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TRANSFORMING SLUM SETTLEMENTS ON ENVIRONMENTALLY SENSITIVE AREAS TO SUSTAINABLE NEIGHBOURHOOD BASED ON ADAPTIVE STRATEGIES: *The case of 'korea-sefer', Addis Ababa*

MSc thesis in Environmental Planning and Landscape Design.

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Title of Thesis: **Transforming slum settlements on environmentally Sensitive areas to sustainable neighbourhood based on adaptive strategies: *the case of 'korea-sefer', Addis Ababa.***

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Confirmation

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Dedication

This manuscript is dedicated in memory of courageous and helpful father, the late
Ato Teketel Sitegen.

May his soul rest in peace, Amen!

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Acronyms

AAEPA = Addis Ababa city Environmental Protection Authority.

m.a.s.l. = meter above sea level

AAWSA = Addis Ababa city Water and Sewerage Authority.

BWUD = Bureau of Works and Urban Development.

CBOs = Community Based Organisations.

CWS = Cities without Slums.

CSA = Central Statistical Authority.

CUI = Canadian Urban Institute-Ethiopia

ecosan = Ecological Sanitation.

EDO = Environmental Development Office.

EEPA = Ethiopian Environmental Protection Authority.

GIS = Geographic Information System.

ICT = Information Communication Technology.

ILO = international Labour Organization

MDGs = Millennium Development Goals.

MMM = Medical Missionaries of Mary.

MSEs = Micro and Small scale Enterprises.

NGO = Non Governmental Organizations.

NHD = Neighbourhood Design.

ORAAMP = Office for the Revision of Addis Ababa Master Plan.

SPSS = Statistical Package for Social Studies.

SWM = Solid Waste Management

SUSD = Sustainable Urban Drainage System.

WCED = the World Commission on Environment and Development.

UN = United Nations

UNCHS = United Nations Centre for Human Settlements.

UNCED = United Nations Conference on Environment and Development.

UNHABITAT = the United Nations Human Settlements Programme.

UNICEF = United Nations Children's Fund.

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Abstract

Developing countries, including Ethiopia, have implemented adaptive and proactive approaches to deal with the situation in urban slums. The efforts so far carried out in Ethiopia, Addis Ababa in particular to this end includes: upgrading, urban renewal, and eco-city planning among others. The primary focus of these efforts was only on undertaking physical improvements with minor concerns on the socio- economic and environmental dimensions of sustainable development.

This paper, therefore, examines the challenges of sustainable development and identifies the views of the people on their future transformation of 'Korea-sefer', purposively selected slum settlement in Addis Ababa situated on steep slope and along river bank. The paper also forwarded recommendations and design proposals to curb sustainability problems in the study area

Hence, sample size representative of 10% is taken where systematic random sampling method is applied to select households located on three different geographic stratas: river flood zones, slopes greater and less than 15%. The method for randomising is snowballing to select one household from the list of the first 10 household numbers and the rest are systematically selected. The paper further applied structured questionnaires, interviews and field observation to collect primary and secondary data. The data collected were analysed and presented with the help of different softwares, graphs, and tables. Maps were also used to describe the events in the site.

Based on the findings of the paper it is concluded that lack of appropriate training, the narrow access roads, overcrowded houses, deteriorated drainage lines, the un-intervened steep slopes have aggravated the un-sustainability of the site in economic and physical aspects. Furthermore, the social and environmental un-sustainability is related to absence of open spaces, amenities. It is further aggravated by the presence of wastes on the streets, drainage lines, and river banks coupled with the poor condition of the toilets. In addition to these flooding and dependency on non renewable energy sources have contributed a lot on the un-sustainability of the site.

Therefore, the design proposals together with the recommendations forwarded address these issues to transform the slum settlement to a more liveable neighbourhood.

Keyword: - transform, slum settlement, environmentally sensitive areas, sustainable development,

CHAPTER I: STUDY BACKGROUND AND RESEARCH METHODS

1.1.INTRODUCTION

The Bruntland definition of sustainable development was adopted in 1987 and its framework was based on a dynamic balance between resource management, environmental protection, and human and economic development (Adli, 1993).

To achieve this balance, we require appropriate management, necessary resources, and emphasis on optimization between the ecological and economic dimensions of development. Public participation (social & political), adequate infrastructure and efficient support services are also of utmost importance in implementing strategies for sustainable development (ibid).

Moreover, Bishay (1993) stated that it would be more realistic and effective to study the implementation of sustainable development to fragile ecosystems: namely steep slopes, flood prone areas and inaccessible settlements with the goal of improving the quality of life of inhabitants and encouraging social interaction. For this to be achieved we need to deal with both human and environmental aspects.

Therefore, this study sheds light on the sustainability of slum neighbourhoods located on environmentally sensitive areas in Addis Ababa with the case taken on 'Korea sefer'. The purpose of the research is to identify the challenges of sustainable neighbourhood development, assess the compatibility and suitability of the existing neighbourhood functions, and identify the vision/aspiration/ of the residents on the future transformation of the site. Furthermore, the study is deemed to promote the essence of sustainable development in slum neighbourhoods in Ethiopia and Addis Ababa in particular.

1.2.Background to the study

The World Commission on Environment and Development (WCED, 1987) known as "Our Common Future" defines sustainable development as one that meets the need of the present without compromising the ability of the future generations to meet their own needs. More prominence was given to the concept of sustainable development

due to its emergence as one of the key resolutions of the United Nations Conference on Environment and Development (UNCED) held at Rio de Janeiro in 1992 and seconded by the Habitat Conference at Istanbul, 1996, whose emphasis were on the need for sound environmental management in order to achieve the objectives of sustainable development. There are two basic programs launched by UN member state to combat the urban slum problems in developing world: agenda 21 and Millennium Development Goals (MDGs) in 1992 and 2000 held in Rio and New York respectively; with the basic objectives of protecting fragile ecologies and avoid slums, and scale up poverty reduction programs in developing counties.

Specifically to achieve sustainable physical development in the developing countries Agenda 21 outlined eight programmes (Leke, 2009): Promotion of adequate shelter for all; Improvement of human settlement management; Promotion of sustainable land use planning and management; Promotion of integrated provision of environmental infrastructure; Promotion of settlement planning and management in disaster-prone areas; Promotion of sustainable construction industry activities and Promotion of human resource development and capacity-building for human development.

On the other hand the Millennium Development Goals (MDGs) declaration spelt out eight interdependent programs. Nonetheless, the MDG that specifically aims at improving the living conditions of the urban population is Goal 7, Target 11 that aims at achieving “a significant improvement in the lives of at least 100 million slum dwellers” by 2020. Both programs strive to bring about sustainability in human settlements particularly in the built human settlements.

In the area of human settlement basic yardsticks of sustainability as established by the United Nations Centre for Human Settlements (UNCHS, 1996), are quality of life of inhabitants, scale of non-renewable resource use, extent of recycling and re-use, the scale and nature of renewable resource use, waste emanating from production and consumption activities as well as the impact of these wastes on environmental health and ecological systems. Here, environmental Planning has a positive catalytic role to play towards achieving sustainable development in human settlements.

Therefore sustainable development and management of human settlement hinges greatly on the effectiveness of physical development plans. This involves the

reconciliation of land uses, provision of the right site for the right use, control of development, provision of facilities, services and public goods; preservation, protection and conservation of resources, preservation of heritage among others. Moreover, there is a growing opinion that we should strive to live our lives more locally, making better use of the human and natural resources that are around us with proper planning interventions (Leke, 2009).

Planning at the neighbourhood level involves understanding the built environment and the consideration of the non-residential built environment as well as the residential dwelling stock. The neighbourhood built environment consists of individual buildings constructed for various purposes, public and open space such as streets, walkways and parks. Any analysis needs to include how both buildings and the spaces around them work collectively and also consider what impact the space or place may have on the activities that take place within them. It must consider the state of the infrastructure systems and services available, such as public transport, water supply, drainage facilities etc.

Hence, the design of sustainable neighbourhood involves the development of communities with due consideration and emphasis on three **E**'s: the Environment, economic and equity goals of sustainability. The specific objectives of attaining these goals could include minimizing external resource inputs and residuals exports to and from the neighbourhood system, maintaining a non toxic environment, sustaining a high quality of life in an equitable and efficient manner. Nevertheless, these objectives are far beyond reach in the neighbourhoods of Addis Ababa including 'Korea sefer'.

Thus this paper will identify neighbourhood priority sustainable development issues, the distribution, availability and accessibility of neighbourhood functions, and assess the extent of pollution threats in the site while identifying the interests and vision of the inhabitants for the future transformation of the site. Finally it will produce a neighbourhood plan accompanied with detailed landscape design for the sustainable transformation of the site.

1.3.Problem statement

Poverty and rapid urbanization are two of the greatest challenges facing Africa today. According to UN-Habitat 2003 estimate 924 million people worldwide, or 31.6 percent of the global urban population, lived in slums in 2001. In the next thirty years, this figure is projected to double to almost 2 billion, unless substantial policy changes are put in place.

Hence, the Ethiopian government introduced policy measures to address the problems posed by slum neighbourhoods since 1960s (UNHABITAT, 2003). The interventions introduced were razing of slums, undertaking minor physical improvements and upgrading of an urban centre. The effort of this approaches were not satisfactory thus they end up with socio-economic and environmental consequences. Thus, the problem of slums remains an area of research with regard to their sustainability.

Almost all the houses in slum neighbourhoods are in bad, and sometimes dilapidated, conditions. They are usually inadequately ventilated (Khurana, 2003). The houses are situated on environmentally sensitive areas with lack of basic facilities and amenities, deprived of open spaces, recreational areas, community centres, drainage lines and emergency vehicular accessibilities among others.

Furthermore, roads and circulations are narrow and often unpaved. The road facilities and street lights are generally inadequate. These adversely affect the accessibility, safety and security of residents and are believed to be largely responsible for high rates of night-time crimes.

In addition to these the drainage system in almost all the slums is very poor. Due to the fact that they are being used for the release of domestic grey and black water which destroys the liveability of the areas. Besides, the existing drainage lines are not properly functioning since they are highly clogged with wastes and the lines are not adequate to handle the storm water run off so that flooding is a common phenomenon in slum settlements.

The liveability of slum neighbourhoods has been impeded by the economic conditions of the slum dwellers. The income basis of the dwellers does not allow them to improve their living conditions since they are employed in the unorganized or informal sector (ibid). Large proportions of them work on a daily wage basis and,

therefore, have little or no job security. Due to low income, their standard of living is also low and they are left with little surplus income to undertake major improvements after meeting their families' basic needs of food and clothing.

On the other hand, the relationship between environment and health is complex in slum neighbourhoods. The unhygienic slum environments make slum dwellers more susceptible to certain types of diseases like respiratory diseases, gastro-intestinal disorders, skin diseases, malarial fever, tuberculosis, etc which are attributed to poor sanitation of the households and the neighbourhood.

Private toilets exist rarely in slum areas and even shared toilets are available only in a few. Where there are no toilets, people defecate in the open fields, river banks or use night services, which besides being an environmental nuisance, poses health threats for children and women. Furthermore, community latrines, even where available generally remain filthy, unsanitary and virtually a menace to the areas in which they exist.

The problem on slum dwellers is aggravated by government programs which end up with socio-economic and environmental consequences. Hence, the fate of slums dwellers and the options to improve their livelihood is left for the decision of political leaders who rarely consult slum dwellers on their future transformation.

Therefore, in light of the aforementioned problems and the basic objectives of agenda 21 which is protecting fragile ecosystems and 'avoid' slums, this paper will try to transform "Korea sefer", one of the slum settlements in Addis Ababa, manifesting deteriorating social, economic and environmental issues. Furthermore, The built environment of the site is represented by dilapidated physical structures: overcrowding, in-accessibility, poor housing quality, limited or no access to parks, greenery and open spaces, high level of informal waste disposal, high vulnerability of ecologically sensitive areas: neighbourhood development on steep slope and river flood zones.

To sum up, the consolidated problem statement for this research paper is how to transform 'Korea-sefer' into a more liveable and sustainable neighbourhood through environmental planning interventions.

1.4.Objectives of the Study

The main objective of the study is to investigate the challenges of sustainable development in 'Korea sefer' and try to see development options to make the site a more liveable eco-village based on sustainable neighbourhood development interventions.

The specific objectives of this study are:

- a) To investigate the socio-economic challenges of sustainable development of 'Korea-sefer': the distribution, availability and accessibility of neighbourhood functions: land use and pattern of development, employment opportunities, and basic infrastructures i.e. road, water and drainage
- b) To assess and identify the major environmental hotspots: pollution threats with an emphasis given to waste management strategies, energy consumption
- c) To investigate the compatibility and suitability of existing neighbourhood functions in the site: Land use and landscape compatibility with respect to the planning frameworks of Addis Ababa structure plan.
- d) To find out the views and interests of the inhabitants on the future transformation of 'Korea-sefer'.
- e) Finally to come up with design proposals and recommendations to enhance the sustainable functioning of the site: based on sustainable environmental planning principles. The plan will be accompanied by landscape design for different open recreational facilities.

1.5.Research Questions

As the objective of transforming slums to sustainable neighbourhoods make people live, work, shop, and play all within a short distance and protect sensitive ecologies, it would be valuable if one pose the subsequent questions, which are actually the research questions of this study.

1.5.1. What are the challenges of sustainable neighbourhood development for 'Korea-sefer' that need sustainable environmental planning interventions?

1.5.2. Are the neighbourhood functions located on a suitable site and compatible?

1.5.3. How do the inhabitants of 'Korea-sefer' envision the future transformation of the site?

1.5.4. How can the deteriorated and inaccessible slum neighbourhood be transformed in to more liveable and sustainable one?

1.6.Scope of the Study

The scope of the research shall be limited in space and theme. The research will be conducted to transform "Korea sefer" slum located in Woreda 04 Yeka sub city Addis Ababa.

The scope of the study in terms of subject/theme/ shall be limited to the spatial aspects i.e. drainage, accessibility and availability of social amenities, topography /slope/ with a collection of relevant data on socio-economic issues of the locality which are an input for the planning process. Moreover, the environmental issues are also considered.

1.7.Methods and source maps

1.7.1. Selection of case study area

According to a report released by UN-Habitat 2007 the slum neighbourhoods in Addis Ababa are concentrated in the inner cites of Addis Ababa. However, they are also found in areas immediately adjacent to the inner city and on fragile ecosystem.

Hence, for the purpose of this study it is wise to consider two or more slum settlements situated on environmentally sensitive areas. Thus, 'Korea-sefer', Yeka sub-city Woreda 04 or the previous Woreda 13 kebeles 05/06, and another site located near Zenebework hospital, Nifas silk lafto sub city Woreda-03 were considered and analysed based on the following criteria.

- Number of households found on steep slope and river flood zones,
- Opportunities for future development,
- Attention given by the city administration to carryout eco-city project,
- The earliest establishment of the settlement,
- Proximity to inner city.

Hence, 'Korea-sefer' with its history of establishment where huge numbers of inhabitants are settled on fragile ecologies (a site is selected for eco-city project by the city government) has the potential for the practical implementation of the proposals of this paper.

Consequently, purposive sampling technique is used for this study because the site is one of the slum settlements in Addis Ababa not found in the inner part, and established on environmentally sensitive landscape. Furthermore, the area has caught the attentions of various stakeholders including the government and NGOs for the better transformation of the neighbourhood setting.

1.7.2. Sampling Methods

Systematic and stratified random sampling method has been employed to choose the households from which the data is to be collected. Hence, representative sampling of 10% has been applied where every tenth households. The bases for randomising has been carried out by obtaining the housing number offered by the Woreda Administration and 1996 GIS data bases. Furthermore, snowballing technique was adopted to choose the first household from the list of the first 10 housing numbers. Thus, from the total 2150 households 215 housing units have been taken as a representative of the total population and studied for this paper. However, the different officials with direct relation to the subject matter of the paper are taken as the sample sizes for this study.

The systematic sampling has been considered at different strata. The strata selected are based on the vulnerability and accessibility of housing units and the potential neighbourhood problems witnessed in the area (annex 1). Hence, the strata are river flood zones, slopes greater than and less than 15%: since households situated in these geographic locations experience different spatial, social, environmental and economic problems which bear a critical component of sustainable development.

1.7.3. Research design

Research method

Descriptive method.-this method is used to describe the state of affairs as it exists. Thus, this method is employed to describe the compatibility and suitability of neighbourhood functions in "Korea Sefer". Moreover, it is also used to describe

various factors which would contribute to the sustainable development of the site. Generally, this method was adopted to describe the general existing condition in terms of housing condition, infrastructure availability and accessibility.

Exploratory method: - this method is particularly employed to explore the existing conditions of the fragile ecosystem, the settlement pattern and the relationship among neighbourhood components based on the base maps, satellite images and check lists.

Hence, the research has used descriptive and exploratory research methods to various research inputs.

1.7.4. Data collection method

a) Type of data

The study used a combination of primary and secondary data to understand the neighbourhood setting and determine the basic needs of the inhabitants for sustainable living condition.

Primary data: - primary data were collected from the residents, woreda administration, NGOs, CBOs (Community Based Organizations), members of the Korea war veterans association and other pertinent stakeholders working on settlement development, improvement, and planning and landscape design in the site, city and sub city. Questionnaires were administered to these groups of respondents to get their views and perception on the status and characteristics of the neighbourhood based on the basic principles of sustainable neighbourhood development. In addition, extensive personal observations were also made to assess the environmental quality of the neighbourhood.

Secondary data: - relevant secondary sources had also been consulted. Particularly, data and literatures including published reports, and unpublished sources from Federal institutions, Addis Ababa City, Yeka sub city and Woreda 04 Administrations, NGOs, ORAAMP (Office for the Revision of Addis Ababa Master Plan) documents, and the academia will be extensively used. Moreover, best practices from developed and developing countries in the areas of protection of

environmentally fragile areas, sustainable neighbourhood planning and development were discussed.

b) Data collection instruments

Field Survey

Field survey is employed with the help of base map and check list as per the objective of this study. The check list includes issues like the condition of houses, infrastructure, the effects of neighbourhood pattern on the existing ecosystem, the drainage pattern of the site, the highly affected/problematic areas, the condition of river bank, the condition of natural water ways and other related issues in the study area.

Interview

This is employed to collect data related to housing, vulnerabilities occurred, major challenges to storm water drainage management, the deriving factors to damp solid and liquid wastes to open fields and natural water ways, and possible suggestions in the view of residents to handle the challenges of sustainable development. The residents, Woreda and sub city administration etc are interviewed to get reliable data as they are the most concerned stakeholders for sustainable development in the site.

Questionnaires

This was particularly prepared for Woreda and sub-city experts/professionals in particular reference to office of works and urban development, urban planning institute and Environmental protection team at sub-city and city level and sampled households of the study area (annex1). This will bring in those data related to major neighbourhood issues, impacts of waste disposal on rivers and the major challenges in promoting sustainable development in the slum settlements.

1.7.5. Data analysis and presentations

To analyze the data collected a combination of quantitative and qualitative analysis methods are employed. And thus, a software package called SPSS (Statistical Package for Social Studies) is partly used for the analyses. Apart from this, a qualitative description is also made for non-measurable traits, particularly for those related with quality. Furthermore, spatial analyses have been conducted using GIS

(Geographic Information System), Excel, archiCad, AutoCAD and artlantis landscape software as analytical tools. Finally, the analyzed data are presented with maps, tables, graphs and pictures obtained during field survey.

1.7.6. Source maps

The following source maps are used for this study:

- Base map were used to investigate and extract the contours of the site to help make analysis on slope and topographic related issues. Moreover, it also indicates the overall condition of the contour map to examine the elevation and flow length of the catchments areas.
- Google earth satellite images to verify and ground-truthing the existing situations in the map and to carry out the analysis and support the photographic images.

1.8. Significance of the study

Since the research focuses on sustainable transformation of slums and protecting environmentally sensitive areas, I believe, it will be an important document for government officials, Non Governmental Organisations (NGOs), the community, environmental advocates etc. Furthermore, the output will be an important input for the academia too to debate on and propose a new and/or improved form of interventions in the slum settlement transformation. The study, I hope, will also create curiosity among students so that they will appreciate the problem and helps build group of scholars that are aware of the problem itself.

1.9. Limitations of the study

The limit in this paper includes that the respondents may not accurately state and prioritize their neighbourhood sustainable development issues, which constitutes an important variable that determines the state of the neighbourhood and identify possible areas for neighbourhood planning intervention in the site. The other limitations include the availability of limited literatures, developing countries' experience, on the issue under consideration. Furthermore, the different social institutions like CBOs were reluctant to provide the required data for this study.

1.10. Organization of the research

The first chapter is the introductory section which depicts the overview of the research where background to the study, statement of the problem, objective, research questions, methodology, significance, scope and limitations of the study are included. The second chapter deals with the review of literatures of relevant topics whereas the third chapter presents descriptions of the study area. The fourth chapter elaborates on the findings of the research along with the analysis and concluding remarks. Finally, the fifth chapter presented recommendations and design proposals including land use plans and related landscape details together with ecosan projects for the sustainable transformation of “Korea sefer”.

CHAPTER II: LITERATURE REVIEW

2.1. Introduction

This literature review part has searched and included those literatures which are highly related to the subject matter of this paper. Hence the reviews give due attention to the following issues related to slums and their potential interventions for in situ transformation. Consequently the focus of the literature search is on the approaches to urban slums, development tools to protect environmentally sensitive areas, sustainable development, community development, local agenda 21 and sustainable urban environment, Ecological sanitation: an ecosystem approach to the management of wastes and Vetiver technology¹ to improved urban water quality to ensure sustainable development t. These literatures are considered to pave the way for design proposals and recommendations of this paper.

2.2. Definition of terms and concepts

“A sustainable neighbourhood is a mixed used area with a feeling of community. It is a place where people want to live and work, now and in the future. Sustainable neighbourhoods meet the diverse needs of existing and future residents, are sensitive to their environment, and contribute to a high quality of life. They are safe and inclusive, well planned, built and run, and offer equality of opportunity and good services to all (Bristol, 2005).

Economic sustainability: is the term used to identify various strategies that make it possible to utilize available resources to best advantage. It is also described as the process of allocating and protecting scarce resources, while ensuring positive social and environmental outcomes (Malcolm, 2012)

Environmentally sensitive areas: places that is vital to the long-term maintenance of biological diversity, soils, water, or other natural resources. They include flood prone areas, wildlife habitat, steep slopes, wetland, and prime agriculture lands” (Ayman M., 2003).

¹ Vetiver is a sterile, fast-growing plant that does not propagate by seed and can not become a “weed”.

Slums are often defined as, “buildings and areas that are environmentally and structurally deficient. A result of multiple deprivations such as; illegal land tenure, deficient environment and inadequate shelter and are the result of the gap between the demand and the legal and formal supply in the housing market” (Amey Z. et al, 2009).

UN-HABITAT 2003 defines **slum** as any specific place, whether a whole city or a neighbourhood, if half or more of all households lack improved water, improved sanitation, sufficient living area, durable housing, secure tenure, or combinations thereof. An area or neighbourhood deprived of improved sanitation alone may experience a lesser degree of deprivation than an area that lacks any adequate services at all, but both are considered slums in this definition. Slums are characterized by dilapidated housing conditions, inadequate provision of infrastructure, services and public facilities, community cohesion, under utilization of scarce prime urban land, unplanned settlement and insecure tenure.

