

2022-08

The Assessment of Green Legacy Initiatives Impacts on Environment in Case of Entoto Park, Gulale Sub-City, Addis Ababa, Ethiopia

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SCHOOL OF RESEARCH AND GRADUATE STUDIES
FACULTY OF CHEMICAL AND FOOD ENGINEERING
ENVIRONMENTAL ENGINEERING POST GRADUATE PROGRAM**

MSc Thesis on:

**The Assessment of Green Legacy Initiatives Impacts on Environment in Case
of Entoto Park, Gulale Sub-City, Addis Ababa, Ethiopia**

**By
Temesgen Abdisa**

**AUGUST 2022
BAHIR DAR, ETHIOPIA**



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The Assessment of Green Legacy Initiatives Impacts on Environment in Case of Entoto Park, Gulale Sub-City, Addis Ababa, Ethiopia

By

Temesgen Abdisa

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Environmental Engineering

By

Advisor: Belay Teffera (PhD)

AUGUST 2022

BAHIR DAR, ETHIOPIA

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Declaration

This is to certify that the thesis entitled the Assessment of Green Legacy Initiatives Impacts on Environment in Case of Entoto Park, Gulale Sub-City, Addis Ababa, Ethiopia submitted in partial fulfillment of the requirements for the degree of Master of Science in Environmental Engineering under faculty of chemical and food engineering, Bahir Dar Institute of Technology, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during this investigation have been duly acknowledged.

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Approval of thesis for defense result

I hereby confirm that the changes required by the examiners have been carried out and incorporated in the final thesis.

Name of Student Temesgen Abdisa Signature [Signature] Date _____

As members of the board of examiners, we examined this thesis entitled "*The Assessment of Green Legacy Initiatives Impacts on Environment in Case of Entoto Park, Gulale Sub-City, Addis Ababa, Ethiopia*" by Temesgen Abdisa. We hereby certify that the thesis is accepted for fulfilling the requirements for the award of the degree of Masters of Science in "Environmental Engineering".

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ACKNOWLEDGEMENT

I would like to thank in depth of my heart my Almighty God and I would like to have deep thanks to Dr. Belay Teffera who gave me insight on the Assessments of Green legacy initiatives impacts on environment with his valuable comments and support during the whole process of writing the research paper.

It is my pleasure to thank for my friends Mr. Mengistu Chalte who devoted his time and knowledge for technical and format corrections, Mr. Nure Jamal who was my boss and who award me because of my appreciable activities and the winner of from kemissie zone workers by scoring 98.78 % and the 1st worker. I would also like to appreciate all staff members of Bole Educational office for their indirect participation in my research.

Finally but most importantly, I would like to thank my family: beloved wife Belaynesh Basazine, my four daughter's (Diyana, Chaltu, Sifan and Sorome Temesgen)for their everyday motivation and encouragement to this success. I would not have completed my research without the support of all these wonderful people.

ABSTRACT

Green legacy initiatives are much to be gained from altering the plantations of indigenous trees surrounding road sides, parks, and green places. One Tree Planted focus in our country Ethiopia is to rebuild animal habitat, restore soil and critical watersheds, all while improving the lives of the communities who rely on the forests the most. As trees grow, they help stop climate change by removing carbon dioxide from the air, storing carbon in the trees and soil, and releasing oxygen into the atmosphere.

The main environmental problems impacting, aside from climate change, are soil erosion and land degradation, deforestation and forest degradation, water scarcity, biodiversity loss, and several forms of pollution, global warming, overpopulation, waste disposal, ocean acidification, loss of biodiversity, deforestation, and ozone layer depletion are a few of the pressing challenges.

Not only, the political leaders, stakeholders as well as directly concerned bodies and the community at all plant the seedlings but also, the foreign country like Heads of UN Agencies and staff of the United Nations in Ethiopia planted trees in Addis Ababa in support of the Green Legacy Initiative, a go-green campaign to counter the effects of deforestation and climate change. “The Green Legacy Initiative “Launched in 2019 by Ethiopia Government, the Green Legacy initiative is part of the Government’s plan to plant 20 billion seedlings by 2024 .Green Legacy Initiative is aligned with the priorities of the Government of Ethiopia’s (GoE) national development plan and strategy. Ethiopia. Since 2011, it has been preparing and implementing its climate resilient and net-zero carbon emission development strategy. In his address, strengthening the Enabling Environment for Clean Cooking Sector Phase II Project Manager, Dr. Gessesse Dessie, urged participants to plant trees for a sustainable future for the next generation. He added, 'Trees are not just wood. Their leaves, branches, trunk, and roots percolate raindrops in the soil. This water later springs out and flows to a river. The most utilized humble river that never leaves Ethiopia only to remain sunk inland.' Furthermore, he stressed that making sure the seedlings grow into trees, will ensure the Green Legacy initiative for three consecutive years . The year 2021 tree planting is held under the motto 'Let’s make Ethiopia greener'. Assessing the impact of Green Legacy initiative on the environment research was undertaken in Entoto Park where one of the interesting Green Legacy initiative center in Addis Ababa, Ethiopia

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List of Abbreviation

UN	United Nation
(EFCCC)	Environment, Forest and Climate Change Commission
(EBI)	Ethiopian Biodiversity Institute
(GoE)	Government of Ethiopia's
(WMO)	The World Meteorological Organization and the
(UNEP)	United Nations Environment Program founded
(IPCC)	Intergovernmental Panel on Climate Change
(D&D)	Deforestation and forest Degradation
(GHG)	Greenhouse Gas
(MT)	Metric Tons
(USAID)	United Sates of America Institute of Development
(FAO)	Food and Agriculture Organization of the United Nations
(MEFCC)	(Ministry of Environment, Forest and Climate Change
(SDGs)	Sustainable Development Goals
(FDRE)	Federal Democratic Republic of Ethiopia
(PIC)	Prior and Informed Consent
(TPL-CCPE)	Trust for Public Land Center for City Park Excellence
(MEFCC)	National Forest Sector Development Program
(REDD)	Rio Declaration on the Environment and Development
(UNCCD)	United Nations Convention to Combat Desertification

CHAPTER ONE

1. BACK GROUND

1.1. INTRODUCTION

The main objectives of the green economy are to protect, sustain, and restore nature, safeguard and promote public health, advance social justice through green business and institutions, and alleviate poverty by generating high-quality green collar jobs.

GREEN refers to a world where natural resources are sustainably managed and protected to enhance livelihoods and guarantee food security, including oceans, land, and forests. Green legacy initiatives are much to be gained from altering the plantations of indigenous trees surrounding road sides, parks, and green places. One Tree Planted focus in our country Ethiopia is to rebuild animal habitat, restore soil and critical watersheds, all while improving the lives of the communities who rely on the forests the most. As trees grow, they help stop climate change by removing carbon dioxide from the air, storing carbon in the trees and soil, and releasing oxygen into the atmosphere. Trees provide many benefits to us, every day. Climate change, biodiversity loss, depletion of natural resources, degradation of ecosystem services, unfavorable patterns of consumption and production, and expanding cities are the current environmental issues our planet is dealing with.

Climate change is defined as a change in the climate that may be directly or indirectly linked to human activity that modifies the global atmosphere's composition in addition to natural climate variability seen over comparable time periods (UN, 1992a). Global climate change is a major issue for policy in the twenty-first century because it poses a threat to social stability, economic growth, and the environment.

The World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) founded the Intergovernmental Panel on Climate Change (IPCC) in 1988. According to the UN, Ethiopia had only 4% of its land covered in forests in the 2000s, down from 35% a century earlier.

The greatest threat to the forest ecosystem and the goods and services it provides, however, is deforestation and forest degradation (D&D), which is causing a considerable decrease in the providing of valued ecosystem goods and services from forests in emerging tropical nations. It is based on scientific data showing that between 17 and 20 percent of the world's greenhouse gas

(GHG) emissions are attributable to deforestation. The 2012 Earth Summit placed a strong emphasis on the need for transformative policies to increase the effectiveness of such new measures.

Profits from eco-businesses and the possibility of carbon credit sales between 2012 and 2015 saved reduced deforestation prevented the release of 5.5 million metric tons (MT) of carbon dioxide into the atmosphere, which is the same as taking 1.2 million cars off the road for one year, according to the United States Environmental Protection Agency. In parallel, its emissions of greenhouse gases have increased over the period, raising 11% between 2008 and 2009. Agriculture and deforestation are responsible for more than 85% of emissions, whereas the power, transport, industrial, and each make a 3% contribution. Ethiopia contributes less than 0.1 percent of the world's emissions, but it is already seeing the negative effects of climate change. In a nation where 85% of farmers rely on rain-fed agriculture, communities are suffering from more variability and extreme weather events, increased warmth, and diminishing rainfall.

In response, USAID backs Ethiopia's vision for a climate resilient, green economy, which offers a road map for the country to reach middle-income status by 2030 without increasing greenhouse gas emissions compared to 2010 levels. Since 2019 (PA, Articles 6 & 8 (4) (h)), the national forest legislation and reforestation initiatives have been in compliance with the Rio accords. One of the first nations to take the risky step of developing a middle-income economy through green legacy programs our own country, Ethiopia.

Since 2011, it has been preparing and implementing its climate resilient and net-zero carbon emission development strategy. On the other hand, it has been practically planting tree saplings to fulfill global obligations to mitigate climate change, guard against drought and desertification and achieve food security through fruit-producing trees to contribute to sustainability.

Entoto park is highly covered with Eucalyptus its toxins in the soil down the hill must be properly washed away after this extremely taxing operation takes a couple of rainy seasons. However, initiatives to preserve forests have garnered a lot of international attention. New plantings of native vegetation will increase the biodiversity in the Entoto Park. Once the eucalyptus has been replaced, the existing natural plants will flourish and multiply.

Entoto Park is one of these, which has its own consequences of environment for the welfare of the population. Green legacy initiatives are much to be gained from altering the plantations of indigenous trees surrounding road sides, parks, and green places.

Even though, Green Legacy do not have this much negative impacts on the environment assessing this project to what extent this activity alleviate/overcome the environmental problem especially climate change was the issue of this paper.

This study focuses on the assessments of the Green Legacy Initiative's impacts on the environment in case of Entoto Park Gulale Sub-city, Addis Ababa, Ethiopia.

1.2. STATEMENT OF THE PROBLEMS

The main environmental problems impacting, aside from climate change, are soil erosion and land degradation, deforestation and forest degradation, water scarcity, biodiversity loss, and several forms of pollution, global warming, overpopulation, waste disposal, ocean acidification, loss of biodiversity, deforestation, and ozone layer depletion are a few of the pressing challenges. The initiative's design is comparable to that of the Climate-Resilient Green Economy. By assessing green legacy initiatives impacts on the environment and its benefits and costs that ensures the environmental activities in Entoto Park.

1.3. GENERAL OBJECTIVES

The main objective of this study is to assess the environmental impacts of green legacy initiatives on the environmental costs and benefits that ensure the environmental activities.

1.4. SPECIFI OBJECTIVES

- To identify green legacy initiatives statues in Entoto park
- To evaluate the /Negative or Positive/ impacts of green legacy initiatives on the environment in Entoto park
- To analysis costs of the environmental activities in Entoto park
- To analysis the environmental benefits that can be gained from the Entoto park

1.5. SIGNIFICANT OF THE STUDY

The Green Legacy Initiative, which calls for the planting of billions of trees throughout Ethiopia, under the motto of "let us make Ethiopia Green" inconvenienced by mass plantings, some of which fall on weekdays.

