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**ADDIS ABABA UNIVERSITY**  
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**COLLEGE OF SOCIAL SCIENCES**  
**DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES**  
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**GIS AND REMOTE SENSING BASED SITE SUITABILITY ANALYSIS FOR  
TOURISM DEVELOPMENT IN EAST GOJJAM ZONE, ETHIOPIA**

**BY**  
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**STATEMENT OF APPROVAL**

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This is to certify that the project prepared by Ziyen Achamyeleh, entitled; “GIS and Remote Sensing Based Site Suitability Analysis for Tourism Development: The case of East Gojjam Zone” submitted in partial fulfillment of the requirements for the degree of Master of Arts in Geography and Environmental Studies (Specialization in GIS, Remote Sensing and Digital Cartography) complies with the regulations of the university and meets the accepted standards with respect to the originality and quality.

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## **Acronyms and Abbreviation**

AHP	Analytical Hieratical Process
CSA	Central Statics Agency
DFE	Direct Foreign Expenditure
DEWCTO	Debre Elias Woreda Culture and Tourism Office
DWCTO	Dejen Woreda Culture and Tourism Office
ECTT	European Council on Tourism and Trade
EGZCTO	East Gojjam zone Culture and Tourism Office
EGZFEO	East Gojjam Zone Finance and Economic Office
EGZ	East Gojjam Zone
GDP	Gross Domestic Product
GII	Geospatial Information Agency
GIS	Geographic Information Systems
GPS	Global Positioning System
LDCs	Least Developed Countries
MCE	Multi-Criteria Evaluation
MOCT	Ministry of Culture and Tourism
MWCTO	Machakel Woreda Culture and Tourism Office
NMA	National Metrological Agency
RS	Remote Sensing
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNWTO	United Nation World Tourism Organization
USGS	United States Geological Survey
WTO	World Trade Organization
WTTC	World Travel & Tourism Council

## **ABSTRACT**

*East Gojjam Zone has high tourism potentials due to the presence of numerous cultural and natural attractions. But the potential was not explored well. This study is aimed at assessing the tourism potentials, challenges and mechanisms of tourism development using Geographic Information System and remote sensing in East Gojjam Zone. Purposive sampling was employed to identify 70 samples from target populations in East Gojjam Zone. Six criteria and thirteen factors were considered for land suitability evaluation for tourism. These are landscape (visibility, land use land cover), wildlife (wildlife areas), topography (elevation, slope), accessibility (proximity to cultural sites, natural attractions, roads, river and town), vegetation and climate (rainfall, temperature). The result without constraint indicates that 5% of areas were highly suitable and 9% were moderately suitable for tourism. Less and not suitable areas, on the other hand, accounts for 14% and 72%, respectively. The major challenges that militate against the potentials of tourism development in the area include lack of infrastructure, natural resources degradation, lack of tourism professionals, and poor coordination of stakeholders. The potential tourism resources of the area needed to be developed and well promoted in a desired way.*

Key words: Tourism, Multi-criteria evaluation, Remote Sensing and GIS, Site Suitability, East Gojjam

# CHAPTER ONE

## 1. INTRODUCTION

This chapter describes the overall backgrounds of the study, research problem, objectives, research question, scope and significance of the study, limitation and organization of the paper.

### 1.1 Background of the Study

Tourism is a set of impacts of business transactions. It is a complex set of processes that involve economic, constructed and natural ecosystems, patterns of ownership, relationships between countries that produce and receive, and the relationship between the place where tourism takes place and the broader society (Burns, 2003). Tourism is the sum of the phenomena and relationships that emerge from nonresident travel and stay, to the point that they do not lead to permanent residence and are not related to any earning activity (Lickorish & Jenkins, 2007). Tourism is described as comprising the activities of individuals who, for leisure, business and other purposes, travel to and stay in places outside their typical environment for no more than one consecutive year (UNWTO, 2012).

Travel and tourism relates to the activity of travelers on trips outside their usual environment with duration of less than one year. Travel and tourism, as one of the world's largest economic industries, creates employment, generates exports and income worldwide. Annual Economic Reports of WTTC (2018) covers 185 countries and 25 regions of the world. In WTTC annual analysis of the worldwide economic impact of travel & tourism, the sector is shown to account for 10.4% of world's Gross Domestic Product (GDP) and 313 million jobs, or 9.9% of total employment, in 2017 (WTTC, 2018).

According to (UNWTO, 2012), tourism has become one of the most important socio-economic phenomena of our modern times. It is among the largest economic sectors, providing income, job and foreign exchange in many countries, through its multiplier effect stimulating a range of other related sectors. Tourism is also a key force for development and poverty alleviation, growing much more dynamism in developing countries than in developed ones. It has become the prime source of foreign exchange revenues for the 50 Least Developed Countries (LDCs), and the principal export for 83 % of developing countries. In many small island developing states, reliant on tourism for their national economy, this activity can constitute up to 40% of GDP.

Geographic Information System is one of the most amazing advanced technologies in the planning of tourism development. Spatial data can be used to investigate conflicts, examine impacts and assist decision-making. GIS used for systematic evaluation of environmental impacts by data integration, manipulation, visualization and analysis (Bahaire and Elliott-White, 1999).

Both tourism and GIS share in common characteristics like crossing the application areas and the boundaries of disciplines. The tourism field uses GIS as a decision supporting tool in many tourism issues such as visitors flow management, tourism site selection, impact evaluation and sustainable tourism plans. Most studies indicated that GIS tool is strong and effective in tourism and recreation planning which can aid in the development of tourism industry effectively. GIS technology plays an important role in the evaluation of the effects of tourism operations, in the monitoring of environmental conditions and in the analysis of the suitability of the sites for the proposed development sites. The potential for GIS applications in tourism is therefore of great importance (Verka, 2016).

Ethiopia has enjoyed international prominence with a home of varied natural, historical, and cultural attractions. Fifteen of its heritages (8 cultural, 2 natural and 4 intangible heritages) have been registered by UNESCO as world cultural heritages. The total foreign and domestic tourist arrival in Ethiopia annually was 849,122 and 23,863,423 respectively in 2019 and generates 3,179,112,768 USA dollar. On the other hand the total annual foreign and domestic tourist arrivals in East Gojjam Zone was 2875 and 495188 respectively and generates 2,063,722.32 USA dollar in 2019 (MoCT, 2019). Ethiopia has great potential to develop the tourism industry.

There are plenty of natural beauty, cultural heritage and unique holiday celebrations that can attract international tourists. The study area is also rich in potential of natural, historical, religious, traditional, and other tourist attractions. This study is aimed at exploring the potential sites, for tourism development in the area.

## **1.2. Statement of the Problem**

Tourism has the lion's share in a country's overall economic growth and development. In this regard, given the endowment of Ethiopia with a range of natural and man-made resources, the

sector has not gained much attention for years. The tourism industry has now become a major source of income for the sector's various stakeholders (Kidane-Mariam, 2015).

Tourism's success in any country depends on that country's ability to adequately develop, manage and market the country's tourism facilities and activities. For economic growth and diversity, many developing countries rely mainly on tourism. Because tourism has a close relationship with space and geography, it seems important and potentially effective to use Geographic Information Systems in tourism and hospitality research and marketing practice. However, GIS applications have been limited to date, particularly in tourism and hospitality marketing, presumably due to a lack of familiarity with GIS and its benefits (Feng and Morrison, 2002).

Even though, Ethiopia has a huge potential of tourism and greater attractions, it's not yet explored well. The northern part of Ethiopia, Amhara Region, is known by its tremendous tourism (both the cultural and natural) sites and potentials of tourism. Due to its geographical location, in and around Abay Gorge, East Gojjam Zone is a naturally gifted area where many potential tourist attractions are found. The area is blessed with rich potential of natural, historical, religious, traditional and other tourist attractions. However, it's potential for tourism remains untouched (Kidane-Mariam, 2015).

Different researchers conducted in assessing tourism potentials in different woredas of East Gojjam Zone. Atsbha, (2015) assess the potential resources of Dejen wordeda, Sintayehu, (2015) assess the potentials tourism resources of Choke Mountain, and Abie, (2018) assess the potentials, challenges and prospects of tourism development in Basso Liben Woreda. The above researcher's state that the study areas are endowed numerous tourism resources. They focused on assessment of tourism potentials and they are depending on only existing tourist sites. Such studies did not attempt to identify potential tourist attraction sites of the Zone by employing any suitability analysis. Hence, the challenges and opportunities of tourism development in general are not yet explored in the study area and also none of them have used GIS and RS technology in their analysis. Therefore, this study attempts to identify the potential suitable areas, challenges and possible mechanisms for tourism development using GIS and Remote Sensing.

### **1.3. Objectives of the Study**

The general objective of this study is suitability analysis of tourist attraction sites in East Gojjam Zone by Using GIS and Remote Sensing. The study has the following specific objectives:

- To identify the tourist destination areas of East Gojjam Zone
- To assess the potential suitable areas for tourism development in the study area.
- To examine the challenges of tourism development in the study area.
- To investigate the possible mechanisms for tourism development of East Gojjam Zone

### **1.4. Research Questions**

- What are the most important natural features and cultural attractions of East Gojjam Zone?
- What are the potential suitable areas for tourism development?
- What are the main challenges of tourism development in the study area?
- What are the possible mechanisms of tourism development in the study area?
- Who are the stakeholders that take part in the development of the tourism sector in the Zone?

### **1.5. Scope of the Study**

This study focused on evaluating the potential of areas in the East Gojjam Zone for tourism development. It integrates spatial modeling tools in GIS and multi-criteria decision analysis to identify areas that will be optimal for tourism and ensure a more sustainable approach to its development in this zone. The study present the spatial distribution of suitable tourism sites in different areas of East Gojjam Zone by analyzing the whole area with a set of criterion indicators that are most important for sustainable tourism development. These indicators decided based on literature and tourism experts in Ethiopia. This will provide a framework for selecting areas for tourism development in any part of the zone .This research also provide the dynamic digital tourist site map of East Gojjam Zone.

### **1.6. Significance of the Study**

Even though many studies were conducted in many Woredas of the Zone, there is no research conducted so far in the tourism sector under this topic in the study area. The result ad study was contributes much for government organization, NGOs, policy makers and implementers to

understand the gaps and to take actions to improve the situation. The research is also expected to contribute for the concerned stakeholders, especially for East Gojjam zone and Amhara region culture and tourism bureau to understand the major suitable sites and to provide digital maps for the development of tourism industry. Finally, the study is expected to serve as a source or reference material for conducting further research in the field. This study will help planners and policy makers to be aware of the significance of tourism in terms of the importance it provides for generating revenue- by attracting tourists, conserving the natural environment and providing a playground for promoting learning. Moreover, it enables local people to be active participant to conserve their environment and to get benefit for their livelihood.

### **1.7. Limitation of the Study**

The study was conducted in one of the central highlands of Ethiopia. The tourism site suitability analysis results obtained in this study may not be generalize for the country Ethiopia because of diversified geographical conditions and cultural as well as socioeconomic situations. As a site suitability study, detailed exposition of the tourist flow and its effects for development of the Zone is not sufficiently provided. This study had the following limitations such as lack of standards for site selection criteria's, lack of internet access, lack of essential tourism data and resources in East Gojjam zone culture and tourism office. Covid 19 is also one of the main factors that complicated the gathering of information and make discussions within different stakeholders.

The researcher used different methods to solve those challenges like, using experts opinion and literatures for setting criteria's, mobile telephone to discuss with stakeholders about the issue, keeping rule of "social distance" and state of emergency rules during interview, used private and CDMA internet package to download necessary data and documents to achieve the purpose of this study and taking strong commitment to reduce the stress of Covid 19 during the study.

### **1.8. Operational Definition of Terms**

**GIS:** is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.

**Remote Sensing:** is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance.

**MCE:** is method of the allocation of land to suit a specific objective on the basis of a variety of attributes that the selected areas should possess.

**AHP:** is a structured technique for organizing and analyzing complex decisions for quantifying the weights of decision criteria.

**Suitability Analysis:** is a geographic or GIS-based process used to determine the appropriateness of a given area for a particular use.

**LULC:** is the categorization of human activities and natural elements on the landscape within a specific time frame based on established scientific and statistical methods of analysis of appropriate source materials.

**NDVI:** is a standardized way to measure healthy vegetation.

### **1.9. Organization of the Paper**

There are five chapters in the thesis. Chapter one presents introduction, problem statement, objectives, scope and significance of the study. The second chapter deals with the theoretical and conceptual background of tourism, GIS and Remote Sensing. The third chapter is devoted to providing the general description about the study area, methods, materials used in the work, data sources, and requirement of analysis. Chapter Four describes and presents analysis and interpretation of findings of the study. Finally the conclusion and recommendation part of the thesis is described in the last chapter.

## CHAPTER TWO

### 2. REVIEW OF RELATED LITERATURE

This chapter describes the conceptual, theoretical, empirical literature and conceptual frameworks of the study.

#### 2.1 Conceptual Literature

##### 2.1.1 Concepts and definition of tourism

There is no unique definition given for tourism industry. There are many beliefs and perception concerning the issue. Those differences may be originated from differences of ideas and attitudes of peoples and organizations defining it on different period of time.

Mathieson and Wall (1982) notes that as the temporary movement of people to destinations outside their usual places of work and residence, the activities carried out during their stay in those destinations and the facilities produced to meet their needs, a good working concept of tourism was established. According to Johan Tribe (2009), the UNWTO has mainly been concerned with political, commercial and normative principles and doesn't approach the conceptual aspects.

For the purposes of recreation and business, tourism can be defined as the act of travel and the provision of services for this act. Tourists are people who travel and stay in places outside their usual environment for a period not exceeding one year in a row for leisure, business and other purposes not related to the exercise of an activity paid from within the place visited" (WTO, 2006). Tourist is a person who travels to any tourist destination, a nonpermanent resident of the tourist destination, who depends on tourism facilities such as hotel accommodation, restaurants, and local transportation etc, for the period of stay in such destination. The expenditure made on such trip constitutes Direct Foreign Expenditure (DFE) to the region of destination irrespective of their Nationality (Ajala, 2016).

##### 2.1.2. Categories of tourist attractions

A tourist attraction is a place of interest where tourists visit, typically for its inherent or an exhibited natural or cultural value, historical significance, natural or built beauty, offering leisure and amusement. Tourism resources are categorized into natural and manmade attractions (Negashe *et al*, 2011).

**Natural attractions** are an attraction that has been created by nature. Many of these places have been granted a status in order to preserve their nature and provide services for the public to enjoy the sights. With its flora and fauna, safaris, jungle trekking, all sorts of natural habitats, mineral waters with healing properties and health spa development, warm and clear water in wild seas are classified as natural attractions (Negashe *et al*, 2011).

**Manmade attractions** include sites and areas of archaeological interest, historical buildings and landmarks, places of historical importance, museums and art galleries, political and educational institutions, religious institutions, rituals (pilgrimages, fairs and festivals, arts and crafts, dance, music, folklore, indigenous life) are created by man for fun, leisure or business (Dovgun & Holodova, 2013). Man-made attractions also divided into historical, heritage and cultural attraction (Negashe *et al*, 2011).

**Cultural attractions** consist of both social relations and materials, artifacts, behavioral patterns, knowledge and values that have been acquired and transmitted through generations. According to Negashe *et al*, (2011) The main cultural tourism resources are arts (theatres, art gallery), traditional crafts (pottery, traditional furniture, traditional clothing and jewelry) language (dominant language of the country, minority and regional languages), industry and commerce (famous shops and shopping malls, markets, farm attractions, and work place visits) and sport and leisure activities such as participant, as spectator, traditional games and sports.

**Historical and heritage attractions** are attractions that are old and have been in place for many years and are now historical. They consist of religious sites (churches, cathedrals, shrines and mosques), types of architecture (specific building styles) and heritage attractions like museums, castles, palaces, ancient monuments, historic gardens, historic landscapes, historic villages (Negashe *et al*, 2011).

### **2.1.3. Role of tourism**

Tourism has a powerful multiplier effect, contributing to development. Tourism can be used as a means of growth for many small businesses by buying local tourism products and other local yet non-tourism goods. Tourism-related activities include, but are not limited to: entertainment, transportation services, renting and sales of crafts, tour guides, cafes, hotels, beach manicures

and pedicures, and much more. These activities are related to financial influx and tourism has opportunities to create jobs, generate income and increase export earnings (Ntibanyurw, 2006).

The tourism industry plays an important role in society's political, economic, cultural and environmental growth. Tourism industry is one of the fastest growing economic sectors in the world and the biggest manpower employer helps to gain several billion dollars annually by drawing a billion people from one destination to another. Tourism preserves and retains the country's natural and cultural resources, helps prevent local population migration, and enhances the local community's economic and socio-cultural level. It serves as a tool to protect natural areas economically and increases their economic importance and raises awareness of environmental values (Anupama Sharma, Sumita Kukreja, Anjana Sharma, 2012)

Social interaction between the tourist community and the host community enhances mutual appreciation, tolerance, understanding, awareness, family ties, learning, respect and relationships. Whereas, on the one hand, residents of the host country receive education about the outside world while sitting at home, on the other hand, they used the facilities of universities, libraries, healthcare institutions and internet cafés, which were funded by the tourism industry (Anupama *et al*, 2012).

#### **2.1.4. Factors of tourism**

Tourism is a movement of people who travel to or stay outside their home. It is known to be a major ingredient in the strategy of economic development. However, the sustainable development of the tourism industry worldwide has been affected by various external and internal factors. While Ethiopia has numerous natural, religious, historical, non-natural and cultural tourism attractions, it is incomparable for its economic contribution and potential.

The main contributing factors are the scarcity of tourist facilities, the lack of skilled human resources, poor promotion, lack of integration of operators and inadequate accommodation (Selemon & Alemken, 2019).

Factors that influence the development of the tourism industry are described as security, participation of citizens, media and information technology. Public participation leads to better decisions and community decisions involving citizens are more likely to be acceptable to local people. The government's role in ensuring safety and the role of media and information technology has also been shown to be important in the development of the country's tourism industry (Ardahaey, 2010).

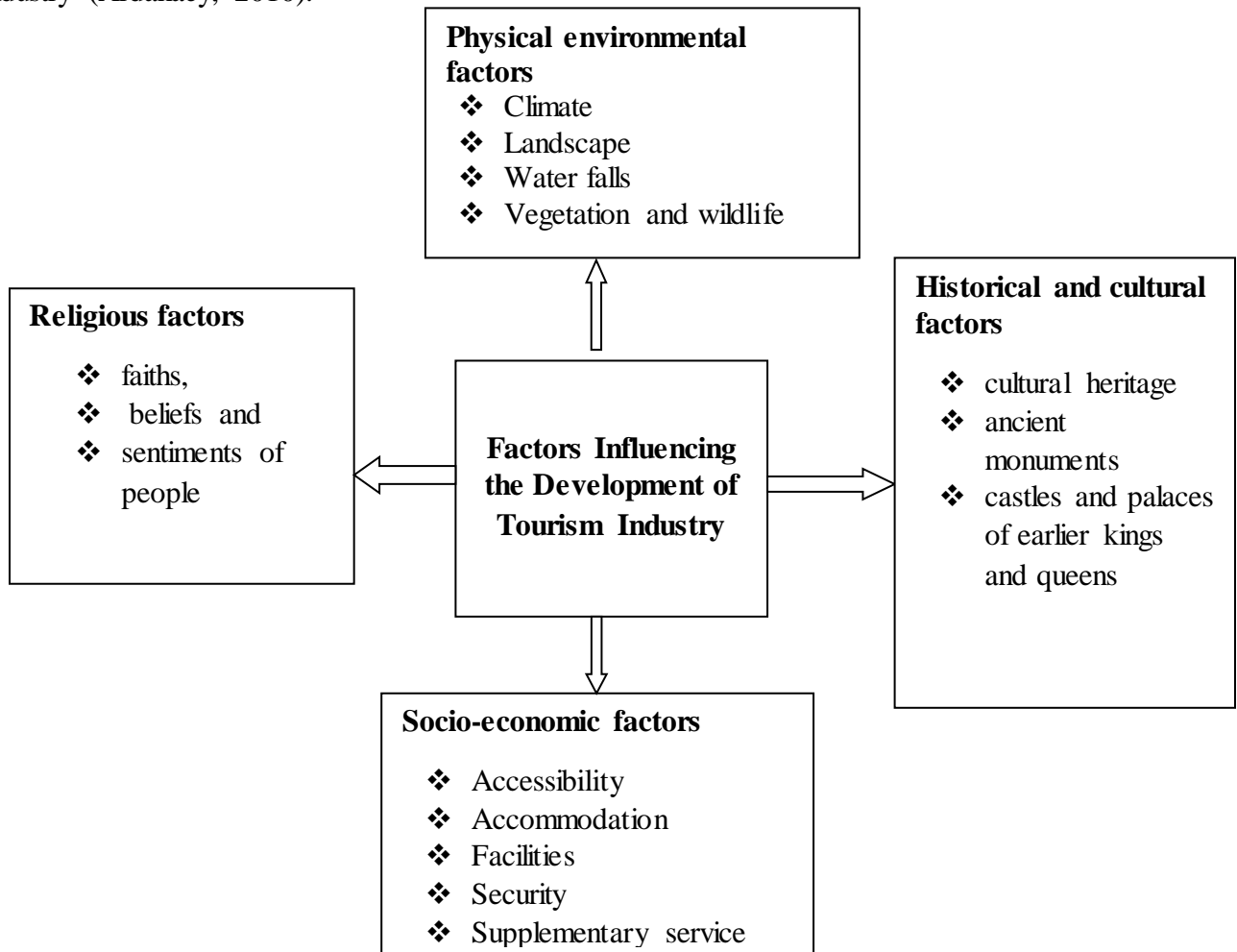


Figure 1: Factors influencing tourism development (source, Image credits © Manoj Patil.2013.)

