ADDIS ABABA UNIVERSITY SCHOOL OF EARTH SCIENCES

REMOTE SENSING AND GIS STREAM

MSc Thesis on:

Assessment of Biodiversity Conservation of Entoto Natural Park for Ecotourism Development.

By:

Asfaw Demeke Tesema (GSR/0565/07)

Advisor

Dr. Getachew Berhan

A thesis submitted to the school of Graduate studies of Addis Ababa University in partial fulfillments of the requirements for the degree of Master of Science, Remote sensing and Geo-informatics.

Addis Ababa

December, 2016

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Acronyms and Abbreviations

AAMS = Addis Ababa Millennium Secretariat

AfDB = African Development Bank

AUC = African Union Commission

BMC = BioMed Central

BPCDA = Beautification, Park & Cemetery Development Agency

CABI = the Centre for Agriculture and Bioscience International.

CBD = Convention on Biological Diversity

DBH = Diameter at Breast Height

DEM = Digital Elevation Model

DN = Digital Number

EBI = Ethiopian Biodiversity Institute

ECA = Economic Commission for Africa

EHT = Ethiopian Heritage Trust

EIA = Environmental Impact Assessment.

EMA = Ethiopian Mapping Agency

EPB = Environmental Protection Bureau

ERDAS = Earth Resources Development & Analysis Systems

ESRI = Environmental Sciences Research Institute

ESTA = Ethiopia Sustainable Tourism Alliance

ETM^{+} = Enhanced Thematic Mapper

EWNHS = Ethiopian Wildlife and Natural History Society

FGRCP = Forest Genetic Resources Conservation Project

GDP = Gross Domestic Product

GISs = Geographical Information Systems

GIZ = German Agency for International Cooperation

GPS = Global Positioning Systems

GVA = Gross Value Added

IAS = Invasive Alien Species

ITA = International Tourist Arrivals

ITR = International Tourist Receipts

IUCN = International Union for Conservation of Nature

LUPO = Land Use Planning of Oromia

MoA = Ministry of Agriculture

MoARD =Ministry of Agriculture and Rural Development

MoCT = Ministry of Culture and Tourism

MSS = Multispectral Scanner

NMSA = National Meteorological Service Agency

PCD = Park Cooling Distance

PCI = Park Cooling Intensity

PCMS = Publications and Conference Management Section

PRSP = Poverty Reduction Strategy Paper

SARs = Chinese Special Administrative Regions

SBPDA = Sanitation Beautification Park Development Authority

SBPDA = Sanitation, Beautification Park Development Authority

SPOT = Satellite Pour I'Observation de la Terre (French)

SRTM = Shuttle Radar Topography Mission

TCE = International tourist arrivals at Collective Tourism Establishments

TF = International Tourist arrivals at Frontiers

THS = International Tourist arrivals at Hotels and Similar establishments

TIES = the International Ecotourism Society

TIN = Triangulated Irregular Network

TM = Thematic Mapper

UNWTO = United Nations World Tourism Organization

USAID = United States Agency for International Development

USGS = United States Geological Survey

WAJIB = Waldaa Jirattoota Bosonaa in Afan Oromo meaning "forest Dwellers associations''

WTO = World Tourism Organization

Abstract

The major objective of this study was generating biodiversity and land use/cover changes for the development of ecotourism by applying Geographic Information Systems GISs and Remote Sensing process in the Entoto natural park. Various studies attempted to carry out research work on value of ecotourism for wildlife conservation and economic development in Ethiopia and little is done on investigating opportunities and challenges of ecotourism potential sites. Ecotourism can provide a strategic source of revenue to natural areas that need protection. Thus, this thesis was foreseen with the objective of assessment of the biodiversity and potential opportunities of the Entoto natural park for the development of ecotourism in this site. The primary data collection was performed during field verification. To gather the required primary data for this study, questionnaires and interview were made to determine the status of biodiversity, opportunities and opinions for the development of ecotourism in Entoto Park. The remotely sensed data processes were performed by applying different and appropriate software in accordance with the data type. The supervised classification technique was used to classify the imageries because an a priori knowledge was gained from the field verification. The result of field verification showed that 25 types of tree and shrub plant species were recorded from the Entoto natural park and the response through the questionnaires and the information obtained from conducted personal interview were almost matched with the result of data recorded from the field. *Eucalyptus globulous and Juniperus procera* occupied nearly 88 % of the total species abundance of the study area. Change detection maps and topography maps were amongst the outputs produced in an ArcGIS and ERDAS Imagine environment. As compared successive decadal data with each other the analyses result revealed that, forest cover of the area shown more increase. The land in this park setting may be suitable for new camp grounds or a range of built structures and facilities such as accommodation and venues and nature-based activities such as canopy walks. This research would add value to the literature on the significance of biodiversity for the development of ecotourism and benefit of ecotourism to environmental conservation and strong coexistence between them. Based on the actual resources of the conducted area and evaluation results, Entoto Natural Park can be considered as an appropriate site for ecotourism promotion.

Key words: Ecotourism, Biodiversity, GISs, Sustainable, Afromontain, criteria

CHAPTER I: INTRODUCTION

1.1 General Background

Earth's surface is covered by valuable ecosystems such as forest. The earth sciences provide fresh information about the natural environment and its resources (Fedorov, 1980). But we are still unable to properly assess our own ability to calculate and predict all the consequences and implications of human's interference with the structure and composition of the natural environment. A new fundamental feature of Earth sciences recently is taking place in research, on phenomena at a global and even a cosmic scale.

The emergence and development of geospatial technology has opened the way for collecting, storing, processing, analyzing and displaying spatial data for various environmental applications. The data acquired by Remote Sensing are related to electromagnetic properties of the Earth. Under many conditions the data can be related to real world parameters or features. Remote sensing is the instrumentation, techniques and method to observe the Earth's surface at a distance acquire data and to interpret the images or numerical values in order to obtain meaningful information of particular objects of the Earth. The number and variety of plants, animals and other organisms that exist is known as biodiversity. It is an essential component of nature and it ensures the survival of human species by providing food, fuel, shelter, medicines and other resources to mankind. The richness of biodiversity depends on the climatic conditions and area of the region. All species of plants taken together are known as flora and about 70,000 species of plants are known till date. Ethiopia has great geographic diversity, and macro- and micro-climatic variability. The country has ten ecosystems, and 18 major and 49 minor agro-ecological zones. Ethiopia possesses an estimated number of 6000 species of higher plants of which 10% are endemic. The country has 284 species of wild mammals and 861 species of birds. Ethiopian Biological diversity Institute (EBI, 2014). The country is endowed with great diversity of plant and animal genetic resources. Ethiopia is one of the countries in the world that are rich in biodiversity. Two main types of area closure are being implemented for rehabilitation and restoration of degraded areas in the country. One is by closing an area from livestock and people so that natural regeneration of the vegetation can take place and the other is closing off degraded lands while implementing additional measures such as planting of seedlings, mulching and establishing water

harvesting structures to enhance and speed up the regeneration process (et.chm-cbd.net/biodiversity/biodiversity-ethiopia).

Today, entertainment and recreation are essential to human with due attention to conservation and sustainable utilization related objectives. Therefore, the development and construction of forest parks and resources conservation are required in order to attract the tourists generate income, for leisure and relaxation. Of key significance, is the realisation that the Protected Landscape approach provides both a practical and economical role for farmers and an important framework around which environmental conservation can be linked to the improvement of the quality of life for local people (Okello, 2003). According to (UNWTO, 2015), an ever-increasing number of destinations worldwide have opened up to, and invested in tourism, turning it into a key driver of socio-economic progress through the creation of jobs and enterprises, export revenues, and infrastructure development. Ecotourism's perceived potential as an effective tool for sustainable development is the main reason why developing countries are now embracing in their economic development and conservation strategies. Ecotourism emerged as an alternative form of tourism in the 1990s to mitigate the faults of conventional (mass) tourism in meeting the needs of sustainable development. It has since become widespread in Thailand and is adopted not only in natural areas but also in rural communities (Bunruamkaewa and Murayamaa, 2011). Ecotourism is often as any form of tourism that involves nature. In reality, the latter activities often consist of placing a hotel in a splendid landscape, to the detriment of the ecosystem. As noted by Bunruamkaewa et al. (2011), ecotourism must above all sensitize people to the beauty and the fragility of nature. (Bunruamkaewa and Murayama, 2011) disagree with the act of some operators those who disseminate their operations: using the labels of "green" and "eco-friendly", while behaving in environmentally irresponsible ways (Bunruamkaewa and Murayama, 2011). In all developed countries of the world interest in ecotourism has long been growing and is likely to continue to grow. Most of ecotourism visitors are matured and comparatively affluent. They represent a good source of income for tour organizations, but they can also be demanding. They are typically interested in several kinds of tours: safari-type luxury tours to observe wildlife, birds, landscape; adventure tours of a more modest sort, which emphasize remote areas, colorful people or unusual geologic features.

Ethiopia is rich in such resources which can offer a mixture of experiences and the opportunity to observe local life and natural attractions where can be established such as those that already operate at Bishangari on Lake Langano and at the site in the Afar region and others are at the planning stage

(Henze, 2007). As tourism further develops in Ethiopia, a greater variety of the country's attractions will become accessible to visitors such as foreign tourists, diaspora visitors, foreign residents and Ethiopian citizens themselves. Students and young adults who are less affluent and content with simpler accommodations and fewer comforts are good prospects for ecotourism. They are interested in trekking, exploring remote landscape, wild animals, birds, river- and lake experiences, and observing exotic ethnic groups. Scholars with a professional interest in ethnography, archaeology, various aspects of biology and geology represent opportunities for both individual and group tours sponsored by organizations (Malede Birhan and Girma Gebreyes, 2015). Ecotourism is a form of tourism involving visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low-impact and often small-scale alternative to standard commercial (mass) tourism. Tourism in Ethiopia has always involved features of ecotourism. People who visit the historic sites are, of course, primarily interested in the country's history and the unusual accomplishments of Ethiopians over the millennia. But they are also interested in the physical features of these areas and in the extent to which they are being protected. Some tour organizations are beginning to specialize in animal- and bird-watching tours, tours to observe indigenous forests and unusual geologic features (http://www.e-unwto.org/doi/book/ 10.18111/9789284416899).

Ecotourism was given more concerns since the world Ecotourism Summit in 2002, because it is expected as a tool for ensuring sustainable conservation of destination areas, satisfying the enjoyment of tourists, benefiting the destination community and contributes to poverty reduction. Especially, according to the recent WTO market surveys that conducted, the growth of ecotourism demand will favor Africa (Theodros, 2004). The region is likely to attract a higher proportion of tourists, both those on ecotourism tours and those seeking out newly developing destinations, which are abundance in the region (http://www.e-unwto.org/doi/book/ 10.18111/9789284416899). In Ethiopia, conservation and sustainable utilization related activities are being conducted vigorously. As a result, significant improvements in the status of some biodiversity resources have been achieved. Rehabilitation and restoration of degraded areas, afforestation and practices of sustainable management of natural resources have, for example, resulted in increased forest cover and enhancement of the associated biodiversity (EBI, 2014). The Ethiopian government is proving its commitment and willingness to develop tourism through a number of initiatives. Tourism is a featured component of Ethiopia's Poverty Reduction Strategy Paper (PRSP), which aims to combat poverty and encourage economic

development. Despite of the world's economic crises`, Ethiopia has achieved growth in the tourism sector. As part of the international economy, tourism is a major force as it generates 13.98 % of Ethiopia's total exporting earnings in 2008 (Ministry of Culture and Tourism, 2009).

1.2 Problem Statement

According to different studies and institutions in Ethiopia, including the city of Addis Ababa, ecotourism sector is at its infancy stage. Moreover, the Entoto natural park is newly established site by the initiation of the Ethiopian Heritage Trust (EHT) for environmental conservation and restoration of the indigenous habitats in the park. Thus exhaustive studies are required in order to assist preservation of the original biodiversity of the park by conducting research works in further ecotourism promotion, facilitation for future service provision for visitors and conservation purposes. Environmental degradation in Ethiopia is well advanced. As noted by William (2009), more than 70 per cent of Ethiopia falls into its classification of land that has suffered desertification showing that even without wholesale industrialisation and urbanisation, humans can still have a significant deleterious effect on the natural environment (William, 2009).

Ecotourism is just a current issue not only in Ethiopia but also at the international arena. Ecotourism is a small but rapidly growing industry working with a niche market that is governed by market forces and regulations. Ecotourism is primarily advised as being equivalent to nature tourism in the market place. Some countries, companies, and destinations have social and environmental policies and programmes, while others do not. This has led to confusion worldwide about the meaning of the term Ecotourism as it is applied in the marketplace. Today Ecotourism potential of Ethiopia is huge and unmatched but the development of ecotourism sector is at its infancy stage. This is due to lack of effective and sound institutional framework and legal bases for ecotourism development in related to the less emphasis and recognition given to ecotourism and also lack of cohesiveness, integrity and cooperation amongst the stakeholders. Consequently, studies show that Ethiopia is not earning significant benefit from tourism sector in general including ecotourism.

Therefore, the ecotourism sector requires a prudent study to discern and identify those limiting factors and find solutions so that a strong participatory ecotourism management system can be established to protect green spaces depletion and enabling it to sustainably render their economic, social and environmental benefits to the people. The application of remote sensing and GISs technology and use

of current geospatial data can contribute to the achievements of the objectives. Despite the challenges of ecotourism these days, there was limited ground surveys conducted to recommend improving the biodiversity conservation for its proper management. Accordingly, the current research demonstrates the assessment of biodiversity for potential and opportunities of the development of ecotourism in the Entoto Natural Park by implementing remote sensing and GISs methods. Although tourism has a significant contribution to economic development and conservation of environmental resources, it also has negative impact on tourist's destination areas. Especially during the past decades because of the interest of business profit of the tour operators to attract more tourists, which resulted in high negative impacts of tourist's destinations, principle of nature-based tourism or ecotourism was not considered. In sub-Saharan Africa tourism has developed without planning (Sindiga and Kanunah, 1999). In Ethiopia, research quantifying threats such as frequency with which tourism and recreation were identified as threats and methods to ameliorate their impacts are still limited or they are not available.

1.3 OBJECTIVE

1.3.1 General Objectives

- The general objective of this study is to generate the biodiversity and land-use and land-cover changes by using geospatial data derived indices.

1.3.2 Specific objectives

The specific objectives of the current study are to:

- Generate the biodiversity and land-use and land-cover changes by using geospatial data derived indices;
- To assess the biodiversity conservation status of the study area;
- To generate land use land cover and produce maps
- Identify multi-faceted challenges and opportunities for ecotourism development.

1.4 Significance of the Study

Tourism is one of the major economic sectors of Ethiopia, and government has labeled tourism as a priority sector, in part as a tool for poverty alleviation. The domestic aspect of Ecotourism is of great importance as an educational tool for developing greater awareness among the population of the need

for environmental and cultural preservation and in enlisting cooperation from the public in improving and restoring the country's assets for the present and future enjoyment of its expanding population. Taking into account the local interest, potential areas of interest to tourists like the country's bird watching, heritage sites, and infrastructural challenges like road quality and transportation options, ESTA identified that a number of specific local communities to partner with for the duration of the five-year grant funding period. Community-managed ecotourism sites in Ethiopia are in Central and Southern Rift Valley. The innovative network of Community Conservation areas, which includes Lake Zuway and Lepis Forest, is the first of its kind in Ethiopia (Jennifer, 2013). That hand-in-hand approach led to the creation of 34 associations to support sustainable livelihood generation and biodiversity conservation in the Central and Southern Rift Valleys, (http://ethiopia.usembassy.gov/pr_5.html).

The establishment of ecotourism in Entoto Natural Park can help to generate direct financial benefits for conservation and generate income both for local people and other sectors. Recreational parks such as Entoto Natural Park in their design and development can include aesthetic beauty, different facilities and play options as well as environmental conservation. Thus, leisure and recreation facilities, services and the environment is encouraging people to keep healthy, have fun, feel good, maintain independence in old age, and preventing illness and disease. Moreover, Entoto park is located at a very closer distance to the city of Addis Ababa that has the largest population and which is the capital city of Ethiopia. According to the Central Statistical Agency of Ethiopia (CSA, 2007) the total population of Addis Ababa was about 3.041 million in 2012.

1.5 Organization of the Thesis

This thesis constitutes five chapters. Chapter one describes general overview of the research. In the first chapter, the introduction of the study is presented. This covers background of the study, statement of the problem, objectives of the study, research questions, and significance of the study and limitation of the research. Chapter two presents the literature review which encompasses definitions of concepts, empirical review of literature related to biodiversity, ecotourism such as, principles, opportunities and challenges. Chapter three describes the study area and methodologies. Chapter four presents discussion and the results of the study, and also opportunities and challenges of ecotourism development subtitles are available in this chapter. Finally, chapter five presents conclusion and recommendations.

CHAPTER II: LITERATURE REVIEW

2.1 Biological Diversity

2.1.1 Definitions of Biological Diversity

According to Pearce (2001), one of the most difficult issues in an economic value on biodiversity is determining what exactly the object of value is. We make a distinction between *biological resources* and *biological diversity.* A biological resource is simply a given example of gene, species, or ecosystem. Biological diversity refers to the *variability* of biological resources. In simple terms, biodiversity is the 'variety of life' whereas; biological resources are the manifestation or embodiment of that variety (Pearce, 2001).

Ethiopia is gifted with diverse ecosystems in which diverse flora and fauna resources are found. The major ecosystems include: Afroalpine and sub-afroalpine, scrub, Montane dry forest and Montane moist forest, Acacia-Comiphora woodland, Combretum-Terminalia woodland, Lowland humid forest, Aquatic, wetland, Montane grassland, Desert and semi-desert ecosystems (Birhan and Gebreyes, 2015). Biodiversity is the variety of different types of life found on the Earth and the variations within species. It is a measure of the variety of organisms present in different ecosystems. This can refer to genetic variation, ecosystem variation, or species variation (number of species) within an area, biome, or planet. Terrestrial biodiversity tends to be greater near the equator which seems to be the result of the warm climate and high primary productivity. Biodiversity is not distributed evenly on Earth. It is richest in the tropics. Marine biodiversity tends to be highest along coasts in the Western Pacific, where sea surface temperature is highest and in the mid-latitudinal band in all oceans. There are latitudinal gradients in species diversity. Biodiversity generally tends to cluster in hotspots, and has been increasing through time, but will be likely to slow in the future (Thryambakam, and Saini, 2014).

Ethiopia is a centre of origin for cultivated crops such as coffee, tef, enset, and centre of diversity for many crop species such as durum wheat, barley and sorghum. The country has rich resource of indigenous farm animals also. The main direct threats to Ethiopia's biodiversity are habitat conversion, unsustainable utilization of biodiversity resources, invasive species, replacement of local varieties and breeds, climate change and pollution. Indirect causes of biodiversity loss in the country are demographic change, poverty, and lack of awareness and coordination. Due to direct

and indirect pressures, ecosystems and a number of wild plants and animals including endemic species, as well as farmers' varieties and indigenous animal breeds are declining (EBI, 2014). Site suitability is a process which analyzes the merits of possible locations in which a defined use or activity can be performed. Land suitability is assessed and classified with respect to specified kinds of use. Site suitability assessment is a basic self-assessment tool to test site suitability for a proposed ecotourism operation. The concept of land suitability is only meaningful in terms of specific kinds of land use, each with their own requirements. Site suitability is a process which analyzes the merits of possible locations in which a defined use or activity can be performed. Ethiopia possesses great biological diversity i.e., macro and micro-climatic variability (Bunruamkaewa, K. and Murayama,Y. 2011).

