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## The Major Causes of Deforestation and its Management Options in the Case of Ethiopia

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### Abstract

Deforestation is a major environmental challenge which has been persistent from the past, and the situation is more worsened at present. Deforestation is the primarily a concern for the developing countries including Ethiopia because of its negative contributions which include the loss of biodiversity and the increase of greenhouse effect. There are several reasons why deforestation occurs through forest clearance for agricultural expansion is widely believed to be the biggest immediate cause of deforestation in developing countries. The most important cause of deforestation are agricultural expansion, urbanization and infra-structure, poverty, wood and wood products, clear-cutting, corruption and political cause, lack of secured of land and tree tenure policies and frequent fires took the largest share for forest destruction. Deforestation, associated with environmental consequences such as climate change and global warming, soil erosion and land sliding, land degradation, desertification and prolonged drought, human and environmental health and social and economic impacts. There are several management option was taken to overcome the impacts of deforestation through reforestation, afforestation, land and tree tenure and participatory forest management, Reduce population growth and increase per capita incomes and Strengthening research, education and extension are the most applicable options for sustainable forest and biodiversity management.

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### Introduction

Forests are sources of variety of foods that supplement and complement what is obtained from agriculture, wood fuels with which to cook food and boil water and a wide range of traditional medicines and hygienic products. It also contributes to the improvement of productivity of land through improving soil fertility, water percolation and provisions of shed (Tolessa *et al.*, 2019). Following the FAO definition, Ethiopia adopted a new forest definition as follows: “Land spanning at least 0.5 ha covered by trees and bamboo), attaining a height of at

least 2m and a canopy cover of at least 20% or trees with the potential to reach these thresholds insitu in due course” (WBISPP,2005). In the recent forest proclamation of Ethiopia (No. 542/2007), high forests, woodlands, plantations, bamboo forests are recognized as forests.

Forest is a conditional renewable resource which can be regenerated but needs a certain period of time to maintain its sustainable functioning. Ethiopia is located in the horn of Africa covers about 1.01 million square km area. The recent data on forest resources of Ethiopia

among countries with forest cover of 10 to 30%. According to this report, Ethiopia's forest cover is 12.2 million ha (11%). It further indicated that the forest cover decline from 15.11 million ha in 1990 to 12.2 million ha in 2010, which is 2.65% of the forest cover loss. It is a country of about 100+ million populations over 80% of its population resides in rural area depending on economic activities of agriculture and natural resources (FAO, 2016).

Deforestation is primarily a concern for the developing countries including Ethiopia because of its negative contributions which include the loss of biodiversity and the increase of greenhouse effect (Angelsen *et al.*, 1999). There are several reasons why deforestation occurs: trees or derived charcoal can be sold as commodity and used by humans, while cleared land is used as pasture, farming, plantations of commodities and human settlement (Alemu, 2017). Despite forest degradation could have an impact on populations' livelihoods and income generation activities through the reduction and loss of direct economic services (Muleta *et al.*, 2020).

Deforestation is a major environmental challenge and high alarming and threat to ecosystem which has been persistent from the past, and the situation is more worsened at present. Therefore, there is an urgent need to focus on the mitigate measures in order to prevent the distressing effects of deforestation in the near future. In order to alleviate the problem of deforestation, the strategies should be based on the underlying causes of and sustainable management options. The purpose of this review is to understand the major of deforestation carouses and their management options under Ethiopian conditions.

### **Course of Deforestations**

Forest clearance for agricultural expansion is widely believed to be the biggest immediate cause of deforestation in developing countries. The most important cause of deforestation was crop land expansion followed by cutting of trees for fuel wood and construction materials, agricultural expansion took the largest share for forest destruction.