### 2.1.5. Tourism and sustainable development

The concept of sustainable tourism is used in the context of achieving economic growth without damaging the natural and built environment and conserving the culture of local communities (Kamamba, 2003). Tourism should be sustainable in order to play its development factor

position successfully. Tourism's role in economic development is undoubtedly significant. Yet calculating the economic impacts of tourism in developing countries remains difficult.

High-quality products can be produced from tourism, but this is made possible by responsible resource management which results in an appropriate preservation of the tourism product. If tourist attractions are not well maintained, they can lead to environmental degradation and particularly natural attractions deteriorating tourism item. Because tourism cannot grow alone, it is also necessary to maintain complementary sectors in order to develop and sustain tourism activity. Failure to maintain tourist attractions and complementary services can not only reduce tourist income but can also destroy the strong connection between tourism and other sectors (Ntibanyurw, 2006).

### **2.1.6 Application of remote-sensing and GIS for tourism**

GIS is decision support computer based systems for collecting, storing, presenting and analyzing geographical spatial information. GIS is a technology for handling geographic data in digital form, and satisfying the ability to preprocess data from large stores into a form suitable for analysis, including operations such as reformatting, change of projection and generalization. It also have direct support for analysis and modeling, so that form of analysis, calibrations of models, forecasting, and prediction are all handled through instructions to the GIS and used to post processing of results including reformatting, tabulation, report generation, and mapping (Reddy, 2008).

GIS produced three types of information which are tourism resource maps, tourism use maps, and tourism capability maps. This enables stakeholders to analyze the resource set to Identify how much is available and where it is, to help planners and managers determine the capability of an area for the creation of new tourism products/services, to identifying locations suitable to tourists/tourism, evaluate land-use options to identify zones of conflict/complementary – access points, water, wildlife habitats etc and monitor tourist resources at risk from poor management and planning decisions (Daniel, 2009).

Site selection is an important application of GIS in tourism planning. By using suitable location identification tools and topology, it is simply possible to identify potential areas for further tourism development. GIS used for identifying location suitability of areas and resource inventories of resources according to environmental concern (Rahma, 2010).

The demand for marketing in tourism sector has increased and GIS can play an important role in tourism marketing. Visitors want to find geographical information about an area before they go. They want to know where things are, what services are available, what the environment is like, and they want to be able to search for data on specific sites. Users of management want to learn about the process from which customers come, their socio-economic backgrounds and good potential locations for new tourist sites. Therefore GIS and RS has role for marketing and management of tourism (Abel, 2014).

### **2.1.7. Suitability analysis**

Site selection or analysis of suitability is a type of analysis used in GIS to identify the best place or site for something. Potential locations used to assess suitability may include, among many others, the location of a new hospital, store or school. Users must set different parameters when conducting site selection analysis from which the GIS program will assess the best or ideal sites. Site selection analysis can be carried out with vector or raster information, but one of the most commonly used site selection types, weighted site selection, raster data use (Briney, 2014).

Analysis of suitability is an assessment of the suitability of a site or area for a specific use. Analysis of suitability is usually carried out through a cross-section of social, environmental, cultural, physical, biological or other parameters. Suitability maps are typically the result of a suitability test. We represent in a graphical form the spatial distribution of the determined values. Geographic information systems can aid in a variety of ways to improve decision-making. Creating suitability or hazard maps is a first approach. They show which locations or areas are particularly suitable for a particular purpose or those specifically threatened by a hazard. Most decision-making situations take into account multiple decision criteria. (<http://www.gitta.info> - Version from: 26.11.201)

### **2.1.8. GIS and multi-criteria evaluation**

Multi-criteria assessment in GIS is concerned with allocating land on the basis of a number of characteristics that the selected areas will possess to meet a specific objective. Although commonly used in GIS; it is shown that commonly used approaches in vector and raster systems typically lead to different solutions (Eastman, 1999). GIS provide a powerful set of tools for interpreting and evaluating spatial information to decision makers. Nonetheless, GIS usability is

limited to certain deterministic analyzes in key areas of use, such as spatial search. The application of multi-criteria evaluation (MCE) techniques with GIS is conveyed as providing the consumer with the means to determine different alternatives based on multiple criteria and objectives (Carver, 1991).

Decision making in tourism development and indeed many other domains often requires a consideration of many factors that ranges from socio-political, economic, environmental etc. Among which various stakeholders and decision makers have divergent views which makes the decision-making process difficult. Basic advantage of multi-criteria evaluation is its ability to provide a frame work to complex decision making problems that allows the problem to be broken down in to workable units and to be structured in such a way that enables the complexities of the problem to be unraveled. In theory and in practice, however, multi-criteria evaluation does not adequately address the facilitation issue of interaction between analyst and decision-makers to elicit and revise preferences as part of the iterative process particularly with multiple decision makers, multi-criteria evaluation does not provide clear guidelines on how to analyze or aggregate multiple weights (Drechsler and Proctor, 2003).

#### **2.1.9. Criteria used for tourism site selection**

The process of site suitability requires the identification of the appropriate locations for a particular land use activity by considering physical resources (elevation, slope, aspect, climate), natural resources (soils, geology, hydrology, flora and fauna habitat, and environmentally sensitive areas), and existing land use and development (manmade facilities such as transportation systems, existing urban areas, and utility or networks (Perta,2013).

These different types of information constitute the “criteria” based on which the area under consideration. Some Criteria’s which are used by different researchers are the following.

**Land Cover.** This criterion indicates the Flora and Fauna. The land cover classes selected for tourism are Vegetation (herbaceous, shrub land, grassland, savanna), Forest (deciduous or semi-deciduous), and Water (rivers, lakes, waterfalls). They are managed mainly for ecosystem protection and for recreation (Gynaye, 2017).Identification of land cover establishes the baseline from which monitoring activities (change detection) can be performed and provides the ground cover information for base line thematic maps (Daniel, 2009).

**Vegetation:** Vegetation is an important ecosystem on earth. It influences the earth system in many ways. Any influences on this fragile variable should be investigated, especially in a changing climate (Oduber, Ridderstaa, 2015). Vegetation may be defined as the patch work of plant species arrayed across the landscape. It includes a variety of life forms such as trees, shrubs, grasses, forbs and non-vascular plants like mosses. Forests also have many tourism attractions (Daniel, 2009).

**Topography:** Topography describes the surface shape and relief of the land. It refers to various Landforms (physical features) which represent the external shape of the earth (Tewodros, 2010). Elevation and slope should be considered when selecting site for tourism construction project what areas are best suited to different types of eco-tourists and tourism experiences. To evaluate the nature and element of an area making the landscape what areas is suitable for tourism, it is necessary to consider the position, angle and stage (Gyinaye, 2017).

**Accessibility:** The accessibility to the cultural sites, historical sites, traditional and local community, includes the distance from road (with regards to the naturalness of the area) were both important factors for tourism (Gyinaye, 2017).

**Climate:** The tourist industry is also very vulnerable to natural disasters, and tourists tend to be more vulnerable than local residents because of their lack of familiarity with the places they are visiting. Tourists, for example, may disregard warning signs of impending disaster, which the local population tends to heed. Frequency and intensity of severe weather and extreme events may also affect destination choices, but may also damage or destroy infrastructure (Hamilton, Maddison, RSJTo, 2005).

## **2.2 Theoretical Literature**

### **2.2.1 Theories of tourism development**

There are several theories and models of tourism development based on the demand and supply factors. The main supply factors of tourism development are based on the local tourism resources and this approach is called evolutionary theory in tourism development. The second approach bases demand factors of tourism are based on the motives of consumers termed as motivational theory to tourism development. Each of these theories have their own phases and sub theories as reviewed below.

### **2.2.1.1. The evolutionary theory**

While studying the tourism development and factors or its main drivers that influencing tourism development trends, it is important to answer the two questions, first why certain processes are happening in certain areas and second what are the main drivers of these processes (Newsome et al., 2001; Coenen, Truffer, 2012). Therefore, it is necessary to apply a systematic approach to the development of tourism in certain areas and their transformations (Lewis, 1998; Butler, 1980; MacDonald, Jolliffe, 2003). In order to reflect the evolving nature of tourism in certain areas, it is necessary to apply the evolutionary tourism development theory. This theory dominates literatures related economics and tourism related area and theories describe the development of tourism in a cyclical pattern.

Butler theory explained six phases, attributed by different dynamics and focuses of the areas analyzed, using symptomatic variables, such as the number of people coming to a certain area over the course of time or a year (Butler, 1980). He gave symbolic names to the various phases: Exploration, Involvement, Development, Consolidation, Stagnation, and Rejuvenation or Decline. Accordingly the first phase (exploration) takes place when many or countless individual tourists arrive at a given location, attracted chiefly by its natural, cultural assets and in this phase tourists independently organize their trips, and follow no tried-and-true recreation paths but their impact on the lives of inhabitants and the local economy is minimal.

Involvement is the second phase and it takes place when tourists visit an area in growing numbers, and some of the inhabitants begin to draw their livelihood from accommodation, gastronomy, health services, and the like. Local people's involvement proceeds through becoming active in the tourist business or Economy, even focusing their activities completely on visitor's expectations arise in the area for organized forms of recreation, and there is pressure to improve transport and conveniences or services for tourists.

Development which the third phase of cycle begins at the moment when the tourist in the area becomes one of the main sources of income, and the number of tourists is either equivalent to or exceeds the number of permanent local residents. Tourist organizations other than local people or from outside the tourist area enter the region, pushing out the local businesses and depriving the permanent residents of control over the development of how tourism functions in the area.

The consolidation is fifth phase, marks the full development of the tourism functions in a given area and it is characterized by a reduced growth in numbers of tourists, and by tourism becoming the dominant industry in the local economy. A gap occurs between the spaces with the town's health/tourist functions (sanatoriums, hotels, restaurants, etc.) and those with social functions (e.g. households). Projects are taken up to extend the tourist season and to expand the area in which services are offered. Antagonism from the local population can grow with the intensification of obstacles in running a business.

The last but not least phase is stagnation phase and it brings a decisive halt to the growth dynamic of the number of visitors, the attainment of a maximum quantity of tourists in the area, and then a decline in the number of visitors. At this point the area has a very well defined profile, but it has ceased to be fashionable, and its image no longer fits the region.

The last phase of the cycle is either the rejuvenation or decline of the area's tourist function. Decline is characterized by a drop in numbers of tourists, and the closure of unprofitable tourist sites or their transformation into typologically different venues (e.g. social care houses, private apartments). The area is no longer capable of rivaling other more attractive places for tourists. The services on offer are reduced, making the location increasingly unattractive, which makes it draw less and less tourists. If the area has a sufficiently large infrastructure, weekend or one-day tourists appear. The local population becomes involved, this time generating demand by offering services that are accessible at a lower price. The decline phase can conclude within the total or partial disappearance of the tourist function in a given area. The area can, however, enter a phase of rejuvenation, though this is impossible without a conscious and complex program of activities to enhance the attributes that decide on an area's attractiveness. This can be achieved through introducing artificial attractions or by using unexploited natural resources.

#### **2.2.1.2. Motivation theories**

In addition to the general demand factors driving tourism development, there are vital consumer motives of tourism services. The review of tourism motivation theories allows identifying the main reasons why consumers are buying tourism services and products. Analysis of the literature discloses that there are several tourism motivation theories such as Rituals Inversion Theory, Plog's Tourist Psychographic Portrait Theory, The Sunlust and Wanderlust Theory, Push and

Pull Theory, Personal and Interpersonal Theory, The Physical, Status and Prestige, Cultural and Impersonal Motivation Theory, and The Inner Directed and Outer-Directed Theory.

**Ritual Inversion Theory** (Graburn, 1983) explains that the main motive of tourists is to escape from the routine of everyday life and experience what is not possible to experience in their normal life at their locality; the desire for new experiences, opposite of daily life routine, motivates tourists to travel.

**Plog psychographic portrait theory** (Plog, 2002) among important theories, which categorizes the individual tourist characteristics that may explain the different groups (segments) of tourists. The psychographic continuity is based on the social class, lifestyle, and personality characteristics. No less important is how these characteristics influence the personal motivations of individuals to travel. If to divide the whole population, a typical bell-shaped curve, where the majority of people would be displayed somewhere between the two extremes as centrists“, may be obtained. On the one end of the curve, there are psycho centrists. These people are focused on themselves; they prefer to travel to familiar places and nearby distances. People conforming to this type can travel to nearby resorts and probably almost never further than their native land or country. On the other part of the curve, there are centrists as well. These people are curious, looking for exotic tourism not for the masses and prefer distant trips that provides them a sense of discovery.

**The Sunlust and Wanderlust Theory**(Almeida, 2012),explains the main reasons why people travel and its concept is based on the fact that tourists are attracted to these areas they travel, which can give them such specific things that they cannot get in their place of residence. The wanderlust concept says that tourists want to go from one place, which they know, to another place, which they do not know.

**The Push and Pull Theory** (Hallab, 1999) explains why people move from one place to another. The Push concept explains that tourists are travelling to satisfy their needs. The Pull concept is based on the fact that the tourist areas are designed in a way to attract tourists.

**The Personal and Interpersonal Theory** (Mannelli, Iso-Ahola, 1987) argues that people are travelling for personal and interpersonal reasons. Personal reasons are related to self-enrichment,

self-seeking, capacity building, challenges, learning, exploration, and recreation. Interpersonal theory of motivation is based on self-enrichment and the development of social relations.

**The Physical, Status and Prestige, Cultural and Impersonal Motivation Theory** (Tsephe, Obon, 2013) presents four tourist motivation dimensions: physical, cultural, interpersonal, status, and prestige. The physical motivation concept is directly related to the personal health of the body, physical recreation, sport, and occupation, and the need to rest on a beach. The status and prestige of motivation are based on the concept of self-esteem and tourist's personality development. The cultural motivation concept states that persons are travelling to gain knowledge about other countries and to learn about diverse cultural life. The interpersonal motivation concept refers to the fact that tourists want to meet new people, to visit.

**The Inner-Directed and Outer-Directed Theory** (Gnoth, 1997), argues that people are travelling for both internal and external causes. Internal reasons are related to emotions of tourists, while the outer reasons are cognitive in their nature.

According to these basic motives of travelers, the demand factors of tourism can be analyzed and assessed. The performed analysis of tourism development theories allowed to reveal and group the factors influencing development of tourism into demand and supply factors; however, these factors may be influenced by issues like availability of local resources (attractive areas, resort and natural resources, human resources, infrastructure, etc.), macroeconomic environment, competition in the tourism market and between regions, support of the local community. The motives of tourists play an important role as well; therefore, market segmentation and well-defined marketing theories can increase the demand of tourism.

The study appears to support ideas of motivational and evolutionary theory which is tourism development depends on supplies of local tourism resources to promote the tourist attraction sites which is suitable for tourists as evolutionist and demand of consumer based on attractiveness as motivational theory. GIS and remote sensing technology is a powerful tool to explore the potential suitable area, promoting tourism site, mapping the attraction of the area by using web sites and showing the challenges and mechanisms of tourism development.

### **2.3. Empirical Literature Review**

Tourism is viewed as an engine for economic growth and there are many researches that focus on the area. The limited studies were focused mainly on analyzing potentials, challenges and opportunities of tourism development using GIS and remote sensing. In the following paragraphs some of the major empirical works are presented.

Atsbha, (2015) assess the potential resources of tourism development in Dejen woreda using purposeful sampling method to select informants and analyzed data statistically. This study shows the preservation of the precious resources in Wereda could be used as a source of income that would be generated from tourists visiting the area. Sintayehu, (2015), assess and identify the potential tourism resources of Choke Mountain and its Environs. In the study, mixed research approach was employed to collect both qualitative and quantitative data which were collected via extensive review literature, questionnaire, interview, focus group discussion, and field observation. The result of the study revealed that Choke Mountain and its surroundings are endowed with natural, cultural, and historical potential tourism resources.

Suryabhadgavan, et al (2015), identifies potential ecotourism sites in Hawassa town and its surrounding. The main objective of this study is to evaluate and identify the ecotourism potential using multi criteria techniques for optimal exploitation of the area for the tourism. The finding of the study shows that the largest part of the area was identified as moderately suitable; hence the Hawassa town and its surrounding can contribute for national development through sustainable use of the ecotourism potential of the area. This work was assessed the potential suitable areas for ecotourism based on Visibility, land use land cover, slope, elevation, Proximity to road, lake, natural and cultural attractions, fauna and flora conservation, rainfall and temperature. A study by Zoeram, Ali, and Aghajani, (2019) identifies the Potential Eco-tourism Site Suitability Using AHP and GIS, A Case of Hugumburda Forest and its Surrounding Areas, Ethiopia. This work was assessed the potential suitable areas for ecotourism based on land use land cover, soil, slope, elevation, scenic attractiveness, rainfall and temperature. The result showed the large part of the area was highly suitable for ecotourism.

Other studies example Daniel (2009), identify potentially suitable sites for ecotourism in the surroundings of Addis Ababa City mainly based on the Natural components of ecotourism.

Seven factors, namely: Land use-land cover, soil, elevation, slope, vegetation density, temperature and rainfall were considered to determine the suitability of an area for ecotourism.

Abel (2012) examined a web-based GIS utility that allows the tourists to have spatial and non-spatial tourism information about Bahirdar town anywhere in the internet. This study intends to develop a prototype based on a three-tier architecture using client/server paradigm. Apache, Map server, PHP, and chameleon are the open source software that was used for developing the portal. Mesele and etal(2017) studied the development of a GIS enabled online interactive application for tourists in Addis Ababa city, Ethiopia. The main objective the research was to develop a GIS enabled online interactive application for tourists. This was developed with Web-GIS open source software, Map Server, and Graphic User Interface (GUI), and provided access to users.

Many researchers did their research papers on tourism development to investigate the potential tourism resource site, eco-tourism area and tourism suitability site by using different techniques. Some of them are using sampling techniques to identify the potential tourist attraction site, others are linking tourism development with incomes and nature based tourism development and the rest of them are used GIS, remote sensing and web GIS system to promote existing tourism sites. But this study is different from the above researchers in different ways. This study was reveals tourism development by combining existing and new tourist site by using all necessary techniques to address the problem and contributes research idea for decision makers. Finally, the present study aimed at assessing the tourism potentials, challenges and mechanisms of tourism development using GIS and remote sensing in East Gojjam Zone.

## 2.4. Conceptual Framework of the Study

The conceptual frame work of the study (Figure 2) provides information about the role of GIS and RS for tourism development.