2.1.2 Benefits of Biodiversity

A large part of our cultural heritage is associated with ecosystems and landscapes with special features that remind us of our historic roots, both collectively and individually (such as special, usually old trees, the remains of traditional cultivation systems, or historic artifacts). These ecosystems and landscape elements give us a sense of continuity and understanding of our place in our natural and cultural environment and are increasingly valued as expressed by the designation of cultural landscapes and sites with special historic interest. Urban forestry in Ethiopia has so far received limited attention. Over 3 million people live in Addis Ababa city which is one of the fastest growing cities in Africa (CSA, 2007). Urban sprawl is demanding its toll on urban forests and green spaces which provide a wide array of benefits for urban dwellers. Particularly the urban poor depend on forests for livelihood, and they are most seriously affected by environmental disasters. The vicinity of Addis Ababa, especially the northern hills were once covered with mixed indigenous forests consisting of tree species such as *Juniperus procera, Podocarpus falcatus, Olea africana*, *Hagenia abyssinica*. However, already at the end of 19th century, the natural vegetation was reduced significantly due to population growth and expansion of the city (Swain, 1955). As described by (Choi, 2011), negative environmental effects of urbanization such as deterioration of air quality, higher temperatures, and increased noise pollution lead to greater psychological and physical stress, resulting in decreased quality of life and increased health problems. Urban forests provide an array of protections against those above noted harms. Trees help regulate climate and

reduce the demand for energy. However, urban forestry programs must involve effective planning to avoid inadvertently causing other problems, such as displacement of important native species. Allowing tree removal to clear space for housing has increased the likelihood of flooding and landslides, and impaired the natural areas and watersheds that existed in peri-urban areas (Choi, 2011). The green vegetation can improve both indoor and outdoor thermal comfort, while at the same time providing multiple environmental services, such as carbon storage. Earlier studies have shown that urban green spaces such as parks can considerably mitigate the urban heat island effect (Gudina Legesse et al., 2014). While the theoretical debate rages over the utility of buffer zones, independent reserves are quietly acting as buffer zones in many locations. In Costa Rica, the government has gone so far as to promote establishment of privately owned nature reserves as buffer zones for national parks (Boza, 1993).

2.2 Development of Ecotourism

2.2.1 Definitions and Concept of Ecotourism

According to The International Ecotourism Society (TIES, 2001), **ecotourism** is defined as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education" (TIES, 2015). TIES was founded in 1990 (www.Ecotourism.org/ties-overview). The term "Ecotourism" was coined by "Hector Ceballos Lascurain" in 1983, and was initially used to describe the nature-based travel to relatively undisturbed area with an emphasis on education (Lascurain, 1983). Ecotourism has a wide range of meanings because of different parties or people defined it according to their own specific interests and priorities instead of all things to all people (Strasdas, 2002). As described by Okello (2003), ecotourism refers to tourism that is nature based but that seeks to minimize harmful impact and seeks to promote conservation. While the term ecotourism is often used to refer to smaller-scale businesses and operations, the principles of sustainable tourism are applicable to all forms of tourism in all types of destinations, from mass tourism to small niche markets (Amy, 2012). Ecotourism is based on the natural environment with a focus on natural and cultural heritage. Hence, establishing a set of warning indicators and criteria is necessary for ecotourism management (Bunruamkaew and Murayama, 2012). The domestic aspect of ecotourism is of great importance as an educational tool for developing greater awareness among the population of the need for environmental and cultural preservation and in enlisting cooperation from the public in improving

and restoring the country's assets for the present and future enjoyment of its expanding population (Henze, 2007). Many people often ask why ecotourism should be viewed differently from other forms of sustainable tourism. In essence, ecotourism must be planned and managed to successfully offer its key social and environmental objectives (Wood, 2002).

Nevertheless, it is important to differentiate between ecotourism and sustainable tourism: Sustainable tourism, as defined by the U.N. World Tourism Organisation, is "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities." Ecotourism can include nature-based tourism, community-based tourism, home-stays, visits to world heritage sites and other forms of responsible travel. Sustainable tourism is 'one that establishes a suitable balance between the environmental, economic and socio-cultural aspects of tourism development, plays an important role in conserving biodiversity. It attempts to minimize its impact on the environment and local culture so that it will be available for future generations, while contributing to generate income, employment, and the conservation of local ecosystems.', World Tourism Organization (WTO, 2016). Sustainable tourism is defined by different professionals and is described by John et al. (2006) as tourism that is economically, socio-culturally and environmentally sustainable. With sustainable tourism, sociocultural and environmental impacts are neither permanent nor irreversible (John and Simon, 2006). As described by Mohammedsalih et al. (1999), in Ethiopia, there are nine protected areas (National Parks), of which only two are gazetted ones, the Semein Mountains National Park and Awash National Park. The other protected areas including the game reserves, sanctuaries, national forest priority areas etc. are not gazetted. The main objectives of these protected areas are to protect natural resources of the country but recently most of protected areas of Ethiopia are exposed to severe degradations due to failure of creating alternative options like ecotourism, which are off-farm activities (Mohammedsalih and Shibru, 1999).

Furthermore, tourism can be a key vehicle in raising awareness and fostering positive behaviour change for biodiversity conservation among the millions of people travelling the globe every year. The positive of sustainable tourism is to ensure that development is a positive experience for local people (WTO, 2016). In 1991, Boo initiated the notion of ecotourism into the global context, since then there is an ongoing debate around the efficiency of the term. Some argued the term to be no

more than a myth or a rhetoric speech about sustaining our 'ego'. Others sees the term as a panacea from heaven presenting the tourism industry with a sensitive environmental approach. Hesham (2005) argues that 'eco-tourism' to be a highly rated sustainable form of tourism that is only applicable to specific locations of high scenic environmental social and culture values and with specific management capabilities (Hesham, 2005). As described by Wood (2002), ecotourism was just an idea, not a discipline, many businesses and governments promoted it without an understanding of its most basic principles (Wood, 2002). The fundamental essence of ecotourism is sustainability, which encompasses environmental stewardship, social responsibility and economic viability. While the term ecotourism is often used to refer to smaller-scale businesses and operations, the principles of sustainable tourism are applicable to all forms of tourism in all types of destinations, from mass tourism to small niche markets. In macro-economic terms, expenditure by international visitors is counted as exports for the destination country and as imports for the country of residence of the visitor. For many countries inbound tourism is a vital source of foreign currency earnings and an important contributor to the economy, creating much-needed employment and further opportunities for development. In her article, "Gender in Tourism" (1995), Swain situates women's roles in tourism within a wider context of gender relationships, particularly, and power dynamics. Swain has rejected the binary of host and guest, emphasizing gendered exchange in tourism and privileging neither Western traveler nor the stereotypical local other. She examines the active exchange between tourist and host, noting that both parties participate in the tourist relationship (Swain, 1995).

2.2.2 Ecotourism Principles

As specified by TIES, it has been 25 years since TIES was started, it was important to re-visit the following three principles found in the literature – that ecotourism:

- is **NON-CONSUMPTIVE / NON-EXTRACTIVE**
- Creates an ecological **CONSCIENCE**
- Holds eco-centric values and ETHICS in relation to nature.

According to (TIES, 2015), ecotourism is about uniting conservation, communities, and sustainable travel. This means that those who implement, participate in, and market ecotourism activities should adopt the following ecotourism principles:

- Minimize physical, social, behavioral, and psychological impacts.
- Build environmental and cultural awareness, and respect.
- Provide positive experiences for both visitors and hosts.

  Deliver memorable interpretative experiences to visitors that help raise sensitivity to host Countries' political, environmental, and social climates.
- Design, construct and operate low-impact facilities.
- Recognize the rights and spiritual beliefs of the Indigenous People in your community and work in partnership with them to create empowerment.

The concept of ecotourism is a new phenomenon and it is difficult to explain its significance achievement since the approach of ecotourism is not widely disseminated in Ethiopia.

2.2.3 Benefits of Ecotourism

Ecotourism represents an approach to tourism that emphasizes environmental and cultural preservation. Ecotourism is the fastest growing sector in the industry today and there are many benefits which can be gained. In ecotourism, the focus is more on creating a sustainable future, where man and nature can coexist peacefully. It is also an educational drive where you learn to reduce your impact on nature. In this way, an eco-tourist also significantly cuts the impact of traditional tourism by learning the eco-friendly ways of living, and improving the livelihood of the local people. It is much more than the love for travel and nature. Ecotourism has a strict connection with sustainable tourism. Sustainability depends on the relationship among tourism and environment reference. Suitable management for ecotourism development is essential in order to conserve and maintain the biological richness of the area as well as economic upliftment of the local people. In addition, ecotourism can be defined as an opportunity to promote the values in the protected areas and to finance related stakeholders (Ok, 2005). In this respect, ecotourism evaluation should be regarded as an important tool for sustainable development of tourism in any area (Ceballos-Lascurain, 1983). Ecotourism represents an approach to tourism that emphasizes environmental and cultural preservation. Social benefits of forests include health, employment, education and recreation, community building and property (Kuchelmeister, 2000). These benefits are frequently overlooked. Especially the employment benefits are important for developing countries like Ethiopia, while other social benefits will gain in importance with raising living standard.

2.2.4 Health Benefits

There was no effect for causes of death unlikely to be affected by green space, such as lung cancer and intentional self-harm. Interpretation: Populations that are exposed to the greenest environments also have lowest levels of health inequality related to income deprivation (Mitchell and Popham, 2008). Physical environments that promote good health might be important to reduce socioeconomic health inequalities." Nature and green spaces contribute directly to public health by reducing stress and mental disorders (Ward et al., 2012; Annerstedt et al., 2012), increasing the effect of physical activity (Mitchell, 2012), reducing health inequalities (Mitchell and Popham, 2008), and increasing perception of life quality and self-reported general health (Maas et al., 2006; and Stigsdotter et al., 2010). Trees cool and filter the air, absorb noise, and protect soil and wildlife. They provide with basic needs such as food and fuel and for raw materials to generate income. Finally, trees add value to cities by delivering aesthetic appeal, while enhancing the quality of life and increasing property values (Choi, 2011).

According to Gudina Legesse et al. (2014) the range within which the cooling effect had been observed Park Cooling Distance (PCD) was positively related to park shape index and park area. The maximum Park Cooling Intensity (PCI) was 6.72 ◦C and the maximum PCD was estimated at 240 m (Gudina Legesse, et al., 2014). As noted by Annerstedt et al. (2012), the basic idea that many people have of ecotourism is of going to a nature reserve, admiring the flora and fauna, and coming back rejuvenated. The concept though is not as simple as that. It is essential idea is to keep in check the carbon footprint that you leave when you go to any place. Thus, ecotourism concerns on your participation during the tour in benefiting the environment and the people. As such, an eco-tourist's role is to conserve and improve the environment of the place he or she visits. Controlling for individual and regional covariates, researchers found that, on average, individuals have both lower mental distress and higher well-being when living in areas with more green spaces. Although effects at the individual level were small, the potential cumulative benefits at the community level highlight the importance of policies to protect and promote parks such as, green spaces for well-being" (Annerstedt et al., 2012). In recent years, researchers have been looking into another potential benefit of green space and vegetation — improvements to public health — but a clear consensus has yet to emerge. A 2011 systematic review found that there is only "weak evidence for the links between physical, mental health, well-being, and urban green space." Two years later, however, another systematic review concluded that "the balance of evidence indicates conclusively that knowing and experiencing nature makes us generally happier,

healthier people." A 2010 Meta-analysis in BMC Public Health found that, compared to walking or running in "synthetic environments," doing so in green spaces led to decreased anger, fatigue and feelings of depression in addition to increased attention levels. However, many were short-term studies involving mainly college students, and did not assess health outcomes.) "Cross-sectional evidence suggests that living closer to recreational or/and urban green spaces, such as parks, is associated with lower mental distress. However, earlier research was unable to control for time-invariant heterogeneity (e.g., personality) and focused on indicators of poor psychological health (Barber, 2008).

2.2.5 Economic Benefits

The very reason to build a park might be to provide recreational and leisure services, to create job opportunities for the community, generate income for poverty alleviation. Recently, excluding Entoto Natural Park, there are more than 17 public parks within the Addis Ababa city, at least 1 park in each sub-city but only there is a very limited number of recreational parks in peripheral zones. But the available recreational parks are not sufficient to provide the required services for the city of Addis Ababa which accommodated million people. In the near or distant future, Entoto Natural Park can be developed as one of the ecotourism sites and the recreational parks in peripheral region of the city of Addis Ababa. Ecotourism as the most attractive subset of the tourism industry can contribute to natural resource conservation and local development. At some ecotourism destinations, residents benefit from revenue sharing programs that either provides cash payments or, more commonly, funding for community projects such as water or schools. It also provides new markets for locally produced goods, increased government revenues through fees and taxes paid by visitors, and serves as insurance for the protected areas from being converted to other land use types. Tourism is an excellent means for transferring income from wealthy nations and persons to the poorer sections of society. Ecotourism is especially effective in this transfer since travelers often vent in to remote, economically disadvantaged regions.

2.2.6 Environmental Benefits

With a history deeply rooted in the conservation movement, ecotourism has provided a highly strategic source of revenue to natural areas that need protection. Ecotourism began as untested idea that many hoped could contribute to conservation of natural resources worldwide (Wood, 2002). The government of Ethiopia recognizes development and promotion of ecotourism and provided consultancy services

for a number of potential developers of ecotourism sites. But, it is not easy to clarify whether developers and policy makers properly recognize the idea of ecotourism. However, there is a good start that some investors started to involve in development of ecotourism in different regions of Ethiopia. Bishangari Eco-Lodge located at Eastern of Langano Lake in Oromia Region and Village Ethiopia located at Afar Region (Bilen) are examples of these private ecotourism developments in Ethiopia (Theodros, 2004). In past few years, Land Use Planning of Oromia (LUPO) aims to create alternative income generating means such as ecotourism to reduce the pressure on the natural resources of land through conducting a pre-feasibility study of proposed areas on the potentials of ecotourism (Schwenk, 2002). According to (Gemechu Shale, 2014), and some other Authors, the development of ecotourism in Addis Ababa city is currently facing economic, social, cultural, legal, and environmental challenges. As described by Gemechu Shale (2014), that the ecotourism development in Addis Ababa city is constrained by economic, social, cultural, legal, and environmental challenges. In his thesis work Gemechu Shale made the following recommendations: Increase awareness on the benefits of ecotourism and conservation of eco-attractions, Community participation should be mainstreamed in the planning process of ecotourism development of case study sub-cities and Addis Ababa city to motivate them for active participation and benefit sharing from the sub-sector, undertaking research to identify and develop eco-attractions in Addis Ababa, and provide training and education opportunities on ecotourism management and development for tourism professionals in Addis Ababa and its sub-cities. According to Gemechu Shale (2014) both the challenges and opportunities were found to have similarities with the assertions of Blackman et al. (2004) who identified the presence of a “champion” or leader, effective private-public sector partnerships, the identification and development of specialist attractions, government control and support, good market research, and community involvement as opportunities for the success of tourism development in peripheral regions. The same scholars also identified a lack of control over negative impacts, difficulties with finance, community opposition and a lack of infrastructure as barriers to successful tourism development (Gemechu Shale, 2014). As described by AAMS (2007), on the other hand, the city is blessed with economic, social, cultural, legal, political, and environmental opportunities.

Different professionals and experts held their opinions. As indicated by O’Conner (2005) green spaces like parks cater to community’s vantages through the maintenance of heritage of a specific culture by keeping the pristine status of the environment and letting the communities meet and carry out their

cultural practices. Parks also serve as nodal junctions of different cultural backgrounds. Thus, green spaces give the opportunity to people of diverse culture to know each other. Therefore, green spaces like parks serve as heritages of culture (O'Conner, 2005). Cicea (2015) affirms that green spaces play important role in tourism, in the meantime increase Gross Value Added (GVA) taxes that green spaces influence through urban tourism, shopping, generation of public services, selling of cultural artifacts and traditional clothes, hotel catering. Thus, tourism boosts hard currency income from international tourists and income from in tourists. Therefore, green spaces boost revenues for state budget. By and large, parks (green spaces) do have environmental, social and economic benefits, which we call ecological service. Degradation of green spaces on the other hand means losing those services in which some of them are very critical for life. Man's existential angst resulted from the destruction of vegetal cover is leading him to an unsafe environment. In view of this, studying biodiversity, green spaces have been a research and policy agenda (Horst, 2006). Tourism also causes some major positive impacts at tourists' destination areas. These positive impacts are economic, cultural or social impacts and environmental impacts. The positive economic impact of tourism includes generating foreign exchange, diversification of the livelihoods creating job opportunities for rural areas and increasing linkages; the positive cultural impacts of tourism includes: promoting modernization and cultural pride of host communities; and the positive environmental impacts of tourism include non-consumptive use of biodiversity. Minimizing environmental impacts and contribution to environmental education and conservation are also positive contribution of tourism (Strasdas, 2002). As noted by (WTO, 2002), as cited in Tisdell, 2003) , the other positive impacts of tourism are increasing the linkages between tourism business and local economy and reducing seasonality in tourism in order to ensure the well-being of employments and to minimize seasonal and casual employments (Tisdell, 2003). This thesis can contribute to the plan for ecotourism establishment is useful for tourism facilities development in Entoto Natural park and other ecotourism resource utilization where ecotourism can be more promoted. Ecotourism represents an approach to tourism that emphasizes environmental and cultural preservation. Some of the benefits include:

- ✓ It is low impact tourism, where people make a conscious effort to appreciate the environment, conserve the natural resources, and re-invest sufficient amount of revenues in protecting natural habitat.

- ✓ Ecotourism is good for the local community, as it provides employment, services and stimulates the economy. It helps in energy conservation and protects the plants and animals from the effects of traditional tourism.
- ✓ Ecotourism offers new opportunities for small-scale investments and increases the national responsibility in protecting biological resources. Especially in developing countries, it is a means of socio-economic and environmental conservation.
- ✓ Ecotourism provides recreational and educational travel without disturbing the harmony of the natural environment. It helps in reaping the benefits by the participation of people in the conservation of the flora and fauna.
- ✓ Visiting a national park or protected area will contribute towards the park maintenance in the form of fees for the staff taking care of it.
- ✓ You can admire the craftwork made by local artisans and buying these from them will help their economy as well as conserve the local heritage.
- ✓ You can go bird watching or walk through the forests exploring the different natural wonders, and stopping by villages to enjoy their cuisine, and lifestyle.
- ✓ Ecotourism can bring you closer to nature, open up to new ideas, take you to places less travelled, and give you a wonderful new experience without harming the environment.
- ✓ Ecotourism is a rapidly growing business and can provide the best of all the worlds. With the business of ecotourism growing, it will provide employment to the local people and will ensure that fewer people leave for the cities. The local population will gain new skills, so, they will not be totally dependent on the limited natural resources.
- ✓ Ecotourism is becoming very popular nowadays especially in adventure trips such as mountain climbing, white water rafting, bird watching etc. In such travels, the visitors are expected to clean up the mess before leaving and hence natural habitat is kept undisturbed.

2.2.7 Impacts of Ecotourism

However, tourism may cause negative impact depending on the type and nature of sectors and phenomena. It causes three major negative impacts at tourists' destination areas. These are negative economic impacts, cultural or social impacts and environmental impacts. The negative economic impacts of tourism include, the occurrences of seasonal jobs and brain drain, cultural impacts including

alter traditional cultures (crime, prostitution, etc.) and the environmental impacts of tourism such as pollution and over-consumption of natural resources (e.g., water) and destruction of habitats (Strasdas, 2002). The scale and intensity of tourism impacts are determined by a variety of factors, such as extent of tourist site use, resilience of ecosystems, pattern and degree of facility development, and the size of the country (Briguglio and Briguglio, 1996). Carrying capacity or limits on acceptable change are concepts referred to when the impacts of tourism on the society and environment are analysed. There is no one measurable capacity threshold that would be valid to all countries or type of countries. While there is no rigorous definition of carrying capacity that embraces al considerations for society as a whole, there is an awareness that some maximum, tolerable degree of change exists for the various inter-related sub-systems, i.e., social, cultural, economic and environmental (Johnson and Thomas, 1996). As tourist activities are concentrated along specific zones, the densities exert heavy pressure on environment and local infrastructure (Beedasy and Whyatt, 1999). Although tourism has a significant contribution to economic development and conservation of environmental resources, it also has negative impact on tourist's destination areas. Especially during the past decades because of the interest of business profit of the tour operators to attract more tourists, which resulted in high negative impacts of tourist's destinations, principle of nature-based tourism or ecotourism was not considered. The negative effects were observed in such as vegetation depletion, wildlife casualties, pollution of water and atmosphere in tourists' destination areas. Consequently, in the 1990s, the attention for environmental issues of tourists' destinations areas were increased and ecotourism to be pronounced. In sub-Saharan Africa tourism has developed without planning. Three decades of such development increased tourist arrivals and foreign exchange receipts but led to serious environmental and socio-cultural problems and the degradation of the tourism product. Tourism has developed in sub-Saharan Africa without planning. Essentially, tourism has grown with government encouragement and private sector participation but without a blueprint on the type of tourism desired, growth rate control, and consent by local communities which are the arenas for guest-host interactions. Lack of planning soon leads to serious environmental and socio-cultural problems. Tourism becomes uncompetitive and is ultimately unsustainable (Sindiga and Kanunah, 1999).

