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Ethiopian Institute of Architecture,
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Addis Ababa University

Green Frame Work in Gondar Town

By: Tewodros Ferede

Addis Ababa, Ethiopia, June 2011

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M.Sc. Thesis in

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Green Frame work in Gondar town

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June 2011

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Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all source of material used for the thesis have been duly acknowledged.

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Confirmation

This thesis can be submitted for examination with my approval as a university advisor.

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TABLE OF CONTENT

CHAPTER FOUR

Chapter Five

5 Proposals

LIST OF FIGURES

Figure Page NO

Abstract

Global warming could result in a rise in sea levels, changes in patterns of precipitation, more variable weather, and many other consequences. These changes threaten our health, agriculture, water resources, forests, wildlife.

Environmental effect from human pressure and land use has become a major problem worldwide but the effects are felt more in the developing countries than in the developed countries because of the high population growth rate and the associated rapid depletion of natural resources.

The Evergreen scrub vegetation type appeared to be expanding with increasing human influence signifying a decrease in biomass of vegetation as a result of collecting wood for fuel and other domestic uses.

Deforestation and land Degradation in Ethiopia, however, are impairing the capacity of forests and the land to contribute to food security and to provide other benefits such as fuel wood and fodder. Ethiopians are facing rapid deforestation and degradation of land resources. Population increases have resulted in extensive forest clearing for agricultural use, overgrazing, and exploitation of existing forests for fuel wood, fodder, and construction materials. Forest areas have been reduced from 40 percent a century ago to an estimated less than 3 percent today. The current rate of deforestation is estimated at 160,000 to 200,000 hectares (ha) per year, and fertile topsoil is lost at an estimated rate of one billion cubic meters per year (FAO 1981; UNEP 1983; Constable 1985; Kuru 1990; Yirdaw 1996), resulting in massive environmental degradation and constituting a serious threat to sustainable forest.

Environmental sustainability should not be seen as an add-on but should be included in the design and the delivery of each project. One of the key messages of environmental sustainability is to encourage green frame**.**

This study is conducted to green frame work for Gondar town. The basic method used is the observation and analysis of the natural and green space of the area for their potentials and constraint for green structure and to give a design solution.

Chapter One

Introduction

1.1 Background

The natural environment as an all-encompassing entity that simply exits not as a motionless feature there to serve human needs, but as a set of dynamic processes that define a behavior and establish patterns that interact with and redirect human trajectories. The complexities, conflicts, and contradictions inherent to these contrasting explanations of the term "environment" present a challenge to planning and force the planner to look beyond the immediate dictates of land markets and the goals motivating economic growth. The environment demands wider consideration of all the relevant factors that drive planning and shape the landscape.

Green space area provides an environmentally friendly space where people can interact with the environment in similar ways as humans interact with each other. Green spaces provide educational and recreational opportunities through wild life reserves, hiking areas, golf courses, sports facilities, public gardens, bike trails, and other opportunities. In the urban area, it is critical to maintain the green space area for the following reasons. If a place has lots of green environment, this can lead to a positive benefit not only for the citizens but also for the ecosystem, as well as improve the environmental quality.

Green areas are vital constituents of the urban environment. They are breathing, recreation and interaction spaces for urban centers that are becoming overpopulated, congested and polluted. They are key determinants for behavioral changes and acculturation of generations. A city or town without sufficient green space can be qualified as an organism without breathing organ.

A green frame mainly encompasses open and green areas, whose main purpose is to provide outdoor recreation and breathing space and to maintain environmental balance. Bureau of Work and Urban Development (2001) classifies the green frame into formal and informal green. Formal greens are open and green spaces with specific function and treatment, such as parks, street gardens, playgrounds, sport fields, squares, institutional vegetation cover, private gardens, cemeteries green, etc. informal greens include forest areas, river valleys, agricultural land, grazing lands, open leftover lands, land reserved in the expansion area.

In Gondar, open and green spaces are severely inadequate. The green coverage is drastically decreasing as open and green areas are invaded by the construction of buildings. The city lacks sufficient places for children, adolescents and adults to play and recreate in a healthy environment. One can say that green space is an endangered element of the city. It is therefore high time for the city of Gondar to question the situation of its green spaces.

1.2 Statement of the problem

Green frame is the physical environment within and between our cities, towns and villages. It is a network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes of sustainable environment and benefiting environment and society alike. Functions including environmental, ecological, social and economic aspects exist individually or jointly in all green frames so as to contribute to quality life of citizens and urban biodiversity. Besides, green frame is now viewed and recognized as an important and multifunction role for urban development.

The conservation of green spaces in the town has all too often conflicted with the interests of land development, lack of attention, planning and management problems. As the result, green areas are rapid decreasing in many large cities and towns and have given rise to environment deterioration.

Town have different types of green spaces such as parks, road side greens, lake and river side green corridors, forest and green play grounds more or less providing recreational services for the residents. the green spaces in Gondar town are endanger from lack of attention, poor maintenance, management, lack of development and under utilization and then the existing green areas in the town well not connected each other.

These have a large and diverse inventory of open spaces it is unevenly distributed throughout the city. Generally the parts of the center town that have the highest population densities also have the least amount of public green space. Public green space is of extra importance to residents of these neighborhoods because the single-family homes and the multi-family structures are generally on smaller lots, with limited green space.

The main focus of this research is assessing the existing conditions of green areas in the city mainly focusing on areas of conservation, distribution, as well as planning of green in the town and recommend feasible design solutions.

The basis problems of the study area:-

- lack of trees along the street side.
- The vegetation covers of the surrounding hills are damage and some parts of hills are damage.
- The built up areas and existing recreational area are not compatible.
- Lack of Open space or green at the neighborhood.
- Lack of connectivity for green space and church forests are not well connecting.

- Structural plan problems such as like of the green areas not including in the plan.
- Lack of vegetation along the river side.

1.3 Objectives of the research

Main Objective

The main objective of this research is to assess the existing situation of green spaces and propose green frame work plan for inner part of the town including with a design solution.

Specific objectives

To achieve the main objective the following specific objectives are formulated:

- To identify existing situation of urban green areas.
- To provide open space and recreational areas.
- Linkages between ecosystems and parks or public lands.
- Connectivity between landscapes and green spaces.
- Preserve existing trees, open space, and river buffers.
- To provide alternative planning solutions.

1.4 Research questions

The basic questions that should be answered are: -

1. What is green framework?

2. What are the components of green framework?

3. What elements should be changed in character or enhanced?

4. Where is there a need to create new elements and what type should they be?

5. Which elements should be linked together?

1.5 Scope and Limitation

To conduct this research the main constraints are time and lack of research outcomes related with the research topic. Data availability and analysis of urban green areas in the town to obtain important inputs require different materials, time and financial issues. These problems are obstacles to assess and analyze the existing situation of green areas and inner parts of the city and propose planning and design solutions. Therefore, the outcome of this study focuses to

produce city wide spatial green frame work produce a details of green streets specific areas and public park. These plans shows existing potential green resources, intervention areas, proposed areas for the future, detail plan for selected local development plan area, networked green spaces as well as functions and activities for the areas. The study area should be found in the inner of the town between the two rivers such as ***keha*** and ***Angereb*** River.

1.6 Relevance of the study

To achieve sustainable and comfortable environment in the city, decrease the run of water and also increases the amount of ground cover, which in turn increases storm water infiltration rates and cool hot air, vegetation covers reduces the erosion of riverbank.

Green frame delivering the ecosystem services to provide healthy soil and good quality air and water as well as other benefits that are fundamental to the well-being of both the economy and society.

Green frame work can benefit adaptability for a wide range of situation that result from climate change impacts. This adaptability is possible because green frame can conserve and reuse water, promote groundwater recharge, and reduce surface water discharges that can cause flooding. Additionally, the vegetation utilized in green frame can serve as sources of carbon sequestration, thus capturing carbon dioxide from the atmosphere.

Green frame help to prepare the City Region for protection climate change and safeguard the ecosystem services.

In general we can say that the town takes these kinds of green spaces and recreational areas needs attractive and functional. Therefore the need of the green frame work plan is very crucial for Gondar town.

1.7 Structure of the research

First chapter-introduction of back ground, problem description, objectives and research Questions, significance of the study, scope and limitation of the research and Methodology part describe the methods how to collect data and analyzing understand data's for the research.

Second chapter - highlights a review of literature that consists of both academic matter and observed issues associated with the combine subject matter of the study.

Third chapter – Descriptive of Study Area

Fourth chapter -talks about data analysis and interpretation describing the area of the green existing situation and evaluation of the major planning issues for their potentials, restriction and problems.

Fifth chapter - Green frame and proposed for design solution for the study area

Sixth chapter - conclusion and recommendation

1.8 Methodology of the Research

The study was conducted in Gondar town to study this research knowing and recognition of green frame work, assessment of their qualities, accessibility, distribution, connection as well as on participation of planning and management of green frame work issues will be based reviewing related literatures and survey methods. These approaches are vital sources of data for his research.

Generally, the approaches to address the research should be;

1. Reviewing related documents such as sources of data from various governmental and nongovernmental organizations
2. site observation – direct physical observation and assessing existing situation of urban green space in the study area
3. Interviewing and discussion with concerned stake holders such as professionals, residents, concerned institutions.

1.8.1 Data collection

For this research primary and secondary data sources were collected from various sources. The primary data sources are obtained from survey techniques and secondary data's are also obtained from published and un- published sources of different institutions.

The major source of data for the study include both primary and secondary data's

Primary Data: - Interviewing and discussion with selected key informants, personnel as well physical observation of the study area were the primary data collection techniques to generate important data's on the situation of green frame work qualities, accessibility, benefit, participation on planning and management, connection as well as the town perception on green frame work.

Secondary Data: - These are most significant data that are needed for the actual study, these are gathered from existing maps, written some literatures like books, Magazine, internet websites, photos, Satellite images and city development plans most important data sources.

1.8.2 Data analysis and interpretation

After the data's are collected from various sources, data's and information has been organize and analyze using different software's like, ArcGIS, AutoCAD, ArchiCAD, Sketch

Up,Artlantis,Adobe PhotoShop ,Ulead video studio and others. To come up with the final green framework plan.

1.9 Definition of terms

Green frame- an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations it network waterways, wetlands, woodlands, wildlife habitats, and other and other conservation lands.

Green Belt - designation for land around certain cities and large built-up areas, which aims to keep this land permanently open or largely undeveloped. The green belt is to check the unrestricted sprawl of large built-up areas prevent neighboring town from merging; safeguard the countryside from encroachment; preserve the setting and special character of planned or protected open space, consisting of recreational parks, farm land, or uncultivated land.

Open space-generally refers to undeveloped land or land without human-built structures which contain park, forest, wetlands, and river.

Green space- woodland and scrub, nature reserves, grassland, wetlands, open water bodies and recreation spaces, play areas, outdoor sport facilities, housing green spaces, domestic gardens, village greens, urban commons, other incidental space, green roofs, hedge, squares and spaces, and highway trees .

Green corridor / wildlife corridor-These linear areas of land are normally formed by a variety of habitats which allow safe passage for wildlife. They usually link more extensive areas of habitat. Rivers/canals including their banks, road and, ditches, pedestrian paths and rights of way.

Greenway-a greenway is a corridor of open space that can run through urban, suburban, and rural areas Green space and natural, cultural, and scenic features. Some greenways run alongside rivers, canals or disused railways. Greenways often provide for recreational opportunities, while others are established almost exclusively for environmental protection.

Green wedges- comprise the open areas around and between parts of settlements, which maintain the distinction between the countryside and built up areas, prevent the coalescence (merging) of adjacent places and can also provide recreational area.

Chapter Two

Literature Review

2.1 Definition and Concept of Green Frame

Green frame work is the physical environment within and between our cities, towns and villages. It is a network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a Green frame work approach also contributes towards sustainable resource management (C Davies, R MacFarlane, C McGloin, and M Roe. 2006).

Green frame work can be defined in different countries in different context as: The term "Green frame work" is a relatively modern one, with its roots in city planning and urban design in the USA. The concept was developed to provide counterpoint to the emphasis in planning placed upon the built or "Grey" frame work. In other words it seeks to put the functions of green spaces and the contribution they make to quality of life and quality of place on a more equal status with those features normally associated with the term "frame work" in development, for example, transport, energy, water and communications networks.

In the USA context, Green frame work is commonly defined as "the Nation's natural life support system – a strategically planned and managed network of wilderness, parks, greenways, conservation easements and working lands with conservation value that supports native species, maintains natural ecological processes, sustains air and water resources, and contributes to the health and quality of life for America's communities.

The notion of planning for greener cities has been prevalent in the UK and European context too for many years and can be traced back in the UK to the Garden City movement at the beginning of the Twentieth Century and pioneers in this form of urban planning such as Sir Ebenezer Howard. More latterly, the growth of the urban and community forestry movement over the last 20 years in the UK has accelerated the growing recognition of the value of a holistic approach to urban green space planning. City Region green Infrastructure strategic Planning (City Region Green Infrastructure Strategic Planning 2006).

“Green structure is our nation’s natural life support system that an interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks and other conservation lands; working farms, ranches and forests; and wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources and contribute to the health and quality of life for America’s(Mark a. Benedict, .and Edward t. McMahon,2005).

2.2 The Benefits of Green Frame work

The benefits which can be derived from Green frame work extend beyond the environment to social to economic. In many ways it overarches and reaches out to almost everything we do in the region. It crosses boundaries both spatially and in many other ways. Green frame work truly is a multi-functional resource, which underpins sustainability, directly benefits the economy and improves the quality of life of communities. As we look forward to the region's recovery, the benefits of Green frame work may be summarized as follows under some key headings.

2.2.1 Economic Benefits

Placing accurate economic values on green frame or its green space components is far from easy, but is vital to support the case for sustained investment. Although the vast majority of the evidence points to green frame work benefiting many vital aspects of social and environmental sustainability, the challenge is in convincing budget holders of the economic value of such 'indirect' impacts. In most cases there is little doubt that returns on green frame work investment are high, but without adequate demonstration it is often difficult for investments to be made in line with other initiatives where direct cost-benefit valuation is simpler. A series of case studies where economic valuation has taken place are discussed in order to demonstrate the net economic value of initiatives to create or improve green structure. There is good evidence that green space can make positive impacts on both local and regional economic regeneration, especially for job creation, business start up and inward investment.

However, the quality and quantity of this evidence is comparatively poor and further research is needed to improve it.

The tangible benefits that an attractive environment and investment in green spaces brings in terms of attracting and retaining both business and a skilled workforce. Green frame work additionally creates real opportunities for new commercial activity, for instance in tourism, conservation, new recreational facilities, particularly those that will link urban and countryside areas (Vadims Sarajevs and Gregory Valatin2010).

2.2.2 Social Benefits

There are many potential social benefits that good quality, accessible green space and infrastructure can provide, but the most significant of these can be grouped into three broad categories:

1. Improvements in levels of physical activity and health.
2. Promotion of psychological health and mental well-being.
3. Facilitation of social interaction, inclusion and community cohesion.

Associations have been found between access to green space and raised levels of physical activity, which in turn improves individuals' health. There is a strong body of evidence which

shows that they can have a beneficial impact on mental well-being and cognitive function. At their best, green spaces can also help facilitate social interaction, integration and the development of community cohesion.

The potential social benefits that green infrastructure can provide are therefore substantial and have been strongly linked to a range of key government priorities. Although direct economic evidence about the provision of these benefits is limited, what little exists suggests that green structure provision and green space initiatives are a cost-effective method of achieving them. The improvement of existing and creation of new green infrastructure should be prioritized.

The benefits accessible green spaces bring to public health through increased opportunities for exercise and recreation, its contribution to community cohesion and enhancing quality of place through improving the environment of residential neighborhoods (Amy Stewart and Anna Lawrence 2010).