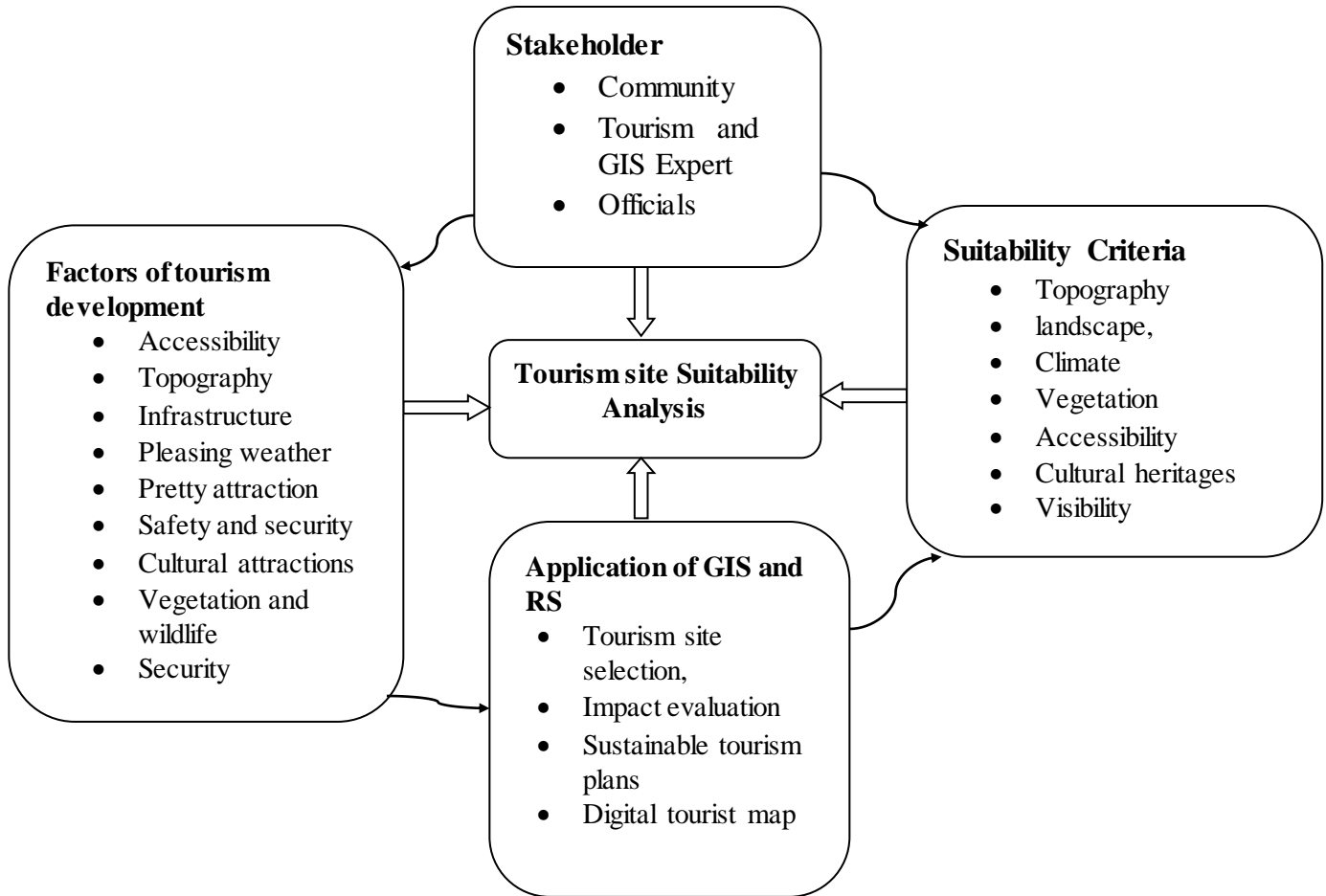


Figure 2: Conceptual frameworks (Source: own construction, 2020)

The above conceptual framework tries to show the linkage between the stakeholders, GIS and RS, factors and suitability criteria's for tourism development. There are different factors that affect the development of tourism like accessibility, topography, infrastructure and others. The stakeholders have a responsibility to solve the tourism development factors, identify, preserve and conserve destination areas and setting multi criteria's for selecting suitable tourism site. RS and GIS is a powerful technology to show the potential tourism sites, factors and mechanisms of tourism development, and making analysis using multi criteria's seated by stakeholders. Generally, tourism site Suitability analysis needs the collaboration of technology, stakeholders, multi criteria's and identifying factors of tourism development

## CHAPTER THREE

### 3. STUDY AREA OVERVIEW, MATERIALS AND METHODS

This chapter describes the location, physical and socio economic characteristics of study area, methods and materials.

#### 3.1 Study Area Description

##### 3.1.1 Location

East Gojjam Administrative Zone is one of the eleven Zones of Amhara National Regional State and constitutes 20 Woredas (16 rural woredas, and 4 Town administration Woredas). It covers a total area of around 14,004km<sup>2</sup>. It is bordered on the south by the Oromia Region, on the west by West Gojjam, on the north by South Gondar, and on the East by South Wollo. The bend of the Abay River defines the Zone's northern, eastern and southern boundaries. Its highest point is Mount Choqa (also known as Mount Birhan) which has an elevation of around 4100m above mean sea level (msl). Geographically, it extends from 9<sup>o</sup> 55' 01'' N to 11<sup>o</sup> 14' 12'' N and from 37<sup>o</sup> 29' 37'' E to 38<sup>o</sup> 30' 18'' (CSA, 2007).

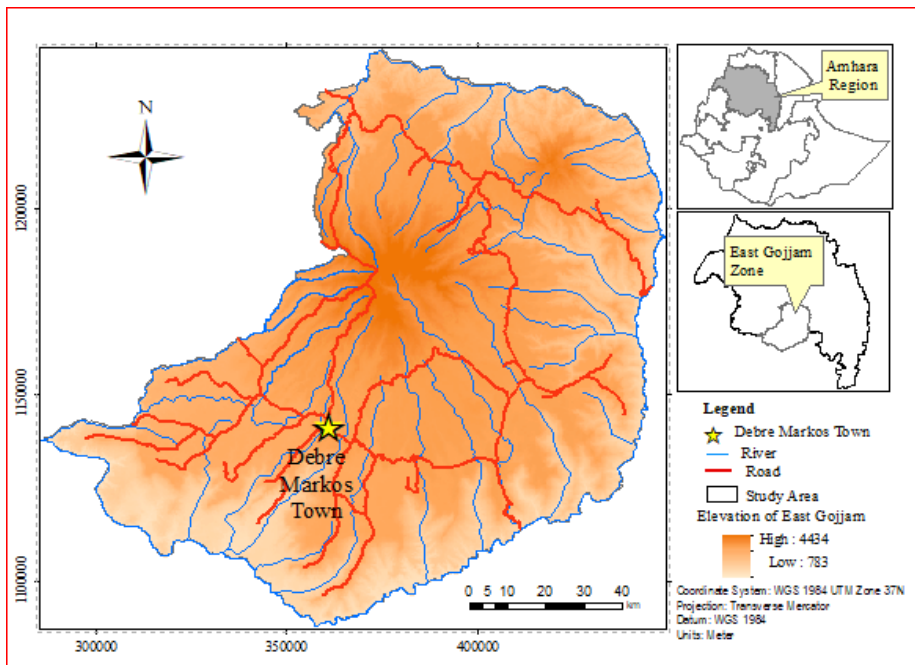


Figure 3: Location map of study area (CSA, 2007)

### 3.1.2 Topography, climate and vegetation

East Gojjam Zone is characterized by mountains including Choke Mountain and abamentous mountain, plateaus (Yetnora, Awabal and Anaded, Gozamin, Debre Elias) and Gorges (Abay Gorge and Wamet). The study area occurs in the altitudinal ranges between 759 to 4100 m a.s.l.

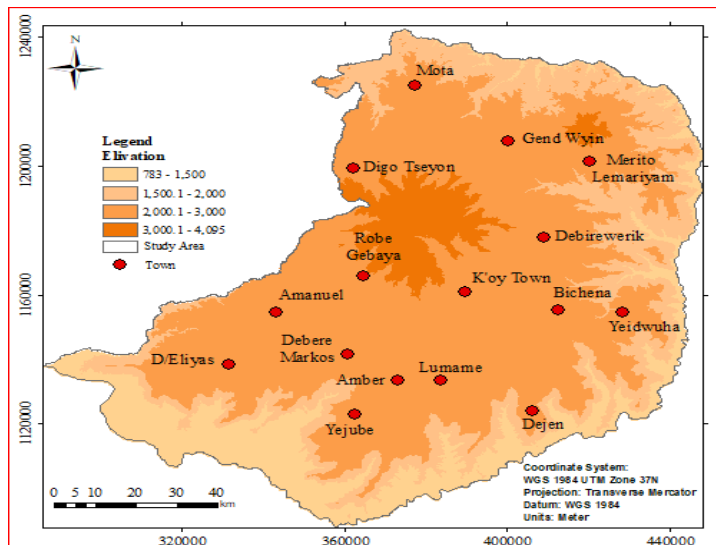


Figure 4: Elevation map of study area (Source: USGS, 2020)

Figure 5 depicts 30 years (from 1990 to 2019) record of average monthly rainfall of 9 stations found in the study area. Accordingly, highest monthly average rainfall is recorded in Kuy followed by Yejube and Dejen. Lowest monthly average rainfall is also recorded in Yejube and Yetnora on January. Highest monthly average rainfall for all stations is recorded during the months of June, July and August. On the other hand lowest average rainfall is recorded in November, December and January.

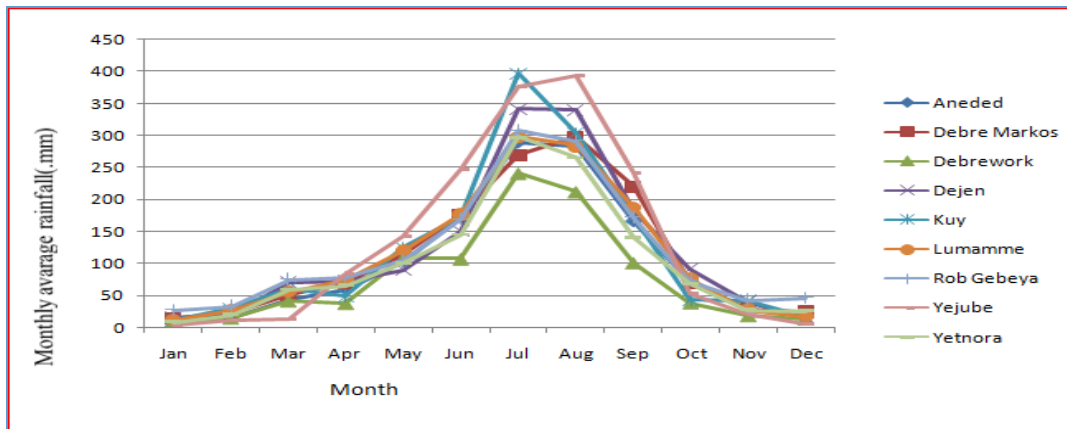


Figure 5: Monthly average rainfall of study area (Source: NMA, 2020)

Topography of East Gojam Zone is diversified, and these topographic variations compiled with climatic variability resulted in different vegetation types. These are Afroalpine and sub-afroalpine vegetations, Dry Evergreen Montane Forest and Combretum Terminalia Woodland (Zewde, 2014). Currently, 41 bird species are found in Afro tropical highland biome of Choke Mountain including endemic Abyssinian, Long claw (*Macronyx Flavicollis*). Some bird species, such as the Abyssinian Long Claw, Wattled Ibis, Thick billed Raven, White collared Pigeon, and Blackwinged Lovebird, are endemic to Ethiopia. There are 16 animal species, such as Leopard (*Panthera pardus*), Golden / Common Jackal (*Canis aureus*), Common Bush Back (*Tragelaphus scriptus*), Abyssinia Colobus, Common Duiker, Spotted Hyena (*Crocuta crocuta*), Anubis Baboon (*Papio Anubis*), Bush Pig (*Potamochoerus porcus*), and Common Duiker Choke Mountain and its surroundings.

### **3.1.3. Demography and socio economic activities**

The total population of the East Gojjam Zone is 2,153,937, of whom 1,066,724 are men and 1,087,221 are women. With an area of 14705.36 square kilometers, this zone has a population density of 153.80/km<sup>2</sup>. The urban populations account to 213,568 (9.92%) of the inhabitants. The largest ethnic group reported in this zone was Amhara (99.82%), and all the other ethnic groups combined were about 0.12% of the total population. Amharic is primary language spoken by the total population. With respect to religion, 97.42% of the total population was followers of Ethiopian Orthodox Christianity, and the rest 2.49% were followers of other religions (CSA, 2007). The population of this zone is estimated to be 2,496,325, according to the East Gojjam Zone Finance and Economics Office (EGZFEO) (2014/15). There were 1,221,255 males out of the total projected population, and 1,275,970 females. Agriculture is predominantly the economic base of the administrative region. Eighty six (86 %) of total population lived in rural areas. The area of study is one of the major areas producing teff (staple food) and the second pulse crop in the region. Barely, wheat, oil seeds, sorghum, maize, wheat, oats, beans and peas are the major crops produced in large quantities (CSA, 2012).

## 3.2. Research Methods

### 3.2.1. Data acquisition

The main purpose of this study is to investigate the applicability of GIS and MCE in prioritizing locations for tourism development in East Gojjam and perform a suitability analysis to achieve the study objective. The study used both primary and secondary data.

Firstly, the primary data were generated from satellite image, field survey, questioners from experts working in the zone and woreda culture and tourism department, the zone and wereda communication department, hotel and destination managers. In addition, a Global Positioning System (GPS) was used in the field survey for the collection of sample points and to identify location of existing tourist attraction areas of the study area. The secondary data were gathered from Department of Culture and tourism (tourist attraction areas and their description), Geospatial Information Institute (topographic data and spot image), National metrological Agency (metrological data) and different literatures, journals and articles.

Table 1: Materials and software's

No	Data type	Sources	Resolution	Software for processing and analysis of the data
1	Landsat 8 image of the year 2020	United States Geological Survey (USGS)	30m	ERDAS IMAGINE 2015
2	DEM	United States Geological Survey (USGS)	30m	ERDAS IMAGINE.15 and ArcGIS10.5
3	GPS data	Filed Survey		ArcGIS10.5
4	Vegetation	NDVI		ERDAS IMAGINE 2015
5	Topography data	EGII		ArcGIS10.5
6	Climate Data	NMA		
7	Questionnaire	Filed Survey		
8	Digital Photo	Filed Survey		

The following ancillary data was used for the analysis.

- Toposheet 1:50000 scale from GII,
- Spot image 2016 from GII
- Google earth
- Tourism data from culture and tourism bureau of study area and other necessary data ware used

### 3.2.2. Sampling techniques

There are 20 woredas in East Gojjam zone. Five woredas were selected purposefully that have huge potentials of tourism resources. These are Gozamn, Enemay, Dejen, Debere Elias and Machakel woredas. Purposive sampling technique was used to select total of 70 samples from officials and experts working in the Zone and Woreda Culture and tourism department, the Zone and wereda communication department, hotel and destination managers and environmental conservation bureau of the study area. In order to obtain full information, the participants of this study were selected purposely based on their work experience, position, educational background, skill and knowledge of experts on the subject of the research.

Table 2: Sampling techniques

No	List of respondents(total population)	Selected wordas					Total
		Gozamin	Dejen	Enemay	Debre Elias	Machakel	
1	Tourism experts	6	1	1	1	1	10
2	Woredas communication experts	1	1	1	1	1	5
3	Hotel managers	5	3	3	3	3	17
4	Destination managers and tour guides	8	12	6	6	4	36
5	Environmental conservation expert	2	-	-	-	-	2
<b>Total</b>							<b>70</b>

### 3.2.3 Data processing and method of analysis

The spatial and statistical data that were used for this project was processed using MCE methods and GIS tools. A set of evaluation criteria were determined and indicators that are suitable for each criterion were selected for measurement. The related factors and criteria's are presented in spatial data layers and evaluated using different GIS analysis functionalities (reclassification, conversion tools, raster analysis and weighted overlay) in ArcGIS 10.5 suite. The weighted layers were then summed up in a final suitability.

**Land use land cover (LULC):** Land use land cover map of the study area was produced using the supervised method of image classification. Accuracy assessment is undertaken by using 250 GPS points from the field and the overall accuracy is accounts 87.14 percent.

Table 3: Land use land covers type and their Description

LULC Type	Description	Land use suitability for Tourism
Forest	Areas between forest and non-forest lands that have at least 10 percent cover with live trees and forest areas	Highly important for tourism and sustainable environment. It can serve as main tourism attraction and classified as high suitable.
Water body	Includes surface covered with water (such as a river or lake or ocean).	Can serve as active recreation and classified as high suitable.
Wetland	Include swamps, marshes, bogs and similar areas.bvg	An area where local and migratory birds can entertain and classified as high suitable.
Scrubland	Includes scattered trees, closed and open shrubs,	Moderately suitable for tourism
Grass land	Includes grasses for grazing and recreation areas.	Is an area of grazing land and an area birds can consider and classified as Moderately suitable
Settlement	Includes residential, commercial, Services areas.	It can serve as accommodation site, service provider
Farm land	Includes Agricultural land	Not suitable and classified as not suitable
Bare land	Includes Waste and unmaintained land for any purpose.	Not suitable and classified as not suitable

**Vegetation index (NDVI):** Vegetation density of the study area was generated using NDVI image of the study area. Vegetation in this sense indicates all plant communities (Eucalyptus, Scattered trees, Shrub, Rangelands and Wetlands.) in the landscape that share similar characteristics. The Normalized Difference Vegetation Index (NDVI) is a standardized index used to generate an image displaying greenness (relative biomass). This index takes advantage of the contrast of the characteristics of two bands from a multispectral raster dataset ,the chlorophyll pigment absorptions in the red band and the high reflectivity of plant materials in the near-infrared (NIR) band. The documented and default NDVI equation is as follows:

$$NDVI = ((IR - R) / (IR + R))$$

- IR = pixel values from the infrared band R = pixel values from the red band

**Multi Criteria Evaluation (MCE):** is method of how to integrate information from multiple parameters to form a single assessment list. In a weighted linear combination, variables are combined by adding a weight to each and a description of the results to produce an effective map. The formula for weight combination is given as follows (Ronald, 2001):

$$\sum = W_i X_i S \quad \text{where } S \text{ is suitability } W_i \text{ is weight of factor, } X_i \text{ is Criterion score of factor } i.$$

Because of the different scales up on which criteria are measured, it is necessary that factors be standardized before combination using the above formula, and the type be transformed, if necessary, such that all factor maps are positively correlated with suitability. A procedure for standardization, typically using the minimum and maximum values as scaling points (Ronald, 2001). According to Ronald (2001) the simplest linear scaling is given by Vogged as follows:

$$X_i = (R_i - R_{\min}) / (R_{\max} - R_{\min}) * \text{Standardized range}$$

Where  $X_i$  is the criterion scores of factor  $i$ ; and  $R$  is row score.

**Analytical Hierarchical Process (AHP):** is a decision support tool, which can be used to solve complex decision problems. It uses a multilevel hierarchical structure of objectives, criteria, sub criteria and alternatives. AHP uses a fundamental scale of absolute numbers to express individual preferences or judgment. To ensure the credibility of the relative significance used, AHP also provides measures to determine inconsistency of judgments mathematically. Based on the properties of reciprocal matrices, the consistency ratio (CR) can be calculated.  $CR < 0.1$

indicates that level of consistency in the pair wise comparison is acceptable. Saaty (1980) suggests that if CR is smaller than 0.10, then the degree of consistency is fairly acceptable. But if it is larger than 0.10, then there are inconsistencies in the evaluation process, and AHP method may not yield meaningful result.