2.2.8 Environmental impacts of ecotourism

Negative impacts from ecotourism occur when the level of visitor use is greater than the environment's ability to cope with this use within the acceptable limits of change. Uncontrolled tourism poses

potential threats to many natural areas around the world. It can put enormous pressure on an area and lead to impacts such as soil erosion, increased pollution, discharges in to the water, natural habitat loss, increased pressure on endangered species and heightened vulnerability to forest fires. The technological complexity of the present centuary has led to various forms of pollution which are both initiated and compounded by tourism development in general and by travel in praticular (Anderson, 1996; and Veneeva, 2007). In a research conducted and noted by Rankin et al. (2015), in Australian continent, tourism and recreation are diverse and popular activities. They may also contribute to the risk of extinction for some plants because of the range and severity of their impacts, including in protected areas. To evaluate the extent to which tourism and recreation may be threatening process for plants, they conducted a continental level review of listed threats to endangered vascular plants using data from Australia. Of the 659 vascular plant species listed as critically endangered or endangered, tourism and recreation were listed as a threat(s) for 42%. According to Rankin et al. (2015), this is more than those listed as threatened by climate change (26%) and close to the proportion listed as threatened by altered fire regimes (47%). The most common types of threats listed were visitors collecting plants in protected areas (113 species), trampling by hikers and others (84 species), damage from recreational vehicles (59 species) and road infrastructure (39 species) (Rankin et al., 2015). In Ethiopia, research quantifying threats such as frequency with which tourism and recreation were identified as threats and methods to ameliorate their impacts are still limited or not available. As noted by Anderson (1996), Holloway (1999) and Neto (2002), poorly managed ecotourism results in the following negative environmental issues.

- Any large-scale tourism movement increases air pollution, contribute to unacceptable levels of noise in rural surroundings and disposal of waste into waterbodies.
- Although ecotourism is intended for small groups, even a modest increase in population puts extra pressure on the local environment and necessitates the development of additional infrastructure and amenities.
- The construction of water treatment plants, sanitation facilities, and lodges come with the exploitation of non-renewable energy sources and the utilization of already limited local resources.
- Its consumption of virgin territories like deforestation, disruption of ecological life systems and Various forms of pollution, all of which contribute to environmental degradation.

- When the overwhelming majority of profits are put into the pockets of investors instead of Re-investment in to local economy or environmental protection, it causes the resentment by local people results in environmental degradation.
- Loss of biodiversity: - when land and resources are strained by excessive use, and when impacts on vegetation, wildlife, mountain, marine and coastal environments and water resources exceed the carrying capacity, it can cause loss of biodiversity. This loss of biodiversity in fact means loss of tourism potential.
- The presence of affluent ecotourists encourages the development of destructive markets in wildlife souvenirs contributing to illegal harvesting and poaching from the environment.
- Introduction of exotic species: - tourists and suppliers may unconsciously bring in species that are not native to the local environment and that can cause enormous disruption and even destruction of ecosystems.

2.2.9 Socio–cultural Iimpacts of ecotourism

Human culture is strongly influenced by ecosystems, and ecosystem change can have a significant impact on cultural identity and social stability. Human cultures, knowledge systems, religions, heritage values, social interactions, and the linked amenity services (such as aesthetic enjoyment, recreation, artistic and spiritual fulfillment, and intellectual development) have always been influenced and shaped by the nature of the ecosystem and ecosystem conditions in which culture is based. At the same time, humankind has always influenced and shaped its environment. Rapid loss of culturally valued ecosystems and landscapes lead to social disruptions and societal marginalization, now occurring in many parts of the world (Rudolf et al., 2003). As described by Schaller (1998), Holloway (1999) and Neto (2002), the common sociocultural effects of ecotourism include:

- Exploitation of local workforce:- the resident population may excluded from the development process and relegate to minimum wage support jobs.
- Instability:- Tourism is highly vulnerable to international shocks like natural disasters, wars, sudden changes in consumer tastes, sharp economic downturns and terrorist attacks.
- Displacement of local people from their land:- even though ecotourism often claims that it preserves and enhances local cultures, with the establishment of protected areas, local people may illegally lose their homes and most often with no or little compensation.

- Pushing people on to marginal lands does little to enhance livelihoods even when a proportion of ecotourism profits are directed back in to the community.
- Land use conflict:- ecotourism often causes conflict and changes in landuse rights and fails to deliver promises of community level benefits.
- Cultural change:- indigenous cultural change may result from contact between tourists and locals, which is usually closer and more prolonged than in mass tourism. Problems arising when indigenous villagers adopt city or western ways, include acculturation, locals may begin "manufacturing" culture solely for tourists' consumption.
- Tourism has contributed to an increase in crime, thefts, muggings and expansion of HIV/AIDS.
- Locals may come to experience increasing dissatisfaction with their own standards of living or/and way of life and seek to imitate the tourists.
- Job opportunities and higher salaries attract workers from agricultural and rural communities who freed the restriction of their family and the familiarity of their home environment, may abandon their traditional values. Leading to an increase in the breakdown of marriage and in divorce.
- Water Resources result from contact between tourists and locals, which is usually closer and more prolonged than in mass tourism.

2.2.10 Mechanisms to Minimize the Negative Impacts of Ecotourism

Controlling ecotourism within the limit of the carrying capacity of the environment can be accomplished through sound management techniques or the use of economic instruments like user charges (or entrance fees), various kinds of taxes and imposing a limit on the number of visitors or tradable permits (Anderson, 1996). Natural resource depletion and environmental degradation associated with ecotourism activities are sometimes serious problems in tourism-rich regions (Neto, 2002). To minimize the problems that expose natural resources to degradations in protected areas, some interventions, which involve ecotourism activities, have been attempted in Adaba -Dodola forest priority area in Bale zone in Oromia regional state WAJIB which is said to be "Waldaa Jirattoota Bosonaa'' in Afan Oromo meaning "forest Dwellers associations" is an example of an outcome of such effort. Incomes obtained by local community from provision of accommodation services to tourists, horse provision and tour guiding which contributes to reduce free livestock grazing and deforestation of

protected area (Tsegaye ,2007). According to Tisdell (2001), in order to minimize the side effects of ecotourism, government intervention at different levels is needed in the following ways.

- ✓ Limiting the number of tourists and tourist operators based on the carrying capacity of the area,
- ✓ Improving the patterns or logistics of tourism movements to reduce environmental damage or adverse effects,
- ✓ Providing appropriate environmental education to tourist operators and tourists. Whether it is through tour operators, lodges, national parks, private reserves, or different types of ecotourism related activities, education can make a difference.
- ✓ Education is one of the most crucial elements of ecotourism because it can change the way people (both locals and tourists) think about the environment,
- ✓ Introducing technological improvements to reduce environmental damage,
- ✓ Imposing restrictions on constructions.

CHAPTER III: MATERIALS AND METHODS

3.1 Materials

3.1.1 Data Acquisition

The study employed purposive sampling method to collect data from different stakeholders. Accordingly, Ethiopian Heritage Trust, Addis Ababa Culture and Tourism Development Bureau, Ministry of Culture and Tourism, Institute of Biodiversity, Environmental Protection Bureau of the Addis Ababa city Administration, and are more concerned institutions so that they were contacted for primary data collection. The second task was data collection from key stakeholders and all other related sources on biodiversity conservation and ecotourism development in the Entoto Natural Park. The primary data collection was performed during field verification. Moreover, there were challenges and opportunities during transect walk. In support of this present study, various datasets of different formats from multiple sources such as, satellite, data, maps, and plant measure data were processed. In addition, for this study literature, Internet, electronic source materials, and other secondary data were incorporated For the identification of changes over the land use/cover of the Entoto natural park three-decade time-series datasets were analyzed. Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), IKONOS, Landsat 5 TM (Thematic Mapper), Landsat 7 ETM+ (Enhanced Thematic Mapper), Quickbird 2, RapidEye, SPOT 5 (Satellite Pour l'Observation de la Terre), and Worldview-2 are frequently used for remote sensing of vegetation properties. Remotely sensed data were one of the major input datasets for this present study. Thus, imageries acquired in 1986, 1995, and 2015 from Landsat system, and SPOT image of 2006 were used for analyses. Maps at 1:50000 and 1:250,000 scales were obtained from the Ethiopian Mapping Agency. The vector data (road, river, and contour) that were digitized from two 1:50000 topographical paper maps were obtained from EMA. There are other types of data that were used for terrain analysis, elevation data processing and show general topographic characteristics of the study area. These types of data include TIN, DEM, and SRTM that are used to show the slope and aspect of the area and were downloaded from (www.earthexplorer and www.glcf). Legal, policy, evaluation reports, and media sources can be considered as secondary sources of information..

Formats for vegetation data collection namely, Floristic richness, Tree/shrub species, seedling & sapling data and Land Cover Relieve Data Sheet were obtained from the Institute of Biodiversity and

Conservation. For field verification, Global Positioning System (GPS), Compass, and a Map of (1: 50,000) scales) were used. The locations (co-ordinate) of each sample plots were recorded by a GPS (Table 2). The data required for this study were obtained from a variety of sources. Different references, reports and websites were useful means of obtaining information about what policies, initiatives, projects, best practices, etc. already exist.

3.2 Methodology

The first methodological step was a comprehensive review of the existing literature in order to obtain both theoretical insights and secondary data. In this thesis both quantitative and qualitative methods were employed. To gather the primary data, questionnaires and interview were made to determine the status of biodiversity by means of questionnaires collecting opinions of concerned experts to define opportunities for the development of ecotourism in Entoto Park. The qualitative data were acquired through semi-structured questionnaire, transect walk and field observations were transcribed and analyzed. When questionnaires were returned, a personal interview was conducted with certain respondents to explore in depth the perspectives and outcomes of the conservation and ecotourism promotion. Questionnaires were delivered to key representatives of the Ethiopin Minirty of Tourism and EHT. Most interviews were conducted face-to-face, and a few were conducted by phone. Respondents were asked about the perspective of the park, the conservation outcomes they thought were most important, and the factors they believed contributed to the existence of the park. Interviews were digitally recorded and notes were taken. Systematic sampling was one of the methods employed for field data collection of this study. All trees and shrubs were recorded from the systematically established quadrats along each transect. The primary data collection was performed during field verification. Moreover, there were challenges and opportunities during transect walk. The study employed purposive sampling method to collect data from different stakeholders. Accordingly, Ethiopian Heritage Trust, Addis Ababa Culture and Tourism Development Bureau, Ministry of Culture and Tourism, Institute of Biodiversity, Environmental Protection Bureau of the Addis Ababa city Administration, and are more concerned institutions so that they were contacted for primary data collection. The second task was data collection from key stakeholders and all other related sources on biodiversity conservation and ecotourism development in the Entoto Natural Park. Then, geospatial data were used and remote sensing and GIS methods implemented for the data analysis. One of the vital procedures is integration of all datasets (raster, vector attribute, and statistical) to assess the spatial

changes of the land use/cover and biodiversity in the study areas. The remotely sensed data require some pre-processing prior to be used directly in which, among others, the atmospheric effect, geometric error are corrected for. Spectral Profile is a display that plots the reflectance spectrum of a designated pixel. Image enhancement was one of the methods which have been used. As noted by any sensor system has various sources of noise, resulting in a few erratic pixels. Thus satellite data were pre-processed and enhanced in order to avoid noise and radiometric error and made ready before make use of them for further interpretation and analysis. Enhancement techniques can be applied to reduce atmospheric and sensor variability in Multispectral Scanner (MSS) data require minimal preprocessing and post-processing of the imagery. Image enhancement is the process of making an image more interpretable for a particular application. The resolution merge function has been implemented for resampling low spatial resolution data (30 m) to a higher spatial resolution i.e.; (15 m) with the options of retaining spectral information. The resolution of a specific sensor can refer to radiometric, spatial, spectral, or temporal resolution. Enhancement makes important features of raw, remotely sensed data more interpretable to the human eye. Enhancement techniques are often used instead of classification techniques for feature extraction—studying and locating areas and objects on the ground and extracting the maximum information from the raster data (Faust, 1989). In order to make the data compatible to each other data integration was one of the approaches employed.

Ethiopia possesses an estimated number of 6000 species of higher plants of which 10% are endemic. The country has 284 species of wild mammals and 861 species of birds. Data on other wild animals are scanty; and the number of reptile, fish, amphibian and arthropod species identified so far are 201, 200, 63 and 1,225, respectively. Of these faunal resources, 29 wild mammals, 18 bird, 10 reptiles, 40 fish, 25 amphibians and seven arthropod species are endemic to Ethiopia. But due to direct and indirect pressures, ecosystems and a number of wild plants and animals including endemic species, as well as farmers' varieties and indigenous animal breeds are declining. Therefore, 103 tree and shrub species, 31 bird, one reptile, nine amphibians, two fish and 14 other invertebrate species are threatened (EBI, 2014).

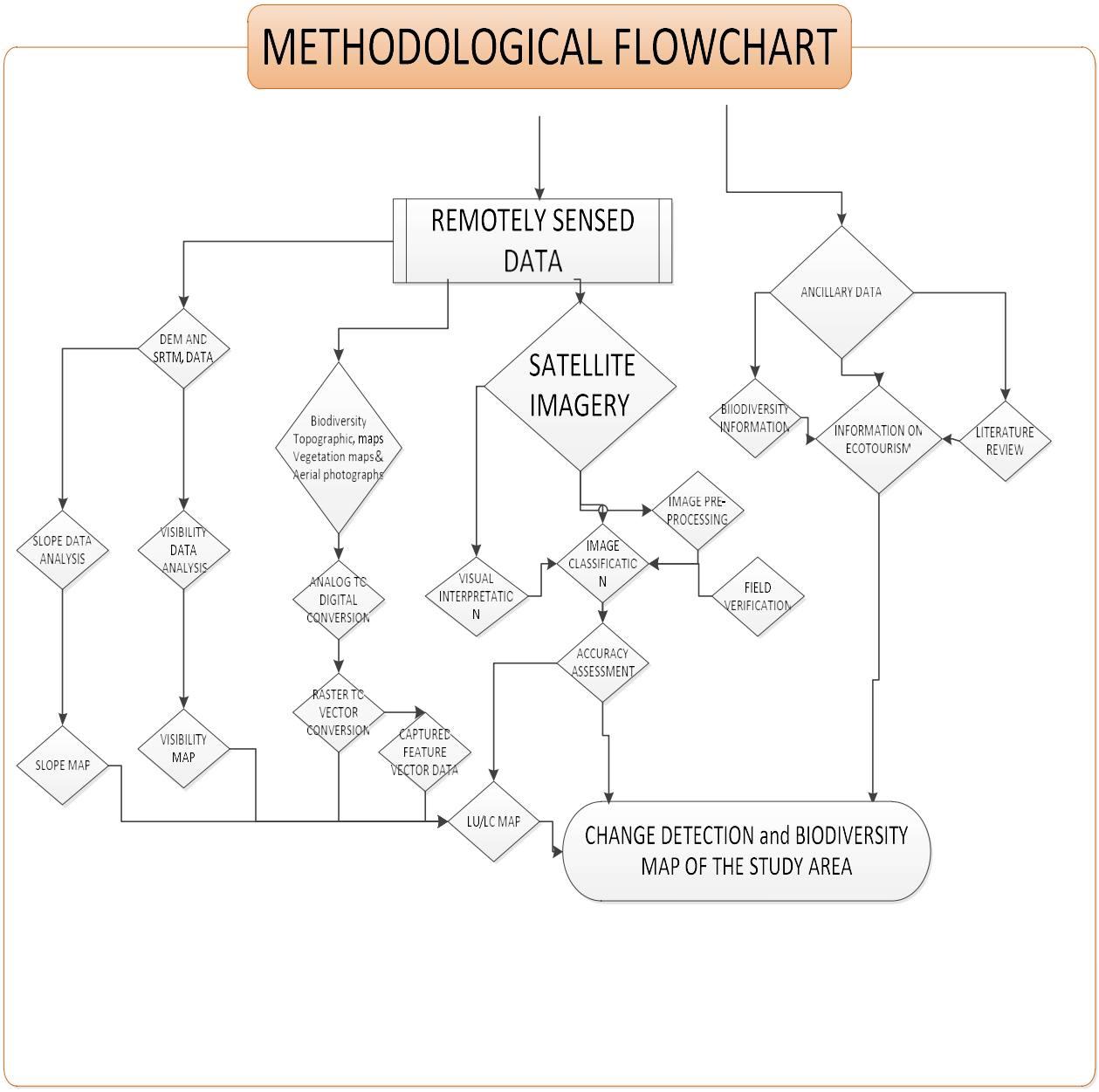

Figure 1 Research Process Flowchart

3.2.1 The study area

3.2.2 Study Area Description

The Entoto Natural Park was established by the initiation of few love. It is located between 38°48'00" & 38°47'01" East and 09°04'05" & 09°07'33" North. The Park lies on the south-eastern slopes of Mt. Entoto between the northern limit of the city of Addis Ababa (at 2, 600 m), and the track along the mountain ridge (at over 3,100 m), its total area is 2,300 hectares (figure 2). However, the total area of the Entoto escarpment including the Entoto natural park is 1,300 ha Ethiopian Heritage Trust (EHT). The geology of Addis Ababa and its surrounding has been studied by several researchers. The Alaji basalts are exposed at the crest of Entoto hills and across the sululta plains. They form high topography (ridges) and are the oldest rocks belonging to Alaji cycle. These basalts show variations in texture from porphyritic to aphanitic. In the northern part, the Entoto mountain chains are composed of rhyolite and trachyte with minor amount of obsidian rich tuffs which are called the Entoto silicics. They are associated with Alaji formation and rest on older basalt. The rhyolites are porphyriticwith phenocrysts of quartz, sandstone and andesine-oligoclase and groundmass of devitrified glass, iron oxide, plagioclase and quartz. The trachytes are composed of phenocrysts of an orthoclase sanadine, oligoclase and magnetite and a ground mass of plagioclase (Haileselassie and Getaneh, 1989). Vertic cambisol soils types are widely spread over the study area. The hill chain Entoto, on where the Entoto Natural Park is situated in the northern part of Addis Ababa is composed of basalts, which is covered with volcanic topsoil materials of about one to two meters thick. The dominant soil type of Entoto is clay and the topsoil materials in the western parts are thick and soft compared to those of the northern and eastern parts. The mountain is formed from a tilted block of bedrock that has left very steep, soil-less slopes and cliffs on the northern side, and much longer, shallower slopes on the south-eastern side. It is not uncommon to see sharp changes in the inclination of the slope and some flat land areas in different parts of the city. On the top of the hills, and ridges including Entoto streams are dense. The park is an excellent place for watching vultures (with five species present), as well as eagles, buzzards and hawks, larks and ravens. Of particular interest are *Gypaetusbarbatus* (a notable population exists in the Entoto and Gorfu hills), *Buteooreophilus, Bubo capensis* (historical records only), *Aquila wahlbergi* and *Accipiter rufiventris*. Many Palearctic and intra-African migrant species use the park (EWNHS, 2015).