Sustainable development

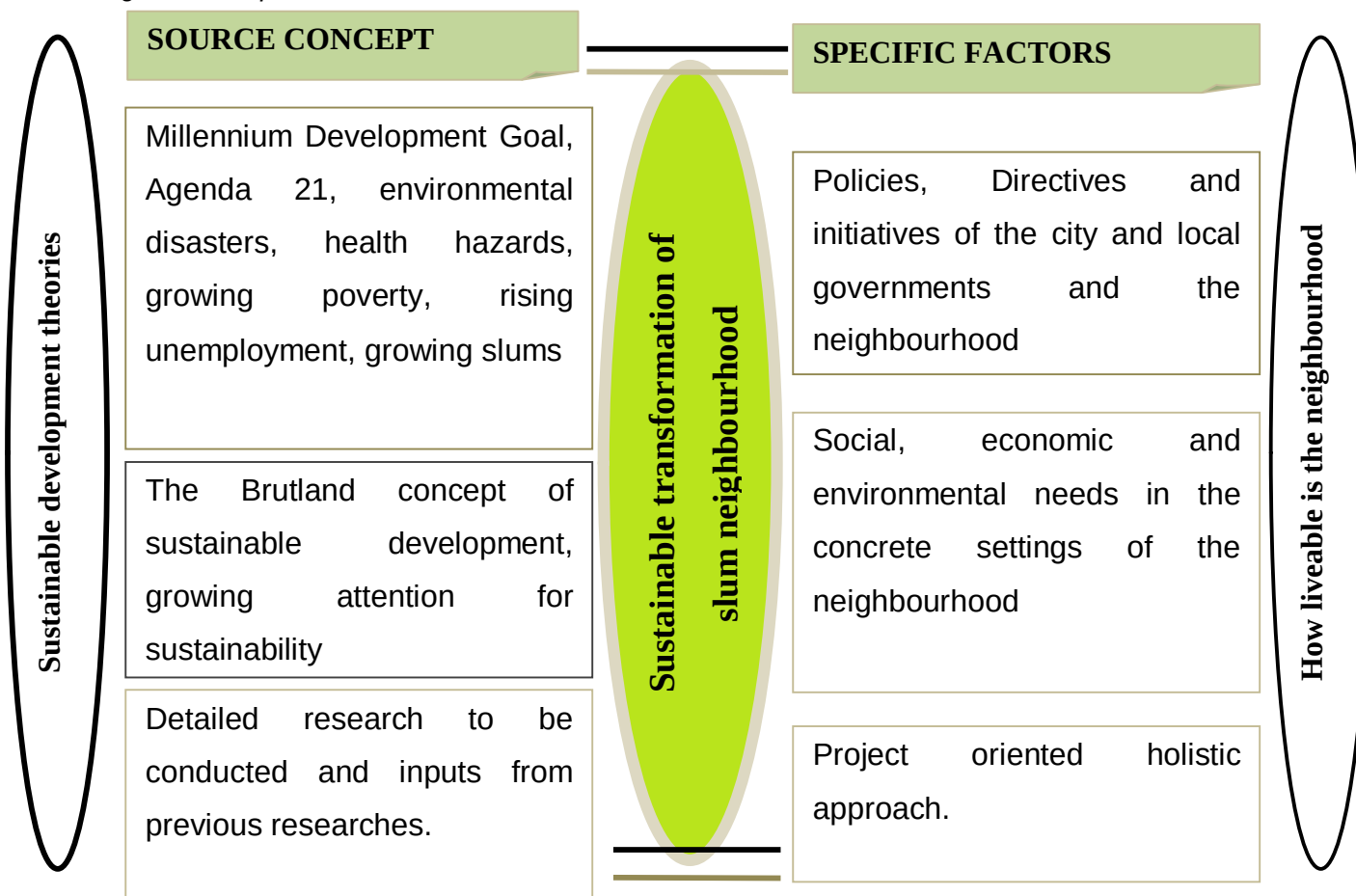
The most universally quoted definition is that produced in 1987 by the World Commission on Environment and Development (WCED), otherwise known as the Brundtland Commission (after its Chairperson, Gro Harlem Brundtland, Prime Minister of Norway):

Our Common Future, the Commission's final report, defined sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.

Concepts

Conceptual framework for sustainable transformation of slums

Fig 2.1 Conceptual framework for sustainable transformation of slums



Source: (Adopted from the conceptual framework of EU projects eco-city, Coplak cited on Canadian Urban Institute-Ethiopia (CUI -2011)

2.3. Approaches to slum improvement

2.3.1. Slums: A consequence of inadequately planned and rapid urbanisation

In the cities of developing countries, urbanisation has become virtually synonymous with slum formation. The UN operational definition of slum (2003) is based on the household as the basic unit of analysis: "A slum household is a group of individuals living under the same roof in an urban area who lack one or more of the following five conditions: access to water, sanitation, secure tenure, durability of housing; sufficient

living area". Thus, slums can either be planned (usually degraded inner city tenements) or unplanned settlements.

Public authorities responsible for urban land and housing policies have not been able to meet the ever increasing demand for affordable housing and serviced land in adequate scale. Urban poverty is on the increase and growing number of households cannot afford housing in planned and serviced settlements. Squatter settlements and informal subdivisions on public or private land, often on hazardous sites unsuitable for residential development, are a direct response to the absence pro-poor urban planning and provision of affordable land and housing through formal process.

In 2005, there were 998 million slum dwellers worldwide (one third of the world's urban population). If the current trend continues, the slum population will reach 1.4 billion by 2020 (UNHABITAT, 2006)

This unprecedented state of flux requires a new approach to urban planning. Recently, African ministers dedicated their work to finding alternatives to the existing urban planning practices which proven to be inefficient in addressing Africa's urbanisation process. They identified "equitable access to land, adequate shelter, the provision of basic services, political will, decentralization, good governance, the empowerment of national and local authorities, the adoption of inclusive processes of mobilising local resources and inclusive decision making processes as being fundamental to any strategy to prevent and upgrade slums(UNHABITAT, 2006).

The living and working conditions in slums are characterised by a number of deprivations including lack of adequate housing, water, sanitation, and basic social services. In many instances, people living in slums are not recognised as residents of the city and are at permanent risk of eviction.

2.3.2. A comprehensive, participatory approach to slum upgrading

Today, upgrading and prevention of slums are seen as key measures to attain the objectives of urban poverty reduction. With the adoption of the UN Millennium Development Goals (MDGs) in 2000, the poor living conditions in unplanned settlements were put on the global development agenda. In 2005, the world summit allocated to prevention an importance equal to upgrading:

“In pursuance of our commitment to achieve sustainable development, we further resolve: to achieve significant improvement in the lives of at least 100 million slum-dwellers by 2020, recognizing the urgent need for the provision of increased resources for affordable housing and housing-related infrastructure, prioritizing slum prevention and slum upgrading” (Article 56 of the September 2005 UN summit resolution as cited on UNHABITAT, 2006)

In an effort to contribute to the realisation of Target 11, UNHABITAT promotes implementation strategies that consist of adaptive and proactive elements. Furthermore World Bank stressed that the approaches to urban slum should hinge on these two elements.

Approaches to Urban Slums bring together the growing and rich body of knowledge on the vital issue of improving the lives of existing slum dwellers, while simultaneously planning for new urban growth in a way which ensures that future urban residents are not forced to live in slums. With hundreds of millions suffering everyday, and projections that their numbers may double; one thing is certain: practitioners and policy makers at all levels will need ready access to a range of practical, affordable and implementable approaches to slums: Adaptive and proactive approaches(World Bank, 2008).

Adaptive Approaches

Adaptive approaches are affordable and meaningful strategies that improve the situation of existing slum dwellers and further strengthen their integration into the social and economic fibre of the city. Broadly speaking, adaptive approaches involve upgrading the level of urban services in slums: physical, social, and economic. They also include pragmatic solutions for dealing with the twin issue of land and tenure. Adaptive approaches have been proven to increase the well-being of millions of slum dwellers while simultaneously strengthening urban and national economies. Project-level interventions can be further bolstered if they are implemented concurrently with supportive national policies and broad-based programs to upgrade slums.

The physical services in an upgrading project might include water supply, sanitation, roads, footpaths, drains, street lighting, land readjustment, and a range of other such services. Physical services can be categorized as on-plot, on-site, and off-site.

On-plot services are those that are used privately by households. These could include individual sanitation facilities, water connections, or electricity. On-site services are those that are used collectively by the project site residents. They can include public sanitation facilities, public standpipes for water, site preparation, footpaths, street lighting, and the relocation of structures to make room for more plots or public facilities. Off-site services are those that are used collectively by the project site residents and the city at large.

These services typically integrate the project site into the larger infrastructural networks of the city. They might be national or city roads, municipal water and sanitation networks, transportation services, and markets.

The following three pictures were taken in different parts of a slum in the Philippines that was part of the successful 'Tondo Foreshore' upgrading initiative in the 1970s. In the first picture, the path is unpaved and wet; a woman is carrying a large orange bucket of water, the homes on the right hand side use wooden planks to bridge an unpaved drain, and a long garden hose is drawn out across the path to provide water access. The second picture shows the installation of physical infrastructure in process, and the third picture shows the site almost complete, with paved access and drainage.

Pic 2.1 adaptive strategy as a way to transform slums



Source: World Bank, 2008.

In addition to physical services, adaptive approaches include a range of social services. Social services in upgrading initiatives can include education, health facilities, sporting facilities, day care, and community facilities. Social services should not be taken lightly; they often contribute to increased economic growth, reduced crime, and better education and awareness.

Projects may also include economic services to generate employment in the area and to raise incomes. Economic assistance can include training, job placement, credit and technical assistance to small businesses, establishment of new community-owned enterprises, microfinance opportunities, and loans for housing and for building materials. If implemented correctly, such services will unlock bottlenecks to development and make way for economic revitalization in the area.

Proactive Approaches

Proactive approaches can be significantly more cost-effective, affordable, and easy to implement than retroactive measures. They are both financially and socially beneficial to cities, national governments, and the urban poor. All cities can and should take such measures.

In a recent World Bank study on the effects of urban population growth on the built-up area of cities, it was projected that developing countries could triple their entire urban built-up area between 2000 and 2030. This means that in only 30 years, developing countries alone might generate the same amount of built-up urban area as the entire existing urban world had done up to the year 2000. The magnitude and rate of this urban transition is unprecedented.

Managing the process of urban expansion is critical, but can be a complex and multi-tiered challenge. City development strategies can be effective instruments through which cities can organize, orient, and initiate their response to the multitude of challenges and opportunities posed by their urban future.

A proactive approach to slums will form an integral component of city development strategies. In addition, many of the other components of city development strategies such as economic development, good governance, municipal finance, urban environment, job creation, and poverty reduction will also have a considerable impact on the ability of cities to manage the needs of the urban poor living in slums.

Within the broader scope of city development strategies, a focused inquiry into low cost shelter options for the poor will require understanding and assessing the dimensions of demand for land and housing.

2.4. Development project tools for protecting environmentally sensitive areas

The demonstrated track record in dealing with sensitive areas was not very encouraging. The unique features of the environmentally sensitive areas made the risk of pollution and environmental damage almost irreversible. The zero alternatives were necessary: that no development is the safest alternative (Ayman M., 2003).

- No development: The proponents of this approach argue that the slow moving waters are a perfect environment for the growth of micro-organisms. The location of a large water surface in a region creates a competitive habitat where the struggle for survival among certain types of algae releases poisons into the water that can reach harmful levels to humans if flooding does not flush these poisons annually.

Urban discharge of untreated sewage into the water body is likely to increase that threat. Since our experience with prohibition and pollution discharge is not that impressive, it was perceived that the “no development” was the safest alternative.

- Have Faith and Develop: The second option was to trust that the current and improved efficiency of institutions and communities is likely to safeguard the water bank and environmental resource while reaping the economic benefits of the area.
- Proceed With Innovation: The third and final option was to appreciate the unique economic, social and environmental opportunity the place has, while admitting but dealing with the flaws in the system. Water for development is the major factor.

2.5. Sustainable development

The intricate concept of sustainable development is useful as it conveys key links between different actors and sectors and also between geographical scales (the local, regional and local) into importance. Equally significant, it also highlights potential synergies and conflicts between different goals.

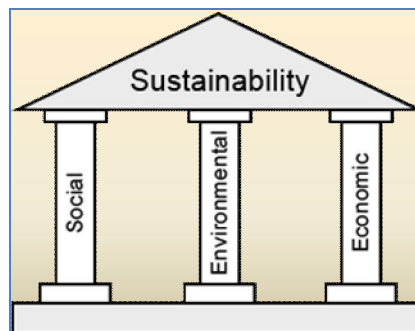
A sustainable city is a city whose citizens are able to have their own needs met without endangering the living conditions of other people and the well-being of the natural world, at present or in the future (Graham et al, 2003). In the first instance,

the emphasis of the term, sustainable development, is on people and their needs for long term survival, the relationship between the present generation and the future generations.

Human needs go into different elements of life, including good air quality and water quality, healthy food and good housing. They also comprise quality education, a vibrant culture, good health care, satisfying employment or occupation, and the wealth sharing. As well as factors such as safety in public places, supportive relationships, equal opportunities and freedom of expression, and meeting the special needs of the young, the old or the disabled (URBAN 21).

The concept of sustainability, which is about balancing social, environmental and economic considerations so that the quality of life for both present and future generations is increased, and we maintain a healthy community and a healthy environment and a healthy economy, can be represented by a stool of three legs where one needs the help of the other two to keep the stool in balance.

Fig 2.2 the three pillars of sustainable development.



Source: - S.Sundar, 2011.

2.5.1. Social sustainability

Social sustainability is the ability of a social system to function at a defined level of social well being indefinitely. The dimensions of social sustainability include but not limited to: resident's health and safety Impacts on local communities and cheer their quality of life, Benefits to the disadvantages groups of a society e.g. handicap, elderly, children and Women.

For a community to function and be sustainable, the basic needs of its residents must be met. A socially sustainable community must have the ability to maintain and build

on its own resources and have the resiliency to prevent and/or address problems in the future.

There are two types or levels of resources in the community that are available to build social sustainability (and, indeed, economic and environmental sustainability): individual or human capacity, and social or community capacity.

Individual or human capacity refers to the attributes and resources that individuals can contribute to their own well-being and to the well-being of the community as a whole. Such resources include education, skills, health, values and leadership. Social or community capacity is defined as the relationships, networks and norms that facilitate collective action taken to improve upon quality of life and to ensure that such improvements are sustainable.

To be effective and sustainable, both these individual and community resources need to be developed and used within the context of four guiding principles: equity, social inclusion and interaction, security, and adaptability.

2.5.2. Environmental sustainability

Herman Daly, one of the early pioneers of ecological sustainability, looked at the problem from maintenance of natural capital viewpoint. In 1990 he proposed that:

- ✓ **For renewable resources**, the rate of harvest should not exceed the rate of regeneration (sustainable yield);
- ✓ **For pollution**: The rates of waste generation from projects should not exceed the assimilative capacity of the environment (sustainable waste disposal); and
- ✓ **For non renewable resources** the depletion of the non renewable resources should require comparable development of renewable substitutes for that resource.

Environmental sustainability is thus the rates of renewable resource harvest, pollution creation, reduced impact on human health and non-renewable resource depletion that can be continued indefinitely. If they cannot be continued indefinitely then they are not sustainable.

2.5.3. Economic sustainability

The general definition of economic sustainability is the ability of an economy to support a defined level of economic production indefinitely. The economic dimensions of sustainability includes: Creation of new markets and opportunities for sales growth, cost reduction through efficiency improvements and reduced energy and raw material inputs and creation of additional added value (The SIGMA project, 2001).

A sustainable economy enhances a nation's standard of living by creating wealth and jobs, encouraging the development of new knowledge and technology, and helping to ensure a stable political climate. Having a diverse economy, that is, one based on a wide range of profitable sectors, not just a few, has long been thought to play a key role in a sustainable economy.

Consequently, improving the economic position of residents of an area and businesses is arguably the most critical component of any community revitalization strategy. Former approaches that relied on tax expenditures to attract investment and employers to depressed areas have proven costly and ineffective. Tax abatement and incentives may have some impact at the margins, or where public spending includes education or infrastructure investment, but economists generally agree that such policies alone are not strong enough to influence location decisions or solve the problems of urban economic development (LeGates, et al., 1996).

Instead, more recent literature suggests a dual approach to economic revitalization for distressed areas: *targeted business development* to retain and expand desirable businesses; and *multi-dimensional workforce development* to help residents secure jobs that will support workers and their families (ibid). If well integrated, business and workforce development strategies can be mutually supportive and achieve beneficial synergies for distressed areas. The objectives of business and employees do not always correspond, creating a need for close coordination to balance competing priorities and minimize contradictory outcomes. For example, strategies to support business expansion are unlikely to improve distressed neighbourhoods if new jobs are filled by outside commuters or offer few opportunities for income growth to local employments. A more equitable economic development plan would target resources to promote expansion of firms that offer long term, well-paying employment opportunities for low income, minority and single parent families (ibid).

The benefit of integration and coordination of various economic development strategies is almost universally recognized, but rare in actual practice. A key finding of the Conservation Company's study of initiatives to increase economic opportunities for disadvantaged persons underway in 12 cities (including Los Angeles and Oakland) is unfortunately typical: the researchers discovered over a dozen promising programs, but found not a single example of comprehensive city-wide coordination of economic and workforce development (ibid). Still, the wealth of promising, if disconnected, efforts that are underway suggests the potential that may be realized with stronger partnerships and improved program integration.

Table 2.1 dimensions of sustainable development.

Ecological Perspective	Economic Perspective
• Maintain/enhance production potential. • maintain/enhance biodiversity • reduce environmental risk • be socially acceptable	• maintain/enhance production • maintain/enhance product diversity • reduce production risk • be socially acceptable

Source: - S.Sundar, 2011

2.6. Community developments

Sustainability also includes the concept of stable, integrated communities, and planning for such communities must embrace both tangible issues – such as the timely provision of school places and the intangible, such as people's perception of what constitutes an attractive, secure environment in which to rear children.

Community development combines the idea of “community” with “development”. The concept of community is about a group of people with a shared identity. Hence, community development relies on interaction between people and joint action, rather than individual activity: what some sociologists call “collective agency” (Flora and Flora, 1993 as cited on Jim Cavaye, 2000).

“Development” is a process that increases choices. It means new options, diversification, thinking about apparent issues differently and anticipating change (ibid). Development involves change, improvement and vitality; a directed attempt to

improve participation, flexibility, equity, attitudes, the function of institutions and the quality of life. It is the creation of wealth; wealth meaning the things people value, not just dollars (Shaffer, 1989). It leads to a net addition to community assets, avoiding the “zero sums” situation where a job created “here”, is a job lost “there”.

Putting the two terms together; community development means that a community, itself, engages in a process aimed at improving the social, economic and environmental situation of the community.

Community development is the generic term used to describe the process by which local communities can raise their own standard of living. These process include establishment of services, e.g. for social welfare, health protection, education, improvement of agriculture, development of small scale industries (ibid).

The “concrete” benefits of community development, such as employment and infrastructure, come through local people changing attitudes, mobilizing existing skills, improving networks, thinking differently about problems, and using community assets in new ways. Community development improves the situation of a community, not just economically, but also as a strong functioning community in itself.

Community development builds the five capitals of a community: physical, financial, human, social and environmental. It is through participation in their community that people rethink problems and expand contacts and networks; building social capital. They learn new skills, building human capital. They develop new economic options, building physical and financial capital. They also can improve their environment. The Issues in Community Development are summarized as follows.

Table 2.2 issues of community development.

economic	social	environmental
• Disparity in income: declining middle class, wage gap. • Economic restructuring: Industrial to entrepreneur, Knowledge economy	• Health care: access, affordability and obesity • Social amenities in housing, recreation, transportation and arts • Education:-equity in KG-	• Land use patterns: urban sprawl and farmland preservation • Water quality and quantity • Air quality

• Infrastructure: Telecommunications, Entrepreneur ready • Workforce Development: Job readiness skills, Problem solving ability	12, college preparedness and family values • Addictions: Drug & Alcohol Dependency • Diversity, etc	• Waste management • Conservation • Alternative Fuels.
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Source: - Jim Cavaye, 2000.

2.7. Local Agenda 21 and sustainable urban environments

The United Nations conference on Environment and Development: the Rio de Janeiro Earth Summit in 1992 approved Agenda 21 as an action plan for sustainable development in the twenty-first century. It aims to address the issues of growth, development and quality of life at the local level in a way which does little harm to the global environment (think global ... act local). The development of local approaches to Agenda 21, which involves actions by local people and local groups to deal with their specific local environmental issues, was recognized as crucial to the success of the plan. A process was envisaged which would actively involve and empower local communities in decision-making about local actions and in the implementation of those actions. Agenda 21 aims to:

- Protect the Earth's natural ecosystems and the living things they contain;
- Reduce our use of energy and raw materials, as well as our production of pollution and wastes;
- Share opportunities and responsibilities more fairly between countries and between different groups within each country.

Each nation has been developing its own approach to ensuring a greater level of sustainability in the way actions at local and national level impact on the environment or the quality of life. Governments and local authorities have been rewriting their policy statements with reference to the objectives of Agenda 21.

Local Agenda 21 is concerned with sustainable development and its promotion at the very local level, in local communities as well as at the regional and national level.

This includes:

- environmental concerns
- social concerns
- Economic concerns.

We cannot separate these issues. Health, for example, is intrinsically linked to poverty and the environment. For instance, the poorer people are the unhealthier they are, and wherever there is a polluted environment human health suffers.

Local Agenda 21 is based on everyone being involved and being empowered to be responsible for improving their local quality of life and so being able to live in a more sustainable manner. To achieve this, national governments and local authorities need to create an appropriate legislative and fiscal framework, and local community groups and individuals need to be alerted to how their actions could be made more sustainable. Greater sustainability of action has to be achieved at individual and neighbourhood level if any impact is to be made at global level, through the cumulative impact of the mass of appropriate local actions; without these local-level actions no amount of governmental good intentions and rules and regulations will make any difference to the state of the global environment. Thinking sustainable needs to become deep rooted in all local communities; government's role is to make this possible.

Many improvements in environmental performance are not attainable by individuals on their own; therefore there is a need for co-operation and partnership between individuals, and, in particular, organizations from the following sectors: commercial sector, voluntary sector and public sector.

2.8. Ecosan – an ecosystem approach to the Management of wastes

Introduction

The main objective of a sanitation system is to protect human health by breaking the cycle of disease. Sanitation includes four technical areas: excreta management (faeces and urine), grey water management, solid waste management and rainwater drainage (GTZ, 2005).

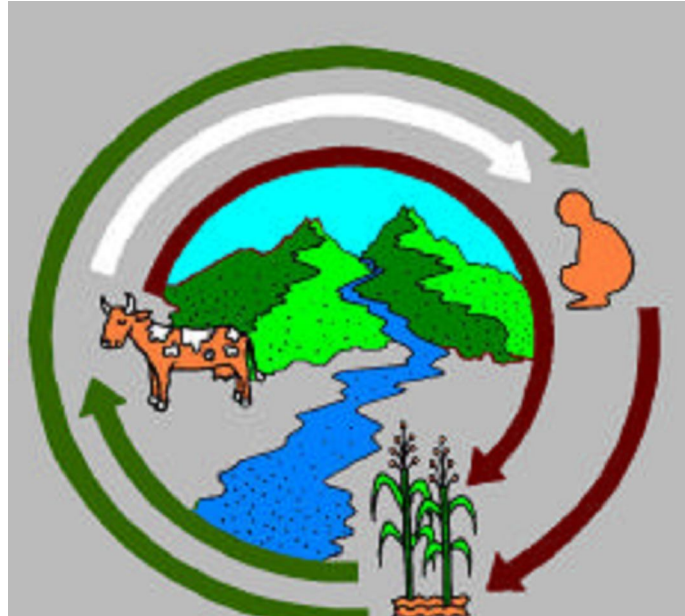
Substantial amounts of plant nutrients and organic matter are present in household waste and waste from food processing industries (Tadesse et al, 2008). Theoretically speaking, the nutrients in domestic wastewater and organic waste are nearly sufficient to fertilize crops to feed the world population (Wolgast 1992 as cited on GTZ, 2005). In order to evolve towards a sustainable society we need to recycle nutrients, reduce the water consumption, and minimize the energy needed to operate waste treatment processes. The initiative to do this is ecological sanitation-ecosan in short.

Ecological sanitation is an eco-system approach to deal with human excreta and other solids and liquids that we now try to get rid of through disposal. They contribute to preserving soil fertility, whilst minimising the consumption and pollution of water resources. Additionally, they have the potential to produce renewable energy from biogas systems. Ecological toilets separate urine and faeces and further dry the faeces over time. This process destroys pathogens in the faeces before they are released back into the environment and recovers the nutrients and organic matter from both the urine and faeces and returns them to soil and plants.

Hence, to destroy pathogenic organisms either through dehydration or decomposition is to prevent nuisance and to facilitate subsequent transport, secondary processing and end use.