### 3.2.2. Work Flow Chart (Methodology)

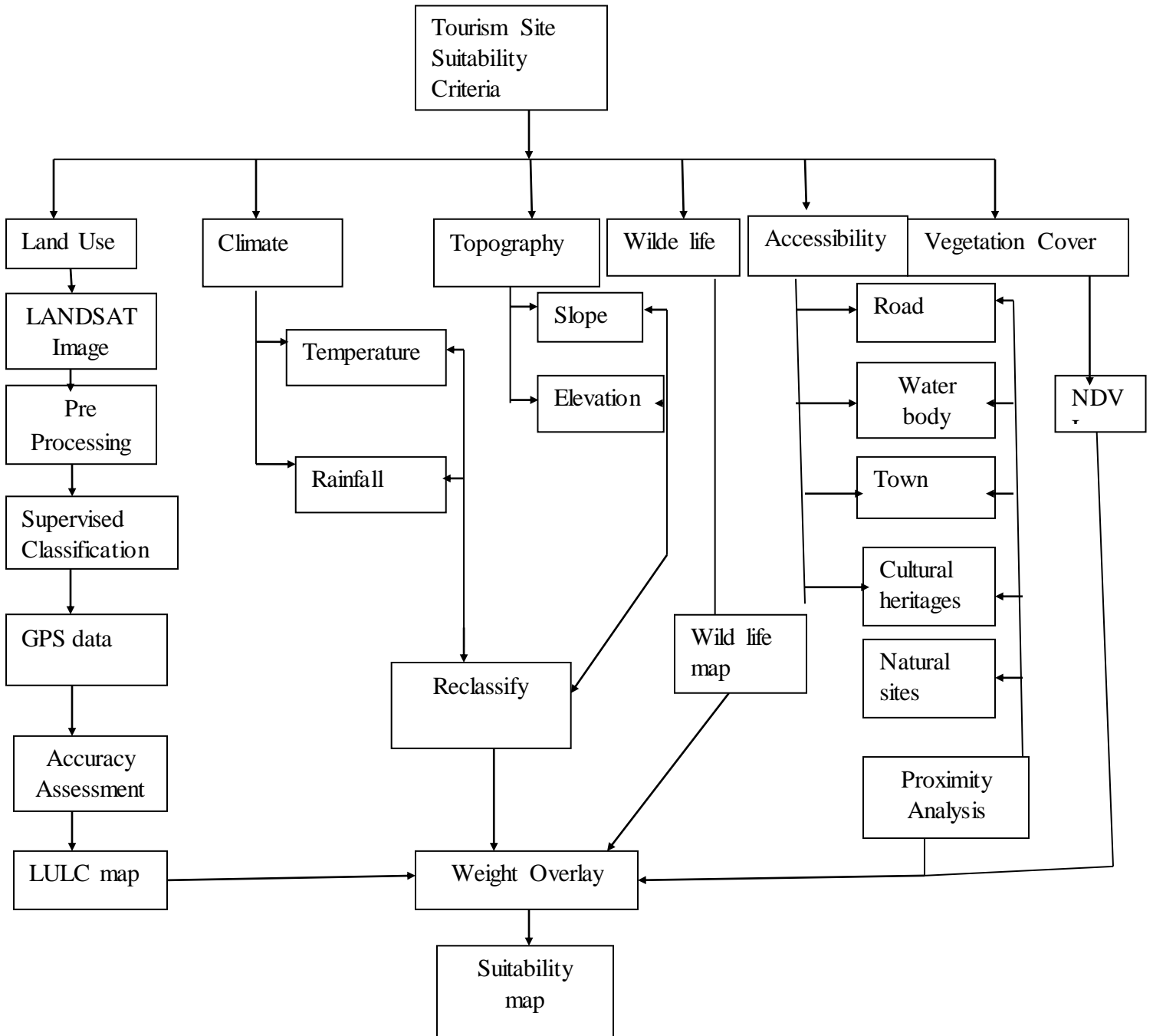


Figure 6: Work Flow Chart

## CHAPTER FOUR

### 4. DATA ANALYSIS AND INTERPRETATION

This Chapter deals about the analysis and interpretation of the data collected through Primary and secondary data sources

#### 4.1. Tourist Attraction Sites of East Gojjam Zone

According to the finding, East Gojjam Zone has several tourism resources. The study assesses both the natural and cultural tourism potentials of the zone. The main tourism attraction sites of the study area which are registered by culture and tourism bureau of East Gojjam Zone were discussed as follows.

##### 4.1.1 Cultural attractions of East Gojjam Zone

**Merto Lemariam Monastery:** is located 197 kilometers north-east of Debre Markos in Inebse Sar Midir Woreda, Lying on a hilltop elevated 2600 meters above sea level. The local religious fathers say Merto Le Mariam which is now seen ruined was built in the 4<sup>th</sup> century ( in 341 ) during the reign of Abrha We-Atsbeha. Before the advent of Christianity, the place had once been the strong hold of Judaism where Judaic sacrifices had been offered and the place had been Tsirha Aryam. It is said that ,after Abrha Weatsbeha had built the church, they gave it the Merto Le Mariam (the Amharic ‘Yemariam adarash’ (The seat of virgin Mary ). The monastery owns spatial gifts of king’s and rulers’ clothes, head jewelries, ‘brana’ books, and crosses, cups made from silver and horn and *Ahmed Gragn’s* dress etc. The annual holiday is celebrated on January 21 (EGZ Culture and Tourism Office, 2015).

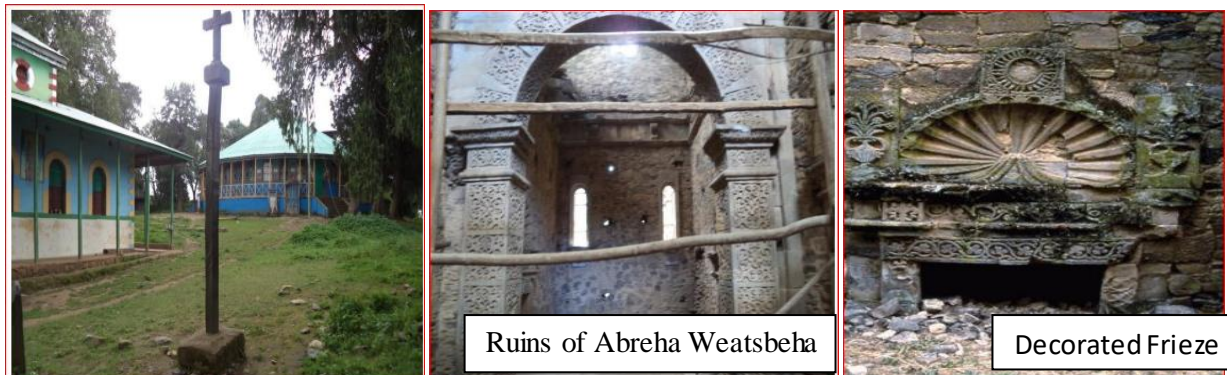


Figure 7: Merto Lemariam Monastery (Source: EGZCTO, 2015)

**Debre Work Maryam Monastery:** is found in Enarj Enawga woreda. The history of the Monastery states that the church was established in 351 AD. Geographical setting which is at very closely similar with that of Mertule Lemariam gives the monastery an attractive topographic view. Different spiritual wall paintings, gifts of kings are the remarkable witness for its oldness. Among Saint Luke's paintings of Saint & Virgin Marry named, 'WOINTU', is found in this Monastery. The Monastery also has a single storied treasury house which had served it till the recent times. This house was built during Gondrine period, in a Gonderine architectural building design during the reign of Yohannes (1667-1682). The Monastery has ancient 'brana' books. Crosses including **Aba Sertse Petros's** standing cross which measures nine arms, contributions of Emperor zera Yaeqob, war dress made of iron, his hat and other many heritages. The annual holiday is celebrated on September 17 & January 21 (EGZCTO, 2015).



Figure 8: Debre Work Maryam Monastery (Source: EGZCTO, 2015)

**Dimma Giyorgis Monastery:** is located on a highway from Addis Ababa to Bahir Dar via Motta. The road to the monastery goes 12 Kilometers deep in to the East direction, at 10 Kilometrs far before Debre Work on Bichena to Debre Work road. The founder of the church was said to be a religious father first known as *bekimos* and later *Tekeste Birhan* in 1297AD. A book called 'Gedile Flipos' and other 'brana' literatures were found in the church which also state the same about the establishment of the church. The church owns many invaluable heritages, gifted from kings, noblemen and believers which have passed many years. In its long history Dimma monastery was also among one of the famous **Qine bets** (house of poetry). For example, the honorable artist Doctor **Haddis Alemayehu** and his main character **Bezabih** in his long Novel. *Fikir Eske Meqabir* (Love unto crypt) were here. Attended by a number of Christian followers and tourists the holidays of Dimma Giyorgis are colorfully celebrated on December 8 & April 23 (EGZCTO, 2015).



Figure 9: Dimma Giyorgis Monastery (Source: EGZCTO, 2015)

**Aba Asrat Monastery:** is found 8 km south of Debremarekos .The road to monastery is 8 km south on main way of Debre Markos to Addis Abeba . The monastery was established in 1845 by a monk Abba Asrat .The annual holiday is celebrated on October 27.nowadays the monastery owns 57 monks and 20 nuns. The monastery possess indigenous trees such as acacia, junipers trees and the home of many wild animals such as hyenas,monkeys, bush bucks etc. The annual holiday is celebrated October 27& August 27 (GWCTO, 2020).

**Anktse Betsuan Saint Lalibela Monastery:** is located in Machakele woreda eastern part of Ammanuel the capital of the woreda .The monastery typically found on mountain chains of ‘Yechene‘, which has scenery and breathtaking landscape of the area. The monastery has traditional school which used to help and teach orphans .The monastery is actively engaged producing agricultural out puts. The annual holiday is celebrated on December 29 (MWCTO, 2020).

**Washa Amba Abune Tekelehaymanote Monastery**is found in Machakle Woreda at Gera Kidamin Kebele which name is Kuasheba .The monastery is located deep in to the cave where large bounties of plateaus and natural forests are existed. The church is established 15 years ago by Abbese Wolete Mariyam Gelaw. The monastery is the home of different vegetables and fruits. All members are devoted producing different agricultural outputs and participate in natural resource conservation. The annual holiday is celebrated on December 24& August 24 (MWCTO, 2020).

**Saint Trinity Monastery:** is found in west of Debre Elias .The monastery is situated at the middle of the most spectacular and unique sight of four mountain chains. The two rivers ‘Yetma’ and ‘Temecha’ meet across the monastery. It is fertile and an eye catching sight and located in a deep gorge surrounded by natural forest and different vegetables and fruits such as oranges, bananas, sugarcanes etc .The holy water which is believed to be curable is found in the monastery. The annual holiday is celebrated on January 7 & June 7 (DEWCTO, 2020).

**Debre Genet Elias Church:** Debre Genet Elias Church is found in D ebre Eilias Woreda which is established in 15<sup>th</sup> century during the reign of Zeariyiacob in 1466 AD. The church has served for centuries the source for traditional education ofMetsafe( commentaries on bible) Zema(church music), Aquaquam( church movements)Qine (Potery) ,Kidasie (Liturgy).This church has contributed the most renowned figures such as Yofetaha Nigusie,Patriarch Tewoflos ,Melaku Begosew,and the honor Artist Haddis Alemayehu .The church is also a home of a legendary bride and bridegroom which has ancient mysteries. The annual holiday is celebrated on December 1 (DEWCTO, 2020).



Figure 10: Debre Genet Elias Church (Source: EGZCTO, 2015)

**Kidus Markos Church:** is found at Debre Markos, headquarter of East Gojjam. The church was established in 1874 by king Tekelehaymanote. The church has the most renowned and unique building. The church has served the source for the name of the town. The church is the home of ancient wall paintings, old parchments’ .crosses made from gold, silver, dresses .king Tekelehaymanote tomb and indigenous trees are also found in the compound. The annual holiday is celebrated on April 30 (GWCTO, 2020).

**Abay Rufael Celebration:** is celebrated annually on Ethiopian 13 month (pagume 1-4). This annual celebration is celebrated with numerous tourists around the country to be baptized from Abay (river Nile). This holiday depicts the coming of new year. Beside that by visiting the breathtaking landscape of Abay one can witness how nature is wonder full, mysteries and eye catching. Many thousands of people come to the area to attend the Ceremony. Even though participant people in the ceremony are mainly from the two nearest regions (*Amhara and Oromiya*), there are also people who come from different parts of the country. Participant people come from these regions conduct the ceremony on the opposite side they come.



Figure 11: Abay Rufael Celebration (Source: EGZCTO, 2015)

**Aba Fakih Yasin Memorial:** is celebrated Yemezegn kebele 10 km away from Debre Elias. The name fakih depicts the one who highly educated spiritual Islamic father. Debedabi 'is a place where this annual memorial is celebrated due to that father fakih yasin was a notable Muslim leader at 19<sup>th</sup> century in the area. Debedabi was a market place of the time and it was part of transaction route of Metema via port of Metswa. Father fakih yasin was an icon for those Muslim followers of the area. The annual Memorial Day is celebrated on October 16 (DEWCTO, 2020).

**Yet Nora Market:** is a market that takes place beside the high way from Addis Abeba Bihar Dar via Debre Markos. The Market is found after 10 kilometers from Dejen to Debre Markose at a sub town called Yet Nora. The market is a nationwide market conducted weekly on every Tuesday. In hot market seasons of this market, merchants come from Awi, Wollo Zones of the region and Tigray, Oromiya, southern Nations Nationalities & Peoples regions of the Country. The market beyond its trading value has also much ceremonial and unique attraction value (DWCTO, 2020).

**King Tekle Haymanot Palace:** is found in the capital of the Zone. Debere Markos located centrally, on the hill top of the town. Even though the name for the palace comes from King Tekele Haymanot, most of the buildings found on the palace are constructed by a ruler for the area in 1920's called Dejazmach Tshayu EnkuSillasie. But the founder of both the palace and the town was King Tekele Haymanot in 1845 E.C. As a result, the King had first constructed his palace there before. Today, the meeting hall connected with a building which was also the residence of the then Dejezemach, many other buildings around which are also in use for administrative purposes still today are found. A big throne bed, benches made by carvings are also found (GWCTO, 2020).

**Aba Kostir Belay Zeleke and Associated Attractions:** Dejazmach Belay Zeleke is a patriot who fought for independence of his country against the second time five years (1928-1933 E.C) Italian occupation. The birth place and fighting center of the hero is in Enemay woreda at a place called '*somma*'. The patriot, using this place as a place of defense won many battle fields, in different districts of the Zone. Today, the remains of patriot's palace, the remains of the church that he and his fore fathers used, military exercise fields for his soldiers, a huge tree which he use as military discussions center during fight called '*warkaye*' and other associated historical attractions are found at his place of birth Bokena. Aba Kostir Belay used to have outstandingly and massively destroyed his enemy. Among all such battle field victories that he had got were Ayalfush-Yegosa (around Debere Work), Bichebna, Dejen, Yetnora and somma (EGZCTO, 2015).

#### **4.1.2. Natural attractions of East Gojjam zone**

**Lake Bahire Giyorgis:** is found in Goncha Siso Enessie woreda after turning left 7 km from the Ginde Woien to Mertu Lemariam road. The lake covers 112 square Kilometer area. The exact depth of the Lake is still unknown. However, it is believed around 30 meters. The Lake has different unique characteristics. Among these, the plant called '*meqa*' which are similar to the reed shows movement or sailing within the lake. The '*meqa*' moves by forming island form structure. The time and direction of their movement has no time bound. Among its other things, the sailing of these plants is an amazing part of the lake for the locals & foreign visitors. Pumice named as '*serez*', a type of rock can also be seen floating around the lake. The Lake has an attractive looking and is located in a deep Gorge, surrounded partially by natural forest. In the western part of the Lake one Medium and two large caves are found (EGZCTO, 2015).



Figure 12: Lake Bahire Giyorgis (Source: EGZCTO, 2015)

**Aba Menious Mountain:** is found at the middle of the two woredas of Goncha Siso and Inbsie Sar Meder. The mountain has an elevation of 3664 meter above sea level which makes it the second highest mountain in the Zone next to Choke Mountains. According to the chronicles the 5 monks Aba Menious, Aba Motsa, Aba Marcos, Aba Nakutolabe have lived in the area. The name Aba Menious was given to commemorate the leader of the monastery. The area has seven chains of mountains which are situated from west to east. From nearby distance of the mountains there are two lakes named *upper* and *lower* lake (EGZCTO, 2015).

**Wuregreg Water Fall:** is found 10.5 km south of Yejube, capital of Basso Liben Woreda. The water drops for about 25 meters, and sprays water droplets gives a place scenic beauty. The water fall also serves as bridge to cross humans and animal during summer ((EGZCTO, 2015).

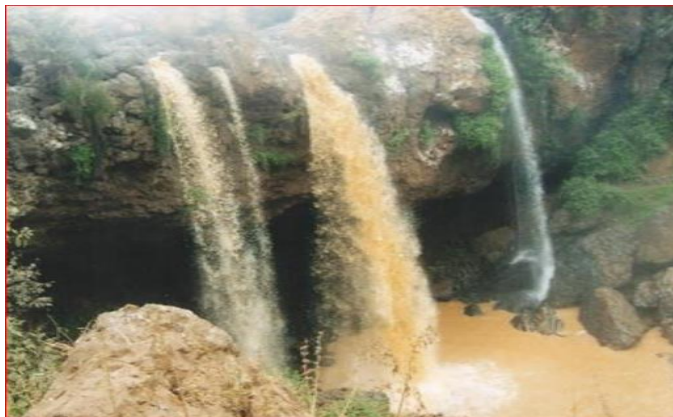


Figure 13: Wuregreg Water Fall (Source: EGZCTO, 2015)

**Abbay Gorge:** It is truly a magnificent gorge which is found in both sides of the Blue Nile River and spans an altitude of around 2500m to 1200m. It is comparable in scale with the Americas Grand Canyon, and is often cited to be the largest canyon in Africa. The first stop after crossing the gorge coming from Addis Ababa is Dejen. A few Kilometers north of Dejen, the main road

splits in two direct routes to Bahir Dar via either Debre Markos or Motta. The two bridges of the Abay (Blue Nile) are other main features of the area. These are the old, Emperor Haile Sillasie's and the new Hidasse Bridges. The bridges in combination with the river basin, their own relativity of design, magnitude have incomparable attractiveness (Field Survey, 2020)



Figure 14: Abay Gorges (Source: Field Survey, 2020)

**Minje Graveyard:** is found in Dejen Woreda west of deep slope areas of Abay gorge. The cemetery has its own burial system which has ordered up to 8 burials like bricks'. The area is full of skeletons, pieces of cloths and other remnants. During New Year, children's of the area present bunch of flowers for the cemetery to depict as the pigeon gave the palm for NOAH to make him happy. South east of the grave yard the Agew wall or the moon wall which has ordered accordingly where elders are used it for war time (DWCTO, 2020).

**Qebi Water Fall:** is situated in the middle of mountains and spectacular eye catching caves. It is found south of Debere Markos .The water falls drops to great depth and sprays water droplets in align with birds songs give a place attractive feature. Besides the place serves as a tourist attraction and also used for agricultural practices for nearby farmers (GWCTO, 2020).

**Choke Mountains:** is one among in the country and the highest mountain in the Zone. The altitude for the mountain is 4100 meters high and it touches 9 Woredas. The Mountain is in the vicinity of Debere Markos town. But it only requires a 27 Kilometers travel to the Rebu Gebeya a town where in which the mountain also clearly starts to rise up its elevation. The Mountain owns different spectacular geographical settings that are very eye catching for visitors. Among these, at the South-West direction of the Mountain Choke has four mountain ranges lined South-West to North-West. These features are commonly called *Arat Mekerakir* means four mountain

ranges. Each range features also has its own name reflecting the shapes they have. These are ‘*Enat Amba*’ (mother hill) because it has a relatively big size from the rest of the hills. ‘*Gemese amba*’ means fractioned hill. ‘*Qulit amba*’ means a hill with the shape of a dining tool called *Qulit* and ‘*Lemat Amba*’ means a hill with feast presenting material called ‘*Lemat*.’ The Mountain also has its own unique plant species called *jibra*, *Asta*, *Audagn*, *Amja* and others which does not grow anywhere. The Mountain has also forests which are composed of these species. The wild animals are also found in these forests. The mountain is the source for above 23 major rivers and 275 stream tributaries of River Abay. During the autumn and spring seasons the Mountain is a natural gift of good-looking and source of pleasure (EGZCTO, 2015).



Figure 15: Choke Mountain (Source: EGZCTO, 2020)

## 4.2. Suitability Analysis for Tourism Development of the Study Area

### 4.2.1. Criteria maps generation and classification

Based on the acquired information from literature search and expert’s opinion, there were 6 criteria determination and 13 factors classification for identifying and prioritizing the potential tourism sites as presented in (Table 4). These are landscape (visibility, land use/cover), wildlife (species), topography (elevation, slope), climate (rainfall, temperature,) accessibility (proximity to cultural sites, natural attraction places, roads, towns, and water bodies) and vegetation cover. These important criteria and factors in determining what areas are best suited for tourism development.