The innocent act of planting trees has also served as a diversion from the serious political and economic difficulties the nation is currently experiencing. The initiative's design is comparable to that of the Climate-Resilient Green Economy.

Assessing the environmental impacts of green legacy initiatives on the environmental benefits and costs to ensures these environmental activities, to achieve green legacy initiative's goal of Ethiopia preparing and implementing its climate resilient and net-zero carbon emission development strategy, re-establishing and safeguarding forest ecosystems is emphasized by Green Legacy, along with its plans to mitigate soil infertility, preserve wildlife and biodiversity, and address environmental degradation.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. GREEN INITIATIVES AND ENVIRONMENTAL PROBLEMS

The Green Legacy Initiative, which calls for the planting of billions of trees throughout Ethiopia, under different mottos for instance in 2013 the motto of "let us make Ethiopia Green" inconvenienced by mass plantings, some of which fall on weekdays.

Planting trees has also served as a diversion from the serious political and economic difficulties the nation is currently experiencing. The initiative's design is comparable to that of the Climate-Resilient Green Economy, a much bigger strategy introduced in 2011 to lessen the environmental effects of economic growth.

The initiative's goal of re-establishing and safeguarding Ethiopia's forest ecosystems is emphasized by Green Legacy, along with its plans to mitigate soil infertility, preserve wildlife and biodiversity, and address environmental degradation and it has been preparing and implementing its climate resilient and net-zero carbon emission development strategy. It is not an absurd strategy to go about it by planting five billion trees in 2013, for a total of four times that by 2024. For instance, the Labor Party of the United Kingdom promised to plant two billion trees.

The use of planting trees alone cannot be sufficient to halt climate change. Green Legacy is still praiseworthy in its stepped-up and ongoing efforts to raise awareness, alter behavior, and increase the covering of forest lands that declined as Ethiopia's population rose. It is comparable to similar programs in other regions of the world. However, planting trees is the simple part. Growing them is a different matter. Low survival rates are common. Campaigns to plant large numbers of trees have had dismal success. This has a very clear cause. When done on a big scale, it is nearly hard to ensure that the proper kind of seedlings is planted in the soil composition, altitude, and weather conditions ideal for them. It takes a lot of resources to provide follow-up care, which goes beyond just putting some dirt in the ground and planting a seedling. Only plants that are invasive in particular areas, like eucalyptus trees, have a high success rate under these conditions. Once they are planted, they are resourceful species that don't need much maintenance.

However, the objective is to diversify away from these environmentally harmful species and toward ones that might be useful in alleviating environmental deterioration but are harder to cultivate, as the Green Legacy properly argues. Undeniably, If 20 billion trees are planted over the course of four years, even a small portion of it is a considerable number.

In order to maximize the impact of this program, attention must also be given to conservation initiatives, which are known to be considerably more successful. The fact that Europe defied the worldwide trend and had a "forest boom" adding a forest cover the size of Portugal in the 25 years since 1990 has made this clear. However, Europe is a wealthy continent that might implement cutting-edge conservation techniques to safeguard forests. The survival rate of seedlings which is planted in Entoto Natural Park is 92 percent, (Gulale Sub-City Administration Environmental Protection and Green Development Office 2013/2014 Annual Report). A better course of action would be to study nations who have implemented novel conservation techniques, many of which have concentrated on solving .

People cut down trees because they need the wood for building and heating or the land for housing. The likelihood that people will cut down trees increases with how rural the location is and how likely it is that they will belong to a lower income group. It is a survival issue. To address these issues, Green Legacy initiatives are being undertaken all over to involve local populations in the governance and management of the forests in there. It mostly entails paying locals in cash in exchange for maintaining trees. In essence, it gives nearby populations a feeling of control and ownership over the wood lands. When they are made to directly profit from its conservation, the forests acquire a larger level of significance in their eyes. It is much less effective to police and lecture people who cut down trees for their part in the abstract concept of climate change.

In Ethiopia, the concept of incorporating local populations in forest management is not new. A community-based management system is in place for about 1.4 million hectares of forest area, or 10% of the total. Although there is no assurance that individuals involved would profit financially from this, it is on the basis of such principles that conservation can be expanded. Initiatives such as the Green Legacy could be complimented with such an effort.

2.2. THE MAIN ENVIRONMENTAL PROBLEMS

The main environmental problems impacting Ethiopia, aside from climate change, are soil erosion and land degradation, deforestation and forest degradation, water scarcity, biodiversity loss, and several forms of pollution, global warming, overpopulation, waste disposal, ocean acidification, loss of biodiversity, deforestation, and ozone layer depletion are a few of the pressing challenges. One of the worst soil degradation issues in the world is thought to exist in Ethiopia. In Ethiopia, the average yearly rate of soil loss is thought to be 12 tons per hectare, although on steep slopes with denuded vegetation, this rate can greatly surpass 300 tons per hectare.

According to Badege Bishaw's (PhD) study, "Deforestation and Land Degradation on the Ethiopian Highlands: A Strategy for Physical Recovery," initiatives to plant trees in Ethiopia between the early 1970s and the 1990s, including those supported by the United Nations Development Programmers (UNDP), had a survival rate of less than 20 percent.

2.3 INTERNATIONAL AND DOMESTIC CONTEXTS FOR FOREST SERVICES AND THREATS.

Depending on their coverage area and the ecological, social, and economic services they provide, different jurisdictions and the international legal community define forests differently (Brunei, J., & Dwasi, J. (2006). For instance, in the European Union, the forest is defined as a 20 percent canopy covering at least 0.5 hectares of land. In contrast, the Mediterranean region and "the Food and Agriculture Organization of the United Nations (FAO)" definition limit this amount to 10%. Where little pieces of forest enter the dense vegetation is defined more extensively in several national regulations. The Ethiopian Forest Law, for instance, defines it as "...trees, plants and other biodiversity accumulation at and in the surrounding of forestlands, roadsides, riversides, farm and pasture lands as well as residential areas, parks that grow naturally or generated in various other methods." According to this national definition, a forestland is any region that is covered with trees and contains a variety of animal and plant species (Article 2(4); Brunei, J., & Dwasi, J. (2006). These connotations help us comprehend forest ecosystems, which include regions with a dense canopy of trees of any species.

The forest ecosystem provides numerous benefits to both people and the environment, such as fuel, non-wood forest products, soil and water protection, "protection of fragile ecosystems

(mountains, dry lands, and small islands)," biodiversity preservation, climate change mitigation/carbon sequestration, as well as additional economic and socio-cultural values and services (Eikermann,2015).By controlling climate processes and climate change, for instance, it safeguards the environment (Ministry of Environment, Forest and Climate Change (MEFCC), 2017).

Water flow quantity, quality, and regularity are all maintained by forests, which also store carbon in their tissues and soils by absorbing atmospheric carbon dioxide to maintain climate equilibrium and prevent atmospheric disruption (Brunei, J., &Dwasi, J. (2006).

Forests reduce soil erosion because they typically grow on mountains and other high ground (MEFCC, 2017). A forest hosts wildlife in particular and speeds up the economic development of a state in general. For a very long time, forests have provided humans and other animals with food, medicine, and a place to live (Summer, 2020).

Forest products are primarily the basis for the subsistence, social-cultural expressions, and spiritual practices of indigenous people and other rural communities (Asfaw, &Etefa, According to economists, natural forests provide more than one-fourth of the income in rural communities.

Deforestation and forest degradation, however, are the two main hazards to forests; however the severity of the threat varies depending on an economic cluster (Eikermann, 2015). Deforestation refers to the process of turning forestland into another type of land use. However, degradation is defined as "changes in the forest that adversely affect the stand's or site's structure or function, consequently reducing its capacity to offer goods and services" (Forest Biodiversity, 2006).

When the amount of the forest falls below the specified unit or units, such as 10%, forest loss occurs in both situations. Commercial and subsistence agriculture, infrastructure (dams, water reservoirs, and roads), mining, and urbanization are all factors that contribute to deforestation in emerging nations like Africa (UNCCD, 2019a). On the other hand, unchecked livestock grazing, fuel wood collecting, charcoal manufacture, and timber extraction and logging are the main causes of deterioration (Hosonuma et al., 2012). According to REDD+ Ethiopia in 2021 and The New York Declaration on Forests in 2019, infrastructure construction-related activities, for instance, are responsible for 9–17% of tropical and subtropical deforestation. According to a

study, between 2016 and 2018, "tree loss in Latin America (59 percent) and south-east Asia (80 percent)" was a result of commodity-driven deforestation (Heflich,2020). In addition, pastoralists and hunters start fires in the forest to kill wild animals for sustenance and to gain new grazing grass for their herds. Because of the fire's carbon emissions, the atmosphere is disrupted (a report from Abe-Dongoro district [unpublished], 2017). The aforementioned stated forest services are impacted by forest loss due to these factors.

The effects of losing trees include decreased biodiversity, increased greenhouse gas emissions, disturbance of water cycles, increased soil erosion, and disruption of livelihoods (WWF, 2021). Following the removal of trees from a landscape, a study reveals that soil erosion affects 52 percent of land by eliminating its healthy soil utilized for food production (IUCN, 2021). In consequence, this issue has a negative impact on 1.6 billion people's livelihoods worldwide, of which one billion are the poorest of all.

Forest gain refers to a restoration that raises the area at least to the minimal forest level mentioned in the aforementioned definitions. While there have been observed gains in the amount of forest cover in industrialized nations and several nations in northeast Asia, forest loss is still occurring in developing nations generally and in tropical forest regions. However, it is challenging to gauge the true quality (degradation) and number of forests that have been cleared due to a lack of scientific data and unequal distribution of technology (Eikermann, 2015). According to FAO, between 2010 and 2015, the rate of forest loss decreased to 0.08 from 0.18, where it was in 1990. (MEFCC, 2017).It claims that planting trees on 110 million hectares (ha), or roughly 7% of the world's forest area, helped prevent further loss (MEFCC, 2017). Though the issue is still severe in the tropical nations of the worldwide South and the Boreal zone of Eurasia in the global North, this organization's 2018 analysis reveals that the world loses roughly 13 million ha of natural forests each year (MEFCC, 2017). Ten million losses occur annually, an increase of three million during the 1990s (Eikermann, 2015: pp. 22-23). A 1996 study found that deforestation eats 10 million hectares (ha) annually. In 8000 years, the world's forest cover had significantly decreased from 6.2 billion (ha), or 47% of the planet. As a result, 25countries faced total loss, while 29 countries remained only with 10% of their forest cover and developing countries lost 65 million hectares within 1990-1995.For instance, between 2000 and 2013, Ethiopia lost 70,000 ha while also gaining 30,000 ha annually. However, according to the 2015

state report (Ethiopian National Planning Commission, Central Statistical Agency), forest cover increased from 7% in the late 1990s to 14% in 2013. (Hereafter, NPC& CSA, 2017). Since then, annual forest loss has increased to 91,000 (ha) (Climate kosg GmbH, 2020). The main causes of these issues are human encroachment and current environmental issues, which prevent the world forest cover from rising above 30%. (Sotirovet al.2020).

