

The Status of Forest Development in Ethiopia: Challenges and Opportunities: A Review Paper

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DOI: <https://doi.org/10.5281/zenodo.10409611>

Published Date: 20-December-2023

Abstract: Ethiopia is endowed with a variety of ecosystem diversity with the chain of highlands, midlands and lowlands as well as more than 13 major vegetation types. This review based on identifying the existing opportunity and the major challenges of forest as well as suggests future directions for better forestry development and conservation practice Ethiopia. Forestry directly contributes to the national economy through employment generation, potential foreign currency earnings through export, energy, food, industry, and tourism. Moreover, it provide wide ecological values mainly as a major carbon sink regulating climate change, control erosion, maintain soil fertility, and reduce risk of natural disasters like flood and land slide. Even though, the forest provide varies ecological and economic value the deforestation, overgrazing, agricultural expansion and forest fire are becoming the main challenges threaten forest status in Ethiopia. These challenges in turn results in other serious ecological consequences like loss of biodiversity, soil erosion, loss of soil fertility, food insecurity and poverty. However, to overcome these challenges, and improve the forest cover in Ethiopia, there are several potential opportunities including the Existence of forest policy, the signed a number of international agreement. Ethiopia Launches Climate Resilient Green Economy (Green legacy), Agro forestry and home garden practices, Priority High Forests and National Parks, religious and other Sacred Site and the expansion of different protected area. Therefore, efforts should be made to address the existing challenges and apply those potentials opportunities entirely so as to develop and conserve the forest resources sustainably in Ethiopia.

Keywords: Biodiversity, Conservation, Deforestation, protected area.

1. INTRODUCTION

Globally, about 30 percent of the land was covered by forests which accounted for about 3,952 million hectares. However, gradually the coverage is declining from time to time at a rate of 12.9 million ha/year mainly as a result of different anthropogenic factors Food Aid Organisation (FAO, 2020). From this, Africa's forest cover is estimated to be 650 million ha, constituting 17 percent of the world's forests [FAO, 2007]. Ethiopia, as a result of its diverse physiogeographic features (Masresh et al, 2015; Mechal, 2017), is one of the east African countries endowed with rich biological resources [Erenso *et al.*, 2014], is enabled the country to be one of the world's biodiversity hotspot (Kelbessa *et al.*, 1992) and one of the 12 Vavilov centers of crop genetic diversity (Vavilov, 1951 and Bayeh, 2013). According to the National forest inventory report (2018) the forest cover of the country is estimated to be 15.7%.

The country has diverse vegetation resources that range from lowland scrubs to tropical rainforest that comprised both natural and planted forest. The natural forests are also different types: moist and dry tropical Afromontane forests, woodlands and shrub lands while the planted forests comprised industrial plantation and small scale woodlots (Friis *et al.*, 2010, Asefa *et al.*, 2020; FAO, 2020). Forests are also crucial for Ethiopia's ecological diversity and economic development

(Mulatu, 2019; Eyasu et al., 2020; Shumi et al., 2021). It generated economic benefits in the form of cash and in-kind income equivalent to 111.2 billion Ethiopian Birr (ETB) (USD16.7 billion) or 12.86% of Gross Domestic Product (GDP) in 2012-13. Similarly the contribution of forest ecosystems to other sectors, particularly agriculture, is valued at 6.77% of GDP (United Nations Environment Programme (UNEP), 2016, FAO and UNEP, 2020).

However the rapid increase of the population in Ethiopia coupled with the ever-increasing demand for forest products as well as the expansion of land for crops and grazing is among the major causes of the ongoing deforestation in the natural forest systems of the country (Lemenih and Kassa, 2014). A recent report indicated an average forest loss, which was estimated at 91,000 ha year⁻¹ Ministry of Environment, Forest and Climate Change (MEFCC), 2018). Also the indirect threats comprise gaps in the application of forest policy and regulations; tenure/unclear forest user rights; lack of private investment in forestry development ; inadequate land use planning and participatory forest management (PFM) related implementation gaps (Kindu et al., 2013; FAO (Food and Agriculture Organization), 2015) .