Accordingly, suitability levels per parameters for tourism development were defined in the following Table 4.

Table 4: Criteria and factors in land suitability analysis for tourism

Tourism Requirement			Factor Suitability Rating			
Criteria	Factors	Unit	Highly suitable	Moderately suitable	Low suitable	Not suitable
Landscape	Visibility	Line of sight	4-11 highly visible	0.75-4 middle visible	0-0.75 low visible	0 not visible
	LULC	class	Forest, wetland and water body	Shrub and grass land	settlement	Farm land and bare land
Wildlife	Wild life areas	class				
Accessibility	Proximity to cultural sites	KM	0-5km	5-10km	15-20km	>20km
	Proximity to natural sites	KM	0-5km	5-10km	15-20km	>20km
	Roads	KM	0-2km	2-6km	6-10km	>10km
	Towns	KM	0-10km	10-20km	20-30km	>30km
	Rivers	KM	0-2km	2-4km	4-6km	>6
Topography	Elevation	Meter	>3000	2000-3000	1500-2000	<1500
	Slope	Degree	0-10%	10-20%	20-35	>35
Climate	Rainfall	MM	100-130mm	85-100mm	>135mm	<85mm
	Temperature	°C	12-20	9-12	20-22	<9&>22
Vegetation cover	vegetation density	NDVI value	0.2-0.99	0.15-0.2	0.1-0.15	(-0.2)-0.1

Source: (Experts opinion, 2020)

## 4.2.2. Classification of criteria maps

### 4.2.2.1. Landscape

**Visibility:** Visibility (scenic attractiveness) factor was generated from a digital elevation model integrated with the location of natural uniqueness by view-shed analysis on the basis of visible or not visible (lines of sight). Naturally unique and cultural attractive places were collected using GPS in the form of point feature data.

The view-shed analysis was done to determine the scenic attractiveness. For this study based on visibility value (line of sight), high visibility value (4-11) was ranked as highly suitable, middle visibility value (0.75-4) was ranked as moderately suitable, low visibility value (0-0.75) was ranked as low suitable and visibility value (0) was not suitable.

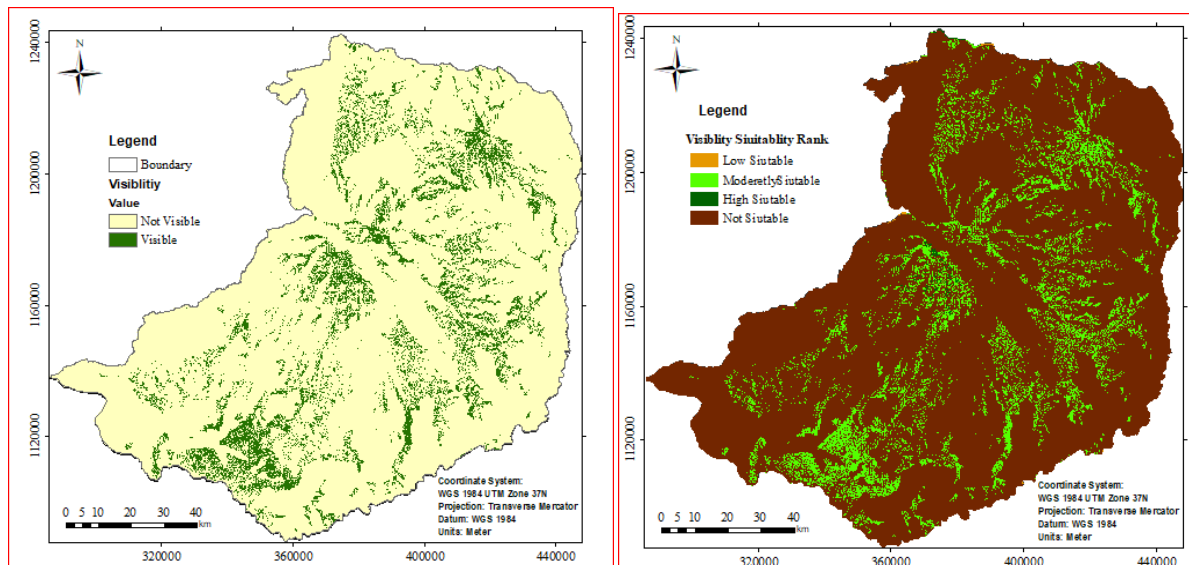


Figure 16: Visibility and reclassify visibility map of study area

Table 5: Suitability rating for visibility of study area

No	Visibility Value(Line of Sight)	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	0	Not Suitable	1187838.9	84
2	0-0.75	Low Suitable	0	0
3	0.75-4	Moderately Suitable	210490.74	15.02
4	4-11	High Suitable	3006.0835	1
		Total	1400856.2	100.00

**Land use / land cover:** As it is indicated in Table 6, 70 percent of the study area is covered by farmland. It is then followed by Shrub which accounts for 15 percent, grassland 6 percent and forest 3 percent. Agriculture is the dominant economic activity in the study area.

Table 6: Land use land cover type and their area

LULC_ Class	Area _Ha	Percentage (%)
Farmland	1008581.42	70
Forest	36829.20	3
Wetland	29183.00	2
Shrub	218727.55	15
Grassland	71808.80	6
Settlement	4315.00	1
Water Body	4609.94	1
Bare land	35051.15	2
Total	1400856.2	100

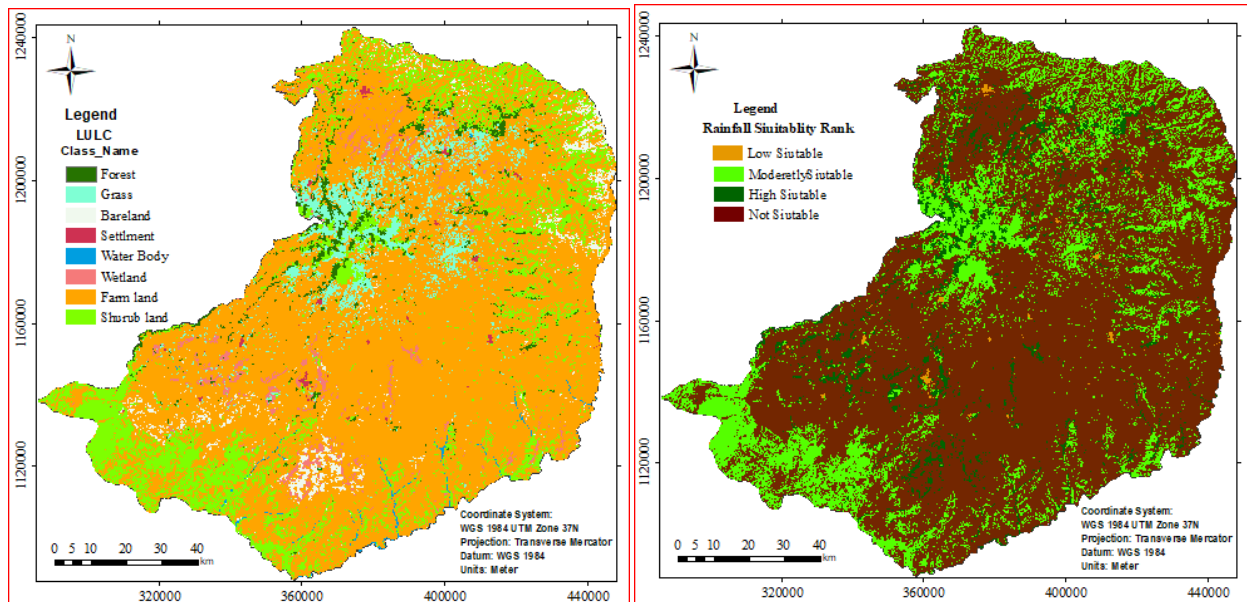


Figure 17: LULC and reclassified LULC map of study area

Table 7 shows that the land use land covers of the study area were dominated by farm lands (74%) which are considered as constraints and not suitable for tourism development. 5% of area were highly suitable for tourism which is covered by forests, water bodies and wetlands. 20% of the area were moderately suitable for tourism development and it is covered by and shrub and grass lands.

Table 7: Suitability rating for LULC of study area

No	LULC Class	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	Farm Land and Bare land	Not Suitable	1043628.57	74
2	Settlement	Low Suitable	4314.09	1
3	Shrub and Grass Land	Moderately Suitable	290556.64	20
4	Forest, Water Body and Wetland	High Suitable	70607.05	5
		Total	1400856.2	100.00

#### 4.2.2.2. Vegetation cover

**Vegetation density:** Healthy vegetation will have high NDVI values ranging from +1 to -1. However, no green leaves give a value close to zero. A zero means no vegetation and close to 1 (0.8-0.9) means the highest possible density of green leaves. Bare soil and rock reflect similar levels of NIR and Red and so will have high NDVI values near zero. Clouds snow and vegetation are the opposite of vegetation in that they reflect more visible energy than infrared energy, and so they reflect negative NDVI values(chernet,2009 : arcgis help). For this study based on NDVI value high NDVI value (0.2-0.99) was ranked as highly suitable, middle NDVI value (0.15-0.2) was ranked as moderately suitable, low NDVI value (0.1-0.15) was ranked as low suitable and NDVI value (-0.24)-0.1)was not suitable.

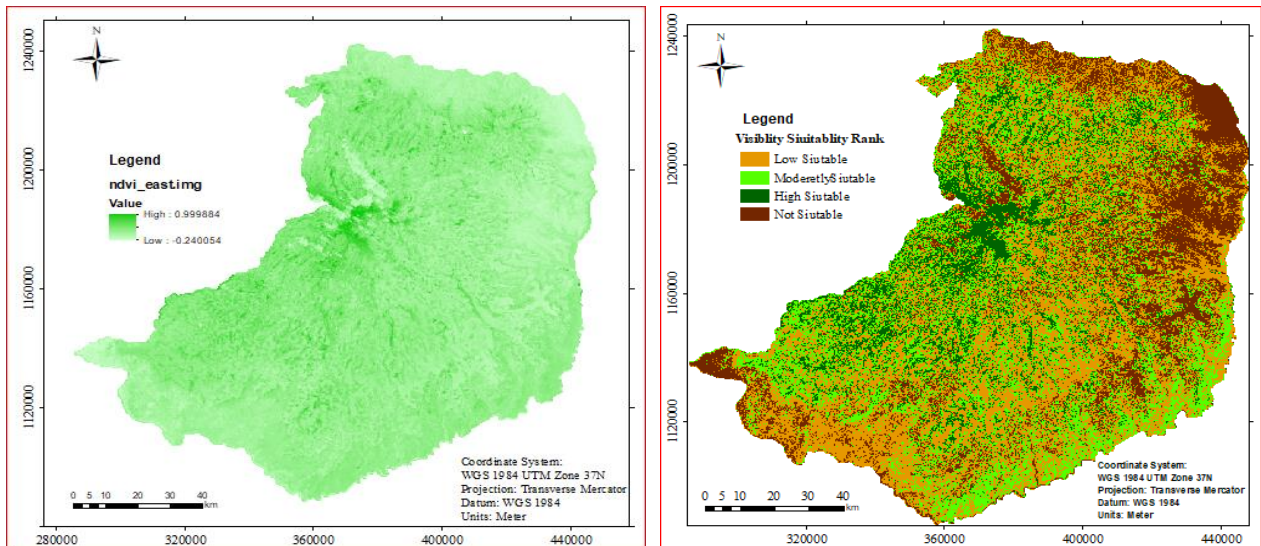


Figure 18: NDVI and reclassified vegetation map of study area

Based on the NDVI value, vegetation covers of study area shows that 14% of the areas were highly suitable for tourism and 23% were moderately suitable. It indicates that there is moderate vegetation cover in East Gojjam Zone.

Table 8: Suitability rating for vegetation cover of study area

No	NDVI value	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	(-0.24)-0.1	Not Suitable	272264.95	19.44
2	0.1-0.149	Low Suitable	598168.95	42.71
3	0.15-0.19	Moderately Suitable	322090.11	23.00
4	0.2-0.99	High Suitable	207922.18	14.85
		Total	1400856.2	100.00

#### 4.2.2.3 Wildlife

**Wild life areas:** concerns with reservation and protection areas where the places have habitats and species .Wildlife areas are digitized from spot image 2016 in the form of polygon features and then converted to raster format. Then areas which have wild life were ranked as highly suitable and the areas outside of the protected area are ranked as no potential for wildlife.

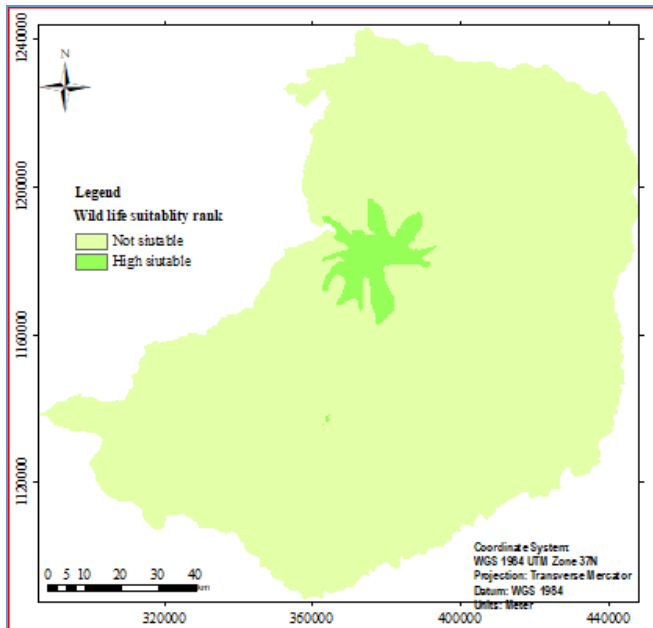


Figure 19: Reclassified wildlife area map of study area

#### 4.2.2.4 Topography

Elevation and slope factors were considered for the selection of sites for tourism projects as which area are best suited for different types of tourism experience.

**Elevation:** In this study, elevation factor was generated from a Digital Elevation Model (DEM). Elevation called altitude is the height of place above or below a reference level such as mean sea level. To evaluate the nature and element of an area making the landscape what areas is suitable for tourism, it is necessary to consider the position, angle and stage. Tourists like more mountainous areas for recreation. Elevation class were classified based on activity diversity which the area provides and the significance for tourism potential reclassified in to four class as elevation of  $>3000$  as high suitable ,  $2000\text{m}-3000\text{m}$  as moderately suitable,  $1500\text{m}-2000\text{m}$  as low suitable and  $<1500\text{m}$  not suitable.

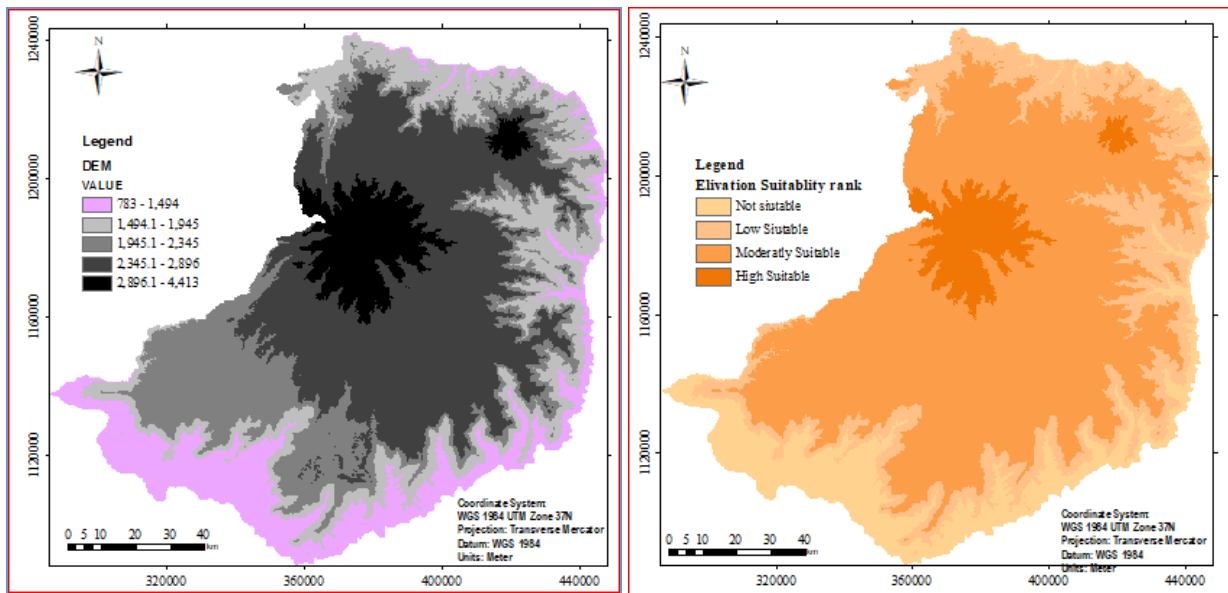


Figure 20: Elevation and reclassify elevation map of study area

High elevation area was characterized by containing varieties of vegetation, waterfalls, wild life and birds. Table 9 shows that 7% of the study area were mountainous and high suitable for tourism and 59% have moderate elevation and it is moderately suitable for tourism development.

Table 9: Suitability rating for elevation of study area

No	Elevation value	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	<1500m	Not Suitable	208089.13	14
2	1500m-1999m	Low Suitable	280417.14	20
3	2000m-3000m	Moderately Suitable	826874.6	59
4	>3000	High Suitable	85142.82	7
		Total	1400856.2	100.00

**Slope:** represents the gradient of an area expressed either in percent or in degree. The complexity of the area in terms of slope is a vital factor in the suitability analysis for tourism. This factor is show a varying degree, a complexity of area and slope of area which effect to selected area by defining percentage of slope that related to site suitable of tourism. In addition, slope is a safety indicator implying the gentler the slope, the higher the safety factor and vice versa. It is reclassified in four class as slope degree of 0-10% as high suitable ,10-20% as moderately suitable,20-30% as low suitable and >30% as not suitable.

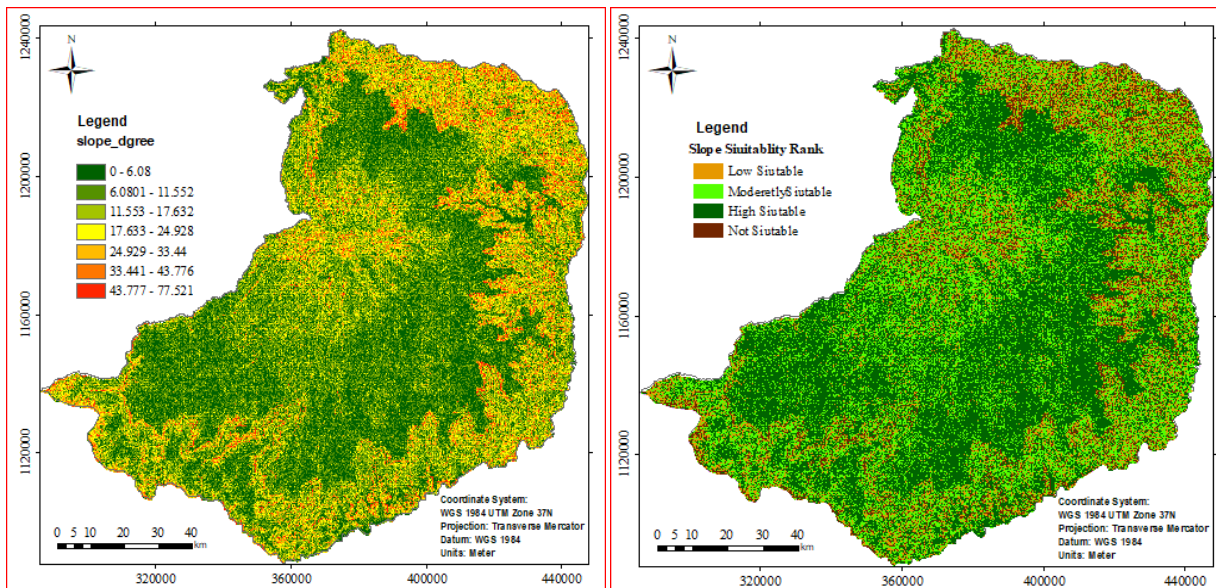


Figure 21: Slope and reclassify slope map of study area

Table 10: Suitability rank for slope of study area

No	Slope in percent	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	0-9.99%	Not Suitable	132711.46	9.48
2	10-19.99%	Low Suitable	170423.78	12.17
3	20-29.99%	Moderately Suitable	414531.33	29.60
4	>30%	High Suitable	682833.12	48.76
		Total	1400856.2	100.00

#### 4.2.2.5. Climate

**Rainfall:** is highly associated with the growth of vegetation. The availability of surface and ground water is also directly or indirectly dependent up on the availability and amount of rainfall. Moreover, it highly modifies the state of weather condition of a certain area. Therefore, high amount of rainfall of a certain area is more suitable for tourism sites than less amount of rainfall. For this study raster data from NMA was used to classified rainfall amount of study area. Areas which have a rainfall of <85mm was classified as not suitable, 85mm-100mm as moderately suitable, 100mm-130mm as highly suitable and >130mm as low suitable.