Essential features of ecosan are: containment, sanitization and reuse (Steven A., 2001). Ecosan recommends that *human excreta and household organics* be sanitized and that the resulting plant nutrients and soil improvements be applied in agricultural production in the proximity of **human settlements**. The **grey water** from household showers, baths and kitchens undergoes treatment and is safely recycled or returned to nature. Ecosan proposes a sanitation system that reduces or eliminates the use of water as a means of disposal of faecal material (ibid)

Fig.2.3 closed loop system of ecosan



Source: - Steven A. 2001

Ecosan is a closed-loop ecosystem approach to the management of human excreta. In the simplest sense, if we look at the man, the woman, or the child squatting, we see that the waste is returned to the land, the brown line, for the production of green plants: food, flowers, trees and the like. The green plants are then returned to humans, the green line. In societies that include animal husbandry, just add another layer to the closed loop system. In some parts of the world it may be cows, whereas in other parts it may be pigs, buffaloes, chickens, etc. There are a couple of points in the diagram above. First, there are no visible external inputs to this picture. Ecosystems generally have all they need locally, with the exception of the energy from the sun which provides power to the entire ecosystem. Second, there are no external outputs from the system. All wastes are converted by microbes, fungi, etc. to a valuable resource for another life form. If we export waste from the system, we often create toxic pollution elsewhere, often in a different ecosystem, such as pollution in marine environments. Quite simply the Ecosan loop can be summarized as food for people, and people for food (ibid).

Ecosan has three basic principles. First, it promotes health and prevents disease. It does this by treating excreta as near as possible to where people defecate rather than flushing it downstream for the unfortunate to cope with. There are several ways to treat excreta, one of which is dehydration. Second, Ecosan approaches protect the

environment while conserving resources. One of the main causes of fresh water pollution is sewage. By not using fresh water to transport excreta, and returning it to the land after treating it, water is conserved and protected. Finally, Ecosan approaches recover nutrients in excreta, return them to productive uses, and therefore recycle nutrients. They are Food for people, people for food.

Fig 2.4-ecosan toilet.



Source: water aid, 2011

The above figure shows the ecosan toilet and its components. The toilet has separate urine diversion and faeces system and it utilised plant screen to cover the containers of urine and faeces.

Advantages of ecosan

The advantages of ecosan are discussed based on the opinions of the users in Majumbasita, Tanzania 2006. The users responded that the ecosan has great ecological and economical advantages; the users of the system are all satisfied with how the latrine is performing. According to the latrine owners there is no more bad smell, no ground water pollution, less sanitation based diseases, cheaper in construction they are saving up to 50% costs of the normal pit latrine, it saves water needs very little water, only for cleaning the toilet once a day, requires small space and some of them have installed the unit inside the house. As an additional benefit the community mentioned the regular use of urine as a natural fertilizer to their gardens, the study of yielding comparison and the level of nutrients is still going on.

Compared to the conventional systems, ecological sanitation systems are technically simple and can be built at low cost because they require no water supply, no sewers and no excavation. More importantly, human waste becomes part of a natural ecosystem as stated above, recycled and returned to the land for food production and food security rather than being dumped as a pollutant.

The technical aspects of ecosan are solid waste, urine and faeces, grey water, and rainwater. The system involves collection, treatment, and utilisation of these ecological resources as illustrated on the following figure.

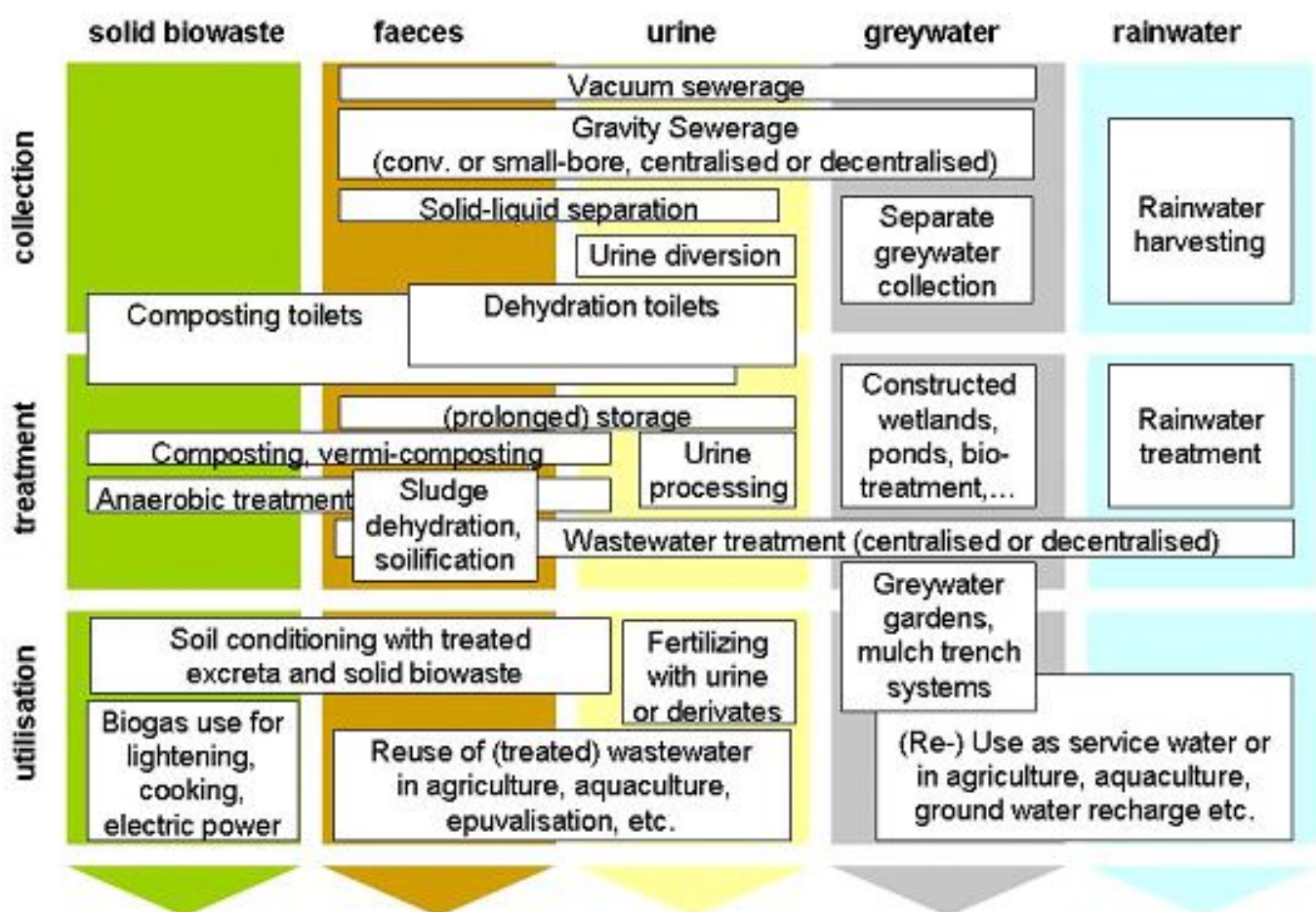


Fig 2.5 technical areas of ecosan

Source: GTZ, 2005

2.9. Improving urban water quality using Vetiver technology

Vetiver grass, *Vetiveria zizaniodes* (L) Nash, is a member of the *Gramine* family. It is a tropical clumping grass that is sterile, fast-growing and that does not tiller to the

side. The culms above root crown are dense and very stiff, while the roots are fine, dense and deep (3 m). Planted as a slim hedge, it forms a vegetative barrier above and below the ground that functions as a filter strip, trapping 70-90 percent of sediments. Runoff filtering through a vetiver contour hedge is slowed down and spread out, preventing concentration of flow. Vetiver planted adjacent to concrete or masonry structures, such as bridges or drains, protects interface between the soil and concrete. When planted on the contour of sloping land, a vetiver hedge anchors the soil profile three meters deep by increasing shear resistance of the soil by 40 percent and prevents landslides (Journey, W. 2003)

Vetiver hedges may be deployed in a variety of ways to remove pollutants from urban runoff before they are carried to water bodies:

- o As filter strips along the margins of surface drains, or surrounding intakes to storm sewers to remove debris and suspended solids;
- o Surrounding "hot spots" for erosion, such as housing and road construction sites where soil is disturbed;
- o To intercept leachate and/or suspended solids from runoff from industrial sites that use or create hazardous materials and from landfills, urban refuse dumps;
- o To stabilize soils in hills above the urban area and/or preventing soil erosion within and along the margins of the urban area;
- o Treatment of collected surface runoff in dispersed constructed wetlands;
- o On the banks and in the channels of seasonal waterways to prevent scouring during storms;

Bright green vetiver hedges are aesthetically pleasing enhancements to the urban landscape and may be groomed periodically by trimming the tops to maintain their appearance. Young vetiver shoots are palatable fodder, harvested biomass may be used for handicrafts or for mulch in horticulture. Large-scale planting of hedges, whether the setting is urban or rural, may be undertaken by governments as multi-objective public works programs that supplement the income of the under-employed or poor while at the same time creating economically productive and permanent environmental infrastructure for the larger community (ibid).

2.10. Summary of literatures

A sustainable city is a city whose citizens are able to have their own needs met without endangering the living conditions of other people and the well-being of the natural world, at present or in the future. Human needs go into different elements of life, including good air and water quality, healthy food and good housing. They also comprise quality education, a vibrant culture, good health care, satisfying employment or occupation, and the wealth sharing. As well as factors such as safety in public places, supportive relationships, equal opportunities and freedom of expression, and meeting the special needs of the young, the old or the disabled (Girade, 1998). However, these elements are far beyond reach of urban slum settlements. Hence, the Rio de Janeiro Earth Summit in 1992 approved Agenda 21 as an action plan for sustainable development to address the issues of growth, development and quality of life at the local level in a way which does little harm to the global environment (think global ... act local). The development of local approaches to Agenda 21, which involves actions by local people and local groups to deal with their specific local environmental issues, was recognized as crucial to the success of the plan. The approaches developed by World Bank 2008 are Adaptive and proactive strategies.

Adaptive approaches involve improving the quality of life in urban slums: physical, social, and economic. The physical issues in this strategy include water supply, sanitation, roads, footpaths, drains, street lighting, land readjustment, and a range of other such services. On the other hand the Social initiatives can include education, health facilities, sporting facilities, day care, and community facilities. The economic services are provision of opportunities for training, employment creation, credit and technical assistance to small businesses, establishment of new community-owned enterprises, microfinance opportunities, and loans for housing and for building materials. Meanwhile the proactive approach focuses on redevelopment policy of governments where the desire to change the slum condition needs concerted efforts from various stakeholders. Moreover, it is a strategy developed to deal with the impacts of urban expansion and urbanisation.

This aspect provided by World Bank 2008 has been accepted and supported by advocates of the protection of environmentally sensitive area. Hence, Ayman M. and Ismail 2003 stated that the most necessary option is not to have development on these areas where the overall impact is not significant. The other options presented

have faith and propose development which requires the potential commitment of the institutions and community to improve their efficiency while maintaining the current situation. The last option cited is to proceed with innovation while appreciating the unique social, economic and environmental benefits of the site by implementing an intervention to deal with the drawbacks on the issues.

The major issues for the transformation process include community development which bears an integral component of sustainable urban development. The focus of the development shall be on building the five capitals of a community: physical, financial, human, social and environmental.

Dealing with these five capitals by implementing the approaches discussed will provide potential benefits to the urban slums: retaining landscape features, enhancing biodiversity, planning for flood plains/ erosion/, maintaining historic buildings and their setting, and promoting sustainable urban drainage systems.

The significance of ecosan systems in dealing with the social, economic and environmental issues of urban slums is crucial. The sanitation program promotes health and prevents disease, protect the environment and recycle nutrients. Moreover, it helps in promoting the economic benefits for slums dwellers.

The role of Vetiver grass for urban slum sustainability lies on its potential for protecting soil erosion, water conservation and trapping suspended wastes from runoff. Hence, they protect the river system from sliding.

CHAPTER III: DESCRIPTION OF THE STUDY AREA

3.1. Introduction

This portion of the paper gives information on the history and naming of the study area, 'Korea- sefer'. Furthermore, the geographical location of the site is described and its administrative and service integration with the adjoining landmarks and establishments have also been incorporated to give an overall clue about the site. The issues raised in the topography of the site also reveal that the site is situated on varying altitudes within short distances. Finally the population, ethnic and religious composition of the inhabitants have thoroughly been discussed.

3.2. History and naming

The history of the study area can be traced back to 1950's where the Korean War took place. Upon the request made by the secretary General of the League of Nations (now the United Nations), Ethiopia dispatched its army, known as Kagnew² battalions meaning 'being difficult to penetrate', in may 1951 to restore peace on Korean Peninsula and to defend freedom of the Korean People. The total numbers of soldiers sent were 3520. The soldiers joined the UN peace keeping convoy in Pusan, South Korea. Ethiopian soldiers were so brave that there were no hostages. However, 123 were killed and 536 were injured during the war. The last Ethiopian Soldiers returned to home in 1965 when South Korea opened its embassy in Addis Ababa.

In May 1978 the South Korean people erected a Korean War memorial monument in **Churchmen**, a capital of **Kangwon** province to commemorate the Ethiopian soldiers who fought and died during the war at this place. The monument measures 16.4 meter. On the other hand, Emperor Haileselassie I gave the veterans a plot of land around their working area near Menelik II hospital and Jan-meda, called 'Lieilte-tsehay' military hospital where the soldiers were working. The soldiers settled there since 1965.

The veterans, after clearing vast tract of forest, settled in the area regardless of its suitability of the site to support human settlement development/residential purpose/

² Kagnew meaning very difficult to penetrate

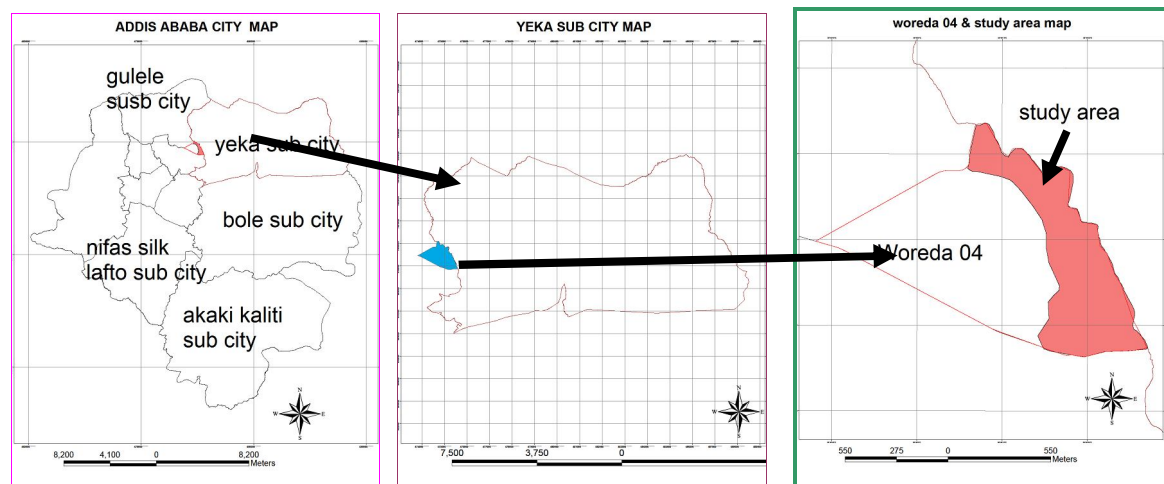
and accessibility of dwelling units for emergency trafficking and vacuum truck. Thus, they built their dwelling units on steep slope and along river banks. Hence, the name 'Korea sefer' is given by the local people based on the fact that majority of the settlement being occupied by the veterans of Korea war and their families.

The veterans and their settlement had been neglected during the Derg regime. This is due to the differences in the political ideology of the regime and the Emperor. The Derge is known for its socialism which is similar to that of the North Korea, which the veterans fought against. For this reason, they were considered as 'worthless', 'attacking 'sister' country 'North Korea'. Hence, the Derg considered them as enemies rather than brave Ethiopian that fought for freedom and glory. Consequently, the area did not receive any attention from the officials during the Derg and it became very much dilapidated and basic infrastructures were lacking.

3.3. Location

The study area is located in Addis Ababa, Yeka sub city Woreda 04.

Map3.1 location map of the study area



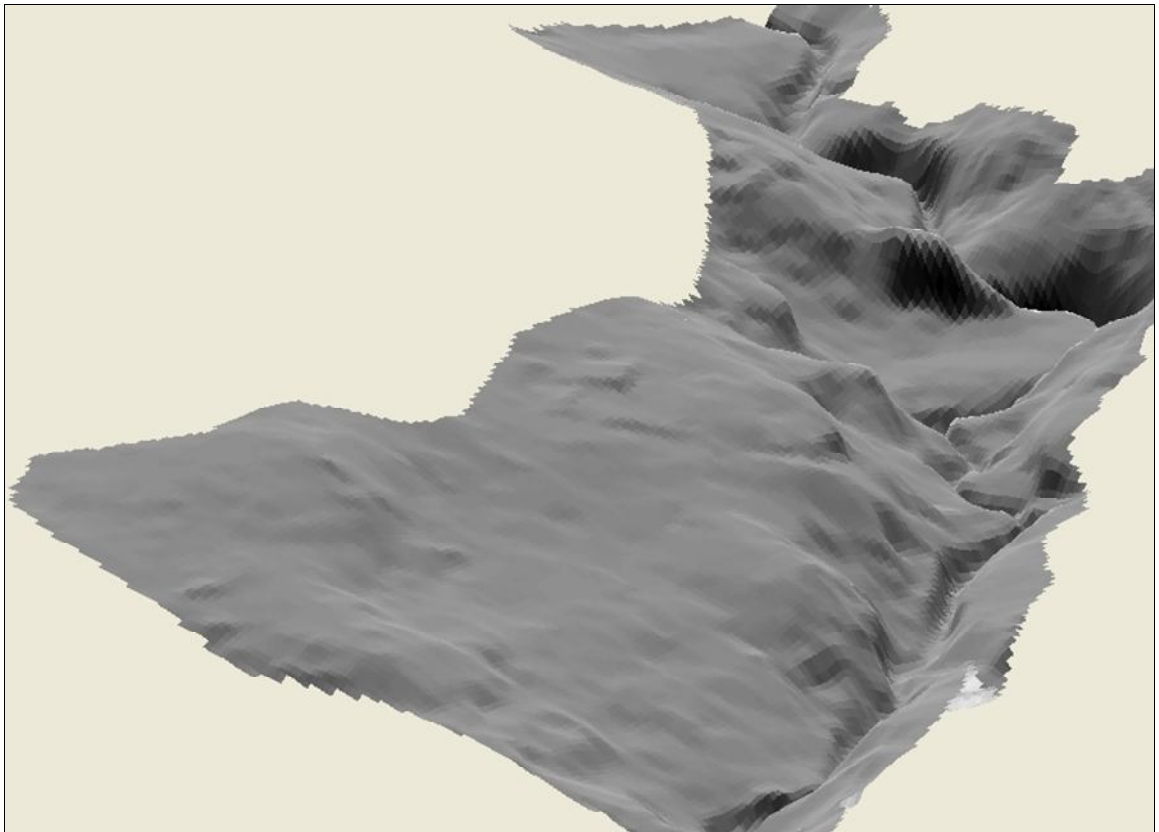
Source: computed by the Author.

The study area, 'Korea sefer' is geographically located between 38° 46'05"- 38° 46' 43"E latitude and 9° 2'08"- 9°2'51"N longitude. It covers an area of about 40 hectares. The site is bounded by Kebena River which flows from North to south eastern direction and Major outlet road on the North-west, south and western directions. Moreover, it is characterised by steep slopes covering significant portion of the site.

3.4. Topography

Relief or altitude has its own impact on the settlement pattern and accessibility of urban/neighbourhood functions. Thus, it affects the socio-economic conditions of an area. The topography/relief of the study area shows significant altitudinal variation. The study area has an altitude ranging from 2399- 2471 meter above sea level (m.a.s.l). The three dimensional overview of the site depicts this fact.

Map 3.2 three dimensional topographic map of the study area

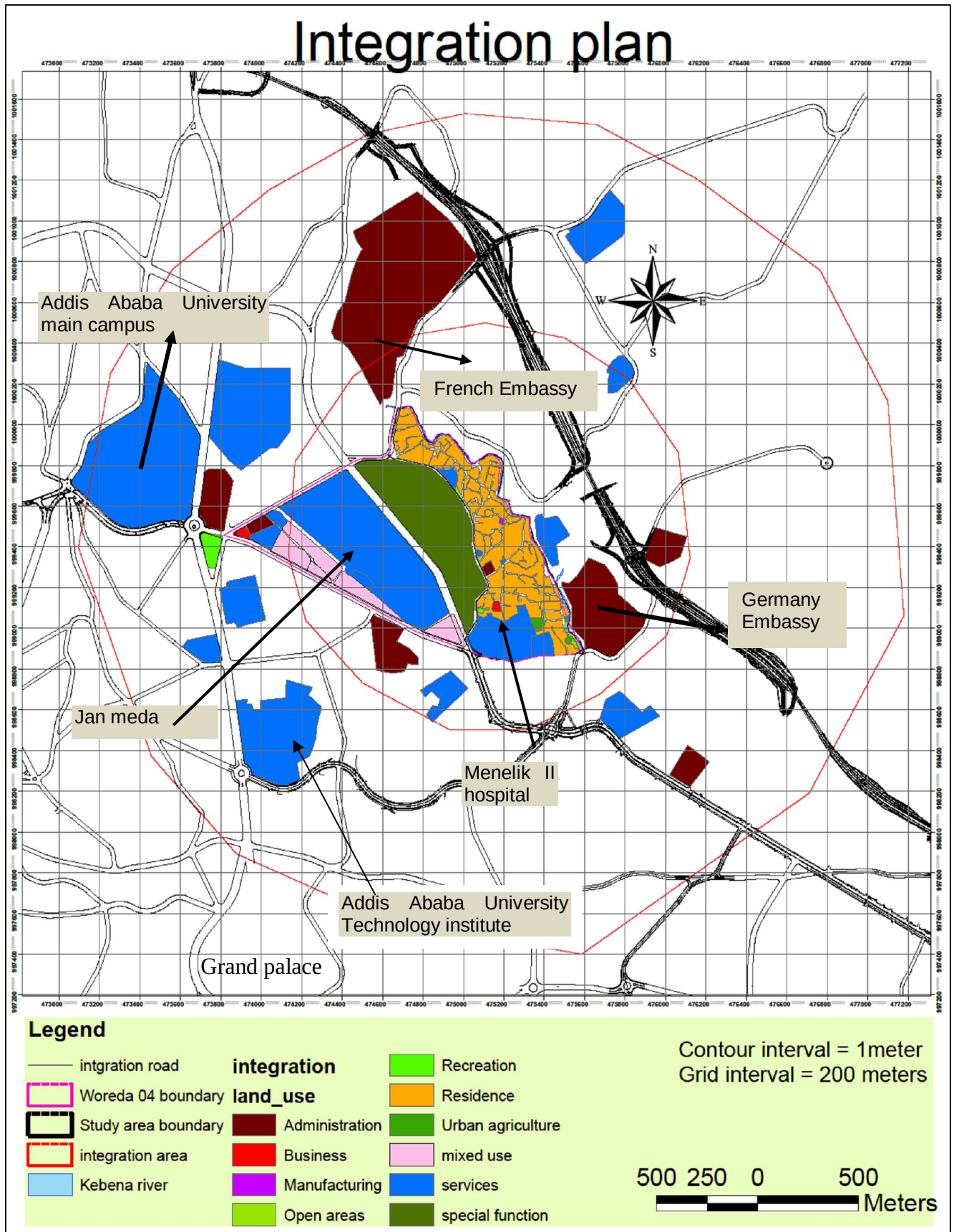


Source: Contour extracted from Addis Ababa city base map and computed by GIS software, 2012

3.5. Functional integration of the site to adjoining landmarks and establishments

The site has only one major road that provides an outlet and means of interaction with the rest of the city. Moreover, the Major road that extends from Sidist Kilo to Menelik II Hospital and Russia Road which connects French Embassy to Menelik II Hospital are the major linkages lines for the site. Moreover, it is linked to facilities such as Jan-meda festivity area, police station and training centre, universities, embassies, etc. It is also integrated to services including primary school in a walking distance.

Map3.3 functional integration map of the study area



Source: Addis Ababa city base map

Based on the above map the study area has functional integration with Administration i.e. embassies, government organizations, and military bases. On the other hand there are services including churches, museums, universities, preparatory and primary schools among others.

3.6. Geology.

The typical volcanic centers of the region, (Addis Ababa) are the Entoto Ridge (3200 m a.s.l), Mt. Wochacha (3385 m a.s.l), Mt. Yerer (3100 m a.s.l), and Mt. Furi (2839 m a.s.l). According to Ethiopian Geologic Survey map and report, the geology of the study area is characterized by Repi basalt rock type. The rock is mainly greenish grey to dark grey but rarely of pink colour. This rock is porphyritic and aphanitic with top part mostly vesicular. Weathering of the rock forms different colours of mainly dark brown. Spheroidal weathering is more conspicuous phenomenon. It is mainly affected by joints making it fissile functions.

