy which comprises different floristic arrangement and bionetwork. Montane grass land is mostly found within the range of 1500 to 3200 meters above sea level. Several species of grass like *Eragrostis*, *Hyparrhenia*, *Pennisetum*, *Panicum*, *Cymbopogon Cynodn* and *trifolium* are commonly found in the system [11]. The grass land soil is moderately fertile and allow for the growing of woodlands in different strata. Common trees species found in the ecosystem are *Acacia abyssinica*, *Juniperous procerra*, *Croton macrostachys*, *Rossa abyssinica*, *Doyayalis abyssinica* and *Maytenus arbutifolia*. Mixed farming activities is practiced in the area which is the cause of disappearance of mammalian wildlife [4].

### Dry ever green montane forest grassland complex

It has complex system and comprises big trees and shrubs with different grasses which is found in the mountainous and high land area of Ethiopia within the range of 900- 3300 meters above sea level. The dominant tree species are *Juniperus procera*, *Olea europaea*, *cuspidata*, *podocarpus falcatus*, *Acacia abyssinica* found in valleys. The existing vegetation coverage is mostly grown after serious deforestation with mixed arrangement and consists of dry evergreen trees and grasses). Mountain Nyala which is endemic mammal is the endangered wildlife in the area. Different type of birds like white backed Black, Abyssinian long claw, Watteled libis, yellow fronted parrot as well as reptiles are found in the ecosystem [12].

### Moist evergreen montane forest ecosystem

The land scape is covered by closed strata and tall trees are found in the system. This ecosystem is found at an altitudinal range of 1500 to 2600 meters above sea level with Aningeria adolfi-friederici, Podocarpus falcatus, Arundinaria alpi and other broad leave tree species. The ecosystem is rich in Varity of mammals like Monkey, Leopard and, chimpanzee. Common birds are Abyssinian Wood pecker, African Hill Babbler, Banded Barbet, and Abyssinian Crimson wing. Wild dogs and lions are found in open Acacia land [13].

### Acacia commiphora woodland ecosystem

It is found in the altitudinal ranges of 900 to 1900 meters above sea level. Trees and shrubs are evergreen, and some are deciduous type [14]. Different acacia and commiphora tree species as well as shrubs like Acalypha, Barleria, Aerva, and Aloe species are common. It consists of Zebra, Wild Ass, Black Rhinoceros mammals. Abundant birds such as Golden-breasted Bunting, Salvadori's Seedeater, Yellow throated serin, Ruppells weaver, white headed Buffalo weaver and Abyssinian bush crow are found in the ecology [15].

### Combretum terminalia woodland ecosystem

This biome is found at the altitudinal range of 500-1900 meters above sea level. The Vegetation entails different trees like *Anogeissus leiocarpa* and *Stereospermum Boswellia pyrifera*, Combretum and Terminalia tree species, lowland bamboo and Lannea are common vegetations in the arrangement [16]. Fire incidence and deforestation is the major factors for ecosystem degradation. Different birds like Red-throated Serin, Fox Kestrel, Red-pate Cisticola, Green backed Eremomela, Bush Petr onia and Black-ramped Waxbill are found [17].

### Lowland semi-evergreen forest ecosystem

It is found in the altitudinal range of 450 to 650 meters above sea level. Most trees are deciduous type with, 15-20-meters tall and the tree canopy is continuous. *Baphia abyssinica* is dominant vegetation followed by *Celtis toka*, *Diospyros abyssinica*, *Trichilia Zanha golungensis Lecaniodiscus*, and *Malacantha alnifolia Zanthoxylum*. Wild mammals such as Lesser Cane rat, Nile Lechwe and White-eared Kob, are found in the jungle. Some Leopard and Bush Elephants population are decreased from time to time and they are under threat. Different types of birds are also found in the ecosystem. Particularly Yellow fronted canary, Red tailed Buzzard and Red throated Bee eater birds are common [11].