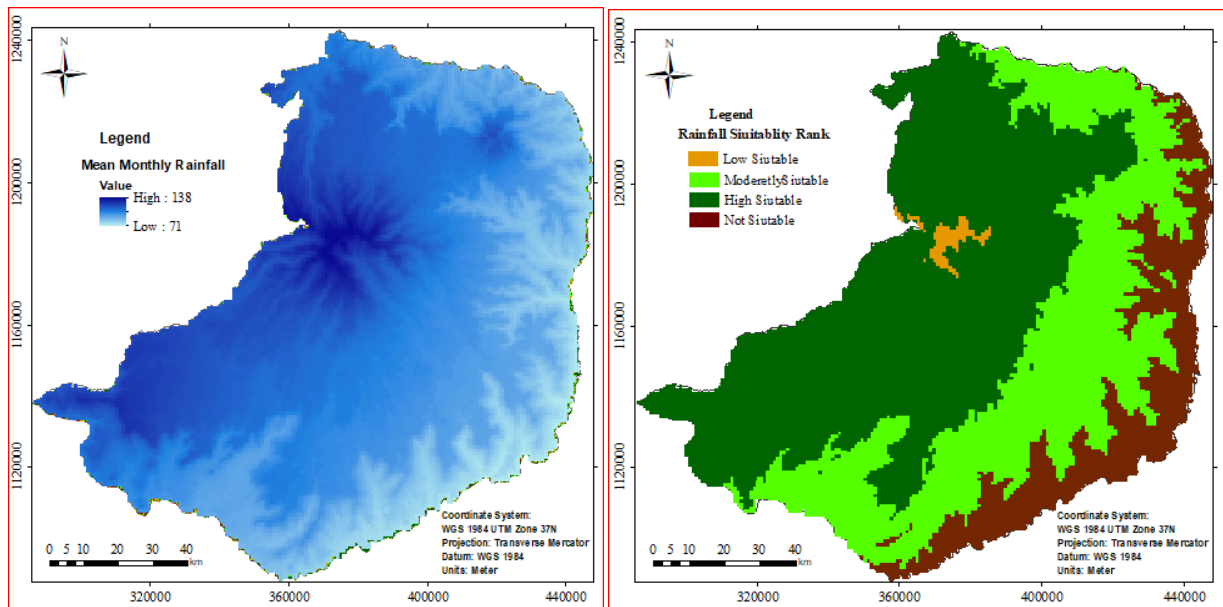


Figure 22: Rainfall and reclassify mean monthly rainfall map of study area

Table 11: Suitability rating for rainfall of study area

No	Rainfall value in mm	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	<85mm	Not Suitable	201338.02	14.1
2	85mm-99.99mm	Moderately Suitable	473941.42	33
3	100mm-135mm	High Suitable	714326.08	50.9
4	>135mm	Low Suitable	11232.15	2
		Total	1400856.2	100.00

**Temperature:** Suitable environment for human recreation is also determined by the temperature of that area. Generally, lowest temperature is considered suitable for tourism, as most humans prefer low temperature area for existence and recreation. Most living things also survive in low temperature area as compared to high temperature area. The same to rainfall, temperature data was derived from raster data .Areas which have a temperature of  $<9\text{c}>22^{\circ}\text{c}$  was classified as not suitable,  $9\text{c}-12\text{c}$  as low suitable,  $12\text{c}-15^{\circ}\text{c}$  as moderately suitable and  $15\text{c}-20^{\circ}\text{c}$  as highly suitable.

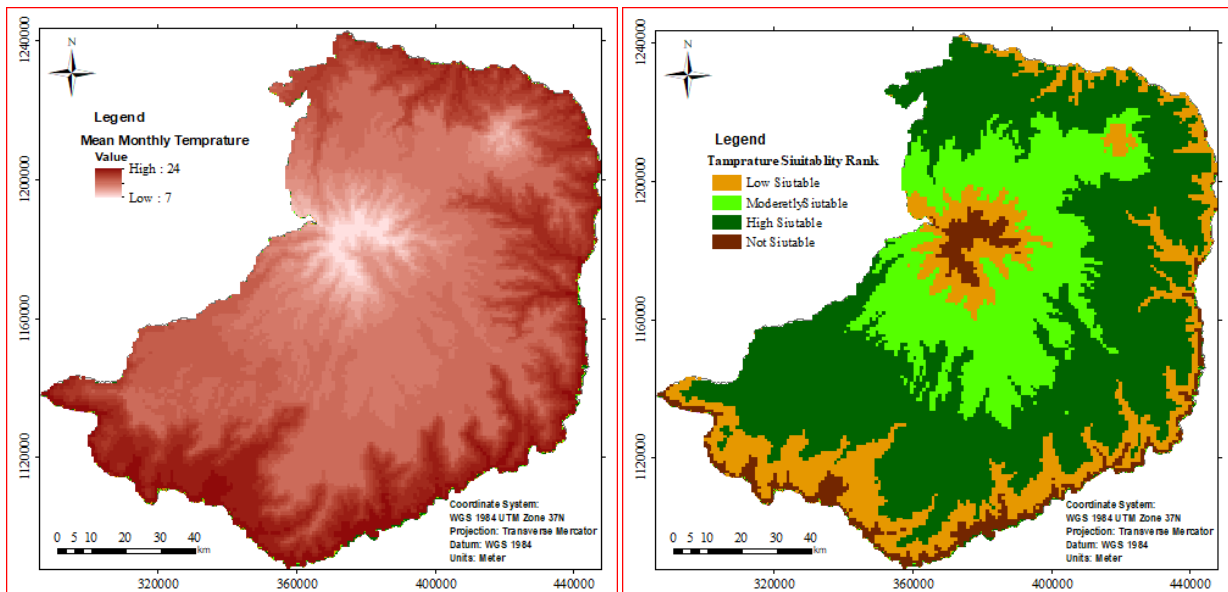


Figure 23: Temperature and reclassify mean monthly temperature map of study area

Table 12: Suitability rating for temperature of study area

No	Temperature value in °c	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	<9&>22	Not Suitable	71714.44	5.12
2	9-11.99&20-22	Low Suitable	260983.46	18.65
3	12-14.99	Moderately Suitable	323470.21	23.11
4	15-20	High Suitable	743543.07	53.12
		Total	1400856.2	100.00

#### 4.2.2.6. Accessibility

**Proximity to roads:** road network connects from major tourist transit to the interior parts of the area. It provides facility for easy and faster movement and is the basic requirement for tourism. This is only possible by travelling from one place to another through road, rail, and air. This criterion was classified based on the transport condition and distance from the road types according to remote areas are the not suited for tourism attractions. Road data were digitized from spot image 2016 and buffer zone was generated to show the proximity of the area to road. Distance from asphalt and all weathered road in Km was consider in this study and 0-2km distance ranked as highly suitable, 2-6km as moderately suitable, 6-10km as low suitable and >10km as not suitable.

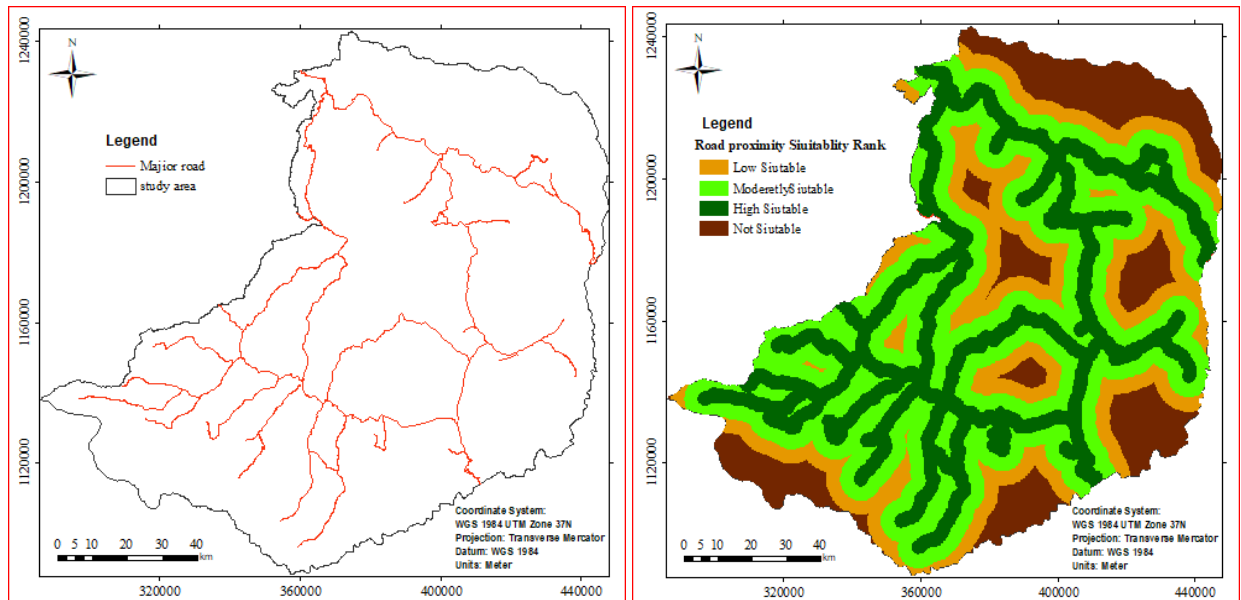


Figure 24: Road and reclassify road proximity map of study area

As shown on Table13, 26%of the area was proximate to road and it is highly suitable for tourism by makes tourist sites accessible for visitors. Moderately suitable area in terms of road proximity was 36%.

Table 13: Suitability rating for proximity to road of study area

No	Distance to road in Km	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	>10	Not Suitable	242322.74	17.30
2	6-9.99	Low Suitable	272881.3	19.49
3	2-5.99	Moderately Suitable	511589.3	36.53
4	0-1.99	High Suitable	373635.86	26.68
		Total	1400856.2	100.00

**Proximity to rivers:** water is the basic essential for any living thing. Therefore river as supply of water for human being is very important. A network of streams in a landscape may not only develop numerous visually attractive geomorphologic features, but also generates variety and diversity that is interest to many visitors. Availability of water in close proximity distance is necessary for many purposes like swimming, recreation, drinking, cooking and sanitation.

The area is very rich in water sources. Rivers like Abay, Temicha, Gedeb, Chemoga, Teshet, Wutirin, Wuseta, Wenka, Muga, Sura, Taga, Anjeb etc are the main attractive and source of water for study area. For this study only perennial rivers were used for producing river map and data was digitized from spot image 2016.0 to 2km distance from rivers were ranked as highly suitable, 2-4km as moderately suitable, 4-6km low suitable and >6km as not suitable for tourism development.

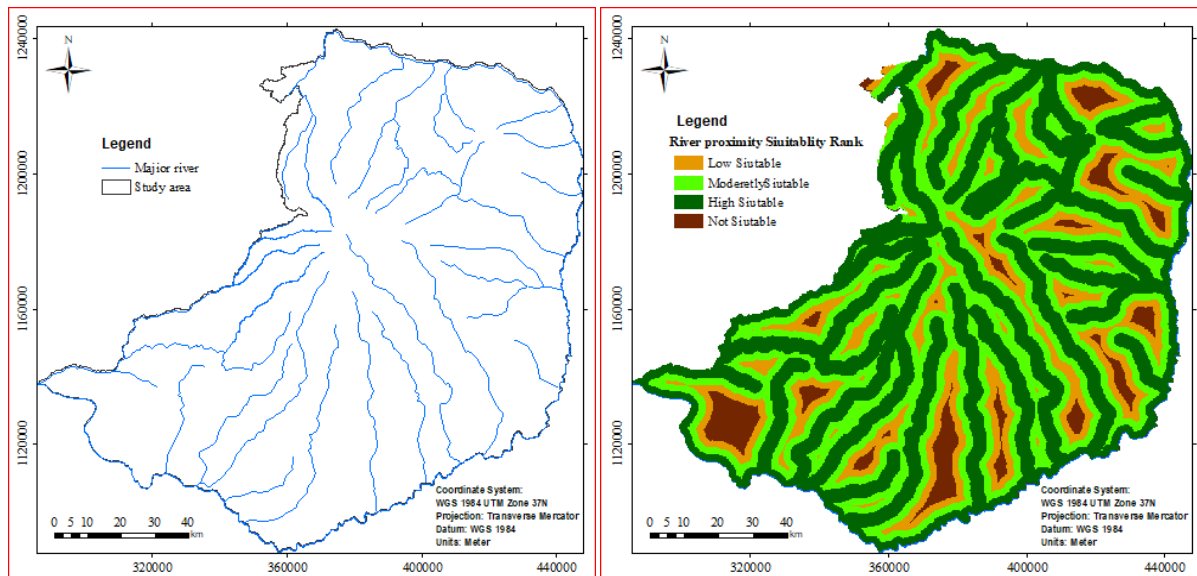


Figure 25: River and reclassify river proximity map of study area

There is high tourism potential in terms of water body which indicates that 44% of the area was highly suitable and 33% were moderately suitable for tourism.

Table 14: Suitability rating for proximity to river of study area

No	Distance to river in Km	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	>6	Not Suitable	79847.029	5.70
2	4-5.99	Low Suitable	222296.35	15.87
3	2-3.99	Moderately Suitable	470404.62	33.59
4	0-1.99	High Suitable	627881.2	44.83
		Total	1400856.2	100.00

**Proximity to towns:** urban center have already developed infrastructures and services which are required for setting up tourism sector. It can be further enhanced by creating few recreational areas to attract tourist. Towns can provide different services for tourists like hotel, restaurant,

pension, internet access, electric power, tele communication service, health service etc. therefore proximity to town is considered as one of the factors for tourism development. For this study the capital town of each woredas in the area were taken to produce the facto map and 0-10km distance from towns ranked as highly suitable,10-20km as moderately suitable,20-30km as low suitable and >30km as not suitable.

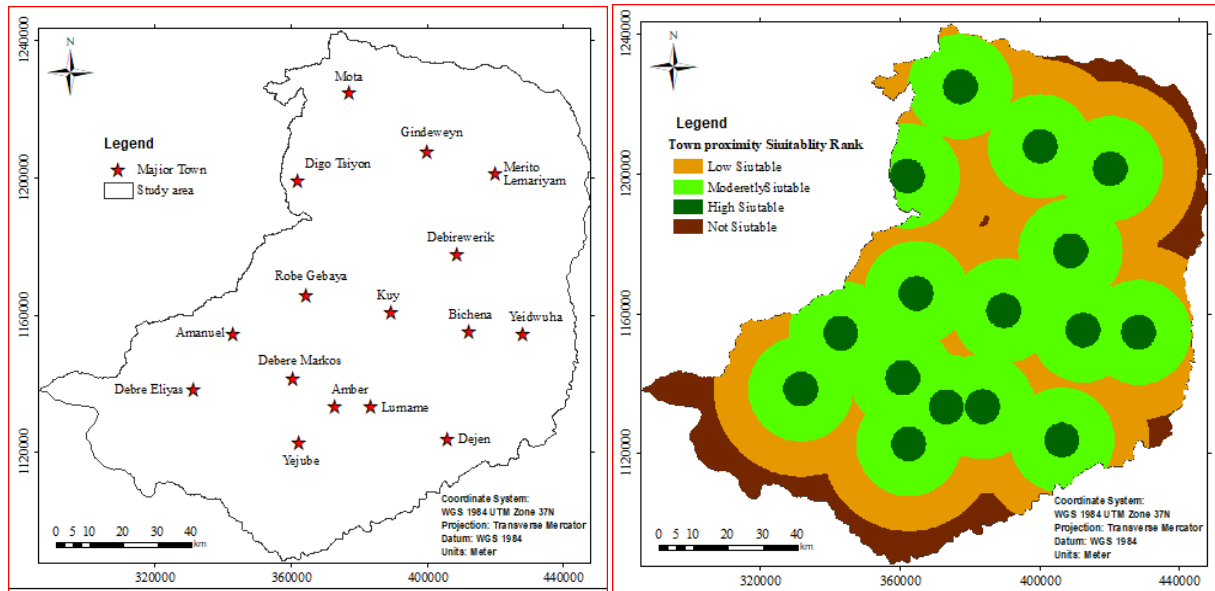


Figure 26: Town and reclassify town proximity map of study area

Table 15: Suitability rating for proximity to town of study area

No	Distance to Town in Km	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	>25	Not Suitable	126289.14	9.02
2	15-24.99	Low Suitable	400232.66	28.58
3	5-14.99	Moderately Suitable	748309.32	53.43
4	0-4.99	High Suitable	125598.09	8.97
		Total	1400856.2	100.00

**Proximity to cultural heritages:** cultural heritages in this study consists of all tourism sites like historical monasteries, palace, historical buildings and bridges, museums, cultural celebrating areas, and others cultural assets which are registered by East Gojjam Zone culture and tourism bureau. They were collected from field survey using GPS and Google Earth pro in the form of point data 0-5km distance from cultural heritages ranked as highly suitable, 5-10km as moderately suitable, 10-15km as low suitable and >15km as not suitable.

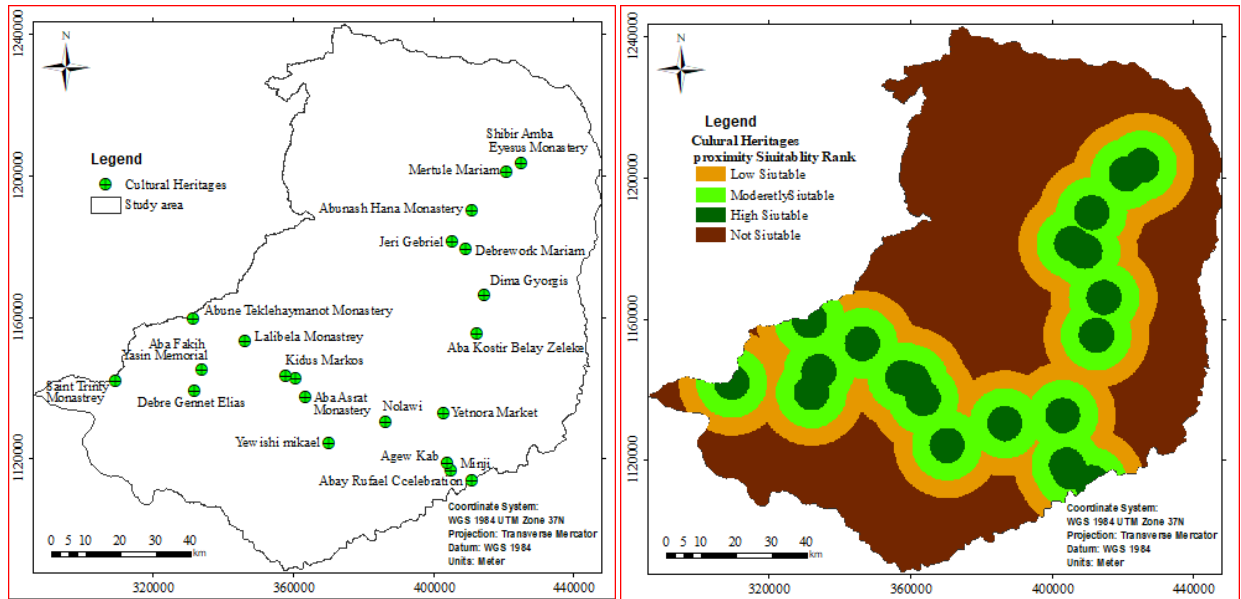


Figure 27: Cultural heritages and reclassify Cultural heritages proximity map of study area

As shown on Table 16, from the total area 9% was highly suitable and 19% was moderately suitable for tourism. It is because of the area was rich in cultural heritages.