However, the government of Ethiopia is making paramount effort to reverse deforestation on the one hand while rehabilitating the degraded forest land on the other. Among the measures taken the most prominent include: creation of new forest through afforestation and reforestation and conservation of the existing natural forest through participatory forest management approach ((Mengist, 2020; Zeleke and Vidal, 2020).

Furthermore The REED+ and forest sector development programs are working on both in afforestation and reforestation and conservation of natural forest (MEFCC, 2017 .FRA,2020, Bekele, 2011; Tesfaye et al., 2020, Abate ,2020, Getahun, 2020). This paper attempts to analyse and explain the status of forest development in respective to the opportunity and existing challenges in Ethiopia. It seeks to answer the following central questions: what is the status of forest development in Ethiopia? What are the opportunities for the development of forest? What are the major challenges those hinder forest development in Ethiopia?. Also considerate the existing opportunities and challenges of forest development in the country.

2. REVIEWING METHODOLOGY

This review article is based on document analysis through a depth review of related literature from different sources. Data were obtained from the review of related literature on the Web of Published articles, researches, books, and reports. A total of 295 papers are searched from Scopus, Web of Science, and other indexed journals using keyword selection (the forest status, deforestation, and biodiversity, protected areas, sacred religious forests, and entire natural forest, green legacy. This review study also looked at Ethiopia's forest resources, as well as current opportunity such as, reforestation/afforestation activities and approaches. "Managed forests", "Plantation forests", "and "increased protected areas" green legacy movement. The "major consequences of forest loss", soil erosion, "grazing and browsing impact on forest" were among the search terms and keywords. We used i) English-language publications and ii) papers published in peer-reviewed scientific journals to define the criteria for screening the relevance of available materials. However, we have also included official website reports, conferences, theses, and unpublished data due to a lack of published literature in peer-reviewed journals.

3. RESULT AND DISCUSSION

The extent of the forest in Ethiopia

The forest cover in Ethiopia was 18.5% around 2000 and has been in serious trouble for decades. Due to continuous efforts to rehabilitate the degraded areas, afforestation/reforestation efforts, and partly due to the change in the definition of forests, the recent estimate becomes 15.7% (FAO, 2020) with a total forest area of 17.22 million hectares. The majority of undisturbed remnant natural forests are located in the south west and south east part of the country ((Lemenih & Woldemariam 2010). As shown in Figure 1, the forest cover has been declining for the last two decades. On average the country losses 92,000 ha of forest per year between 2000 and 2013. The gain in forest cover, through afforestation/reforestation activities, was on average 18,000 ha per annum, which makes the average annual net loss of 73,000 ha per year over the same period (FAO, 2020). The government of Ethiopia is committed to reverse this situation and enhance the contribution of the forest to the country's economy. The target is to increase the forest cover by 15% from its current level of 15.7% to 30% by 2025 (MEFCC, 2018). The country has also promised to the international community to reduce forest degradation and deforestation and increase the forest cover. Ethiopia's Nationally Determined Contribution (NDC) indicated that the forest sector is expected to reduce emissions by 255 MtCO_{2e} by 2030 where 130 million tons of which are to come from the forestry sector (MEFCC, 2018).