Regulations of deforestation/degradation and forestation measures were compelled by the imbalance between the replaced and lost forests, the global nature of the impacts of forest loss, the need to improve forest services, and the complexity of scientific and technological knowledge on forest conservation. Increased attention has been given to the function that forests play in storing carbon and the significant amount of CO₂ emissions that might be averted if deforestation was stopped as a result of the consensus on the necessity of international cooperation to tackle climate change.

Over a billion people globally, many of whom live in severe poverty; depend on forests as a source of subsistence. Forests are also significant repositories of biodiversity. Additionally, since the turn of the century, it is believed that tropical forests have eliminated 22 to 26 percent of the carbon that was stored in the atmosphere all human caused carbon emissions.

According to the Intergovernmental Panel on Climate Change, deforestation and forest degradation are the second most significant human source of CO₂ emissions that contribute to global warming. Around 17 percent of the world's greenhouse gas (GHG) emissions are thought to be caused by deforestation and forest degradation. In the area of agriculture and livestock, it is anticipated that there would be more than 90 million cattle by 2030, up from a current population of about 50 million. As a result, emissions will rise from 65 Mt CO₂e now to about 125 Mt in 2030. From about 19 million tons currently to more than 71 million tons in 2030, soil and agricultural crop production will rise. This is mainly because more fertilizer is being used and more land is being used for agriculture. Due to these increase emissions from 12 Mt CO₂e today to more than 60 Mt in 2030. The forestry industry: conversion of forested regions to agricultural land is the primary driver of deforestation, which results in CO₂ emissions. With population increase as the main driver, forest degradation which contributes to CO₂ emissions is principally brought on by the consumption of fuel wood and over-harvesting of the forests. The building sector: Growing urban populations are responsible for rising waste production and (off-grid)

energy usage. In 2030, it is anticipated that total emissions from buildings will rise from 5 Mt CO₂e to 10 Mt, with off-grid energy usage accounting for about 25% of emissions and trash for the remaining 75%.

2.4. ETHIOPIA'S GREEN LEGACY: A LESSON AND ITS APPLICABILITY

Unlike some other governments' executive decrees or political judgments, Ethiopia's history of the Forestry movement has a legal foundation from the very beginning. Ethiopia's 1980 forest and wildlife proclamation, which overturned the 1965 laws of the state, private, and protective, set forth rules for participation tree planting and maintenance (Proclamation No. 192/1980, Preamble, Articles 3 (1)). This regulation was passed to stop the widespread deforestation and drought at the time mobilization, preamble). Following that, the national forestry program was introduced and put into practice through a campaign and labor-for-food exchange (Ayana et al., 2018). However, because it was not participatory and did not take into account the people prior and informed consent (PIC), including their property rights and those of interested in forest restoration, it was condemned for lacking genuine public support.

The state subsequently implemented a number of legislative and policy reforms that converted every resource previously owned by the state into a co-owned resource and enabled it to adhere to its international obligations. By establishing proclamations and rules to carry out the treaties it ratified, it domesticated them (FDRE constitution, Articles 9(4) & 13(2)). Environmental rights are clearly acknowledged in Ethiopia's 1995 constitution as being intertwined with human and development rights (FDRE constitution, Articles 43 & 44). Article 43(2) states that "[n]ationals have the right to participate in national development and, in particular, to be consulted with respect to policies and initiatives affecting their community" in relation to the acknowledgment of procedural rights. Additionally, article 37 of the constitution clearly guarantees access to justice. In order to carry out its constitutional obligation to "ensure that all Ethiopians live in a clean and healthy environment," the government has also released forest policies and strategies. This includes commitments to protect the environment during the "design and implementation of programs and projects of development" (Article 92).

In order to address desertification and drought, the 2007 forest policy guidelines seek to restore any lost forests (Ministry of Agriculture, 2007). Ethiopia released a new forest development program in 2017 that adheres to and carries out the nation's commitment to

SDG13-climate action and the 2030 sustainable development agenda generally. To bind the international commitments and rights entrenched in the constitution and policy directives, the 2018 forest proclamation was issued. Proclamation No. 1065/2018, Preamble and Article 4 address private, public, nonprofit, and state-owned forests. This law seeks to increase the number of participants in forest development and conservation efforts.

Additionally, it encourages the community to actively participate in the development and maintenance of the state-owned forests and to gain from the forest products (Articles 12(3) and 13(3)). While the green movement has started to achieve economic benefits and other services for the general population, this legal guarantee helped with the practical execution of the SDGs. Ethiopia, for example, has been trading carbon since the Humbug community-based forest management project, which produced \$34,000 through REDD+ for the first time, and in 2021 it also reaped **149** million Birr as a result of reducing deforestation and polluting gases in Bale and west Oromia (ENA, 2021). Through several incentive programs, the forest law specifically encourages the unemployed and the indigenous/local community to engage in forestation (Proclamation No. 1065/2018, Articles 5, 7, & 9). In this regard, it recognizes the irreplaceable role of indigenous people and local communities in managing the existing forest (Ayana et al., 2018: pp. 315-318). However, none of the provisions that identify the rights and obligations of forest owner's mention who owns the trees that will be planted as part of initiatives like the EGL. Regardless of the identified ownership deed to the forested region, the EGL campaign has been carried out on any barren land chosen for forest plantation. During the rainy season, millions of people are mobilized by the EGL campaign to plant billions of seedlings and saplings. Institutions and their staff are in charge of the maintenance and growth of the trees, although the general public as a whole is accountable for the land that has been allotted to it (Articles 19 (5)). Although newly planted forest owners are not specifically mentioned in the law, one can infer probable owners by interpreting Articles 5 through 15 of the most recent forest law in relation to the land tenure on which the trees have been planted. For instance, trees planted in the compound of an industrial park belong to the park and are governed as state forests, though government employees or the public can do the planting activities.

ⁱThe local government or the neighborhood is responsible for the Beijing Law Review campaign. The employees of a regional or federal institution are in charge of conserving,

protecting, and watering the trees planted in the institution's name, even though they are not entitled to ownership of the forest or a share of its benefits because the land was not purchased in their name for forestry purposes (Article 6 (7)). The EGL and earlier forestation initiatives in Ethiopia effectively met the goals of the Rio Conventions and SDGs 15. (SDGs, preamble; UNCCD, Article 2). Where their governance is governed by explicit and consistent law, trees planted between 2019 and 2021 and those envisaged in the plans to attain the twenty billion trees through EGL campaigns would provide similar services.

To promote food security goals, the majority of trees planted are edible indigenous to enhance carbon sequestration capacities. Through collaboration, this method can be expanded to nations like Sudan where cumulative environmental challenges result from anthropogenic, climatic, or cyclical phenomena (Glovers, 2020). By increasing the number of trees by 2024, the EGL has a domestic law framework that meets with Ethiopia's commitments to the Rio conventions and their accompanying protocols (the worldwide Bonn Challenge and the New York declaration), as well as the African (AFR100) restoration targets (Preamble; Gashaw, 2021). The EGL also complies with the regional convention's mandated extension of activities from one jurisdiction to another without impairing state parties' sovereignty. **The ARCCNN** states in Article 1(2) that "this Convention shall apply to the activities carried out under the jurisdiction or control of any Party within the territory of its national jurisdiction or beyond the limits of its national jurisdiction". This clause implies that efforts to restore forests are welcomed by neighboring nations and have a favorable effect on them. Additionally, it requires allies to improve the effectiveness of their policies, laws, and the IEL Convention (ARCCNN, Article 1). As a result, the ARCCNN and the MEAs' application and enforcement frameworks can be used to scale up the EGL.

2.5. THE ENVIRONMENTAL COSTS FOR GREEN LEGACY INITIATIVES

The costs of Parks can be summed up in the following manner, accordingly environmental costs such as costs for soil and water conservation, seedling production, pitting , planting seedlings ,weeding watering and administrations costs, and however the overall costs of the park according to McDonough Midland (2012): "costs of acquiring the property; costs associated with developing the property, including design and construction costs; costs associated with operation and maintenance, including employee payroll and landscaping costs; the opportunity costs

associated with the loss of property tax income that communities would have received if the property had been developed for other purposes." Operating costs and capital costs are the two main cost categories taken into account by TPL-CCPE (2014).

Naturally, each of these prices will vary greatly based on the unique features of the location and design of the park; for example, whether the area is owned by the municipality or not. The characteristics of the paths can greatly alter maintenance costs, just as the quantity of trees and bushes or the presence of flower beds does. Additionally, there are numerous techniques to manage UPs (Tempesta,1997). They might have their upkeep farmed out to a commercial business or handled by the local government. Municipalities frequently cut back on maintenance spending and put off some jobs (like pruning) during economic downturns, thus analyzing current spending may understate actual costs (Fating et al., 2009). The cost of upkeep therefore varies greatly. Maintenance expenses ranged from € 0.39 to 2.73 per m² (constant price 2012), with an average of € 1.10 per m², according to a research done in municipalities in the Veneto Region (tempesta a, 1997). The average annual cost per resident was €10.08. Spending on parks and recreation per person in the largest US cities ranges from \$10 to 287 per capita per year (median = \$ 73). (CCPE,2014). In 15 parks in the UK, the price per resident ranges from €10.61 to €44.12, and the price per square meter ranges from €0.28 to €1.34 (constant price 2002). (dinette al.2002).

According to the findings of the prior studies, it is reasonable to conclude that maintenance costs represent the largest category of expenditures when comparing capital costs to operational costs. The Ministry of Agriculture (183.1M Birr), the Ministry of Water, Irrigation and Energy (83.2M Birr) and the Environment, Forest and Climate Change Commission (74.5 M Birr) have contributed a total of 340.8 million Birr for this year's plantation.

Figure 1 The environmental cost for soil and water conservations in the Entoto park



2.6. THE ENVIRONMENTAL BENEFITS OF FOREST ESTABLISHED THROUGH GREEN LEGACY INITIATIVES

As was previously mentioned, parks in general may help the populace in a number of ways. Despite their being a general consensus on some advantages, there sometimes seems to be some disagreement among researchers. In their evaluation of the scientific literature in the area of park services, Konijnendijk et al. (2013) noted the following consequences: direct and indirect effects on health, social cohesion, tourism, home prices, biodiversity, air quality and carbon sequestration, water management, cooling. Harkin and Welle (2009) added "direct uses" to the list after analyzing the advantages of parks in certain American cities (sports, bicycling, skateboarding, walking, picnicking, bench-sitting and visiting a flower garden). Regarding urban trees and woods, Nowak and Dwyer (2007) identified two major areas of advantages: The First one, Physical and biological, The impacts of temperature and microclimate on the urban environment, the removal of air pollutants, the release of volatile organic compounds by trees and emissions caused by tree care, energy conservation in buildings, and the ensuing effects on emissions from power plants, Hydrology in cities, Noise in cities, Wildlife and biodiversity in cities, and Phytoremediation. Second Social and financial advantages: Individual benefits include improved city aesthetics, spiritual and emotional experiences, psychological advantages, and health; Community benefits include stronger ties among neighbors, a greater sense of safety, increased child supervision in outdoor areas, healthier child play patterns, increased use of common areas in neighborhoods, and fewer violent, property, and violent crimes; and Real estate values Historical and cultural advantages were also mentioned by Tyrväinen et al. (2007).The

Trust for Public Land Center for City Park Excellence (TPL–CCPE) examined the advantages of urban parks in a number of American cities and took the following factors into account:

1. Factors that help the city government generate revenue (tax receipts from increasing property value and increased tourism value).
2. City government cost-saving strategies (storm water management value; air pollution mitigation value).
3. Citizens' ability to save money (direct value; health value, community cohesion value).
4. Citizens' wealth-increasing factors (property value from park proximity; net profit from tourism).