Table 16: Suitability rating for proximity to cultural heritages of study area

No	Distance to Cultural heritages in Km	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	>15	Not Suitable	756311.32	54.01
2	10-14.99	Low Suitable	241145.29	17.22
3	5-9.99	Moderately Suitable	270014.48	19.28
4	0-4.99	High Suitable	132958.1	9.49
		Total	1400856.2	100.00

**Proximity to natural sites:** natural sites for this study is consists lakes, waterfalls, Mountains, Natural Bridges, caves, Gorges, and springs which are registered by East Gojjam Zone culture and tourism bureau. They are collected from field survey using GPS and Google Earth pro in the form of point data. 0-5km distance from cultural heritages ranked as highly suitable, 5-10km as moderately suitable, 10-15km as low suitable and >15km as not suitable.

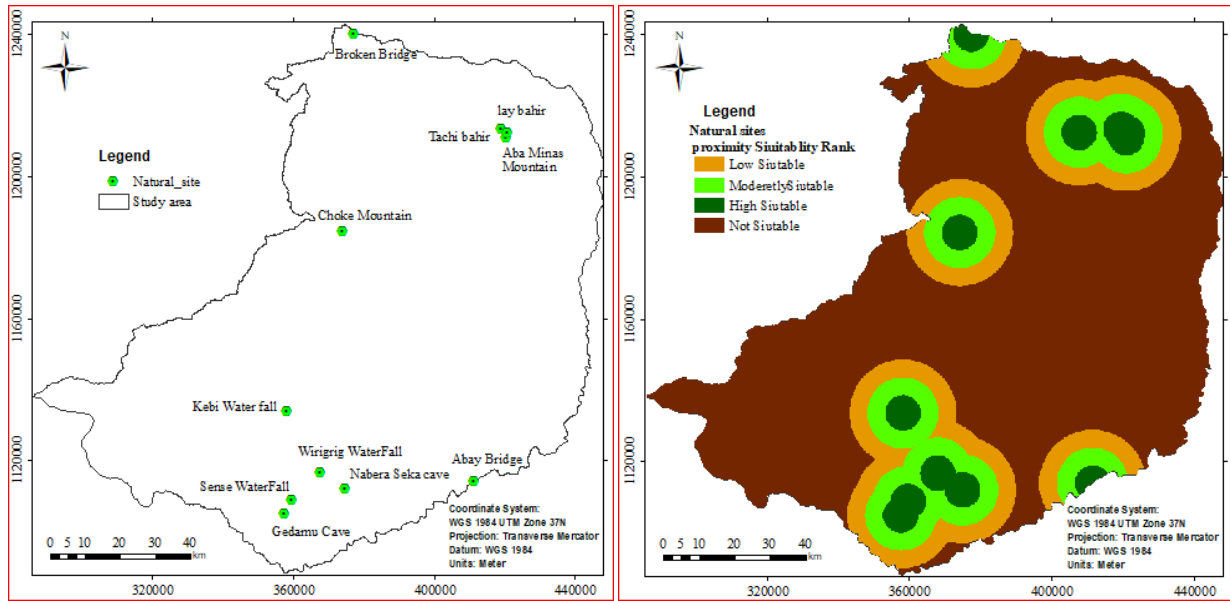


Figure 28: Natural sites and reclassify natural sites proximity map of study area

Table 17: Suitability rating for proximity to natural sites of study area

No	Distance to Natural sites in Km	Tourism Suitability Rank	Area/Ha	Percentage (%)
1	>15	Not Suitable	959461.26	68.51
2	10-14.99	Low Suitable	210490.74	15.03
3	5-9.99	Moderately Suitable	159797.69	11.41
4	0-4.99	High Suitable	70679.515	5.05
		Total	1400856.2	100.00

#### 4.2.3. Determining factors weight and suitability analysis

Suitability evaluation is the actual process of applying multi-criteria evaluation to different criteria's or factors in order to arrive at certain decision. For tourism suitability, fourteen factor maps were produced and reclassified according to their degree of importance for tourism. According to this questionnaire, the prioritizing of factor maps (or simply factors or criterion) from highest to lowest is as follows: Cultural heritage map, Natural attractions map, wild life map, Rivers, Road, Town, NDVI, elevation, slope, land use, visibility, rainfall and temperature. Weight for each factor maps was assigned using AHP .In practice, a CR of 0.1 or below is considered acceptable. Consistency ratio in this study was 0.047 which is less than 0.1. Therefore it is acceptable. The analysis was performed using AHP and GIS techniques. The AHP method was applied to determine relative importance of all selected factors. For the final output, all factor layers were multiplied with their respective weights and added together. MCE is done based on 13 factor maps to produce the site suitability for tourism. The total suitability scores range from 0 and 1. Finally, these values were further reclassified to create land suitability map for tourism.

Table 18: Criteria's and their weight

Criteria	Weight	Factors	Weight	Total Suitability Score
Accessibility	0.585	Proximity to cultural heritages	0.280	0.164
		Proximity to natural attractions	0.260	0.152
		Proximity to river	0.191	0.112
		Proximity to road	0.144	0.084
		Proximity to town	0.125	0.073
Wildlife	0.134	Wildlife areas	1	0.134
topography	0.1	Elevation	0.550	0.055
		Slope	0.450	0.045
Landscape	0.07	LULC	0.543	0.038
		Visibility	0.457	0.032
Vegetation	0.061	NDVI	1	0.061
Climate	0.05	Rainfall	0.520	0.026
		Temperature	0.480	0.024

Finally, the total suitability score from each factor were assembled to create site suitability map for tourism

**Suitability Map** = 0.164 (cultural heritage map) + 0.152(natural attractions map) + 0.134(wildlife map) + 0.112 (river map) + 0.084(road map) + 0.073 (town map) + 0.061(vegetation map), 0.055(elevation map) + 0.045 (slope map) + 0.038(lulc map) + 0.032(visibility map), 0.026(rainfall map) + 0.024(temperature map).

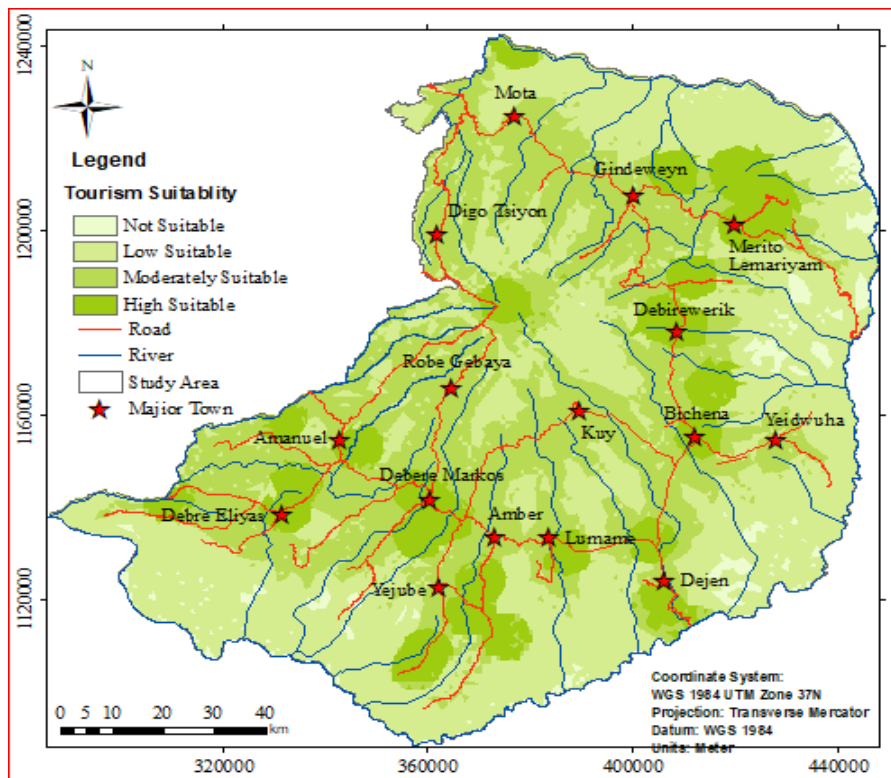


Figure 29: Tourism suitability map of study area

As it is indicated in Figure29, highly suitable area for tourism development lies in the area where suitable capacity of locations is high and satisfies almost all criteria set up. The area is characterized by availability of forests, wildlife sanctuary, as well as rich cultural and natural heritage. The moderately suitable areas are found nearby the highly suitable areas where suitable capacity of locations is medium and satisfies most of the criteria set up, but some criteria are not satisfied. These are largely nearby from natural and cultural heritages with green area, vegetation cover and great tourism potential with unique natural resources. So this area can be developed tourism destination by facilitating proper tourism infrastructure and services under policy

guidelines. The least suitable areas are found in all part of the study area where suitable capacity of locations is low and satisfies some of the criteria set up, but most of the criteria are not satisfied. These are highly covered by agricultural lands and far from tourism infrastructures. Not suitable areas assume that all of criteria are not satisfied. Accessibility is a prerequisite for tourism development. Major tourist attraction such as heritage site, natural attractions and water bodies or lake showed strong green color on the map depicting high suitability

#### 4.2.4. Constraints for tourism suitability analysis

In order to show the actual suitable sites for tourism it is better to extract constraint factors from the suitable area. Agriculture is the dominant economic activities of farmers in East Gojjam Zone. Therefore agriculture or farm lands were considered as constraints for tourism development in the study area. This constraint that is farm land were extracted from land use land cover of 2020 and by clipping it from the suitable map the final suitable area for tourism were shown in figure 30.

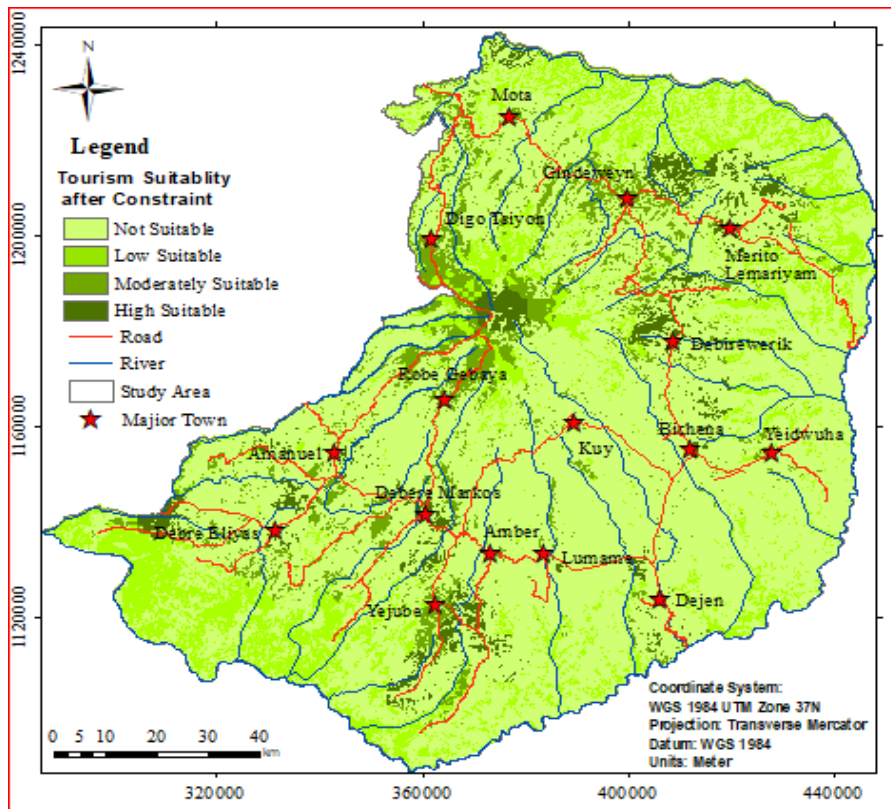


Figure 30: Tourism suitability map after constraint

As shown in figure 31, it was found that the area of highly suitable was about 5% (75009.92). The moderately suitable areas make up about 9 % (124284.87 ha). Low suitable area accounts 14 % ( 200441.78) and not suitable areas accounts the highest percentage of the area which is 72 % ( 1001098.35 ha).

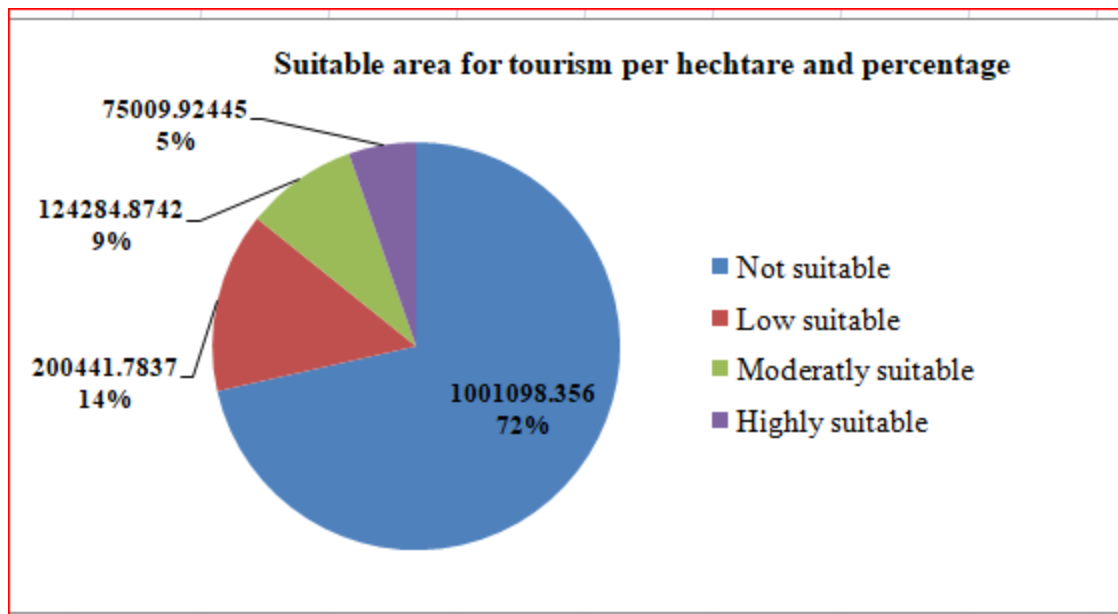


Figure 31: Tourism suitability per Area

Without constraint factor the study area have high potential for tourism development. As figure 41 indicates that there is high tourism potential area around choke Mountain and it is followed by Aba Montous Mountain and cultural heritage areas like Dima Gyorgis and Merto Lemariam. This indicates that mountainous areas have high potentials because these areas have waterfalls, varieties of vegetations, wildlife and birds and good attractions.

#### 4.3. The Challenges of Tourism Development in East Gojjam Zone

As the information gathered from questioners and researchers observation, East Gojjam Zone (EGZ) is rich with various tourist attractions; potential area for natural, unique historical and cultural tourist attractions. But the development of tourism sector is very low compared to the vast tourism potential. Respondents' assess the challenges of tourism development based on the following attributes.

Table 19: Challenges of tourism development related to Infrastructure in EGZ

No	Challenges	SDA		DA		N		AG		SAG		T	%
		N	%	N	%	N	%	N	%	N	%		
1	lack of transport services	6	8.5	8	11.5	2	3	28	40	26	37	70	100
2	lack of abundant telecommunication service	2	3	3	4	5	4.5	35	50	25	35.5	70	100
3	lack of sufficient electric power	1	1.5	1	1.5	4	5	31	44	34	48	70	100
4	lack of health service for the residents and visitors	0	0	3	4	2	3	36	51	29	42	70	100
5	Lack of well-organized road access	4	6	7	10	6	8.5	24	34	29	41.5	70	100
6	The tourism potential sites are not accessible for public and other modern transportation	2	3	8	11.5	5	7	35	50	20	28.5	70	100
7	Lack of sufficient accommodation (hotel, restaurant, pension)	2	3	10	14	8	11.5	21	30	29	41.5	70	100

Source: Own survey, 2020.

(Note: SDA=strongly disagree, DA= disagree, N=neutral, AG=agree, SA=strongly agree).

Infrastructure is very essential element for tourism development. Infrastructure in this study contains transport service, road facility, electric power, telecommunication service and health service. But as it is shown in the Table19, infrastructure is the main challenges in EGZ. With regard to lack of transport service, respondents forwarded their responses as 26(37%) of them strongly agreed, 28 (40%) of them agreed, 2 (3%) of them didn't know, 8(11.5%) of them disagreed and 6(8.5%) of them strongly disagreed. This shows that 52 (77%) respondents

expressed their agreement and 14 (20%) of them expressed their disagreement. This implies that the majority of 52 respondents agreed on lack of transport service as the main challenges in the area. According to the information gathered by interview traditional transportation system is accessible in the study area traditional transport (mule, horse and donkey) system is not challenge rather it is the opportunity for tourism potential.

With regard of lack of modest telecommunication service, respondents forwarded their responses as 25(35.5%) of them strongly agreed, 35 (50%) of them agreed, 5(4.5%) of them didn't know, 3(4%) of them disagreed and 2(3%) of them strongly disagreed. This shows that 60 (85.5%) respondents expressed their agreement and 5(7%) of them expressed their disagreement. This implies that the majority of respondents agreed on lack of lack of good telecommunication connectivity service as the main challenges in the area. According to respondents, 34(48%) of them strongly agreed, 31 (44%) of them agreed, 4(5%) of them didn't know, 1(1.5%) of them disagreed and 1(1.5%) of them strongly disagreed and this shows that 65(92%) respondents expressed their agreement on lack of sufficient electric power. Lack of health service for the residents and visitors is also other challenges in EGZ. With regard to this, respondents forwarded their responses as 29(42%) of them strongly agreed, 36 (51%) of them agreed, 2(3%) of them didn't know, 3(4%) of them disagreed and none of them strongly disagreed.

Other challenges in the study area are inaccessibility of tourist sites. According to respondents, the results shows that there is Lack of well-organized road access; 29(41.5%) of them strongly agreed, 24(34%) of them agreed, 6(8.5%) of them didn't know, 7(10%) of them disagreed and 4(6%) of them strongly disagreed. The tourism potential sites are not accessible for public and other modern transportation.

Lack of sufficient accommodation (hotel, restaurant, and pension) is one of the challenges of tourism development in the area. With regard to this, respondents forwarded their responses as 29(41.5%) of them strongly agreed, 21(30%) of them agreed, 8(11.5%) of them didn't know, 10(14%) of them disagreed and 2(3%) of them strongly disagreed. This shows that 50(71.5%) of respondents expressed their agreement and it implies that the majority of respondents agreed on Lack of sufficient accommodation (hotel, restaurant, pension) is the main challenges in the area.

Table 20: Challenges of tourism development related to awareness in EGZ

No	Challenges	SDA		DA		N		AG		SAG		T	%
		N	%	N	%	N	%	N	%	N	%		
1	Lack of tourism officers to create awareness to the host community	2	3	4	6	10	14	30	43	24	34	70	100
2	Lack of community awareness towards tourism resource of the area	4	6	8	11	4	6	28	40	26	37	70	100
3	Religious leaders are not well aware about monastery tourism sites and their treasures	0	0	10	14.5	6	8.5	20	28.5	34	48.5	70	100
4	The local community does not know about the concept of preservation and conservation	2	3	11	16	5	7	19	27	33	47	70	100

Source: Own survey, 2020.

(Note: SDA=strongly disagree, DA= disagree, N=neutral, AG=agree, SA=strongly agree).

As it is shown in the Table20, lack of awareness is also one of the challenges of tourism potentials development in the area. With regard to lack of tourism officers to create awareness to the host community, respondents forwarded their responses as 24(34%) of them strongly agreed, 30 (43%) of them agreed, 10(14%) of them didn't know, 4(6%) of them disagreed and 2(3%) of them strongly disagreed. This shows that 54(77%) of respondents expressed their agreement and it implies that the majority of respondents agreed on tourism officers to create awareness to the host community is the main challenges in the area. According to respondents, 26(37%) of them

strongly agreed, 28(40%) of them agreed, 4(6%) of them didn't know, 8(11%) of them disagreed and 4(6%) of them strongly disagreed, Lack of community awareness towards tourism resource of the area is also the challenge of tourism development. Religious leaders are not well aware about monastery tourism sites and their treasures. Respondents forwarded their responses as 34(48.5%) of them strongly agreed, 20(28.5%) of them agreed, 6(8.5%) of them didn't know, 10(14.5%) of them disagreed and none of them strongly disagreed. As respondents results shows, 33(47%) of them strongly agreed, 19(27%) of them agreed, 5(7%) of them didn't know, 11(16%) of them disagreed and 2(3%) of them strongly disagreed, the local community does not know about the concept of preservation and conservation.