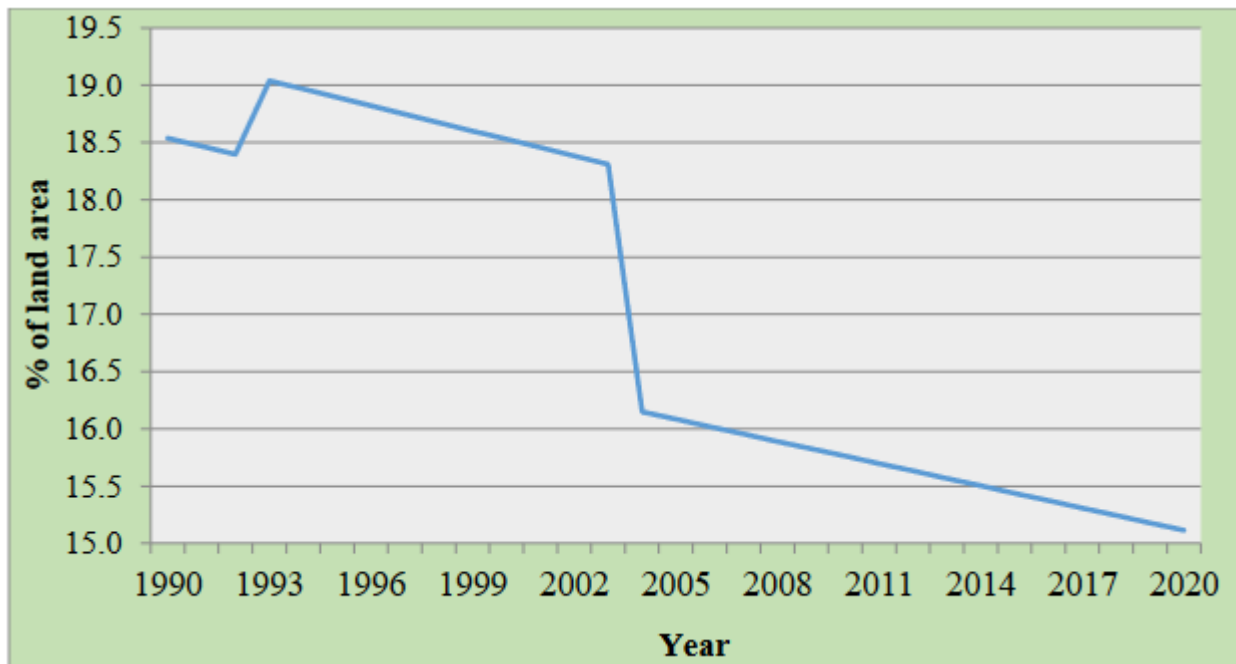


Figure 1: Forest covers trends

Source: WB data on forest inventory(2020).

THE ROLE OF FOREST SECTOR IN THE ETHIOPIAN ECONOMY

Ethiopia has diverse forest resources that provide several benefits to the people which can ensure a green economic growth pathway. However, the contribution of forests to the overall economy of the country is very low. According to MEFCC (2018) forests contribute to the GDP was 2.3% in 2015 and planned to increase to 8.3% by 2020. However, this figure is believed to be underestimated as it did not consider several services of the forest into account. A more comprehensive assessment undertaken by UNEP in 2016 showed that the contribution of forests to the Ethiopian economy is about 13%. It is also argued that there is no proper account of the benefits of forests because they are either belonging to another sector or proper valuation methods have not been adopted (UNEP, 2016).

In general, this shows that there is a big room for forests to contribute to the country's economy. The low economic contribution of the sector is mainly due to the subsequent challenges that the sector encounter. Forest degradation and deforestation is the cause for low agricultural productivity, food insecurity, and rural poverty. The main challenges facing the forest sector in Ethiopia are discussed in detail in the next section. Forest products play a significant role in the livelihood of rural communities in Ethiopia. Households use forest products such as firewood, fodder, honey, wild coffee, mushroom, spices, medicinal plants etc. Available evidences from developing countries show that, on average, household derive 10-60% of their income from forests (Wiebe et al., 2022; Ali et al., 2020; Beyene et al., 2019 ; Heubach et al., 2011). In particular, the poor are more dependent on forests and hence derive a significant share of their income from forest resources.