These lists of advantages raise, in my judgment, two key issues. First, Konijnendijk. et al. (2013) noted that not all impacts are backed by scientific data cite the lack of a definite, conclusive demonstration of the impact of parks on tourism, social cohesion, and water regulation. Weak to moderate evidence supports the impacts on carbon dioxide sequestration and health. Second, there appears to be some misunderstanding because authors frequently fail to distinguish between the benefits that green spaces can produce and the techniques that can be used to quantify these benefits in monetary terms. For instance, the rise in house prices is not a benefit per se, but can be seen as a sign that people prefer to live close to the parks. Consequently, the ability to pay a greater price for a home is a financial indicator of all the benefits that can come from living near a green area.

The soil-holding capacity of Eucalyptus is very moderate compared with the trees initially covering the slopes of Entoto. This lack of soil stabilizing undergrowth causes severe erosion, easily observed in the water running through Addis in connection with the rainy seasons. For every rain period, the layer of fertile soil gets thinner. If nothing is done now, there will be nothing left for new vegetation in a couple of years, and the erosion will be irreversible this character of the Eucalyptus tree's roots is evident in the highland landscape around these trees.

Thus, the surroundings of the Eucalyptus tree appears very different from the landscape of the native *Juniperus procera* trees, where a showy undergrowth well cover a diverse and widespread network of soil reinforcing root networks.

2.7. CLIMATE CHANGE CAUSES AND REPERCUSSIONS

Carbon dioxide (CO₂) and other greenhouse gases in the atmosphere have effects on the globe that scientists have been aware of since the eighteenth century. Concern over the issue of global climate change brought on by greater accumulations of these gases has risen in recent decades. According to numerous studies that have been published in peer-reviewed scientific publications, **97** percent or more of climate scientists who are currently publishing work concur that human activity is very likely to be to blame for the century-long trends in global warming. The Intergovernmental Panel on Climate Change's 2013 and 2014 findings make it abundantly evident that greenhouse gas emissions caused by people are primarily to blame for the recent observed global climate change. According to the IPCC, global temperatures will rise by 1.5°C (2.7°F) to 4.8°C (8.6°F) by 2100 compared to pre-industrial levels.

Recent declarations by the American Geophysical Union and the U.S. Global Research Program show that the scientific community is increasingly accepting of the truth of climate change and the human contribution to its current pattern: From the top of the atmosphere to the bottom of the oceans, there is ample proof of climate change.

Using satellites and networks of weather balloons, scientists and engineers from all around the world have painstakingly gathered this proof by tracking changes in species' distribution, behavior, and ecosystem function. All of the evidence points to one clear conclusion: the globe is warming, and during the past 50 years, this warming has been predominantly caused by human activity. When we analyze climate change through the lens of economics, greenhouse gas emissions, which result in global warming and other changes to weather patterns, can be seen as both a source of environmental externalities and an instance of the abuse of a shared resource. Reducing carbon dioxide emissions can have significant economic advantages. For instance, the Environmental Protection Agency estimated that three recent automobile rulemakings will result in climate pollution mitigation initiatives of between \$78 billion and \$1.2 trillion.

Pollutants can be released into the atmosphere, which is a global commons. Global pollution generates a "public terrible" that impacts everyone and has a broad influence. The release of local and regional air pollutants is restricted by environmental protection regulations in many nations. In terms of economics, such regulations internalize part of the externalities brought on by local and regional pollution. Carbon dioxide (CO₂), the main greenhouse gas, had little limits

in place until recently, but since then, its atmospheric concentration has continuously increased, recently passing the milestone of 400 parts per million (ppm).

2.8 GREEN HOUSE EFFECT

The glass of a greenhouse lets the sun's rays warm the air inside, but it also serves as a barrier to heat loss. In frigid climates, plants that need warm temperatures can therefore be grown. French physicist Jean Baptize Fourier introduced the concept of the global greenhouse effect in 1824. In this phenomenon, the atmosphere of the world behaves like the glass in a greenhouse. Clouds, water vapor, and the natural greenhouse gases carbon dioxide (CO₂), methane, nitrous oxide, and ozone block outgoing infrared heat while allowing inbound solar radiation to flow through.

As a result, the Earth develops a natural greenhouse effect that is conducive to life. Without it, the planet's average surface temperature would be closer to 18° C (0° F) than it is to 15° C (60° F). The Swedish physicist Savant Arrhenius first the idea of an increased or artificial greenhouse effect in **1896**. Arrhenius postulated that the increasing burning of coal, which had coincided with the industrialization process, would result in a rise in the atmospheric concentration of carbon dioxide and warm the world. (Fankhauser,1995). Emissions of greenhouse gases have increased since Arrhenius's day. Significantly. The amount of CO₂ in the atmosphere has grown by 40% since pre-industrial times. Methane and nitrous oxide emissions from agriculture and industry, together with increased combustion of fossil fuels like coal, oil, and natural gas, as well as man-made chemicals like chlorofluorocarbons (CFCs), all contribute to the greenhouse effect. Complex models that estimate the impact of present and future greenhouse gas emissions on the global climate have been created by scientists. Despite the fact that there is still a great deal of uncertainty surrounding these models, there is now widespread scientific agreement that the greenhouse effect caused by human activity is a serious threat to the world's ecology. In all of its publications, the Intergovernmental Panel on Climate Change (IPCC) has found that the atmospheric concentrations of greenhouse gases (GHG) have significantly grown as a result of human activities since 1750."Human influence on the climate system is apparent, and current anthropogenic emissions of greenhouse gases are the largest in history," the paper states.

There is no doubt that the climate system is warming, and many of the changes that have been noticed since the 1950s span a wide time period, from decades to millennia. Sea level has increased, the ocean and atmosphere have warmed, and snow and ice cover have decreased. According to the IPCC, the average world temperature will rise by 1.5°C to 4.8°C (2.7°F to 8.6°F) above pre-industrial levels by 2100. Global temperatures surpassed heat the world has already seen an average temperature increase of 1°C compared to pre-industrial times.

2.9. THE IMPACTS OF EUCALYPTUS'S ON THE ENVIRONMENT

Allelopathy is the provision of chemicals from leaves or litter that inhibit the germination or growth of other plant species (FAO, 1985). The major implication of allelopathic effects in smallholder farming systems is the reduction in crop output when trees are planted adjacent to crops. The long-term ecological consequences of allelopathic tree species on soils are not known.

However, it has been hypothesized that long-term exposure to allelochemicals may cause soil erosion by reducing vegetative cover. Competition with vegetation for water, and water table depletion are common arguments against planting eucalyptus. The general hypothesis is that high water requirements and characteristics such as deep root systems provide eucalyptus with a comparative advantage over other plants with respect to water usage.

Depletion of soil nutrients is one of the most commonly cited criticisms associated with eucalyptus trees. In contrast to commonly used agroforestry species such as leucaena and Acacia, Eucalyptus are non-leguminous they do not fix nitrogen, an essential element for soil health and sustainability. Thus, the background to Ethiopia's groundwater loss derives its source from the decreases of the soil layers, reducing the remaining soil's ability to retain moisture and severely damaging future chances for the citizens to obtain clean household water and reintroduce indigenous species.

Erosion: Because there is no ground cover in the foreign implanted Eucalyptus forest, the only thing to hold the soil is the sporadic web of roots of the trees. This lack of soil stabilizing undergrowth causes severe erosion, easily observed in the water running through Addis in connection with the rainy seasons. For every rain period, the layer of fertile soil gets thinner. If nothing is done now, there will be nothing left for new vegetation in a couple of years, and the erosion will be irreversible.



Fig.2 the consevation structuers in Entoto park.(Gulale Sub-City Administration Environmental Protection and Green Development Office 2013/2014 Annual Report).

Flooding: On Entoto, every leaf and branch that has fallen to the ground is collected by people, whereas in a natural forest, organic material from leaves, wood, roots etc., is left to be decomposed in the soil. The organic matter improves the soil structure, leading to a higher infiltration rate and a much better water storage capacity. The surrounding highland environment exhibits this characteristic of the Eucalyptus tree's roots. Due to the monoculture of eucalyptus trees, there won't be any ground cover in the end. The roots of the eucalyptus tree usually resemble scattered upward-stemming root tubers with fewer irregular and minor radiating root stems that are isolated from the topography and soil of the environment. This root property of the eucalyptus tree is visible in the surrounding highland environment.

CHAPTER THREE

3.MATERIALS AND METHODS

3.1 STUDY AREA DESCRIPTION

The Entoto Park located between 38°48'00" and 38°47'01" East and 09°04'05" and 09°07'33" North, it can be found. The Park's entire area is 1,230 hectares, and it is located on the southern slopes of Mount Entoto between the northern limit of Addis Ababa (at 2,500 m) and the trail along the mountain crest (at over 3,100 m) . Ethiopian Heritage Trust However, the Entoto Escarpment's entire extent, including the Entoto Natural Park, is 1,230 ha (EHT). Huge eucalyptus plantations that were created by a state-owned forest corporation on the Entoto Mountain are currently being removed by the company as well as fuel wood collectors.

3.2. THE TOPOGRAPHY

The northern boundary of the city of Addis Ababa is at 2,500 meters, while the track along the mountain crest is at over 3,100 meters. Entoto Natural Park is located on the south-eastern slopes of Mt. Entoto, between (2300 m - 3,100 m) (Figure 1). Low pressure, also known as the Inter Tropical Convergence Zone, which is traveling across the equator periodically northward and southward on the African Continent, is a factor in the climate of Entoto Park. From 24.3°C in May, the average maximum temperature varies. The average minimum temperature ranges from 11.8°C in May to 7.7°C in December; it reaches a maximum of 20.3°C in August. About 70% of the annual rainfall occurs during the primary rainy season, which runs from June to September and reaches its maximum peak in August. April sees again another little rainfall apex (Dirk, 2001). Addis Ababa and the surrounding territories receive 270 mm of rain during the summer (June, July, and August), and 12 to 32 mm of rain at the very least during the winter, according to the National Meteorological Agency of Ethiopia (NMAE, 2014). (December, January and February). The research region and Addis Ababa an average annual rainfall of (1165 to 1170 mm). The Entoto Park has a track that serves as the separation line between it separates the Addis Ababa and Oromia Regions as well as the Abbay (Blue Nile) and Awash watersheds in the north and south, respectively.