2.2.3 Environmental Benefits

Urban green frame work can deliver a wide range of environmental benefits, particularly:

• Reduction in air pollution.

• Reduction in flood risk as part of sustainable urban drainage systems.

• Improvement of the perceptions of an urban area as aesthetically pleasing.

• Amelioration of high summer temperatures caused by the urban heat island effect and climate change.

None of these benefits occur in isolation, and well-designed and well-managed green infrastructure can deliver all of them at the same time. However, pressures on land use in urban areas may make it difficult to site green space in the optimum position, which make trade-offs and compromise necessary. These trade-offs should not, however, prevent urban Green structure from delivering a good subset of the above benefits.

The conservation and creation of wildlife habitats and corridors, reductions in air and water pollution and the contribution made towards reducing climate change impact. This allows the urban areas of the town to showcase a product where high quality physical regeneration is matched by a high quality environment. When taken together, the benefits of Green frame can be seen to have a considerable and measurable impact upon quality of place and livability at a local neighborhood level. When strategically planned and measured across a City Region, Green Infrastructure can be seen to have the potential to create a truly sustainable community by integrating environmental assets and processes with key elements of economic renaissance such as housing renewal, inward investment, and site structure development (Gail Atkinson, Andy Brunt 2010).

2.2.4 Land Regeneration Benefits

Previously developed derelict, underused, neglected land in and around urban centers can provide real opportunities to deliver social, environmental and economic benefits via conversion to green frame work. In particular, by delivering improved environmental health, quality of place and subsequently increased land value and regional investment, the conversion of land to green infrastructure can be very cost-effective. Nevertheless, land regeneration requires both project resources and revenue funds for long-term management and maintenance; these can be substantial.

The regeneration of land presents a prime opportunity to make the connections between existing green spaces and facilitate its functioning at a larger scale.

Work needs to be done to secure further delivery including: effective sustainability evaluation for land regeneration and green frame work creation programmes; an understanding of the impacts of climate change on some contaminated land remediation strategies and associated risks to human and environmental health; a much improved understanding of the relations between people and landscapes, and the use of donation in green space design in order to drive delivery of quality functional green spaces desirable to local residents(Gail Atkinson and Ros Bryant,2010).

2.2.5 Hydrological Benefits

Alterations to the natural environment can affect the movement of water through the hydrological cycle and alter its composition. By replacing vegetation with more impermeable materials, urban development has had a significant impact on the hydrology, freshwater ecology and terrestrial ecosystems that river systems support.

Green structure can provide hydrological benefits in two key areas: flood alleviation and water quality (improvement and protection). urban trees (in the riparian zone and floodplain) can contribute to flood alleviation by delaying the downstream passage of flood flows, reducing the volume of runoff, and promoting rainfall infiltration into the soil, thereby reducing the rate of runoff. Flood alleviation using trees may be restricted to small-scale flood events; however, this is significant as trees store more water during lower intensity rainfall events over longer time periods than intense events over short periods. Moreover, small storm events are responsible for most of the annual pollutant loading to receiving waters so there is considerable scope for water quality improvements. Green roofs, Sustainable Urban Drainage Systems (SUDS), wetlands and retention/detention basins also offer hydrological benefits through reduced runoff, increased storage and improved water quality. Further studies are required to quantify hydrological benefits and assess the efficacy of individual green frame components and their integrated use (Nadeem Shahan and Samantha Broadmeadow, 2010).

2.2.6 Health, Well-Being and Community Benefits

Green space in both urban and rural settings provides places for people to enjoy, whether this is from physical activity such as play, games, walking and cycling or from quiet activity such as gardening and watching wildlife. Often just the mental satisfaction and peace which being amongst or looking at greenery provides is enough to boost people's well-being. Substantial evidence has now accumulated to indicate that green space not only encourages healthy physical activity but also benefits recovery from illness and mental health, this can be achieved just from being able to look out of a window to trees and other greenery. Further benefits accrue from encouraging and enabling people to become involved in supporting and managing their local green.

spaces whether this be from working on allotments, holding community events, improving areas for wildlife, planting trees or looking after community open spaces. A well designed network of green spaces linking key places in a community, for example homes, schools and shops, helps to build communal spirit and morale and provides safe places for play and people movement www.tcpa.org.uk/pages/green-infrastructure.htm.

2.2.7 Biodiversity

Green frame work provides habitats for wildlife and also can link, expand and buffer important habitats and support the migration and dispersal of species. Creation and enhancement of Green frame work can provide new habitats and link urban and rural areas, improving the value of both town and countryside for wildlife. Green space in urban areas can be especially valuable for wildlife and provide a range of habitats in gardens, street trees, copses, parks and ponds. Green frame work assets include semi-natural habitats, including designated areas of conservation. Protection of such areas is vital, as once lost their re-creation may not be possible. Green frame work can provide the settings and opportunities to bring people close to wildlife and enhance their enjoyment www.tcpa.org.uk/pages/green-infrastructure.html.

2.3 Functions of Green frame work

Based on the comparison of the different green frame work definitions and concepts it can be said, that green frame work should provide multiple functions and benefits to the human society as well as the environment.

The function of the design viewpoint based on appropriate designs for appropriate places. This is to help improve the visual image of town, achieve uniformity and create a standard approach to the long-term maintenance and management of the Borough's landscaped areas. It is based on the principle of utilizing to the landscape elements of amenity grassland and extra-heavy standard and semi-mature trees as the linking threads between well designed and cared for

landscaped areas. This approach will be adopted along the main green street links into the borough's commercial, employment, residential and civic areas.

Street Scene Strategy are committed to making green spaces, the public realm, town centers and main transport corridors neater, cleaner, greener and safer.

Green frame work systems help protect and restore naturally functioning ecosystems and provide a framework for future development .In doing so, they provide a diversity of ecological, social, and economic functions and benefits, like enriched habitat and biodiversity; maintenance of natural landscape processes; cleaner air and water; increased recreational opportunities; improved health; and better connection to nature and sense of place. Well planned green space has also been shown to increase property values and decrease the costs of public infrastructure and public services, including the costs for storm water management and water treatment systems (Mark A. Benedict and Edward T. McMahon,2005).

2.4 Characteristics of Green frame work

There is a grey-green range of thinking relating to concepts surrounding 'frame work', although 'Green' can be used to denote the function or facility provided by an element, even if it is not strictly 'Green' in land use terms. It is suggested therefore that the definition of 'grey' as fundamentally distinct from 'green' may not be altogether helpful, and that, like a color chart, we can move through a range of shades in the middle is grey/green. Elements that might be classed as 'grey', but which contribute to the wider functioning of green frame work should be treated as part of the green frame work network. Grey infrastructure, such as bus routes, should be made to integrate with green infrastructure networks rather than vice-versa.

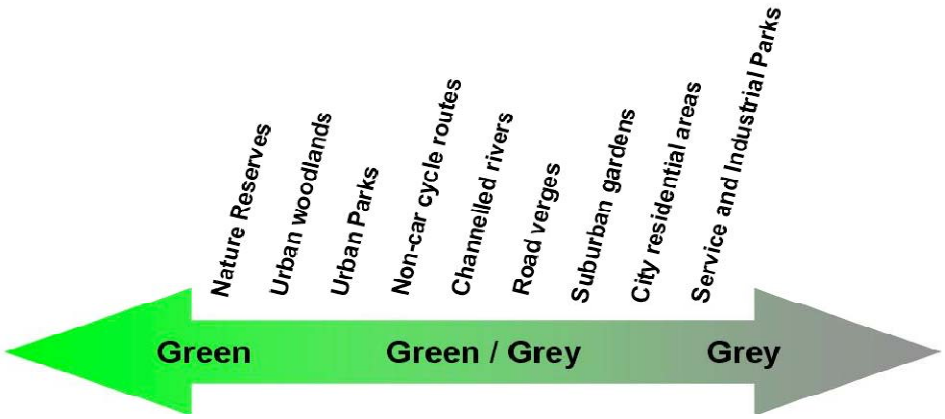

Figure 1: The Grey-Green continuum

One of the problems encountered in considering green infrastructure planning is that it is often hard to visualize and therefore may not be accounted for properly. The green-grey continuum concept may help to overcome the lack of obviousness of green compared to grey, which is well understood in the planning process (C Davies, et al 2005).

2.5 Green Frame work Principles

All regions, communities, private landowners, public agencies, and conservation organizations are working to conserve and restore our country's natural life sustaining system. Although these projects go by many different names (greenway planning and design, ecosystem management, watershed protection, conservation development, habitat restoration, stream improvement, green prints), successful initiatives are based on common principles and share similar strategies. What follows are six guiding principles and strategies that have been identified as critical to the success of green frame work initiatives. Taken together, these principles provide a strategic approach and framework for conservation that can advance the sustainable use of land while providing an interconnected system of green spaces that benefit people, wildlife and the economy. They are intended to help provide design, planning, acquisition and other decision making guidance for community-based sustainable (Mark A. Benedict and Edward T. McMahon,2005).

2.5.1 Green frame work for protection and development By making green frame work for conservation, communities can plan for and protect interconnected, green space systems. And where isolated "islands" of nature already exist, green frame work planning can help them identify opportunities to restore the vital ecological connections that are necessary for the survival of those protected areas. Having a green frame work strategy also helps planners and developers minimize the adverse impacts that rapid growth can have on ecosystem functions and services, such as the loss of wildlife habitat and migration corridors and the loss of riparian and other natural areas that absorb nutrients, recharge ground and surface water supplies, slow and absorb storm water runoff, and replenish soils.

Protecting green frame work up front ensures that existing open space and working lands are seen as part of the community's essential assets and not left vulnerable to development pressures that would leave green frame work further reduced and fragmented(Mark A. Benedict, .and Edward T. McMahon,2005).

2.5.2 Principle Green frame should be multi-functional- A green frame network should fully demonstrate 'multi-functionality'. This is a simple but powerful concept which seeks the integration and interaction of different functions on the same site and across a green frame network as a whole. It is key to realizing the full sustainable benefits from available land in and around the town. Multi-functionality is a reversal of the traditional approach to land use planning that seeks to spatially separate land uses and functions.

Multi-functional green frame in an eco-town context can also be viewed as the application of an 'ecosystem approach' to a new urban environment. An ecosystem approach has been defined as 'a strategy for the integrated management of land, water and living resources that promotes

conservation and sustainable use in an equitable way and which recognizes that humans, with their cultural diversity, are an integral component of many ecosystems(Mark A. Benedict And Edward T. McMahon,2005).

2.5.3 Linkage is key for green frame work

The desired outcome for all green frame work initiatives is the creation of a green space network that functions as an ecological whole, not as a random assemblage of separate, unrelated parts. The strategic connection of different system components — parks, preserves, riparian areas, wetlands, and other green spaces — is critical to maintaining vital ecological processes and services (e.g., carrying and filtering storm water runoff, storing and cleaning fresh water, cleaning urban air) and to maintaining the health and biodiversity of wildlife populations(Mark A. Benedict and Edward T. McMahon,2005).

2.5.4 Green frame work functions across multiple authorities and at different scales.

Green structure systems strategically to connect across urban, suburban, rural and wilderness landscapes and incorporate green space elements and functions at the state, regional, community and parcel scales. Green frame strategies can be used for initiatives of any size or scale, including: Green structure exists and operates at both small and large scales. How the management of green infrastructure systems is conducted will be scale dependent. Some benefits will add up regionally, others will be local. Scale allows for the consideration of green structure to encompass assets of different sizes ranging from a street tree (neighborhood scale) through to an entire moorland (county scale) or total environmental resource base regional scale (Mark A. Benedict and Edward T. McMahon, 2005).

Green structure at different levels and scales include:

Regional scale - principally through the Regional Spatial Strategy, where the emphasis is on the highest priority elements and networks, for example nationally designated sites and major river corridors

Sub-regional scale - at a County or City Region level where the emphasis is on identifying elements which have the potential to qualitatively enhance the sub-region's environment and where the infrastructure may be significantly strengthened by higher level initiatives that span local authority boundaries.

Examples include extensive parks and gardens, local nature reserves and SSSI's, and areas of woodland

District scale - through Local Development Frameworks and local green space strategies, where the emphasis is on providing suitable and sufficient green spaces for recreation, amenity and conservation, and providing routes and pathways for multiple purposes

Neighborhood scale - where the emphasis is on the cumulative effect of many local features, such as street trees, private gardens, allotments, small water bodies and streams, and small pockets of unused land

-The project scale, involving individual parcels and within single real estate developments.
-The community scale, supporting local resource conservation and restoration efforts and including park, recreation and other open-space projects ((Mark A. Benedict and Edward T. McMahon, 2005).

2.5.5 Green frame should be provided as a varied, widely distributed, strategically planned and interconnected system. The towns should offer much more than 'amenity' or easy maintenance green spaces. The Green frame network must provide a wide variety of spaces, habitats and connections, supplying a broad range of ecosystem services.

Green infrastructure is often used to refer to networks of parks and open lands that preserve habitats and ecosystem functions (usually created or protected by managing land uses), but the term can also encompass small-scale natural features such as trees planted along a city sidewalk. While green infrastructure is often used for water management purposes, it can also be used to tackle other issues such as air pollution, urban heat island effects, wildlife conservation and recreational needs.

Green framework cannot simply be assembled from parcels of marginal land not needed or wanted for housing. Nor can it be provided via just one or two large land parcels on the edge of the development. It must be fully integrated.

The strategic planning of Green framework requires a co-ordinate approach from a multidisciplinary and cross-organizational team. Engineers, landscape architects, ecologists, park managers and planners are some of the key technical contributors to a successful Green framework strategy. Local authorities, national agencies and major landowners will also need to work with major developers to implement the strategy (Town and Country Planning Association, London, 2008).

2.5.6 Green framework should be accessible to local people and provide alternative means of transport. Green framework within a town must provide outdoor spaces that are attractive, welcoming and engaging to local people, and which feel safe, are attractive and meet a variety of human needs. Such needs include the need for contact with nature, the need for young people to play and spend time with friends in their local neighborhood, as well as the need for other groups of people to be able to walk or cycle safely in the area where they live for all short journeys.

Green framework should provide excellent walking and cycling opportunities for recreation and as a means of transport, offering a quick route from homes to services – and so helping to discourage the use private cars. Inclusive design elements must be employed to ensure that Green framework is accessible to all – for example the use of clear signage and the provision of separate cycling and pedestrian lanes, which are integral to the needs of many disabled, blind and older people. Street furniture such as benches should be dementia-friendly (Town and Country Planning Association, London, 2008).

2.5.7 Green framework should be able to achieve physical and functional connectivity between sites at all levels and right across a town, city or sub-region.

It is vital that each individual green space functions as part of a larger network and that a Green frame network incorporates all the green spaces of a town or city, both public and private.

Connectivity may not always mean a direct physical connection between sites, although a physically joined-up network should dominate. Simple proximity can be enough to functionally integrate an individual green space into a wider network. For example, some species can move between unconnected sites if the distances involved are not great. Private gardens can also be useful 'stepping stones' or informal wildlife corridors between sites. Separate but closely co-located green spaces can still operate collectively in mitigating the effects of climate change (Town and Country Planning Association, London, 2008).

2.6 The concept of planning

The concept of planning is difficult to define in precise terms. Perhaps at its most fundamental level planning can be described as a universal skill that involves the consideration of outcomes before a choice is made among alternatives (Feldt, 1988). To illustrate this idea, consider the desire of any town, USA, to preserve open space for recreational uses. Open space and recreation are fairly well understood ideas, but the decision of which lands to preserve as open and for what recreational uses is not a simple matter. Should lands be preserved for hiking or off-road vehicle use? How do we decide? What if we are wrong? Therefore, we can refine our definition to describe planning as a method for reconciling choice under conditions of risk and uncertainty. However, regardless of definition, a central element of planning is the desire to direct change in order to produce a beneficial consequence at some point in the future. In this sense we can think of planning as a vision (James K. Lein, 2003).