THE EXISTING OPPORTUNITIES FOR FOREST DEVELOPMENT IN ETHIOPIA

Participatory forest management

This is a generic term for different initiatives like community-based forest management, collaborative forest management, and joint forest management. It has been a dominant feature of forest governance in the tropics since the 1980s (Arts and Buizer, 2009). PFM can potentially contribute toward achieving improved forest conditions and enhanced rural livelihoods, if local communities are recognized as important stakeholders in forest management and encouraged to participate actively (Kassa et al., 2017; Siraj et al., 2018).

The government of Ethiopia adopted PFM as a mechanism to help improve the management of natural forests and woodlands that have been under state ownership since the mid-1970s. In Ethiopia, PFM was introduced by NGOs in the

mid-1990s, aiming to reduce deforestation and degradation while also improving community access to and use of natural forests (Tesfaye et al., 2012a; Ameha et al., 2014). Approaches of PFM recognize and manage conflicts between livelihood needs and economic interests of communities, and conservation and protection objectives of the state (Tesfaye et al., 2012b). Where PFM has been implemented, deforestation declined and tree regeneration improved (Tesfaye et al., 2012b). Various studies show that without PFM, rates of D&D would have been much higher (Kassa et al., 2009). An estimated 1.5 million ha of forest in Ethiopia is now managed through PFM initiatives (Lemenih and Kassa, 2014). A recent report of the Ethiopian Forestry Development and the then Environment, Forest and Climate Change Commission (EFCCC) covering the 2016-2020 planning period indicated that the total areas of natural forests under PFM had reached 2 million ha [Environment Forest and Climate Change Commission (EFCCC), 2020].

Enclosures/enclosures (AEs)

It is the practice of excluding a designated degraded land from grazing, cutting trees, and shrubs as well as from cultivation to allow vegetation to regenerate, to reduce soil erosion, to increase rainwater infiltration, and increase biomass production (Aerts et al., 2009; Abiyu et al., 2011). Assisting rehabilitation of the productive potential of the land is attained either through resting alone or coupled with soil and water conservation (SWC) work and tree planting interventions (Asfaw et al., 2015). Widespread state-led efforts to establish large-scale AEs began in the 1980s in the Tigray region, northern Ethiopia. Later on, it became the major means of rehabilitating degraded lands in other regional states of the country. The benefits of AEs for restoring soil properties and improving availability of wood have also been documented (Birhane et al., 2018; Mekuria et al., 2018). The exact figure of areas put under AEs in Ethiopia is lacking, but areas under AEs in the Tigray region alone grew from 1.2 million ha in 2012 to 1.5 million ha in 2015 (Birhane et al., 2018).

Sustainable land management and the green legacy initiative

It attempts to rehabilitate productivity of degraded lands in ways that are ecologically sound, socio culturally acceptable, and technically and economically feasible. In. The SLM program aims at promoting SWC measures such as soil or stone bunds, bench terraces, trenches, cutoff drains, drainage canals, and check dams (Schmidt and Tadesse, 2014). Over time, SLM scopes expanded and included planting of different trees, shrubs, and herbaceous species, and establishing AEs and discouraging free grazing of livestock, hence ensuring a sustainable flow of ecosystem services (Ebabu et al., 2019). The second growth and transformation plan (GTP II, from 2016 to 2020) of Ethiopia targeted to identify 5 million ha of land and rehabilitate the area using afforestation or reforestation to increase the national forest cover by 4.5% by 2020.

The GTP II plan also envisaged to plant 21 billion tree seedlings but managed to produce and plant 15 billion seedlings on an area of 2.6 million ha [Environment Forest and Climate Change Commission (EFCCC), 2020]. In 2019, H.E. Dr Abiy Ahmed, prime minister of Ethiopia, launched the GLI with a target of planting 20 billion seedlings in 4 years. The forest sector plan for 2021–2025 is designed to help realize this goal [Environment Forest and Climate Change Commission (EFCCC), 2020]. A total of 82 million hectares of land as having potential for tree-based restoration, of which 11 million hectares is classified as priority requiring rehabilitation. This indicates that :

- ✚ Existing forests can be restocked for biodiversity conservation, carbon sequestration, and flow of ecosystem services;
- ✚ planted forests can be established to generate economic benefits and prevent landslides and flooding;
- ✚ Agroforestry can be scaled up to produce food, wood, and fodder;
- ✚ Planting trees could be planned to stabilize riverbanks and reduce sedimentation;
- ✚ Commercial plantations can be promoted to meet the growing wood demand for industrial and domestic uses.