Similarly Population increase have resulted in extensive forest clearing for agriculture, overgrazing by domestic animals, utilization for fuel wood, fodder and construction materials (Alemu, 2017). Africa, which has about 16 percent of the world's forests, is losing its forests at a higher rate than any other continent. The

FAO indicates that the continent lost more than 9 percent of its forest area from 1990 to 2010, but some experts suggest that the rate of deforestation in Africamay actually be much higher (Anonymous, 2010).

### **Livestock grazing**

In Ethiopia, fodder derived from the forested areas provides 10% and 60% of the livestock feed during the wet and dry seasons respectively (Lemenih, 2009).According to Tariq *et al.*, (2014) determined that one of the main causes of deforestation is livestock grazing.

The natural small vegetation is the only main source for livestock grazing in Ethiopia. The livestock affect the forests by two means, one by using the vegetation as a fodder and grazing. Secondly, large number of cattle and herds crush and trample the small vegetation. Thus over grazing and trampling of livestock contributes to deforestation and has adverse effects on forests in Ethiopia. According to the FAO, (2016) report the link between deforestation and cattle ranching are strongest.

Forest area has been reduced by almost 40 percent over the past 40 years over the same period, pasture areas and the cattle population increased rapidly.

Despite livestock pressure on pasturelands and poor stock management systems are found to be the major sources of land degradation through soil erosion and deforestation. It has, therefore, been estimated that about 20% of the total soil erosion in Ethiopia is from degraded pasturelands (Yirdaw *et al.*, 2017).

### **Agricultural expansion**

Kissinger *et al.*, (2012) show that small holder agriculture is the main cause of deforestation in tropical areas. It contributes to 35% of the destruction of the forests in Africa, 65% in Latin America and a little more than 30% in Southeast Asia. The idea that slash-and-burn agriculture is responsible for an irreversible deforestation and the disastrous degradation of forests and soils of tropical regions is increasingly challenged. In fact, studies conducted by ethnobotanists and anthropologists emphasize the benign character and non-disruptive effects, in the ecological sense, of the traditional agriculture as far as it is carried out by the indigenous populations of the forested tropical regions (Ngoma *et al.*, 2021).

## 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 infra-structure 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 construction of roads, railways, bridges, and airports opens up the land to development and brings increasing numbers of people to the forest frontier. Whether supported or not by the governmental programmers, these settlers have usually colonized the forest by using logging trails or new roads to access the forest for subsistence land. 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).

## Poverty

Poverty is also a strong factor in the issue of deforestation. The socio-economic environment that limits peoples' economic options, damage health, limit the formation of rural capital, reduce income generating opportunities and limits institutional and infrastructure development. In Ethiopia the majority of our people are now in absolute poverty (Niel *et al.*, 2019). This means that these rural people have used up all their crop harvest, have no cattle to sell, and have no cash to purchase food. It is at this desperate stage that they turn to forests for survival. One way they deal with the situation is by trying to locate food items from the forest, which is generally termed famine food. The other way that they use the forests is by selling products from the forest in order to generate cash income with which to buy food item. This means that forests and forestry can serve as safety net for the poorest of the poor at the worst of time (Azadi *et al.*, 2018).

## Wood and wood products

The forest products industry is a large part of the economy in both developed and developing countries. People throughout the world depend on wood for shelter and fuel. In fact, almost 3 billion people in developing countries rely on wood for heating and cooking. For

example, wood and charcoal, which is produced by heating wood, are the preferred cooking and heating fuels in Ethiopia. The charcoal consumption alone was twice wood lands could sustain without further deforestation. Loggers there illegally clear 100 square miles (259 sq. km) of forest each year just to meet the demand for charcoal. Millions more people use wood to build homes and furniture. Trees are also cut down to make packaging, paper, and many other products. Logging provides the raw goods for these products. Much of this logging is carried on illegally. Today logging may be the greatest threat to forests in Africa, and other countries.