2.7 Green frame work Planning

Trends Influencing the Shift to Green frame work in the past, many communities considered open space to be land that has not yet been developed. The legal and philosophical framework

of our land use system assumed that land was a commodity to be consumed. Communities that did plan for open space focused almost exclusively on preserving land for parks, which were viewed as a community amenity. Most open space preservation efforts were site-specific and were not undertaken in conjunction with local land use planning.

Trends influencing a shift to a systematic, Green frame work approach to open space Planning includes.

- Increasing recognition of the problems associated with urban sprawl and landscape fragmentation, particularly on the fringe of major metropolitan areas.
- Endangered species protection, particularly the emphasis on habitat conservation plans that protect multiple species and link isolated preserves.
- Public health concerns, including obesity that have resulted from inactive lifestyles.
- An increase in the marketability and resale value of homes near protected green space, such as parks and greenways.
- Urban revitalization, emphasizing the value of natural areas within the city.
- Smart growth policies and programs at the state, regional and community levels.
- Development practices designed to promote environmental, social and economic sustainability (Mark A. Benedict and Edward T. McMahon, 2005).

2.8 Why Green frame work Planning

Green frame work planning represents the coming together of various interests as described above. It is not seen just as a way of providing an improved green structure for the landscape, but also as a mechanism for more informed decision-making and more 'joined-up' thinking in relation to urban and regional environmental planning.

Green frame work is seen as a critical part of urban frame work and as a positive way to conceptualize green space planning. The aim is to increase the quality of natural capital rather than concentrate solely on the quantity of natural capital.

Embedded within green frame work planning is the idea that stakeholders should have the opportunity to be involved in the shaping of environmental and green space planning at a variety of scales. Recent enthusiasm for pushing forward green frame work planning indicates that frame work has become a 'muster point' for academic, public bodies and practical agencies interested in green space issues and a way to help develop environmental thinking across disciplinary and political boundaries (C Davies, et al 2005).

2.9 Purpose of green frame planning

Green frame planning is a means of ensuring that the region's natural life support systems are maintained and providing a range of benefits to improve the livability and sustainability of the region.

The country contains some outstanding landscapes and natural habitats, but also some major environmental challenges.

In addition, the region needs to be able to respond to environmental changes such as those being driven by climate change, as well as social and economic needs.

Green frame work planning is an important tool to help drive the sustainability lead environmental, economic and social renewal of the country. At regional level, green infrastructure planning sets out the required definition, guidance on approaches and regional strategic outcomes being sought from green frame work. Strategic plans for green frame are needed at sub-regional level to guide and ensure joined up cross boundary action at local level. Detailed green frame work planning is best done at local authority level and may best be pursued as a shared responsibility in partnership between the local authority and key local stakeholders.

2.10 Standard for green frame Planning

The English Nature Green space standard is regarded as having the best fit to green frame Planning and is used in this guide in a modified form. The modified standard is referred to as Accessible Natural Green space Standard plus; ANGST+. The modified ANGST standard takes account of stakeholder involvement, local decision making and connectivity, the latter being a fundamental component of all infrastructure; green or grey.

- No person should live more than 300 m from their nearest area of natural green space of at least two (2) hectares in size.
- There is provision of at least two (2) hectares of natural green space per 1,000 populations.
- That there should be at least one accessible 20 ha site within two (2) km from home
- That there should be one accessible 100 ha site within five (5) km.
- That there should be one accessible 500 ha site within (10) km.
- Those adjacent green spaces are interconnected; the priority and extent being determined by local decision making informed by stakeholder involvement (Davies, et al 2005).

Chapter Three

Description and Analysis of the Study Area

3.1 History and Background

Gondar is centered on a complex of castles built during the 17th and 18th centuries, when the city was the imperial capital of Ethiopia. Gondar was expanded significantly around 1635 by Fasiledes, the son of the city's founder, Suseniòs. To build his castle, Fasiledes employed Portuguese-Indian, and possibly Turkish, craftsmen brought to Gondar for the purpose.
Gondar stretches along a ridge in the northern Ethiopian highlands.
Gondar is the former capital city of Ethiopia1632-1868, is. And the city administration of Gondar is comprised of 12 urban and 10 rural kebeles and one satellite town.

Know a day Gondar is one of developing town in the region but the quality of town plan is not good organizing the future layout of a city showing either the existing streets or roads; open spaces public buildings are not good relationships because some area highly condensed of people.

The heritage site and other natural features make Gondar unique and attractive urban center. The landscape and its natural environment let the tourists be interested to visit the town. Now a day's many local and foreign tourists become interested beside these the existing open space and green areas are sufficient but many spaces are hidden or non-functional, currently these spaces are altering for residential and other purpose. In general we can say that the town takes these kinds of green spaces and recreational areas needs attractive and functional.
Therefore, the need of the green frame work plan is very crucial for Gondar town. Green framework can provide a variety of environmental, economic, and social benefits in additional to the esthetics. In order to achieve environmentally sustainable city with enhanced natural resources.

3.2 Location and Topography

The study area is located in northern part of Amhara National Regional State and capital of North Gondar Administrative zone. It stretches along a ridge in the northern Ethiopian highlands. The city sits at an elevation of 2,200 meters, and is surrounded on three sides by a crown of 3,000-meter high mountains; the climatic zone is weyina dega, Average temperature 20°C, Annual rainfall-1,172 mm, ranging in population study area 122,996 Study areas – 11.058 sq km. To the south, the landscape opens to a valley and distant views of Lake tana, source of the Blue Nile is situated 748 km far from of Addis Ababa.

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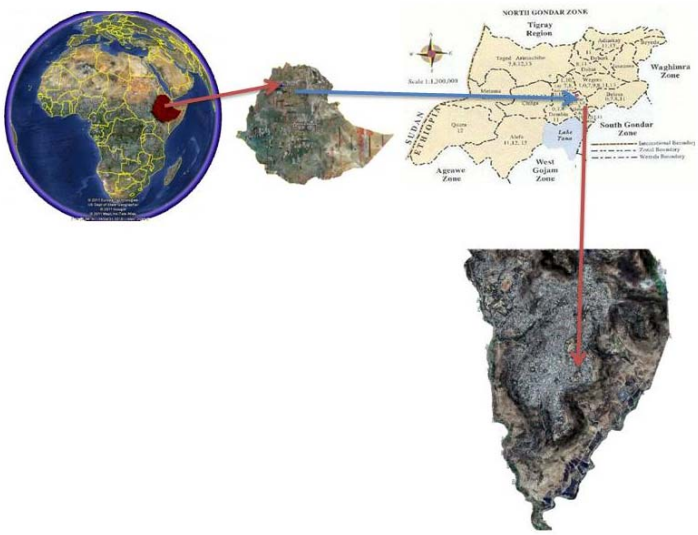


Figure2: Location map of the study area

The topography of the area is most of hilly some are rocky (and often degraded) hills, and areas of poorly drained bottom land.

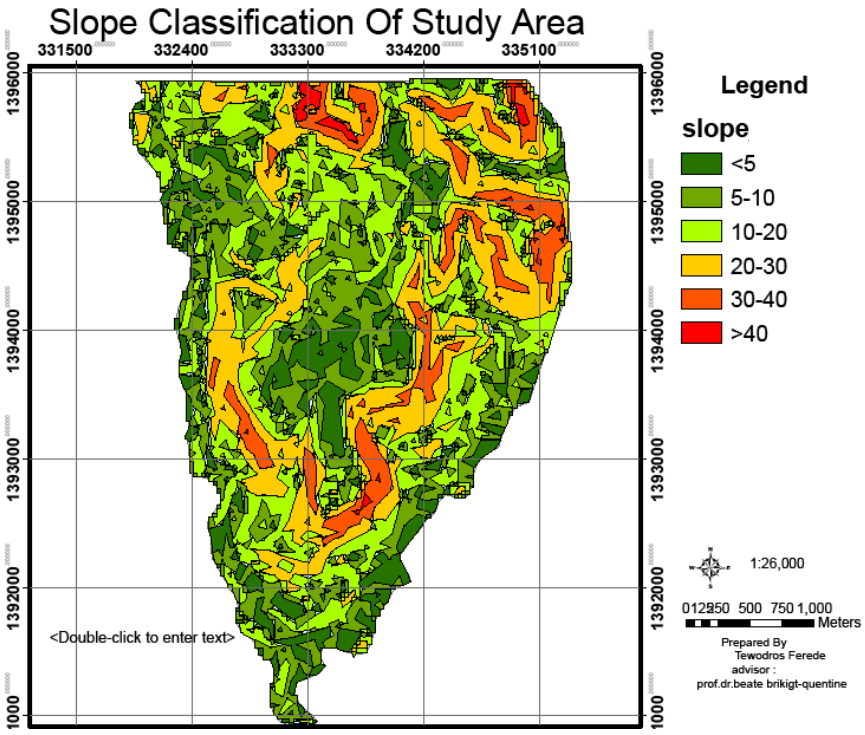


Figure: 3 slop Classification Map *(Made by the author)*

3.3 Climatic condition

3.3.1 Rain fall and Temperature

The rainfall pattern of Gondar, as information obtained from meteorological station, is Uni modal and characterized by single maximum rainfall pattern with peaks in July and August. About 80%-90% of the mean annual rainfall falls in the main rainy season (“Kiremt”), which starts in June/July and extends to August/September. Rainfall variability in time is considerably high especially at the beginning and end of the main rainy season. The rainfall records for 51 years shows that the average annual precipitation at azezo airport is about 1,172 mm.

The mean annual temperature ranges from 12.90C to 26.40C.

3.3.2 **Wind**

The monthly average wind speeds are graphically displayed in Figure4. In the study area the wind direction in the table and graph below shows that, one year data from February 2005 to January 2006 as being complete year.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Average
Emonth	133	109	86	64	156	202	82	64	84	72	85	47	95.9 MWh
V-month	6.5	6.1	5.5	5.1	6.7	7.4	5.2	5.1	5.2	5.5	5.6	4.9	5.7 m/s
Weibull	2.3	2.3	2.0	2.2	2.0	2.0	1.8	2.2	1.8	2.5	2.3	2.7	2.03 (k)

MEAN MONTHLY WIND SPEED Vmonth in m/s

V-year = 5.7 m/s
E-year,est = 1,151.0 MWh

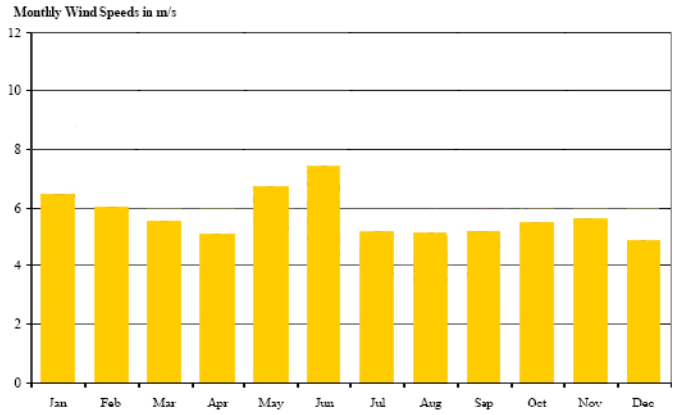


Figure: 4 Monthly Wind Speeds in m/s

Source: http://www.gtz.de/wind

The display of the full one-year wind direction data from all stations shows clearly, that all pre-selected wind station a single predominant wind direction. In the case of Gondar stations the wind direction is NNW.

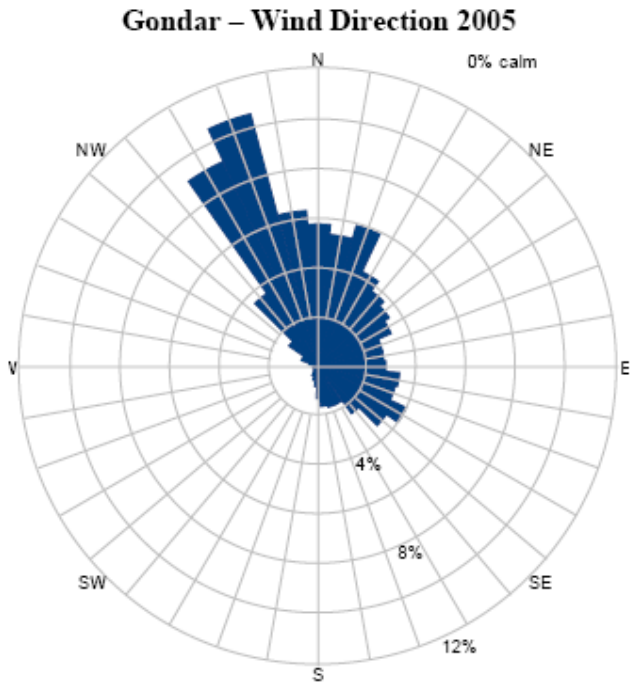


Figure 5: Wind Direction
Source: internet: http://www.gtz.de/wind

3.4 Soil Characteristics

According to the FAO classification Gondar town has grouped into three major categories: Eutric cambisols (stony phase), Eutric cambisols (lithic phase) and Lithosols but the soil map of the study area could be one categories: Lithic Leptosols In this local situation, the cambisols were categorized in to subunits (phases). Since the major land forms of the area are not significantly dissimilar, the soil component within each terrain component is not found to be separated differently.

The figure indicates the majority of the soils are Lithosols, but I seen different books and site observation are found some area was covered with lithic phase of cambisols the rest of watershed area. The distribution of lithosols is found to be high in forest and bush land while cambisols are found mainly in cultivated land units.

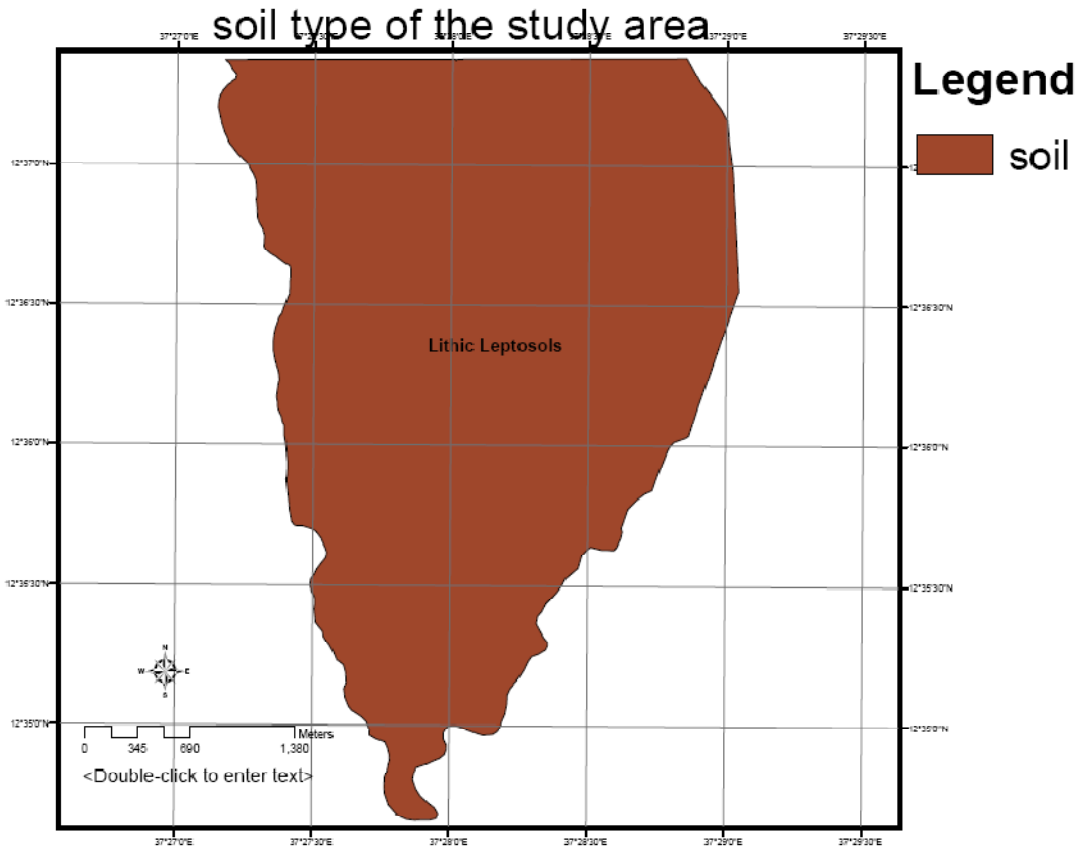


Figure 6. Soil type of study area

3.5. Land Use and Vegetation

Land use refers to different land use types in the town such as: commercial, residential, services, administration and industries. The vegetation types and situation of the study area consists of evergreen or semi–evergreen 2-3m bushes; bigger bushes, small trees and larger trees.

