International Journal of Advanced Multidisciplinary Research
ISSN: 2393-8870
www.ijarm.com
(A Peer Reviewed, Referred, Indexed and Open Access Journal)
DOI: 10.22192/ijamr Volume 9, Issue 6 -2022

Review Article

DOI: http://dx.doi.org/10.22192/ijamr.2022.09.06.006

# The Current status, Challenges and Efforts of Conservation of Biosphere Reserves in the Ethiopia

**Abesh Birhanu, Girum Faris**
Ethiopia Biodiversity Institute, Assosa Biodiversity Center, Forest and Rangeland Plant Biodiversity Case Team, Assosa, Ethiopia
Ethiopia Biodiversity Institute, Branch Centers and Stakeholders Directorate, Addis Abeba, Ethiopia
Corresponding Authors Email address;*birhanuabesh12@gmail.com*

**Keywords**

Biosphere Reserve, Ethiopia, UNESCO, Yayo, Sheka, Majange; LakeTana, Kafa

## Abstract

Ethiopia is one of the centers of richest biodiversity hotspot countries in the world. This review paper was initiated comparative assessment of kafa, sheka ,lake Tana, Yayo and Majang biosphere reserves, located in the all parts of Ethiopia, regarding their status of plant diversity, threats, and efforts of conservation. To this end, awide review of different journals, articles, and proceedings was made. Consequently, the review indicates that five the biosphere reserves contained myriad plant biodiversity, specifically the "hotspot" of Afromontane rainforest biodiversity, with some degree of dissimilarities among them. Lake Tana(695,885ha), kafa(540,631ha), Sheka(238,750ha), Majang(225,490ha) and Yayo(161,021ha) are the largest zones area covered by biosphere reserve in the Ethiopia orderly. However, there are many challenges were encountered in all the biosphere reserves in Ethiopia those are conversation of land use, deforestation and degradation, agriculture expansion, investment, overgrazing, firewood, charcoal and other factors. Hence, to reduce forest conversion and biodiversity loss, the government of Ethiopia is creating conservation mechanism like the establishment of the protected area and biosphere reserve which is controlled and managed by the community and the government. The main conservation strategy of biosphere reserve are conservation as an open system, sustainable utilization of researche, research and assessment of the impact of research through monitoring and awareness and training of people in the biosphere reserve both inhabitants and managers.

## 1. Introduction

According to the current world network of biosphere reserves there are about 701 biosphere reserves in 124 countries including 21trans-boundary sites 2 Transcontinental Biosphere Reserves, over 250 million people are use as to home are designated globally [80]Ethiopia is the largest landlocked country in Africa with an area of 1.13 million kilometer square that is located in the northeast of Africa between 03° 40' and 15° N latitude and 33° and 48° E longitude.

The country is one of the top 25 biodiversity-rich countries in the world, and hosts two of the world's 34 biodiversity hotspots, namely; the Eastern Afromontane and the horn of Africa hotspots [19].For example, about 6500 to 7000species of higher plants are estimated to exist in Ethiopia, of which about 12 percent species are endemic[26,46].Basically, forest in the southwest of Ethiopia has relatively high forest cover as compared to other parts of the country, about 56 percent of the country's forest cover [32].

In the same manner, Ethiopia has five internationally recognized sites of biosphere reserve namely Kafacoffee biosphere reserve, nominated in 2010, Yayocoffee biosphere reserve nominated in 2010, Sheka forest biosphere reserve nominated in 2012 , Lake Tana biosphere reserve nominated in 2015 and Majang forest biosphere reserve nominated in 2017.Southwestern parts of Ethiopia is the home of for many plant and animal diversity[70]. The country has diverse flora and fauna most of them are endemic.

Currently, Ethiopia supporting more than 2,985 described species of animals and 7,000 of higher plant species with 12% endemism, among the fauna 320 are mammals with 36 endemism, 926 birds with 24 endemism, 1,265 arthropods with 21 endemism, 200 fish with 40 endemism, 201 reptiles with 16 endemism and 73 amphibians with 30 endemism many of the biodiversity living in and around the biosphere reserve and critically depend on the reserve for livelihoods [10,30].

This review paper was designed to evaluate, compare and contrast the five biosphere reserve in Ethiopia such as *Kafa,Yayo, Sheka, Lake Tana, and Majang* forest biosphere reserve.

However, nowadays, Ethiopia is facing biodiversity losses, interlaid, and linked with commercial and subsistence cultivations [1]. The most important reason behind the rapid deforestation rate is increasing human population growth with subsequent high demand of land for agriculture and grazing, firewood, charcoal, timber, and other purposes [32 31,20].

In connection to the challenges of forest conservation in the Ethiopia has been taking measures to rehabilitate degraded forests and conservations of natural forests [83,52]. Protected area and biosphere reserve were the main conservation mechanisms. The central Objectives of these biosphere reserves are biodiversity conservation, research, and development function to meet the local people's needs and henceforth improve their quality of life [58,76].

Therefore, this paper addresses comparative appraisal of these five biosphere reserves on their current status of plant and animal biodiversity, factors that affects, and ways of conservation efforts.

## 2. Objectives

The overall objective of this review paper is to compile information on the biosphere reserves of Ethiopia, with particular emphasis

i) To addresses reasonable evaluation of these five biosphere reserves on their curent status of plant and animal biodiversity
ii) To review the major challenges encountered and ways of conservational efforts in the Ethiopia biosphere reserves.
iii) To evaluate the impact of human activities in biodiversity at Yayo,Kafa, Sheka, Lake Tanaand Majang biosphere reserve in the Ethiopia.

## 3. Methodology

The methodology followed was mainly reviewing articles from known journals, books, reports and student thesis pertinent to the topic. The different published and unpublished articles were reviewed in the course of compiling this review work.The available materials were systematically selected on the basis of content, relevance and their publication time.

## 4. Result and Discussion

### Definitions of Biosphere Reserves

The word *biosphere* was coined by the Austerian geologist Eduard Sues in 1975.Biospher can mean that totality of livings residing on the earth the space occupied by living thing or life or life supporting systems(Atmosphere, Hydrosphere, Lithosphere and Pedosphere).The term for zones in universe where life as we know it should be sustainable[43].

Biosphere reserves are 'learning places for sustainable development'. They are sites for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including conflict prevention and management of biodiversity. They are places that provide local solutions to global challenges. Biosphere reserves include terrestrial, marine and coastal ecosystems. Each site promotes solutions reconciling the conservation of biodiversity with its sustainable use [75].

In broader sense, biosphere reserve is an area established to conserve the biological and cultural diversity of a region while promoting sustainable economic and social development. According to[57], biosphere reserve is described as a place where people and nature coexist and interact with each other for their mutual benefits.

All members of society, including local communities, environmental groups, and economic parties, are involved and work together to address conservation and development issues. Any place is given such title, biosphere reserve, by UNESCO as part of the Man and Biosphere (MAB) Programme [75].

The requirements of biosphere reserves should, explicitly, fulfill three basic functions: conservation function: this is conservation of cultural diversity and biodiversity: species, genetic, and ecosystem variation development function: this encourages economic and human development; logistics function: this supports research, monitoring, demonstration projects, and information exchange related to local, national, and global conservation and developments [57,76,75].

### History of Biosphere Reserves

Though Eduard Seuss had coined the term biosphere more than hundred years ago, it is Vladimir Vernadsky's concept of the biosphere, formulated in 1926, that is accepted today[82].The first international biosphere reserve congress was held in Minsk, Belarus, since 1983 jointly covered by UNESCO and UNEP which gives rise to an "action plan for biosphere reserves." the second international congress was held in 1995 in Seville, Spain, on "biosphere reserves", and biosphere reserves were visualized as guides to the twenty-first century, "showing a way to a sustainable future" In this conference, the three most important tasks were identified as conservation, development, and logistic support [27].

The third world congress of biosphere reserves was held in 2008, Madrid, Spain, which is called "Madrid action plan for biosphere reserves." It strengthens the Seville strategy and raises biosphere reserves to be an international designated area dedicated to sustainable development in future generations[57]. More specifically, biosphere reserves have immense impacts on socioeconomic-related concern and hence play a significance role in poverty reduction and implementation of Sustainable Development Goals (SDGs). Obviously, biosphere reserves are sources of hope for local

communities, recognized as a viable option for enhancing their income generation mechanism [19].

The worldwide network of biosphere reserves provides a global framework for education and research, as well as the manifestation and attainment of sustainable resource use [75].