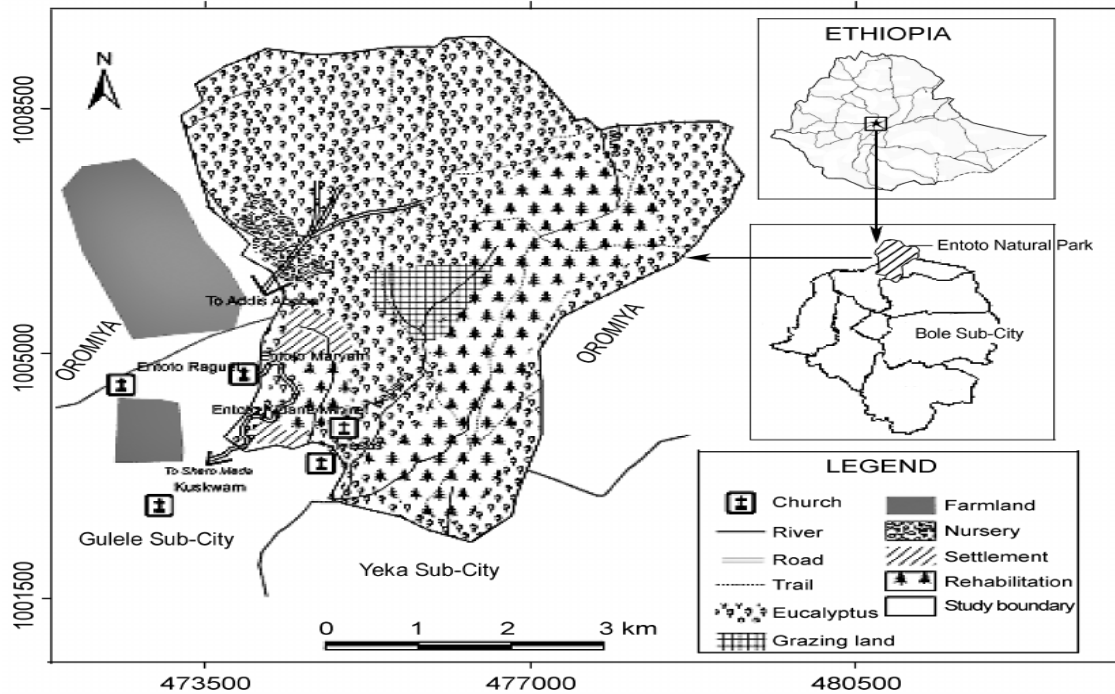


Figure .3 location of Entoto Park

3.3 SAMPLE SITE SELECTION

In May 2022, field data gathering was completed. The field data were collected using sample quadrates that were placed 50 m apart along transects using measuring tape meters and GPS. 25 quadrates (2.25 hectares) in total were sampled. Each quadrant /plot was positioned along a linear transect at intervals of 500 m in the control transects utilized in this study, which represented the suggested standardized technique for recording plant distributions and abundances. Each control transect is 30 x 30 m and separated by a distance of 1 km.

The sample plots were created at set intervals (500m) along parallel, 1 km-long linear transects. For assessing species composition, one to seven 30 m × 30 m subplots were developed in each major plot. Systematic sampling techniques were employed to create the sampling plots and gather samples. East-west and north-south line crossings specify the stands to be sampled at one scale, and intersections at a finer scale define the sample spots inside the stands.

To assess the impacts of green legacy initiatives on the environment in the Entoto Natural Park's from survival rate of seedlings, plant community structure and species composition. From

the main plot, which is 900 meters square, samplings and density were collected. In each sampling plots reading XY coordinate, trees and shrubs was taken, counted and reported.

Table 1 Coordinate points of each plot

No	X-coordinate	Y-coordinate	Elevations	Description of the area
1	37p0473726	1004295	2931	
2	37p0473572	1004386	2901	
3	37p0472874	1004465	2930	
4	37p0472493	1004184	2904	
5	37p0471969	1004067	2953	
6	37p0471625	1004176	2945	
7	37p0471176	1004618	2912	
8	37p0471259	1008860	2885	
9	37p0471399	1003586	2852	
10	37p0471727	1003396	2816	
11	37p0471760	1003532	2775	
12	37p0471838	1003234	2768	
13	37p0471716	1003024	2793	
14	37p0471456	1002487	2737	Green legacy site
15	37p0473674	1003993	2875	Green legacy site
16	37p0473605	1004082	2866	Green legacy site
17	37p0473588	1004478	2936	
18	37p0473308	1004414	2929	
19	37p0472668	100467	2945	
20	37p0472111	1003975	2943	
21	37p0471215	1004043	2929	
22	37p0471006	1004600	2902	
23	37p0471514	1003253	2822	Kuriftu entertainment
24	37p0471679	1003572	2821	Green legacy site
25	37p0471887	1002970	2769	Flower Nursery site

3.4. DATA ACQUISITION

Simple Random sampling was used in the study to gather information from various stakeholders. As a result, more concerned institutions were contacted for primary and secondary data collection, including the Environmental Protection Bureau of Gulale Sub-City, Addis Ababa City Administration Urban Beauty and Green Development Office, Entoto Park Headquarter and Gulale Sub-City Land Development Management Office.

The second job was to gather information on the assessments of the effects of green legacy projects on the environment in the Entoto Natural Park from important stakeholders and all other relevant sources. Field verification involved the primary data was gathered. Additionally, there were difficulties and chances during the transect walk.

Multiple datasets in a variety of forms, maps, and plant measurement data, were processed to support the current investigation. In addition, literature, the Internet, electronic source materials, and other secondary data were incorporated into this study. Other sorts of data were employed for the study area's general topographic characteristics, elevation data . Secondary sources of information include legal, policy, evaluation reports, and media sources. Collecting data about Forest, Tree /Shrub species, Seedling & Sampling, etc. GPS and a map with a scale of 1:50,000 were all used for field verification. A GPS was used to record the coordinates of each sample plot (Table 1).

A number of sources provided the information needed for this investigation. Finding out about existing rules, initiatives, projects, best practices, etc., from various references, reports, and websites was helpful.

3.5 METHODS

The initial methodological stage was a thorough analysis of the available literature to gather both secondary data and theoretical insights. Both quantitative and qualitative methodologies were used in this study.

Using surveys to acquire the perspectives of interested parties in order to establish opportunities for the assessment of the environmental consequences of green legacy efforts in Entoto Park, primary data were gathered through interviews and questionnaires.

The semi-structured questionnaire, transect walk, and field observations were used to collect the qualitative data, which were then transcribed and evaluated. After receiving completed questionnaires, some respondents underwent in depth personal interviews to discuss their opinions and the findings of analyses of the impacts of green legacy on the environment.

Key members of the given questionnaires to complete are the Ethiopian Environmental Protection Bureau of Gulale sub city, Addis Ababa City Administration Urban Beauty and Green

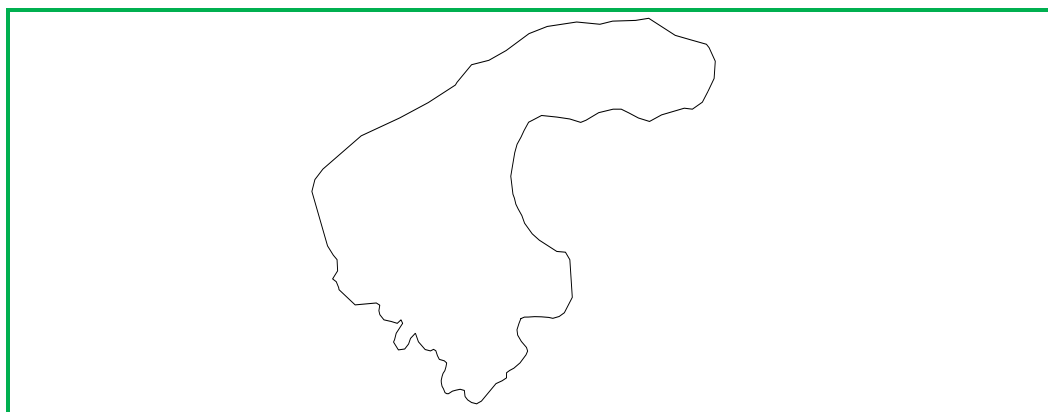
Development Office, Entoto Park Headquarters, Gulale Sub-City Planning Commission Branch Office and Environmental Protection Bureau of the Addis Ababa city Administration.. A few phone interviews and most in person interviews were conducted.

One of the techniques used for this study's field data collecting was systematic sampling. From the carefully created quadrates along each transect all trees and bushes were recorded. Field verification involved the primary data gathering. Additionally, there were difficulties and chances during the transect walk. The second goal was to gather information about the Entoto Natural Park from important stakeholders and other relevant sources. Then, for the data analysis, cost-benefit was utilized by MS-Excel together with GIS techniques.

3.6 .DATA ANALYSIS

Arc-GIS, MS-Excel, Top Map and other tools were used for the processing and analysis of data. GIS can be utilized to provide a more holistic approach to issue solving where both qualitative and quantitative information must be processed when combined with the right models (Bedsat and Wyatt, 1999). Because a priori knowledge was acquired during the field verification of the study region, the supervised classification technique was employed to categorize the imageries.

Figure 3 EXTRACTED MAP OF ENTOTO PARK



CHAPTER FOUR

RESULT AND DISCUSSION

4.1 RESULTS

Many of the studies we have cited in this section Green Legacy do not have this much negative impacts on the environment assessing this by quantifying project to what extent this activity alleviate/overcome the environmental problem especially climate change was the issue of this paper address assessing the environmental impacts of green legacy initiatives on the environmental benefits and costs whether to ensures or not of these environmental activities, to achieve green legacy initiative's goal of Climate-Resilient Green Economy, re-establishing and safeguarding Ethiopia's forest ecosystems is emphasized by Green Legacy, along with its plans to mitigate soil infertility, and address environmental degradation in isolation.

The following are the goals of developing Entoto park for Addis Ababa, according to A Preliminary Survey of Possible Site at Entoto by EHT: To create a leisure area for Addis Ababa residents, Spread awareness among the popular, particularly among young people, of the value of protecting the environment, Promote the re-emergence of the local animals and natural vegetation and serve as an example of effective conservation management, Make it possible for residents of the Park's surrounding areas to contribute to and profit from its development, Give scientists the chance to examine and survey the region's geology, hydrology, vegetation, and animals.

The main environmental problems impacting, aside from climate change, are soil erosion and land degradation, deforestation and forest degradation, water scarcity, biodiversity loss, and several forms of pollution, global warming, overpopulation, waste disposal, ocean acidification, loss of biodiversity, deforestation, and ozone layer depletion are a few of the pressing challenges. The initiative's design is comparable to that of the Climate-Resilient Green Economy.

The Green Legacy Initiative, which calls for the planting of billions of trees throughout Ethiopia, under the motto of "let us make Ethiopia Green" inconvenienced by mass plantings, some of which fall on weekdays. The innocent act of planting trees has also served as a diversion from the serious political and economic difficulties the nation is currently experiencing. However, both the positive and negative effects of green legacy initiatives on any given site are

likely to be many and interrelated. The benefits derived in terms of carbon sequestration, slowing erosion and retaining soil moisture over the entire plot of land may compensate for the losses in crop production experienced within the zone affected by the trees. Planting indigenous is an ecologically favorable land use will also be highly mitigating the environmental conditions.

4.2 ENVIRONMENTAL COSTS OF THE GREEN LEGACY INITIATIVES

The costs of Parks can be summed up in the following manner, accordingly environmental costs such as costs for soil and water conservation, Nursery establishment/strengthen/management/, pitting, planting seedlings, weeding watering and administrations costs and Capacity building in the Entoto Park in Addis Ababa, Ethiopia.

A very delicate topic of environmental damage is soil degradation, especially soil erosion. Ethiopia's soil resource is undergoing rapid degrading processes. On steep slopes with soil loss rates larger than 300 tons per ha per year, where vegetation is denuded, the average yearly rate of soil loss is estimated to be 12 tons/ha/yr., although it can significantly exceed this.(Center for Environmental Science, College of Natural Sciences, and Addis Ababa University, Ethiopia March 2015 Accepted).