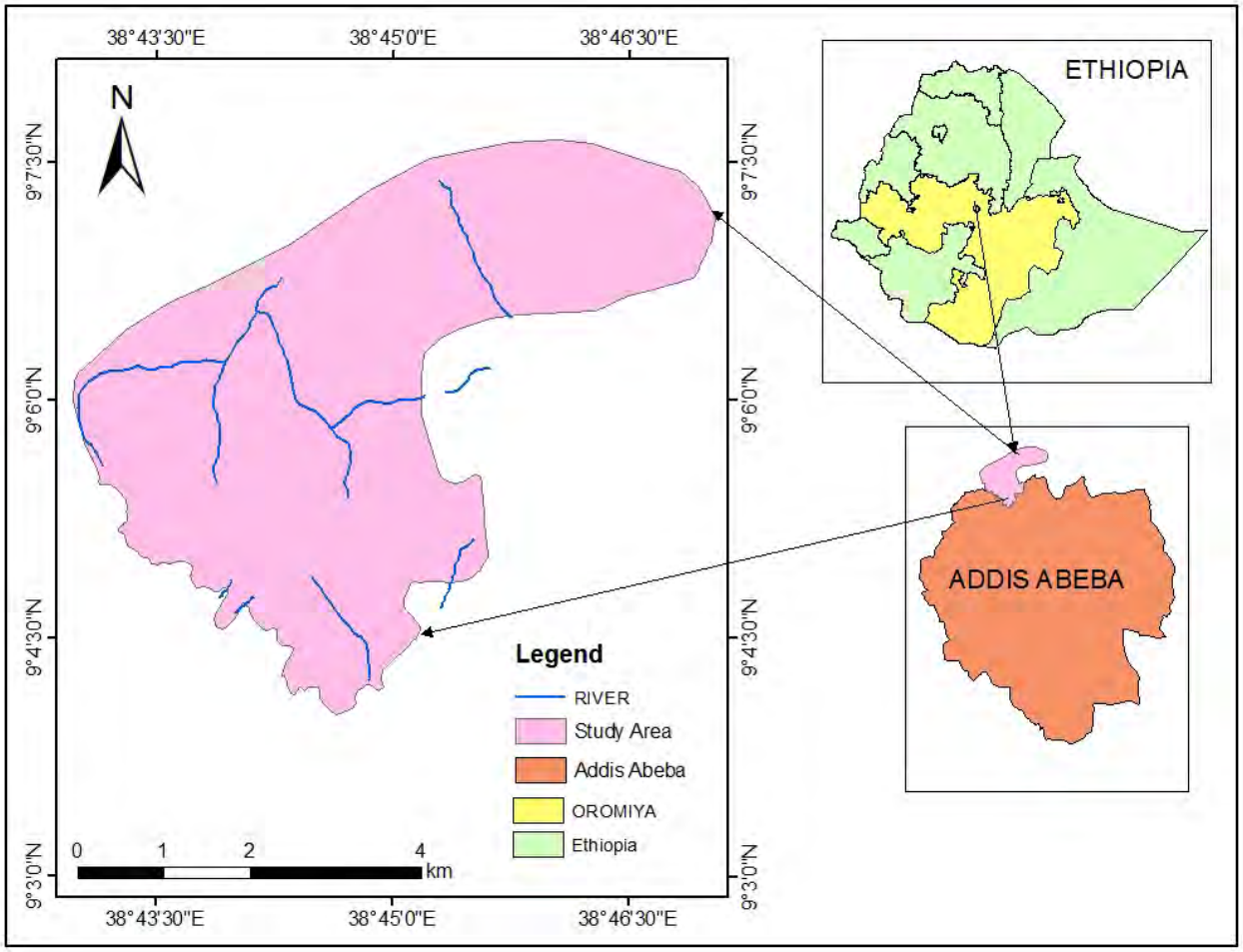

Figure 2 Location Map of the Study Area

3.2.2.1 Topography

Entoto Natural Park lies on the south-eastern slopes of Mt.Entoto, between (2300 m - 3,100 m) the northern limit of the city of Addis Ababa (at 2,600 m), and the track along the mountain ridge is (at over 3,100 m) (Figure 3). The climate in Entoto Natural Park is subjected to low pressure, also called Inter Tropical Convergence Zone, which is moving across the equator seasonally northward and Southward on the African Continent. The average maximum temperature varies from 24.3°C in May to 20.3°C in August; the average minimum temperature varies from 11.8°C in May to 7.7°C in December. The main wet season takes place from June to September, causing about 70% of annual rainfall with the highest peak in August. Another small peak of rainfall is observed in April (Dirk, 2001). According to the National Meteorological Agency of Ethiopia (NMAE, 2014), Addis Ababa and its surrounding

areas receive 270 mm rainfall during summer season (June, July, and August) and minimum rainfall amounting 12 to 32 mm in winter season (December, January and February). The average annual rainfall in the study area and the city of Addis Ababa amounts to (1165 to 1170 mm). There is the track in the Entoto park which forms the border between Addis Ababa and Oromiya Regions, and divides two large watersheds, that of the Abbay (Blue Nile) to the north and the Awash to the south (Figure 2).

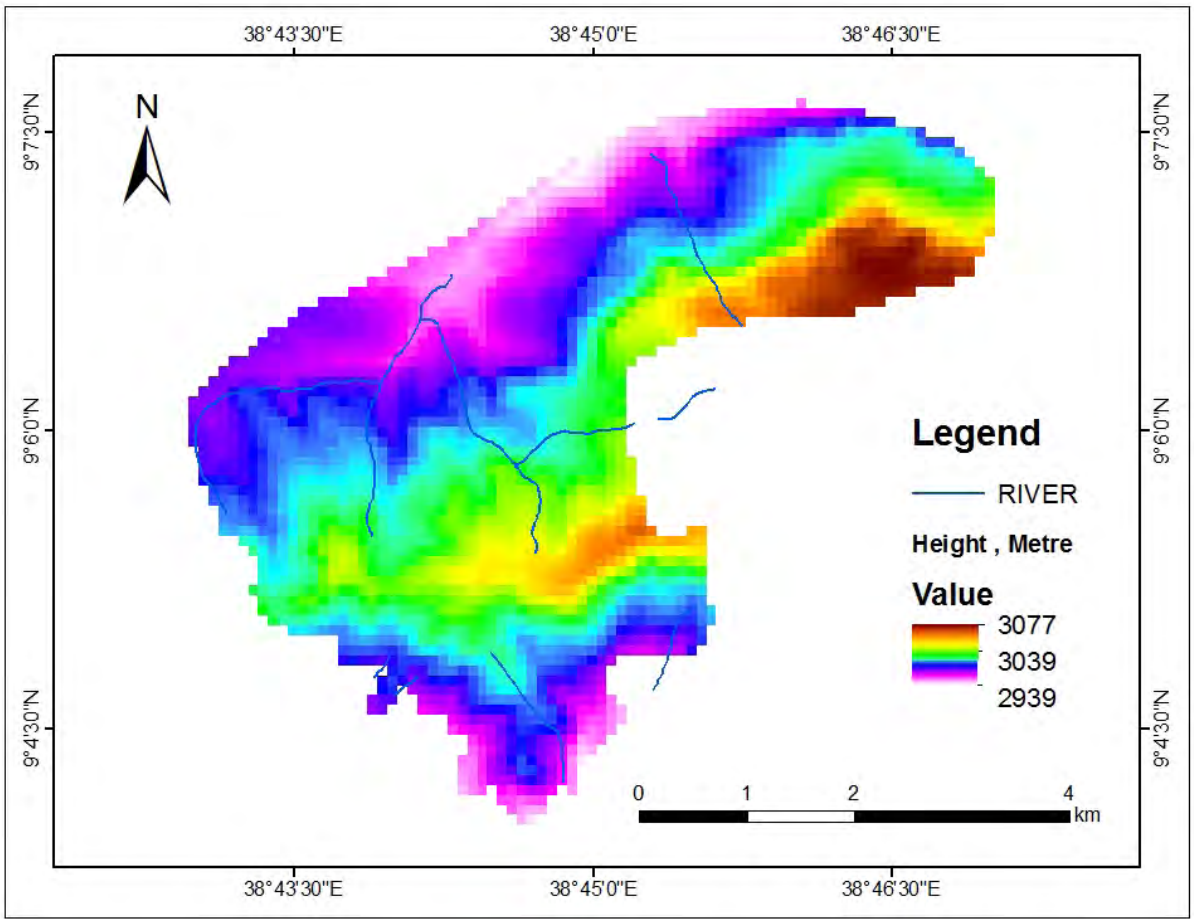

Figure 3 Topographical Map of the study area.

3.2.3 Sample Site Selection

The field data collection was performed in February, 2016. The field data were obtained from sample quadrates which were laid down along transects at a distance of 50 m from each other using measuring tape meter. A total of 29 quadrats (2.6 hectare) were sampled (Figure 7). Individuals were classified in a series of girth classes at specific height intervals (Diameter at Breast Height (DBH)) ≥3.5m high (considered as trees) 1.0 m to 2.5 m saplings) and less than ≤ 1.0 m high (seedlings).The control transects used in this study represent the recommended standardized protocol for recording plant distributions and abundances with each quadrat/plot placed along a linear transect at 500 m intervals. Each control transect is 1km away from each other with 30 X 30 m quadrat-width (Figure 7). The sample plots were established at a fixed interval (500m) on linear transects in parallel and 1km away from each other. In each major plot from one to seven subplots of 30m x 30m were established for species composition assessment, open space and bare land cover estimation. In establishing the sampling plots, a combination of systematic sampling method was used to collect samples. This approach was complete systematic design locates stands and subsamples within stands by reference to a grid superimposed over the survey area. Intersections of north-south and east-west lines at one scale define stands to be sampled and intersections at a finer scale define sample points within stands. To investigate the plant community structure, species composition, and regeneration status of Entoto natural Park Forest, eight lines transects were laid down starting from the lower limit of the study area to the top of the ridge. Sample quadrants of 30m x 30m (Trees, Seedlings, Saplings and Shrubs) were measured. Species richness, density and saplings were collected from the major (900m square size) plot. All trees and shrubs rooted in within the plot were considered and diameter at breast height (dbh) for trees and diameter at stamp height (dsh) for shrubs were measured by using Tree Caliper. Height of trees and shrubs with dbh/dsh greater than 2.5 cm was estimated visually. Number of stems above ground was also counted and registered for trees and shrubs with dbh/dsh greater than 2.5cm. The data collected by GPS were downloaded by using GarminMapsource software and processed in accordance with the appropriate system for each data format. Then, percentage cover, frequency and woody species richness were calculated and analysed by using Forest Genetic Resources Conservation Project (FGRCP) database Access for windows version7.0 software.

3.2.3.1 Data Analysis

All the data processes were performed by applying different and appropriate software in accordance with the data type. The software package used were ERDAS Imagine version 2014, ArcGIS ver.10.3, FGCP For geospatial data processing and analysis, ERDAS Imagine, ArcGIS, MSExcel and other software were applied. One of the methodological steps is a comprehensive suitability analysis for biodiversity conservation and determines ecotourism development in the Entoto natural park by implementing ArcGIS and other software applying proper techniques. Coupled with appropriate models, GIS can be used to provide a more holistic approach towards problem solving in which qualitative and quantitative information has to be processed (Beedasy and Whyatt, 1999). Then, GIS vector layers were created and incorporated as input parameters with the suitability map analysis. Then, the final suitability map of the Forest Park was prepared in GIS environment. The supervised classification technique was used to classify the imageries because an a priori knowledge was gained during the study area's field verification. Accordingly, pixels that represent patterns and each land cover features were identified and selected with help of ground truth data.

Accuracy assessment is a general term for comparing the classification to geographical data that are assumed to be true, in order to determine the accuracy of the classification process. Accuracy assessment should be an important part of any classification but it is frequently not done. The reason for this is that it usually involves a lot of work in the field, which can be very expensive and time consuming (Congalton 1991).

CHAPTER IV: RESULTS AND DISCUSSION

4.1 RESULTS

The result of field verification showed that 25 types of tree and shrub plant species were recorded from the Entoto natural park and the response through the questionnaires and the information obtained from conducted personal interview were almost matched with the result of data recorded from the field. The plants are already grown on 500 hectare out of the 1300 hectare of the EHT project area. In addition, the floristic species compositions of the Entoto natural park are significant and 20 of them were recorded. However, as compared to other small forests in Ethiopia, the species diversity of Entoto forest consisted of less than 30 types of tree and shrub plant species. The significant plant species reduction in Entoto was the consequence of the deforestation of the natural vegetation due to population growth and expansion of the Addis Ababa city already occurred at the end of 19th century (Figure 5&6).

The result of Spectral Profile algorithm revealed that even the reflectance value of most of the vegetation i.e., forest, woodland, grass, and shrub were been more separated/de-correlated by Band 5 of Landsat TM as illustrated in two dimensional plots (Figure 4). However, on band 2 most feature classes were poorly separated, and the reflectance of forest & woodland, and shrub & soil even has shown subtle difference. Therefore, Bands 3, 4, and 5 were found to be informative and selected as candidate bands for further analyses. A two dimensional plot of the bands been produced (Figure 4).

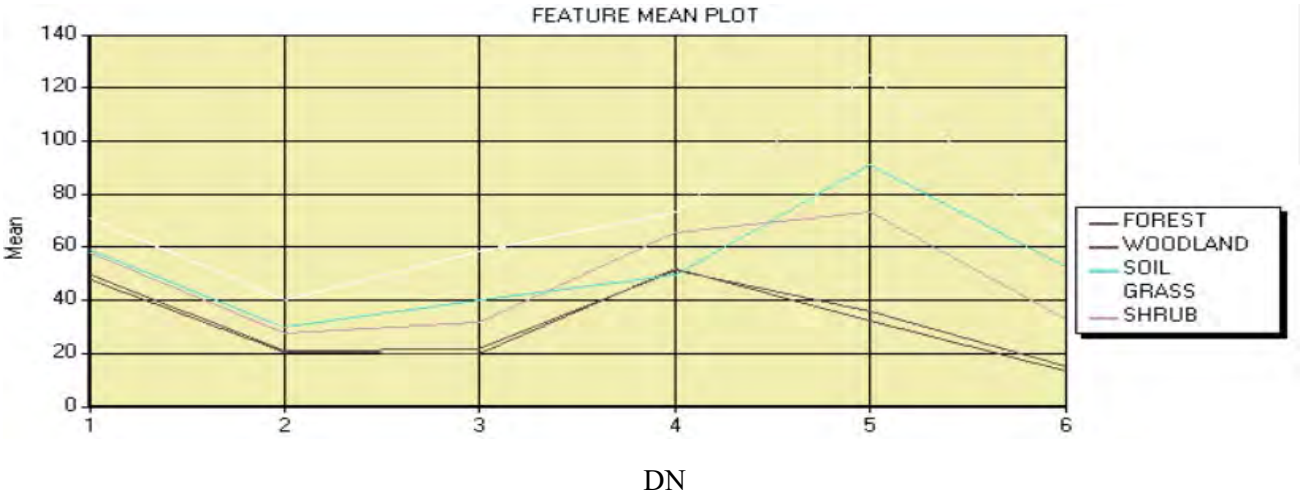

Figure 4 Feature Spectrum Plot

Then, Landsat data of (30 metre resolution) for (i.e., 1986, 1995, 2007, and 2015) were classified by applying supervised classification method (Figure 5 and 6). Both GIS and Remote Sensing techniques accelerated this research process, enhanced accuracy and reduced the expenses of this study. In addition, the map of the study area, land use/cover, and topographical maps were produced in an ArcGIS and ERDAS Imagine environment.

The accuracy of a classification is usually assessed by comparing the classification with some reference data that is believed to accurately reflect the true land-cover (Congalton, 1991). The accuracy assessment reflects really the difference between our classification and the reference data. A measure for the overall classification accuracy can be derived from this table by counting how many pixels were classified the same in the satellite image and on the ground and dividing this by the total number of pixels. For this study, sources of reference data included ground truthing, higher resolution satellite images, and topographical and thematic maps. The classification accuracy of each imagery i.e., 1986, 1995, 2007 and 2015 is 97%, 90%, 82% and 81.3% respectively. The land se land cover matrix is stated in the Appendix 1.

4.1.1 Land use Land Cover Change

The result of time-series image of (1986, 1995, 2007 and 2015) analysis revealed that in comparison to one decadal data by another time data, forest cover of the area shown more increase. The spatial change of other three land cover features is constant. However, except forest cover the area of all other features is more or less declining (Figure 5 and 6). The result of image analysis indicated that since 1980s to 1990s, forest area coverage of the study has shown continuous increase in relation to other vegetal cover and from 1990s onwards forest cover shown gradual decline and shrub area coverage has increased by more than 1% relatively (Table 1). It is also believed that the environmental conservation project activity of the Ethiopian Heritage Trust who planted 40,000 indigenous seedlings in the Entoto Natural Park on 500 hectare has contributed to the Entoto forest area improvement. The whole Entoto mountain range (and many of its surroundings) was covered with Eucalyptus plantation. The habitats in the park are diverse: forest, bushland, cultivated fields, grassy meadows, rocky slopes and cliffs, streams and marshes. The natural vegetation is Afro-montane forest and, where drainage is impeded, woodland with open meadows. The forest would have been dominated by *Juniperus procera* with groves of *Olea europaeacuspidata*, scattered *Hagenia abyssinica*, *Hypericumrevolutum, H.quartinianum, Podocarpus falcatus* and *Acacia abyssinica*, with *A. negrii* in some of the more

disturbed valleys. *Erica arborea* appears at altitudes above 3,000 m. Shrubby areas include species with fleshy fruits like *Rosa abyssinica* and *Carissa edulis*, which attract fruit-eater birds. The number of herbs, both in the undergrowth of the forest and in the meadows, is very large and includes a number of endemics, particularly clovers Ethiopian Wildlife and Natural History Society (EWNHS, 2015). Agriculture is one of the main stay of the local residents which occupied neighbouring lands and even including some portion of the Entoto natural park project area which is undertaken by EHT. Regardless of the close proximity to the city of Addis Ababa, farming system of the surrounding community has been little affected by modern inputs (Figure 5& 6). Farmers on Entoto cultivate barley, wheat, and raise cattle and sheep, and in addition, horticulture is practiced by some farmers.

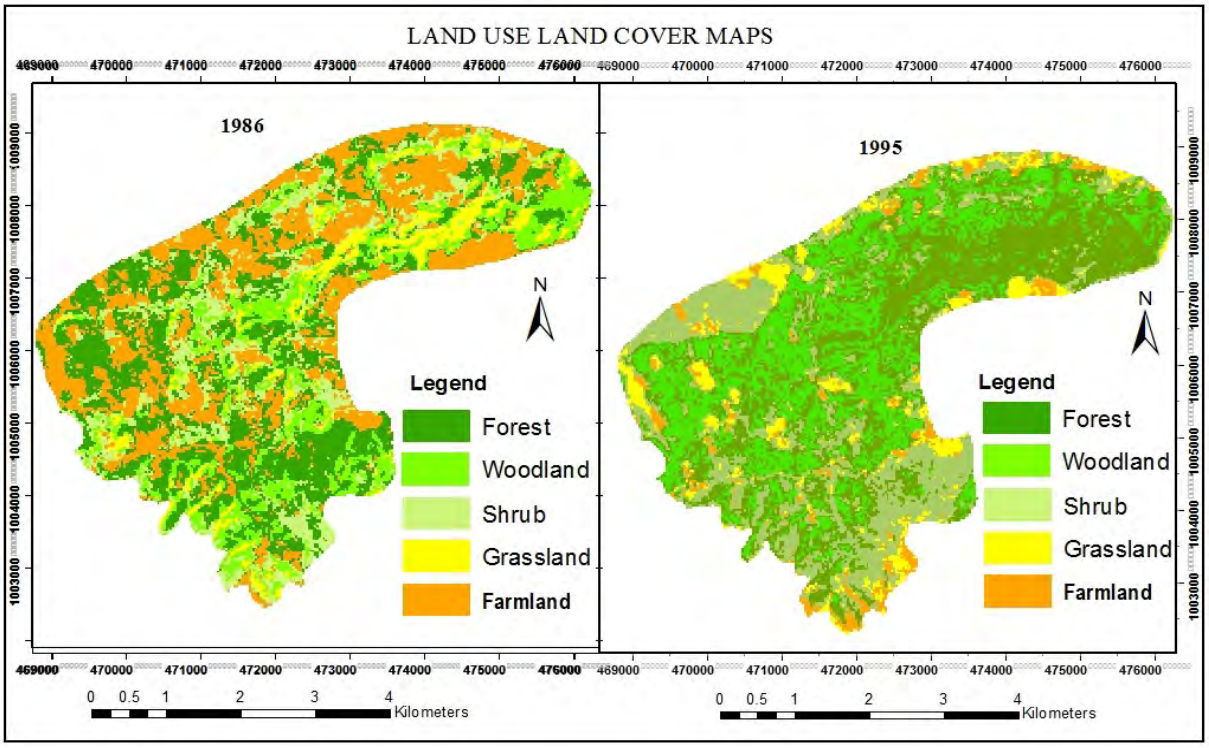

Figure 5 Land use and land cover map of Year 1986, (left) and 1995 (right).
Source: Landsat images acquired in 1986 and 1995.