Nowadays, there are 701 biosphere reserves in 124 countries of the world and 250million of people home to covers. Out of the total biosphere reserves, 79 are found in 29 African countries and21million of people home to cover which in Ethiopia has 5 biosphere reserves. Kafa besides Yayo, Sheka, Lake Tana, and Majang was nominated since 2010, 2012, 2015, 2014 and 2017, respectively [75].

From historical perspectives of biosphere reserve establishment, the first country that established and registered biosphere reserves was the Democratic Republic of Congo since 1976. In general, the foundation of biosphere reserves illustrated a nearly linear increment from 1976 to 2018 .

This is due to the desire to achieve sustainable development, and each country understands the benefits of biosphere reserves in conservation and sustainable management of forest resources [75].

## Importance of Biosphere Reserves in Ethiopia

Biosphere Reserves involve local communities and all interested stakeholders in planning and management. The biosphere reserves are intended to fulfill 3 basic functions,

❖ Conservation function - to contribute to the conservation of landscapes, ecosystems, endemic species and genetic variation, Conservation of biodiversity and cultural diversity.
Example, it may prevent man-animal conflict eg. death of tiger Avni who was shot dead when she turned man-eater
Along with the wildlife, culture and customs of tribal are also protected,

❖ Economic developmental function - to foster economic and human development which is socio-culturally and ecologically sustainable.
❖
Example, it promoting economic and human growth that is sustainable on a sociocultural and ecological level.

It seeks to strengthen the three pillars of sustainable development: social, economic and protection of the environment.

❖ a Logistic function - to provide support for research, monitoring, education and information exchange related and training to local, national and global issues of conservation and development [79,81,75].

Example, it Promoting research activities, environmental education, training and monitoring in the context of local, national and international conservation and sustainable development.

## Three Zones of Biosphere Reserve in Ethiopia

Zonation of a Biosphere Reserve in Ethiopia are aim to manage resources in an integrated manner by taking protection into consideration for sustainable utilization and resource planning. This is tangible through classifying biosphere reserves into three zones such as core, buffer, and transition zones [57,6]. This classification is considered in all the biosphere reserves found in Ethiopia, for conservation and sustainable management of resources [70].

Accordingly, in relation to the concepts of zonation, core, buffer, and transition zone and their size of distribution of all the biosphere reserves are presented. It has three interrelated zones that aim to fulfill three complementary and mutually reinforcing functions:

Core Areas zone:it is the most protected area of a biosphere reserve where all kinds of human interaction should be avoided, except for research and monitoring of the natural vegetation dynamics. It may contain endemic plants and animals.The areas to be selected for such zones

should also undisturbed high forest with wild coffee population structure and composition of other plants [68].

They conserve the wild relatives of economic species and also represent important genetic reservoirs having exceptional scientific interest. A core zone is a protected region, like a National Park or Sanctuary/protected/regulated mostly under the Wildlife (Protection) Act, 1972. It is kept free from human interference.

Every biosphere reserve must contain one or more core areas. These have strong legal protection and serve as a shelter for wild plants and animals free from any human disturbances. Activities that are allowed in this zone are monitoring, research, and traditional nondestructive uses, while activities like agriculture, settlement, grazing of domestic animals, and harvesting products are not allowed [57,70]. In all parts of Ethiopia, biosphere reserve zones differ in their size of coverage; for instance, the core zone is the smallest in cover as compared with the other zones[79,78,24](Table 1).

Buffer zone: is slightly disturbed forest zone, where collection of non-timber forest products and honey is allowed. But, the users are not allowed to manipulate the canopy or ground vegetation to enhance coffee production or other forms of agricultural activities. In addition, settlement is not allowed[70]. .This zone is the guard keeping of the core zone by enclosing and protecting from the anthropogenic impacts. The buffer zone surrounds the core zone and its activities are managed in this area in the ways that help in the protection of the core zone in its natural conditionThis zone functions as essential ecological corridors, connecting the core zone to the transitional zone. Activities that are allowed in the buffer zone include tourism,wild coffee collection, recreation, research, and education training [79,78,24].

Transition Zone:It is the outermost part of the biosphere reserve .In the transition zone, the traditional forest coffee production system, garden coffee and agricultural practices and human settlement are allowed. Habitat restoration/rehabilitation and research can be carried out on those areas that were highly degraded.The farming practice should involve the traditional agroforestry system, without total clearing of the forest vegetation. Local communities are also allowed to manipulate the coffee populations in areas under their possession, using local landraces[89].

In this zone, people are allowed to live and make livings. In this zone, local residents, NGOs, scientists, cultural groups, economic stakeholders, and others work together to manage and sustainably develop the area’s resources. Activities like farming, fishing, tourism, beekeeping, settlements, urban and villages, industry, and enterprise are allowed in this zone [57,6]. The transitional zone comprises the largest cover as compared to the total area of the biosphere reserves in all the parts of Ethiopia[79,78,24].

The total area coverage of all biosphere reserves is estimated to be(1, 8617,777ha), Lake Tana (695,885ha),kafa (540,631ha),Sheka (238,750ha),Majang (225,490ha) and Yayo (161,021ha) are the largest zones area covered by biosphere reserve in the Ethiopia orderly (Table1)

Table 1: The size zones in the biosphere reserves in Ethiopia.

| Zones | Yayo biosphere | Lake Tana biosphere | Majang biosphere | Kafa biosphere | Sheka biosphere |
|---|---|---|---|---|---|
| Core | 27,733 | 22,841 | 43,878 ha | 41,319 | 55, 255 |
| Buffer | 21,552 | 187,567 | 73,400 ha | 161,427 | 76,395 |
| Transition | 117,736 | 485,477 | 108,212 ha | 337,885 | 107,100 |
| Total area | 167,021 ha | 695,885ha | 225,490. ha | 540,631ha | 238,750h |
| Reference | [74,69,56] | [38,25] | [69] | [32,5,57] | [67,32,31] |

## Description of five Biosphere Reserves in Ethiopia

### Yayo Coffee Forest Biosphere Reserve

The Yayo Biosphere Reserve is located in Illubabor and BunoBedele zones of Oromia Regional State, southwest of Ethiopia. The area is drained by small rivers like Geba, Dogi, Saki and Sese, which discharge into the Baro River which is one of the major tributaries of the river Nile. The biosphere reserve contains landscape elements of regional, national and international importance. The most important landscapes are forest, agricultural land, wetland, and grazing land.The area is also of cultural and historical significance since it possesses many archaeological sites, ritual sites, caves and waterfalls.It covers 167,021 ha and stretched over six districts: Doreni, Yayu, BiloNopa, Algie-Sachi, Hurumu, and Chora [19].

### Ecological and Socioeconomic Characteristics of YayoBiosphere Reserve

The area plays a key role in the conservation of natural and cultural landscapes. The biosphere reserve includes Eastern Afromontane Biodiversity Hotspot and Important Bird Areas of international significance and one of the last remaining Montana rainforest fragments with wild Coffea arabica populations in the world.

The area is also of cultural and historical significance since it possesses many archaeological sites, ritual sites, caves and waterfalls. The core areas and buffer zone are considered as one of the Regional Forest Priority Areas (or Forest Conservation Area) and Forest Coffee conservation Site. [41]

The transition area is found adjacent to the buffer zone and it is composed of agricultural land, wetland, grassland, settlement area and fragments of forest land. All the management units (core, buffer, transition) in the proposed biosphere reserve are contiguous; but there are five coreareas. About 154, 300 permanent residents live in the biosphere reserve and mainly rely on agriculture.

The designation as a biosphere reserve is expected to enhance ecologically sound and traditional agriculture, to foster ecotourism and to create new jobs in small businesses such as coffee, bee-keeping, spices and horticulture activities. Within the biosphere reserve framework, local communities are familiarized with the wise use of natural resources and sustainable development techniques, and the implementation of conservation projects. [41]

Currently, two projects funded by the German Federal Agency for Conservation and German Federal Ministry of Education and Research are being implemented in the proposed biosphere reserve: Conservation and use of the wild populations of Coffea arabica in the mountain rainforests of Ethiopia and public awareness and environmental education project. [41]

## The Majang Forest Biosphere Reserve

The Majang Biosphere Reserve is located in the Majang zone of the Gambella People National Regional State. It located midpoint: 7°25'35"N - 35°07'50"E in the west of the country, this biosphere reserve includes Afromontane forests in one of the most fragmented and threatened regions in the world. The landscape also includes several wetlands and marshes. On higher ground, above altitudes of 1000metres, the vegetation is dominated by ferns and bamboo, while lower areas are covered with palm trees. This region, rich in biodiversity, includes 550 higher plant species, 33 species of mammal and 130 bird species. The population is around 52,000 inhabitants. It covers a total area of 224,925 ha of forest, woodland, agricultural land, and rural and town settlements. It is a unique biogeography and shares border with the Illubabor zone of Oromia Regional State and Sheka and Bench-Maji zones of the Southern Nations, Nationalities, and People (SNNP)[61,69].It encompasses two districts; namely Godere and Mengeshi which have 32 administrative villages together [85].