THE MAJOR CHALLENGES OF FOREST IN ETHIOPIA

Deforestation and forest degradation

Deforestation is that the permanent conversion of forests to another land cover, nearly always to crops, pastures, or plantations like feather palm (United Nations Development Programme, 2016). Deforestation remains one of the greatest concerns in Ethiopia. Forests once covered an estimated 40% of the country and up to 90% of the highlands (Ethiopian Forestry Action Program (EFAP), 1994), although exact areas are debated and difficult to estimate (McCann, 1997). As of 2015, forests covered approximately 11–15.5% of the country (FAO (Food and Agriculture Organization), 2015; MEFCC

International Journal of Novel Research in Interdisciplinary Studies

Vol. 10, Issue 6, pp: (7-19), Month: November – December 2023, Available at: www.noveltyjournals.com

and FAO, 2016). Most of Ethiopia’s deforestation is driven by the increasing demand for agriculture and livestock range, local and regional subsistence needs (e.g., fuel wood, construction material), and village growth as the population and economy of Ethiopia continue to be one of the fastest growing on the continent (Pankhurst, 1995; Zeleke and Hurni, 2001; Kindu et al., 2013; FAO (Food and Agriculture Organization), 2015). As a result, the majority of lowland forests have been cleared adding increasing pressure on highland Afro-montane tropical forests. Similarly the lost and deforestation rate in Ethiopia highly from 2001 -2020 in all parts of the country (Table , 1).

Table 1: Tree cover loss by year at the sub national level (administrative level 1)

Sub-Nation	Adminst 1	(2001) <i>ha</i>	(2001-05) <i>ha</i>	(2006-10) <i>ha</i>	(2011-15) <i>ha</i>	(2016-20) <i>ha</i>	(2001-20) <i>ha</i>	(2001-20) %
Addis Ababa		747	64	26	115	83	287	38.5%
SNNP		3,326,705	20,673	31,765	42,245	41,342	136,025	4.1%
Tigray		4,772	16	36	50	103	206	4.3%
Afar		427	4	1	2	2	9	2.1%
Amhara		122,284	332	393	913	812	2,449	2.0%
Benshangul-Gumaz		2,087,815	8,798	18,861	15,892	6,552	50,102	2.4%
Dire Dawa		2	0	0	0	0	0	0.0%
Gambela Peoples		1,207,200	2,950	6,168	8,104	7,612	24,833	2.1%
Harari People		1	0	0	0	0	1	53.8%
Oromia		5,289,670	35,266	53,862	63,619	60,936	213,682	4.0%
Somali		712	120	45	8	2	174	24.4%

Source: Mongabay (1995-2020).

Table 2: Primary forest loss and tree cover loss (ha):Ethiopia

Year	Primary forest	Tree cover (30 %)
Primary loss 2002-2018	63.736	
Tree cover loss 2001-2018		370127
Primary loss/ Total tree cover loss	17.2 %	
Percent loss 2001-2018	3.4 %	
Loss/year(2001/2-2010)	3140.33	17703
Loss/year(2011-2018)	4434.13	25632

Source: Mongabay, 1995-2018

CAUSE AND IMPACT OF DEFORESTATION IN ETHIOPIA

Cause of deforestation.

Consistent with the United Nations (UN) agency, deforestation is outlined because of the conversion of forests to different land use or the long- run reduction of the tree cover cowl below the 10 % threshold as outlined for forests (UNDP, 2016). According to (Teketay, 2022; National action programme to combat desertification, 2022), the major causes of deforestation in Ethiopia i). Rising stipulate for tree products, that is, fuel wood, transmission poles, creation wooden, farm implements, fodder etc. ii). Changing forest land to arable and shifting cultivation, urbanization.