## Clear-cutting

Many people argue that it is not logging itself that causes deforestation, but the practice of clearing entire fields of all their trees, a practice called clear-cutting. Forestry is big business in countries large and small, powerful multinational corporations are involved in harvesting and selling valuable hard woods by clear-cutting the forests (Tariq and Rashid, 2014). The extraction and consumption of tropical hardwoods has been so massive that some countries that once led the export market have exhausted their supplies. The demand for hardwoods for construction, furniture, and other uses has contributed to deforestation in Africa and other tropical country. On particular concern to environmentalists is the growing demand for rare, exotic hardwoods that are only found in intact tropical forests. The demand for precious tropical hardwoods has multiplied nearly 25 times over the last 40 years. Currently, 99 percent of tropical hardwoods sold are taken from old-growth tropical rain forests. Clear-cutting is used not only to harvest the trees that are in a forest. A forest may also be clear-cut to make room for housing or industry; the trees burned or otherwise disposed of (Syed and Naushad, 2018).

## Corruption and political cause

The FAO identified forest crime and corruption as one of the main causes of deforestation in its 2010 report and warned that immediate attention has to be given to illegal activities and corruption in the world's forests in many countries. Illegal forest practices may include the approval of illegal contracts with private enterprises by forestry officers, illegal sale of harvesting permits, under-declaring volumes cut in public forest, under pricing of wood in concessions, harvesting of protected trees by commercial corporations, smuggling of forest products across borders and allowing illegal logging,

processing forest raw materials without a license (Syed and Naushad, 2018).

### **Lack of secured of land and tree tenure policies**

According to Wabelo (2020) In Ethiopia there is no system for the rural poor to secure tenure over land and the fact that, forests need longer periods for their development means that there is not sufficient incentive to plant trees. Therefore, farmers are motivated neither to plant trees nor to protect the existing ones rather to take advantage of the existing ones. The 1995 FDRE Constitution Article 40(4) is guaranteed the peasants to have access to the land freely and also it guaranteed not to be evicted from the land. However there are situations that force them to evict peasants from their possessions. We have only limited land resources, but our population is increasing at an alarming rate. Today's young people become adults and demand land, because they have a constitutionally guaranteed right to get land freely. These situations, dictate us to reallocate land between the previous possessors and present claimants

### **Frequent fires**

In the world fires are a major tool used in clearing the forest for shifting and permanent agriculture and for developing pastures. Fire is a good servant but has a poor master. Fire used responsibly can be a valuable tool in agricultural and forest management but if abused it can be a significant cause of deforestation (Hoyos *et al.*, 2018). Based on the data available from 118 countries representing 65 per cent of the global forest area, an average of 19.8 million hectares or one per cent of all forests were reported to be significantly affected and leads to deforestation and global warming through emission carbon dioxide to the atmosphere (Duan and Tan, 2019).

### **Illegal charcoal production**

The forest of the country is rapidly deforested and destroyed to produce more charcoal as people seek to gain money from producing and selling coal along every roadside. This practice is the most contributors to deforestation in Ethiopia because it is the way that the people think to supply them in energy and answer to their needs. Energy policies supposed to balance forest ecosystem protection with meeting peoples' daily energy needs (Alemu, 2017) This protection of the ecosystem requires sustainable management of forests that are exploited for producing charcoal, the organization

concerned to this try to fight the poverty since the charcoal business provides essential supplementary income for thousands of producers. Ethiopia has implemented a domestic energy policy that enhances the energy supplies in particularly charcoal for the urban communities and also setting up a pathway for sustainable decentralized management of charcoal supplies in the cities existing in Ethiopia ((Muleta *et al.*, 2020).

### **Boundary conflict**

Contesting claims of control and exploitation over forest resources and trees can cause or exacerbate conflicts. The presence of high-value resources such as timber may intensify conflict; and to the degree that control over timber allows combatants to generate revenue for arms, it may prolong a conflict. In developing countries such, warring armies and militias have fought one another for control of timber. Conflicting claims to forest resources may spur conflicts between the state on the one hand and local or indigenous communities (Pacheco *et al.*, 2018)

### **Impacts of Deforestations**

Human activities have resulted in large worldwide extents of forest loss and degradation and the associated loss of biodiversity, functions and ecosystem services such as water provision, nutrient cycling and climate regulation. Forest loss and degradation greatly affect human well-being, including economy and health. 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).