## Ecological and Socioeconomic Characteristics of Majang Biosphere Reserve

The area is characterized by a rolling topography and steep slopes at higher altitude. The area is generally highly dissected by several small streams, which drain into the Gilo, Akobo and Alwero Rivers. Areas below 1000 m a.s.l are relatively flat. The landscape in the area is also dotted by numerous small wetlands and marshes. Wetlands on the highlands are dominated by ferns, grasses and bamboo, while the lowland wetlands are dominated by palm trees. [39]

The lowland woodlands are often characterized by clusters of lowland bamboo thickets.

The biosphere reserve area is endowed with diverse species of plants and animals. The area is important for the conservation of the genetic diversity of many useful plants, and most notably ensete (*Enseteventricosum*) and yam (*Dioscoriabulbifera*). Characteristic mammals that occur in the area are leopard (*Pantherapardus*), caracal (*Feliscaracall*), Colobus Monkey (*Colobusguereza*), and anubis baboon (*Papioanubis*)[39].

The total number of people living within the biosphere reserve is about 52,000 inhabitants. The population of the biosphere reserve is predominately composed of the indigenous Majang and Shekacho ethnic groups. The main economic activities are agriculture (cereals, coffee, fruits and spices production), beekeeping and livestock husbandry. From the agro-ecology perspective, Majang is a high rainfall area, with high altitudinal gradient from well over 2400 to around 560 m, which makes it suitable for major agricultural development. It has high potential for food crops, vegetables and fruit production. The area is one of the few food self-sufficient areas in the country, where food aid is not known to the local community. There is also plenty of water for irrigation during dry season.[39]

## The Lake Tana Biosphere Reserve

The Lake Tana Biosphere Reserve is located in the Amhara National Regional State approximately 563 km Northwest of Addis Ababa in the north-western part of Ethiopia.It located midpoint: 11°54’29.11”N - 37°20’40”E in the western parts of of the country. The Lake is located within the watershed, which consists of 137Administrative Kebeles, 10 Districts, and four Administration Zones[91].

The Lake Tana Biosphere Reserve is a hotspot of biodiversity, and it is part of the two biodiversity hotspots i.e., Eastern Afromontane, and Horn of Africa biodiversity hotspots. It is internationally known as an Important Bird Area[11]

The biosphere reserve comprises Lake Tana, the largest lake in Ethiopia, the main source of the Blue Nile, which provides important ecosystem services. The area is a hotspot of biodiversity, internationally known as an Important Bird Area

and is of global importance for agricultural genetic diversity. The area is characterized by an enormous heterogeneity of land uses and natural ecosystems. In 2015, the Lake Tana region was nominated as UNESCO Biosphere Reserve recognizing its national and international natural and cultural importance. [26]

Its surface area (both marine and terrestrial) is 695,885 hectares, with its core area being 22,841 hectares (of which 7,699 are terrestrial), with buffer areas of 187,567 hectares (30,969 terrestrial), and transition areas of 485,477 hectares (354,297 terrestrial) enormous heterogeneity of land uses and natural ecosystems[38].

## Ecological and Socioeconomic Characteristics of Lake Tana Biosphere Reserve

Lake Tana is the largest national freshwater body, accounting for 50% of the total inland waters of the country, and is the source of the Abbay of Blue Nile River. The Biosphere Reserve is an important fish resource and is home to up to 67 different species of fish of which 70% are endemic. The barbus species of Lake Tana constitute the only remaining intact species of large cyprinid fish in the world. A large number of wetlands are located all around Lake Tana, some of them being the largest and ecologically most important units in Ethiopia and in the Horn of Africa, and also form part of the Central Ethiopian Wetland Complex. These wetlands, dominated by papyrus and typha stands, are breeding, nesting and feeding grounds for very large bird populations, and provide a source of animal feed, domestic water supply, building material, fuel, food, etc. for local communities.The Biosphere Reserve is part of the Eastern Afromontane Biodiversity Hotspot and comprises four terrestrial and three freshwater 'Key Biodiversity Areas'. At Lake Tana more than 217 different bird species have been recorded. The area is internationally renowned as Important Bird Area and the high abundances qualify areas around the lake as Ramsar site. Many Palaearctic migrant water birds depend on the lake as feeding and resting grounds, including the common crane (*Grus grus),* Northern shoveller (*Anas acuta),*Black-tailed godwit (*Limosa limosa),* and ruff (*Philomachus pugnax).* Few patches of original forest vegetation and mountain ecosystem remain that have high plant endemism of global importance.

Indigenous trees include: Sesa (*Albizia gummifera),*Birbira (*Millettia ferryginea),*Wanza (*Cordia Africana)*. The region is a gene centre for indigenous agricultural crops such as noug (*Guizotiaa byssinica),*teff (*Eragros tistef).* Wild coffee (*Coffea arabica)* occurs naturally in the area, especially in the Zegie Peninsula. Four major wetland ecosystem types have been identified: Riverine freshwater wetlands, lacustrine freshwater wetlands, palustrine freshwater wetlands and agricultural flooded freshwater wetlands.

Out of the 2,031,820 inhabitants of the proposed site, approximately 15,000 are living on the islands of Lake Tana. The area includes an array of rural settlements, as well as the city of Bahir Dar, which supports traditional land-use patterns. Agriculture (of which most is subsistence farming) forms the backbone of the economy with most of the other sectors (i.e. trade, fishing and tourism) being dependent on its strong backward and forward linkages. More than 2 million people live in the Biosphere Reserve with the Amhara people being the most populous in the area. The main economic activities are agriculture, fishing, national and international tourism (religious and recreational) and sand mining.

The enhancement of production and marketing of local products from the proposed biosphere reserve through cooperatives and small scale businesses will be intensified in close collaboration with local tourism services and the hotel sector. The Papyrus (Cyperus papyrus) is one the most economically important wetland species of the Biosphere Reserve and is used inter alia for fuel, as well as for the construction of the unique Tanqua reed boats. The area has a unique

cultural, historical and aesthetic value with numerous monasteries and churches dating back to the 13th century. Culturally, the Biosphere Reserve is very important as it is home to many unique churches and monasteries of the Ethiopian Orthodox Tewahedo Church; some date back to the 13th century. These churches and monasteries contain valuable treasures of the Ethiopian Christian faith[38].

## The Kafa Biosphere Reserve

The Kafa Biosphere Reserve is located in the Kafa zone administration of the Southern Nations, Nationalities, and People's (SNNP's) Region State of Ethiopia.It spans 540,713.1ha and stretches across boundaries of 10 districts, namely, Adiyo, Bita, Chena, Chetta, Decha, Gesha, Gewata, Gimbo, Aylem, and Tello,250 rural kebele administrations, and 25urban towns. This forest is the home of Co ee arabica and holds 5000 wild varieties of co ee [28].The Kafa Biosphere Reserve is located in the Kafa Zone of Ethiopia approximately 460km southwest of Addis Ababa. The Bonga National Forest Priority Area partly forms the southern boundary of the Biosphere Reserve, whilst the eastern boundary follows the AdiyoWoreda with the Gojeb River and Gewata-Yeba (Boginda) National Forest Priority Area forming the northern boundary.It was declared in 2010, and has a surface area of 760,114.1hectares. It has a population of 608 227 people [90].

## Ecological and Socioeconomic Characteristics of Kafa Biosphere Reserve

From a species diversity perspective, a wealth of plant, animal an invertebrate species occur. The Biosphere Reserve would also contribute to the conservation of avifaunal biodiversity, providing habitats for a wealth of birds. The Alemgono Wetland System and its surrounding area is a particularly important breeding habitat for the Wattled Crane (*Grus carunculatus*), Black Crowned Crane (*Balearica pavonina*), Abyssinian Longclaw (*Macronyx flavicollis*) and Rouget's Rail (*Rougetius rougetti*).

The Saylem Woreda forms the northern part of the Biosphere Reserve and the western boundary constitutes the Gesha NFPA. The Kafa Zone contains more than 50% ofthe remaining montane forests in Ethiopia and it is the centre of origin and genetic diversity of wild Coffea arabica.