Large Scale Agricultural Expansion

According to the WBISPP (2004), EFCCC, 2017, forest clearance for agricultural expansion is the main direct cause of deforestation . For example, in parts of the south-central Rift Valley, agricultural land expansion accounts for 82% of the high forest lost (Dessie and Christiansson 2008). Similarly, in the central and southern Rift Valley, agricultural activity accounted for 80% of the observed change in land cover and degradation from 1973 to2000 (Sherefa , 2006). In the same time period, Garedew (2009) estimates that in the semi-arid areas of the central Rift Valley, which have low agricultural potential, 30–33% of woodlands were converted for crop production. Furthermore available evidences show that

agriculture together with logging is responsible for about 80% of global deforestation (Duker et al., 2019, Bekele et al., 2015).

Deforestation and Small-Scale Agriculture

According to WBISPP (2004 point to small-scale agriculture as the main driver of deforestation in the recent past. (FDRE, 2011) report identified large-scale development activities as one of the major direct drivers of deforestation. The average annual increase in the total number of smallholders and total area cultivated between the years 2006 and 2012 is about 4.7% and 3.0%, respectively (CSA 2007; 2013). Also the extent of deforestation might depend on the type of crops to be grown. Available empirical studies show that smallholders are the main agents for deforestation (Solomon et al., 2018; MEFC, 2017; EFCCC, 2017).

Deforestation, Commercial Agriculture and Investments

large-scale activities in forest areas can have multifaceted impacts as they often occur in tandem with small-scale agricultural activities and can result in spontaneous transmigration (Geist and Lambin 2001, Desie and Christiansson (2008), The(FDRE 2011c) identifies the expansion of large-scale development activities as one of the causes of deforestation with particularly large impact. In line with the focus on increasing investments in crops, huge areas of agricultural lands have been leased to establish commercial agriculture, with the support of a favorable incentive structure (Rahmato , 2011). A study by the Oakland Institute (2011) indicates that the majority of these investments are occurring in areas where shifting cultivation is practiced. This suggests that the impact of large-scale agricultural activities may be even greater as it is likely to displace people who use shifting cultivation and so increase their own potential to impact on deforestation. Cotton, oil crops and pulses, respectively, are the three most important crops with a 67% share in the total land area transferred (Oakland Institute, 2011).

Table 3: The major direct drivers of deforestation in Ethiopia and their level of impact.

no	Causes of deforestation	Levels of impact
1	Expansion of traditional smallholder agriculture in forest areas driven by population growth of communities around forests	Large
2	Expansion of large-scale commercial agriculture and other development activities including road networks and mega development projects such as hydroelectric dams	Large
3	Population growth due to government settlement programs relocating people to forest areas	Large
4	Increased extraction of wood and other forest products following massive population growth and the resultant high domestic energy demand.	Medium
5	Forest fires related to raising livestock (pasture improvement activities) and making charcoal, due to poor incentives to local communities for sustainable forest use and weak forest protection	Medium

Source: FDRE (2011)

IMPACT OF DEFORESTATION IN ETHIOPIA

Loss of biodiversity:- Loss of biodiversity is mainly due to degradation and destruction of habitat by anthropogenic activities(Meronet al., 2017). The loss of forests has a number of environmental, economic, and social impacts, many of which are interrelated (Ngoma et al., 2021). The destruction of forests worldwide results in flooding, erosion, and landslides; contributes to the extinction of plants and animals and the loss of biodiversity (Syed and Naushad, 2018). Additionally, specifically, the destruction of habitats, the creation of a narrow spectrum of crop varieties, and chronic droughts, nevertheless as wars and conflicts are moreover referred to as effects of the most ordinary reasons for the erosion of diversity in the country (EPA, 2022; United States Agency for International Development, 2022). Furthermore deforestation is having serious impact on biodiversity. This impact is seen in terms of loss of valuable plant species, reduced plant biomass, extinction of species and reduced species richness and evenness (Anyanwu, 2016). It also leads to loss of cultural diversity, loss of biodiversity and loss of carbon storage capacity (Packiam, 2015).