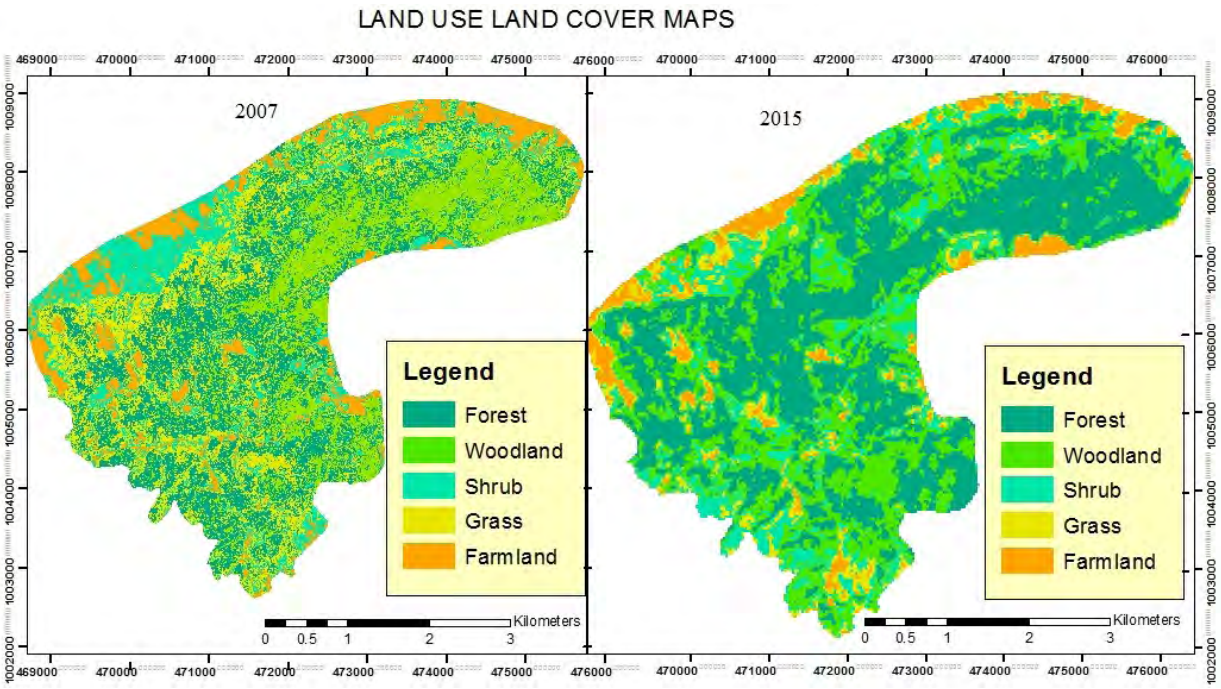

Figure 6 Land use and land cover map of Year 2007 (left) and Year 2015.
Source: SPOT image of 2007 and Landsat image of 2015.

Table 1 LU/Cover Change in Percent

YEAR CATEGORY	1986	1995	B/n 1986 & 1995		B/n 1995 & 2006			B/n 2006 & 2015		
			Change			Change			Change	
	(Hectare)	(Hectare)	In Ha	%	(Hectare)	In Ha	%	(Hectare)	In Ha	%
Forest	256.33	834.18	577.9	225.44	861.72	27.5	3.20	1085.20	223.5	25.9
Woodland	562.6	634.41	71.8	12.77	593.20	-41.2	-6.95	263.12	-330.1	-55.6
Shrub	838.61	565.24	-273.4	-32.60	280.18	-285.1	-101.8	682.65	402.5	143.6
Grassland	111.47	156.6	45.1	40.49	235.65	79.1	33.55	95.04	-140.6	-59.7
Soil	531.03	109.57	-421.5	-79.37	329.25	219.7	66.72	174.54	-154.7	-47.0
Total	2300.00	2300.00			2300.00	Shrub		2300.55		

4.1.2 Assessment of Biodiversity

In the study area a total of 25 plant species, acacia (2), Junipers (1), *Eucalyptus* (1), *Hagenia* (2), *Erica* (1), *Olea* (1), *Hypericum* (1), *Podocarpus falcatus* (1), *Burllesa* (1), *Domboya* (1), *Ekebegia* (1), *Erythrina* (1), *Ficus*(1), *Maytenus* (1), *Millettia* (1), Myrica (1), *Phoenix* (1), *Pittosporium*, (1), *Rosa* (1), *Salix* (1), *Shchefflera* (1), and *Syzygium* (1) representing 20 families were recorded from the Entoto natural park. Out of these, 22 of them were trees, and 3 shrubs. Therefore, only 25 plant species representing 20 families were recorded in the study plots. Of these 25 species, 22 were woody plants (trees and saplings) on which the quantitative analysis was based. Among the woody plants, trees are the dominant growth forms occupying more than 88 % of the total. The field data which constituted of the plant measurement data, each plot points and location/co-ordinate of each plot points were analyzed and the outputs were produced. The resulted plot points were integrated and overlaid with the image map of the sample selection area (Figure 7).

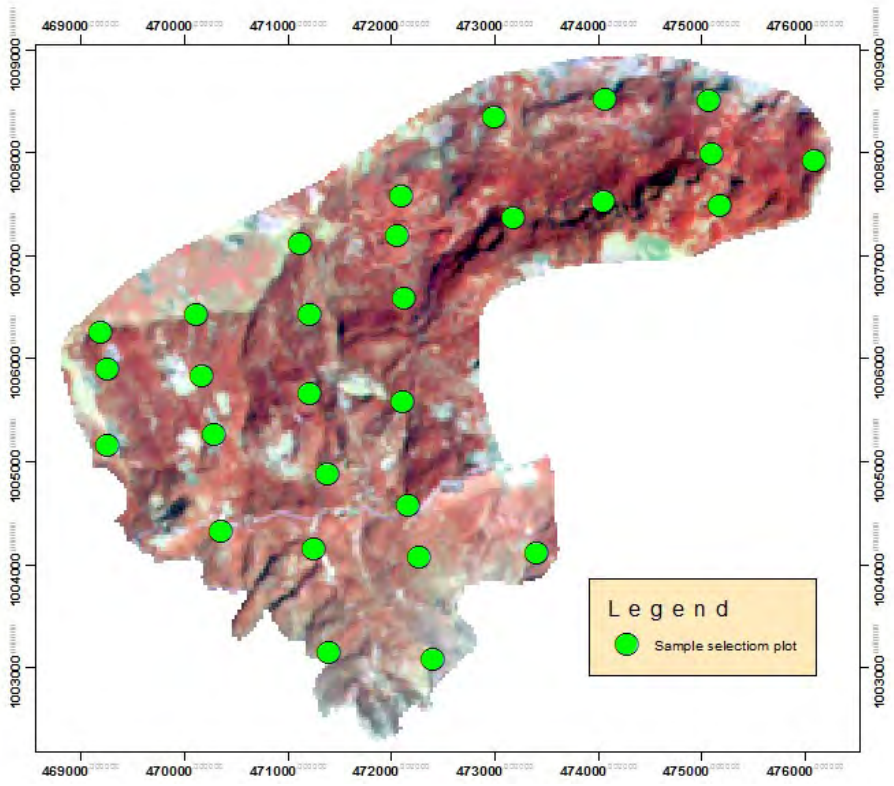

Figure 7 Plots of sample Quadrats. (Source: Data recorded by Author)

Understanding the variation in plant diversity patterns of different scales is an important topic and crucial for both ecological explanations and for effective conservation design (Devries et al., 1997, as cited in Lema, 2011). The description of plant communities involves the analysis of plant diversity, evenness and similarity (Whittaker, 1995). The locations (co-ordinate) of each sample plots were recorded by a GPS. The data required for this study were obtained from a variety of sources. Different references, reports and websites were useful means of obtaining information about what policies, initiatives, projects, best practices, etc. already exist. The recorded co-ordinates of plot points were also organized in a tabular form (Table 2).

Table 2 Coordinate points for plots of sample quadrants.

Plot Number	Easting (X-Co-ordinate)	Northing (Y-Co-ordinate)
3	468549	1005401
4	472115	1005582
5	472116	1006596
6	472058	1007189
7	472098	1007592
4	470125	1006862
3	470175	1005830
2	470297	1005260
2	474076	1008513
1	474063	1007522
6	471115	1007124
4	471201	1005675
3	471383	1004874
1	470053	1004317
1	471399	1003162
2	472997	1008345
1	473182	1007371
1	473414	1004113
3	475072	1008501
2	475106	1007981
1	475187	1007479
1	476095	1007923
2	471261	1004152
1	472403	1003085
5	471115	1007124
2	472268	1004072
3	472167	1004581
2	469289	1005701
1	469260	1005164

Diversity and equitability (evenness) of species in a given plant community are used to interpret the relative variations between and within the community and helps to explain the main reason for such a difference. Species diversity has been identified as one of the key indices of sustainable land use practices and considerable resources are expended to identify and implement strategies that will reverse the current decline in biodiversity at local, regional and international scales, according to (Shackleton, 2000). For comparison some other forests were selected and then discussed.

4.1.2.1 Floristic Composition

4.1.2.2 Entoto Natural Park

A total of 25 of plant species were recorded in Entoto evergreen forest during field data collection and used for analysis (Table I). This shows that the Entoto Park is not rich enough in species diversity compared to many other Ethiopian forests in which more than 80 tree plant species were identified in each forest. Earlier, this forest have been dominated by *Juniperus procera* with groves of *Olea europaea cuspidata*, scattered *Hagenia abyssinica, Hypericum revolutum, H. quartinianum, Podocarpus falcatus* and *Acacia abyssinica,* with *A.negrii* in some of more disturbed valleys. *Erica arborea* appears at altitudes above 3,000 m. Shrubby areas include species with fleshy fruits like *Rosa abyssinica* and *Carissa edulis,* which attract fruit-eater birds. The number of herbs, both in the undergrowth of the forest and in the meadows, is very large and includes a number of endemics, particularly clovers. But as it has been identified during fieldwork most part of the Entoto mountain range (and many of those around it) is dominantly covered with Eucalyptus plantations and followed by *Juniperus procera* tree plants. The result of the data analyses showed that most of the plant species that were recorded in the study plots are indigenous plants (Table2). The FGRCP database Access for windows version software was applied to identify the vegetation into plant community types based on the data of the plant species. Then, the FGRCP database Access for windows version7.0 software was applied for field data analysis in which floristic richness, vegetation density, frequency, density per forest, and total stem per forest were calculated and determined.

Table 3 Floristic Richness of the Entoto Forest

No	Forest Name	Genus Name	Species Name	Family Name
1.	Entoto Natural Park	*Acacia*	*abyssinica*	Fabaceae
2.		*Acacia*	*negrii*	Fabaceae
3.		*Burollesa*	*polystachya*	Discoreaceae
4.		*Domboya*	*Torrida*	Sterculiaceae
5.		*Ekebegia*	*Capensis*	Meliaceae
6.		*Erica*	*arborea*	Ericaceae
7.		*Erythrina*	*brucei*	Fabaceae
8.		*Eucalyptus*	*globulous*	Myrtaceae
9.		*Ficus*	*sycomorus*	Moraceae
10.		*Hagenia*	*abyssinica*	Rosaceae
11.		*Hygenia*	*Abyssinica*	Rosaceae
12.		*Hypericum*	*revolutum*	Hypericaceae
13.		*Juniperus*	*procera*	Cupressaceae
14.		*Maytenus*	*arbutiolia*	Celasteraceae
15.		*Millettia*	*ferruginea*	Fabaceae
16.		*Myrica*	*salicifolia*	Myricaceae
17.		*Olea*	*europaea*	Oleaceae
18.		*Phoenix*	*Reclinata*	Arecaceae
19.		*Pittosporum*	*viridiflorum*	Pittosporaceae
20.		*Podocarpus*	*falcatus*	Podocarpaceae
21.		*Prunus*	*africanus*	Rosaceae
22.		*Rosa*	*Abyssinica*	Rosaceae
23.		*Salix*	*Subserata*	Salisaceae
24.		*Schefflera*	*abyssinica*	Araliaceae
25.		*Syzygium*	*guineense*	Poaceae

Source: data recorded by Author.

The quantity of stems which were recorded in all quadrants was calculated and *Eucalyptus globulous* is the species that is grown in larger quantities of which is 4560 stems in all quadrants and the least abundent is *Podocarpus falcatus* with 15 stems and only 0.17% of the total stems (Table 5). A few species of trees dominated the quantity of stems in all quadrants of the forest vegetation in which about 51% of the total abundance is contributed by *Eucalyptus globulous* species alone. The two tree species namely *Eucalyptus globulous and Juniperus procera* occupied nearly 88 % of the total species abundance of the area (Table 4).

Table 4 Quantity of stems in all quadrants

Forest Name	Genus Name	Species Name	SumOfQuantity	%
1	*Acacia*	*negrii*	168	1.907
2	*Acacia*	*abyssinica*	118	1.339
3	*Burollesa*	*polystachya*	75	0.76
4	*Domboya*	*torrida*	52	0.53
5	*Ekubeergia*	*capensis*	9	0.09
6	*Erica*	*arborea*	870	9.875
7	*Erythrina*	*brucei*	84	0.853
8	*Eucalyptus*	*globulous*	4560	51.759
9	*Ficus*	*sycomorus*	96	0.98
10	*Hagenia*	*abyssinica*	160	1.816
11	*Hypericum*	*revolutum*	150	1.703
12	*Hypericum*	*revolutum*	65	0.66
13	*Juniperus*	*procera*	2432	27.605
14	*Maytenus*	*arbutiolia*	51	0.52
15	*Millettia*	*ferruginea*	93	0.94
16	*Myrica*	*salicifolia*	85	0.86
17	*Olea*	*europaea*	337	3.825
18	*Phoenix*	*reclinata*	37	0.38
19	*Pittosporum*	*viridiflorum*	49	0.50
20	*Podocarpus*	*falcatus*	15	0.17
21	*Prunus*	*africanus*	57	0.58
22	*Rosa*	*abyssinica*	91	0.92
23	*Salix*	*subserata*	55	0.56
24	*Schefflera*	*abyssinica*	63	0.64
25	*Syzygium*	*guineense*	72	0.73
			9844	

Source: Data collected and recorded from field.

A relatively small number of species dominated in the forest, with only 2 species occurring in more than 88 % of the plots. At the family level, *Myrtaceae* and *Cupressaceae* are the most diverse with 1 species each, followed by *Oleaceae*. In terms of stand density, *Myrtaceae* is the most abundant plant (Table 5).

Table 5 Table 5 Relative Density of the Plant

Forest Name	Genus Name	Species Name	Total Stems	Total stem per Forest	Relative Density %
Entoto Natural Park	*Acacia*	*abyssinica*	17		0.08
	Erica	*arborea*	279		1.3
	Eucalyptus	*globulous*	15359		70.21
	Hagenia	*abyssinica*	88		0.41
	Juniperus	*procera*	6106		28.00
				21570	100

Source: (Data recorded by Author).

4.1.2.3 Menagesha suba State Forest

The Menagesha Suba State Forest is 30 km south west of in Oromia National Regional State in central Ethiopia. The mountain sides are generally steep with ravines cut by streams and rivers. Menagesha Suba State Forest covers 9,248 ha. Dry evergreen afromontane forest together with grassland and Acacia woodland once believed to have formed a vegetation mosaic across the Ethiopian plateau. The forests and woodlands occur on the better drained soils of the mountains and of the valleys sides while the grassland occupies the heavy clay soils at the bottoms of the valleys. According to (Lema, 2011), the Natural Forest of Menagesha Suba State Forest is dominated by Juniperus procera that grows to c. 30 m and forms a relatively open canopy. Olea *europaea subsp cuspidata, Allophyllus abyssinicus, Maytenus arbutifolia* and *Euphorbia ampliphylla* form the understory, and some Podocarpus falcatus trees are scattered throughout the forest. At higher altitudes, smaller *Juniperus procera* are mixed with *Erica arborea, Rosa abyssinica* and the endemic Jasminum stans. Two giant herbs, Lobelia *giberroa* and *Solanecio gigas* dominate the sides of the valleys; the striking *Scadoxus multiflorus* carpets the forest floor. The floristic data analysis was done based on 106 species that were recorded and collected

within the sampled plots. A totality of 128 species of herbaceous flowering plants belonging to 102 genera and 44 families were documented from Menagesha Suba State Natural Forest (Lema, 2011).

4.1.2.4 Boginda Forest

Boginda forest covers some 7500ha of natural high forest and is administratively located in Gimbo Woreda, Kafa-Shaka Zone in Southern Nations, Nationalities and Peoples Region. In this forest a total of 73 woody specimens were identified from Boginda forest, out of which 70 were, within the sample plots and 3 were outside the sample plots. The most diverse family of this forest was Rubiaceae followed by Euphorbiceae, Celasteraceae and *Fabaceae*.

4.1.2.5 Belete Moist Evergreen Montane Forest

Belete forest is situated in Shabe-Sombo District, Jimma zone, Oromia National Regional State, 375 km Southwest of Addis Ababa. In Belete moist evergreen montane forest a total of 157 species of vascular plants belonging to 135 genera and 69 families were identified (Kflay and Kitessa, 2014). From the identified species *Pteridophytes* and gymnosperms were represented by two species each, and the remaining 153 species were Angiosperms. *Podocarpus falcatus* and *Juniperus procera* are the two gymnosperms found in the study area. The most species rich families were presented *Fabaceae* and *Lamiaceae* with ten and nine species respectively. Thirty-three families were represented each by one species. The growth forms of the species recorded from Belete moist evergreen montane forest was dominated by herbs, followed by trees. Belete moist evergreen montane forest consists of 17 (10.82%) endemic species to Ethiopia some of which are included in the (Kflay and Kitessa, 2014). For comparison purpose total number of plant species of Entoto natural park, Menagesha suba State Forest, Belete Moist Evergreen Montane Forest and Boginda Forest were used (Table 5) the data were presented graphically (Figure 8).