The Biosphere Reserve includes the East Afromontane Biodiversity Hotspot and other endemic agricultural crops such as *Enseteventricosum and Eragrostistef,* and a cultural and linguistic identity quite distinct from the rest of Africa. Furthermore, it includes a unique coffee culture that is deeply engrained in the Ethiopian economy and history.

The area includes an array of rural settlements, traditional land-use patterns and sites of cultural and natural significance, which are home to approximately 608 227 people.

Main economic activities in the area are dominated by agriculture that contributes approximately 41% to the GDP, 80% of exports and 80% of the labour force. Other sectors include services and tourism, manufacturing and trade. Agriculture forms the backbone of the economy with most of the other sectors (i.e. trade and tourism) being dependent on its strong backward and forward linkages.

The key management focal areas of the Biosphere Reserve include: - coordination of conservation initiatives with the focus on the protection of the endemic and global important genetic resources of Coffea arabica and its associated ecosystems; - provision of a sustained flow of high-quality water to adjoining regions; and the - promotion of sustainable development in order to alleviate poverty and inequ(37).

## The Sheka Biosphere Reserve

The Sheka Biosphere Reserve is located in the Sheka zone of the SNNP's regional state. It covers 238,750ha offorest, bamboo thickets, wetlands, agricultural land, rural settlements, and towns. It shares border with the

Illubabor zone,Kafa,and Bench-Majizone of the SNNP regional state [67].

It is administered by Sheka Zone Administration, in association with Masha Woreda, AnderachaWoreda,andyeskiworeda. The ethnic composition of Sheka Zone is quite diverse today. Of the total population, the the major ethnic groups are: 34.7% Shekacho, 20.5% Kafficho, 20.5% Amhara, 9.6% Oromo, 5.0% Sheko, 4.8% Bench, and 2% Mezengir[40].

Ecological and Socioeconomic Characteristics of Sheka Biosphere Reserve

The forest in Sheka which is also part of the Southwest Highlands Forests of Ethiopia is important for the conservation of Afromontane forest vegetation types, especially the Afromontane Rainforest and Alpine Bamboo thickets. Afromontane forest vegetation has long been considered one of the most threatened eco-regions in the world.

The area is rich in plant and animal species. There are over 300 higher plants, 50 mammals, 200 birds, and 20 amphibian species occurring in all habitat types within the biosphere reserve. There also many endemic species, at least 55 plants and 10 birds, and38 threatened species of flora and fauna.

The characteristic species of the Afromontane rainforest are a mixture of broadleaved tree species and include: *Pouteriaadolfi-friederici, Syzygium guineense, Polysciasfulva, Oleawelwitschii, Diospyrosabyssinica, Manilkarabutugi and Cordiaafricana.*A discontinuous canopy of smaller trees (less than 10m) include*Allophylusabyssinicus, Chionanthusmildbraedii, Clausenaanisata, Coffeaarabica, Deinbolliakilimandischarica*. Native coffee is one of the characteristic species in the understory. The shrub layer includes *Acanthus eminens, Dracaena fragrans, Lobelia giberroa, Seneciogigas, and others. Lianas and scrambling shrubs are numerous. Epiphytes are very common and include Canarinaabyssinica, Scadoxnutans, Peperomiatetraphylla, Aspleniumsandersonii, Loxogrammelanceolata,* different orchids, mosses, and others.

In the Afromontane rainforest and transitional rainforest, animal species are varied and include a diverse range of invertebrates inhabiting all niches from the soil to high forest canopies and vertebrates including amphibians, reptiles, birds and small and large mammals. Common forest mammals and birds species in the area includes: porcupine, Chlorocebus (Cercopithecusaethiops), blue monkey (Cercopithecusmitis), De Brazza's monkey (Cercopithecusneglectus), baboon, African buffalo, lion, leopard, African civet (Civettictiscivetta), Ethiopian hare (Lepusfagani), Abyssinian black-headed oriole (Oriolusmonacha), Abyssinian ground hornbill (Bucorvusabyssinicus), Abyssinian woodpecker (Dendropicosabyssinicus), among others.

The Sheka forests are sources of various direct uses for the local community. These include construction materials from climbers/liana, tree ferns (locally called Seseno), timber, fuel wood, logs for beehive construction, wood for utensils, bee forage and traditional hanging beehives, spice production and medicinal plants collection. The locally constructed wood products valued highly by the community include timber doors, windows, dining tables, chairs, benches, beehives, coffins, and raw timber for sale.

Non-timber forest products (NTFP ) collected from the forest include medicinal plants, spices like Korerima and leaves of phoenix. In kebeles at lower altitude (<2000 m), coffee is becoming an important NTFP, next to honey. Fuel wood collection from the dense forest is common only in kebeles at higher altitudes, where the settlement is close to the forest areas. Moreover, wild fruits are vital for the local communities not only because they eat them but the wild fruit also serves as food for wildlife and in turn save crops from wildlife.The local population is deeply committed to maintaining the integrity of the

ecosystem through the practice of ecologically sustainable agriculture[42].

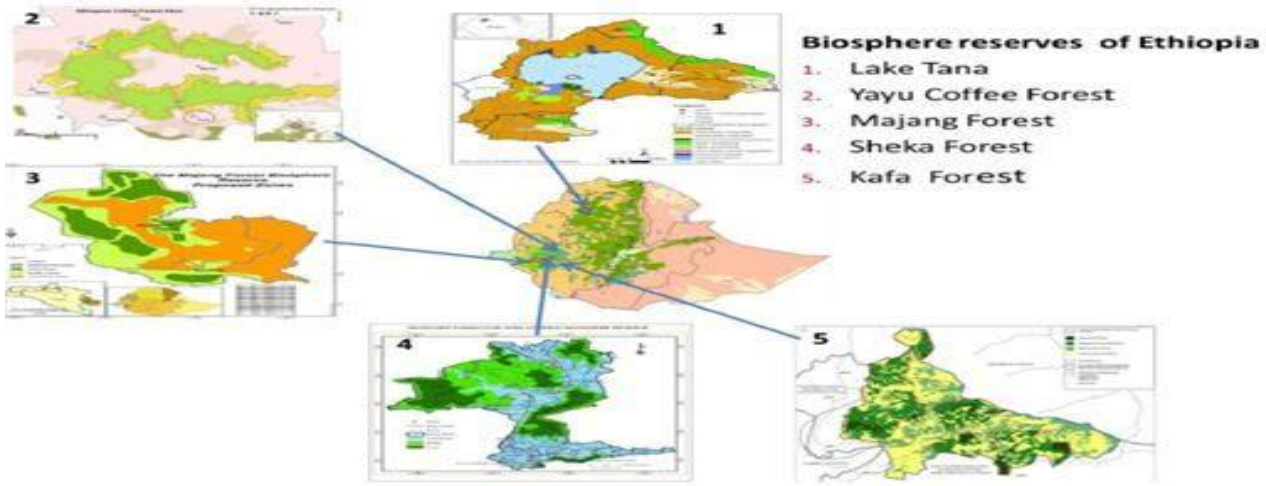


Figure:1Mape of Ethiopia Biosphere Reserve

## The Current Status of Ethiopia Biosphere Reserves

Ethiopia is a special topography, geology, landscapes ranging from highland and rugged mountains, deep gorges, river, and rolling plains. The altitude generally ranges from 120 m below sea level at the Afar depression to 4,620 m mount Ras-Dashen in North West Ethiopia. Ethiopia is one of the top 25 biodiversity-rich countries in the world and center of origin and diversity for several cultivated crops [88].

The area is rich in plant and animal species. For instance ,there are over 300 higher plants, 50 mammals, 200 birds, and 20 amphibian species occurring in all habitat types within in sheka the biosphere reserve(Table 2).

Regardless of their biological diversity, many other tropical biosphere reserves in the five have plenty of biological entities and several ecological services. These areas are endowed with many plant diversities such as coffee, spices, and medicinal plants. In-situ preservation of biodiversity can be best ensured under the protection of the entire biosphere reserve ecosystems [70].According to many study findings, the largest higher plant species are recorded by Majang(550), Yayu(450)Sheka(300), Kafa (224) and Lake Tana(179) orderyencompass diverse plant species(Table 2).