### **Climate change and global warming**

Deforestation is a contributor to global climate change and is often cited as one of the major causes of the enhanced greenhouse effect. Climate is the key natural resource in which the others depend. Severe changes in climate pattern due to human influence had been threatening biodiversity, and other natural resources (Tessema and Simane 2020). Tropical deforestation is responsible for approximately 20% of world greenhouse gas emissions. According to the Intergovernmental Panel on Climate Change (IPCC) deforestation, mainly in tropical areas, account for up to one-third of total anthropogenic carbon dioxide emissions. Trees and other

plants remove carbon from the atmosphere during the process of photosynthesis and release oxygen back into the atmosphere during normal respiration. Actively growing trees or forests can remove carbon over an annual or longer time frame. Both the decay and burning of wood release much of this stored carbon back to the atmosphere. In order for forests to take up carbon, the wood must be harvested and turned into long-lived products and trees must be re-planted. Deforestation may cause carbon stores held in soil to be released. Forests are stores of carbon and can be either sinks or sources depending upon environmental circumstances. In Ethiopia agriculture is the back bone and income for many families as rainfall patterns are being affected greatly by climate change. It can lead to floods as well as drought conditions. These both conditions have negative effects of climate change on poor people as their crops are destroyed in both situations. This is also a great loss to our economy as combating poverty is a major issue for our economy. Climate change with allied extremes is one of wide-ranging global environmental modifications having deleterious effects on natural systems, humans, economies, infrastructure, ecosystems, and biodiversity (Zegeye 2018).

### **Soil erosion and land sliding**

There is a great deal of controversy concerning the relationships between soil erosion and deforestation. Deforestation generally increases rates of soil erosion, by increasing the amount of runoff and reducing the protection of the soil from tree litter. Tree roots bind soil together, and if the soil is sufficiently shallow they act to keep the soil in place by also binding with underlying bed rock. Tree removal on steep slopes with shallow soil thus increases the risk of landslides, which can threaten people living nearby. However most deforestation only affects the trunks of trees, allowing for the roots to stay rooted, negating the landslide for short run. Zegeye (2018) reported that in Ethiopia uncontrolled browsing of trees and shrubs is another aspect of overgrazing and a bald-faced cause of deforestation leading to intensive soil erosion. In hilly areas, soil erosion contributes to the risk of mudslides and landslides, putting lives and entire communities at risk.

### **Land degradation**

More than half of all African people are affected by land degradation, making this an urgent development issue for the continent. For example, an estimated US \$42 billion in income and 6 million ha of productive land are lost

every year due to land degradation and declining agricultural productivity. A characteristic feature of the Ethiopian agriculture is the concentration of about 75% of the human and livestock population on 35% of the country's landmass, which lies within the tepid mid highlands to cold highlands (i.e., 1500-3200 masl).

This zone is characterized by relatively high rainfall, cool temperature and an environment free from malaria and tsetse infestations that is much conducive for human habitation (Mesfin Abebe, 1998). As result of the large concentration of human and livestock populations, however, the Ethiopian highlands have been subject to severe soil degradation and over-exploitation of die natural resources through deforestation, over grazing and biomass removal for household energy. Soil degradation in the Ethiopia highlands is prevalent at a tragic rate, which becomes main problem to achieve sustainable agricultural production. Hurni (1993) reported that at the national level, soil loss on Ethiopian cultivated fields is estimated  $42 \text{ t ha}^{-1} \text{ yr}^{-1}$ . The causes of land degradation in Ethiopia are cultivation on steep and fragile soils with inadequate investments in soil conservation or vegetation cover, erratic and erosive rainfall patterns, declining use of fallow, limited recycling of dung and crop residues to the soil, limited application of external sources of plant nutrients, deforestation and overgrazing.