Soil erosion: The blended impact of steep topography, excessive depth rain storms, degraded vegetation, significant cultivation, overgrazing, and soil with depleted natural depends results in severe soil erosion. According to (Hamito, 2001) over 14 million ha (27 %) of the Ethiopian excessive lands had been critically eroded out of which approximately 1/2 need to be absolutely withdrawn from agriculture to reforestation. An extra thirteen million ha (23 %) are reasonably eroded, and of the ultimate 28 million ha, 15 million ha are at risk of erosion. Deforestation has caused the depletion of soil nutrients, contributing to low agricultural productivity and constrained home meal resources in sub-Saharan Africa (Mekonnen *et al.*, 2008). Land degradation in flip significantly impacts agricultural productivity and manufacturing. In 1990 alone, for instance, decreased soil intensity as a result of erosion led to a grain manufacturing lack of 57000 (at 3.5 mm soil loss) to 128000 t (at 8 mm soil intensity). It has been anticipated that the grain manufacturing misplaced because of land degradation in 1990 might have been enough to feed greater than 4 million human being (Carvalho *et al.*, 2004).

CLIMATE CHANGE (GLOBAL WARMING)

It is well-known that global warming is being caused largely due to emissions of greenhouse gases like carbon dioxide into the atmosphere (NAPA, 2007). Deforestation is caused by the growing demand for forest products and the conversion of forest to agriculture as the human population continues to expand in Ethiopia (Beyene and Shumetie, 2023). In 1980 cropland and pastureland occupied 6-7% of the global land surface; by 2000 cropland and pastureland occupied 35-39% of the global land surface. It is estimated that the world is currently losing over 9 million hectares per year which is an area the size of Ethiopia. Deforestation not only affects the climate by increasing the atmospheric level of carbon dioxide but also affects the environment by inhibiting water recycling, triggering severe flooding, aquifer depletion, soil degradation and the extinction of plant and animal species (Robalino and Pfaff, 2012).

The effect of weather extrude on Ethiopia is greater reported via way of means alarming lack of wooded area useful resources. Africa has the bottom GHG emissions but is hit toughest via way of means of weather extrude. Adaptation to the unavoidable influences of weather extrude will want sturdy help via way of means of the world wide network and contain all stakeholders which include the personnel sector. There region appropriate for agriculture, the period of developing seasons, and yield potential, especially alongside the margins of semi-arid and arid regions, are anticipated to decrease. These could similarly adversely affect meal protection and exacerbate malnutrition within side the continent. In a few nations, like Ethiopia, yields from rain-fed agriculture might be decreased via way of means of as much as 50 % (UNDP, 2022).

OTHER CHALLENGES OF FOREST LOSS IN ETHIOPIA

Urbanization and infrastructure expanding

Urbanization and infra-structure expanding cities and towns require land to establish the infrastructures necessary to support growing population which is done by clearing the forests (Avtar *et al.*, 2019). Tropical forests are a major target of infrastructure developments for oil exploitation, logging concessions or hydropower dam construction which inevitably conveys the expansion of the road network and the construction of roads in pristine areas (Awgchew *et al.*, 2015). The development of these infrastructure projects are of worldwide concern, since tropical forest clearing accounts for roughly 20 per cent of anthropogenic carbon emissions destroying globally significant carbon sinks and around 21 per cent of tropical forests have been lost worldwide since 2010 (Mpofu, 2013). Similarly Infrastructural developments such as roads and hydro dams significantly aggravate the deforestation within the Ethiopia (Melaku *et al.*, 2015, Legesse *et al.*, 2019, Baehr *et al.* (2021).