3.7. Population features of the site.

Population size

Based on the 2007 preliminary statistical report of Central statistical Authority (CSA), the population size of Addis Ababa is about 2, 7 million with an average growth rate of 2.1% per year. Hence, the population in 2012 is assumed to be 2.984 million based on the projections for five years. On the other hand the population size of Yeka sub city, where the study area is located, is about 382,864 with the same average growth pattern.

The total population of the Study area, 'Korea sefer', is about 13,697 (6,025 or 44% male and 7,672 or 56% female) living under 3,446 households, with an average household size of 3.9 (CSA, 2010). The Female proportion in the Woreda is slightly greater than the City which is 52.4% and the Sub-city, which is 53.3% (CSA, 2010). However, based on the door to door survey conducted by Canadian Urban Institute (CUI) in 2009 the total population of the study area is about 11,232 living under 2150 households, with an average household size of 4.48. Of the total population 55%are females while the remaining 45% are males.

Religious and ethnic compositions

In terms of Religion, the overwhelming majority (91.7%) follow Orthodox Christianity, followed by Protestant, Muslim and other religions with a proportion of 4.5%, 3.4% and 1.4% respectively. The proportion of Orthodox Christians in the Woreda is significantly higher than the citywide proportion of 74.7% (CSA, 2010).

In terms of ethnic background, 60.9% of the total population is from Amhara ethnic group followed by Oromo, Tigray, Guraghe, Silte and Other ethnic groups with respective proportion of 23.6%, 6.9%, 3.8%, and 3%. The proportion of Amhara and Oromo in the Woreda is higher than the city level of 45% and 19.1% respectively (CSA, 2010).

CHAPTER IV: DISCUSSION AND PRESENTATION OF RESULTS

4.1. Introduction

This part of the paper will deal on the challenges of sustainable development in and the visions of the inhabitants of 'Korea sefer' on the future transformation of the site. The data collected on spatial, economic, social and environmental dimensions of sustainability will be duly discussed and presented together with the options cited by the inhabitants on how to transform the study area in to amore liveable neighbourhood. Furthermore, the situations in the study area have been presented and interpreted in maps, tables, graphs and texts.

4.2. Spatial issues of sustainable neighborhood

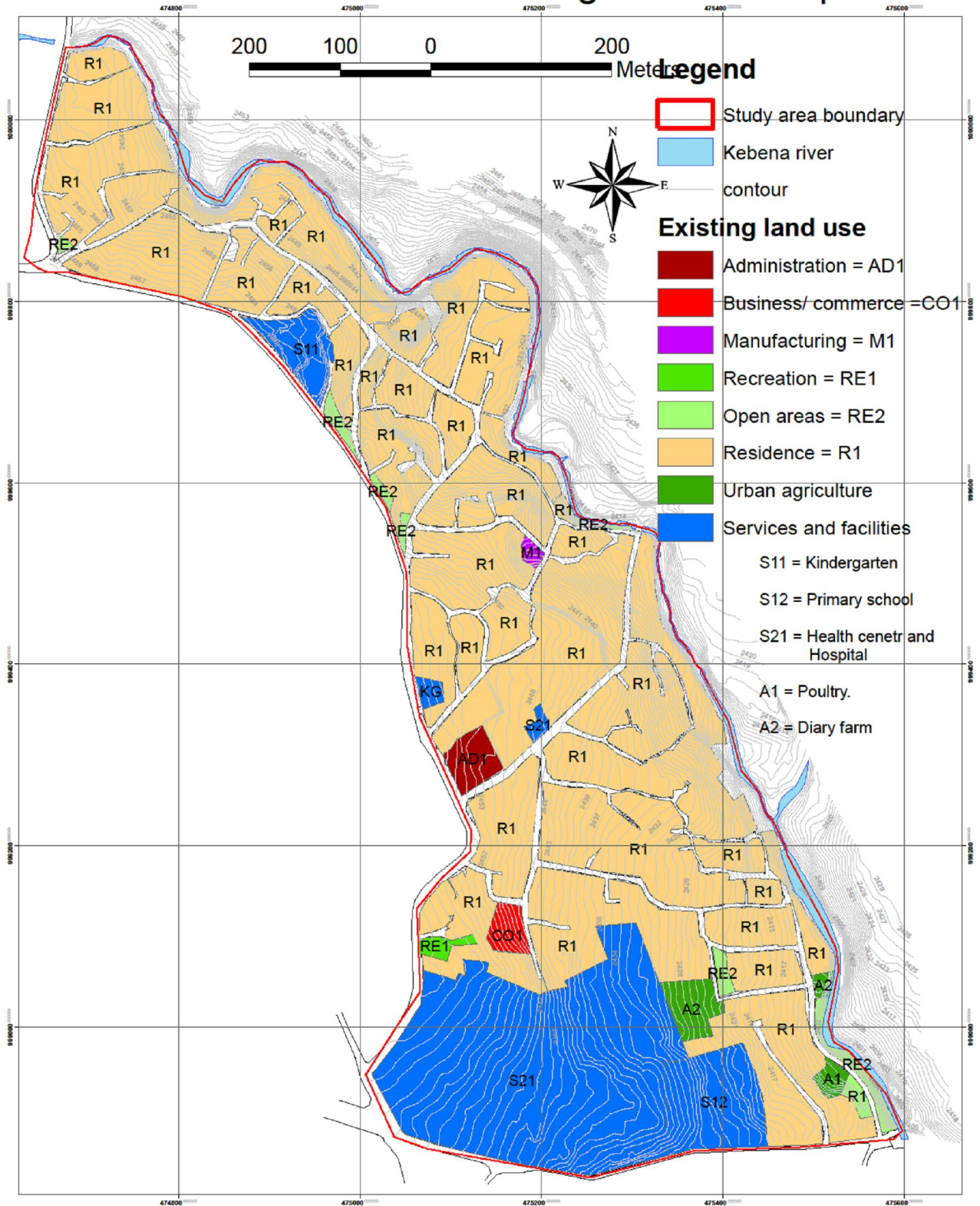
a) Existing land use

'Korea sefer's existing pattern of land uses, buildings, and infrastructure is the result of the neighbourhood's long history of residential development. Located at the north eastern part of Addis Ababa, settlements along Kebena River, on steep slope and limited accessibility and availability of social services accompanied by lower vegetation cover made the site unsustainable.

Assessment of the existing land uses of the study area is the major part of this study. The existing development is estimated to cover an area of about 40 hectares. During the land use inventory of the site, major land use type, land use distribution, locations, land use compatibility/functional integration, density, settlement pattern, hazardous area used for settlement like land exposed to land slide, flood, solid and liquid waste dumping area, steep slopes etc. have got due attention.

Map4.1existing land use map of the study area.

Korea sefer exixsting land use map



Source: field survey, 2011

Inventory of the land use has been carried out by the use of base map of Addis Ababa city and the data were supported by taking pictures. Observations have also been carried out. Interviewing people and conduct formal meeting with professionals, higher officials of the Woreda administration have been used as an input for analysing the existing land use.

The land use compositions of the study area are: Residential areas, the major land use of the site, encompass home based small shops /Kiosk/ attached to residential premises. Administration which represents the Woreda administration, while services and facilities include municipal services related to Hospital, health station, schools. The land use classification of business and commerce designates open and shaded market and small shops found in the study area. Manufacturing signify those micro and small scale enterprises operating in the study area and it includes wood works, food items preparation, and metal work. Open areas and recreation indicate open/idle vacant land in the site and Woreda administration recreation centre respectively. Urban agriculture symbolizes those urban agricultural activities including poultry, dairy farms, and mushroom production found in the study area.

b) Compatibility of land use components

The compatibility issue is viewed against the land use and environmental and/or landscape compatibility. The land use incompatibility is seen with reference to the Menelik II hospital with its adjacent land uses i.e. residential and urban agriculture practice. The conflict of these areas lies on the liquid waste and land pollution caused by emissions from the hospital. Moreover it is attached to lack of appropriate buffer zone between the hospital and the adjacent land uses. On the other hand the environmental incompatibility is viewed against the occupation of environmentally sensitive areas by human being i.e. settlements on slope greater than 15% and along flood zones.

Pic 4.1 waste released to urban agriculture

from Menelik II hospital



Pic. 4.2 houses found along river banks



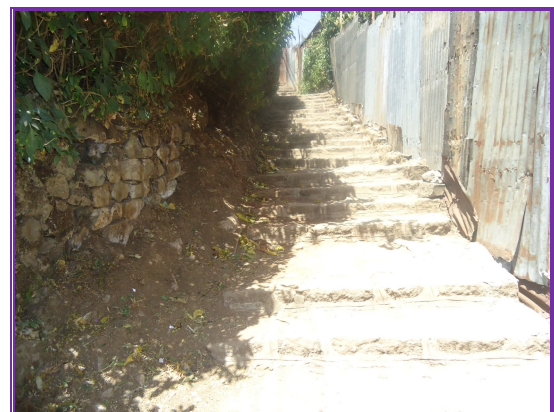
Source: field photograph

c) Existing road network and circulation

According to the site observation and base map of Addis Ababa city the road network and circulation covers about 15% of the total area of the site which accounts for 6 hectares of land. Hence, the road density of the site is within the acceptable range of urban planning practices. However, the road width, functional hierarchy and provision of accessibility is very poor with lack of proper drainage and maintenance.

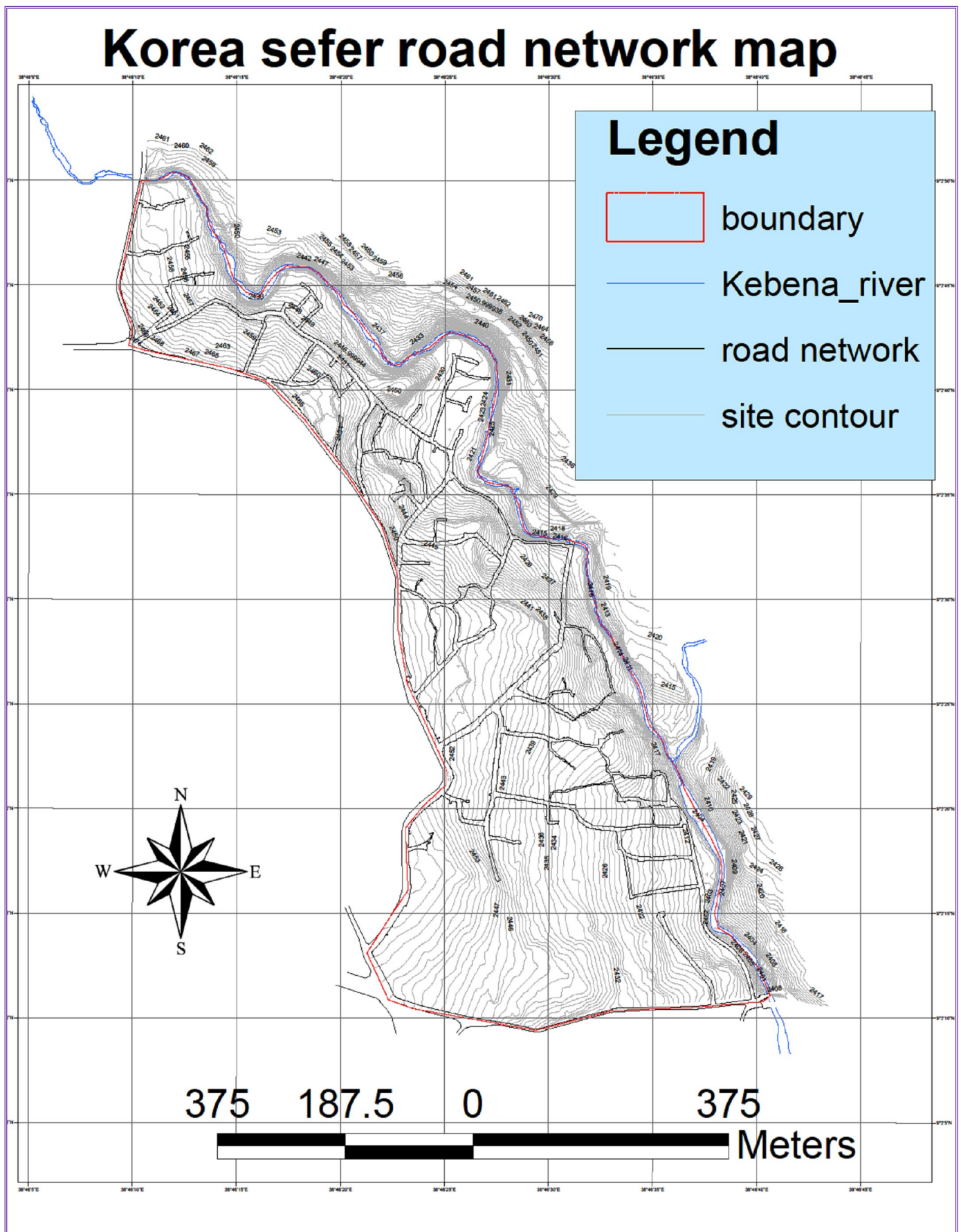
The circulation of vehicles and human being within the site has been impeded by the steep slopes and the narrow width of the roads in the site. Thus, some parts of the site are accessed by external long steps which are not comfortable for elderly, women and children. Other roads are inaccessible for facility vehicles i.e vacuum and waste trucks which contribute a lot on aggravating the health problems of the study area.

Pic 4.3 circulation and road condition in the study area



Source: field photograph, 2012.

Map 4.2 road network of the study area



Source: Addis Ababa structure plan and site observation.

The road surface finish is flagged stone taking the major proportion and the site is bounded by asphalt road on three directions except the areas bounded by Kebena River which is unpaved. Furthermore, the steep slopes in the site are accessed by stepped access without intermediate landing.

d) Water supply

The water supply for the study area is obtained from the reservoir located near Jan-meda. Consequently, 68% of the respondents have private tap while 23.5 uses shared type of water tap in the study area. Those dependent of public tap are about 3.6% and rent from the private tap accounts for about 4.1%. The public tap users are complaining about the sustainability of the services rendered since most of the taps are not functional.

Pic 4.4 non- functional public taps in the study area.



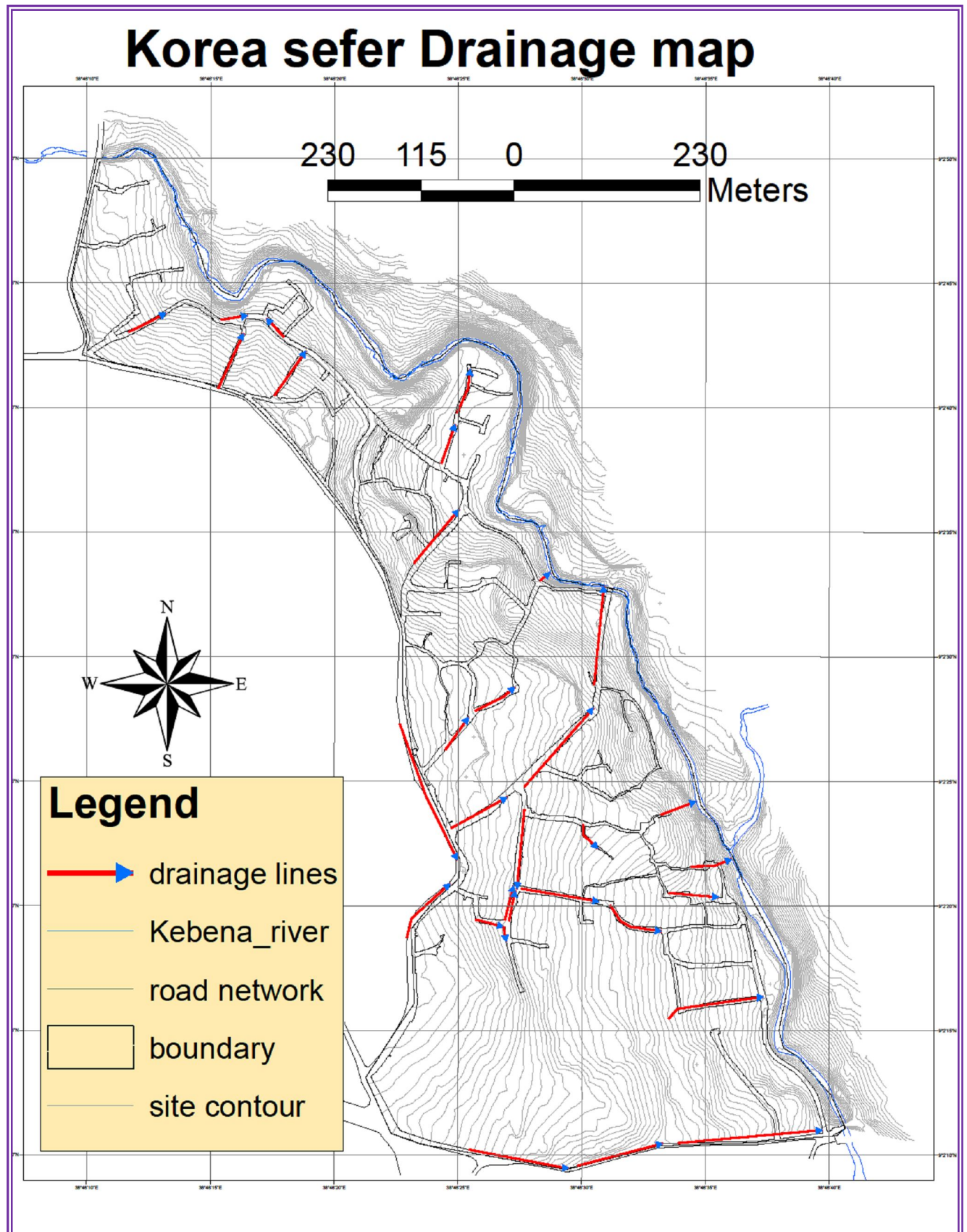
Source: field photograph, 2012.

Those inhabitants who were the beneficiaries of these public taps are now forced to buy water from private taps with a cost that is significantly higher than the public one.

e) Storm water drainage

The study area is found within the Eastern Drainage system of Addis Ababa. Generally, because of the nature of terrain, in most parts of the study area, streams and rivers flow is south-east direction.

Map 4.3 Drainage map of the study area



Source: Addis Ababa city base map

The existing drainage lines and open ditches are not well maintained and sufficient to provide the required services particularly for storm water management since they are clogged by wastes disposed directly in to the drainage lines.

Pic 4.5 open ditches clogged by wastes



Source: field photograph, 2012.

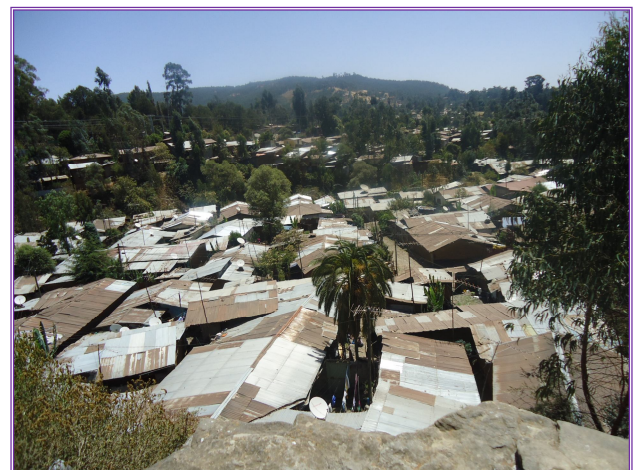
f) Housing density

To safeguard the safety and security of housing areas at the city core, the density should be maintained at 650-2000 residents/ha by encouraging the change of housing typology from single to multi-story walk-up buildings (ORAAMP, 2002:52)

Housing density is calculated by taking the number of buildings to the total area that it is subject to. Hence, the density for the study area is derived for the three different stratas i.e. slope below 15%, greater than 15% and along river flood zones.

Thus, the housing density on slope less than 15% is 233.11 buildings per hectare while those on greater than 15% reaches 219.18. However, there is a significant variation along river flood zones which accounts for about 160.75.

Pic 4.6 houses with limited accessibility.



Source: field photograph, 2012.

The houses are single storey, congested with no neighbourhood green and open spaces, carrying out household as well as community activities. Moreover, the density also reveals that there is no retaining walls or appropriate river buffers delineated.

g) Soil

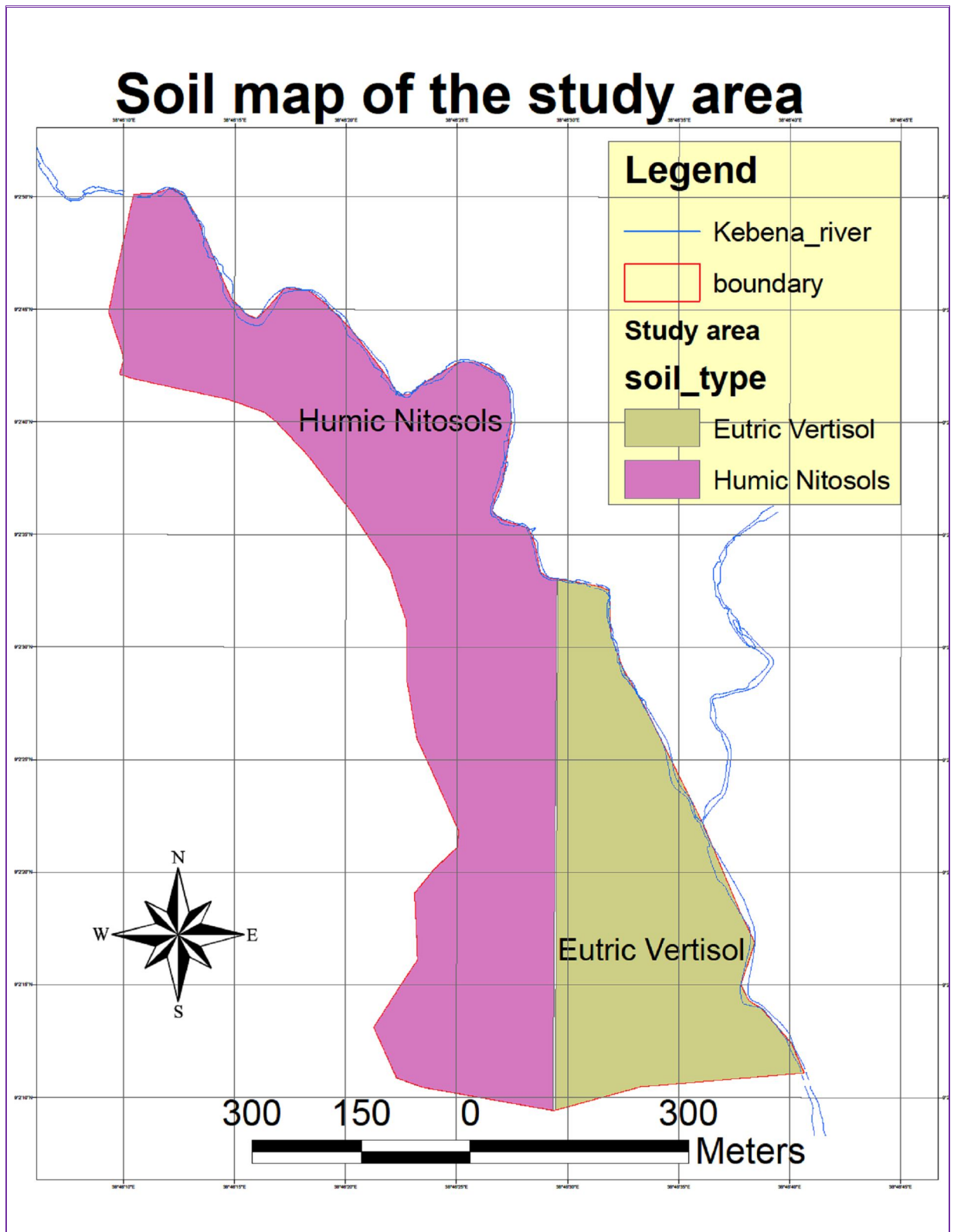
Site planning requires an understanding of soils and how they affect hydrology, construction, erosion control, and plant growth. The surface condition and structure of a soil largely influence how much runoff will result from precipitation. Soil, therefore, is an important factor considered in the design of human settlements and dealing with sustainable urban/neighbourhood development.

The development, type, texture and fertility (quality) of soil is dependent on the natural elements such as parent material, climate, vegetation, slope and micro-organisms. Moreover, cultural impact and interaction of man also contribute for the development of soil.

According to FAO soil classification 2004 the major soil associations found in the study area are Eutric Vertisol and Humic Nitosols.