Table 6 Quantity of plant species of different Forests

No	Forest Name	Total Number of species per forest
1.	Entoto Natural Park	25
2.	Menagesha suba Forest	128
3.	Boginda Forest	73
4.	Belete Forest	157

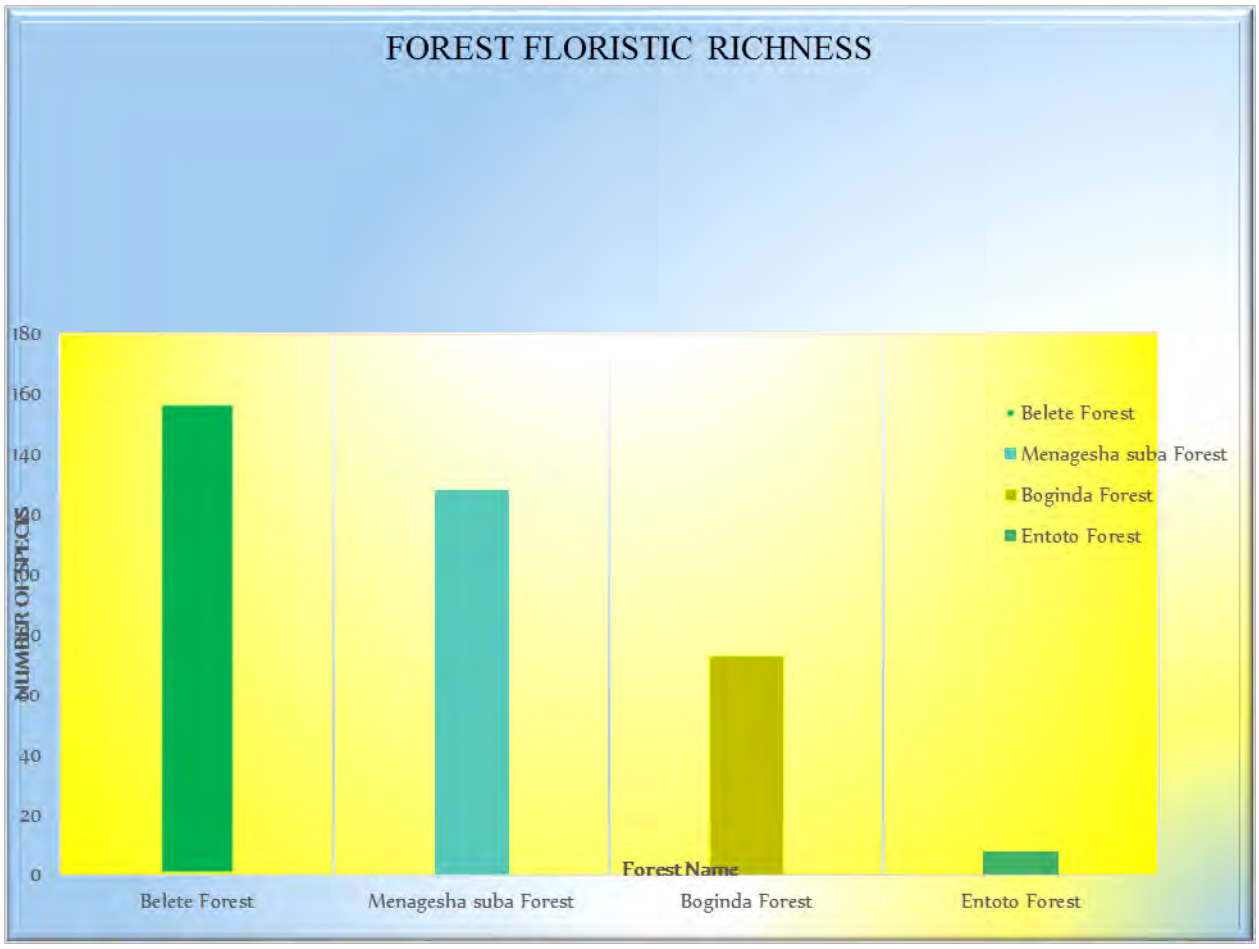

Figure 8 Comparison of Forest Floristic Richness.

4.1.3 Suitability Analysis for Ecotourism Development

Recently, the Entoto natural park is not a fully-fledged national park therefore, it is neither under the responsibility of the Culture and Tourism Bureau of Addis Ababa City Administration nor the Ministry of Culture and Tourism, but it is under the responsibility of the Environmental Protection Bureau (EPB) of the Addis Ababa City Administration. At this current status the Entoto natural park is at a conservation project in progress, rather than a wildlife-filled, visitor-ready tourist attraction. Tourists do not come for the flora and fauna of the Entoto natural park. The reason for this is that it is dominated by the (originally Australian) Eucalyptus globulous trees, which suppress other vegetation, according to (Tesfaye, 2009). The Ethiopian Heritage Trust initiative is now beginning to show returns. The attractive, rugged hillside above Entoto Natural Park's nursery, complete with a wide variety of the indigenous vegetation, compares favourably with the lifeless, uniform swathes of eucalyptus. It gives the visitor an idea of what the pre-Addis landscape would have looked like; and the restoration has also led to the occasional return of dik diks, duikers, and jackals, as well as a variety of birds and shrubs such as *Rosa abyssinica.* The park, with all its scenic beauty of waterfalls, hills and a myriad of birds, attracts students and tourists. The Trust has the future plan of building facilities like restaurants, playgrounds and a training centre for students interested in natural history. The local population will gain new skills, so, they will not be totally dependent on the limited natural resources. In this study, suitability of Entoto Natural Park was assessed for ecotourism development based on selected parameters and by applying geographic information systems (GISs) methods. Site suitability assessment is a basic self-assessment tool to test site suitability for a proposed ecotourism operation. The aspect of environmental degradation is taken into account when assessing suitability. There might, for example, be forms of land use which appeared to be highly profitable in the short run but were likely to lead to soil erosion, progressive pasture degradation, or adverse changes in river regimes downstream. Such consequences would outweigh the short-term profitability and cause the land to be classed as not suitable for such purposes. This principle by no means requires that the environment should be preserved in a completely unaltered state. Agriculture normally involves clearance of any natural vegetation present, and normally soil fertility under arable cropping is higher or lower, depending on management, but rarely at the same level as under the original vegetation. What is required is that for any proposed form of land use, the probable consequences for the environment

should be assessed as accurately as possible and the evaluations should be taken into consideration in determining suitability (Pareta, K. 2013).

The evaluation process of the study conducted for ecotourism site was based on the following chosen factors: distance from roads, land use/cover, reservation/protection, species diversity, elevation and slope, proximity to settlement centres, and population size. Regarding settlement sites the park is located at the very close distance to the city of Addis Ababa, Sululta town, Chancho in the north, and Burayu, Menageha, Sebeta towns in the west, and Lagatafo-lagadadi in the east and all other satellite towns of the Addis Ababa city. Those factors were selected according to the professional expert's opinions. The possible attempt was made to examine the details of the factors. The methodology proposed was useful to identify ecotourism sites by linking the criteria deemed important with the actual resources of the conducted area. The site must be:

a. At least 1000 metres away from dense built-up areas.
b. Within 1500 m of existing allweather road, dry weather road, and motorway.
c. NOT on agricultural land.
d. NOT on community owned possessions.
e. Involve and benefit traditional owners and local communities.

Mainly, the analyses were made based on the above indicated parameters. The analyses output showed that the Entoto natural park fulfilled the requirements so that it can be recommender as suitable site for ecotourism development. In general, this study identified and used the following factors as indicators of suitability within land ecosystems in terms of:

Accessibility and Distance from the roads: Access characteristics were shown in terms of road access with the roads categories (allweather road, dryweather road, and motorways) were considered.

Dense residential area: it was identified that the study area is beyond the radius of 1000 metres from dense built-up areas

Landscape: The park is situated on an elevated ground above the city of Addis Ababa at attractive, wider visibility and rugged hillside of the Entoto ridge.

Biodiversity: the environmental conservation project activity undertaken by the Ethiopian Heritage Trust planted 40,000 indigenous seedlings in the Entoto Natural Park and which covered 500 hectare of

the park area. In the near future, the Ethiopian Heritage Trust project prearranged to plant 44,000 indigenous seedlings and it planned to cover its project area with indigenous plant species entirely.

Topography: It is situated on the top of the Entoto Mountain at a good visibility site (Figure 3).

Telecommunication: it was identified that there is well developed telecommunication infrastructure surrounding the study area.

Power supply: there is well developed and sufficient sub-stations infrastructure within 1000 m radius of the study area.

Population size: with regard to settlement centres, the park is located at the peripheral area of the city of Addis Ababa. There are other towns in the vicinity such as, Addis Alem, Sululta, and Chancho towns in the north, and Burayu, Menageha, Sebeta towns in the west, and Lagatafo-lagadadi in the east, and in the south Bushoftu, Dukem and Akaki towns. In terms of dense residential areas and industrial zones, a buffer zone was dawn around ensuring that the potential site would not be close to already densely populated areas or existing tourist zones. It was considered that no site could potentially be located on agricultural areas or community owned possessions. Land suitability is assessed and classified with respect to specified kinds of use. This principle embodies recognition of the fact that different kinds of land use have different requirements. The qualities of each type of land, such as moisture availability or liability to flooding, are compared with the requirements of each use. Thus the land itself and the land use are equally fundamental to land suitability evaluation (Queensland State (2015). Most development matters need a criteria set. In the same way, development of ecotourism requires the criteria set that can be used to select ecotourism sites to substantiate the existing opportunities and challenges. Some environmental impacts such as air quality, surface water quality, ground water quality, road traffic, noise level, solid waste disposal system, archaeological and historical sites, natural vegetation and wild animal life to evaluate tourism alternatives were recommended in the literature for tourism planning (McIntyre et al., 2006).

4.2 DISCUSSION

4.2.1 Opportunities and Challenges of the Entoto Natural Park

4.2.1.1 Opportunities

To minimize the problems that expose natural resources to degradations in protected areas, some interventions, which involve ecotourism activities have been attempted in Adaba -Dodola forest priority area in Bale zone in Oromia regional state WAJIB which is said to be "Waldaa Jirattoota Bosonaa'' in Afan Oromo meaning "forest Dwellers associations" is an example of an outcome of such effort. Today protected areas are aimed at conserving biodiversity and large scale of natural ecosystems. However, these protected areas are increasingly facing a number of challenges. Protected areas are important destinations for a growing tourism like ecotourism given that it uses diverse nature, landscapes and biodiversity as major attractions. In these protected areas, there might be a potential threat to, and an opportunity for conservation of natural resources (Wearing and Neil, 1999). Ecotourism introduced in protected areas of some countries to reverse these challenges since ecotourism could have a significant role for conservation of natural resources and the overall development in developing countries(Strasdas, 2002). There is an emerging need and opportunity for building bridges between these two systems to improve the quality of human life. The complex relationships that exist between ecological systems and cultural systems can be understood only by linking our formal knowledge system, based on a hypothetical-deductive approach and inductive reasoning to understand ecosystems, with the traditional knowledge system, derived from societal experiences and perceptions. Our understanding of the tangible benefits derived from traditional ecological knowledge, such as medicinal plants and local species of food, is relatively well developed. However, our knowledge of the linkages between ecological processes and social processes, and their tangible and intangible benefits (such as spiritual and religious values), and of the influence on sustainable natural resource management at the landscape level needs to be strengthened (Rudolf et al., 2003). A concurrent trend in development is toward exploration of land uses that can be ecologically as well as economically viable. "Sustainable development," as defined and promoted by the World Commission on Environment and Development (WCED, 1987), is the umbrella under which these efforts occur (Langholz, 1996). To achieve conservation and sustainable use of ecosystems, ''traditional'' and ''formal'' knowledge systems need to be linked. There is an emerging need and opportunity for building bridges between these two systems to improve the quality of human life

(Rudolf et al., 2003). Currently more sedentary lifestyles are encouraging people to be overweight, risking the onset of chronic diseases, such as diabetes, earlier in life. There is an increasing awareness that health services will not be able to cope unless there is a corresponding move to more active lifestyles. Parks are ideal places to take healthy exercise (Barber, 2008). According to (Arvaniditis, 2008), urban green spaces provide opportunities for exercise and recreation and this contributing to the physical and mental health of the people. According to (Kazmierczak and James, 2008) as cited in (Mesfin, 2011), green spaces have also been proven vital to the physical and mental health of the humans. Visiting a national park or protected area will contribute towards the park maintenance in the form of fees for the staff taking care of it.

Ecotourism represents an approach to tourism that emphasizes environmental and cultural preservation. Social benefits of forests include health, employment, education and recreation, community building and property (Kuchelmeister, 2000). These benefits are frequently overlooked. Especially the employment benefits are important for a developing country like Ethiopia, while other social benefits will gain in importance with raising living standard. Developing ecotourism also involves costs, most importantly a budget for environmental conservation, care and management. The budget needed may be considered as significant, but generally the long-term benefits will outweigh the costs. Other costs may be related to threats to human safety, structural damage, vandalism, unorganized waste disposal and reduction of solar energy. However, these costs can be minimized by appropriate measures. Ecotourism is good for the local community, as it provides employment, services and stimulates the economy. It helps in energy conservation and protects the plants and animals from the effects of traditional tourism (Carter, 1995). The followings are some of the importance of ecotourism:

- ✓ With the growth of ecotourism business, it will provide employment to the local people and will ensure that fewer people leave for the cities.
- ✓ You can admire the craftwork made by local artisans and buying these from them will help their economy as well as conserve the local heritage.
- ✓ It is low impact tourism, where people make a conscious effort to appreciate the environment, conserve the natural resources, and re-invest sufficient amount of revenues in protecting natural habitat.

- ✓ Ecotourism can bring you closer to nature, open up to new ideas, take you to places less travelled, and give you a wonderful new experience without harming the environment.
- ✓ You can go bird watching or walk through the forests exploring the different natural wonders, and stopping by villages to enjoy their cuisine, and lifestyle.

After several home-grown Ethiopian ecotourism associations sprung up in the early 20s, the country made a successful bid for a five-year USAID (United States Agency for International Development) grant to support the country's ecotourism development (Logan, 2012). One critical factor underpinning this trend is that there is significantly more tourism-related work happening across the institution and in different regions; evidence suggests that demand for lending and advice is increasing with the political economy and growth of tourism in developing countries (Hawkins and Mann, 2006). Through grant funding sustainable tourism, experts set up the Ethiopia Sustainable Tourism Alliance (ESTA) to liaise with local communities and collaborate to create local ecotourism enterprises (Logan 2012). ESTA is part of the USAID Global Sustainable Tourism Alliance, which uses tourism development as a vehicle to reduce poverty, stimulate economic growth, promote natural resource stewardship, and conserve biodiversity in a number of countries around the world. In Ethiopia, the Alliance is already working with local stakeholders to design a program that will create jobs, respect social-cultural values and heritage, and protect the environment. Program activities will include biodiversity conservation, ecotourism and other niche market development, workforce development, and handicraft production and marketing. In keeping with their goal to conserve and enhance both biodiversity and cultural patrimony, ESTA is concentrating on the Central and Southern Rift Valley Lakeland. Home to the successful ESTA development in Lepis and the earlier German Agency for International Cooperation development (GIZ) in Adaba Dodola, the Rift Valley Lakeland is rife with nature preserves and historic lakes. After GIZ developed rustic accommodations in Adaba Dodola, ESTA brought community stakeholders from Lepis to see what they could do with their area, and worked with them to select potential campsites within the forest and identify endemic bird species that would appeal to the lucrative bird-watching tour sector. Locals took the initiative to improve forest trails and build a bridge over the river to open up additional hiking options. Village Ethiopia, an Ethiopian-owned tour company, runs a 15-unit lodge in the region with rustic reed-and-grass huts. In 2009, at the height of the global recession, Africa was the only region in the world to experience an increase in international arrivals, but Ethiopia is still slow in reaping the effects of this international interest, only drawing in

0.7% of the Africa continent's visitors, according to the UN *(http://www.irrob.org/ecotourism_in_ethiopia.html .Ecotourism in Ethiopia. EhiopianJournal).*

The Ethiopian Heritage (EHT) was established by the initiation of few of the patriots namely, Architect Yosef Bereded, Dr.Agidew Rede, Prof. Richard Pankhurst, Dr. Alula Pankhurst, Michael Sergeant(British nationality) and few others in 1992 with the major objective to preserve and develop historical, cultural and natural heritages of Ethiopia. Tourism revenue aside, historically there has been a trade-off between commercial activity and environmental protection. It is only recently that 'green growth' – investment in renewable sources of energy, has become a mainstream idea. For a developing nation like Ethiopia, this trade-off has been, and is, even more pronounced: economic growth is very much the primary target of its policy. On the edge of Addis Ababa, a long-term conservation project is ongoing to restore indigenous vegetation in place of the imported eucalyptus that has dominated for over a century (William, 2009). However, with the contemporary focus on climate change issues and the wider concept of sustainability, environmental thinking has become ubiquitous. When these ideologies are combined with romantic, aesthetic notions about preservation of original habitats and species it becomes a powerful idea: not only is it nice to preserve unique, natural things, but also we need to be much more careful about how we utilize the earth's resources (William, 2009). To use natural resources sustainably, resource assessment, developing management plans for forest management and land use; and organizing local communities around parks and users of non-timber forest products are among the actions that have effectively been carried out in most of the national regional states of Ethiopia since 2010. Direct and indirect annual economic values of some protected areas are estimated at 1.5 billion USD. "For tourism to be successful and sustainable, both the land and communities in the destination must be healthy and productive" (**http://ethiopia.usembassy.gov/pr_5.html**).

Some of the opportunities of Ecotourism Development are summarized as follows:

- ✓ The presence of long-term conservation project being undertaken by the Ethiopian Heritage Trust to restore indigenous vegetation and conserve the environment, and the continuous follow up,
- ✓ The situation of the park on the periphery of Ethiopia's capital, i.e., city of Addis Ababa and its geographical location that is in the centre of Ethiopia,

- ✓ Proximity to many urban centres which are the potential stakeholders /visitors in the future, especially, the city of Addis Ababa the capital city of Ethiopia and which is the largest town in the country,
- ✓ The park is alongside the main road that winds up from the central part of the city of Addis and also accessible by means of all-weather road from other directions.
- ✓ Access to the Site can be made by using existing roads and tracks without incurring maximized expense for road construction.
- ✓ There is an ongoing effort to protect the forest from destruction by human, domestic animals and wildlife.

4.2.1.2 Challenges

Moreover, as demands for ecotourism increases strongly, the availability of suitable ecotourism sites worldwide is deteriorating, threatening their ecological sustainability. The major reasons for deterioration of ecotourism sites are: i) Incompatible economic uses of land area for other economic activities such agriculture, industry, mining and urban development, ii) Inappropriate tourist development and infrastructures necessary to support those development willful destructions of ecotourism by tourists, iii) Numbers of tourists in excess of carrying capacities and adverse environmental externalities or spillovers which destroy ecotourism resources or assets (Tisdell, 2001). Though the country's ecotourism sector has seen marked growth in terms of both arrivals and offerings in the last few years, the parts of the country being developed for ecotourism are still very new to visitors. With infrastructural concerns remaining one of the main unaddressed barriers to rural tourism; it's difficult to travel to Ethiopia's absolute glut of undisturbed natural areas independently (Logan, 2012). Natural resources in developing countries are under great threat partly due to lack of alternatives and partly due to the type of livelihood of the people. By diversifying the livelihood of the people (mainly towards ecofriendly type), it is possible to minimize the pressure on natural resources. In this regard, ecotourism enables both as an economic activity to diversify livelihood and to sustainably management of natural resources (Amogne, 2014). Okello (2003) noted that the relationship between protected areas and local communities is a key factor in the long-term conservation of the natural resources in and around these protected areas. However, in many cases, the relationship faces conflicts. Public participation has the potential to encourage knowledge transfers between the park management and local community which may be a stimulus for mutual understanding between stakeholders.

Conflict can be an outcome of resource scarcity as a result of population pressure, inequitable distribution of land by non-local populations, and lack of transparency in addressing land problems. Some land conflicts are related to global forces such as trade liberalization, structural adjustment programmes, commercialization, globalization and privatization of community lands, forests and water services (AUC-ECA-AfDB, 2010). Inadequate participation of the locals in ecotourism development process results in inequitable benefit sharing. Simple provision of incentives as a means to exploit resources and marginalize a certain part of a community may intensifies over exploitation of resources, loss of confidence on ownership, and increase the annoyance of marginalized community towards further development of ecotourism (Teressa, 2015). The assessment of the study indicated/ substantiated that the presence of both critical opportunities and challenges for ecotourism development in the Entoto Natural Park. Some of the recent challenges are:

- As explained by EHT experts, one of the prevailing conflicts between EHT project and the surrounding community (farmers) in the Entoto park area centered on access to and control over land and mainly timber, farmland and land for house settlement.
- The frequent demand made by the orthodox church for ownership of the eucalyptus forest
- Dominance of only very few exotic plant species diversity which are not favorable for many animal species as a habitat and little variety of biological diversity than many other forests, deforestation, clearance of any natural vegetation,
- Anthropogenic activities such as urban expansion by removing vegetation, soil erosion, population pressure,
- Damage to the saplings planted by EHT project wild animals and domestic animals (Photograph 1).
- Unreliable budget source for the conservation and restoration of indigenous plant species and difficulty in securing tourism fund.
- Invasive Alien Species (IAS) is one of the major drivers of ecosystem change, second only to climate change. According to Mack et al. (2007), *Eucalyptus globulous* is one of the Invasive Alien Species (IAS). And unfortunately, Entoto Park is dominated by the (originally Australian) *Eucalyptus globulous* trees, which suppress other vegetation.