### **Desertification and prolonged drought**

In developing country desertification occurs when the tree and plant cover that binds the soil is removed. It occurs when trees and bushes are stripped away for fuel wood and timber, or to clear land for cultivation.

This is aggravated by animals' feds away grasses and eroded topsoil with their hooves (Bishaw, 2009). Desertification is the reduction in or loss of biological productivity of land (land degradation) particularly in dry land ecosystems. Conventional wisdom is that desertification is on the increase and that it how threatens about b/n 25 and 35% of the earth's land surface and b/n one-sixth and one-quarter of the world's population. The (UNCED) United Nation Convention on environmental development, 1992 suggests that about 70% of the world's dry land and one-quarter of the total land area of the world are affected, degraded. According to the United Nation environmental program (1995) directly affects 250 million people and directly puts at risk another one million, many of them already living in poverty. The cause of desertification includes human activities and climatic variations (Zegeye, 2018).

## Human and environmental health

Deforestation and unsustainable forest management practices increase water pollution, making local populations more vulnerable to disease. More than 3 million deaths result from water pollution and poor sanitation annually, most of these in poor rural areas.

The United Nations Forum on Forests, laments, “Despite the close linkages between land use, forestry, fresh water and health, these sectors are rarely managed in a holistic manner (Sanbata *et al.*, 2014). In Africa, for instance, more than 80 percent of the population depends on medicinal plants for their medical needs. The loss of forests could make it difficult for poor people to get these medicines.

Forest resources also are important to human health in wealthier nations. Aspirin originally came from the bark of willow trees. Quinine, the treatment for malaria, comes from the bark of cinchona trees.

Roughly 70 percent of the plants shown to have anticancer properties are found only in the rain forest. Scientists suggest that we have only scratched the surface in exploring the medicinal properties of many plant species. Less than 1 percent of tropical plants have been involved in laboratory experiments to determine their potential as medicines (Hoyos *et al.*, 2018).

## Social and economic impacts

At least 400 million people live in or near forests, including 60 million indigenous people who depend on forests almost entirely for their livelihood. Millions more make a living through subsistence agriculture, hunting and gathering, or low-impact harvesting of forest products such as rubber, nuts, or rattan. The people who depend directly on forests include the world’s poorest residents. The World Bank says that 90 percent of the poorest of the poor families living on less than a dollar a day depend substantially on forests for their livelihoods.

For them, deforestation is devastating. The forest is important to the inhabitants of wealthy countries as well. Worldwide, forest industries employ between 60 and 100 million people.

As forests are depleted, there is increased risk of shortages of forest resources, particularly in developing countries that lack forest management policies and the means of enforcement (FAO, 2016).

## Management Aspects

### Reforestation

This practice refers to the reestablishment of trees in deforested lands. It is the best option to overcome deforestation and offset soil degradation. Trees can be reestablished either by natural regeneration or by seeding and transplanting. It takes about 4–5 years before trees can produce sufficient litter cover to significantly reduce runoff and soil erosion. Litter cover of at least 5 cm depth is required to protect the soil against erosion. Management of young tree plantations is important to reduce formation of rills and gullies, which are likely to occur during the vegetation establishment stage. The global area under forest plantations has steadily increased since the 1970s (FAO, 2016). Reforestation has concentrated on planting *Pinus*, *Eucalyptus*, and *Acacia* species in tropical ecosystems. Planting a wide range of species is necessary to achieve simultaneous goals of soil and water conservation and production of food, wood, and bioenergy.