The Map- below reveals that the soil types in the study area are vertisol and nitosol soil groups. Vertisols soil groups are a soil in which there is a high content of expansive clay that forms deep cracks in drier seasons or years. It is typically formed from highly basaltic rocks such as seasonally humid or subject to erratic droughts and floods, or to impede drainage. Depending on the parent material and the climate, they can range from grey or red to the more familiar deep black (black cotton soils in East Africa).

Map 4.4 soil map of the study area



Source: FAO soil classification 2004

The natural vegetation of vertisols is grassland, savannah, or grassy woodland. The heavy texture and unstable behaviour of the soil makes it difficult for many tree species to grow, and forest is uncommon. Furthermore, Rain fed farming is very difficult because vertisols can be worked only under a very narrow range of moisture conditions: they are very hard when dry and very sticky when wet.

Nitosol are among the most productive soils of the humid tropics. The deep and porous solum and the stable soil structure of Nitosols permits deep rooting and make these soils quite resistant to erosion. The good workability of Nitosol, their good internal drainage and fair water holding properties are complimented by chemical (fertility) properties that compare favourably to those of most other tropical soils. Nitosols have relatively high contents of weathering minerals and surface soils. It may consist for several percent of organic matter, in particular under forest or crops. Nitosols are planted to plantation crops and also widely used for food crop production on small holdings. Nitosols are hard when dry, very friable when moist and plastic when wet. Furthermore, most intensively cultivated soil because they are friable, have high moisture storage capacity and stable structure. They lack base minerals like sodium, calcium, and they are rich in iron and aluminium.

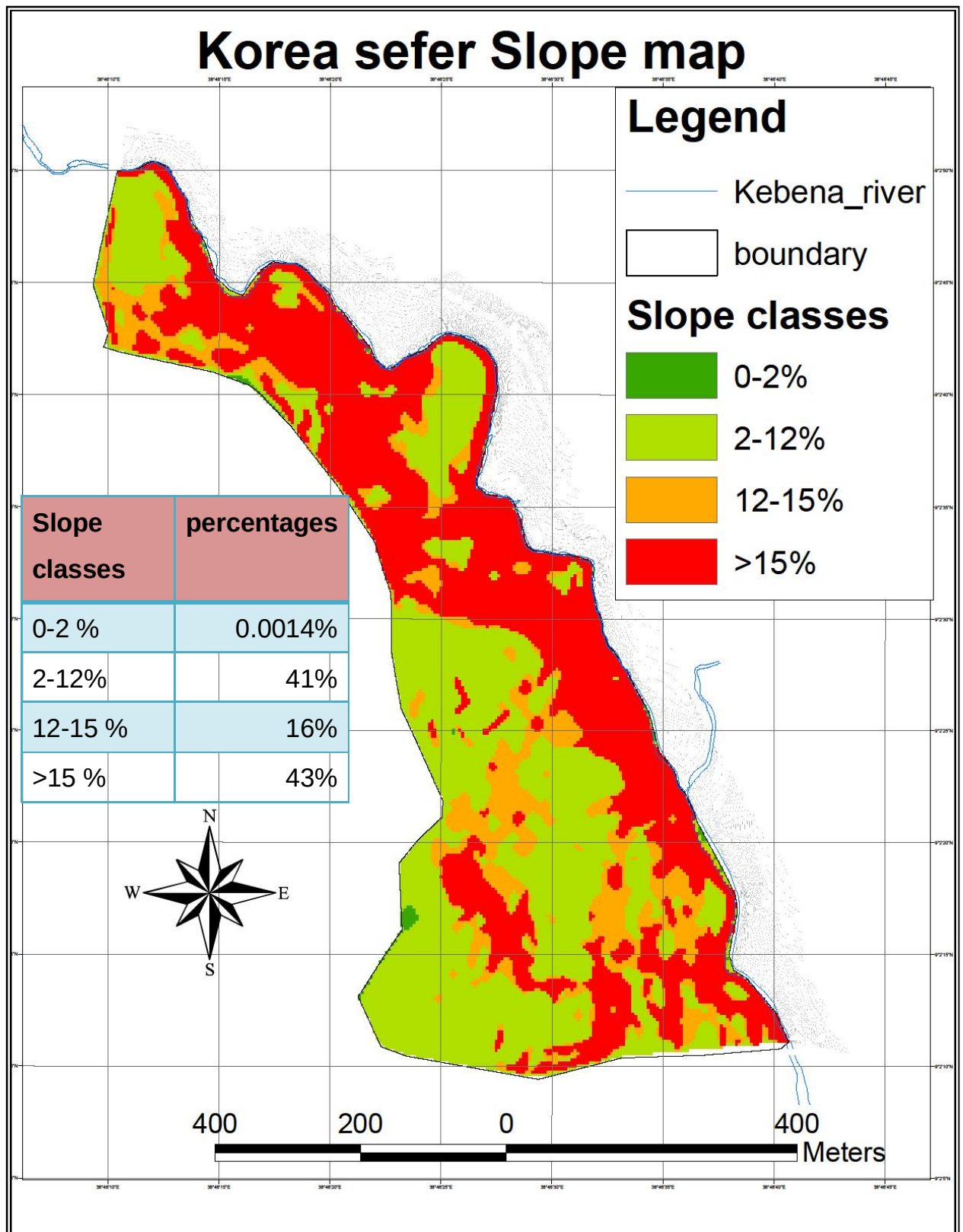
Therefore based on the above characteristics of the two soil type, Vertisols are more favourable for recreational functions where the possibility of structural developments are very minimal while the Nitosols are suitable for locating any kind of urban facilities.

h) Slope and Site suitability analysis

Slope analysis

Slope mapping is derived from topographic maps and it is expressed in terms of percentage. Therefore a slope map for the study has been prepared with four classes as per slope requirements of Addis Ababa structure plan (ORAAMP, 2002) and neighbourhood design manual (2006). Accordingly, the slope classes considered are based on the nature of the steepness of the site and its suitability to support different neighbourhood functions. The classes are 0-2% indicating terrain where the area is swampy or frequently affected by floods, 2-12% and 12-15% which are suitable for settlements particularly low cost housing schemes and slopes > 15 % that are more suitable for urban/neighbourhood green frame.

Map 4.5 slope map of the study area.

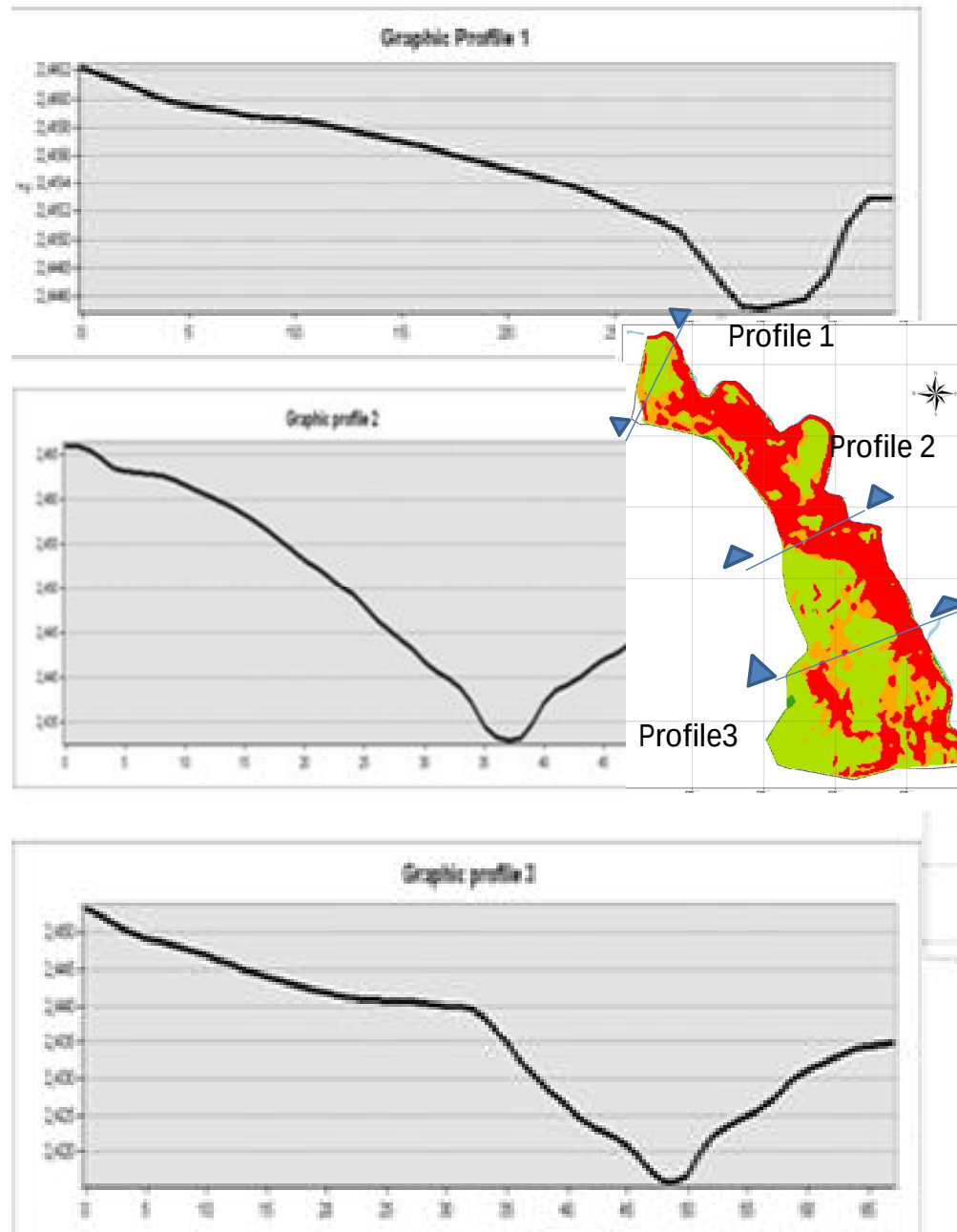


Source: own computation.

According to the above map about 43% of the study area has slope greater than 15 percent which are not suitable for settlement development as per Addis Ababa structure plan. But with the adaptive strategies such terrains can be made suitable for human settlements. On the other hand, 41% of the site is covered by slopes between 2-12% and 16% is taken by slope range between 12-15%.

The next graph shows the cross-sectional views of the site taken at different points.

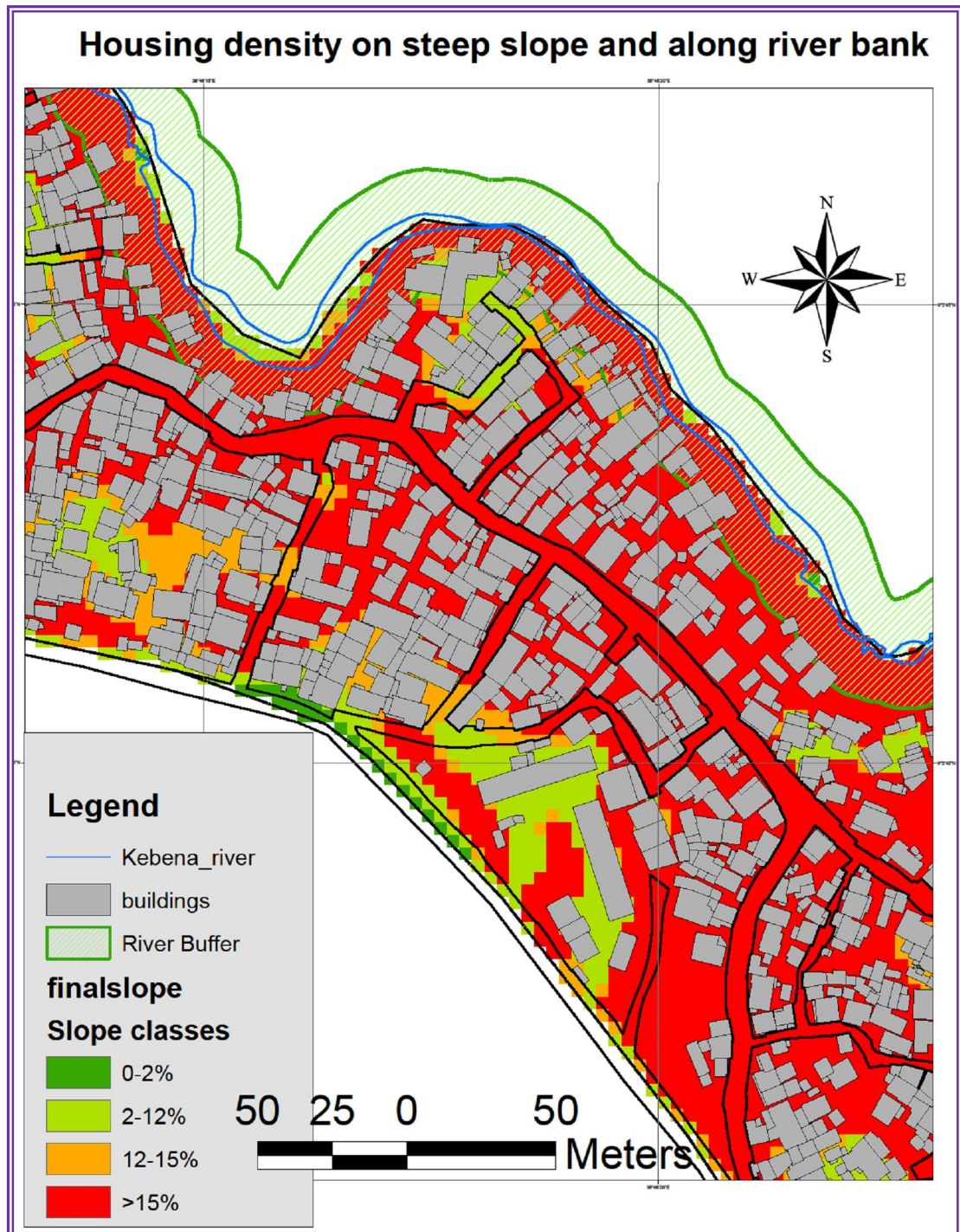
Map4.6 slope profile of the study area



Source: own computation, 2012

Conversely, taking the relationship and cross tabulation between slope and settlements there are about 50% of the households situated on slopes greater than 15% and along river flood zones. These areas need both adaptive and proactive strategies to transform. The proactive strategies will be applied to those settlements found along river banks.

Map 4.7 cross tabulation of slope and housing density



Source: own computation, 2012.

Suitability analysis

Land suitability analysis takes baseline information further, combining sometimes diverse spatial data to assess the land's intrinsic capability for different uses. It can be used to screen sites for a particular use, gauge vulnerability of sensitive areas for certain uses, evaluate development pressure, and develop comprehensive land use plans.

The suitability analysis for this study is conducted by 'gestalt method' which insists on the physical observation or interpretation of the aerial photographs and images of a specific site. Hence, based on the field survey and the slope analysis made with respect to the provisions of the Addis Ababa structure plan (ORAAMP, 2002, pp65) the following areas within the study site are not suitable for settlement development. Conversely these areas are more suitable for activities related to recreation, open spaces, urban forest, among others. Slopes greater than 15% and less than 2%, and river flood zones are not suitable for settlement developments and need to be conserved for other neighbourhood functions and amenities such as forest, recreation areas, urban agriculture, etc. but slope between 2-12% can be used for any settlement related proposals with due consideration on the rise and fall of the area or the contour line. However, with the aim of this paper, utilising adaptive strategies can help to mitigate the social and spatial problems attributed to slopes.

4.3. Socio-economic issues of sustainable neighborhood development in the study area

4.3.1. Economic issues

Human development and the achievement of human potential require a form of economic activity that is environmentally and socially sustainable in this and future generations (Malcolm, 2012). Thus, the idea of economic sustainability is to promote usage of those resources that are both efficient and responsible, and likely to provide long-term benefits. In the case of a business operation, economic sustainability calls for using resources so that business continues to function over a number of years, while consistently returning a profit (ibid)

On the other hand, the assessment on economic issues of sustainable development is geared towards identifying employment/unemployment status and the associated efforts and constraints in the study area.

According to the sample survey conducted for this study 66.3% of the respondents are employed while 29 % are unemployed and the remaining 4.7% are retired due to age. Among the employed those working in private institution make up 38.1% followed by those working in government institutions which accounts for about 34.13% the share of self employed is about 21% where they are either organized under MSEs or engaged in economic activities that require minimum capital and skill. Those working in NGOs take only 6.31% from the total employed.

Those self employed who are willing to take part in MSE related job opportunity can be organized in either cooperative, group or create their own private enterprise. In addition they can choose the economic sectors i.e. construction, urban agriculture, solid waste collection, textile, preparation of food items, wood and metal work, and coble stone, and other i.e. loading and unloading of coffins, beauty salon, night parking, video and editing, etc.

The MSE office of Woreda 04 will grant the enterprises work permit after undertaking intensive review of business feasibility study and the amount of jobs potentially created. Furthermore, the enterprises can obtain technical and financial support from the office.

Hence, with the economic sectors the office has organized and created jobs for the residents under the three modes of enterprises: namely cooperatives, groups and private enterprises. Hence, 21 cooperatives, 11 groups and 10 private enterprises have been established with the support obtained from the office since 2008.

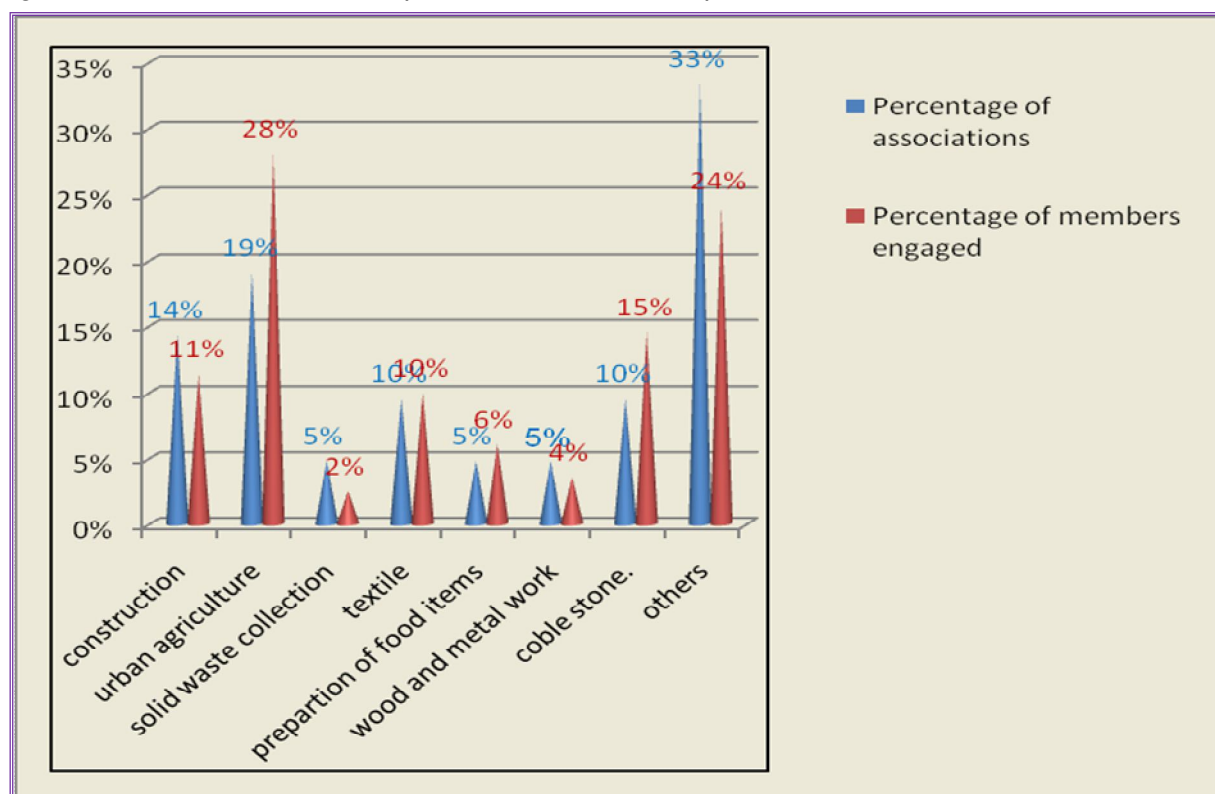
The residents choose to organize in cooperatives having the highest number of members (282) followed by group (85), the members for private enterprises (10) in all economic sectors (woreda 04 MSE Office, 2012).

The role of MSE cooperative enterprises in creating jobs in the study area

The Woreda MSE office has organized 21 cooperatives to engage in economic activities and contribute their share in the reduction of unemployment in the woreda and particularly in the study area. Hence, the cooperatives are organized under various economic sectors that potentially won the attention of their members.

Each economic sector has different amount of members. The table below reveals the members and number of cooperatives registered under each economic sector.

Fig 4. 1 economic sectors and respective members of enterprises established.



N.B = others –loading and unloading of coffins, Beauty salon, etc

Source: woreda 04 MSE office and own computation 2012.

Based on the above table about 33% of the cooperatives are willing to engage in economic activities that require labour and muscular fitness i.e. to the loading and unloading activities of coffins. This is followed by urban agriculture where 19% of the cooperatives are engaged in. On the other hand least number of cooperatives are registered under solid waste collection, preparation of food items and wood and metal work each constituting about 5%. The share of coble stone and textile is about 10% each.

However, the figure also revealed that about 28% of the members of the cooperatives need to engage in urban agriculture where they can undertake dairy farm, poultry, mush rooming, and horticultural related agricultural activities.

Alternatively 24 % of the members are organized under economic activities that need labor and the activity depends on the market demand such as loading and unloading of coffins from and to Menelik II hospital. There is least demand by the members of the cooperatives to take part in economic activities related to the collection and disposal of solid waste and it constitutes about 2%. The reason for this is that the

members do not feel comfortable with the task and the geographic location of the site is cumbersome for the tasks to be carried out.

Most of all the significance of these cooperatives lies on their potential for creating jobs for other individuals. Hence, they have created overall jobs for about 14 additional individuals in addition to the economic benefits that their members have obtained. Thus, they have created jobs for a total of 296 individuals.

Pic 4.7 urban agriculture established under cooperatives enterprises.



Source:-field photograph, 2012.

Pic 4.8 textile and leather MSE enterprises



Source: field photograph, 2012.

Nevertheless, the economic sustainability of these cooperatives is highly hampered by the efficient and effective use of input resources with reduced wastes as well as quality of final products. Moreover, the issues of space have paramount effect on

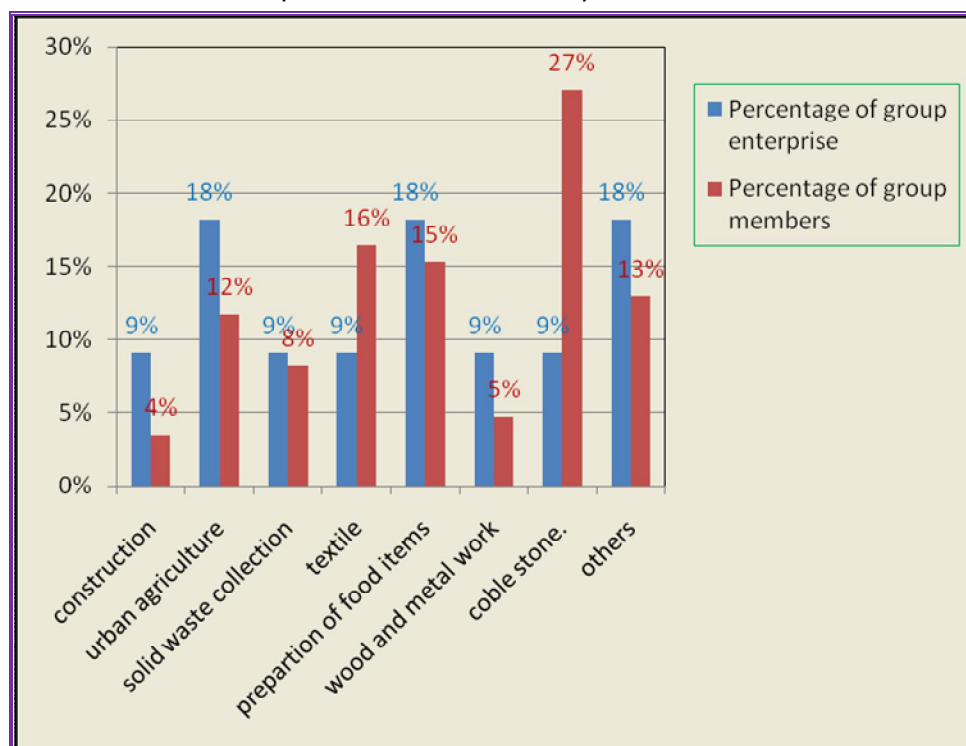
their sustainability accompanied by poor skill to diversify products. Hence, their profitability is insignificant even to cover their initial cost.