Due to negative effects of eucalyptus on any given site are likely to be undermine the parks output. For the entire parking lot, this required figuring out the expenses of developing and maintaining soil and water conservation techniques and for green legacy initiatives. This resulted in annual costs of almost 10 million birr/year. (Environmental Protection and Green Development Office of the Gulale Sub-City Administration, 2013 Annual Report).

Table .2 the environment costs of for soil and water conservation in the Entoto Park

N ^o	Activities	unit	Physical activities Annual target	Annual budget/birr/
1	Total allotted budget for one woreda for one year	birr		3,011,991.38
1.1	Area survey /Per diem, fuel, transport	Ha	138	1,512,625.44
1.2	Base map preparation/ Per diem , fuel, transport, equipment, purchase, reporting	Ha	138	95,440.69
1.3	Secondary forest restocking/planting, pitting	Ha	138	81,806.30
1.4	Physical soil and water conservation structure/daily labourer	Ha	138	133072.46
1.5	Identification and distribution of livelihood option	N ^o	100	1049847.58
2	Nursery establishment/strengthen/management/	N ^o	1	645,949.28
2.1	A fforestation/reforestation/	Ha	143	505,657.60
2.3	Technical assistance and capacity building for 145 expert and 2900 beneficiaries			447,479.74
2.4	PFM establishment/strength /livelihood/	ha	123	94,583.70
2.5	Assessments of forest resource	No		94583.7

(Source:-Environmental Protection and Green Development Office Gulale Sub-City Administration 2013 annual report)

When estimating the value of Mount Entoto Forest, it was determined how much it would cost to artificially replace its erosion control and watershed protection.

Figure. 4 soil and water conservation structure in the park



Figure 5. Nursery site for the production seedling

Types and sizes of seedlings planted in Gulale Sub-City Basin and Green Areas Development Administration Office, and Entoto Park in 2012/2013

No	Tree type	Measurement	Amount	Species
1	Black Wood	No.	40,052	Tree
2	Omedla	No.	59,564	Tree
3	Olive	No.	15,115	Tree
4	Saligna	No.	71,000	Tree
5	Decision	No.	115,000	Tree
6	Sasbania	No.	18,000	Tree
7	Koso	No.	1,200	Tree
8	Barber	No.	51,305	Tree
9	Course	No.	400	Tree
10	Pachula	No.	8,000	Tree
11	Gravelia	No.	18,923	Tree
12	Cypress Pyramid	No.	573	Tree

13	Shushes	No.	10,020	Tree
14	Wanza	No.	45,000	Tree
15	Bisana	No.	49,321	Tree
16	Juniperious	No.	39,693	Tree
17	Juniperious	No.	13,945	Tree
	Total	No.	557,111	
18	Esther	No.	637	Flower
19	Geranium	No.	18,743	Flower
20	Palm	No.	592	Flower
21	Flower	No.	77	Flower
22	Crescent	No.	164	Flower
23	Bush Flower	No.	32	Flower
24	Agabantus	No.	3,500	Flower
25	Alternate	No.	1,000	Flower
26	Candy Flax	No.	950	Flower
	Total number	No.	25,695	
27	Bananas	No.	2,100	Fruits
28	Orange	No.	500	Fruits
29	Vinegar	No.	530	Fruits
30	Lemon	No.	1,380	Fruit
31	Oil and	No.	1,125	Fruit
32	Avocado	No.	1,591	Fruit
33	Mango	No.	1,730	Fruit
	Total	No.	8,956	
34	Damakase Medicine	No.	1,030	Medicine
35	From Se Medicine	No.	880	Medicine
36	Health Medicine	No.	1,050	Medicine
37	Hariti Medicine	No.	600	Medicine
38	Rosemary Medicine	No.	1,100	Medicine
39	Ret Medicine	No.	1,350	Medicine
40	Coffee Medicine	No.	2,000	Medicine
41	Koba Medicine	No.	1,400	Medicine
	Total	No.	9,410	
	Grand Total	No.	601,172	

Types and sizes of seedlings planted in Gulale Sub-City Basin and Green Areas Development
Administration Office 2013/2014

No	Tree type	Measurement	Amount	Species
1	Black Wood	No.	4,591	Tree
2	Omedla	No.	26,530	Tree
3	Olive	No.	1,213	Tree
4	Saligna	No.	72,844	Tree
5	Decrance	No.	108,564	Tree
6	Sasbania	No.	18,000	Tree
7	Koso	No.	1,200	Tree
	Total	No.	232,942	Tree
8	Course	No.	11,949	Tree
9	Gravelia	No.	6,258	Tree
10	Shushes	No.	20	Tree
11	Wanza	No.	5,000	Tree
12	Bisana	No.	3,241	Tree
13	Juniperious	No.	4,321	Tree
14	Fertilizer	No.	13,945	Tree
	Total	No.	283,145	
15	Esther	No.	637	Flower
Grand Total			516,724	

Types and sizes of seedlings planted in Gulale Sub-City Basin and Green Areas Development
Administration Office Plan to plant Entoto Park in 2014/2015

No	Tree type	Measurement	Amount	Species
1	Omedla	No.	160,000	Tree
2	Olive	No.	3,000	Tree
3	Saligna	No.	45,000	Tree
4	Decision	No.	65,000	Tree
5	Koso	No.	2,000	Tree
6	Barber	No.	10,000	Tree
7	Course	No.	15,000	Tree
8	Gravelia	No.	8,000	Tree
9	Jacaranda	No.	500	Tree
10	Nim	No.	8,000	Tree
11	Sasbaniya	No.	12,000	Tree
12	Shushes	No.	200	Tree
13	Wanza	No.	5,000	Tree
14	Basana	No.	200	Tree

15	Juniper us	No.	6,000	Tree
16	Fertilizer	No.	250,000	Tree
17	Esther	No.	3,500	Tree
	Total		593,400	
18	Good Evening	No.	4,000	Flower
19	Brush	No.	2,000	Flower
20	Bottle Brush	No.	400	Flower
21	The oil	No.	600	Flower
22	Pance Pachula	No.	600	Flower
23	Avocado	No.	500	Flower
24	Apple	No.	4,000	Flower
25	Total		1,198,900	
	Grand Total		1,792,300	

Particularly different type seedlings was produced and planted to achieve the Green Legacy initiatives on Entoto park in these four consecutive years.

Table: -3 The amounts of seedlings planted in different years in the Entoto Park

no	year	Planted seedlings
1	2012/2013	601,172
2	2013/2014	566,927
3	2014/2015	605,500
	Total	1,773,599

The amounts of seedlings planted Gulale Sub-City Basin and Green Areas Development Administration Office, and Entoto Park in 2013/2014 Annual report.

Figure 6 Seedling survival rate out of the Eucalyptus covered areas



The survival rate according to Gulale Sub-City Basin and Green Areas Development Administration Office 2013/2014 annual report and interviewer was 92 % .However ,according to Figure 6 I observe the study area's survival rate was only around the Eucalyptus tree was deforested and, the boundaries of the park (Figure 6) . The total area of the park covered with Eucalyptus the selfish tree which do not permit for the growth of other species tree and shrubs .So, before planting the seedlings thinking about management ,responsibility and deforesting the Eucalyptus is the very beginning issue.

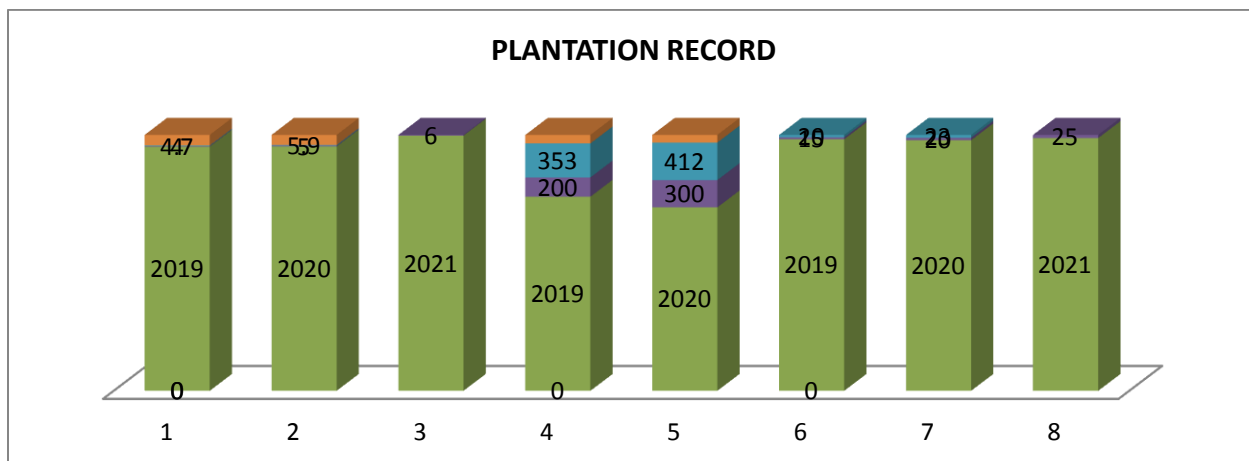
4.2.1 THE GREENING ACTION PLAN, ITS ACHIEVEMENTS

Ethiopia has designed and embarked upon various initiatives to combat climate change, minimize deforestation, manage topsoil erosion, improve water balance, enhance carbon sequestration, and improve food security. The Green Legacy Initiative is among these, and in 2020 the Government of Ethiopia has announced its target to plant **20 billion trees** between 2020-2023.

The tables below show the 2020 national tree plantation plan, achievement and its distributions Building on last years' experience, preparations were made early on to allocate enough funds for the program by regional governments and the three federal institutions responsible to coordinate this national operation. The Ministry of Agriculture (183.1M Birr), the Ministry of Water, Irrigation and Energy (83.2M Birr) and the Environment, Forest and Climate Change Commission (74.5 M Birr) have contributed a total of 340.8 million Birr for this year's plantation. The "Green Legacy" initiative, which has been in place since 2019.

Following are the millions of prepared seedlings that were sent to each nation: Ethiopian Broadcasting Corporation (EBC), 2021). Djibouti nine, Eritrea 29, Kenya 386, Somalia 129, South Sudan 91, and Sudan 316. Since 2019 (PA, Articles 6 & 8 (4) (h)), the national forest legislation and reforestation initiatives have been in compliance with the Rio accords. However, it has been practically implemented to plant tree seedlings to meet global climate change mitigation obligations, prevent drought and desertification, and provide food security from fruit-producing trees to contribute to sustained.

Activities	Table 4. Green Legacy plantation record							
	No. of trees in billions			Planted million/day		Public participation in million		
	2019	2020	2021	2019	2020	2019	2020	2021
plan	4	5	6	200	300	15	20	25
Archived	4.7	5.9		353	412	20	23	
Growth rate	88	84		88	84			



Public participation, leadership commitment, and institutional coordination are increasing and are the reasons for the success.

Remark :-The success of planting has been more than the plan, while each year's plan increases by one billion. One billion samplings from the 2021 plan will be sent to six neighboring countries.

Source: Ethiopian Broadcasting Corporation (EBC, 2021).