Table 2: Fauna & flora composition of the Ethiopia Biosphere Reserve

| Fauna and flora | Yayo biosphere | Lake Tana biosphere | Majang biosphere | Kafa biosphere | Sheka biosphere |
|---|---|---|---|---|---|
| Higher plants | 450 | 179 | 550 | 224 | 300 |
| Mammalis | 50 | 16 | 33 | 300 | 50 |
| Birds | 30 | 300 | 180 | 474 | 246 |
| Repitile | 10 | 35 | 20 | 10 | 8 |
| Amphibians | 20 | 19 | 20 | 7 | 20 |
| Fishes | - | 67 | - | 6 | - |
| Reference | [56] | [ 73,67] | [12,62,17] | [9.84.8,3] | [67,23,42] |

## The Major threats of the biosphere reserves in Ethiopia

Like several other tropical ecosystems in Africa, Ethiopia Biosphere Reserve is facing unprecedented their ecological integrity. Unsustainable activities leading to habitat destruction and fragmentation of wildlife corridors are major challenges confronting this fragile ecosystem.

The revew of all of biosphere reserves were different severely human impacts are recorded by different scholars in different biosphere reserves. For instance the major challenges of the lake tana biosphere reserve are water hyacine,sedmintationeradiction of wetland and other.The other biosphere reserve challeges recorded (Table 3)Agricultural expansion logging, unsustainable use demand and exploitation of natural resource by the local communities surrounding the biosphere.

Table 3: The Major threats recorded in the biosphere reserves of Ethiopia

| Yayo biosphere | Majang biosphere | Lake Tana biosphere | Kefa biosphere | Sheka biosphere |
|---|---|---|---|---|
| Logging Agricultural expansion | Agricultural expansion | Water hyacine | Unsustaible activity leading to habitat distrustriction | Commericial coffee tean plantation |
| Unsustaible use demand of natural resource | Setlments | Sedimentation | Exploted due to logging, agricultural use ;honey production to use fire | Agricultural expantionoverrgarzing |
| Conversation of land use | Erosion of local traditional conservation practices | Eradication of wetland | Poor communication with stakeholder | Fire wood |
| Deforestation and degradation | | | | |
| Investement | logging | Pollution | Lacke of legal personality | Charcoal |
| Firewoods | Expansion of larg scale agricultural investement | Construction of building at buffer zone | Lack of of fund | Forest dependency |
| Overgrazing | | Unsustaaible utilization | Inaccessibility | Lack of responsible body |
| [74] | [17] | [91,89,33,73] | [9,86] | Investement [61] |

### 4.1. Deforestation and Forest degradation

Deforestation due to collection of fire woods and charcoal, which is a consequence of indiscriminate logging, hinders the significant role that forests play at the global level in climatic change mitigation, oxygen production and carbon cycling[74].

The forest cover of the southwestern biosphere reserves has been declining at an alarming rate due to the combined effects of different factors. The causative factors of deforestation have their roots in different sectors of anthropogenic and natural. Based on different findings, the main driving forces behind in all biosphere reserves are commercial plantation (Coffee and tea) by investors, agriculture expansion, settlement, fuelwood extraction, illegal logging for timber, and farm tools[18,61,53,84] (Table 3) .

The causes of deforestation in all biosphere reserves were largely subjugated to investment and agriculturerelated land expansion. Different findings indicated that more than 60 percent of the forestland covers were changed to investment land (plantation of coffee and tea) agricultural crops in all biosphere reserves of Southwestern Ethiopia[53]. More fragmented forests are found in the transition zone and near edges of buffer zone boundary since they are more prone to human impacts or activities [84]. A number of specific studies have been undertaken which provide some indication on the rate of deforestation in Southwest Ethiopia [7,47]For example, [21] attempted to forecast future land cover changes resulting from human population increase in the BaroAkobo basin, and it was estimated that on average 1.77 million ha of high forest is cleared annually between 1987 and 2010 for agricultural activities (Table 4). In North Bench, Sheko and Yeki districts in the SNNP region and Dima district in Gambella region, about46, 940 ha of forest land was converted between 1987 and 2005 for agricultural activities in the adjacent of Sheka biosphere reserve [20]. Moreover, in Gesha, Masha, Anderacha, Yeki, Sheko, and North Bench districts in SNNP region, about 61, 00 ha of forest land was lost between 1987 and 2005 because of NTFPs exploitation[48](Table 4). Recently, over 2455 ha of forest land has been leased for investors working on plantations of coffee and spices in the Sheka biosphere reserves [35]. Besides, recently, about 19,165.83 ha of forest land in Majang biosphere reserve surrounding has been leased for plantation of tea before the establishments of Majang biosphere reserves [63].

### Population dynamics

Rapid population growth is a number one challenges of the residents; threatening the biosphere reserve. This implies that family planning methods and control of immigration especially in their wored as that are found in the biosphere reserve is found pertinent.

The community reported that the population growth has one of the main threatening factors of the biosphere reserves. The population of the area is growing at an alarming rate due to two main factors: natural growth and settlement/population immigration-illegal / informal/ unregistered movement of people to the area from different parts of the country. As a result, the proportion of natural resources particularly, land and with forest cover has been diminishing. The proportion of land owned by people/family members is declining and resulting competition over access to land has become tough. This experience further threats boundary /zonation -expanding of transition areas towards buffer and core areas. [87]

### Timber Production and Trade

Timber business was one of the main threats to forests around the biosphere reserve. The production of timber leads to forest destruction and degradation that have implications for future climate concerns and loss of biodiversity and much of the country's timber dense forest specially core and buffer zones. Cutting trees in this case can damage indigenous trees leading to loss of biodiversity. One of the major triggering

factors of timber production and trade is the high demand for timber products nationally and locally. The demand for wood and wood products has rapidly increased in recent times all across the country. Some private business and individuals who engaged in wood work in the surrounding towns of the biosphere reserve make their base in the biosphere reserve and engaged in producing and transporting forest products to the urban centers such as Bedele, Mettu, and Jimma.[87]

### Fuel Wood Consumption and Trade

Fuel wood collection and charcoal making for local consumption and petty trade was another threat to forests around the biosphere reserve. The residents in all six wored as found in the biosphere reserve solely rely on wood for their energy requirement. Every household collects wood from the forest to prepare their food. In addition, many households living adjacent to roads collect wood in high volume and sell it to the surrounding market/towns. They use this business as additional source of income for their living. The participants in the management plan believed that all these activities lead to forest destruction and degradation, which have implications for future climate concerns and loss of biodiversity. Cutting trees to make a charcoal or firewood in high volume amounted to the dramatic increase of population can decline forest coverage and leading to loss of biodiversity[87].

### 4.2. Loss of Plant Biodiversity

Considerable cover of the moist Afromontane vegetation and biodiversity occurs in the remnant forests of Southwestern Ethiopia[36]. Conversely, the conversion of biosphere reserves into semi forest coffee system and other land uses has influenced and will have prolonged impacts on the diversity of the moist forest, if management measures are not carried out. Floristic composition or species diversity was severely changed in the southwest remnant forest blocks which include all the biosphere reserves [31,70].

A significant number of native trees species were threatened as a result of heavy exploitations. For example, different scholars [16,70,5,51,49] reported that Prunusafricana, Cordiaafricana, Afrocarpusfalcatus, and Dracaena afromontana are endangered species in all biosphere reserves' surroundings. Moreover, currently coal mining and fertilizer factories have been established in *Yayo* biosphere reserves which have a negative impact on biodiversity resources through site clearing, excavation, drilling, and earthworks involved. More specifically, it is causing wild coffee extinction and loss of another biodiversity [50].

### Human Impacts activity

Human activity, pressure, threats and their relative severity to wild animal in Biosphere Reserve are of concern to conservation for several reasons.These results revealed that livestock grazing, agricultural farming on biosphere reserve, fuelwood collection, fodder collection, fodder collection and logging are the main threats being faced in the biosphere reserve from the villages surrounding it. This is not surprising since most of these villagers own livestock and the only place where vegetation exists during the dry season is the biosphere reserve. Aside from these, fuel wood extraction and charcoal production are prominent activities in the study areas because most of the inhabitants depend on fuel wood and charcoal as household energy sources[66].

### Lack of Institutional Arrangement

Ideally, Ethiopia has established Biodiversity Development and Management (BDM) program in 2009 with the aim of implementing the Man and the Biosphere Reserve Program where a national committee has been established from the representatives from various ministries, agencies, research and academic institutions of the Federal and Regional States and is chaired by the Ministry of Science and Technology. Again, in principle, a biosphere reserve should have its own management system to ensure its functions and objectives.