### Desert and semi desert scrubland ecosystem

It is found in the low land area with an altitude of 500 meters above sea level. Drought tolerant vegetation scarcely cover the area. Trees like Acacia species, Boswellia ogadenenesis commiphora staphyleifolia and other shrubs are growing in the range [15]. The semi desert scrubland is mainly found in the north-western part of the nation.

### Aquatic and wetland ecosystem

Ethiopia possess several lakes, rivers and wetlands in different agro-ecologies. In the aquatic ecosystem fresh water lakes and rivers are included. Most lakes are found in the rift valley area while rivers and wetlands are fond in all part of the country. In the highland area mountain chains are the source of several rivers and basins. These rivers and lakes comprises different type of fish, reptiles and hippopotamus [18]. According to Shimelis and Afework [19], different species of trees, grasses and sedges are found around riverine.

Most wetlands which are rich in fauna and flora are found around Lake and river basins as well as in flatlands of the country. This ecosystem possesses different macrophytes, birds and grasses [20]. Most wetlands are under threat due to sediment deposition, expansion of agriculture and grazing lands [21].

## Potentials

The existing ecosystem has a good potential in providing socioeconomic benefits and several critically important ecological services. From some local livelihood perspectives, Ethiopian forest ecosystem are sources of provisioning ecosystem services including food, water energy and shelter in rural and urban areas as provisioning services [22]. As a regulating service, flood and disease control, serve as a shelter and play important role in regulating the climate variability [23]. Diversified trees, shrubs and grasses serve as medicinal substances, recreational and cultural benefits. According to studies from various countries in the tropics, including Ethiopia, overall forest incomes from timber and non-timber forest products contribute substantially to household annual income [24,25]. Forest resources are also essential component of rural livelihood diversification and can provide safety nets during income crises for many households as well as supporting poverty alleviation [26]. Protected Ecosystem also used to purify the air and water, generate oxygen, and stabilize the climate. The creation of the air we breathe and the supply and distribution of water we drink is found from the healthy ecosystems [27-31].

### Challenges and Threats of Ethiopian Ecosystem Resources

The ever-increasing population in rural and urban areas creates a great pressure on natural resources by over utilizing the endowment and completely change the ecology to different developmental activities. The conversion of lands to farming and grazing activities, the construction of reservoirs for irrigation and electrification as well as the high demand of forest products, disturbs the natural feature of the biome and aggravates the degradation of the remaining forest ecology [3]. In moist evergreen montane forest ecosystem expansion of large coffee farm plantation, timber extraction, investors and small-scale farmers interest in agricultural lands, new settlement program and fire hazards are the most prominent factors for the exhaustion of the resources). The rate of deforestation is also aggravated due to high demand raw materials for construction, charcoal, fuelwood and pol. Similar interference of human activities in south and eastern part of the country enhanced the vulnerability of the ecosystem resources and numerous taxa are under threat. The land scape of Ethiopian highlands vegetation cover becomes bare and becomes fragile for water and wind erosion which enhances sediment deposition in water bodies and large flat fields. The runoff water transports soil nutrients in to water bodies and causes eutrophication which pollutes the aquatic live animals and plants. Wet lands, marshes and swamp areas conversion to grazing and cultivation also leads to the disappearance of biodiversity of wetland habitats and the appearance of invasive weeds.

## Conclusion

Ethiopia possesses diverse ecosystems with various flora, fauna and microbial resources. The high massif high land of Ethiopia is long separated from the rest of the lowland areas; they are rich in terms of species diversity and in endemics. The spectacular escarpments and gorges of most of ecosystems provide extremely breathtaking scenery, and therefore, have great scenic values. Besides this the rare and endemic wild fauna and flora in most ecosystem owe for tourist attractions. The common threats for different ecosystem resources are over-exploitation of natural resources; expansion of agriculture and grazing lands, climate variability and other factors being inextricably linked with the loss of ecosystem resources which is directly or indirectly interrelated to interference of human activity. Integrated land-use planning with environmental conservation activities at landscape level is needed for sustainable healthy ecosystem management and utilization. Area closure and afforestation with integrated watershed management are also necessary to restore the ecosystem resources in different niches.

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