4.3 ENVIRONMENTAL BENEFITS OF FOREST ESTABLISHED THROUGH GREEN LEGACY INITIATIVES

Depending on their coverage area and the ecological, social, and economic services they provide, different jurisdictions and the international legal community define forests differently Brunei, A.J., & Dwasi, J. (2006). For instance, in the European Union, the forest is defined as a 20 percent canopy covering at least 0.5 hectares of land . In contrast, the Mediterranean region and "the Food and Agriculture Organization of the United Nations (FAO)" definition limit this amount to 10%. Where little pieces of forest enter the dense vegetation is defined more extensively in several national regulations.

The Ethiopian Forest Law, for instance, defines it as "...trees, plants and other biodiversity accumulation at and in the surrounding of forestlands, roadsides, riversides, farm and pasture lands as well as residential areas, parks that grow naturally or generated in various other methods." According to this national definition, a forestland is any region that is covered with trees and contains a variety of animal and plant species (Article 2(4); Brunei .A,J Dwasⁱⁱi, 2006). These connotations help us comprehend forest ecosystems, which include regions with a dense canopy of trees of any species. Forest Development, Conservation and Utilization Proclamation, Negarit Gazette, 24th year no 21, Addis Ababa, 23 January 2018, Article 2 Proclamation No.1065/2018, Forest Development, Conservation and Utilization Proclamation (1),The smallest amount up, forests can be defined contextually along with their functions.

The forest ecosystem provides numerous benefits to both people and the environment, such as fuel, non-wood forest products, soil and water protection, "protection of fragile ecosystems (mountains, dry lands, and small islands)," biodiversity preservation, climate change mitigation/carbon sequestration, as well as additional economic and socio-cultural values and services (Eikermann,2015).By controlling climate processes and climate change, for instance, it safeguards the environment (Ministry of Environment, Forest and Climate Change (MEFCC), 2017).

Water flow quantity, quality, and regularity are all maintained by forests, which also store carbon in their tissues and soils by absorbing atmospheric carbon dioxide to maintain climate equilibrium and prevent atmospheric disruption (Brunnee,J.and Dwasi, 2006). Forests reduce soil erosion because they typically grow on mountains and other high ground (MEFCC, 2017). A

forest hosts wildlife in particular and speeds up the economic development of a state in general. For a very long time, forests have provided humans and other animals with food, medicine, and a place to live (summer, 2020). Forest products are primarily the basis for the subsistence, social-cultural expressions, and spiritual practices of indigenous people and other rural communities (Asfaw & Etefa, According to economists, natural forests provide more than one-fourth of the income in rural communities.

All the interviewed community define the benefits of Entoto Park, used for climate change, are soil erosion and land degradation, deforestation and forest degradation, biodiversity loss are stabled , creates jobs for the community, accesses to infrastructures and recreations.

4.3.1. CARBON EMISSIONS AFFECT ON THE ENVIRONMENT SOUNDED BY GREEN LEGACY INTIATIVES

Our carbon footprint has a negative impact on the environment in multiple ways: It is the main cause of human-induced climate change, it contributes to urban air pollution, it leads to toxic acid rain, it adds to coastal and ocean acidification and it worsens the melting of glaciers and polar ice. While, reducing emissions save money or money cost overall.

The social cost of carbon is an estimate of the economic costs, or damages, of emitting one additional ton of carbon dioxide into the atmosphere, and thus the benefits of reducing emissions. The estimate informs billions of dollars of policy and investment decisions in the United States and abroad. The social cost of carbon is a measure of the economic harm from those impacts, expressed as the dollar value of the total damages from emitting one ton of carbon dioxide into the atmosphere.

The current central estimate of the social cost of carbon is over \$50 per ton in today's dollars. Depending on technological development, economic costs are \$13-\$45 billion per year.¹ Metric Tone=1,000 Kilograms=2,205 Pounds. Also called a "tone," it's what's typically used when discussing carbon emissions CO₂. Besides CO₂ the most common greenhouse gases are methane, nitrous oxide, and a group of synthetic substances called fluorinated gases. GHG emissions reductions from such policies could be as much as 670 million metric tons per year. Americans can take easy steps to cut planet-warming emissions like carbon dioxide and simultaneously save money.

Efficient households can save \$1,560 a year on natural gas and utility costs over a 50-year period, according to a University of Michigan analysis. The average global carbon price is around \$3 per tonne of CO₂; Only 4% of global emissions are priced above \$40 per tonne. At those prices, companies and governments are not incentivized to pay for emission reductions. This means that a quantity of CO₂ can be expressed in terms of the amount of carbon it contains by multiplying the amount of CO₂ by 0.27 (12/44). E.g. 1kg of CO₂ can be expressed as 0.27 kg of carbon, as this is the amount of carbon in the CO₂. The critical chemical difference is that CO₂ contains one atom of carbon and two atoms of oxygen, whilst CO has one carbon and one oxygen atom. One of the biggest benefits of reducing carbon emissions is that it would decrease the number of deaths related to air pollution and help to ease pressure on healthcare systems. To achieve growth in the economy while still prioritizing the reduction of carbon emissions, a decoupling between the two is needed.

The economic benefits from reducing carbon dioxide emissions can be enormous. For example, the Environmental Protection Agency has projected the value of climate pollution mitigation efforts from three recent vehicle rule makings at between \$78 billion and \$1.2 trillion. By measuring its presence or absence in a particular parcel of air, researchers can track down how much CO₂ in that air came from natural biogenic sources and how much from burning fossil fuels. And if the parcels are carefully chosen, that analysis can pinpoint the sources of emissions.

There are two ways to measure carbon emissions for a country: production-based accounting, which aggregates all greenhouse gas (GHG) emissions of goods and services produced domestically in a country (including those that are subsequently exported), and consumption-based accounting, which looks at domestically to Calculate the emission rate by multiplying the emission factor by the maximum capacity of the operation (in units of production per hour, material usage per hour, or whatever units the emission factor is in).

The emission factor-based methodology estimates GHG emissions by multiplying a level of activity data (e.g., kWh of electricity consumed by a facility) by an emission factor (e.g., grams of CO₂ per kWh). A typical tree can absorb around 21 kilograms of carbon dioxide (CO₂) per year, however this figure is only achieved when the tree is fully grown samplings will absorb significantly less than this. Over a lifetime of 100 years, one tree could absorb around a tonne of CO₂. When you run the number, it turns out that one acre of forest absorbs about 2.5 tons of CO₂

per year. Trees for Life calculate 6 trees offset 1 tone of CO2. And a tree absorbs = 0.16 tones CO2 per year. Moreover ,**77,998,087.15** Pounds per Year and 10,000,000 of soil and water conservation costs **can be saved due to the green legacy of Entoto park.**

Table .5 Total numbers of trees in each plot

Number of plot	Types of trees	Amount	Description
1	Eucalyptus	130	193
	Junipers' procera	30	
	Bush and shrubs	33	
2	Eucalyptus	163	254
	Junipers' procera	76	
	Bush and shrubs	15	
3	Eucalyptus	153	208
	Junipers' procera	39	
	Bush and shrubs	16	
4	Eucalyptus	140	180
	Junipers' procera	20	
	Bush and shrubs	20	
5	Eucalyptus	185	226
	Junipers' procera	10	
	Bush and shrubs	30	
6	Eucalyptus	200	222
	Junipers' procera	10	
	Bush and shrubs	12	
7	Eucalyptus	143	220
	Junipers' procera	56	
	Bush and shrubs	21	
8	Eucalyptus	165	199
	Junipers' procera	20	
	Bush and shrubs	14	
9	Eucalyptus	165	200

	Junipers' procera	20	
	Bush and shrubs	25	
	Sasbaniya	5	
10	Eucalyptus	123	225
	Junipers' procera	52	
	Bush and shrubs	50	
11	Eucalyptus	141	202
	Junipers' procera	31	
	Bush and shrubs	10	
	Sasbaniya	20	
12	Olivia	60	143
	Flower	52	
	Junipers' procera	31	
13	Eucalyptus	123	197
	Junipers' procera	64	
	Sasbaniya	10	
14	Eucalyptus	101	123
	Junipers' procera	64	
	Bush and shrubs	12	
	Sasbaniya	54	
15	Eucalyptus	3	84
	Junipers' procera	38	
	Bush and shrubs	31	
	Koso	12	
16	Eucalyptus	13	132
	Junipers' procera	51	
	Bush and shrubs	20	
	Koso	40	
	Acacia	13	
17	Eucalyptus	129	160

	Junipers' procera	14	
	Bush and shrubs	16	
	Sasbaniya	1	
18	Eucalyptus	163	194
	Junipers' procera	12	
	Bush and shrubs	19	
19	Eucalyptus	132	162
	Junipers' procera	17	
	Bush and shrubs	13	
20	Eucalyptus	162	199
	Junipers' procera	23	
	Bush and shrubs	14	
21	Eucalyptus	187	248
	Junipers' procera	26	
	Bush and shrubs	35	
22	Eucalyptus	71	176
	Junipers' procera	56	
	Bush and shrubs	49	
23	Eucalyptus	134	206
	Junipers' procera	56	
	Bush and shrubs	16	
24	Eucalyptus	141	206
	Junipers' procera	42	
	Bush and shrubs	18	
25	Eucalyptus	136	200
	Junipers' procera	43	
	Bush and shrubs	21	
Total		4881	4881

Within the sampling site from the total of 4881 composition of different types of trees 65.6% is Eucalyptus tree which is 3203. This lack of soil stabilizing undergrowth causes severe erosion, easily observed in the water running through Addis in connection with the rainy seasons.

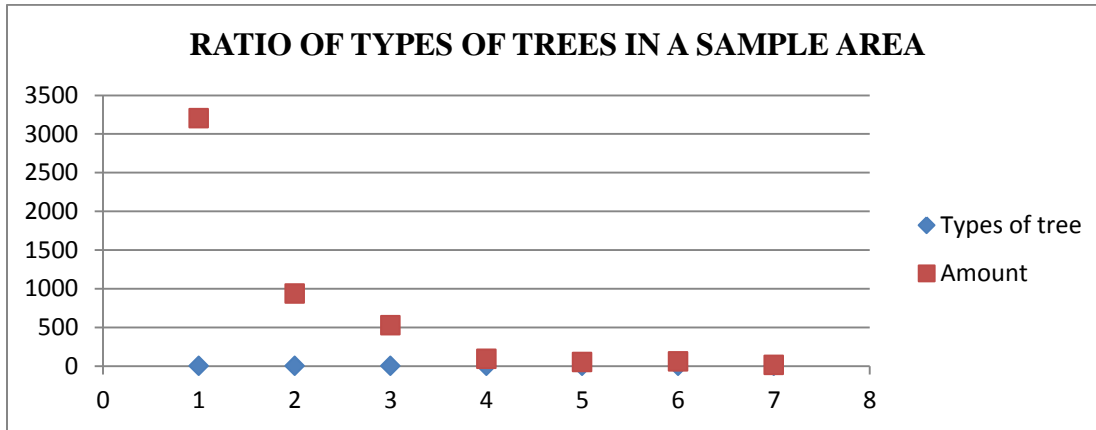
Figure 7. The total area of the park covered with Eucalyptus the selfish tree which do not permit for the growth of other species tree and shrubs causes the land bare and expose to severe erosion which further cause land degradation and cost.