### Afforestation

Afforestation refers to the process of planting trees in lands that previously did not support trees. These trees produce wood and fiber and conserve soil and water. Unlike reforestation, afforestation increases the total forest area by growing trees in pasturelands, rangelands, shrub lands, and agricultural lands. In some ecosystems, trees can expand naturally if logging, grazing, and other human disturbances are curtailed. Planting trees in degraded or abandoned agricultural lands is the best approach to restoring degraded lands. It is a useful strategy to counteract or reverse the accelerated global deforestation (Pacheco *et al.*, 2018).

### Land and tree tenure and participatory forest management

To combat deforestation and to recover forest resources successively, appropriate land tenure systems is required. In Ethiopia land is still under the control of the government. Unless land is redistributed to individual farmers and they are guaranteed continuous ownership, success in the adoption of agroforestry and tree planting on the Ethiopian highlands is unlikely. Despite the land and tree tenure policy of the country should be changed to reward the farmers who invest in agroforestry and forest plantations, which require long gestation periods (Dinesh *et al.*, 2017). The government should introduce

land and tree tenure policy changes to promote agroforestry and tree planting in the country. Land and tree tenure should give landowners and farmers the guarantee to plant and own the forests. Without clear land and tree tenure policy, it is difficult to give incentives to farmers and landowners to grow trees. Wabelo (2020) reported that the Ethiopia government policy follows poor land and tree tenure which needs a great attention for alleviating deforestation and sustainable natural forest conservations.

### **Reduce population growth and increase per capita incomes**

In Ethiopia huge population number of rural areas had been putting a great burden on the sustainability of almost all types of natural resources (Tolessa *et al.*, 2018). There is, therefore, serious degradation of land, water, forest, rangeland, and wildlife resources that appear to feed of each other. This results in severe soil loss, low vegetative cover, unsustainable farming practice, continuous use of dung and crop residues for fuel, overgrazing, and destruction and/or migration of wildlife, which again are intensifying the degradation of available resources in a vicious circle. Reduction of population growth is pivotal in reducing deforestation in the developing countries. Consequent of reduced population, increase in per capita income will occur as a consequence of increased incomes and literacy rates which will reduce pressure on the remaining forests for new human settlement and land use change (Pacheco *et al.*, 2018).

### **Strengthening research, education and extension**

Training and education of stakeholder's helps people understand how to prevent and reduce adverse environmental effects associated with deforestation and forestry activities and take appropriate action when possible.

Research substantiates it and helps to understand the problem, its cause and mitigation. This arena is lagging behind for paucity of funds and investments encourages this arena. There is a lack of knowledge and information in the general community about forests and forestry.

Forest managers and those developing forest policies need to be comprehensively educated and need to appreciate the complexity of the interacting ecological, economic, social, cultural and political factors involved (Milne *et al.*, 2019).

### **Engage and Strengthen Non-governmental institutions**

It's essential to slow down the rate of deforestation in the county this could be achieved by engaging non-governmental organizations that prioritize environmental sustainability as environmental NGOs' contribution towards conservation management has been enormous. According to Chakravarty *et al.*, (2012), NGOs are better positioned than government parasternal because they are not constrained by the government bureaucracy and inertia. They further claim that they are well equipped to bypass corrupt tendencies and they are highly effective in getting to the people who are most needed for decision making.

### **Strengthen government and non-government institutions and policies**

Strong and stable government is essential to slow down the rate of deforestation. FAO (2016) considered that half of the current tropical deforestation could be stopped if the governments of deforesting countries were determined to do so (Niel *et al.*, 2018). Environmental NGO's contribution towards conservation management has been enormous. They have the advantage over government organizations and large international organizations because they are not constrained by government to government bureaucracy and inertia. They are better equipped to bypass corruption and they are very effective at getting to the people at the frontier who are in most need.