The role of group enterprises in employment creation

Creating job opportunities need to consider wider and multiple options to attain the concept of sustainable development and promote economic efficiency in an urban/neighborhood setting. Thus, the MSE office in the study has organized individuals under a group enterprises in line with the cooperatives established with different economic sectors since 2008.

Hence, the total numbers of group enterprises in the study area are 10 and their members and respective economic sector is presented below.

Fig 4.2 economic sectors and respective members of enterprises established.



Source: woreda 04 MSE office and own computation, 2012

The figure above shows that there are equivalent number of group enterprises that are engaged in urban agriculture, preparation of food items and other loading and unloading activities and each of these economic sectors takes about 18% of the enterprises. In addition to these, the share of construction, solid waste, textile, wood and metal work, and coble stone is about 9% for each.

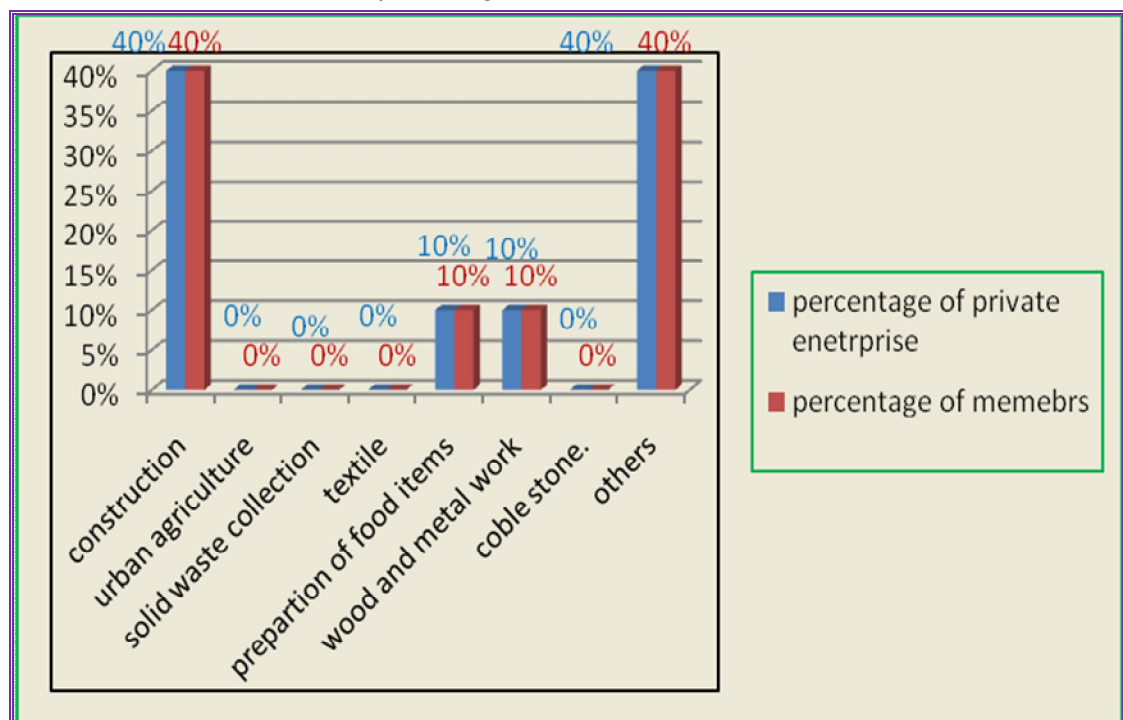
Nevertheless, these facts are not adequately supported by the number of members each group enterprise has. Hence, the demand to engage in construction activities and, wood and metal work related activities is very low i.e. 4 and 5% respectively which attributed to the absence of jobs in the study area. Conversely, with respect to the demand to engage in coble stone took 23% of the total which is attracting the attention most of the unemployed persons due to the recent focus given by the government for this economic sector. The second most demanded economic sector is textile which accounts for about 16%. The percentage share of preparation of food items and urban agriculture is about 15% and 12% respectively. The share of solid waste collection is minimal with 8% of the members engaged in the task.

The group enterprises have created job for 7 individuals residing in the study area apart from the total job created for their members i.e. 85.

The role of private enterprises in creating job opportunities in the study area.

The creation of job opportunities through private enterprises allows mobilizing individual investment, knowledge and promotes the exchange of experience and expertise between the owner and the potential employees. Hence, with this justification and the need to curb the situation of unemployment in the study area the Woreda MSE has granted work permit and provided working space for private enterprise.

Fig 4.3 economic sectors and enterprises organized under woreda 04 MSE office.



According to the graph above the private enterprises are keen to engage in various economic activities in the study area. Hence, 80% of the private enterprises are established to take part in the construction sector and loading and unloading activities that do not require much initial investment having short return on profit. Preparation of food items and wood and metal work constitute about 10% each. There is no private enterprise willing to participate on urban agriculture, solid waste collection, textile and coble stone.

Pic 4.9 private enterprises organized and producing various goods.



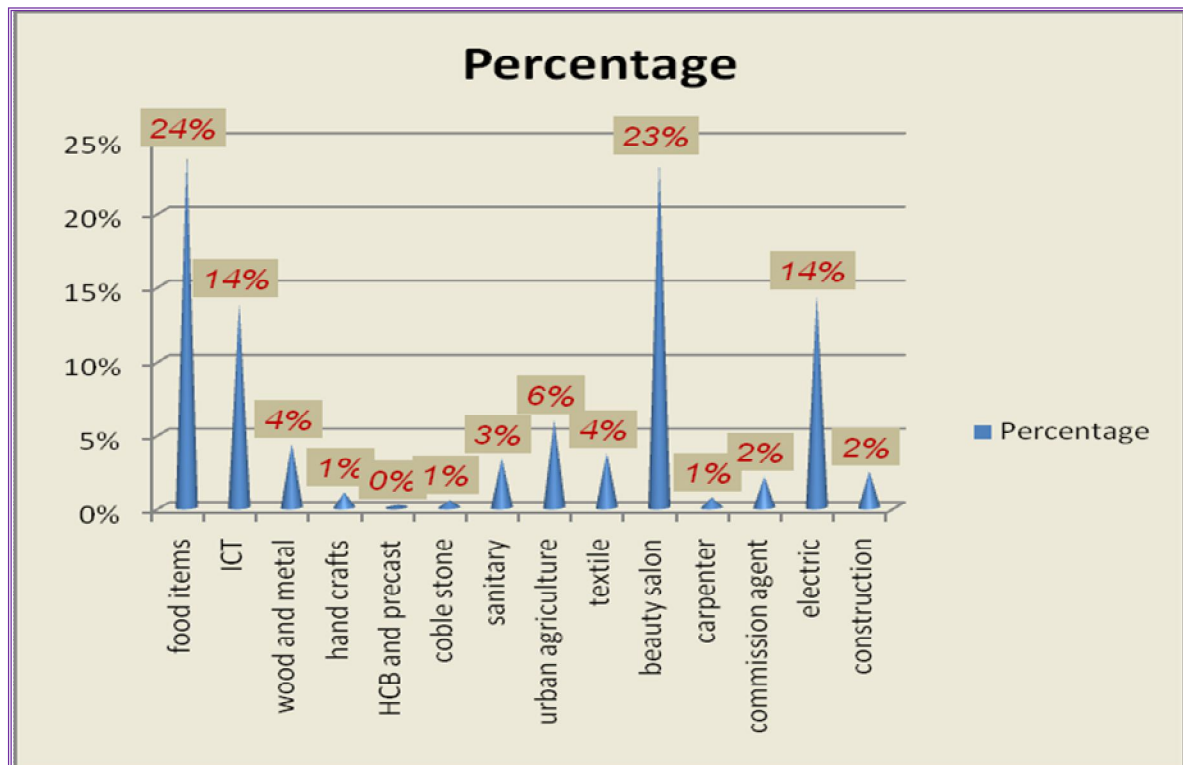
Source: field photograph by the author, 2012

Employment opportunities desired by the unemployed individuals in the study area

The unemployment rate in the study area seems lower than city wide unemployment rate (27.9% CSA-2009). The MSE office in woreda 04 has created and is creating job opportunities to the inhabitants although there are problems related to market linkage and space requirement for production and display of finished products.

The efforts to promote sustainable livelihood and economic efficiency lies on the assessment made on the economic sector that the unemployed individuals want to engage in the future. Hence, respondents sampled for this paper are interested to participate on economic activities of food items preparation, beauty salon, and construction, among others as depicted on the following graph.

Fig 4.4 need assessments of unemployed residents in study area



Source: the MSEs office in woreda 04 and the author, 2012.

The figure above reveals that 24% of those unemployed respondents want to engage in economic activities of food items preparation which is followed by beauty salon which constitute about 23%. The reason to engage in these activities is attributed to the limited training, little initial investment, and small working area required by the sectors. These sectors are followed by ICT and electric related tasks, each constituting about 14%, which indicate that there are potentially skilled but unemployed member of the society who like to join the work force but failed to do so by the absence of opportunities.

Sustainability of the economic sectors and their operation in the study area

Though employment opportunities are created in the study area the demand assessment made show that there are problems associated with the operation of the different enterprises established. The members of the enterprises have responded that their business is not sustainable (i.e. resources are not utilized efficiently and effectively, no product diversification, etc) since there are problems related to market linkage, appropriate training, small or no space for working and display of produced goods, and financial support accompanied by lack knowledge on producing diversified products.

Moreover, the enterprises organized in the Woreda MSE are not working in their area of establishment but far from their neighborhood. For instance, the coble stone enterprises are forced to work around 'Lagatafo' and 'Hana Mariam', coble stone training centers some eighteen Kilo meter far from the study area. These enterprises, even though they like their jobs, are complaining about the transportation cost that took much of their daily income. The other economic sector in this respect is the construction sector. The limited job opportunities available in the study area have forced these enterprises to go out in to the neighboring Woredas in search of a job.

The urban agriculture activities in the study area are carried out through the customary ways of producing milk, egg, and mushrooms. The location of these activities along the river made the quality and quantity produced to be insignificant due to mismanagement and lack of appropriate training accompanied by small working premises.

The other basic component for the economic un-sustainability is the failure to produce diversified products and utilize the wastage of the primary products for other economic benefits. Product diversification, efficient and responsible utilization of resources, can reduce economic volatility and increase real activity performance.

However, integrating various economic activities that go hand in hand and promoting product diversity are not well practiced and implemented in the economic sectors established in the study area.

Furthermore, the sustainability of the economic activities has been highly hampered by the market linkages so far created by the MSE office and the enterprises themselves. According to the officials of the MSE office and the members of the various enterprises interviewed, the search for market is left to the MSE office which is officially assigned to provide technical and financial support based on the demand assessment and business development service requirements. The search for 'exhibitions, is left for the cooperatives who have little knowledge and information on the potential benefits to be harnessed from the services.

4.3.2. Social issues

Social Sustainability is the core element of sustainable development. Essentially sustainability is about creating and maintaining quality of life for people. Social sustainability involves protecting the mental and physical health of all, encouraging

community, treating all fairly, and providing essential services. These elements are essential because a healthy society cannot be developed and maintained if the population are in poor health. If they are treated unfairly then it will only be a matter of time before they protest, and community fosters the sense of personal and collective responsibility necessary for a society to operate effectively without degenerating into chaos. It is also critical that essential services are effectively delivered to everyone who needs them.

According to a study conducted by CUI 2011 the most important factors that influenced peoples decision to move into and/or stay in a neighborhood are existence of family and friends nearby, quality and cost of housing, availability/quality of schools. Other factors that influenced their decision include transportation options, availability of amenities, and availability of stores and shopping and low level of crime.

Hence, the social sustainability is measured more in respect to physical amenities: the availability and accessibility of nearby schools (Kindergartens, elementary and high schools), Shopping centers, health posts, and convenient access to amenities and outdoor recreation opportunities, parks & pathways, and level of crime.

a) Education

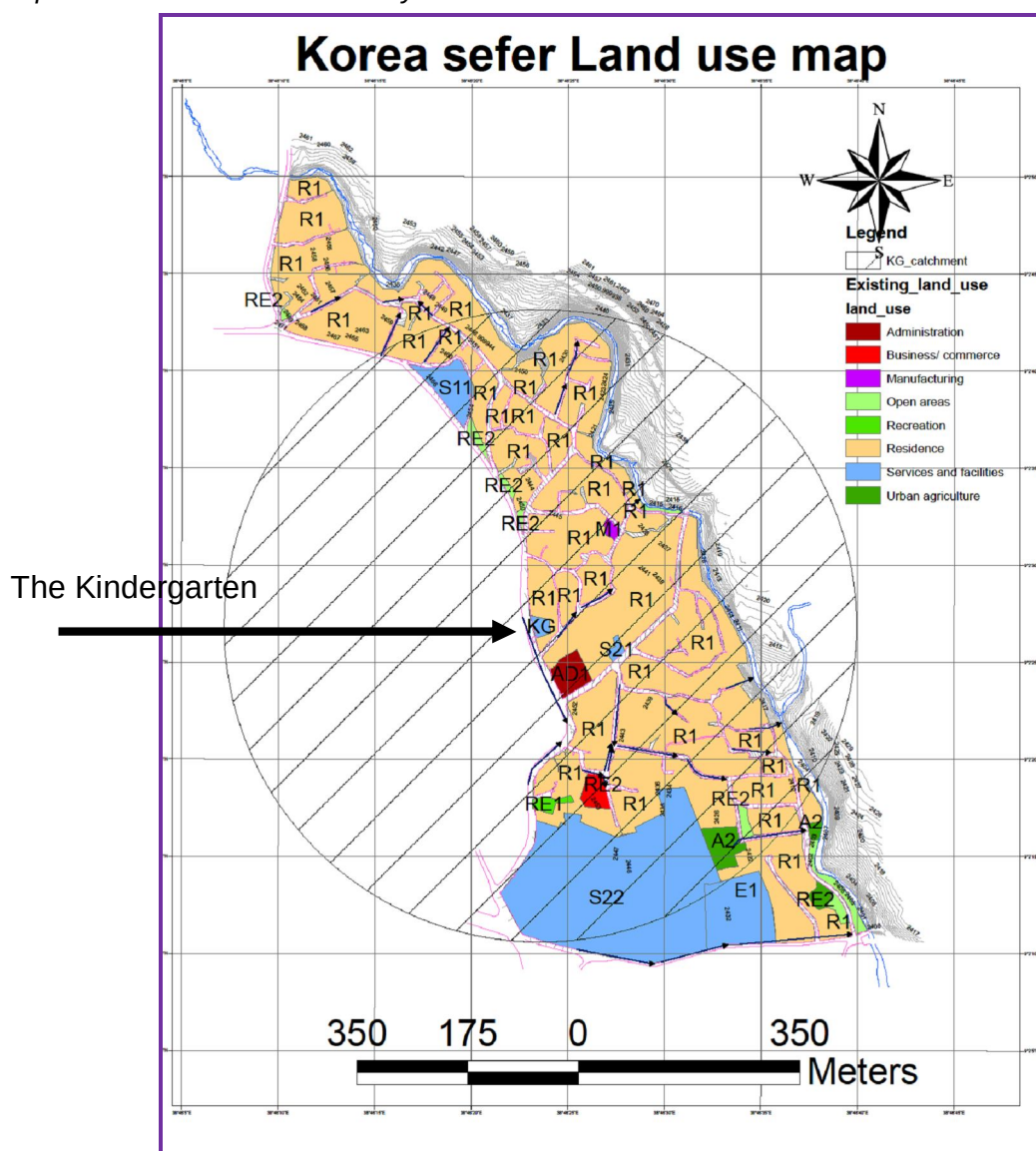
There is one public school, Addis Birhan built recently, and one missionary elementary and high school. Moreover, there is also one public kindergarten in the study area. The student-class ratio in the public school is 1:40 which is in line with national standard which stipulates the student class ratio to be 1:40 to grades 5-10. However, the student class ratio for classes 1-4 is above the national standard of 1:30 as it stands as 1:40(Woreda 04 education office, 2011).

According to the information obtained from the Education office, the major problems in the education sector are the absence of public kindergarten and small intake capacity of the recently built public kindergarten. The officer revealed that almost 80% of the students of the Woreda join grade one without attending kindergarten education. This has seriously affected the performance of these students and made them less competitive than their classmates who get the chance to go to kindergarten. The main reason for the student not to attend kindergartens is lack of publicly owned tuition free kindergarten before the academic year and un-affordability of the private kindergartens by many families.

The Woreda was able to construct kindergarten with the help of UNICEF and started admitting children of low income families in September, 2009. However, there is severe lack of chairs and tables in the kindergarten and have limited capacity to enroll all children who are in need of primary education.

Moreover, the accessibility of the existing Kindergarten (Annex 4) is far from the standards set by Addis Ababa Master Plan. According to the plan the catchment radius for Kindergartens is within 500-1000meters to cover user population of about 750 -1000. However, the existing Kindergarten is expected to give service for all the households in the study area further away by 1200 meters.

Map 4.8 KG catchment in the study area.



Source: site survey, 2012

The total number of population in the study area is about 11500 with 2151 households. Hence, based on the standard set by ORAAMP these numbers of population with the average catchment area specified may require two up to three kindergartens.

However, concerning the elementary and high schools, Addis Birhan and Adventist missionary, are located within the distance set by ORAAMP standards (ORRAMP, 2002). Accordingly, their catchment area falls in 2.5-3 kilometers with a total population of close to 10,000 – 12,000. The study area having a population of 11,500 has enough elementary and high school as per the standards.

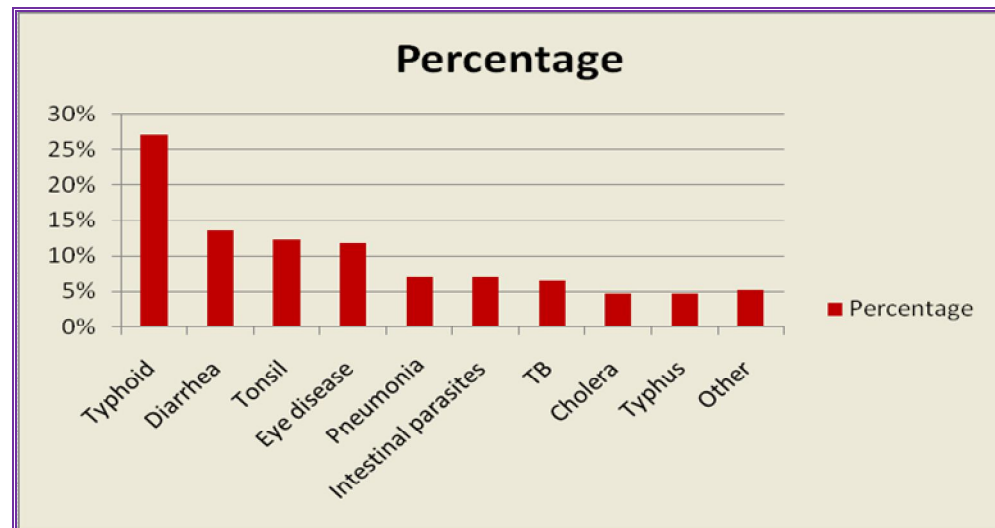
b) Health situations

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (CUI, 2011). However, lack of health services and poor living and health condition of urban residents is one manifestation of urban poverty.

There is one referral Hospital, Minilik II, in the study area which gives health services not only to the residents of the site but also to individuals referred to it from health institutions found in other parts of Ethiopia. Furthermore, the Woreda administration has constructed G+4 health center adjacent to its office but the center did not start delivering its predetermined services to the residents of the Woreda. Hence, the residents of the study area as well as the Woreda go far away from their area of living to other areas within the Yeka sub-city or other places. So the services of emergency health concerns are very difficult to act on.

However, based on the social study conducted by CUI 2011, of all the residents of the study area, 95% are found in good health condition, those chronically ill, aged, physically disabled, and mentally disabled are of 2.3%, 1.2%, 0.8%, and 0.7% respectively. Even though the proportion of the people with disabilities and chronic health problems seems very small, their absolute number is very significant. The following table summarizes the frequency and percentage status of health of the residents of the Woreda.

Fig4.5. Frequency and percentage distribution of the health status of residents of the study area



Source: CUI, 2011.

The above table revealed that diseases like Typhoid, Diarrhea, Pneumonia, intestinal parasites, Tuberculosis, Cholera and Typhus, which are most of the time the result of either poor sanitation or poor living condition or both dictate the list of major health issues in the study area. These diseases account for more than three fourth of the incidence of diseases in the Woreda. This, is mainly due to toilets built together with the shelter, over-crowded living condition, many users of single toilet resulted in poor toilet sanitation, over congested settlement with lack of access to fresh air, lack of separate dry and liquid waste collection, lack of hygienic playground for children, poor shelters exposed to wind breeze, poor economic capacity to treat already affected patients and dilapidated housing condition exposing residents to various diseases. Apart from these factors, the Health Officer of the Woreda has added over-crowded living condition in one house, river pollution, and lack of sanitation and contamination of water pipes with liquid wastes due to corroded pipeline as major factors contributing to the occurrence of the infectious diseases.

Likewise, based on the field survey conducted and the data obtained from the Woreda 04 Health office on the toilet facilities of the study area, 40% of the privately constructed toilets, and 97% of the shared ones are closed due to sanitation problem i.e. prevalence of excreta around the toilet, on its mouth, and the condition of the toilet door being dismantled and open. These have been done due to the inaccessibility of the toilets for vacuum truck.

Pic 4.10 unhygienic shared toilet.



Source: field photograph, 2012.

Besides, 20% of the households do not have direct access to toilet facilities such that they dispose their excreta on open fields, river banks or 'use night services' for sanitation.

Hence, the health problem in the study is aggravated by the presence of the aforementioned pathogenic and spatial factors.

c) Amenities

Neighborhood amenities include facilities such as Shopping centers, outdoor Recreation Opportunities, libraries, community centers, Parks & Pathways. The study area is endowed with tertiary market place established by MSE office and concern Ethiopia. However, these market areas are not enough and easily accessible for the residents since they are located near Menelik II Hospital.

The other amenity that the neighborhood lacks is recreational areas. There is only one public recreation area owned by the woreda administration. Nevertheless, Most of the respondents have revealed that they do not spend their leisure time in the neighborhood since there are no recreational areas that satisfy their recreational needs satisfactorily. Slight number of the interviewee responded that they use only the 'Lions Park' on special occasions, particularly during holidays and festivity times. Hence, the residents of the study area do not use recreational areas, parks, in their neighborhood which have its contribution on limiting the social interaction and affects the sustainability of the area.

Moreover, the woreda administration has started the construction of G+3 youth center before 3 years. However, the construction progress is highly affected by lack

of commitment, finance and problem on bidding process. So, the good opportunities to get neighborhood recreational activities have been greatly affected.

Therefore, the overall availability and accessibility of the neighborhood functions and amenities are very insignificant. Hence, the needs, aspirations and social interaction and requirements of the inhabitants of the study area are not well enhanced and assured as a result the study area is not socially sustainable.

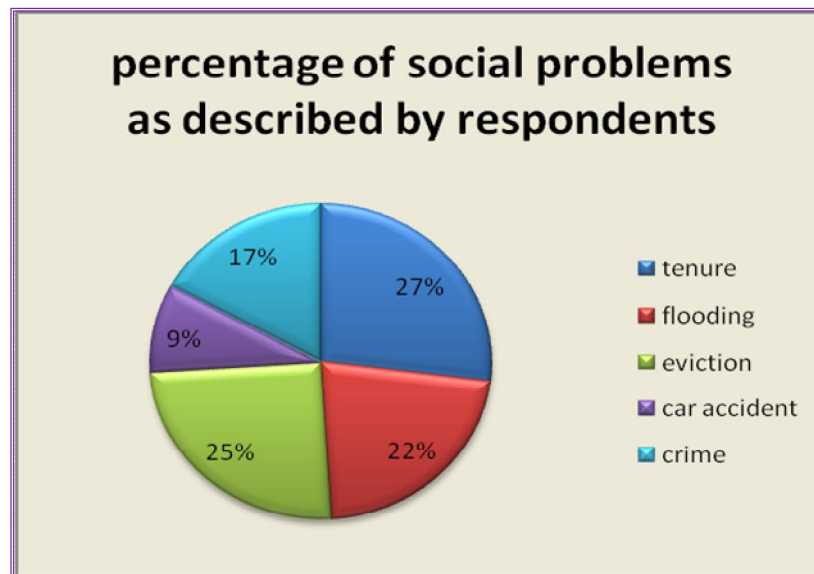
The problem of social interaction can be solved with the provision of walkways that are user and environmentally friendly. However, the existing access roads do not encourage elderly, children and women to take a walk in the neighborhood since the road are deficient of walk way facilities i.e. green trees, well maintained walkways, etc.

d) Safety and security issues

Human security means protecting fundamental freedoms: freedoms that are the essence of life. It means protecting people from critical (severe) and pervasive (widespread) threats and situations. It means using processes that build on people's strengths and aspirations.