Large trees are very scattered and limited in the town. The species that occur in the area include: indigenous species like, Olea africana, Croton macrostachys and also plantation forests dominantly Eucalyptus globules.

We can see that most of the natural forest that once covered much of the temperate only church forest and is now seriously reduced the green coverage, converted to built-up and other functions.

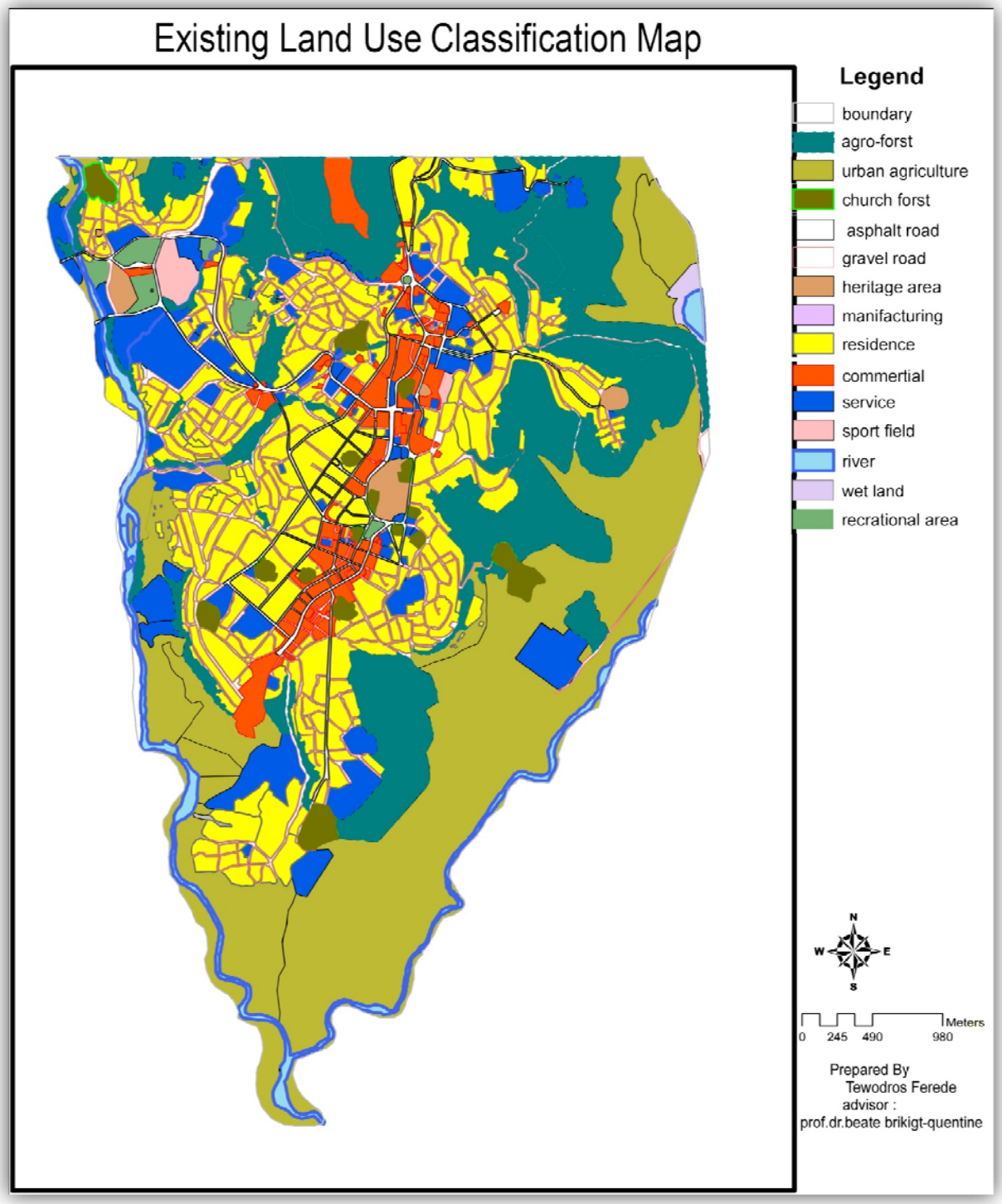


Figure 7: Existing Land use Classification Map **(***made by the author)*

3.6 Tourism-Gondar is value note that the historical relics of the architectural, cultural and economic importance. The architectural achievement are impressive which have evoked the admiration of foreigner and initiative a sense of pride among Ethiopian culturally, the historical relics are importance for they are evidence of the way the solomonic dynasty operate and the competitive nature of gonderiane monarchs. The castles Gondar, the 17th and 18th century capital of Ethiopia. In Gondar, 'Royal Compound' with many majestic castles constructed in the European middle age architectural style, the 'Bath of Emperor Fasilades', and finally Debre Birhan Sillassie church ('Trinity at the mount of light') which is the finest of the Gonderine churches. It was built during the reign of Emperor Iyasu (1682 - 1706). The inside walls of the front room are covered with paintings on cloth, glued to the surface. The ceiling is built with thick beams and it is decorated with winged angel heads looking down churches and other moments as well as its location.

The table as show the number of tourist increase year after year and Green frame is sustainable development, an important role is played by sustainable rural tourism development. Tourism, as economic activity, strongly depends on landscape. The quality and the surface covered by this green natural frame are major factors which influence the amounts from tourism activities.

There are large rural areas which are economically depending on tourism. The grey structure, which also has an important role, must be completed by a green frame work, both being pillars of a sustainable tourism.

Table: yearly tourist number

Year in E.C	Number of foreigner Tourist	Revenue (Birr)	Number of local tourist	Revenue (Birr)	Total no of tourist	Total Revenue collected (Birr)
1992	3081	----------	11394	----------	14475	----------
1993	3143	----------	14539	----------	17682	----------
1994	6323	----------	15665	----------	21988	----------
1995	8647	----------	20595	----------	29942	----------
1996	10443	----------	27784	----------	38227	----------
1997	13546	677,300	37495	149,980	51041	827,280
1998	12969	648,450	28732	114,928	41701	763,378
1999	19929	996,450	39724	158,898	59653	1,155,346
2000	18152	907,600	50273	201,092	68425	1,108,692
2001	21324	1,066,200	60491	241,964	81815	1,308,164
2002	21292	1,170,200	64078	298,760	85370	1,468,960
Total	138849	5,466,200	370770	1165622	510319	6,631,820

Source: north Gondar department of sport and cultural affairs (2002 E.C)

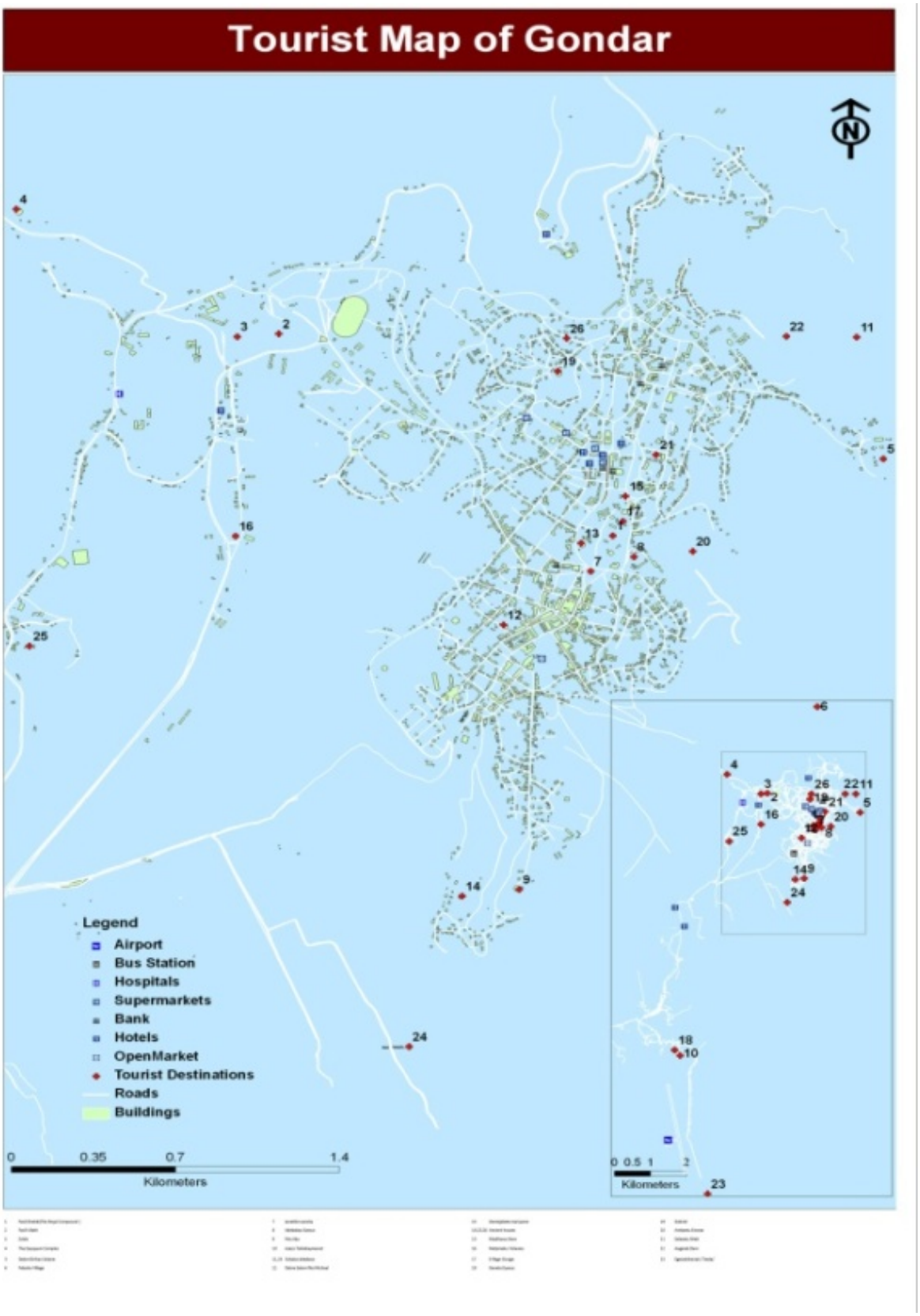


Figure 8. Existing tourism map *(adopted from girma semu consult*)

Chapter Four

4 Evaluation of existing situation of the study area

4.1 Evaluation of the existing city master plan

The first Master Plan for Gondar was designed in 1932 by Italian professionals serving more than 30 years. The second master plan of the town was prepared by National Urban planning institute in 1998. In addition, the third structural plan of the town was prepared by Federal urban planning institute in 2006 until serving current socio-economic development of the town.

The A Master Plan is a general plan for the future layout of a city showing either the existing and proposed streets or roads; open spaces public buildings, etc.

The town is historically established and the most rational and sustainable form of human settlement. Owing to problems of the town the plan is not including different types of green spaces and even the proposed green areas are changed to other purpose as well as un planed buildings in the area changes their architectural image and planning structure.

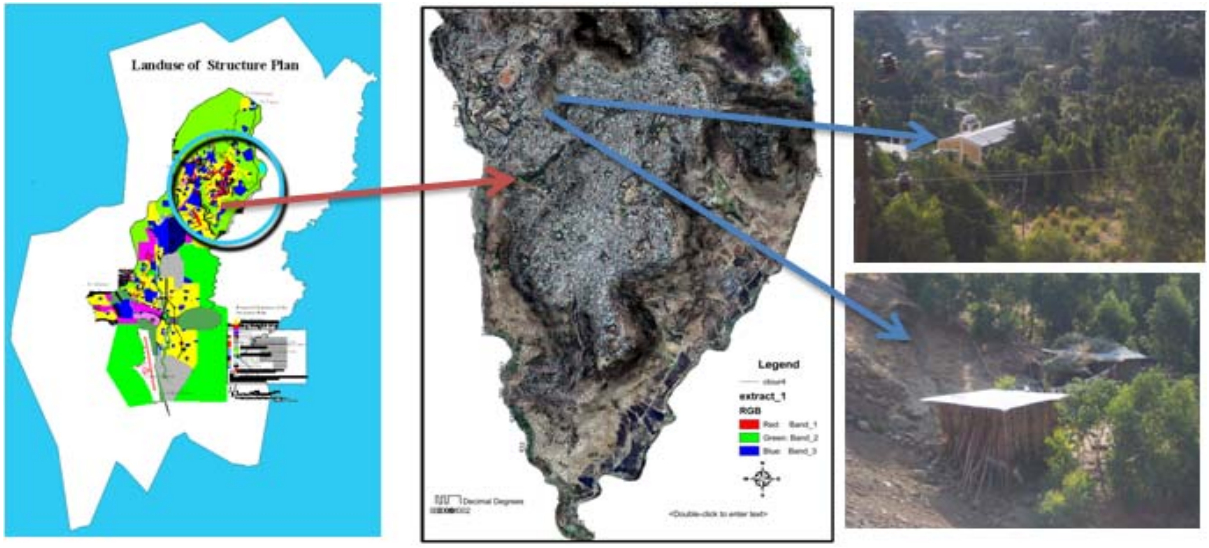


Figure 9: evaluation of structure plan *(taken by the author)*

4.2 Evaluation of Recreational Areas

These existing open space and green areas are sufficient but many spaces are hidden or non-functional, currently these spaces are altering for residential and other purpose. In general we can say that the town takes these kinds of green spaces and recreational areas needs attractive and functional. The area has a large and diverse inventory of open spaces it is unevenly distributed throughout the city. Generally, the centers of the town that have the highest population densities also have the least amount of public green space. Public green space is of extra importance to residents of these neighborhoods because the single-family homes and the multi-family structures are generally on smaller lots, with limited green space. Neighborhood green encompasses the play-lots, playgrounds or play fields that should be available for population sizes of about 1500, 5000 and 10000 inhabitants, respectively. They are indispensable for neighborhood life as they allow diversified activities and playing. They are also the most frequented and easily accessible areas for children and the elderly.

This indispensable living component is critically missing in Gondar. Neighborhood open spaces are largely either

- squatted by illegal occupiers or appropriated for expansion of plots,
- used as waste dumping area, or
- Parcel for residential and commercial development

One can say that the neighborhood green areas in Gondar are mostly fictive. They are mentioned in the settlement plan but nearly absent on the ground. The extent of the problem is so severe that most of the children of the city are obliged to play on the road, thereby highly exposing themselves to the risk of becoming victims of car accidents, to bad street culture and to health problems and injuries.