However, YCFBR has no management unit of its own. Lack of institutionalized organ responsible for permanent management and conservation of the biosphere reserve was the main concern. As a result, there was no integration among different organs, the management of the biosphere reserve was based only on voluntary services, the involvement was not sustainable and there was duplication of responsibility and effort. Although there were some organizations who have direct stake such as Oromia Forest and Wildlife Enterprise, Oromia Environment Forest and Climate Change Authority at regional, zonal and woreda level and NGOs such as PHE-EC and Ethio-Wetlands, and ECCF level as such there was no a unit primarily and permanently responsible for coordinating, planning, implementation, monitoring and evaluation. The participants in the discussion also seriously mentioned that lack of integration and duplication of effort in managing the biosphere reserve, which led to confusion, conflict of interest and lack of commitment. For instance, the OFWE officers at zonal and district levels admitted that although their office is primarily responsible for managing the biosphere, they faced a claim that other organs are simultaneously responsible. Uniquely, they mentioned duplication of function and a conflict of interest between them and other organs such as Zonal Forest and Environmental Protection Authority Office, Land Management Office, and Agricultural Development Office. This led to lack of specific organ primarily responsible for coordinating and integrating multiple organs particularly at Regional, Zonal, Woreda, and Kebele level towards a collective end[87].

### The Ways of Conservation Efforts of Biosphere Reserves in Ethiopia

The last remaining cloud forests in Southwest Ethiopia contain different endemic species including Coffeaarabica[12,5,55]. To conserve or reduce deforestation and forest degradation of the remained Afromontane rainforest, the governments of Ethiopia and different stakeholder participated in the establishment of biosphere reserves[18]. For instance, high deforestation (1035.8 ha) occurred during 2005–2009 and lesser deforestation was experienced in 2010–2013 (22.23 ha) before and after the establishment of Yayo biosphere reserves, respectively .With regard to biosphere reserve establishment, nowadays, the REDD+ project and other NGO involves four regional states of Ethiopia special in (Oromia, SNNP,Amhara and Gambella) for conservation and sustainable development through reduction emission from deforestation and degradation, forest conservation, sustainable forest management, and enhancing forest carbon stock[45]However, it requires strong local people participation and women inclusion during the intervention. Similarly, it needs creation of forest base livelihood and income diversification mechanism. Thus, the local people will benefit and minimize their forest dependency in the biosphere reserve surrounding [18,59]

Creating awarness and traning of people in the biosphere reserve both inhabitatant and mangers.
Research and assessment of the impact on thebiosphere reserve through montering.

## 5.Conclusion and Future Directions

Ethiopia is one of the centers of biodiversity in the world and it relies on its diverse biological resources mainly on forests for its national and local socio-economic development. It has also some logistic functions such as research, monitoring, education and information exchange.
Regardless of its biological diversity, many other tropical biosphere reserves, Sheka, Majang, Kafa,lakeTana and Yayo, have plenty of biological entities and Afromontane biodiversity “hotspot” (endemic species, coffee, spices, and medicinal plants) delivers several ecological services. However, the forest cover has decreased due to increasing human population growth with a very high demand of land for subsistence agriculture and grazing land, forest resources for firewood, charcoal, timber, construction, and many other purposes. The conversion of coffee forest or biosphere reserves into semi forest coffee system and other land uses has influenced

and will prolong impacts on losing of biological entity.

**Finally as an overall suggestions I forward the following future direction based on the above all information.**

- ❖ In decision-making through strengthening the links and partenerships among local communities, NGOs and local and national governments.
- ❖ Follow up of the recommendations for implementation involving potential actors such as local peoples, society, managers, decision makers, institutions through communication, education, indigenous knowledge for collective action, knowledge, and networks.
- ❖ To conserve this, the governments of Ethiopia and different stakeholder participated in the establishment of biosphere reserves. With regard to biosphere reserve establishment, nowadays, the REDD + project involves four regional states of Ethiopia (SNNP,Oromia,Gambella and Amhara,and other new biosphere reseves) for conservation and sustainable development of the ruminant forest through REDD + mechanism. However, it requires local people participation and as well as women inclusion during the project intervention.
- ❖ Similarly, it needs creation of forest base livelihood and income diversification mechanism. Thus, the local people will be benefited and minimize their forest dependency in the biosphere reserve surrounding.
- ❖ To conservation as an open system, sustanible utilization of research, research and assessment of the impact of the research through monitoring andawareness and traning of people in the biosphere reserve both inhabitants and mangers.
- ❖ Finally, to reduce the forest conversion, the government of Ethiopia is creating conservation mechanism like the establishment of the protected area and biosphere reserve which is controlled and managed by the community and the government.

## Acknowledgment

I am extremely grateful and indebted to acknowledge all the prior investigators for making available their research article used for this reviewed manuscript.

## Conflict of Interest

I declare that no any conflict of interest exists.

## References

1. A.Ababa, “National biodiversity strategy and action plan,” 2005.
2. A. Bekele and D. W.Yalden, Mammals of Ethiopia and Eritrea, Addis Ababa University Press, Addis Ababa, Ethiopia, 2013.
3. A.Berghofer, C. Stadler, and G. Langdale, ¨ Sustaining Life: thee Cloud Forests of Kafa Marketing Concept for the Kafa Biosphere Reserve, Ethiopia. Report to NABU–3e Nature and Biodiversity Conservation Union, Berlin, Germany, 2013.
4. A. Dibaba, “Woody species diversity, vegetation structure, and regeneration status of the moist Afromontane forest of Agama in southwestern Ethiopia,” International Journal of Ecology, vol. 2020, Article ID 1629624, 10 pages, 2020.
5. A. Leßmeister, “Assessment of vascular plants in the Kafa biosphere reserve,” 2017.
6. A. Urtans and V. Seilis, Planning and Management of a Biosphere Reserve. Reference Book for Practitioners and Managers, Latvian National Commission for UNESCO, Salacgriva, Latvia, 2009.
7. A. Wood, M. Tolera, M. Snell, P. O’Hara, and A. Hailu, “Community forest management (CFM) in south-west Ethiopia: maintaining forests, biodiversity and carbon stocks to support wild coffee conservation,” Global Environmental Change, vol. 59, Article ID 101980, 2019.

8. Aerts R, Berecha G, Gijbels P, Hundera K, Van Glabeke S, Vandepitte K et al., Genetic variation and risk of introgression in the wild Coffee arabica gene pool in SW Ethiopian montane rainforests. Evolutionary Applications. 2013; 6:243-252
9. Ali YasinMohammed;A review on kafa biosphere reserve: roles in meeting sustainable development of Ethiopia. Journal of Medicinal Plants Studies ,2020; 8(4): 222-226
10. Avibase (2014).Avibase the world bird database. Available from: file:// F: Avibase Bird Checklists of the World – Ethiopia checklist (accessed on 30 March 2015).
11. Aynalem S, Bekele A (2008) Species composition, relative abundance and distribution of bird fauna of riverine and wetland habitats of Infranz and Yiganda at southern tip of Lake Tana, Ethiopia. Trop Ecol 49(2):199–209
12. B. Alemu, K. Hundera, and B. Abera, "Floristic composition and structural analysis of Gelesha forest, Gambella regional State, Southwest Ethiopia," Journal of Ecology and the Natural Environment, vol. 7, no. 7, pp. 218–227, 2015.
13. B. Reserves, The Seville Strategy and the Statutory Framework of the World Network, UNESCO, Paris, France, 1996.
14. B. Wondimagegnhua, "Challenges and prospects of farm and non-farm livelihood strategies of smallholder farmers in Yayu biosphere reserve, Ethiopia. A qualitative analysis," in Proceedings of the Conference on International Research on Food Security, organized by the University of Natural Resources and Life Sciences (BOKU Vienna), Vienna, Austria, May ,2016.
15. Berghofer A. Financing Equilibrium in the Cloud Forests of Kafa. Fundraising Strategy for the Kafa Biosphere Reserve, Ethiopia, 2013.
16. C. B. Schmitt, Montane Rainforest with Wild Coffea Arabica in the Bonga Region (SW Ethiopia): Plant Diversity, Wild Coffee Management and Implications for Conservation, CuvillierVerlag, G¨ottingen, Germany, 2006.
17. Chiranjib Kumar Choudhary, Selemon Thomas Fakana and AlemkenBerihunMengist; Conservation of Majang Forest Biosphere Reserve: An opportunity through Community based Ecotourism Programme in Majang Zone, Gambella, South West Ethiopia, Asian Journal of Conservation Biology, December 2021. Vol. 10 No. 2, pp. 280–296 , ISSN 2278-7666 ©TCRP Foundation 2021 https://doi.org/10.53562/ajcb.66305
18. D. Beyene, "Assessing the impact of UNESCO biosphere reserves on forest cover change. +e case of Yayu Coffee Forest Biosphere Reserve in Ethiopia," Unpublished thesis, UNESCO, Wageningen, +e Netherlands, 2014.
19. D. Getahun and E. T. Keno, "Attitudes and perceptions of the local community towards Yayo coffee forest biosphere reserve, Iluabba bora zone of Oromia national regional state," Ethiopian Journal of Sciences and Sustainable Development, vol. 6, no. 1, pp. 79–90, 2019
20. D. T. Wakjira, "Forest cover change and socioeconomic drivers in southwest Ethiopia," M.Sc. thesis, TechnischeUniversitatM¨unchen, M¨unchen, Germany, 2007. ¨
21. D. Teketay, "Deforestation, wood famine, and environmental degradation in Ethiopia's highland ecosystems: urgent need for action," Northeast African Studies, vol. 8, no. 1, pp. 53–76, 2001.
22. D. Teketay, Forest Resources and Challenges of Sustainable Forest Management and Conservation in Ethiopia. Degraded Forests in Eastern Africa: Management and Restoration, pp. 19–63, Earthscan, London, UK, 2010.