Table 21: Challenges of tourism development related to coordination of stakeholders in EGZ

No	Challenges	SDA		DA		N		AG		SAG		T	%
		N	%	N	%	N	%	N	%	N	%		
1	Culture and tourism has poor coordination with stakeholders	4	6	2	3	13	18	30	43	21	30	70	100
2	Lack of promotion and tour operators	5	7	7	10	9	13	23	32	27	38	70	100
3	Lack of government support to the tourism sector	1	1	3	4	2	3	33	47	31	45	70	100

Source: Own survey, 2020.

(Note: SDA=strongly disagree, DA= disagree, N=neutral, AG=agree, SA=strongly agree).

As it is shown in the Table21 poor coordination of Culture and tourism bureau with stakeholders is considered as a challenge for tourism development by (21(30%) of the respondents rated strongly agreed, 30(43%) of them agreed, 13(18%) of them didn't know, 4(6%) of them disagreed and 2(3%) of them strongly disagreed), Lack of promotion and tour operators (27(38%) of them strongly agreed, 23(32%) of them agreed, 9(13%) of them didn't know, 7(10%) of them disagreed and 5(7%) of them strongly disagreed) and Lack of government support to the tourism sector(31(45%) of them strongly agreed, 33(47%) of them agreed, 2(3%)

of them didn't know, 3(4%) of them disagreed and 1(1%) of them strongly disagreed)are also challenges in the study area.

Generally, lack of infrastructure, lack of awareness, lack of accommodation, poor coordination of culture and tourism with stakeholders, lack of promotion and tour operators and lack of government support to the tourism sector are the main challenges for tourism development in EGZ.

#### 4.4. Possible Mechanisms of Tourism Development of the study area

Respondents' assess the methods of tourism development based on the following attributes.

Table 22: Mechanisms to develop tourism potentials in the study area

No	Methods	SDA		DA		N		AG		SAG		Total %)
		N	%	N	%	N	%	N	%	N	%	
1	Establishment of tourist service facilities (hotels, restaurants)	5	7	9	13	1	1	30	43	25	36	100
2	Selection of tourist destinations areas	3	4	5	7	2	3	38	54	22	32	100
3	Develop Cultural and tourism policy & strategy	3	4	12	17	5	7	29	42	21	30	100
4	The collaboration of stakeholders	4	6	6	9	8	11	31	44	21	30	100
5	Promotion of tourism resources	7	10	9	13	6	9	30	43	18	25	100
6	Preservation and conservation heritages	0	0	0	0	1	1	36	51	33	48	100
7	Investment in tourism facilities and services	4	6	7	10	4	6	31	44	24	34	100
8	Researches related to tourism	3	4	4	6	3	4	39	56	21	30	100
9	Create awareness for community and stakeholders	2	3	3	4	5	7	37	53	23	33	100
10	Share trends and experience	1	1	4	6	3	4	40	58	22	31	100

Source: Own survey, 2020.

(Note: SDA=strongly disagree, DA= disagree, N=neutral, AG=agree, SA=strongly agree)

Table 22, shows that the respondents responses suggesting possible mechanisms of tourism development of EGZ. Accordingly, establishment of tourist service facilities (hotels, restaurants) have been indicated by 25 (36%) of them as agreeing strongly, 30(43%) of them agreed, 1(1%) of them didn't know, 9(13%) of them disagreed and 5(7%) of them disagreed strongly. This shows that 55(79%) of respondents expressed their agreement, but 14(20%) of them expressed their disagreement. This implies that the majority of respondents agreed with establishment of tourist service facilities (hotels, restaurants) were possible mechanisms of tourism development. According to respondents, selection of tourist destinations areas is also one of the possible mechanisms for promoting tourism development in the Zone. The results reveals that, 22 (32%) of them agreed strongly, 38(54%) of them agreed, 2(3%) of them didn't know, 5(7%) of them disagreed and 3(4%) of them disagreed strongly. This shows that 60(86%) of respondents expressed their agreement and it implies that the majority of respondents agreed with Selection of tourist destinations areas is possible mechanisms of tourism development.

Development of cultural and tourism policy & strategy is another mechanism pinpointed by respondents for tourism development in the Zone. According to respondents, 21(30%) of them strongly agreed, 29(42%) of them agreed, 5(7%) of them didn't know, 12(17%) of them disagreed and 3(4%) of them strongly disagreed. This shows that 50(72%) of respondents expressed their agreement and it implies that the majority of respondents agreed with development of cultural and tourism policy & strategy is one of possible mechanisms of tourism development.

According to respondents response on the contribution of, the collaboration of stakeholders of tourism development 21(30%) of them show their strongly agreement, (31(44%) of them agreed, 8(11%) of them didn't know, 6(9%) of them disagreed and 4(6%) of them strongly disagreed) and promotion of tourism resources (18(28%) of them strongly agreed, 30(43%) of them agreed, 6(9%) of them didn't know, 9(13%) of them disagreed and 7(10%) of them strongly disagreed) are also possible mechanisms for tourism development in EGZ.

Preservation and conservation of heritages is indicated by (33(48%) of respondents that strongly agreed for its role in tourism development in the Zone, 36(51%) of them agreed, 1(1%) of them didn't know and none of them disagreed) and investment in tourism facilities and services

(24(34%) of them strongly agreed, 31(44%) of them agreed, 4(6%) of them didn't know, 10(17%) of them disagreed and 6(4%) of them strongly disagreed) are also possible mechanisms for tourism development in EGZ.

Tourism related researches are considered important in order to develop tourism in the Zone .In this connection 21 (30%) of the respondents agreed strongly, 39(56%) of them agreed, 3(4%) of them didn't know, 4(6%) of them disagreed and 3(4%) of them disagreed strongly. This shows that 60(86%) of respondents expressed their agreement, but 7(10%) of them expressed their disagreement. This implies that the majority of respondents agreed with students do researches related to tourism.

Awareness creation for community and stakeholders is considered important for tourism development in the Zone. In line with this (23(33%) of the respondents indicated their strongly agreement , 37(53%) of them agreed, 5(7%) of them didn't know, 3(4%) of them disagreed and 2(3%) of them disagreed strongly) and Share trends and experience ((22(33%) of them agreed strongly, 40(58%) of them agreed, 3(4%) of them didn't know, 4(6%) of them disagreed and 1(1%) of them disagreed strongly) are also others methods to develop tourism in EGZ.

Generally, establishment of tourist service facilities (hotels, restaurants), selection of tourist destinations areas, development of cultural and tourism policy & strategy, collaboration of stakeholders, promotion of tourism resources, preservation and conservation of heritages, doing researches, create awareness for community and stakeholders and share trends and experience ware some of the possible mechanisms for tourism development in EGZ.

## CHAPTER FIVE

### 5. CONCLUSION AND RECOMMENDATION

This chapter deals with conclusion and recommendation of the study

#### 5.1 Conclusion

The purpose of this study was to identify and prioritize the potential tourism sites and assess the main challenges and mechanisms for tourism development in East Gojjam Zone. This study presents an integrated approach of GIS with AHP and MCE combination to assess the tourism suitability by matching the characteristics of an area with those attributes most appropriate for tourism. It was started by the calculation of weighting and rating from the AHP analysis where experts were asked to determine the relative importance of each criterion and factor. This study also uses Web GIS for promoting and advertising tourism sites in the study area.

There were six criteria and thirteen factors in the form of 13 GIS-based layers incorporated for land suitability evaluation for tourism. These are landscape (visibility, LULC), wildlife (wildlife areas), topography (elevation, slope), accessibility (proximity to cultural sites, natural attractions, roads, river and town), vegetation (NDVI) and climate (rainfall, temperature). Highly suitable was about 5% (75009.92). The moderately suitable areas make up about 9 % (124284.87 ha). Low suitable area accounts 14 % (200441.78) and not suitable areas accounts the highest percentage of the area which is 72 % (1001098.35 ha).

The most suitable tourism site identified according to the analysis is the area characterized by availability of forests, wildlife sanctuary, as well as rich cultural and natural heritage. Accessibility is a prerequisite for tourism development. Major tourist attraction such as heritage site, natural attractions and water bodies or lake showed strong green color depicting high suitability.

Without constraint factor the study area have high potential for tourism development. There is high tourism potential area around choke Mountain and it is followed by Aba Montous Mountain and cultural heritage areas like Dima Gyorgis and Merto Lemariam. This indicates that mountainous areas have high potentials because these areas have waterfalls, varieties of vegetations, wildlife and birds and good attractions.

EGZ have huge cultural and natural potentials of tourism resources. These includes, beautiful landscape, wildlife species, attractive nature, home of indigenous plant species, caves, waterfalls and mountains (Choke and Aba Monetous), church school, indigenous hand crafts, monastery(like Dima Gyiorgis and Mertule Maryam) and other tangible and intangible cultural tourism resources.

The major challenges of tourism development the Zone that the study disclosed are lack of awareness, lack of accessibility, lack of infrastructure, lack of researches on destination development, and lack of promotion on the importance of tourism development. There is no well-organized effort between the EGZ tourism offices with other concerned stakeholders.

EGZ communication office has no strong coordination with culture and tourism office. Due to this reason, ample tourism resources, like historical sites and others were not well recorded, identified and announced.

The results also indicate that establishment of tourist service facilities (hotels, restaurants), selection of tourist destinations areas, development of cultural and tourism policy & strategy, collaboration of stakeholders, promotion of tourism resources, preservation and conservation of heritages, undertaking tourism related researches, awareness creation for community and stakeholders and sharing trends and experience could be used for tourism development in EGZ

## **5.2 Recommendation**

Based on the findings of the study the following recommendations are forwarded.

- Investors should have to be support the basic tourism infrastructural facilities and services (accommodation establishments), construct other public and institutional facilities and services and improve the tourism potentials resource.
- To connect the tourism potential sites of EGZ Wordas and Kebeles and to make the travel easy for potential visitors, Amhara Regional Administration should be improved road and transportation systems
- Wildlife and environmental conservation of the East Gojjam Zone have to study Wild life, birds and their location and should have map their distribution because their benefit as a tourist attraction was very high.

- Monasteries and churches are important tourism potentials in EGZ. So, religious institution and tourism office should conserve and promote those resources.
- Areas that are found as high suitable sites should be advertised to both local and foreign tourists so that local people can entertain economic activities. Educational awareness concerning their utilization, management and conservation should be given hand in hand. Concerned governmental and non-governmental organizations should again give greater concern to the maintenance and sustainability of this ecosystem.
- East Gojjam Zone culture and tourism office should be identifies all tourist destination areas and creates awareness for local community to preserve and conserve.
- Agricultural activities were expanded towards tourist attraction sites and it affect the tourism potentials of study area. Therefore the government should give attention for tourism and create awareness for community.

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**APPENDIXS**

**1. Questionnaire**

The main objective of these questioners was to look at the challenges and Mechanisms of tourism development in East Gojjam Zone. Without your response to these questions, it is impossible to achieve the main objectives of the research.

**I: Back ground of the respondent**

A. Gender of the respondent- 1. Male 2. Female

B. Marital status- 1. Married 2. Unmarried

C. Age of the respondents-----Years

E. Educational background-1. Certificate 2. Diploma 3. Degree 4.Masters and above

F. Occupational experiences-.....years

**A. Challenges of tourism development**

Instruction: Dear respondents by the following 5- scale rate 1= strongly agree, 2= Agree, 3 = neutral, 4= disagree and 5= strongly disagree) please respond the following questions based on your level of agreement by ticking (X) one box only for each statement.

		1	2	3	4	5
No	Challenges					
1	lack of transport services					
2	lack of abundant telecommunication service					
3	lack of sufficient electric power					
4	lack of health service for the residents and visitors					
5	Lack of well-organized road access					
6	The tourism potential sites are not accessible for public and other modern transportation					
7	Lack of sufficient accommodation (hotel, restaurant, pension)					
8	Lack of tourism officers to create awareness to the host community					
9	Lack of community awareness towards tourism resource of the area					

10	Religious leaders are not well aware about monastery tourism sites and their treasures					
11	The local community does not know about the concept of preservation and conservation					
12	Culture and tourism is poor coordination with stakeholders					
13	Lack of promotion and tour operators					
14	Lack of government support to the tourism sector					

### B. Mechanisms of tourism development

Instruction: Dear respondents by the following 5- scale rate (1= strongly agree, 2= Agree, 3 = neutral, 4= disagree and 5= strongly disagree) please respond the following questions based on your level of agreement by ticking (X) one box only for each statement

		1	2	3	4	5
No	Methods					
1	Establishment of tourist service facilities (hotels, restaurants)					
2	Selection of tourist destinations areas					
3	Develop Cultural and tourism policy & strategy					
4	The collaboration of stakeholders					
5	Promotion of tourism resources					
6	Preservation and conservation heritages					
7	Investment in tourism facilities and services					
8	Students do researches related to tourism					
9	Create awareness for community and stakeholders					
10	Share trends and experience					

## **Appendix 2: Interview Questions**

### INTERVIEW QUESTION FOR KEY INFORMANTS

Major objective of this interview was to look at the performance, challenges and Mechanisms of tourism development in East Gojjam Zone. Without your response to these questions, it is impossible to achieve the main objectives of the research.

#### **I: Back ground of the respondent**

A. Gender of the respondent- 1. Male 2. Female

B. Marital status- 1. Married 2. Unmarried

C. Age of the respondents-----Years

E. Educational background-1. Certificate 2.Diploma 3. Degree 4.Masters and above

F. Occupational experiences-.....years

#### **II. Interview questions**

1. What are the tourism potentials in East Gojjam Zone?
2. Are tourist destination areas identified in this zone? If yes, how many, what and where are the major attraction of each site?
3. What are the main types of tourism (State the cultural, spiritual, historical and natural heritages) and their available tourism potentials in East gojjam zone?
3. Where and what kinds of plants and animals are found for tourism attractions?
4. What are the conditions of tourism facilities, accommodations and infrastructures?
5. How many tourists are arriving annually in this zone? (Domestic or Foreign)
6. How far the government supports East Gojjam tourism sector?
7. What are the impeding factors to develop these potentials to tourism products?
8. What are the major challenges faced in your institution to promote East Gojjam Zone as a tourist destination?
9. How do you evaluate the developments of these tourism potentials?
10. What kind of mechanisms do you employ at your institution to promote East Gojjam Zone as a tourist destination?
11. Does your organization/destination site have Tourism destination development and management plan document?
12. What are the main criteria to select suitable site for tourism development?

13. Who are the major stakeholders and what their role in developing the tourism potentials of the area?

14. What are your suggestions and recommendations to develop tourism potential in East gojjam zone?

### III Characteristics of Respondents

Variables	Characteristics	No of respondents	Percentage (%)
Gender	Male	29	41
	Female	41	59
Marital Status	Married	18	25
	Unmarried	52	75
Age Group	20-30 years	20	29
	30-40 years	24	34
	40-50 years	14	20
	Above 50 years	12	17
Educational Background	Certificate and below	17	24
	Diploma	26	37
	Degree	24	34
	Masters and above	3	5
Occupational experience	Below 5 years	23	33
	5-10 years	37	52
	10-15 years	7	10
	Above 15 years	3	5

### Appendix 3: Ground Control Points

#### A. Tourist attractions

No	Attractions	X_value	Y_value	woreda	Potential tourisms
1	Choke Mountain	374090	1184360	Hulet Ejj Enessie nibouhrs	Arat Mekerakir, unique plants, wild animals, source of many rivers,
2	Kebi Water fall	358187	1133660	Gozamin	birds songs ,water falls
3	Debre Work Mariam Church	409258	1179170	Enarj Enawga	history from 351 AD, geographical setting, wall paintings, treasury house, museum, annual celebration
4	Abay Gorge	411377	1113950	Dejen	largest canyon, old and hidase bridge, abay river,
5	shibir Amba Eyesus	425316	1203470	Inebse Sar Midir	scenic natural and topographic setting, annual celebration on oct and mar 27 ,40 monks and 60 monks
6	Wirigrig WaterFall	367932	1116740	Basso Liben	serves as bridge,25m depth fall
7	Lake Bahire Gyorgis	407589	1212500	Goncha Siso Enessie	the sailing of Meqa plants ,located in deep gorge, surrounds by natural forest, Church.
8	Saint Trinty Monastery	309521	1141990	D/Elieas	a legendary bride and bridegroom
9	Aba Fakih Yasin Memorial	334122	1145110	D/Elieas	annual memorial on nov 16,
10	Washa Amba Abune Teklehaymanot Monastery	331575	1159530	Machakel	cave, natural forests, celebration on dec and aug 24
11	Abunash Hana Gedam	411214	1190190	Enarege Enawega	cave, rocks, hitory, annual celebration on nov 11
12	Abay Rufael Celebration	411121	1113760	Dejen	celebration on pagume 1-4,
13	Yewishi mikael	370343	1124250	Anded	crosses made from silver, parchment books ,drums etc, holy water, celebration on nov and jun 12
14	Agew Kab	405279	1116610	Dejen	elders are used it for war time.
15	Dima Gyorgis	414675	1166110	Hulet Ejj Enessie	Gedile Flipos,and other brana books, potery, fikir eske mekabir character, wall painting, school,etc
16	Debre Gennet Elias Church	332053	1139110	D/Elieas	history from 1466 AD, traditional school, legendary bride, bridegroom, celebration on Tahissas 1
17	Aba asrat gedam	363584	1137440	aneded	history from 1845,50 monks and 20 nuns, indigenous trees, wild animals, celebration on nov and aug 27
18	Kidus Markos Church	357863	1143460	Gozamin	history from 1874,wall painting, old parchments, crosses, king tomb, indigenous trees, celebration
19	Nolawi Church	386653	1130450	awabel	history from 670 AD ,celebration on dec 21-27 on sunday
20	Mertule Mariam Church	420953	1201150	Inebse Sar Midir	history, architectural art, kings clothes, head jewelries, brana books, crosess,ahemed gragn dress,
21	Broken Bridge	377317	1240110	Hulet Ejj	Its long history,tying on a rope.

				Enessie	
22	Aba Menious Mountain	419277	1213460	between goncha siso and inebse sar medir	its naming based on 5 monks, seven chain of mountain,
23	lay bahir	421168	1212230		lake
24	Tachi bahir	420810	1211010		lake
25	King Teklehaimanot Palace	360643	1142580	Gozamin	monument, hall, diffrent historica heritages
26	Aba Kostir Belay Zeleke and Associated Attraction	412531	1155440	enemay	monument, warkaye plant, history from 1928
27	Yetnora Market	403061	1132730	Dejen	nationwide market, ceremonial and unique attraction value
28	Minji Graveyard	404142	1118650	Dejen	skeletons, pieces of cloths and other remnants.
29	Anktse Betuan Saint Lalibela Monastery	346372	1153090	Machakel	traditional school, holyday on dec 29
30	Jeri Gebriel	405577	1181370	Hulet Eju Enessie	wulude arc suluse traditional church, history from 1533,annual celebration on dec and jul 19

## Anex1

### Pair wise comparison metrics

	culture	Natural	Wildlife	River	Road	Town	NDVI	Elevation	Slope	LULC	Visibility	Rainfall	Temperature
culture	1												
Natural	0.5	1											
Wildlife	0.5	0.5	1										
River	0.5	0.5	0.5	1									
Road	0.333	0.333	0.5	0.333	1								
Town	0.333	0.333	0.333	0.5	0.5	1							
NDVI	0.333	0.333	0.333	0.5	0.5	0.5	1						
Elevation	0.25	0.333	0.333	0.333	0.5	0.5	0.5	1					
Slope	0.25	0.25	0.333	0.333	0.333	0.5	0.5	0.5	1				
LULC	0.333	0.25	0.25	0.333	0.333	0.333	0.5	0.5	0.5	1			
Visibility	0.333	0.25	0.25	0.25	0.333	0.333	0.333	0.5	0.5	0.5	1		
Rainfall	0.333	0.2	0.2	0.25	0.25	0.25	0.333	0.333	0.333	0.5	0.5	1	
Temperature	0.333	0.2	0.2	0.2	0.25	0.25	0.25	0.333	0.333	0.333	0.5	0.5	1