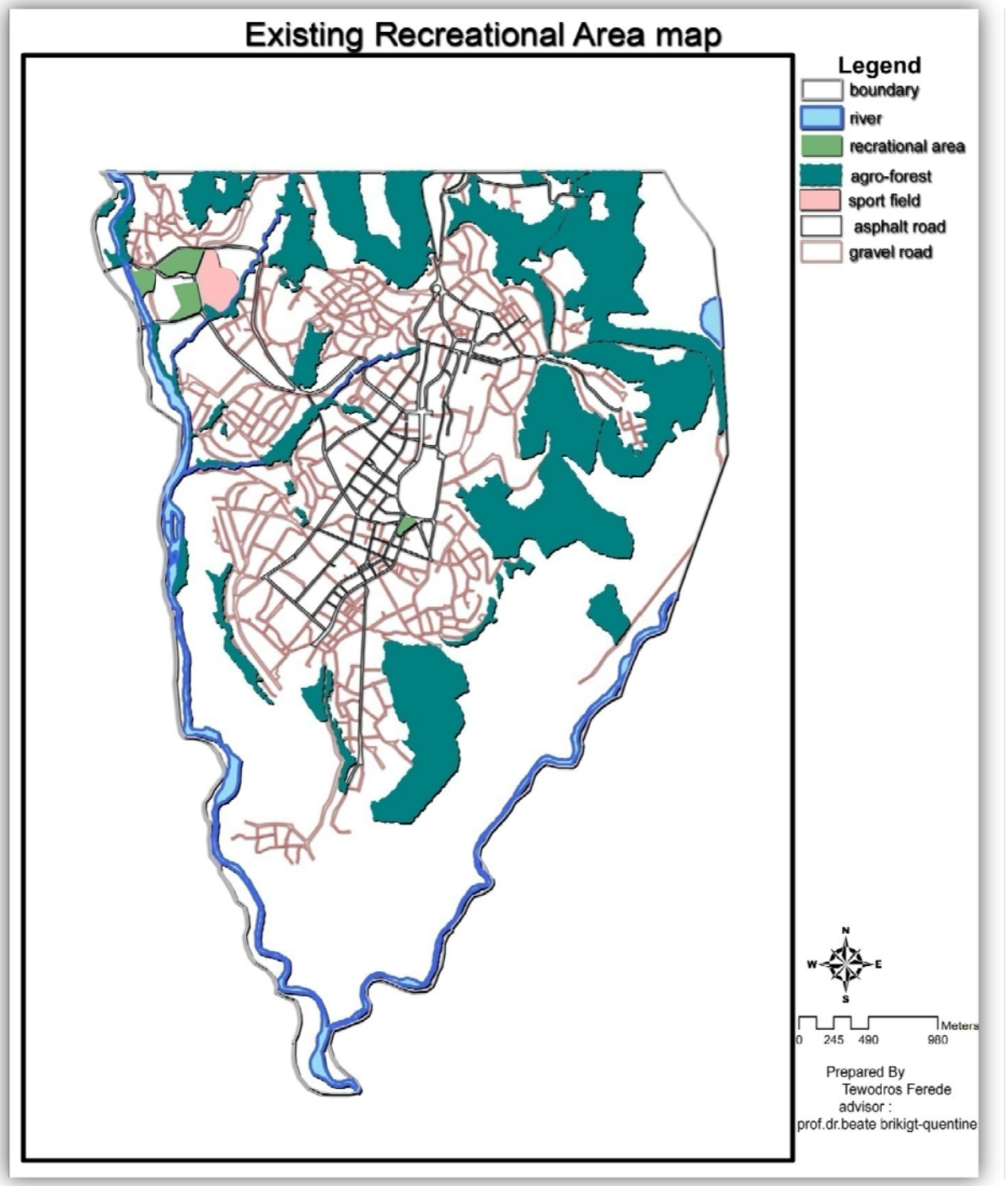


Figure 10: Existing Recreational Area *(Made by the author)*

4.3 Evaluation of the Square

The Square are in to public transport area, It is a highly accessible location being a point at which the behind the road network. However, currently the Square is accessible for walking or cycling, parking and celebrations. I observed the lack of vegetation cover around the square and poor quality of the water infiltration because the area at all enclosed by asphalt and increasing the flood. The Transport Report itself acknowledges the good access but square is not well green and loose connection between the street and the square. Frequently people run across several lanes. Also, the noise of large volumes of heavy traffic makes this an unattractive public place aurally; and visually the expanse of the square surrounding the history building and asphalts makes a mockery of need to this space as Green.

4.4 Evaluation of the Rivers

River is defined as fresh water flowing from an upland source to a large lake or to the sea, feed by such sources as springs and tributary streams. The main parts of a river include a channel, in which the water flows, and a floodplain-a flat region of a valley on either side of the channel. Through the channel and floodplain, water and sediment-material transported by the river, such as sand and silt-are transferred from ridges and mountains to the sea or to a lake a river starts on hillsides as small channels, or rills. The rills combine to-make larger channels or tributaries that eventually come together, forming distinct streams. The largest channels formed by this convergence of tributaries are rivers, and they can carry large quantities of fresh water and sediment across continents.

The river keha and Angereb has its origin on the mountain ridge collecting water from the mountainous areas it takes rout in to the North West and north east direction and the two rivers are to tributary of Nile. Keha is currently used for urban agriculture and Angereb used for drinking water for Gondar town. The silting is the most challenging problem of Angereb dam reservoirs. Sedimentation adversely affects the reservoir capacity.

The consequences are very complex, because dams usually serve multiple purposes. The loss of storage capacity is particularly felt in connection with energy production, water supply for domestic use, industry and agriculture, and in flood control.

Sedimentation also affects the surface area of reservoir by reducing water depth and favoring development of aquatic growth, bottom outlets, gates and valves. These problems could be seen in different regions of the nation. Many dams constructed to store water for irrigation and/or drinking purposes are being silted up while they were under construction.

In the Reservoir, appropriate measures have to be taken to prevent rapid loss of its storage capacity. Therefore, it is important to maintain the storage capacity of the reservoir and prolong its economical life by taking appropriate mechanical and biological measures that could reduce the rate of siltation.

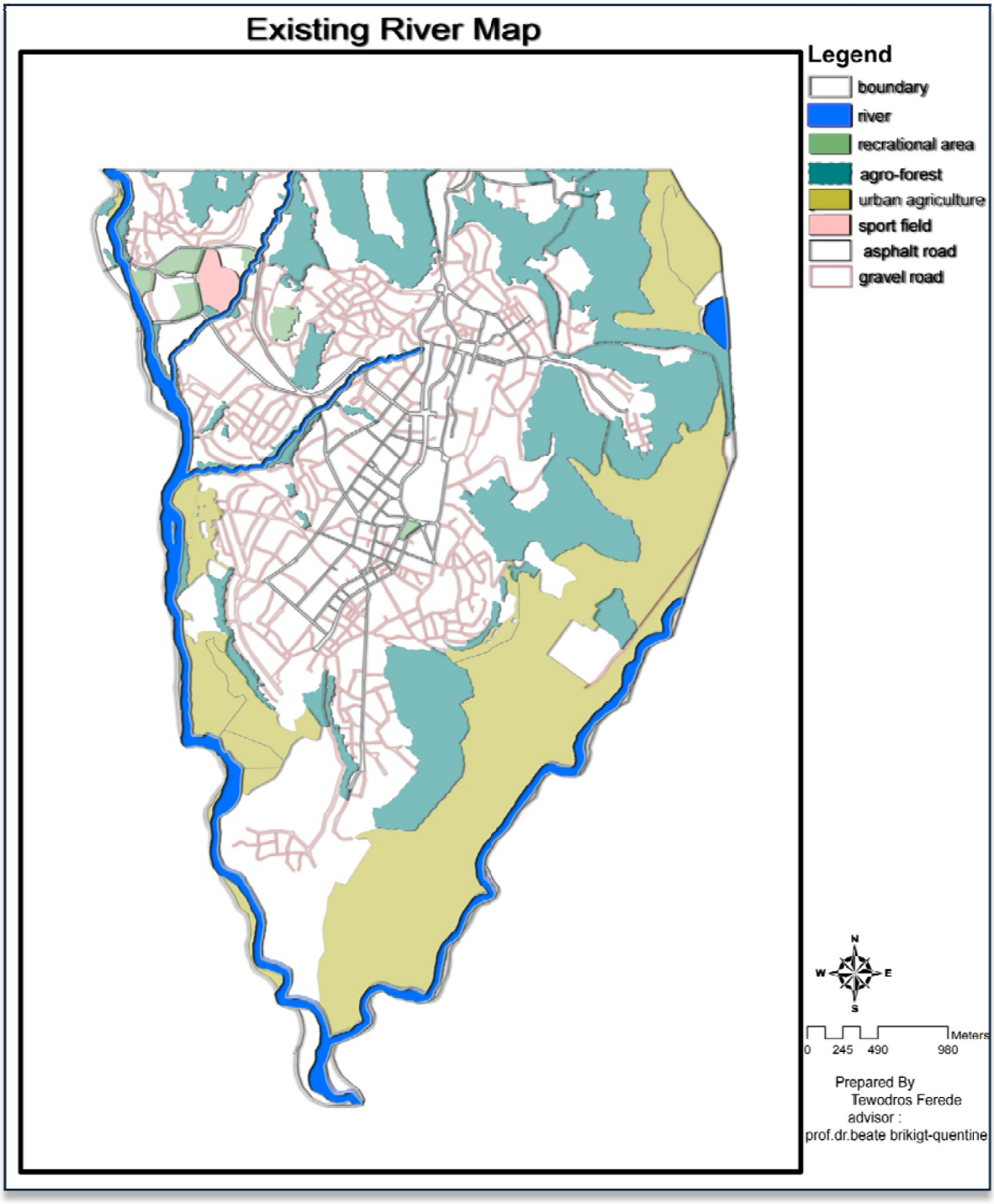


Figure 11: Existing river map *(Made by the author)*

4.5 Identified the Problems

4.5.1 Lack of Accessibility of the Town

In the city is lack of accessibility to move one to another and lack of green vegetation and pedestrian walkway In addition, there is no sitting area in the street for resting and recreation in the town sites. In month of January several tourists arriving in the town causes considerable crowding on facilities, parking area. Buses must park along the road because the bus is currently inaccessible to them, which further restricts already narrow road leading to the heritage site as well as there is some evident structural damage from weathering and vibration of car.

4.5.2 Degradation of River Banks

In the summer season high annual rainfall, with falling over three months and steep terrain results in high velocity water flows. This often leads to flash floods in mountainous areas and large scale flooding in low-lying areas. The high velocity flows and flooding cause severe erosion on river banks.

During the period of rain, some of the water is retained by the soil, some is absorbed by vegetation, some evaporates, and the remainding, which reaches stream channels, is called runoff. Floods occur when soil and vegetation cannot absorb all the water; water then runs off the land in quantities that cannot be carried in stream channels.

In the study area flood is cause for river bank erosion and degradation. In addition in the two river areas should have various pollution problems, degradation of river bank as well as loss of environmentally sensitive areas along river banks.

Figure 12**.** Photo showing existing situation of river banks *(taken by the author)*

4.5.3 Lack of Vegetation Cover along River Bank and Hilly Areas

Vegetation on stream bank is in poor condition Bank erosion and poor habitat resulting from wave attack, a lack of riparian vegetation and unrestricted stock access are key threatening processes along the floodplain reaches of rivers. The mid-upper reaches were identified as relatively stable; the lowland plain was degraded and consequently identified as a strategic priority for rehabilitation.

The erosion area on initiation of the area identified a degraded condition with significant bank instability, unrestricted stock access and poor riparian vegetation cover (along the banks and floodplain). On-going bank collapse was increasing the risk of between the main river and a large flood channel which is overtopped during overbank events.

This most parts of the hilly vegetation's area are decreasing for overgrazing hilly areas, impact of human and livestock population is most intense in the mountains. The evergreen scrub vegetation type appeared to be expanding with increasing human influence signifying a decrease in biomass of vegetation as a result of collecting wood for fuel and other domestic uses.

Figure 13: photo showing poor vegetation cover of hilly and river bank areas *(taken by the author)*

4.5.4 Soil Erosion and Land Degradation

The topography of Gondar town is steeper the slope of a field, the greater the amount of soil loss from erosion by water. Soil erosion by water also increases as the slope length increases due to the greater accumulation of runoff. Consolidation of small fields into larger ones often results in longer slope lengths with increased erosion potential, due to increased velocity of water which permits a greater degree of scouring.

Soil erodebility is an estimate of the ability of soils to resist erosion, based on the physical characteristics of each soil. Generally, soils with faster infiltration rates, higher levels of organic matter and improved soil structure have a greater resistance to erosion. Sand, sandy loam and

loam textured soils tend to be less erodible than silt, very fine sand, and certain clay textured soils.

Past erosion has an effect on a soils' erodebility for a number of reasons. Many exposed subsurface soils on eroded sites tend to be more erodible than the original soils were, because of their poorer structure and lower organic matter.

The lack of permanent vegetation cover in certain locations has resulted in extensive erosion by wind. Loose, dry, bare soil is the most susceptible; Overcutting of vegetation occurs when people cut forests, woodlands and shrub lands - to obtain timber, fuel wood and other products.

Overgrazing is the grazing of natural pastures at stocking intensities above the livestock carrying capacity; the resulting decrease in the vegetation cover is a leading cause of wind and water erosion. Agricultural activities that can cause land degradation include shifting cultivation without adequate fallow periods, absence of soil conservation measures.

Figure 14**.** Photo of eroded and degraded areas *(taken by the author)*

4.5.5 Noise Pollution

An urban environment, because of its high concentrations of people and technology, frequently contains a variety of sounds. If these sounds are produced by someone or something over which an individual hearing the sound has no control, the sounds may become noise and a source of annoyance or irritation.

In the study area, vehicular, small and medium scale industries are the main source of pollution. Therefore, alternative planning solutions are crucial.