However, the urban poor are faced with severe personal and tenure insecurities due to their housing status and condition. Hence, based on the sample survey conducted 27% of the respondents reacted that tenure security is their priority social problem. This is due to the fact that majority of the respondents are living in kebeles houses and fear that the houses will be demolished by government for the construction of condominium houses. The next social problem stated by the respondents is flooding which accounted for about 25%. This problem is highly related to the steep slopes of the site without proper drainage systems and the fact that many people live along river flood zones. On the other hand those with a problem of eviction accounts for about 22% due to fear of potential redevelopment activities to be carried out by government. The other social problem testified by the respondents is crime which takes about 17%, the problem more attributed to lack of street lights in the night times. The least amount is registered for car accidents taking about 9%. This is attributed to the accidents that occur on the main road, Russia Street, and the only outlet of the study area.

Fig 4.6 percentages of social problems in the study area



Source: field survey, 2012.

The prevalence of these social problems varies due to location and social status of the respondents i.e. gender, age, and even by member of the household surveyed.

4.4. Environmental issues in the study area

Environmental issues in an urban setting include issues related to the management of solid and liquid waste, the green frame, energy consumption and the presence of vegetation.

4.4.1. Solid Waste Management /SWM/

Waste management is global environmental issues which constitute a very significant problem in today's world (EiABC, 2011). It may be defined as the discipline associated with the control of generation, storage, collection, transfer, and transport, processing, and disposal of solid waste in a manner that is in accord with the best principles of public health, economic, engineering, conservation, aesthetics, and other environmental considerations, and that also respond to public attitude (ibid). On the other hand waste is the materials that are not prime products (i.e. products produced not for the market) for which the generator has no further use for own purpose of production, transformation or consumption, and which he discards, or intends or to discard (ibid).

Today SWM gives a meaning more than collecting trashes for incineration. Cities in the third world have a significant gap even in collecting wastes. The daily waste generation in Addis Ababa is estimated 0.252kg/capita/day. The current daily waste

generation of the city is 2,297m³. Of municipal waste per day, 65 percent (1,482m³) is collected (Tadesse et al, 2008) and the remaining 35 percent of waste is disposed off through informal means. Only small proportion goes to incineration and dumped on open sites, drainage channels, rivers and valleys.

The increasing problem of SWM currently prevailing in Addis Ababa have stemmed mainly from the pattern of development it followed throughout its history piling up for many years. Haphazard physical development without regard for sanitary and utility facilities characterized the development pattern of the city (Beyne, 1999 as cited on Tadesse et al 2008); the major generators of wastes in Addis Ababa are residential areas, hotels, industries, bars, restaurants, institutions, etc.

Accordingly, based on the data collected, observations and interviews made the majority of waste generator in the study area are residential areas which accounted for about 60 percent of the land coverage of the site. Besides these 98% of the household respondents revealed that some waste is collected by MSEs while the rest, 2%, are disposed off in to the river, open ditches and fields.

The most widely used solid waste management strategies practiced in the study area are source reduction, collection and disposal as described by the beautification office of Woreda 04.

The reduction of waste is made applicable with the awareness raising program made to the public without appropriate training on how to handle and segregate wastes according to their character and future use.

The collection of wastes generated is carried out by two MSEs: 'Tsidat Le-eidget (ዕዳት ለዕድገት)' and Tsidat Le-tena' (ዕዳት ለጤና).

The cooperatives are rendering waste collection services in a door to door scheme where the households put the wastes in bags for making it portable. However, the collection of wastes has been hampered by:

- The geographical location of houses which made most part of the study area inaccessible to collect wastes by MSE,
- The garbage containers are not collected and emptied properly in a timely manner and caused dirty corner, littering of the corner around the skips and encouraged illegal dumping,
- Lack of promotion on waste reduction, recycling and composting,

- Lack of properly designed collection points that reach inaccessible collection areas to reach every part of the city.
- Inadequate payment provided for the MSEs i.e. 30 birr per cubic meter of solid waste collected.

The study area generates significant amount of solid waste and it is collected by MSEs. However, the basic components of environmental sustainability related to solid waste management is very much lacking and there are no efforts to reuse, recycle, and compost the bio-degradable wastes in the site due to absence of composting area, lack of training, and management problem. Hence, the potentially economic benefit to be harnessed from this activity is missing and contributed its share for the un-sustainability of the study area.

Pic 4.11MSE collecting wastes



Source: field photograph, 2012.

Even though the proportion of wastes not collected by MSEs seems very low compared to the actions of the MSEs, their potential health and ecological impacts are significant with a high river pollution and repulsive odour exhibited.

Pic 4.12 Animal manure and solid waste dumped on river bank



Source: field photograph, 2012

4.4.2. Liquid waste

The state of surface water pollution in the city of Addis Ababa is similar with the reality in most developing countries. The level of water pollution tends to rise with increasing human population and low level of economic development in the city.

Most of the streams within Addis Ababa's City boundaries show a significant degree of pollution. In the dry season in most neighbourhood of the city, the different watercourses turn into open sewerage, draining the wastewater of neighbourhood areas (Addis Ababa city Water and Sewerage Authority, AAWSA, 1993). The dark colour of flow in the different waste course indicates the high rate of effluents from septic tank or latrines. It results in health hazard particularly for poor communities of the city.

The discharge of untreated effluents and wastewater from households, establishments and industries that are built alongside the rivers, are the main sources of water pollution in Addis Ababa and the study area in particular. Thus, wastes generated from domestic activities are the main threats to cause surface and ground water pollution in 'Korea sefer'.

Liquid wastes discharged into the river through different drainages lines, domestic liquid waste from overflowing and seeping pit latrines, septic tanks, public and communal toilets, open ground excreta defecation and grey water from Kitchens and bathrooms flow through different drainage lines.

According to the sample survey conducted for this study, 34.2% of the respondents assured that they release waste water directly to the river system without any treatment mechanisms while around 41 % use open ditches/drainage lines which are

directly connected to the river system and the lines are clogged by solid wastes and the area line have repulsive odour for the residents of the neighbourhood. Furthermore, 20.4% revealed that they use their septic tanks to dispose and collect the waste water. However, the septic tanks are not well constructed and could pollute the ground water by seeping into the ground. On the other hand only 4.1% are releasing their grey water on open fields, streets and their plots. The study area does not have sewer line to facilitate the disposal of liquid waste and its proper treatment.

Pic 4.13 open ditches and river bed filled with liquid and solid wastes, producing repulsive odor



Source: field photograph, 2012.

The mismanagement of the drainage lines and the disposal of wastes have been the concern for the sustainability issues related to liquid waste management in the study area in addition to the direct connection of latrines to the river system Which aggravated the pollution problem of the river.

Hence, the absence of biological treatment systems to treat liquid waste coupled with low level of public awareness on the potential impacts of the mismanagement of the wastes have greatly affected the health status of the inhabitants and the sustainability of the site under question. Moreover, it is evident that the waste to resource notion of sustainable development is far beyond practice in the study area.

4.4.3. Green frame and energy use

a) Neighborhood green frame

In the context of the Structure Plan, the planning intervention on the environment refers to the Green Frame, the high relief in and around Addis Ababa, rivers and streams banks, buffer zones, farm lands, waste disposal, and quarry sites (ORAAMP, 2002:30). Likewise, this study takes for granted the proposition set by Addis Ababa city structure plan.

Green frame of a city mainly encompasses open and green areas, whose main purpose is to provide outdoor recreation and breathing place as well as to maintain environmental balance. Bureau of Works and Urban development (BWUD, 2001as cited on green forum 2007) classifies the green frame into formal and informal. The 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 and land reserved in the expansion area.

Similarly, the Addis Ababa structure plan stated that forest, woodland, buffer, and conservation areas should be located along rivers and streams; on flood prone, swampy, and steep areas of slope greater than 15% and around large scale industries, cemeteries, ground-water resources; landslide prone and eroded areas, wherever, the practical continuity of the green frame should be ensured (ORAAMP, 2002:58)

Conversely, Neighbourhood green encompasses neighbourhood play-lots, playgrounds and fields which should be available for the population size of about 1500, 5000 and 10000 inhabitants, respectively (Green forum, 2007:17). They are essential for neighbourhood life since they allow diversified activities and plays. They are also the most frequented and easily accessible for children and elderly.

However, based on the observation made, the study area does not have enough open spaces and the existing open spaces are not well maintained, fenced and hygienic for the children to play and recreate. On the other hand, the provisions of Addis Ababa structure plan are not well reflected in the neighbourhood since steep slopes greater than 15 percent, land slide and river flood prone zones occupied by settlements.

Furthermore, children and teenagers found in the study area revealed that the only open space found in the site has been given to private MSE enterprise such that they are moving away from their village in search of play fields. They also asserted that they may not find appropriate play field when they move out and are faced with different social problems such as car accidents and physical assault by other persons.

Pic4.14 open space in the study area



Source: field photograph.

Hence, the study area and its constituents do not have enough and required amount of green areas. The site lacks one of the basic pillars of sustainable development, green spaces.

According to Addis Ababa structure plan, there is one tree one plot regulation in Addis Ababa so as to increase the vegetation coverage at the local and household level. However, based on the sample household survey made 23.6% of the respondents revealed that there is only one tree in their premises while about 13% of them said there is more than one tree in their compound. Those who testified there is no tree in their compound accounted for 63.4%. Though the site is endowed with indigenous and exotic species of trees, the vegetation cover of the site is very insignificant to get the social, economic and ecological benefits.

Pic 4.15 indigenous and exotic trees and flowers, found in the study area



Tid (Juniperus procera)



Delonix regia Ficus elastica



Azadirachta indica



Rosa sp.



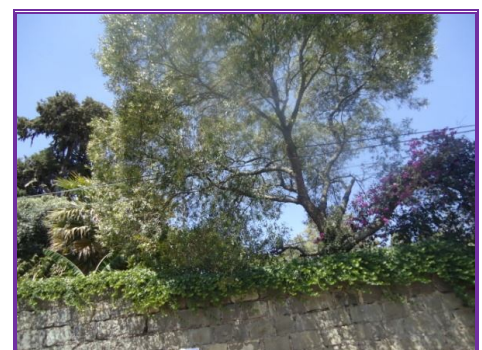
Melettia ferruginea



Ensete ventricosum



Vernonia amygdalina



Olea europea subsp. Cuspidata

Source: field photograph, 2012

The tree species in the site and shown above provide variety of benefits including but not limited to ornamental, water and soil conservation, shading, wind breaking, medicinal etc.

b) Energy use

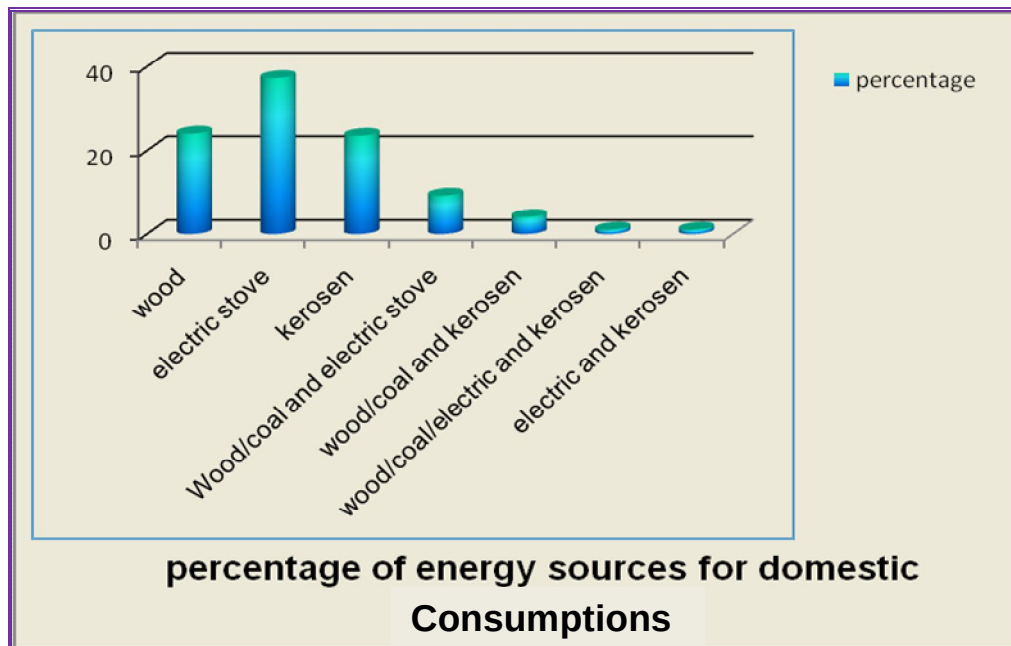
African nations use the least amount of energy per capita than any others in the world. But the type of energy source used by the nations has intensified the damage on the natural ecosystem. As the urbanization rate increases, the demand for energy puts cities under constant pressure. Fire wood and charcoal is an important source of domestic fuel in urban Africa. Addis Ababa uses a considerable amount of wood fuel for domestic purposes (Dubbale et al, 2010).

The percentage share of households which mainly use wood fuel (as a form of fire wood and charcoal) constitutes around 22 percent which is higher even for a developing city. Currently, Kerosene is used dominantly for domestic cooking purposes and has a total share of 69 percent. Kerosene's availability has made it a popular cooking fuel among the large segment of the urban poor. Contrary to its benefits, kerosene continues to be a serious health threat by releasing impurities during combustion and hence downgrading indoor air quality (ibid).

In contrast, 37.2 percent of the respondents revealed that they use electric stove for domestic heating and cooking purposes, while fuel wood and kerosene accounts for 24 percent each implying that about half of the respondents are dependent on non renewable energy sources for their energy consumption. On the other hand, only about 9 percent of them are utilising both electric stove and wood/coal whereas close to 4.1 percent uses a combination of kerosene and wood/coal. The rest of the respondents use the combination of the three energy sources.

The graph below shows the overall patterns of energy consumption in the study area. Hence, the inhabitants of the site are reliant on non-renewable energy sources which are contributing its share towards the environmental degradation of the site and increased the health threat of the inhabitants by increasing the indoor air pollution. Thus, the site is well deprived off the basic concepts and principles of sustainable development.

Fig 4.6 sources of energy used for cooking and domestic purposes.



Source: field survey, 2011

4.4.4. Flooding

Urban areas increase impervious surface, increase runoff, decrease evapo-transpiration, and decrease infiltration. Storm water management has been a delicate issue in human history. With the growth of cities, this task has become more and more complicated, especially in developing countries, which are characterised by: urban explosion over a short period of time, unplanned urban patterns, severe poverty and accumulation of problems.

On the other hand flooding propensity in an area can vary greatly with a change in the water carrying capacity of a drainage basin and/or with a change in land elevation with respect to the base level. Therefore, the flood problem and the solution can be analyzed in the context of two fundamental parameters: water carrying capacity of rivers and land elevation.

The study area is dominated by unplanned settlement patterns, which created a major obstacle for urban drainage. Flood plain and flood-prone areas are occupied by settlements. Hence, close to 32.7 percent of the sampled household respondents stressed that flooding is their primary problem. it is more pronounced by riparian occupants, those found on the lower positions of the steep slope, along dilapidated drainage systems etc. Consequently about 60% of the respondents said that the causes for the prevalence of flooding in the study area is due to the geographic

characteristics of the site which is dominated by steep slope whereas 18.2 % revealed that it is because of the over flow of kebena River during rainy seasons which is recognized to the location of houses along river flood zones.

Furthermore, 11.8 percent justified that it as a result of the absence of drainage lines that accommodate the amount of storm water generated in the study area and its hinterlands. The rest of the respondents commented that the problem of flood is associated with the combination of all the causes mentioned above.

Moreover, the sustainability of storm water management has been hampered by haphazard development pattern; lower level of vegetation cover coupled with impervious layers and overcrowded settlement structures and slope of the terrain condition.

Hence it is well documented and presented that the environmental sustainability of the site is highly affected by its geographical location which hampered the collection efficiency of solid and liquid wastes, absence of green frames, use of non renewable energy sources, and the presence of flooding,

4.5. Community prioritized issue of sustainable development

Prioritisation is about choosing the most mandatory from the most competitive and equally important issues. Thus, economic, social and environmental components of sustainable development are the basic and mandatory and can not be isolated hence the fulfilment of one does not necessarily lead to the attainment of the other. However, their practical implementation and attainment may not be at the same time but with some deviations where the option for prioritising will come to the frontier.

Hence, the household respondents were requested to air their views on the issue of sustainable development to be prioritised for the potential transformation of the site.

Thus, the respondents prioritised that they want the current solid waste management system to be improved incorporating composting and recycling activities such that potential economic benefits can be harnessed efficiently. Moreover, the priority lies on providing and utilising idle but existing urban agricultural areas in a sustainable manner i.e. creating sustainable linkages among different agricultural practices

through training to be obtained. Hence, the first priority is to improve the economic condition and curb un-employment rate in the study area and contribute significantly towards the environmental sustainability which can not be viewed in isolation. Furthermore, the economic priority also allows the beneficiaries to save money and cover the potential costs for new dwelling unit they desire to have.

Apart from the first choice, the economic dimension of sustainable development, for the realisation of the transformation process the respondents justified that enhancing the settlement pattern and utilization of infill sites as an engine for transformation are critical and need due consideration. These are due to the fact that close to 50% of the residents are residing on inaccessible sites and along flood zones which need immediate response for social stability and ecological benefits.

4.6. Options cited to transform the site into a more livable neighborhood

Many people simply are not convinced that there is a need for change. Other people view change with scepticism because the new methods are not proven, yet they might also require a great deal of financial investment. Furthermore, governments could serve as models in the movement toward sustainability, but many lack the commitment to do so.

One of the major sustainability issues is getting mass support from different stakeholders. People generally do not like to change simply for the sake of doing things a different way. It is often necessary, therefore, to provide a reason and address the issue accordingly. Hence, transforming built environment to sustainable area requires one to assess, identify and analyse the economic, social, environmental and spatial issues concurrently. At the same time it is worth while to collect data from the potential beneficiaries, users and losers on the options available and desired to carry out development projects such that the potential impacts of the proposals can be minimised.

Hence, the residents (potential beneficiaries, users, and losers) and the Woreda officials at different levels have been requested to air their views on the sustainability of the site and options available for the future sustainable transformation of 'Korea sefer'.

Based on the assessment made for this study, 86.7% of the household respondents revealed that the site is not sustainable in terms of ecological, economic, social and spatial issues. However, the proportions of the interviewee on the options to transform the site vary significantly based on the location and economic status of the households.

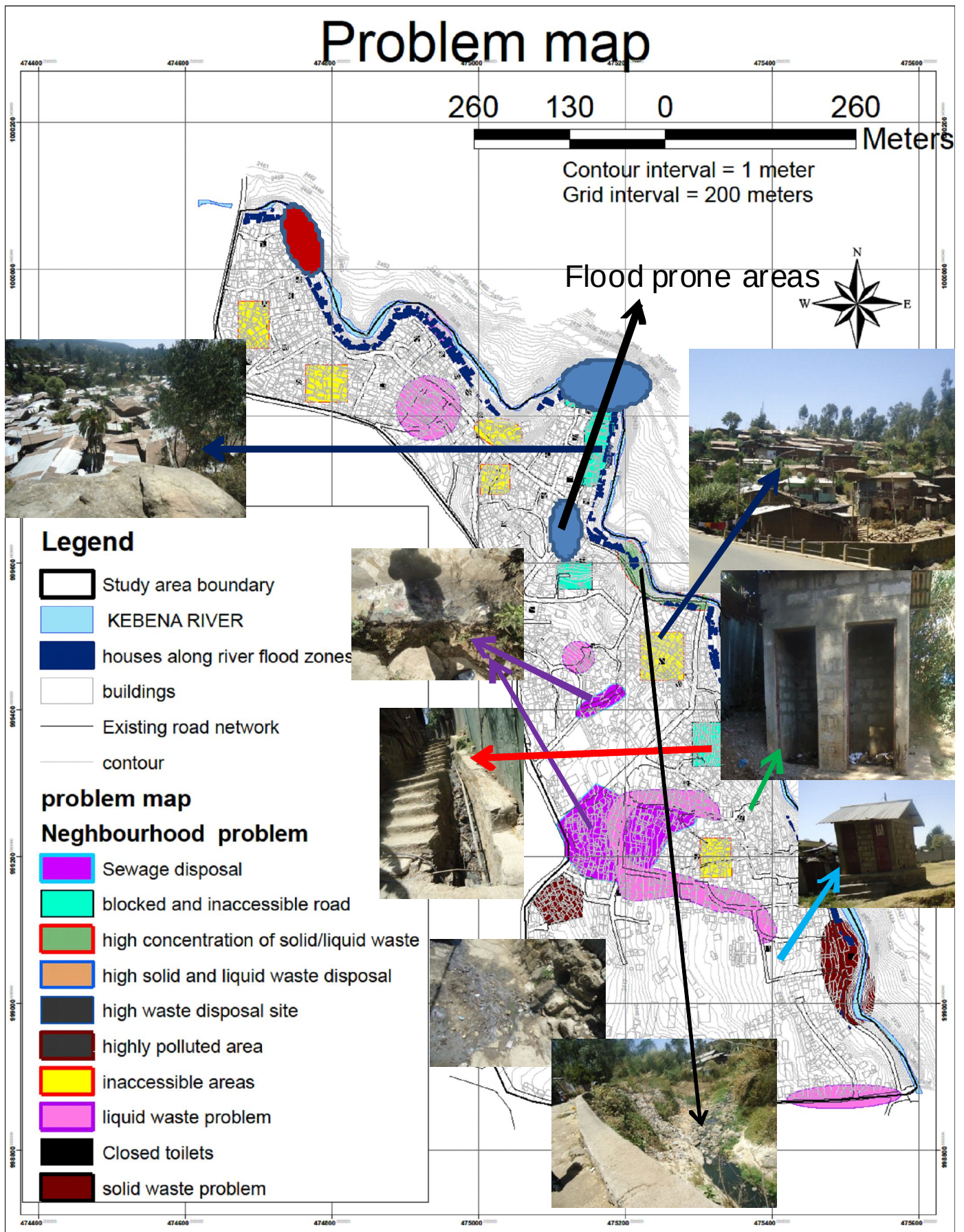
Thus, 52% of the household respondents sampled asserted that the site does not support the basic principles of sustainable development and it shall be transformed so by promoting in-situ transformation of the site by utilising infill developments as an engine for development. These respondents do not need to be evicted temporarily or permanently from their area of residence regardless of their location in the future.

Close to 19% revealed that they want every thing unchanged and wish the situation at present to continue in the future with minor physical improvements. This opinion is highly related to evictions due to the implementation of the project. Conversely about 13% wish to be relocated to other site and let the transformation happen for potential new beneficiaries of the development activity. Such attitude is developed due to the current government act on urban renewal project and they testify the situation will happen if the site is to be renewed or redeveloped. The rest of the respondents wish the site to be transformed with out potential eviction, infill developments or leave the site as it is now by undertaking some minor upgrading.

In support of these arguments the officials of the Woreda have testified that the area needs to be transformed with due emphasis given to the potential benefits to be obtained and the future changes deem to be brought.

Overall the respondents justified that the site does not support the basic principles of sustainable development since the inhabitants are faced with problems on employment creation, pollution, inaccessibility of the site for emergency vehicle route, sanitation problem, lower level of open space and green areas etc.

Map 4.9 problem map of the study area.



Source: produced by the author, 2012

4.7. Summary of major research findings

Table: 4.1summary of major research findings.