The presence of IAS in an ecosystem can determine its functioning across a wide range of temporal and spatial scales by altering biogeochemical cycles (Mack et al., 2007). According to, Mack et al. (2007), *Eucalyptus globulous* is one of the Invasive Alien Species (IAS). And unfortunately, Entoto Park is dominated by the (originally Australian) *Eucalyptus globulous* trees, which suppress other vegetation. Since 1895, Eucalyptus species have been introduced for satisfying the growing demand for wood fuel, construction materials, and in order to reduce the pressure on the remaining natural vegetation. Without successful introduction of Eucalyptus under the reign of Emperor Menelik II it is unlikely that Addis Ababa would have become the capital of Ethiopia and diplomatic centre of Africa (Hancock, 1995). The massive reforestation effort created a greenbelt surrounding the city, which solved the ever present dilemma of wood shortages. Since 1925, *Acacia 'Eucalypt polis'*, or city of eucalyptus trees, and this greenbelt has been further expanded. In the 1960s and 70s, the plantation area around Addis Ababa , including Entoto ridge was about 13,500 to 15,000 ha and (Van Breitenbach, 1963 and Henry, 1973) agree also with the FAO, 1985 report regarding the plantation area around Addis Ababa stated above. Unluckily, the fast growing and water sucking tree is endangering the biodiversity of the ecosystem. Although trees have been an important part of human settlements throughout history, only recently has their full value to urban dwellers been considered. Trees and green spaces play an important role in improving city living conditions. In most developing countries, government and international support for urban forestry has been limited. The dramatic urban population increase in these countries, together with a corresponding growth in needs for food, fuel and shelter, calls for the design of strategies in which forestry will play a larger role in providing such commodities and in improving the urban living environment (www.Ecotourism.org/ties-overview). "The fuel-wood crisis", "social forestry" and, most recently, the conservation of biological diversity as well as the amelioration of global climate change have been headline issues. While its objectives have broadened, however, forestry has remained a rural activity in the eyes of the public. Environmental degradation in the cities, peri-urban areas and even accessible rural areas is the result of the growing populations' striving to fulfil their needs for food, energy and construction wood (Kuchelmeister and Braatz, 2000). This fact is also true for the city of Addis Ababa as well. Moreover, the perceptions of locals towards protected areas are negative because of resource conflict. They perceived the protected areas as a burden on their land use. People living near protected areas have subsistence needs that are direct opposition to the needs of the park. Enough attention was not given to the process of involving local people in decision-making and park management activities. On the other hand, the conservationist blamed the local people as a major threat

to the conservation of the protected area. Therefore, it is necessary to cooperate with local people in order to sustain protected areas through development of ecotourism, which strongly involve the local people in decision-making and benefit sharing. Addis Ababa city needs ecotourism development strategies and plans which adhere to the principles of sustainable ecotourism development like: active contribution of the sub-sector to the conservation of natural, historical and cultural heritages and inclusion of local and indigenous communities in its planning, development and operation contributing to their well-being. To this end the proposed recommendations are believed to have significant contribution for promoting sustainable ecotourism development in and in areas surrounding Addis Ababa in the years to come. Communities, government partners, and the private sector all came together to create sustainable, market-driven attractions that allow residents to make a profit from conserving environmental resources and local culture (Jennifer, 2013).

The Ethiopian Ministry of Agriculture is leading also various schemes to restore and rehabilitate degraded areas in Ethiopia. The schemes include area closure, integrated community based watershed management and natural forest management. The Ethiopian Heritage Trust has undertaken planting the indigenous seedlings at Entoto (north of Addis Ababa) to restore indigenous habitats and develop a natural park with students participating voluntarily. The Queensland State of Australia has established the following Practice Criteria for Ecotourism Operations to guide considerations for the development of ecotourism facilities on national parks as outlined in the implementation framework. Those Practice Criteria for Ecotourism Operations are:

The Ecotourism Operation is compatible with the natural and cultural values of the national park. The natural and cultural values of the site are known and unique elements highlighted. Any constraints or stressors on the system are identified and development and activities on sensitive and vulnerable areas are avoided.

The Ecotourism Operation is designed to fit within the character of the national park.

The design and layout of the Ecotourism Operation is in harmony with the landscape and natural features. The design and layout maximize ecotourism facility sustainability and visitor comfort by considering factors such as aspect and orientation. The site is landscaped with endemic native species.

The Ecotourism Operation minimizes its footprint on the site. Impacts on the Site from construction and operation of the Ecotourism Facility are minimized. The Ecotourism Operation promotes water and energy conservation and a ‘leave no trace’ philosophy is applied in relation to visitor activity. Waste and pollution are minimised.

The Ecotourism Operation contributes to protecting and positively enhancing the national park. The long term viability of the national park is supported by the Ecotourism Operation working in partnership with park management and local groups to, for example, rehabilitate disturbed areas of the national park and educate staff and visitors regarding intrinsic park values. The Ecotourism operation engages, involves and benefits traditional owners and local communities. The importance of the national park to the cultural and economic priorities of local communities is identified and long term partnerships pursued. Traditional owners are involved in the interpretation and experience of indigenous cultural resources. The Ecotourism operation encourages visitors to appreciate and want to protect and conserve the national park. The natural and cultural values of the Site are appropriately interpreted and visitor activities and experiences support the protection and conservation of these values (Queensland State, 2015). It is well known that the natural eco-attractions are flora and fauna, climate, water bodies (ocean, sea, rivers, lakes, hot springs, etc.), scenery, landscape, etc.

CHAPTER V: CONCLUSION AND RECOMMENDATIONS

5.1 Cconclusions

This research assessed the status of biodiversity in the Entoto park as potential opportunities for the development of ecotourism in the Entoto natural park. Great numbers of people annually visit usually historical, cultural, religious, etc. places in Ethiopia, but less attention is given to this sector in initiating the enterprises that are engaged in conservation and ecotourism. Ecotourism, as a niche tourism market, is considered to be one of the fastest growing segments of tourism industry. As stated in (http://www.e-unwto.org/doi/book/ 10.18111/9789284416899), some have claimed that ecotourism is increasing by 25 to 30% a year and most tourism forecasters predict ecotourism to grow further over the coming years, driven by consumer concerns over environmental and climate changes.

This research has a number of theoretical and practical implications for both scholars and practitioners, particularly, in the domain of sustainable tourism development. This study represents the theoretical research about benefits of ecotourism and biodiversity, environmental conservation, ecotourism development, and local communities' relationship on ecotourism development. In order to restore indigenous habitats and to avoid Invasive Alien Species (IAS) challenge of ecosystem change the Ethiopian Heritage Trust has taken the initiation and is undertaking a long-term project to restore 1300 hectares of eucalyptus plantations in Entoto Natural Park, including Entoto Hills above Addis Ababa to its original, indigenous habitat. Since its foundation, the Ethiopian Heritage Trust planted 40,000 indigenous seedlings in the Entoto Natural Park and they are grown covering 500 hectare (EHT). To achieve its goal, EHT is accomplishing the activities to alleviate ecosystem change in the Entoto Park so that the eucalyptuses are being replaced by seedlings of primarily, *Juniperus excelsa, Acacia abyssinica, Olea europaea cuspidata and Hagenia abyssinica* (Table). In the near future, the Ethiopian Heritage Trust is in the process of planting 44,000 indigenous seedlings in order to conserve the natural and scenic beauty of Ethiopia (http://ethiopiaheritagetrust.org/birds%20and%20mammals.html). At the same time, the EHT organisation advocates for a better forest management, to protect the Entoto from deforestation. Eucalyptus was introduced to Ethiopia (originally from Australia) by Menelik II 150 years ago to supply enough fuel and construction material for the capital he intended to build in the Entoto (Hancock, 1995). Religious tourism is as old as the religion itself and consequently it is the oldest form of tourism in the world (Karar, 2010, p. 99; Rinschede, 1992, p. 53). It is clear that

ecotourism, more than any other force, is directly responsible for keeping these reserves operational. This, in turn, translates into protection of numerous threatened and endangered plant and animal species in a variety of habitat types. This protection of biodiversity is an important ecological impact of ecotourism (MacArthur and Wilson, 1967; Diamond, 1976). Furthermore, Entoto Park is biologically significant that it is adjacent to larger and dense settlement centres. This park under protection should help maintain biodiversity. It follows that the only way to draw ecotourists is to protect the ecological resources that attract them. Reserve managers stated that having "interesting ecological attractions" was more important than any other factor in accomplishing their objectives (Langholz, 1996).This awareness may translate into long-term protection of such ecological attractions.

In general, Entoto Park constitutes of limited species diversity in relation to many other surrounding Ethiopian forests in which it has been dominated by *Juniperus procera* with groves of *Olea europaea cuspidata*, scattered *Hagenia abyssinica*, *Hypericum revolutum, H. quartinianum*, *Podocarpus falcatu*s and *Acacia abyssinica,* with A. *negrii* in some of the more disturbed valleys. *Erica arborea* appears at altitudes above 3,000 m. Shrubby areas include species with fleshy fruits like *Rosa* a*byssinica* and *Carissa edulis*, which attract fruit-eating birds. The number of herbs, both in the undergrowth of the forest and in the meadows, is very large and includes a number of endemics, particularly clovers. The rural–urban linkage or the urban ''ecological footprint'' is critical to land change assessments (UNPF, 1991). According to the (Lambina, 2001), regarding land change, integration of natural and social sciences as well as recognition of the increasing role of global factors is required to meet the challenge. True and authentic practice of public participation promotes mutual understanding between stakeholders which consequently produce successful results in collaboration strategies. Generally, public participation seeks and facilitates the involvement of relevant populaces which have interests in the decisions. Tourism developments especially in fragile environments such as protected areas would significantly affect various groups including the management, other relevant agencies and local communities. Any planning in fragile areas need to ensure balanced development between fulfilling the requirements for a flourished tourism in the area and caring for the environment. However, public participation in Ethiopia is considered at its infancy stage. A handful of literature is available indicating the barriers towards true and effective practice of public participation in Ethiopia. It is identified that Culture and Tourism Bureau of the city of Addis Ababa lacks sufficient research examines factors that encourage public participation in decision making for sustainable tourism development. It is imperative

that the management of local community participation is yielded to realize the concept of sustainable resource management and tourism development in natural areas. This calls for the investigation of the conditions that will encourage such practice which subsequently motivated this study for the lack of evidence from the literature on the attributes of public participation even in Ethiopia. The ecotourism development plan of the Entoto Natural Park might consider operation design that can fit within the character of the park. The design and layout of the ecotourism operation is in harmony with the landscape and natural features so that the design and layout maximise ecotourism facility sustainability and visitor comfort by considering factors such biodiversity and other resources. Although UN World Tourism figures show Ethiopia only attracting 0.7% of Africa's visitors at present, it is believed that, with appropriate support and commitment from the Government of Ethiopia and the private sector, there is scope for significant increase in both the number of visitors and their contribution to the economy. Though the country's ecotourism sector has seen marked growth in terms of both arrivals and offerings in the last few years, the parts of the country being developed for ecotourism are still very new to visitors.

The land in this park setting may be suitable for new camp grounds or a range of built structures and facilities such as accommodation and venues and nature-based activities such as canopy walks. Opportunities to reinstate natural and cultural values particularly in areas significantly modified by human interaction may bring additional value to park management and the local community. It is recommended that future landscaping/promotion use indigenous species which require minimal maintenance and are essentially self-sustaining. Further assessment would be required to determine the sustainable ecotourism development with acceptable impacts. This research would add value to the literature on the significance of biodiversity for the development of ecotourism and benefit of ecotourism to environmental conservation and strong coexistence between them. The very reason to build a park might be to provide recreational and leisure services, to create job opportunities for the community, generate income for poverty alleviation. Currently, excluding Entoto Natural Park, there are more than 17 public parks within the Addis Ababa city, at least 1 park in each sub-city but only there are a very limited number of recreational parks in peripheral zones. But the available recreational parks are not sufficient to provide the required services for the city of Addis Ababa which accommodated million people. In the near or distant future, Entoto Natural Park can be developed as one of the ecotourism sites and the recreational parks in peripheral region of the city of Addis Ababa.

Ecotourism depends for its success on the quality of natural and human environment. If tourism facilities and activities result in a high degree of environmental degradation, it is likely that tourism will decline. The reduction in tourists will cause loss in national income that could result in curtailment of essential services, which will further alienate tourists. Thus this industry has to be carefully maintained to obtain maximum benefits for least damage (Manning and Dougherty, 1995). The results point to five main conclusions.

- If properly planned and managed ecotourism may minimize the environmental impacts mean while significantly contributes to the areas.
- First, ecotourism makes possible the existence of numerous independently owned nature reserves in the tropics. These reserves depend on ecotourism more than on any other revenue source, and some are completely dependent on ecotourism.
- Second, the role of ecotourism as a driving force behind the existence of these parks demonstrates a direct link between ecotourism and biodiversity conservation.
- Third, the social, ecological, and economic issues surrounding independently owned nature reserves are beginning to emerge, but remain largely unexamined. Aside from basic descriptive information about size, habitat type, and job creation, we know little about their impacts.
- Fourth, it is possible for a reserve to exist solely on ecotourism revenues, as evidenced by reserves in this study. Although reserves can survive without government support, the question of whether or not any protected area should be required to be financially self-sufficient is likely to have a different answer, and is beyond the scope of this study. Finally, independent reserves and the ecotourists that support them are no panacea for the world's conservation and development woes. They are but one small way of supplementing larger government conservation efforts, and shifting control of natural resources to rural people. The number of independent nature reserves, like ecotourism in general, will continue to grow, regardless of what the conservation community thinks or does. Our challenge, then, is to channel that growth in a way that safeguards both biological integrity and human dignity.

- To achieve conservation and sustainable use of ecosystems, ''traditional'' and ''formal'' knowledge systems need to be linked.

5.2 Recommendations

- The analyses were made mainly, based on the parameters such as, at least the site should be 1000 metres away from dense built-up areas, within 1500 m of existing all weather road, dry weather road, and motorway, NOT on agricultural land, NOT on community owned possessions, and involve and benefit traditional owners and local communities. Then the evaluation showed that the Entoto park fulfilled almost all the requirements so that it can be considered as one of potential and suitable sites for ecotourism promotion in Ethiopia.
- Due attention should be given to the involvement of local communities in ecotourism development of Entoto natural park so as they can develop a sense of ownership with the project. Local participation serves as an early warning system that helps managers to avoid or plan for decisions that might otherwise cause conflict with the local population.
- The response obtained from EHT staff members revealed that there is landuse right conflict between Ethiopian Heritage Trust and some local communities surrounding the Entoto park in particular, the Orthodox church, previous owners claimed to regain the land currently under the project. In order to realize the development of ecotourism in the Entoto natural park, the conflict must be resolved with the intervention of the government through responsible organizations and local agencies in order to settle the conflict.
- Public participation in the decision making process is a crucial practice for sustainable tourism developments.
- There are problems of local communities linked with their livelihood and other related social problems that could contribute to extreme poverty, which in turn contributed to degradations of natural resources of the area. Thus, further study is necessary which can contribute to the poverty alleviation.
- It is necessary increasing awareness of the local communities and other stakeholders on the benefits of ecotourism and conservation of eco-attractions matters for sustainable management of ecotourism activities.
- When land and resources are strained by excessive use, and when impacts on vegetation, wildlife, mountain and other environments exceed the carrying capacity, it can cause loss of

biodiversity. This loss of biodiversity in fact means loss of tourism potential. In order to protect such negative consequences continuous supervision should be developed abreast with the promotion of Entoto Natural Park.

- What is essential however is the recognition that, without adequate understanding of underlying factors and careful planning and management, ecotourism may include unsustainable aspects (Cater, 1993).
- Proper and comprehensive ecotourism plans are required to prevent overusing most widely known forests as well as new integrated plans are needed for introducing unknown potential areas to people. As a result, some specific well known areas are threatened by being overused while other unknown or less familiar ones remain unvisited. Concerned bodies should strive to promote the development of the sector considering its whole contribution.
- In Ethiopia, research quantifying threats such as are still limited or not available. Therefore, research which can conduct the study of frequency with which tourism and recreation threats and methods to ameliorate their impacts must be well-thought-out in the future.

Reference

Adem Gobena (2008). Assessment of Ecotourism Potentials for Sustainable Natural Resources Management in and Around Abijata-Shala Lakes National Park in the Central Ethiopian Rift Valley. Unpublished M.Sc.Thesis, Addis Ababa University, Addis Ababa, Ethiopia.

African Union Commision-Economic Commission for Africa-African Development Bank (AUC-ECA-AfDB) (2010).Land Policy in Africa: Eastern Africa Regional Assessment. ECA, PCMS, Addis Ababa, Ethiopia.

Amogne Asfaw (2014). Ecotourism as a viable strategy for livelihood diversification and Sustainable Natural resource management in Ethiopia (from eco-development paradigm point of view). *Journal of Environmental Science and Water Resources* **3**(2): 040 – 052.

Amy S. *(*2012). Integrating Business Skills into Ecotourism Operations. *Operations International Union for Conservation of Nature and Natural Resources.* Gland, Switzerland.

Anderson I (1996). "Ecotourism." Thailand development research institute. *Quarterly Review* **11**(2):10–17.

Annerstedt, M., Ostergren, P.-O., Bjork, J., Grahn, P., Skarback, E. and Wahrborg, P.(2012). Green qualities in the neighbourhood and mental health - results from a longitudinal cohort study in Southern Sweden. *BMC Public Health* **12**:336–337.

Arvaniditis, P.A. (2008). Economic aspects of urban green spaces: Survey of perceptions and attitudes. *Journal of Environmental Technology and Management* **11**(1):144–165.

Beedasy, J. and Whyatt, D.(1999). Diverting the tourists: a spatial Decision-support system for tourism planning on a developing Island. *Elsevier, International Journal of Applied Earth Observation and Geoinformation* **1**(3–4):163–174.

Blackman, A., Foster, F., Hyvonen, T., Jewell, B., Kuilboer, A. and Moscardo, G. (2004). Factors Contributing to Successful Tourism Development in Peripheral Regions. *Journal of Tourism Studies* **15(**1):60–70.

Boo, E. (1991) Ecotourism: a tool for conservation and development. *Ecotourism and Resource Conservation Journal* **1**:109–114.

Briguglio, L. and Briguglio, M. (1996). Sustainable Tourism in the Maltese. Pinter Publishing. Leicester, UK 162–179 pp.

Bunruamkaewa, K. and Murayama,Y. (2011). Site Suitability Evaluation for Ecotourism Using GIS & AHP: A Case Study of Surat, Thani Province, Thailand. *ELSEVIER, Journal of Procedia Social and Behavioral Sciences* **21**:269 –275.

Bunruamkaewa, K. and Murayama,Y. (2012).Land Use and Natural Resources Planning for Sustainable Ecotourism Using GIS in Surat Thani, Thailand. *Sustainability* **4**:412–429.

Carter, S. (1995).Tourists and Travelers' social construction of Africa and Asia as risky places.

Cater, E. (1993). Ecotourism in the Third World: Problems for sustainable tourism development. Tourism Management. *Tourism Management* **14**(2):85–90.

Choi, J. A. (2011) "Cultivating Urban Forests Policies in Developing Countries," *Sustainable Development Law & Policy* **11**(1): 39–40.

Congalton, R. G. (1991). A review of Assessing the Accuracy of Classification of Remotely sensed Data. University of California, Berkeley, Berkeley, USA.35–45 PP.

Devries, P.J., Murray, D. and Lande, R. (1997). Species diversity in vertical, horizontal and temporal dimensions of a fruit feeding butterfly community in an Ecuadorian rainforest. J. Linnean Society **62**:347-361.

Developments of the new Tourism Paradigm in the Asia Pacific Region (APTA). **In**: 21st Annual Conference of the Asia Pacific Tourism Association. Dong-A University, Kuala Lumpur, Malaysia, May 14–17, 2015.

Dirk, W.(2001). Cultural and Amenity Services. *Ecosystems and Human Well-being: Current State and Trends* **3:**457–472.

Earth Resources Development and Analysis (ERDAS Inc.) (1999). The ERDAS Field Guide (Revised and Expanded Fifth Edition) ERDAS Inc., Georgia, USA, 217–260 pp.