Figure 15: sound pollution areas on the street. *(Made by the author)*

Chapter Five: Proposals

5.1 Proposed Green Framework Plan of the study area

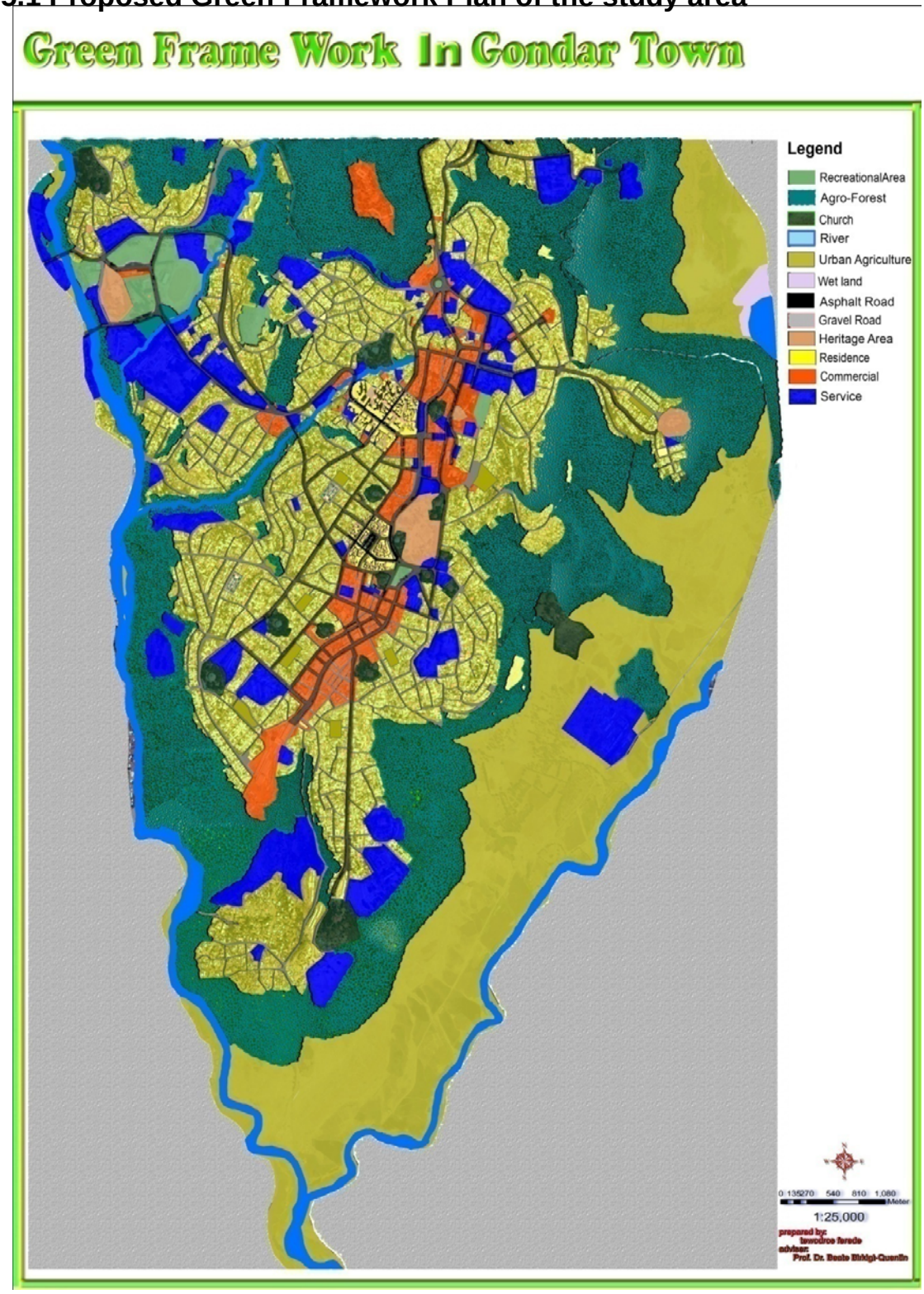


Figure16: proposed green frame work *(Made by the author)*

Green frame work for Gondar is goods and services depend on strong connectivity between location and user, others, such as wildlife habitat, may depend on the interconnectedness of the component parts of the green space for example recreation. Here, it is important that there is suitable access from zones of environment into the green space, and it is increasingly important that accessibility to river side walkway and connect to the outer and the inner green structure

Green frame work can play in promoting and facilitating active travel. Indeed, the green structure approach is an important element of improving accessibility to green space and encouraging active travel: with its focus on networking and the connectivity of green spaces it can aid movement through landscape.

Urbanization alters the natural land cover through the removal of vegetation and by covering over soil with more impermeable materials used in the building of roads, buildings, driveways, parks and gardens.

Green frame work is altering the flow patterns of water flowing through the catchment can fracture hydrological and ecological connectivity, which can then have an impact on the freshwater ecology which relies on high quality flowing water for its survival.

Green spaces its relative positioning within a built-up and its connectivity with other areas are of paramount importance to ensure that the benefits of green frame work are maximized.

5.2 Public green spaces

The city lacks significant public green spaces. The lack of central public spaces in the city can be attributed to the historic separation between neighborhoods, commercial and cultural amenities areas as well as the predominance of the automobile for personal transportation.

Public green spaces, propose on like downtown parks and plazas, and serve as central gathering spaces for celebrations. Public green spaces should be centrally located and accessible to pedestrians and using public transportation. Public spaces are good for communities and create the public realm necessary for the exchange of ideas.

The proposal of Green space is increasing the outer and the inner green space to connect each other and green frame approach is an important element of tackling accessibility since it is a networking approach, concerned with the connectivity of green spaces, which can aid movement through landscape ecological connectivity between natural green space sites, or those others that contain habitats.

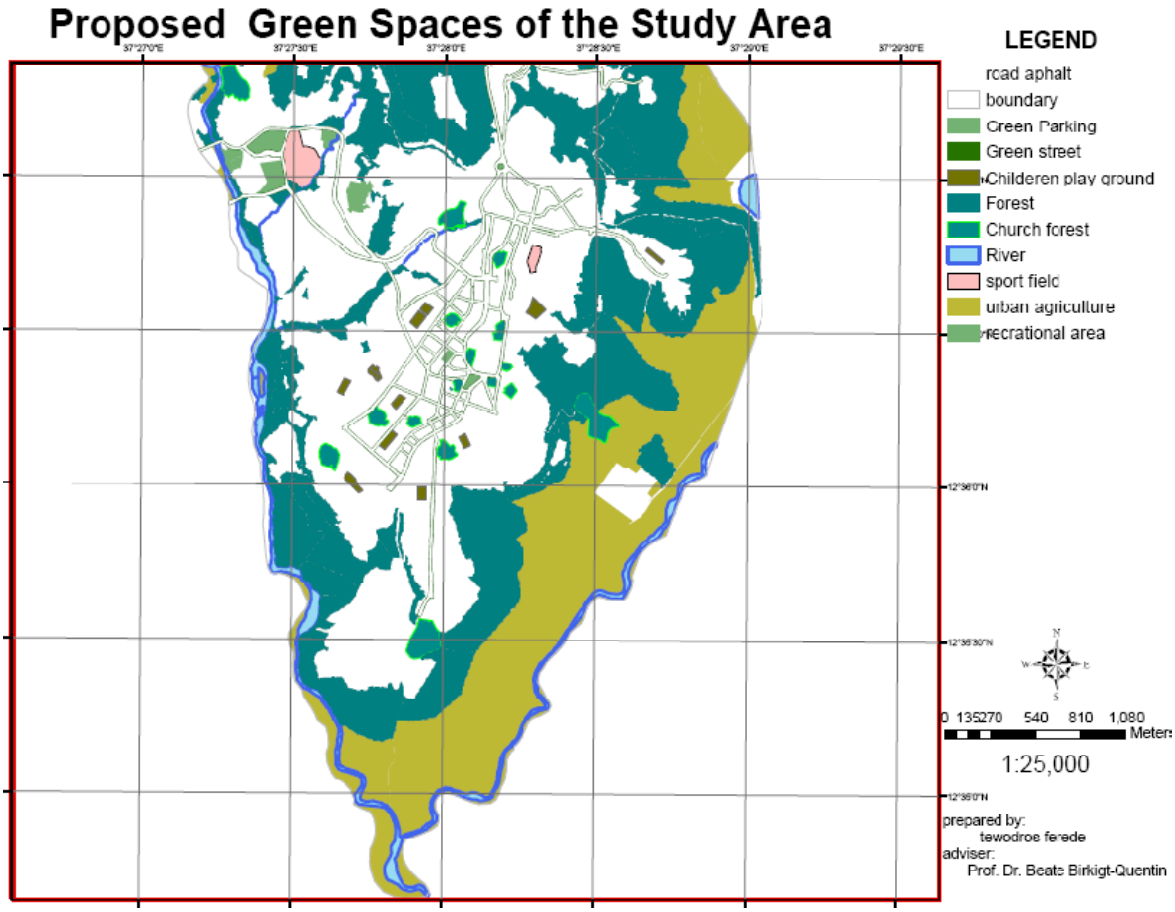


Figure17.Proposed green space *(Made by the author)*

5.3 Public Recreational Park

Public recreational parks are loss of in Gondar town but the design proposal of public recreational park is to minimizing the problem of recreational parks of Gondar town.

Landscaping and the managing of natural areas are essential to the continuance of high-quality parks and recreation areas in the study area. The Town parks are smaller, with grown-up landscapes and contain significant natural features like streams, wooded slopes and wetlands. the parks require significant attention to their natural features to stabilize stream banks, control invasive and address deer damage as called for in their master plans. The city has a Parks crew dedicated to maintaining natural features. These natural areas are the green legacy of the Township and their continued maintenance is important.

The design are including all facilities such like children play ground, indoors and out door games, coffee shops, seating area ,walkway with shading device, car parking etc.

Figure 18.proposed public recreational park *(Made by the author)*

5.4 Green Street

Green streets for Gondar are a vital component of the town in a green structure. They improve watershed health and conserve the existing and future conveyance capacity of the sewer system. Green Streets transform impervious street surfaces into landscaped green spaces that capture storm water runoff and let water soak into the ground as plants and soil filter pollutants. Green Streets convert storm water from a waste directed into a pipe, to a resource that replenishes groundwater supplies. They also create attractive streetscapes and urban green spaces, provide natural habitat, and help connect neighborhoods, green space, parks, and recreational area.

Such as cleaning storm water. Green Streets assist the City to observe with storm water regulations by reducing the amount of untreated water flowing to the City's storm drains. Treatment occurs through bio-degradation of pollutants through soils, plants, and sun light. Use of the adopted Green Street Standard Plans will also reduce urban "heat island effect" by Increasing green space and permeable areas.

Figure 19.plan for Green Street

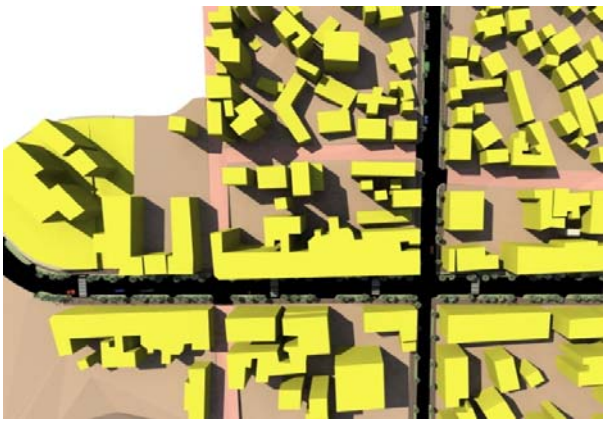


Figure 20. Aerial view of proposed Green Street

Figure21.cross-section of Green Street

Figure 22. The existing situation photo

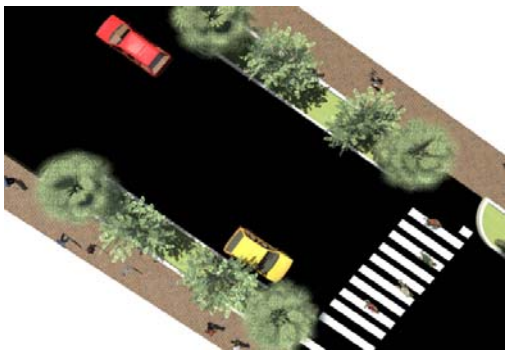


Figure 23. Detail of Green Street *(Made by the author)*

5.5 Green Square

The overall of road transport in Green Square is based on objectives of achieving a physical environment of maximum livability for existing and future communities and seamless integration with surrounding areas.

The Green Square is to achieve a mixed-use permeable urban environment. This environment is built around a cohesive framework of public open spaces and streets including finer pedestrian linkages and through site links to promote community interaction and safety and to integrate active and passive social and recreational activities.

In Gondar green Square are Sustainable urban drainage systems mimic natural drainage techniques to manage surface water run-off as close to its origin as possible. This involves moving away from traditional piped systems and improving the urban water cycle through the use of Water Sensitive Urban Design practices such as waste water and storm water re-use, use of bi-retention swales in the public domain and detention ponds.

The application of sustainable drainage systems is an integral part of the storm water strategy for Green Square, and is actively encouraged as part of the redevelopment of the area. They can assist in reducing the need for additional storm water management investment by mitigating any additional flood risk that new developments may generate.

Figure 24. Proposed green square *(Made by the author)*

5.6 Neighborhood Playgrounds

Neighborhood playgrounds are crucial for Gondar serve as much more than just aesthetic green space. They offer children recreational and educational opportunities while improving the quality of life for the entire community. As a public health asset, they promote healthy lifestyles and work to prevent the growing epidemic of childhood obesity. Open spaces and the overgrown toys we call equipment invite families to play, learn, and grow right in their own neighborhood.

These concerns drove the creation of a unique public and private partnership known as Building Safe Playgrounds and Neighborhoods. This initiative is dedicated to ensuring that

every playground in the city offers families a safe environment that maximizes the social and educational benefits of outdoor play.

Each neighborhood has unique accessibility concerns to address regarding walkways to playground and parks. Every site must offer safe and convenient pedestrian access along primary roadways and local streets. These items are identified and discussed through this process.

Special consideration should be given to providing accessible surfaces in a play area that meets the equipment selection and location along with the type of protective surfacing are key components to ensuring the opportunity for children with disabilities to play on the playground.

5.6.1 Age Separation

For playgrounds intended to serve children of all ages, the layout of pathways and the landscaping of the playground should show the distinct areas for the different age groups. The areas should be separated at least by a buffer zone, which could be an area with shrubs or benches. This separation and buffer zone will reduce the chance of injury from older, more active children running through areas filled with younger Children with generally slower movement and reaction times and the design is considered about this things to age gape.

In areas where access to the playground is unlimited or enforced only by signage, the playground designer should recognize that since child development is fluid, parents and caregivers may select a playground slightly above or slightly below their child's abilities, especially for children at or near a cut-off age (e.g., 2-years old and 5-years old). This could be for ease of supervising multiple children, misperceptions about the hazards a playground may pose to children of a different age, advanced development of a child, or other reasons.

5.6.2 Selecting Equipment

When selecting playground equipment, it is important to know the age range of the children who will be using the playground. Children at different ages and stages of development have different needs and abilities. Playgrounds should be designed to stimulate children and encourage them to develop new skills, but should be in scale with their sizes, abilities, and developmental levels. Consideration should also be given to providing play equipment that is accessible to children with disabilities and encourages integration within the playground.

In the neighborhood playground surfacing under and around playground equipment is one of the most important factors in reducing the likelihood of life-threatening head injuries. A fall onto a shock absorbing surface is less likely to cause a serious head injury than a fall onto a hard surface. However, some injuries from falls, including broken limbs, may occur no matter what playground surfacing material is used.

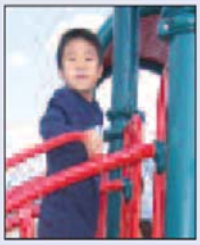
TABLE AGE APPROPRIATE EQUIPMENT

Toddler — Ages 6-23 months

- Climbing equipment under 32" high
- Ramps
- Single file step ladders
- Slides*
- Spiral slides less than 360°
- Spring rockers
- Stairways
- Swings with full bucket seats

Preschool — Ages 2-5 years

- Certain climbers**
- Horizontal ladders less than or equal to 60" high for ages 4 and 5
- Merry-go-rounds
- Ramps
- Rung ladders
- Single file step ladders
- Slides*
- Spiral slides up to 360°
- Spring rockers
- Stairways
- Swings – belt, full bucket seats (2-4 years) & rotating tire



Grade School — Ages 5-12 years

- Arch climbers
- Chain or cable walks
- Free standing climbing events with flexible parts
- Fulcrum seesaws
- Ladders – Horizontal, Rung, & Step
- Overhead rings***
- Merry-go-rounds
- Ramps
- Ring treks
- Slides*
- Spiral slides more than one 360° turn
- Stairways
- Swings – belt & rotating tire
- Track rides
- Vertical sliding poles

Figure 25. Age appropriate equipment *(Adapted from Public Playground Safety Handbook, 2010)*

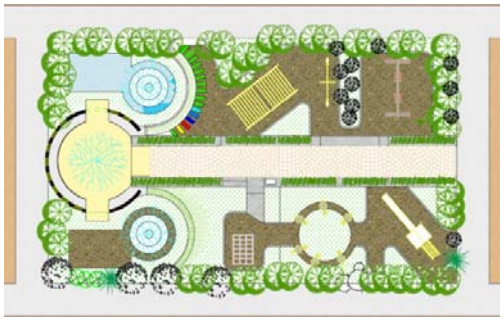


Figure 26. Proposal neighborhood play ground plan

Figure 27. Aerial view of play ground

(Made by the author)

5.7 Shade Trees

Shade trees provide the leafy-green component that characterizes for Gondar Street and residential neighborhoods. The city takes shade trees and other trees very seriously and their preservation and establishment is incorporated into every development of the town.