23. De Beenhouwer M., Oosterlynck B., Van Opstal M., Shaweno A., Belay M., Erens J. (2016) Express Biodiversity Survey in Sheka Forest Biosphere reserve, Ethiopia. Biodiversity Express Survey 5. Biodiversity Inventory for Conservation. Glabbeek, Belgium, 30 pp.
24. Deprez, A. (2011a). Food Futures in Biosphere Reserves: Connecting Food Security to Sustainable Agriculture and Markets. UNESCO, Earth and Ecological Science Division, Paris
25. DessalegEjigu ,Negatassie, 2020 ,Present and future suitability of the Lake Tana Biosphere Reserve in Ethiopia for the Nile monitor (Varanusniloticus) using the MaxEnt model Environmental Systems Research Environ Syst Res (2020) 9:31 https://doi.org/10.1186/s40068-020-00197-y
26. E. Kelbessa, "Threatened endemic plants of Ethiopia," Plants Used in African Traditional Medicine as Practiced in Ethiopia and Uganda, vol. 40, pp. 35–55, 1992.
27. E. Meijaard, R. Denn, and P. Mous, Lessons from Biosphere Reserves in the Asia-Pacific Region, and a Way Forward, UNESCO Office, Jakarta, Indonesia, 2010.
28. Ethiopia biodiversity institute, 2005, "National biodiversity strategy and action plan,"2005. Addis Ababa,
29. Ethiopian Biodiversity Institute (2014). Ethiopia's Fifth National Report to the Convention on Biological Diversity. Ethiopian Biodiversity Institute, Addis Ababa.
30. Ethiopian Biodiversity Institute (2016).Ethiopia's National Biodiversity Strategy and Action Plan 2015-2020. Pp1-138.
31. F. S. Wakjira, Biodiversity and Ecology of Afromontane Rainforests with Wild Coffea Arabica L. Populations in Ethiopia, CuvillierVerlag, G¨ottingen, Germany, 2006.
32. F.Senbeta, "Plant diversity, vegetation structure and relationship between plant communities and environmental variables in the Afromontane Forests of Ethiopia," SINET: Ethiopian Journal of Science, vol. 37, no. 2, pp. 113–130, 2014.
33. G. Goshu and S. Aynalem ,Chapter 2 Problem Overview of the Lake Tana Basin, Springer International Publishing Switzerland 2017 /DOI 10.1007/978-3-319-45755-0_2
34. G. Regassa, Assessing Effectiveness of Forest Management Approaches on Livelihoods and Woody Species Diversity around Sheka Forest, Digital Libraries, Masha, Ethiopia, 2017.
35. G. T. Eshete, Biodiversity and Livelihoods in Southwestern Ethiopia: Forest Loss and Prospects for Conservation in Shade Coffee Agroecosystems, University of California Santa Cruz, Santa Cruz, CA, USA, 2013.
36. G. Tadesse, E. Zavaleta, C. Shennan, and M. FitzSimmons, "Prospects for forest-based ecosystem services in forest-coffee mosaics as forest loss continues in southwestern Ethiopia," Applied Geography, vol. 50, pp. 144–151, 2014.
37. https://en.unesco.org/biosphere/africa/kafa
38. https://en.unesco.org/biosphere/africa/lake-tan
39. https://en.unesco.org/biosphere/africa/majang-forest
40. https://en.unesco.org/biosphere/africa/sheka
41. https://en.unesco.org/biosphere/africa/yayu
42. https://en.wikipedia.org/wiki/Sheka_Forest
43. Huggett, R. J. (1999).Ecosphere, Biosphere, or Gaia? What to Call the Global Ecosystem. Global Ecology and Biogeography, 8(6), 425–431. http://www.jstor.org/stable/2997863.
44. I. Hedberg, I. Friis, and E. Person, "General part and index to vol 1–7," Flora of Ethiopia and Eritrea, vol. 8, no. 1, 2009.

45. J. Andoh and Y. Lee, “National REDD+ strategy for climate change mitigation: a review and comparison of developing countries,” Sustainability, vol. 10, no. 12, p. 4781, 2018.
46. J. O. Caldecott, Priorities for Conserving Global Species Richness and Endemism, World Conservation Press, Marseille,France, 1994.
47. J. P. Sutcliffe, A. Wood, and J. Meaton, “Competitive forests - making forests sustainable in south-west Ethiopia,” International Journal of Sustainable Development & World Ecology, vol. 19, no. 6, pp. 471–481, 2012.
48. J. Sutcliffe, “The extent and economic costs of deforestation in south-west Ethiopia: a preliminary analysis,” Forested Landscapes and Livelihoods, vol. 60, p. 12, 2009
49. J.-C. Vie, C. Hilton-Taylor, and S. N. Stuart, ´ Wildlife in a Changing World: An Analysis of the 2008 IUCN Red List of 3reatened Species, IUCN, Gland, Switzerland, 2009.
50. K. K. Suleman, “Balancing coal mining and conservation in South-west Ethiopia,” 2017.
51. K. Yeshitela, G. Balcha, and T. Bekele, “Challenges and opportunities,” in Proceedings of a National Conference on Forest Resources of Ethiopia: Status, Balcha, Girma, November 2004.
52. M. Lemenih and H. Kassa, “Re-greening Ethiopia: history, challenges and lessons,” Forests, vol. 5, no. 8, pp. 1896–1909, 2014.
53. M. Mahiber, “Communal forest ownership: an option to address the underlying causes of deforestation and forest degradation in Ethiopia,” in Proceedings of a workshop held at Chilimo Forest, Addis Ababa, Ethiopia, July 2008.
54. M. Siraj, “Floristic composition and plant community types in Maze national park, Southwest Ethiopia,” Applied Ecology and Environmental Research, vol. 15, no. 1, pp. 245–262, 2016.
55. M. Van Opstal, B. Oosterlynck, M. Belay, J. Erens, and M. De Beenhouwer, “First assessment of bird diversity in the UNESCO Sheka Forest Biosphere Reserve, southwestern Ethiopia: species richness, distribution and potential for avian conservation,” Journal of 3reatened Taxa, vol. 11, no. 7, pp. 13850–13867, 2019.
56. Mulatu T, Getahun A. 2018. Diversity of anurans in forest fragments of southwestern Ethiopia: The case of the Yayu Coffee Forest Biosphere Reserve (YCFBR). Amphibian & Reptile Conservation 12(2) [General Section]: 30–40 (e158)
57. N. Ishwaran, A. Persic, and N. H. Tri, “Concept and practice: the case of UNESCO biosphere reserves,” International Journal of Environment and Sustainable Development, vol. 7, no. 2, pp. 118–131, 2008
58. P. S. Ramakrishnan, Traditional Ecological Knowledge for Managing Biosphere Reserves in South and Central Asia, Oxford & IBH Publishing Co. Pvt. Ltd., Delhi, India, 2002.
59. R. E. Gullison, “Tropical forests and climate policy,” Science, vol. 316, no. 5827, pp. 985-986, 2007
60. S. Nune, Flora Biodiversity Assessment in Bonga, Boginda and Mankira Forest, Kafa, Ethiopia, Ethiopian Wildlife and Natural History Society, Addis Ababa, Ethiopia, 2008.
61. S. Tadese, T. Soromessa, and T. Bekele, “Analysis of the current and future prediction of land use/land cover change using remote sensing and the CA-markov model in Majang forest biosphere reserves of Gambella, southwestern Ethiopia,” 3e Scientific World Journal, vol. 2021, Article ID 6685045, 18 pages, 2021.