Table:-6 Types of tree in the park

No	Types of tree	Amount
1	Eucalyptus	3203
2	Juniperiusprocera	937
3	Bush and shrubs	526
4	Sasbaniya	90
5	Koso	52
6	Olivia	60
7	Acacia	13
	Total	4881

Table 7:-Ratio of types of trees in a sample area



To calculate the observed amounts of CO₂ in these study area, the total number of tree in the sampled area=4881 trees from 2.25 hr. and the total area of the Entoto park was 1230 hr. So, 1230×4881=6,003,630 different types and stages of trees.

Even though different types of trees observe different amount, A typical tree observe 21kg per year × 6,003,630 tree=126,076,230 kg. The current central estimate of the social cost of carbon is over \$50 per ton in today's dollars. Depending on technological development, economic costs are \$13-\$45 billion per year. 1 Metric Tone=1,000 Kilograms=2,205 Pounds. Also called a "tone," it's what's typically used when discussing carbon emissions CO₂ 1,000 Kilograms=2,205 Pounds, 126,076,230 Kilograms×2,205 Pounds/1,000 Kilograms=77,998,087.15 Pounds Per Year can be saved due to the green legacy imitative of Entoto park.

Annual economic losses attributable to soil erosion in Ethiopia are estimated to be EB10 –12 million per annum (calculated to 1994 prices) (Sutcliffe, 1993; Bo'jo and Cassells, 1995), reducing farm incomes as much as 5–30% by 2010 (Kappel, 1996, as cited in FAO, 1998). Even though the 95 % of the total area of the park was covered with Eucalyptus trees 1230 hr × 300 tone=390,000 tone soil saved from the studied area and 390,000×12 million=4,680,000 birr with 10,000,000 of soil and water conservation costs per year was saved due to the presence of on Green legacy initiatives in the Entoto park.

CHAPTER FIVE

5. CONCLUSION AND RECOMENDATIONS

The Green Legacy Initiative, which calls for the planting of billions of trees throughout Ethiopia, under the motto of "let us make Ethiopia Green" inconvenienced by mass plantings, some of which fall on weekdays. The innocent act of planting trees has also served as a diversion from the serious political and economic difficulties the nation is currently experiencing.

The initiative's design is comparable to that of the Climate-Resilient Green Economy, a much bigger strategy introduced in 2011 to lessen the environmental effects of economic growth.

The initiative's goal of re-establishing and safeguarding Ethiopia's forest ecosystems is emphasized by Green Legacy, along with its plans to mitigate soil infertility, preserve biodiversity, and address environmental degradation. It is not an absurd strategy to go about it by planting five billion trees this year, for a total of four times that by 2024.

These impacts can cost businesses, families, governments and taxpayers hundreds of billions of dollars through rising health care costs, destruction of property, increased food prices, and more. The social cost of carbon is a measure of the economic harm from those impacts, expressed as the dollar value of the total damages from emitting one tone of carbon dioxide into the atmosphere can be observed by trees and released oxygen to the atmosphere.

5.1 CONCLUSION

The goals of developing a natural park for Addis Ababa, according to A Preliminary Survey of A Possible Site at Entoto by EHT: To create a leisure area for Addis Ababa residents, Spread awareness among the popular, particularly among young people, of the value of protecting the environment, Promote the re-emergence of the local animals and natural vegetation and serve as an example of effective conservation management, Make it possible for residents of the Park's surrounding areas to contribute to and profit from its development, Give scientists the chance to examine and survey the region's geology, hydrology, vegetation, and animals.

The Green Legacy Initiative is among these, and in 2020 the Government of Ethiopia has announced its target to plant 20 billion trees between 2020-2023. According to the Green Legacy Initiative steering committee, Ethiopia has so far planted more than **4.1** billion trees out of the intended **5** billion, attaining **83%** of the set target.

The government announced that the target had been exceeded, with more than **350** million planted over a 12-hour period. They gave a very precise **353,633,660** trees planted that day. The government had promoted the day as an attempt at an official **Guinness World Record (GWR).Green Legacy 2021: Ethiopia Plants over 6.7 billion tree Seedlings.**

Addis Ababa has announced on Sunday the successful conclusion of the 2021 the Green Legacy Initiative, a tree-planting push aimed at curbing the effects of climate change and deforestation in Ethiopia. According to the Addis Ababa City Administration, Gulale Sub-City Basin and Green Development Office, the number of seedlings planted with three consecutive years Totally **1,773,599** can be produced in the nursery and planted seedlings in the nursery and planted in the Entoto Park. In 2013/2014 around **945,000** seedlings are planted per year, and with its survival **rate of 92%.**

However as ,I observe the study area these much of survival rate is only around the Eucalyptus tree was deforested and around the boundaries of the park on the other hand internally due to the Eucalyptus impacts and management problems the survival rate was les. So, before planting the seedlings deforesting the Eucalyptus is the very beginning issue. Planting the right seedlings in the right place is encouraged vice versa mobilizing the community with the cost of campaigning was applied ever year is preferable . Those interviewed community commented this activities it have its own impacts properly pitting, planting, and overall management system.

According to the sample, the due to the presence of Entoto park **77,998,087.15** Pounds per year was saved and carbon offsets On steep slopes with soil loss rates larger than 300 tons per ha per year, where vegetation is denuded, the average yearly rate of soil loss is estimated to be 12 tons/ha/yr, although it can significantly exceed this. (Center for Environmental Science, College of Natural Sciences, Addis Ababa University, Ethiopia 10 March 2015.

Annual economic losses attributable to soil erosion in Ethiopia are estimated to be EB10 –12 million per annum (calculated to 1994 prices) (Sutcliffe, 1993; Bo`jo and Cassells, 1995), reducing farm incomes as much as 5–30% by 2010 (Kappel, 1996, as cited in FAO, 1998). Even though the 95 % of the total area of the park was covered with Eucalyptus trees 1230 hr × 300 tone=390,000 tone soil saved from the studied area and **390,000×12 million=4,680,000 birr** with 10,000,000 of soil and water conservation costs per year was saved due to the presence of

Entoto park. Maintenance expenses ranged from € 0.39 to 2.73 per m² (constant price 2012), with an average of € 1.10 per m², according to a research done in municipalities in the Veneto Region (Tempest a, 1997). The average annual cost per resident was €10.08. Spending on parks and recreation per person in the largest US cities ranges from \$10 to 287 per capita per year (median = \$ 73). (CCPE, 2014). In 15 parks in the UK, the price per resident ranges from €10.61 to €44.12, and the price per square meter ranges from €0.28 to €1.34 (constant price 2002). (Dinette al., 2002).

The Ministry of Agriculture (183.1M Birr), the Ministry of Water, Irrigation and Energy (83.2M Birr) and the Environment, Forest and Climate Change Commission (74.5 M Birr) have contributed a total of 440.8 million Birr for this year's plantation. According to the findings of the prior studies, it is reasonable to conclude that operational costs represent the largest category of expenditures when comparing gain capital costs to Maintenance costs. Since, conserving the previous forest with Seedling planting was done simultaneously in the park. The main purpose of the green initiatives is to prevent carbon emissions by building a green economy and elevating the economy to a higher level.

Ethiopia has designed and embarked upon various initiatives to combat climate change, minimize deforestation, manage topsoil erosion, improve water balance, enhance carbon sequestration, and improve food security. Generally, by assessing the impacts of Green Legacy Initiatives, this paper find the cost incurred les the benefits of Green Legacy and its main objectives as trees grow, they help stop climate change by removing carbon dioxide from the air, storing carbon in the trees and soil, and releasing oxygen into the atmosphere was achieved through time and the life span of the planted trees.

5.2. RECOMMENDATIONS

The young trees soon start to compete very efficiently with other vegetation. It is a fast grower, easily reaching above other trees and suppressing them. At the same time, a chemical component in the leaves and roots prevents the growth of both other trees and herbs. This leads to a mono-culture with Eucalyptus as the only tree species and eventually no ground cover.

In the landscape, the Eucalyptus tree's roots often appear separated from the terrain and the rest of the soil, similar to sporadic upward-stemming root tubers but then with a limited number of periodic and minor radiating root stems.

This character of the Eucalyptus tree's roots is evident in the highland landscape around these trees. Thus, the surroundings of the Eucalyptus tree appears very different from the landscape of the native *Junipers procera* trees, where a showy undergrowth well cover a diverse and widespread network of soil reinforcing root networks. Due to the fact that only Junipers Procera and Sasbaniya and its water absorption capacity is 5 times higher than that of any other tree, it grows upright and does not have the capacity to cover the ground. It should not give it time to replace it with indigenous trees, to reduce the cost of soil conservation, to control carbon emissions, and to achieve the green legacy initiatives of the park for its intended purpose.

planting seedlings is known a day is very simple because this activity was under taken by political leaders of the country and the issue of the world as well as overall community awareness raised more over and believes with these activities. Even though each sector those who plant made counteract for management was under the control of them do not apply practically. Due to this reasons as the political leaders and stakeholders made movement to plant the seedlings, continuous management follow up is the most undergoing activity issues every season of the seedling management.

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ANNEXES

Bahir Dar University

Bahir Dar Institute of Technology School of Research and Graduate Studies

Faculty of Chemical and Food Engineering Environmental Engineering Post Graduate Program

The Assessment of Green Legacy Initiatives Impacts on Environment in Case of Entoto Park,
Gulale Sub-City, Addis Abeba, Ethiopia

Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science
in Environmental Engineering ,

Quetationary.

1.Ethiopia, has designed and embarked upon various initiatives to combat climate change, minimize deforestation, manage topsoil erosion, improve water balance, enhance carbon sequestration, and improve food security. do you think that these green legacy initiatives achievable ? yes, no, how ?

2.How can funds be raised for environmental conservation and planting seedlings in Entoto natural park by mobilization of community, Government sectors, other foreigners A. yes B. no from where?

3.What are the positive impacts of green legacy initiatives on environment ?

4.What are the negative impacts of green legacy initiatives on environment ?-----

5. Do you think that the implementation of green legacy initiatives on Entoto park considered a major instrument for achieving emission reduction of CO₂ ? no or if yes how! -----

6. Do you think that the costs of environmental conservation minimized by these green legacy initiatives? -----

7. Do you think that these green legacy initiatives promote planting indigenous trees , so that afforestation and deforestation is desirable? -----

8. Are conservation activities desirable in Entoto park ? why? -----

9. How can incentives can be used to make it more economically desirable for people to conserve than to degrade the environment?

10. Are environmental conservation appropriate to local social, political, institutional and ecological conditions? if you say yes why? and if you say no why? -----

11. Are environmental conservation s are practically implementable?

12. Is the direct benefits of outputs that can be consumed directly, such as timber, minerals, wild foods, recreation, etc. ? if you say yes why? and if you say no why?

13. Management Cost, equipment, capital, wages, running costs, policing costs of What changes in environmental quality have, will or might occur as a result of the green legacy initiatives? What causes these changes? -----

14. How do changes in environmental status affect economic activities? Do they give rise to costs or benefits, and to whom?

15. Preliminary Survey of the objectives of creating a natural park for Addis Ababa are:-

1. To provide a recreational facility for the citizens of Addis Ababa.
2. Educate the population, and especially young people, in the importance of conserving the natural environment.
3. Encourage the re-emergence of the native vegetation and wildlife of the area, and set an example in good conservation management.
4. Enable people living in the neighborhoods of the Park to participate in its development and to draw some benefit from it.
5. Offer scientists opportunities to observe and survey the geology, hydrology, vegetation and wildlife of the area.

Do you think that these objectives are achievable? how?