The Shade Tree protects residents and several members of the Township staff, has exclusive custody and control of all trees on city property and is authorized to plant, remove, maintain and protect all shade trees on public streets and highways, as well as all trees in city parks and parking lots. The town is many type of shading trees found on the roads historical sites and indigenous trees on the church some of tree ages are to corresponding to the castle.

Despite the Township's continued diligence, many areas of the Township are threatened with a significant loss of tree cover in coming years as existing street trees reach maturity and begin to decline.

The study concluded high protection of the indigenous tree in the city of Gondar and that the percentage of tree cover corresponds to the social and economic health of communities and that tree cover is integral to maintaining and improving quality of life in the communities.

Figure 28.Existing shade tree in the city

5.8 Green Parking

The proposal Green parking design is good for Gondar because of minimizing the current problem of parking and environmental friendly.

Green parking refers to several techniques applied together to reduce the contribution of parking lots to the total impervious cover in a lot. From a storm water perspective, application of green parking techniques in the right combination can dramatically reduce impervious cover and consequently, the amount of storm water runoff. Green parking lot include setting maximums for the number of parking lots created, minimizing the dimensions of parking lot spaces, utilizing alternative pavers in overflow parking areas, using green parking area designed to facilitate natural water cycling processes (i.e. evaporation, transpiration, and groundwater recharge) by capturing, filtering, infiltrating, and/or storing storm water.

Components of these soil- and plant-based systems can carry out one or more of the aforementioned functions, including some that store water for various durations (from 24 hours to permanent storage).

All of the techniques for green parking should be applied in new developments and some can be applied in redevelopment projects, depending on the extent and parameters of the project. In urban areas, application of some of techniques like encouraging shared parking and providing economic incentives for structured parking can be very practical and necessary. Commercial areas can have excessively high parking ratios and application of green parking techniques in various combinations can dramatically reduce impervious cover of a site.

Based on the situational analysis of the study area, proposing green parking should focus on behind castle of Fasilades. It serves as green parking area for local people as well as visitors.

Many parking lot designs result in far more spaces than actually required. This problem is exacerbating by a common practice of setting parking ratios to accommodate the highest hourly parking during the peak season. By determining actual average parking demand instead, a maximum number of parking spaces can be set as well.

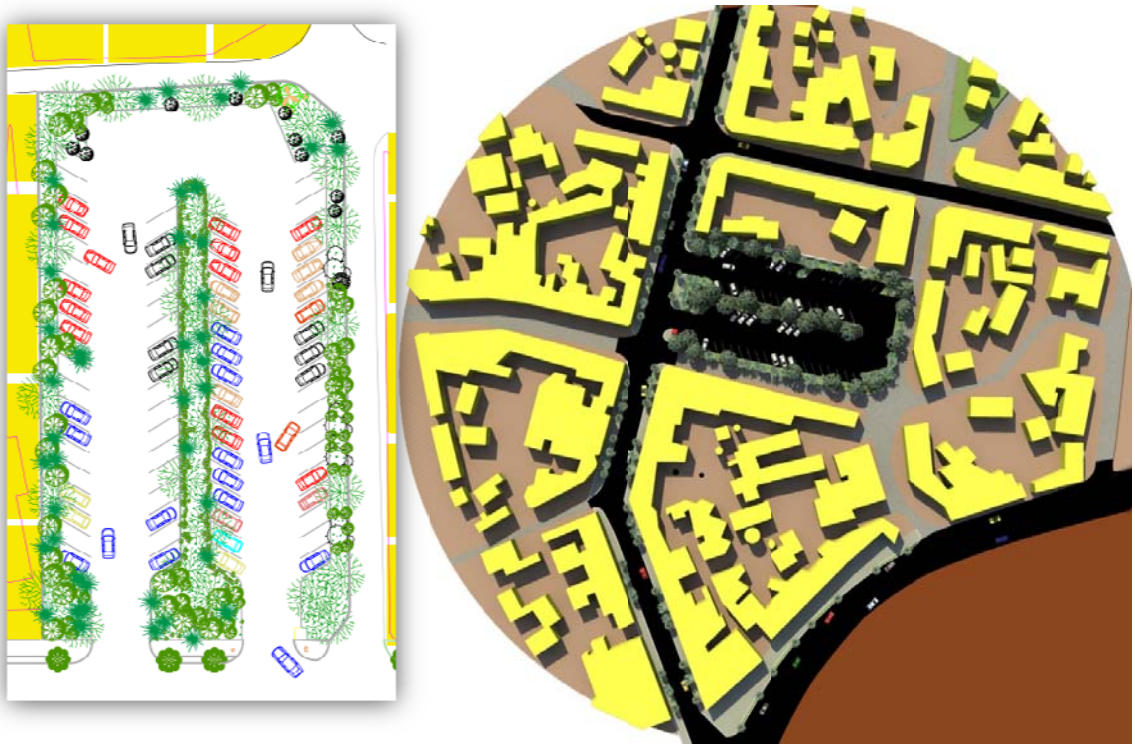


Figure 29. Proposal plan of green parking. *(made by the author)*

Table: sample of parking ratio for different parking requirements

Table 1. Conventional Minimum Parking Ratios			
Land Use	**Parking Requirement**		**Actual Average Parking Demand**
	Parking Ratio	**Typical Range**	
Single family homes	2 spaces per dwelling unit	1.5 - 2.5	1.11 spaces per dwelling unit
Shopping center	5 spaces per 1000 ft^2 GFA	4.0 - 6.5	3.97 per 1000 ft^2 GFA
Convenience store	3.3 spaces per 1000 ft^2 GFA	2.0 - 10.0	--
Industrial	1 space per 1000 ft^2 GFA	0.5 - 2.0	1.48 per 1000 ft^2 GFA
Medical/ dental office	5.7 spaces per 1000 ft^2 GFA	4.5 - 10.0	4.11 per 1000 ft^2 GFA
GFA = Gross floor area of a building without storage or utility spaces.			

Source: ITE, 1987; Smith, 1984; and Wells, 1994)

Another green parking lot technique is to minimize the dimensions of the parking spaces. This can be accomplished by reducing both the length and width of the parking stall. Parking stall dimensions can be further reduced if compact spaces are provided. Utilizing alternative pavers is also an effective green parking. They can replace conventional asphalt or concrete in both new developments and redevelopment projects. Alternative pavers can range from medium to

relatively high effectiveness in meeting storm water quality goals. The different types of alternative pavers include gravel, cobbles, wood mulch, brick, grass pavers, turf blocks, natural stone, pervious concrete, and porous asphalt. In general, alternate pavers require proper installation and more maintenance than conventional asphalt or concrete.

5.9 Prevention of Noise Pollution

A number of recent studies have investigated the effect of trees and shrubs on noise reduction notes that as a sound wave approaches a forest edge, part of the sound is absorbed by surface material, very low frequencies pass through the forest, and high frequencies will be reflected and diffracted by larger trunks and branches Reeth (1976).

Based on situational analysis and best practices obtained from literatures, frequently planted, or indigenous vegetation is often maintained, along major highways. When planted with sufficient width, tree buffers can help muffle the noise generated by traffic. Buffers provide visual screening for adjacent land uses, and they may have an impact on reducing the amount of particulate matter pollutants moving into residential areas. Finally, trees along a street also help reduce glare for drivers of vehicles.

Planting arrangement behaves somewhat as a passageway and carries the noise along rather than reducing it. In urban situations, increasing the street vegetation cover it will be protect the sound and noise reduction plantings should be 6.1 to 15.2 meters wide, and the edge of the belt should be within 6.1 to 15.2 meters of the noise source.

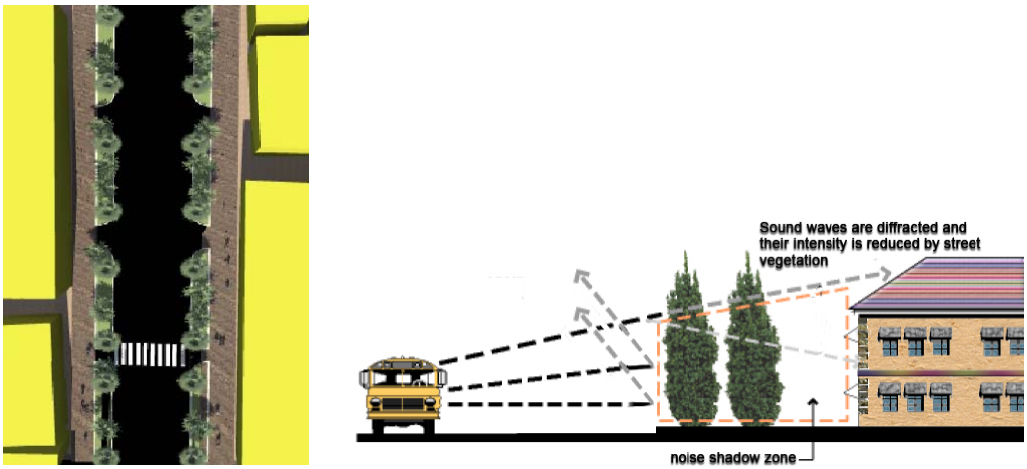


Figure 30. Prevention of noise protection. *(made by the author)*

5.10 Rehabilitation of soil erosion and degradation

The Soil degradation is cause of increased urbanization; more roofs, paving and clearing of woodland and grassland without proper conservation management create erodible land areas, speed up runoff and remove areas available for rainfall infiltration. Vegetation removal from land area will further accelerate erosion and siltation.

Overland storm water drainage or runoff can severely erode unprotected slopes during runoff. Rainfall that does not runoff may seep downward through the soil resulting in a loss in shear strength. This condition may appear as wetness or piping flow down the slope. Clay soils swell and lose shear strength after absorbing surface and groundwater, resulting in creeps or soil movement.

According to this some methods and techniques using for Gondar area rehabilitation or surface stabilization, runoff and sediment control and protection Methods commonly used include flow diversion and perimeter protection of a site with earth berms and ditches, terraces, temporary swales, vegetation and by controlling development along fills. Structural methods include riprap, cellular mattresses, earth Berms, sediment fences, straw bale traps and sediment basins.

5.10.1 Diversion Ditches and Berms - Runoff erosion of slopes can be reduced by intercepting and diverting water away from the top of slope with diversion ditching, diversion Berms or a combination of both. They can be used to protect newly graded slopes until vegetation is established. Diversion ditches can be constructed across slopes to reduce the length of slope exposed to erosion, intercept flow at the top of slope or to convey storm water at the slope base. It may be necessary to temporarily place straw-bale check dams at 50 to 100 foot intervals in the ditches for erosion protection. The ditches may be seeded and mulched or sodded or for long-term erosion protection, stabilized with riprap and other combination of mechanical methods. The diverted runoff should be discharged into a stable area through pipes or ditches lined with riprap

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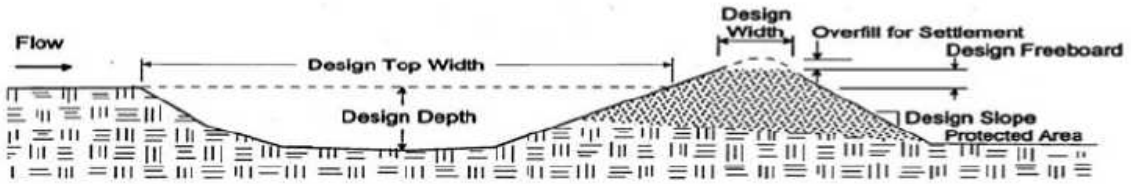

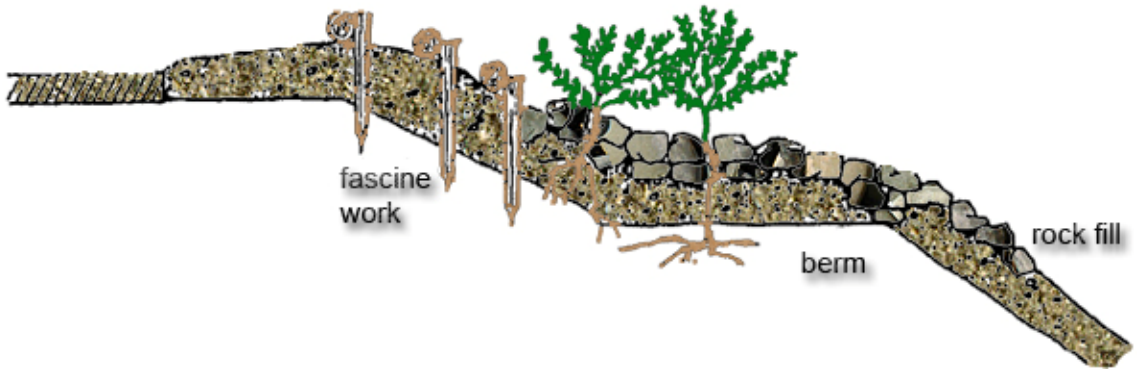

Figure 31. Diversion Ditches and berm*(made by the author)*

5.10.2 Grading and Bench Terraces - Slopes that are too steep can be reshaped by grading the slope. It is more feasible to terrace slopes for small reaches. Terracing slows rainfall and runoff by breaking the gradient of long steep slopes in steps. Ditching on a bench terrace may not be necessary since the benches are constructed to typically slope inward toward the top of slope in order to divert runoff water along the bench rather than down the slope. Vegetation is then more easily established and maintained.

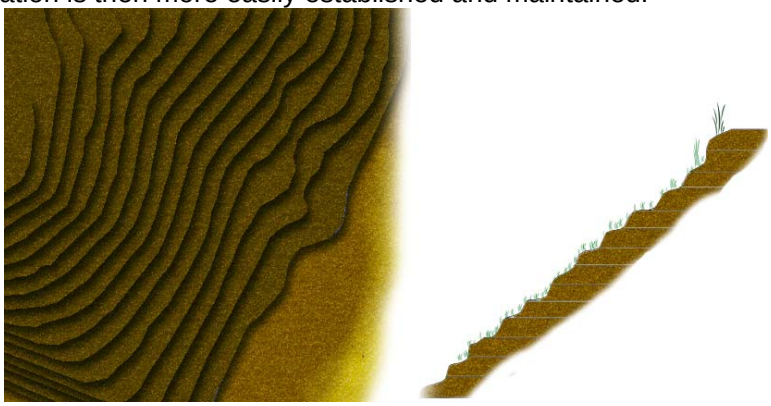

Figure 32.Terracing *(made by the author)*

5.10.3 Swales - Swales are used in a similar fashion, as ditches but do not block traffic as ditches due to their wider and shallower channel cross section. A wider and shallower cross section reduces the storm water velocity and potential for erosion. A wider but shallower trapezoidal channel compared with a v-ditch of equal area for instance will be shown to have a lower velocity of flow. Grassed swales also promote infiltration and help to remove sediments. The construction and maintenance of swales and ditches are similar.

5.10.4 Temporary Slope Drains, Flumes and Down Pipes - Flumes and downpipes are temporary structures used to carry concentrated flows down the face of a slope without erosive damage. Flumes are open channels lines with an erosive resistant material such as concrete, grouted riprap etc. Downpipes are made of corrugated plastic or metal. They have standard entrance sections and like flumes discharge to outlets stabilized with riprap aprons or sediment traps. The advantage of both practices includes prevention of erosion on steep slopes and they do not require special equipment or materials. They are intended for temporary erosion control until a slope is stabilized with vegetation and/or practices.