Ethiopian Biodiversity Institute (EBI) (2014). Ethiopia's Fifth National Report to the Convention on Biological Diversity (CBD). Unpublished technical report, EBI, Addis Ababa, Ethiopia, 72 pp.

Ethiopian National Meteorological Services Agency (NMSA) (2014). Addis Ababa.

Ethiopian Wildlife and natural History Society (EWNHS, 2015). Important Bird Areas in Ethiopia and associated islands–Ethiopia. Addis Ababa, Ethiopia.

Faust, N.L. and Star, J.L. (1989). Integration of GIS and remote sensing. Cambridge University Press, UK. 55–59 PP.

Fedorov, E. (1980). Man and Nature. (The Ecological Crisis and Social Progress). Progress Publishers, Moscow, USSR, 110–114 pp.

Gebeyaw Ambelu (2011). Practices, Challenges and Opportunities of Community Based Ecotourism Development in Meket Woreda, North Wollo Zone, Amhara Region. Unpublished MSc Thesis, Addis Ababa University, Addis Ababa, Ethiopia.

Gemechu Shale (2014). Planning for Sustainable Tourism: Challenges and Opportunities for Ecotourism Development in Addis Ababa. *American Journal of Human Ecology* **3**:21-22.

Gudina Legesse, Dons, K. and Meilby, H. (2014). Efficiency of parks in mitigating urban heat island effect: An example of Addis Ababa. *Landscape and urban planning (ELSEVIER),* **123**(2014):87–95.

Haileselassie Girmay and Getaneh Asefa (1989). The Addis Ababa-Nazaret Volcanics: A Miocene-Pleistocene volcanic succession in the Ethiopian Rift. *SINET: Ethiopian Journal of Science.* **12**:1–24.

Hancock, G.(1995). The Beauty of Addis Ababa. Camerapix Publishers International. Nairobi, Kenya.

Holloway, J.C. (1991). The Business of Tourism, 3rd edition. Clays Ltd, England.

Horst, A. (2006). Rehabilitation of Urban Forests in Addis Ababa. *Journal of the Drylands* **1**(2): 108–117.

Hesham, M. E.B. (2005). Ecotourism and Developing Countries To Eco-wise or To Sustain-wise? Unpublished Article, Cairo University, Cairo, Egypt.

Johnson, P. and Thomas, B. (1996). Tourism capacity: a critique in sustainable Tourism. Pinter Publishing, Leicester, UK 118–136 pp.

Langholz, J. (1995) Ecotourism Impact on Independently Owned Nature Reserves in Latin America and Sub-Saharan Africa. *Yale School of Forestry and Environmental Studies Bulletin Series*, No.99, New Haven, USA.

John, B. and Simon, C. (2006). The Business of Tourism Management. Pearson Education Limited, Birkbeck College, University of London, London, UK. 263–509 pp.

Karar, A. (2010). Impact of Pilgrimage Tourism at Haridwar. *Anthropologist* **12**(2): 99–105.

Kazmierczak, A.E. and James, P. (2008). Urban Green spaces: natural and usable. Leibniz (IOER), Dresden, Germany, 131–134 pp.

Kent, M. (2012). Vegetation Description and Data Analysis: a practical approach, John Wiley and Sons, Sussex, UK, 2–28 pp.

Kflay Gebrehiwot and Kitessa Hundera (2014). Species composition, Plant Community structure and Natural regeneration status of Belete Moist Evergreen Montane Forest, Oromia Regional state, Southwestern Ethiopia. *Momona Ethiopian Journal of Science (MEJS),* **6**(1):97–101.

Kuchelmeister, G. and and Braatz*, S.*(2000). Trees for the urban millennium: urban forestry update. *Unasylva* **51**:50–55.

Kuldeep, P. (2013). Remote Sensing and GIS Based Site Suitability Analysis for Tourism Development. *International Journal of Advanced Research in Engineering and Applied Sciences* **2**(5):2278–6252.

Lambina, E. F., Turnerb, B.L., Geist, H. J., Agbolac, S.B., Angelsend, A., Brucee, J.W., Coomesf, O.T. and Xu, J. (2001). The causes of land-use and land-cover change: moving beyond the myths. *Global Environmental Change* **11**:261–269.

Lascurain, H.C. (1983). 'Ecotourism-A New Approach of Conventional Tourism', Ecosystem Management for sustainability *Journal of Environmental Management* **30**(1):312–319.

Lema Etefa (2011). Floristic Composition and Diversity of Herbaceous Flowering Plants in Menagesha-Suba State Forest, Oromia Region, ETHIOPIA. Unpublished MSc Thesis, Addis Ababa University, Addis Ababa, Ethiopia, 26–30 pp.

Maas, J., Verheij, R.A., Groenewegen, P.P., De Vries, S., Spreeuwenberg, P., 2006. Green space, urbanity and health: how strong is the relation? *Journal of Epidemiology and Community Health* **60**:587–592.

Maas, J., Stigsdotter, U.K., Van Dillen, S.M.E., Verheij, R.A. and Groenewegen, P.P. (2009). Social contacts and a possible mechanism behind the relation between green space and health. *Health & Place* **15:**586–595.

Mann, S. and Hawkins, D.E. (2006). The World Bank's role in Tourism Development. *Annals of Tourism Research* **34**(2):348–363.

MacArthur, R.H. and Wilson, E.O. (1967). The theory of Island biogeography. *Journal of Biogeography* **11:**21–22.

Malede Birhan and Girma Gebreyes (2015). Review on problems, prospects and economic contribution of Wildlife Management and Ecotourism in Ethiopia. *Journal Veterinary Science and Technology* **6**(257):2157–7579.

Manning, E.W. and Dougherty, T.D. (1995). Sustainable Tourism: preserving the golden goose. *Connell Hotel and Restaurant Adminitration Quarterly* **36**(2):29-38.

McIntyre, N., Williams, D. and McHugh, K. (2006) Multiple Dwelling and Tourism. CAB International, London, UK. 108–165 pp.

Mesfin Tadesse (2009). Spatial Metrics and Landsat Data for Urban Landuse Change Detection in Addis Ababa, Ethiopia. Castellon, Spain.

Mitchell, R. and Popham, F. (2008). Effect of exposure to natural environment on health inequalities: an observational population study. *The Lancet* **372**:1655–1660.

Mitchell, R. (2012). Is physical activity in natural environments better for mental health than physical activity in other environments? Social Science & Medicine. *Journal of Epidemiology and Community Health* **60**:487–492.

Mohammed Salih and Shibru Tedla (1999). Environmental Planning, Policies and Politics in Eastern and Southern Africa. *Journal of Forestry Research* **11**(3):115–128.

Mult-criteria Decision Making-Developer View:Applications in Thailand. **In**:Proceedings of the 2013 International Conference on Machine Learning and Cybernetics, Naresuan University, Phitsanulok, Thailand, July 14 –17, 2013.

National Meteorological Agency of Ethiopia (NMAE). (2014). Reports on Temperature and Rainfall characteristics of Ethiopia.

O'conner, D. (2005). Participatory processes: Creating market place of ideas with open space technology. *The Public Sector Innovation Journal* **10**(1):1–12.

Okello, M.M. and Wishitemi, E.L. (2003). Application of the Protected Landscape Model in Southern Kenya *PARKS* **13**(2):12–50.

Okello, M.M. (2008). Tourism Attractions and Satisfaction of Amboseli, National Park. *Tourism Analysis* **13**(4):373-386.

OK, K. (2005). Multiple Criteria Activity Selection for Ecotourism Planning in Ineada. Istanbul University, Istanbul, Turkey.

Oladi, J. F. and Otghsara, T. (2012). Feasibility study on ecotourism potential areas using remote Sensing and geographic information system (case study: abbasabad forest area, veresk, Iran. *Caspian Journal of Environmental Sciences* **10**(1):83–90.

Pareta, K. (2013). Remote sensing and GIS based Site Suitability Analysis for Tourism Development. *International Journal of Advanced Research in Engineering and Applied Sciences* **2:**43-55.

Pearce, D. (2001). Valuation of Biological Diversity Benefits. Paris, France. 26–39 pp.

Piran H., Maleknia, R., Akbari, H., Soosani, J., Karami, O. (2013). Site selection for local fores

park using analytic hierarchy process and geographic information system. *International Research Journal of Applied and Basic Sciences* **6**(7):930 935.

Procedia Social and Behavioral Sciences 21 (2011) 269–278

Queensland State (2015). Best Practice Ecotourism Development Guidelines. Queensland, Brisbane, Australia.

Rankin, B.L., Ballantyne, M, and Pickering, C.M. (2015) Tourism and recreation listed as a threat for a wide diversity of vascular plants: a continental scale review. *ELSIEVER, Journal of Environmental Management* **1**(154):293–298.

Rinschede, G. (1992). Form of Religious Tourism. *Annals of Tourism Research* **19**:51–67.

Rudel, T. K., Oliver, Coomes,T., Moran, E., Moran, M, Achard, F., Angelsene, A, Lambin, E., and Xu, J. (2010). Forest transitions: towards a global understanding of land use change. *Global Environmental Change* **27**(2):95–97.

Rudolf, P.S., Ramakrishnan, de G., Berg, A. van de, Kulenthran, T., Muller, S., Pitt, D., Wascher, D. and Wijesuriya, G. (2003). Cultural and Amenity Services. *Ecosystems and Human Well-being: Current State and Trends* **7:**457–462.

Schwenk, C.R. (2002). Identity, Learning and Decision Making in Change Organizations. *Journal of Organizations Change Management.***15**(5):540–543.

Shackleton, C. M. and High, C. (2000). The comparative value of wild and domestic plants in home gardens of a South African rural village. *Agroforestry Systems* **48**:141–156.

Sindiga, I. and Kanunah, M. (1999). Unplanned Tourism Development in Sub-Saharan Africa with Special Reference to Kenya. *The Journal of Tourism Studies* **10**(1):26–38.

Sintayehu Dejene, Henock Seyoum, and Ready, R.R. (2014). Ecotourism Potential and its Role for Sustainable Developmen and Livelihood in Awash National Park, Ethiopia. *International Journal of Science and Research (IJSR)* **3**(12):2319–7064.

Stigsdotter, U.K., Ekholm, O., Schipperijn, J., Toftager, M., Kamper-Jorgensen, F. and Randrup, T.B. (2010). Health promoting outdoor environments - Associations between green space, and health-related quality of life and stress based on a Danish national representative survey. *Scandinavian Journal of Public Health* **38**:411–417.

Strasdas, W. (2002). Ecotourism Training Manual for Protected Area Managers. German Foundation for International Development (DSE) Center For Food, Rural Development and the Environment. Feldafing and Zschortatu, Germany.

Swain, M.B. (1995). Tourism in Gender. *Annals of Tourism research* **22**:210–227.

Sweeting, A. (2012). Integrating Business Skills into Ecotourism Operations. IUCN, Gland, Switzerland and Kuoni Group, Zurich, Switzerland.

Teressa Derera (2015). Development of community based ecotourism in Wenchi Crater Lake, Ethiopia: Challenges and prospects. *Journal of Hospitality and Tourism* **6**(4):39-46.

Tesfaye Hailu (2009). An environmental Success story in the making. *Selamta* **26**(3):50–51.

Tewodros Giday (2014). Assessment of Natural Resources and Its Implication for Ecotourism Development in Hashenge Watershed. Unpublished M.Sc.Thesis, Mekelle University, Mekelle, Ethiopia.

Theodros Atlabachew (2004).Sustainable Tourism Development and Ecotourism, Walia, **24**(3):34–41

The International Institute for Aerospace Survey and Earth Sciences (ITC) (2001). Principles of Remote Sensing. (Wim Bakker, H, Ben, G.H, John Horn, A.). Hengelosestatraat, Enschede, The Netherlands, 30, 33, pp.

The International Ecotourism Society (TIES) (1990). Ecotourism definitions and Concepts. Retrieved from www.Ecotourism.org/ties-overview on 16.09.2015.

Thryambakam, P. and Saini, S.K. (2014). Wetland and Eco Tourism–A Case Study of Lake Ahenge, Dess'aa National Forest & Hermi Natural Forest, Tigray Region of Northern Ethiopia. *Journal of Agroecology and Natural Resource Management*, **1**(3):193–198.

Tisdell, C. and Wilson, C. (2001). Perceived Environmental Learning and Conservation Impacts of Ecotourism on Environment, Development and Sustainability 7**(**3):295–300.

Tisdell, C. and Wilson, C. (2003). Conservation and Economic Benefits of Wildlife-based Marine Tourism. Taylor and Francis, London, UK, 49–57 pp.

Tsegaye Tadesse, (2007).Linking Forest Conservation with Rural Livelihoods: Lessons from WAJIB approach. Unpublished MSc Thesis, Jimma University, Jimma, Ethiopia.

United Nations Population Fund (UNPF, 1991). United Nations World Tourism Organization (UNWTO) (2016). *UNWTO World Tourism Barometer* **14**:1–6.

United Nations World Tourism Organization (UNWTO) (2016), 2015 ed., *UNWTO Tourism Highlight.*

Vladimirov,V.V., Mikulina, E.M., and Yarguna, Z.N. (1986). Urban and Landscape Problems, Constructive Challenges and Solutions). Progress publishers, Moscow, USSR, 72–85 pp.

Ward, T., C., Roe, J., Aspinall, P., Mitchell, R., Clow, and A., Miller, D. (2012). More green space is linked to less stress in deprived communities: evidence from salivary cortisol patterns. Landscape and Urban Planning **105**(3):221–229.

Wearing, S. and Neil, J. (1999). Ecotourism: Impacts, Potentials, and Possibilities. 1st ed. Reed Educational and Professional Publishing Ltd, Great Britain.

William D. (2009). Entoto Natural Park – an environmental success story in the making. *Selamta* **26**(3):50–52

Wood, M. E. (2002). Ecotourism: Principles, Practices, & Policies for Sustainability, 1st Ed., UNEP, Division of Technology, Industry and Economics, Production and Consumption Unit. United Nations Publication.

Whittaker, R.J. (1995). Distributed Island Ecology.Trends in ecology and Evolution **10**:412–416.

World Commission on Environment and Development (WCED) (1987). *Our Common Future.* New York, Oxford University Press.

Zechmeister, H.G. and Moser, D. (2001). The influence of Agricultural land-use intensity on bryophyte species Richness. *Biodiversity and Conservation* **10**:1609–1609.

Zia Mehrabi, Slade E.M., Solis A., and Mann, D. J. (2014). The Importance of Microhabitat for Biodiversity Sampling Research Article.

URL:

Barber, A., 2008. Start with the park: Creating Sustainable urban Green spaces in areas of housing growth and renewal. Retrieved from http://lifestyle.iloveindia.com/lounge/benefits-of-ecotourism-8866.html#sthash.zjToqdzF.dpuf accessed on 05.01.2016.

Central Statistics Agency (CSA). (2007). Population and Housing Census Report-Country - 2007, Central Statistical Agency, 2010-07. Retrieved from http://www.csa.gov.et/index.php/2013-02-20-14-51-51/2013-04-01-11-53-00/census-2007 Accessed on 22.10.2015.

Cicea, C. and Pîrlogea, C., 2011. Green spaces and public health in urban areas: Theoretical and empirical researches in urban management. Retrieved from http://um.ase.ro/no61/7.pdf accessed on 28.10.2015).

Ethiopian Biodiversity Institute (EBI) (2016). Retrieved from http://www.ebi.gov.et/biodiversity/ecosystems-of-thiopia/ accessed on 15.09.2015.

Eyassu Beadmariam Retrieved from http://ethiopiaheritagetrust.org/birds%20and%20mammals.html accessed on 11.12.2015.

Henze, P.B., 2007. Ecotourism in Ethiopia. Retrieved from http://www.irrob.org/ecotourism in_ethiopia.html on 21.11.2015.

Jennifer B., 2013. Community ecotourism destinations open in Ethiopia's central and southern. Retrieved from http://www.counterpart.org/ accessed on 14.09.2015.

Logan, G., 2012. Ethiopia Poised to Become Next Hot African Ecotravel Destination. Retrieved from http://ethiopia.usembassy.gov/pr3808.html accessed on 19.11.2015.

Mack, M.C. and D'Antonio, C.M., 2007. Impacts of biological invasions on disturbance regime https://www.cbd.int/doc/world/et/et-nr-05-en.pdf accessed on 11.9.2015.

Neto, F., 2002. Sustainable tourism, environmental protection and natural resource management: paradise on Earth?. Retrieved from http://www.mtnforum.org accessed on 03.02.2016
.

Ramachandra, T. V. and Kumar, U., 2004. Geographic Resources Decision Support System for land use, land cover dynamics analysis. Retrieved from http://ces.iisc.ernet.in/energy/Welcome.html accessed on 09.10.2015.

Veneena, V., 2007. Sustainable tourism: A prerequisite of sustainable development. Retrieved from www.streetdirectory.com/travelguide/211352/ accessed on 28.09.2015.

et.chm-cbd.net/biodiversity/biodiversity-ethiopia accessed on 25.10.2015

http://www.e-unwto.org/doi/book/ 10.18111/9789284416899 accessed on 23.12.2015.

http://www.irrob.org/ecotourism_in_ethiopia.html .Ecotourism in Ethiopia. EhiopianJournal accessed on 11.11.2015.

https://tseday.wordpress.com/2008/11/05/ecotourism-in-ethiopiac acessed on 11.01.2016.

http://www.investopedia.com/terms/s/systematic-sampling.asp# ixzz41 YW34aSY accessed on 27.10.2015.

http://ethiopia.usembassy.gov/pr_5.html accessed on 07.11.2015.

www.earth explorer websites accessed on 27.10., 2015.

www.glcf accessed on 27.10., 2016.

www.Ecotourism.org/ties-overview accessed on 05.11.2015.

APPENDIX 1.

Confusion Matrix For Land Use Land Cover Classifications 1986, 1995, 2007 and 2015.

Classified data	**1986**						Users Acc %
	Forest	Woodland	Shrub	Grass	Farmland	Row Total	
	93.5	6.93	0	0	0	100.43	93.1
Forest	6.5	**93.07**	0	0	0	99.57	93.47
Woodland	0	0	**100**	0	0.79	100.79	99.21
Shrub	0	0	0	**100**	0	100	100
Grassland	0	0	0	0	**99.21**	99.21	100
Farmland	100	100	100	100	100	**500**	
Producers acc %	93.5	96.3	100	100	99.21		
				OVERALL ACCURACY			**97.16**

Classified Data	**1995**						users Acc%
	Forest	Woodland	Farmland	Grass	Shrub	Row Total	
Forest	71.49	20.08	0	0	0	91.57	78.07
Woodland	27.48	79.92	0	0	0	107.4	74.41
Farmland	0	0	100	0	0.16	100.16	99.84
Grass	0	0	0	100	0	100	100
Shrub	1.03	0	0	0	99.84	100.87	98.98
Column Total	100	100	100	100	100	**500**	
Producers Acc.%	71.49	20.08	100	100	99.84		
				OVERALL ACCURACY			**90.25**

Classified Data	2007						Users Acc.%
	Forest	Woodland	Shrub	Grass	Farmland	Row Total	
Forest	62593	1779	1772	3355	291	69790	89.69
Woodland	11998	15032	1694	6386	8499	43609	34.47
Shrub	5303	1162	45672	23702	21009	96848	47.16
Grassland	1385	879	5160	48263	14555	70242	68.71
Farmland	421	1041	1507	5049	363486	371504	97.84
Column Total	81700	19893	55805	86755	407840	**651993**	
Producers Acc.%	**76.61**	**89.4**	**81.8**	55.63	89.12	**535046**	
				OVERALL ACCURACY			**82.06**

Classified Data	**2015**						
	Woodland	Forest	Grass	Shrub	Farmland	Row Total	Users Accuracy %
Woodland	126	241	0	0	0	367	34.33
Forest	26	766	0	1	0	793	96.59
Grassland	0	0	68	0	0	68	100
Shrub	0	7	0	185	0	192	96.35
Farmland	0	0	0	0	48	48	100
Column Total	152	1014	68	186	48	1468	
Producers Acc.%	82.89	23.76	100	99.46	100	1193	
				OVERALL ACCURACY			**81.27**