### **Controlling forest fire**

Forest fire is an increasing contributory factor to the loss of forests in Ethiopia. Though the extent of damage is not recorded, a vast area of woodland and bush land is affected by fire every year. Forest fire is not limited to the woodland and grassland areas, but its incidence is also increasing in the high forest areas, where it causes serious ecological, social and economic damages. For instance, the most devastating forest fire, which occurred between February and April 2000, has destroyed a total of about 150,000 ha of mainly valuable natural high forests and an estimated 980 ha of natural coffee stands in the southern and eastern parts of the country (FAO 2016). This has brought a growing concern from the government and necessitated development of an effective forest fire management plan and strategies to combat fire hazards. Apparently, forest fire protection task force has been established at national and local levels.

**Table.1** World forest change (1990-2010)

Region/sub region	1990-2000		2000-2010	
	1 000 ha/year	%	1 000 ha/year	%
Eastern and Southern Africa	-1841	-0.62	-1839	-0.66
Northern Africa	-590	-0.72	-41	-0.05
Western and Central Africa	-1637	-0.46	-1535	-0.46
<b>Total Africa</b>	<b>-4067</b>	<b>-0.56</b>	<b>-3414</b>	<b>-0.49</b>
East Asia	1762	0.81	2781	1.16
South and Southeast Asia	-2428	-0.77	-677	-0.23
Western and Central Asia	72	0.17	131	0.31
<b>Total Asia</b>	<b>-595</b>	<b>-0.10</b>	<b>2235</b>	<b>0.39</b>
Russian Federation (RF)	32	n.s.	-18	n.s.
Europe excluding RF	845	0.46	694	0.36
<b>Total Europe</b>	<b>877</b>	<b>0.09</b>	<b>676</b>	<b>0.07</b>
Caribbean	53	0.87	50	0.75
Central America	-374	-1.56	-248	-1.19
North America	32	n.s.	188	0.03
<b>Total North and Central America</b>	<b>-289</b>	<b>-0.04</b>	<b>-10</b>	<b>0.00</b>
Total Oceania	-41	-0.02	-700	-0.36
Total South America	-4213	-0.45	-3997	-0.45
<b>World</b>	<b>-8327</b>	<b>-0.20</b>	<b>-5211</b>	<b>-0.13</b>

Source: Anonymous (2010)

**Fig.1** Clear cutting for wood for energy source and home constructions



Further, an FAO (TCP) assisted program was set-up within the Ministry of Agriculture, in July 2001, with the aim to develop an effective infrastructure for forest fire management and to increase country capability through training programs and participatory involvement of local communities (Alemu, 2017). Forests provide essential ecosystem services such as soil erosion control,

ecosystem stabilization, and moderation of climate and energy fluxes. Forests also provide wood, food, medicines, and many other wood-based products. Excessive logging and clear-cutting, expansion of agriculture to marginal lands, frequent fires, construction of roads and highways, and urbanization are the main causes of deforestation. Worldwide and the rate of soil



erosion is projected to accelerate with increase in deforestation. Forests are disappearing more rapidly in developing than in developed countries. Hence, Ethiopia had lost and is continuing to lose much of its forests and other natural vegetation resources with no substantial efforts to reverse the trend.

There are several causative factors for large scale deforestation in Ethiopia. The ever-present poverty and rapid population growth are considered as the main causes fueling the rate of deforestation to intensify, and forest degradation to worsen in Ethiopia. Rapid population growth has not only led to land clearance for agricultural purposes, but also to overgrazing in a dominant mixed cereal-livestock production system. It also urges increased pressure on existing forests because of the increasing demand for fodder, fuel wood, and building materials.

The underlying causes of deforestation in Ethiopia need the attention of government authority to resolve these causes by implementing strong rules regulations, environmental awareness and provision of alternate resources, in order to mitigate the adverse impacts of deforestation and save this ecosystem. Forest management goes beyond thinking of forests as a source of goods to consider the many other benefits forests provide, both to local populations and to the wider world. Management techniques focus on maintaining a healthy ecosystem not only to protect trees and other forest resources but also to protect biodiversity.

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