5.10.5 Straw Bale Traps or Check Dams - Use of straw bales like sediment fences is limited to small drainage areas of about two acres and is intended to intercept and detain small amounts of sediments. Straw bale traps however can be located across small swales. For large drainage areas and swales, which have concentrated flows, rock dams or sediment basins are more suitable. Erosion will occur around or under the bales at adverse sites with steep slopes. Installation of straw bales is similar to the requirements of sediment fences. The bales should be entrenched at least four inches or backfilled with compacted soil and anchored with stakes. A stabilized bypass should be considered for sites with large storm water flows to protect the integrity of the straw bale trap.

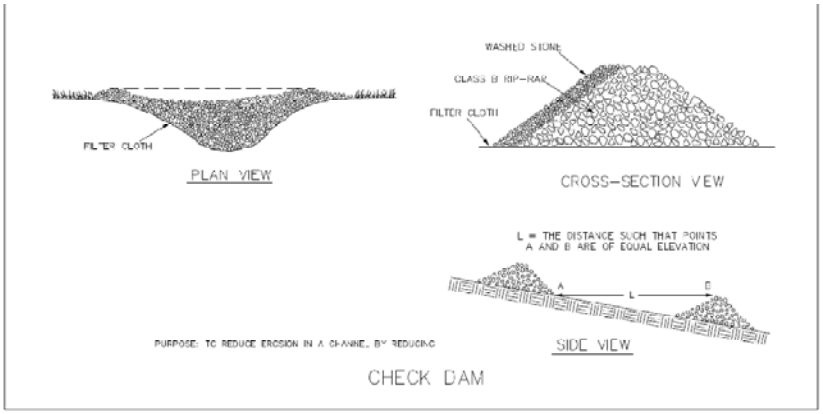

Figure 33. Check Dam*(made by the author)*

5.10.6 Vegetation - Site specific conditions must be considered to use vegetation. Success of vegetation depends on the climate characteristics, slope grades, site preparation and compatibility of vegetation with these conditions. Vegetation is one of the most commonly used methods for stabilization. It is relatively easy to maintain and establish and properly selected plants and grasses are self-maintaining. Erosion control matting may be necessary to hold the seed and soil in place until the vegetation is established on the hilly area of Gondar.

Vegetation protects a slope with the roots and exposed branches, stems. Surface flow velocity is reduced and the capacity for infiltration and water withdrawal from the soils is increased. Seedbed preparation, fertilizers, planting dates, rates of application and type of grasses will depend on the region, specific area for planting, time of year and as specified in the design plans.

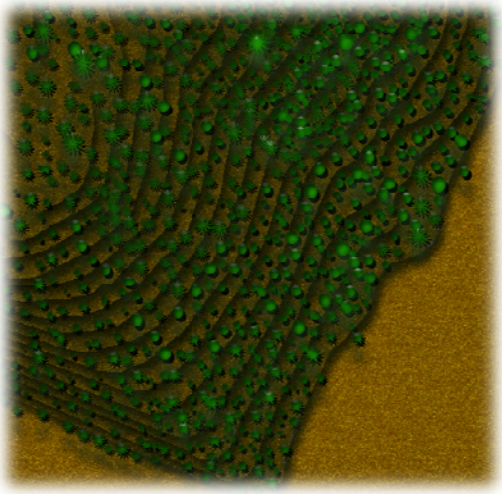

Figure 34.Vegetation of erosion protection *(made by the author)*

5.10.7 Riprap - There are several ways to place riprap. It can be mechanically placed along the slope or in wire baskets as a blanket over the slope. Riprap mattresses are relatively flexible and can adjust as changes from settlement or erosion occur. Minor damage can be easily repaired with additional stone to fill settlement or voids from erosion. A rule of thumb for mattress thickness is 1.5 times the thickness of the largest stone being used. Filter fabric or a drainage material is usually placed as an underlayment to protect from loss of fine soils and to allow for water seepage under the riprap.

Riprap, or rock material embedded in a slope face, sometimes combined with planting Riprap protection.

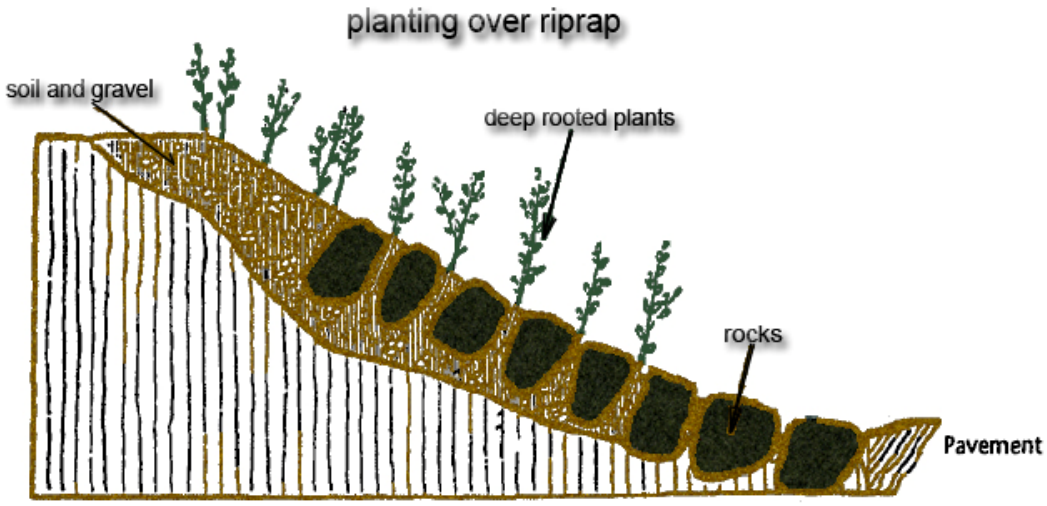

Figure 35.Ripraping *(made by the author)*

5.11 Protection of River Banks

The function of riverbank protection is to avoid bank erosion, which is caused by current attack. Effect of the erosion is collapsing of riverbank, causing movement of my study area river channel. The movement is vertical and horizontal direction, arise meandering, braiding, or move and changing it river path.

Bank protection that commonly use is made from masonry or concrete, this type is expensive and not natural or not environmental friendly; disagree with spirit and soul of eco-hydraulic. Because, riverbank stability has an influence on channel form, vegetation growth and habitat for bank-living species, eco-hydraulic is solve the river problem with environment and ecology approach.

Bank protection measures, which are matching with the spirit and soul of eco-hydraulic, must be:

- Using natural materials which can be found around that will be low cost.
- Labor intensive, lessening unemployment so that as according to condition of our country.
- Can provide habitat for water animal and crop.

Some low-cost river bank protections methods are:

5.11.1 Stone Rip-rap or Beaching

Lining the banks with some stone is feasible if local source of rock is available. The pits in stones and the nooks and crannies between them increase the amount of area for colonization by aquatic insects.

Plants can take root between the rocks and rocks ledges can be used as resting and roosting sites by waterfowl. Stone is a relatively permanent option if the stones used are sufficiently large that they do not wash away during high flows. More angular stones will interlock and thus more stable. Placing a layer of fine gravel or stone under the larger rip-rap material will help to

prevent erosion of finer bank materials from beneath the rocks. To avoid undermining at the toe of the rip-rap, can be used of stone aprons, which extend well out into the riverbed. An extra pile of rocks can be added to the edge of the apron which fall in and continue protecting the bed if it degrades.

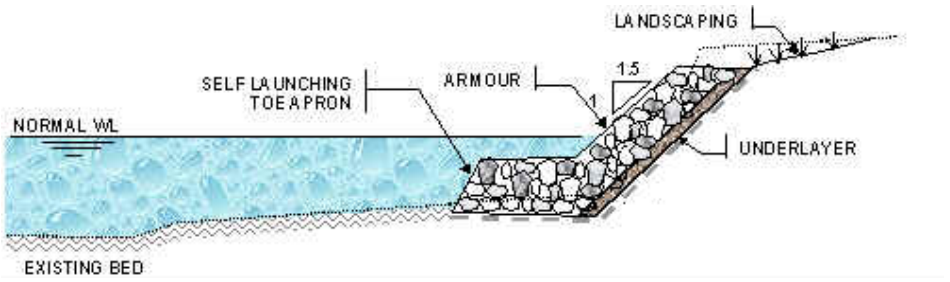

Figure 36. Stone rip raping (*Adapted from Tweed River Estuary Management Plan 2009)*

5.11.2 Dikes, groins or revetments

These structures extend out from a stream bank into the flow figure. They are used to reduce the speed or change the direction of the stream's current and thus reduces the erosion force on the banks.

They are many designs, to timber planks or logs bolted to posts. With proper design silt will be deposited in the quieter water between the groins. Vegetation can be planted in these silt beds which will eventually form floodplain benches. Normally, a series of groins are used along a bank.

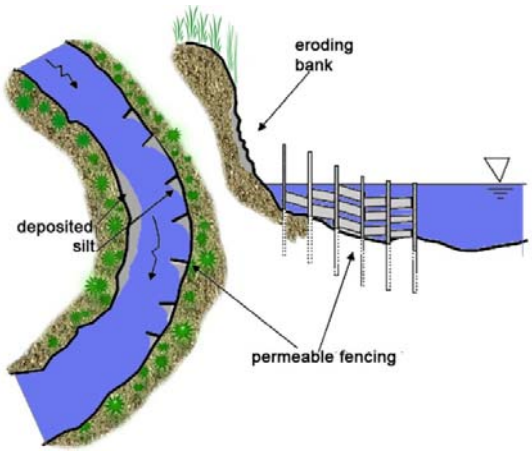

Figure 37. Dikes or groynes*(Adapted from Gordon, McMahon and Finlayson 1992)*

5.11.3 Vertical Timber Posts

Wooden posts or pile driven vertically into the streambed can be used to protect the lower part of a bank, for example where a vertical cliff on the outside of a meander bend is to be preserved. That is recommended at least half of the post should be driven into the ground.

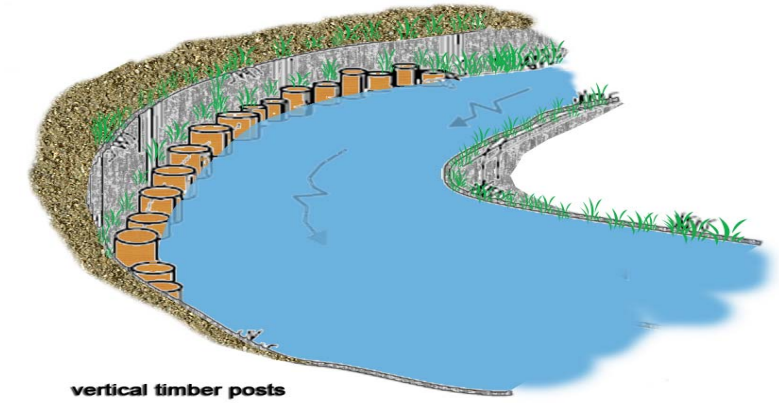

Figure 38. Vertical timber posts *(Adapted from Gordon, McMahon and Finlayson 1992)*

5.11.4 Woody Debris

In areas where tree pruning, snag removal and brush cutting must be carried out these materials can be recycled to the stream in the form of bank protection. Debris can also be used to slow the water, trap silt and sediment and permit the growth of river-edge plants. Cut logs and branches can be secured against a bank protection or for filling scour holes. Large trees should be tethered with the trunk end upstream. Stakes driven into the streambed or heavy-gauge wire or cables looped around the debris and attached to firmly embedded stakes on the bank tops may be necessary to hold the materials in place until anchored by siltation and vegetation growth.

5.3.5 Wicker spiling and hurdles

Smaller material can be woven together for bank protection. Spiling can be used to protect the base of steep banks and to create dikes on smaller stream. Stakes are driven into the ground and braches woven between them. Alternatively, post can be staggered in two rows and brush piled between them. The distance between the posts should be consistent with the length and thickness of the weaving materials. As with timber post (above), the area behind the spiling should be backfilled. If appropriate for the region the use of willow stakes can create a semi-permanent, living form of bank protection.

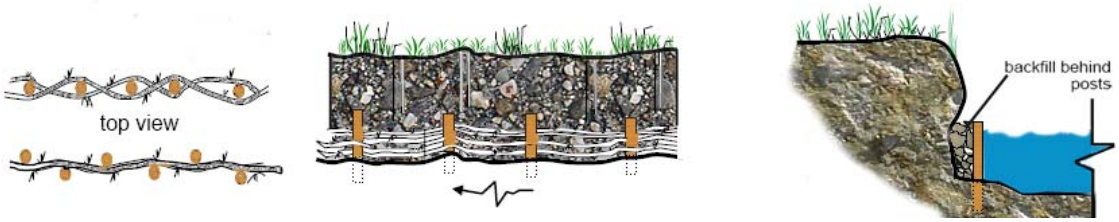

Figure 39. wicker spiling *(Adapted from Gordon, McMahon and Finlayson 1992)*

6. Conclusion and Recommendations

6.1. Conclusion

The design of green frame for Gondar town must be fundamental to the planning of town form, helping to integrate any new urban extensions with existing settlements and the surrounding landscape. It should also conserve and enhance the character of distinctive settlements and prevent urban coalescence. Landscape and urban characterization should inform the design process.

The green situation of Gondar is in quite a critical condition. When a livelihood issue has reached such an alarming stage, urgent action is crucial to safeguard the green heritage of the citizens and ensure a sustainable urban life.

The above rapid assessment leads to the following conclusions:

- Approach and outcomes of planning are to be questioned.
- Perception is the key problem to address, since open and green spaces are perceived as Unproductive and therefore abused.
- The demand for parks will increase with the decrease of plot sizes and the increase of population.
- Addressing the ownership of neighborhood green is critical.
- It is urgently needed to sustain the greening efforts and initiatives.
- Design should seek to manage flood risk at a spatial and local level through green and open spaces. Where appropriate locally, sustainable solutions such measure to reduce flood risk and have a whole range of biodiversity, water quality, water resources and recreational benefits.
- Green frame should contribute to reducing crime and anti-social behavior through well-designed public space, taking into account its use at night as well as during the day.
- Green frame offers the opportunity to build community cohesion and design should offer cultural diversity of space and encourage access to such space for everyone.

6.2. Recommendation

The following key measures are recommended to curb the degradation of the open spaces and respond to the increasing demand for greenery:

1. Meaningful awareness and responsible actions

- Awareness-creation about the adverse consequences of the green deficit is a matter of urgent concern. Decision-makers, planners and the community at large should be aware of the chaos and consequences green deficit causes-beyond the simple awareness about the need for green areas, which is merely a general truth for almost every citizen. Green space must get the attention due to a critical livelihood issue.

- Awareness about the collective nature of neighborhood green should be enhanced. A healthy environment is a community need and open spaces should not be considered as places for poor children.
- The enforcement and fast implementation of the existing plans.
- Clear regulations are needed to protect the green heritage in church compounds, public space, institutions, etc.

2. Increase the accessibility of parks with appropriate spatial distribution and hierarchy. Green areas and parks are important urban land uses.

3. Ensure the spatial integration of rivers so as to achieve sustainable informal green. A shift in the planning pattern will be needed to integrate the rivers into the urban scenery and make them attractive. This will substantially encourage the greening of the riversides and enhance the benefits of the urban environment in the city.

4. Define ownership of neighborhood green with title deeds, generate income for their management (through land tax) and ensure close follow-up by public authority.

The green Endeavour can only be achieved if efforts are integrated and embarked on with Commitment. Declaration and plans are not sufficient if not timely implemented. Environment as a basis of livelihood should be the day-to-day concern of the society and extend beyond yearly celebrations and declaration.

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