Lack Of Secured of Land and Tree Tenure Policies

Tenure insecurity and weak enforcement are among the underlying causes of deforestation in Ethiopia (EFCCC, 2017, Ewnetu, 2021). Tenure security is crucial for long-term investment decision. In Ethiopia, there is still limited capacity to enforce forest regulations and lack of tenure security as a result of absence of state-recognized community and individual rights to forests often discourages investment in the sector (McLain *et al.*, 2019). The national forest law established in 2018 states that communities and associations can have forest ownership rights. But to speed up the 10 implementation of this law, the country needs to enact and implement corresponding forest regulations and guidelines (FDRE, 2018).

Overgrazing/Free Grazing

It is estimated that more than 80% of Ethiopia's population resides in rural areas, and highly dependent on agriculture including livestock production as main economic activity. Livestock production in Ethiopia is mainly based on free grazing.

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Vol. 10, Issue 6, pp: (7-19), Month: November – December 2023, Available at: www.noveltyjournals.com

In Ethiopia, overstocking and overgrazing and poor livestock management, mainly based on the free grazing system, is one of the main causes of natural resource degradation (Melkie, 2020; Solomon et al., 2018; EFCCC, 2017). Another study by Legesse *et al.*, (2019) also argued that overgrazing is one of the causes of deforestation in Ethiopia.

FUTURE FORWARDING

- ✦ Giving more focus to the green legacy of Afforestation and reforestation.
- ✦ Formulation of the effective Forest governance and policy in areas under high threat of deforestation.
- ✦ Revision of the forest laws and regulations along with the construction of national forest strategy.
- ✦ Adoption of a Climate Resilience and Green Economy strategy prioritizing forestry as one of the pillars to build a green economy.
- ✦ Decentralized forest governance and enhancing benefit-sharing among local community.
- ✦ improving crop and livestock production practices to increase food yields, and thus food security and farmer income, while reducing emissions protecting and re-establishing forests for their economic and ecosystem services.
- ✦ expanding electric power generation from renewable sources of energy to reduce the relies of people on forest resource.
- ✦ Ensure and encourage a gradual shift from traditional to modern energy sources.
- ✦ Prevent or control allocation of forested lands for large-scale agricultural investments and monitor the effective enforcement of existing environmental impact assessment regulations.
- ✦ Reduce deforestation and forest degradation from smallholder agricultural expansion via the introduction of agricultural intensification assisted by improved technologies and irrigation systems by subsidizing of critical inputs for poor farmers should be considered).
- ✦ Develop broader regional land-use plans that take into account the future of forest development and forest-based livelihoods in view of sustainable economic development.
- ✦ Scale up the practice of Participatory Forest Management with sufficient decision-making autonomy and economic incentives to the forest custodians organized under forest community.
- ✦ Encourage private forest developers and NGO by providing incentives such as land grants, interest free loans, and technical, marketing and administrative support.
- ✦ Develop a forest extension package in which technologies for forest/woodlot establishment, tending, harvesting and processing are incorporated.
- ✦ Ensure that forest-dependent communities, women and the poor are particularly supported in forest entitlement, and participate in decision making
- ✦ Provide certification of ownership or use rights to individual forest farmers (woodlot owners).

4. CONCLUSION

Forests play an indispensable role in maintaining an environment conducive to sustainable development. Forest also plays a key role in controlling soil erosion, livelihood diversification and biodiversity conservation in Ethiopia. The main consequences of deforestation in Ethiopia, loss of biodiversity, low agricultural productivity, soil erosion and food insecurity that resulted from low soil fertility as result of erosion. Deforestation also contributes to global climate change and increased greenhouse effect. Furthermore the r disappearance is threatening the communities that depend on natural forests for their livelihoods and affects water supply to lowland areas. Deforestation is accompanied by a significant loss of biodiversity and is responsible for the accelerated release of carbon to the atmosphere .Generally effective forestry and natural resource management is so important for sustainable development of biodiversity through enhancing green economy.

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