62. SelemonThomas ,Chiranjib Kumar and AlemkenBerihun Ecotourism Potentials Of The Majang Forest Biosphere Reserve. Gambella, South West Ethiopia ,International Journal of Tourism & Hospitality Reviews eISSN: 2395-7654, Vol 6, No 1, 2019, pp12-19 https://doi.org/10.18510/ijthr.2019.612
63. SemegnewTadese, TeshomeSoromessa, TesefayeBekele, GetanehGebeyehu, "Woody Species Composition, Vegetation Structure, and Regeneration Status of Majang Forest Biosphere Reserves in Southwestern Ethiopia", International Journal of Forestry Research, vol. 2021, Article ID 5534930, 22 pages, 2021. https://doi.org/10.1155/2021/5534930
64. T. B. G. Egziabher, "Vegetation and environment of the mountains of Ethiopia: implications for utilization and conservation," Mountain Research and Development, vol. 8, no. 2/3, pp. 211–216, 1988.
65. T. Bekel, G. Berhan, E. Taye, M. Ersado, and K. Yeshitela, "Regeneration status of moist Montane forest of Ethiopia: consideration for Conservation part," Walia, vol. 2001, no. 22, pp. 45–62, 2001.
66. T. Fekensa, W. Tesfahunegny, and A. Mekonnen, "Impact of human activities on biosphere reserve: a case study from Yayu Biosphere Reserve, Southwest Ethiopia," International Journal of Biodiversity and Conservation, vol. 10, pp. 319–326, 2016.
67. T. W. Gole and F. Getaneh, Sheka Forest Biosphere Reserve Nomination Form, National MAB Committee of Ethiopia, Addis Ababa, Ethiopia, 2011.
68. T. W. Gole, "23 human impacts on the Coffeaarabicagenepool in Ethiopia and the need for its in situ conservation," Managing Plant Genetic Diversity eds J.M.M. Engels, V. RamanathaRao, A.H.D. Brown and M.T. Jackson Contributors Ix Foreword Xiii, vol. 10, p. 237, 2002.
69. T. W. Gole, 13 Sustainability at the Centres of Origin. UNESCO Biosphere Reserves: Supporting Biocultural Diversity, Sustainability and Society, Singapore, Singapore, 2019.
70. T. W. Gole, Vegetation of the Yayu Forest in SW Ethiopia: Impacts of Human Use and Implicatiions for in Situ Conservation of Wild Coffea Arabica, CuvillierVerlag, Gottingen, ¨ Germany, 2003.
71. T. Woldemariam and D. Teketay, "The forest coffee ecosystems: ongoing crisis, problems and opportunities for coffee gene conservation and sustainable utilization," in Proceedings of a Workshop on Imperative Problems Associated with Forestry in Ethiopia, Addis Ababa, Ethiopia, Febuary 2001.
72. T. Woldemariam and M. Fetene, "Forests of Sheka: ecological, social, legal and economic dimensions of recent land use/land cover changes, overview and synthesis. Forests of Sheka: multidisciplinary Case Studies on Impacts of Land use/Land cover Changes," Melca-Mahiber, Addis Ababa, Viii+, vol. 231, pp. 1–21, 2007.
73. TensayAyalew, SisayAlemu. Assessment on Lake Tana Biosphere Reserves in Zegae Peninsula, South and Central Gonder, Amhara Region, North Ethiopia. Journal of Chemical, Environmental and Biological Engineering. Vol. 5, No. 2, 2021, pp. 37-42. doi: 10.11648/j.jcebe.20210502.11
74. TesfuFekensa, WeldemariamTesfahunegny and AsersieMekonnen, 'Impact of human activities on biosphere reserve: A case study from Yayu Biosphere Reserve, Southwest Ethiopia." International Journal of Biodiversity and Conservation, Vol. 10(7), pp. 319-326, July 2018 DOI: 10.5897/IJBC2016.1005 ;ISSN: 2141-243X

75. UNESCO, Biosphere Reserves, UNESCO, Paris, France, 2019.
76. UNESCO, Madrid Action Plan for Biosphere Reserves (2008–2013), Verlagnichtermittelbar, London, UK, 2008.
77. United Nations Educational, Scientific and Cultural Organization (UNESCO) (2010b).Twenty-second Session of the International Coordinating Council of the Man and Biosphere (MAB) Programme: Item 10 of the Provisional Agenda, 31 May — 4 June. UNESCO, Paris. 20.
78. United Nations Educational, Scientific and Cultural Organization (UNESCO) (2012). International Coordinating Council of the Man and the Biosphere (MAB) Programme: Twenty-fourth Session, Final Report, 9 – 13 July 2012. UNESCO Headquarters, Paris
79. United Nations Educational, Scientific and Cultural Organization (UNESCO) (2011b). International Coordinating Council of the Man and the Biosphere (MAB) Programme: Twenty-third Session, 28 June — 1 July 2011. UNESCO, Dresden, Radebeu
80. United Nations Educational, Scientific and Cultural Organization (UNESCO) (2019). International Coordinating Council of the Man and the Biosphere (MAB) Programme: Working Group on Governance, Procedures and Working Methods of the Governing Bodies of UNESCO, 30 September 2019, Room XI ,.UNESCO Headquarters – Paris, France June 17th – 21st 2019 (during the 31st MAB ICC)
81. United Nations Educational,Scientific and Cultural Organization (UNESCO) (2011a). Farming Systems and Food Security — UNESCO Biosphere Reserves as Learning Sites: An Expert Planning Workshop 24 – 25 March 2011. UNESCO, Fontenoy, Paris
82. Vernadsky, V.I. (1989). Biosphere and Noosphere (monograph in Russian), Nauka, Moscow
83. W. Mekuria and E. Aynekulu, “Exclosure land management for restoration of the soils in degraded communal grazing lands in northern Ethiopia,” Land Degradation & Development, vol. 24, no. 6, pp. 528–538, 2013.
84. WeldemariamTesfahunegny, TesfuFekensa and GetachewMulualem ‘’Avifauna Diversity in Kafa Biosphere Reserve: Knowledge and Perception of Villagers in Southwest Ethiopia’’ World Applied Sciences Journal 34 (9): 1222-1229, 2016 ISSN 1818-4952
85. Wondachew, M. and Muchie, N. (2017). Assessment of Traditional Farming and Natural resource Management Practices in Majang Forest Biosphere Reserve, Southwest Ethiopia. MELCA-Ethiopia, Addis Ababa, Ethiopia.
86. Wondimagegn Mengist, Teshome Soromessa , Gudina Legese Feyisa , Monitoring Afromontane forest cover loss and the associated socio-ecological drivers in Kaffa biosphere reserve, Ethiopia, *Trees, Forests and Peoplejournal homepage*: Forests and People 6 (2021) 100161
87. YCFBR, (2018)Yayu Coffee Forest Biosphere Reserve Management Plan. yayu-coffee -forest biospher.pdf
88. Young J. Ethiopian Protected Areas a Snapshot. A Reference Guide For Future Strategic Planning and Project Funding, 2012
89. Z. Bires, S. Raj, Determinants of environmental conservation in Lake Tana Biosphere Reserve, Ethiopia, Heliyon, https:// doi.org/10.1016/j.heliyon.2019.e01997

90. Z. Woldu,The Population, Health and Environment Nexus, the Need for Integration and Networking. A Background Paper for the Establishment and Launching of PHE, Addis Ababa University, Addis Ababa. Ethiopia, 2008.
91. ZurHeide F (2012) Feasibility studies for a Lake Tana Biosphere Reserve, Ethiopia. BundesamtfürNaturschutz (BfN)/Federal Agency for Nature Conservation, Bonn, p 181,2012

**Access this Article in Online**

Website: www.ijarm.com

Subject: Biodiversity

Quick Response Code

DOI:10.22192/ijamr.2022.09.06.006

How to cite this article:
Abesh Birhanu, Girum Faris. (2022). The Current status, Challenges and Efforts of Conservation of Biosphere Reserves in the Ethiopia. Int. J. Adv. Multidiscip. Res. 9(6): 48-69.
DOI: http://dx.doi.org/10.22192/ijamr.2022.09.06.006