No	Dimensions of sustainable development	The major problems identified
1.	Spatial dimensions. - Existing land use. - Compatibility of land use components. - Road network and circulation. - Storm water drainage. - Housing density. - Soil.	- The major land use of the site is residential areas and followed by social services including Menelik II hospital, health centre and schools. The proportion of manufacturing, green open spaces, mixed use activities are insignificant. - Residential areas and urban agriculture situated adjacent to Menelik II hospital are suffering from the nuisance and liquid waste emissions from the hospital. - The narrow road width with poor road hierarchy has obstructed the mobility of human beings and made the entry of emergency vehicles very cumbersome. The long steps provided, with out intermediate landing, to enhance mobility are not comfortable for the elderly and children. - The poor waste management strategy in the site has aggravated the problem of storm water drainage. Almost all drainage lines are clogged by solid waste dumped on the streets and drainage lines. - The housing density on the different strata are about 233.11, 219.18, and 160.75 buildings per hectare on slopes less than 15%, greater than 15% and along river banks respectively and the proportion of household deprived of basic accessibility are significant which demand adaptive strategies as a means to transform the site. - According to FAO soil classification the soil categories of the site are Humic Nitosols and Eutric Vertisols. The Nitosols soil group have good drainabilty, fair water holding capacity, favourable

	Slope and site suitability.	for small scale court yard based urban agriculture, has high moisture storage capacity. On the other hand Vertisols groups are black cotton soils and favourable for small scale urban agriculture and to recreational facilities that do not require huge structures. - The slope map of the study area is prepared with due consideration of the different provisions of the Addis Ababa structure plan and Neighbourhood design manuals. Hence, the map has four slope groups that support different urban functions based on the site suitability analysis of gestalt method. Therefore, there is no part of the study that falls with in the slope range of 0-2% which potentially indicate swampy or flood plain. However, slopes 2-12% and 12- 15 % which are suitable to locate low cost buildings and various neighbourhood functions and these slope classes constitute about 41 % and 16 % of the site respectively. The proportion of slope greater than 15 % is about 43% of the study area which need further adaptive strategy to enhance the mobility and accessibility of different households and neighbourhood functions in a sustainable manner. - The site suitability for this study has been carried by the use of gestalt method where the potential to read aerial photographs, topographic maps and site observation take prominence to gauge the vulnerability of sensitive areas and evaluate the development pressure on these areas. Hence, according to the provisions of Addis Ababa structure plan (ORRAMP, p 65) slopes greater than 15 % are more suitable for green frame development. However, these areas can be made suitable through the implementation of adaptive strategies and avoid eviction of people and allow the areas to be used in a sustainable manner.
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2.	Economic dimensions 2.1. Production of unique products. 2.2. Lack of working premises, appropriate training, market linkages and search. 2.3. Effective and efficient utilisation of wastes.	Based on the sample survey about 66.3 % of the respondents are employed in private, governmental institutions, NGOs and self employed. However, 29% of them are unemployed and about 4.7 % are retired. The MSE office of the Woreda administration provide training, financial and technical support for the self employed and unemployed groups of the society willing to engage in MSE related economic activities i.e. construction, urban agriculture, loading unloading, etc. after organising them either in cooperatives, group or private enterprises. However, the sustainability of the economic sectors is hampered by lack of proper training, market linkages and search, producing unique products and inability to use the wastes properly. The problem is aggravated by lack of working premises.
3.	Social dimensions Accessibility and availability of: 3.1. Schools /KG/, 3.2. Amenities, 3.3. Parks, 3.4. Pathways, 3.5. Recreation, etc.	- The most important factors that affected peoples decision to move in to and/or stay in a neighbourhood include the presence of schools, shopping centres, heath station, convenient access to amenities and outdoor recreation opportunities, parks and path ways. However, the children in the study area are enrolling grade 1 class with out attending kindergarten/KG/ due to low intake capacity of the existing KG. The KG is not very well accessible for the majority of the households. - Moreover, the social sustainability of the site is impeded by the absence of amenities including recreation areas, community centres, day care, libraries, pathways encouraging cycling and pedestrian movement and parks (open spaces for children and neighbourhood

		play lots.). In Addition to these, the safety and security issue that hampered the social sustainability is tenure security, flooding, eviction and crime and least mentioned safety issue is car accident.
4.	Environmental dimensions. 4.1. Solid and liquid waste management. 4.2. Green frame /vegetation/ 4.3. Energy 4.4. Storm water flooding.	• The environmental dimensions of sustainability include: solid and liquid waste management, green frame and vegetation cover, energy consumption. • 98% of the solid wastes in the site are collected by MSEs while the remaining 2% are dumped in to the river system, streets and open fields. However, there is no practice of reduction, reuse, recycling, and composting of wastes in the site. On the other hand the issue related to liquid waste is due to open discharge of grey and black water directly to the drainage lines and river systems. • The problem related to green frame lies on absence of open fields, neighbourhood play lots, and protection of river flood zones. • The use of non renewable energy sources including coal, fuel wood and kerosene for domestic cooking and heating purposes have contributed to the un-sustainability of the site and made indoor air pollution to be the characteristics of the site. • Flooding is the sustainability concern in the site particularly for settlements situated along river banks and at the foot of steep slope. Moreover, the haphazard development pattern also hampered the natural flow of storm water in the study area.
5.	Options cited to transform the site to a more	• 87% of the inhabitants asserted that the site does not support the basic principles of sustainable neighbourhood development and assured that the site need immediate transformation based on adaptive strategies so that potential eviction is very minimal

	sustainable site. 5.1. Economic. 5.2. Environmental 5.3. Social.	• On the other hand, they were requested to air their views on how the site be transformed. They replied that the economic benefits from solid waste management, by practicing composting and recycling of solid wastes, are the first priority. The next option is to utilise land along the river bank for urban agriculture and creating sustainable linkages among different economic sectors that go hand in hand. • However, close to one fifth of them revealed that the existing site condition supports their life style and do not need any intervention. But those found along the river bank want to be relocated to the idle open spaces in the site. • The inhabitants are very much positive to be displaced as a result of potential social amenities to be built to enhance their sustainability in terms of spatial, social, economic and environmental dimensions.
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Source: produced by the author, 2012

4.8. SWOT ANALYSIS

SWOT analysis is the in-depth analysis of the strength and weakness of a particular site and they describe the internal issues of the site while the opportunities and threats are issues which have positive or adverse effect on the site imposed by external issues.

Table 4.2 SWOT analysis of the study area

<u>Strength</u>	<u>Weaknesses</u>	<u>Opportunities</u>	<u>Threats</u>
• Committed residents to change their present situation. • Presence of Kebena River where ecological services can be harnessed. • The existence of different cooperatives. • Presence of active NGOs working in the study area. • The majority of the population is youth constituting about 40% of the total population indicating economically active portion of the study area. • Access road pavements that promote surface infiltration and ground water recharge.	• Settlements along river banks. • Unable to create potential areas for employment. • Lack of neighbourhood amenities. • Lack of open fields/spaces for infill development and/or social interaction. • Settlements on steep slopes and along river banks. • Resistance of the youth to participate on income generating employment opportunities. • Very congested and overcrowded housing. • Presence of very narrow and inaccessible access roads. • Sanitation problem. • No integrated solid waste management strategies placed. • Absence of any recreational facilities. • Vulnerability to flooding due to geographical locations.	• Government policies that encourage reduction of poverty and unemployment. • The eco-city projects launched by the city government of Addis Ababa. • The NGOs support the initiatives and activities on employment creation and supporting social programs.	• The unprecedented threat of climate change. • Government urban redevelopment/renewal programs. • Pollutants released from upstream settlements. • Minimum green frame of the upper catchments of Kebena River which increase the propensity of the site for flooding

4.9.CONCLUSIONS

Sustainable development is predicated on the articulation and incorporation of environmental and human needs in the pursuit of economic growth and development objectives (Aina, et al, 1992). It however has human, physical development and socio-economic dimensions (Leke, 2009).

Hence, the general physical aspect of the study area, 'Korea sefer', reveals that the site is characterised by inaccessibility, congested, overcrowded and limited social infrastructures and amenities. Besides these the land use incompatibility have been observed on the lands that are found adjacent to Menelik II hospital which releases its liquid waste directly in to the adjoining urban agriculture and residential areas. The waste is being used to water plants and it eventually will join the river and pollute the ground water. Moreover, the number of households situated on environmentally sensitive areas is very significant which need environmental planning and landscape design interventions.

In addition to the physical characteristics of the study, the economic issues indicate that the business activities are not well functioning due to lack of appropriate training on the business development strategy, accounting systems and management of business. Moreover, the issue that take the attention is that the different cooperatives operating are not utilising their primary waste to produce other products and contribute their share towards zero waste strategy. The efforts to produce diversified products are very limited and the impetus for market linkage is left for the Woreda MSEs office rather than on the cooperatives. The most important issue raised for the un-sustainability of the sectors is the limitations on the working premises and the provision of job outside of their area of residence with a transportation cost.

On the other hand the site is deprived of amenities and infrastructures like community centre, libraries, and open spaces, pathways, social infrastructures and other facilities which bear a significant role in enhancing social interactions. The issue of safety and security highly lies on tenure security where most of the inhabitants are residing in Kebele owned houses and there is potential fear of eviction in case of urban redevelopment program to be carried out by the government.

The concluding remarks on the environmental issues address the management of waste, green frame and energy usage. Hence, 98% of solid wastes generated in the site are collected by MSEs while the rest are disposed off on streets, open ditches and river banks. On the other hand the solid waste management does not involve any waste management strategy i.e. reuse, recycling or composting of wastes such that the potential social, economic and environmental benefits are not totally harnessed. However, the collection of these wastes is faced with interrelated problems attributed to inaccessibility of the houses, the non timeliness on the collection and emptying of garbage containers which promoted littering of the corner around the skips and encouraged illegal dumping and Lack of properly designed collection points that reach inaccessible collection areas to serve the entire site.

The discharge of untreated effluents and wastewater from households that are built alongside the rivers and situate on steep slopes are the main sources of water pollution in the study area. The liquid wastes discharged into the river through different drainages lines, domestic liquid waste from overflowing and seeping pit latrines, septic tanks, public and communal toilets, open ground excreta defection and grey water from Kitchens and cloth washing through different drainage lines.

The problem is aggravated by the absence of biological treatment systems to treat liquid waste coupled with low level of public awareness on the potential impacts of the mismanagement of the wastes have greatly affected the health status of the inhabitants and the sustainability of the site under question.

The sustainability issue related to green frame lies on the absence of neighbourhood play-lots, playgrounds and fields. Hence, flood abstraction is not a situation to observe and the children are subject to move out from their village in search of play fields. Moreover, the vegetation cover of the site is very minimal the one tree per plot principle is not well implemented and the species of the trees in the site is dominated by exotic ones which have both adverse and favourable effects.

Energy is one of the issues on the sustainable development. It is related to the consumption patter of renewable and non renewable sources. Sustainable development lies on the use of renewable energy sources. However, the households are highly dependent on the use of wood/coal and kerosene for cooking

and heating purposes which is the product of deforestation activities. Hence, the inhabitants of the site, remarkably, use non renewable energy sources.

In addition to the aforementioned environmental issues, flooding is worth mentioning threat in the site. Due to the organic nature of the settlement, the narrow roads, over clogged drainage lines, and occupation of flood zones by settlements flooding become apparent in the site. The major causes for flooding are the terrain conditions followed by riparian occupation. The problem becomes a major threat during rainy seasons.

Even though, the interrelated components of sustainability can not be viewed in isolation, it is wise to address the issues differently by prioritising them. Hence, the first thing prioritised is to enhance the economic aspect by creating jobs and providing training to the cooperatives. This has a potential linkage with the environmental issues where employment related to composting and recycling require little initial investment; they only require provision of working areas. Then the social issue, equity, will simultaneously be addressed based on the fulfilment of the economic issues.

Furthermore, the options to transform the site is related to the use of existing idle open space for relocating the evictees from flood zones and areas required for amenities. This has to be supplemented by the improvements on the existing roads and made them suitable for pedestrian movement and environmentally attractiveness. Therefore, the existing condition of the site: physical, social, economic and environmental does not promote the essence of sustainable development. The site need to be transformed in to a sustainable neighbourhood with due considerations of the different aspects discussed and the interests vested on the inhabitants. The intervention shall strive to concretise the strengths while tackling the weakness and it also search other potential opportunities that bear significance solution to curb the threats identified.

CHAPTER V: RECOMMENDATIONS, DESIGN PROPOSALS AND IMPLEMENTATION STRATEGIES

5.1. RECOMMENDATIONS

The recommendations of this paper are forwarded with due emphasis on the adaptive strategies to deal with slums. At the same time the recommendations have faith on the existing conditions and neighbourhood functions such that the transformation will proceed accordingly. Therefore, in light of these justifications the following research recommendations are forwarded to realise the actual implementation of the proposals of this paper and Agenda 21.

- It is recommended that the sustainability of a specific site does not solely lie on studying the economic, social, environmental and spatial issues (slope, physical infrastructures i.e. drainage, water supply, road and circulation). It further relies on the governance structure and housing issues. Hence, this paper recommends that further study shall be made on the governance structure to promote sustainability in the study area. Moreover, the recommendation on sustainable housing is still open for other researchers.
- The proper realisation of this paper shall be made possible by undertaking institutional reforms as envisaged on Rio Declaration and Agenda 21 so as to harness the financial resources, mechanisms, and technology transfer.
- All agencies of the government system have a key role to play in the implementation of Agenda 21 and the proposals of this paper within their respective competence. To ensure proper coordination and avoid duplication in the implementation of the proposals of this paper, there should be an effective division of labour between various parts of the government system: national, regional and local, based on their terms of reference and comparative advantages.
- It is also recommended that mobilising individual and community resources i.e. skill, knowledge, finance, etc is vital for the process of transformations. Furthermore, community development interventions shall be carried out with due focus on enhancing the social welfare, health protection, improvement of educational and agricultural practices and development of small scale industries.

- It is recommended that the continued active and effective participation of non-governmental organizations, the scientific community and the private sector, as well as local groups and communities, are important in the implementation of Agenda 21 and the proposals of this paper.
- It is recommended that the adaptive strategy shall be employed through enhanced physical transformation through on-plot/site approach where domestic rainwater harvesting, grey water treatment and sanitation facilities shall be promoted at household or compound level. These actions also enhance the economic and social sustainability of the site.
- It is also recommended that the sanitation issues in the site shall be addressed through ecological sanitation programmes which shall be implemented with intensive training on the construction, operation and maintenance of the system.
- The promotion and introduction of appropriate waste management strategy is vital to address the issue of pollution. Hence, waste reduction, reuse, recycling, composting etc strategies shall be implemented to this end. Furthermore, the introduction of the strategy fosters the economic benefits of the inhabitants.
- Further recommendation on environmental issues lies on the use and promotion of sustainable energy sources in the site. Hence, consumption pattern dependent on renewable energy shall be implemented where the use of biogas is recommended for the purpose of domestic cooking and heating purposes, urban agriculture: mushroom, poultry and dairy farming, and street lighting to address the security issue in the site.
- The presence of wastes in the drainage lines has aggravated the problem of sanitation and flooding in the study area. Therefore, it is recommended that the lines shall be cleaned regularly and biological waste treatment systems shall also be applied to make the site a more liveable and sustainable one.
- The existing but non functional public water taps need to be rehabilitated and maintained and the responsibility to manage them shall be given to MSEs operating in the site thus it can be used as income generating activity for the unemployed.
- The use of vetiver grass shall be well promoted in the site due to its importance in dealing with the issue of sustainable development. The plant with diversified benefits shall contribute towards maintaining the river bank, absorbing pollutants

before they reach the water system and form a natural barrier between agricultural practices and other buffer zone functions.

- It is recommended that urban agricultural practices shall be practiced along the river buffer zone so as to get the best benefit from the design proposals of this paper and harness the economic benefits. The agricultural practices shall be delineated by leaving 3 meter buffer from the river edge in order to avoid encroachment and possible overflow of flood into the agricultural land.
- Providing training on targeted business development so as to maintain and expand businesses; and on multi-dimensional workforce development to help business establishments to secure jobs that will support workers and their families.
- Further training is needed on Business development service: accounting system, management, market search etc. Hence, they can produce diversified and profitable products by integrating different businesses that go hand in hand, and reduce the wastes to be generated to the environment.
- It is also recommended to provide appropriate trainings in various areas:
 - Training on entrepreneurship i.e. how to become profitable from the production of diversified products and integrating various economic activities that go hand in hand without causing potential problem on the other.
 - Biogas, rain water harvesting and Ecosan benefits, construction, management, operation.
 - Collection, Handling, Classification, sorting transportation and composting of biodegradable wastes.
 - Business plan preparation.

5.2. DESIGN PROPOSALS.

5.2.1. Introduction

The proposals of this study are based on the provisions of Addis Ababa structure plan, neighbourhood design manuals and the literatures reviewed. Thus, the entire proposal considered that the transformation procedure give emphasis on protecting/enhancing fragile environments and promote the essence of sustainability in the site. Therefore, the process depended heavily on adaptive strategies where the faith on the existing conditions and neighbourhood functions takes due attention and the development will proceed accordingly.

5.2.2. Land use and road/accessibility proposals

5.2.2.1. Land use proposals.

The major changes on the land use are proposed to enhance the economic, social, and environmental concerns with out adversely affecting the settlement pattern of the site. The basic concept for land use proposal has been developed from the assessment made and the interests vested on the inhabitants. Hence, open spaces, social infrastructures and environmental proposals are well dealt for the sustainability of the site. Moreover, the existing idle open spaces has been utilised to propose community centres, relocation sites for potentially evictees that are found along river buffer zones and areas required for additional amenities. The land use proposal has also considered the road proposals with respect to the provisions of the Addis Ababa structure plan.

The proposal have given due attention to the existing neighbourhood functions that need to be maintained and/or need additional facilities for the transformation process to be effective. Hence, functions including: Majority of the residential areas, administration, health centre, primary school, business and commerce, Menelik II hospital, KG and youth centre are maintained in their original site but with some modifications due to road widening and improvement.

Hence, the major new proposals required for community development include: community centre, one additional KG, Open spaces, day care facilities and urban agriculture where Poultry, animal husbandry and small scale farming can be practiced. The urban agriculture is incorporated into the river buffer zone. The soil with a category of Vertisol is suitable for locating recreational facilities and urban agriculture.

Locations for manufacturing and composting/recycling centres to promote employment opportunity through MSEs have also been incorporated in the land use plan.

The proposal attempts to address the issue of incompatibility through the provision of buffers. Buffer to protect the river bank from easy encroachment by settlements and for segregating conflicting land uses i.e Menelik II hospital against the residential areas through the provision of road and planting trees on the roads.

The proposal also addresses the issue of waste management through the assignment of land for composting and recycling activities. Two areas with fair catchments within the neighbourhood have been proposed for this function. This proposal aims at creating additional employment to the inhabitants and avoids the health risks associated with poor waste management. The lands designated for this purpose are idle open spaces that are under utilised.

The other consideration of the proposal is attached to improving the social interaction of the inhabitants. Hence, recreational/open spaces/, community centres and day care facilities are deemed to improve the social problems of the inhabitants. Moreover, the mixed use proposals also enhance community development issues and reduce the distance to be covered for the purchase of goods.

The proposals for the play lot for children in the neighbourhood is done as per the standards for catchments area and inhabitants to be served based on Addis Ababa structural plan and neighbourhood design manual /2006/.

The table 5.1 reveals that the percentage cover of the river buffer has been increased. The composting area, recreational activities will have potential impact on transforming the site to the required level of sustainability. The percentage cover of the road with the improvement on its width and accessibility is about 18% of the total area

Table 5.1 proposed land use percentage distribution

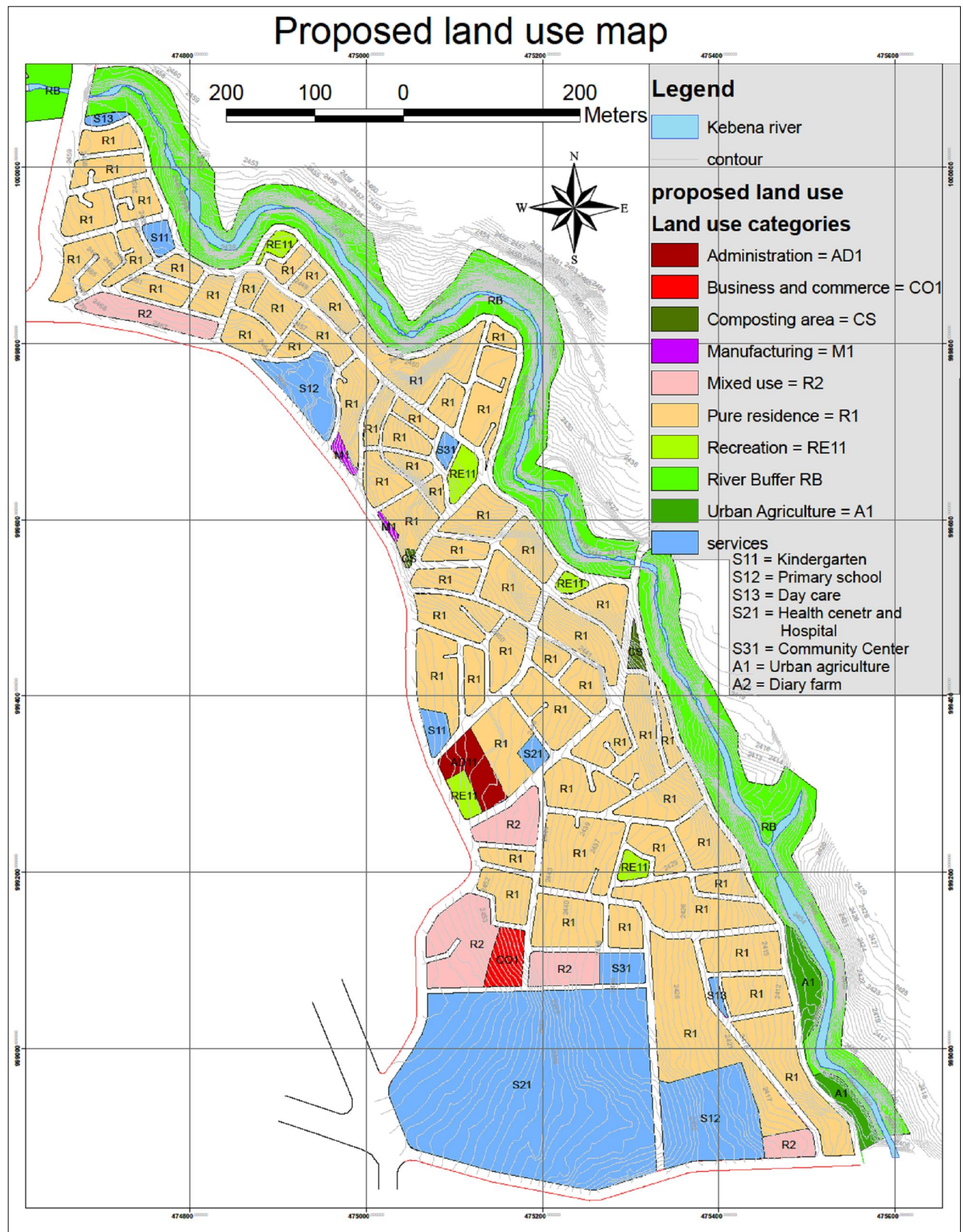
No.	land use categories	Code	Percentage
1	Administration	AD11	0.79
2	Composting area	CS	0.19
3	Manufacturing	M1	0.18
4	Residence	R1	42.76
5	Mixed use	R2	3.69
6	Urban agriculture	A1	0.01
7	River buffer	RB	13.26
8	Recreation	RE11	1.24
9	Kindergarten	S11	0.55
10	Primary school	S12	3.82
11	day care	S13	0.23
12	Hospital and health centre	S21	14.47
13	community centre	S31	0.6
		Total land use	81.79
	road		18.21
	total study area	40 hectares	100

Source: - Own computation.

Furthermore, the paper made proposal for relocating the potentially displace persons due to river buffer zone protection, road widening and locating neighbourhood amenities. Hence, land adjacent to, separated with 12 meter road, Menelik II hospital has been proposed for infill sites to incorporate the ideas and interests of the inhabitants to be relocated within the study area.

The housing typology will be decided based on the housing scheme of the city: it might be condominium with G+ approach or it will be carried out based on the housing study to be conducted by other studies in the future. The location of infill site has been indicated on the green map proposal of this paper on page 102.

Map 5.1 proposed land use



Source: - own computation

5.2.2.2. Road and accessibility proposals

The road proposal of the study appreciates and considered the significant roles that the existing road networks play in the transformation process. Hence, the study makes some changes on their size, dead ends and pavement. Furthermore, additional access and circulations have been proposed with due emphasis on the slope of the site and sustainable intervention.

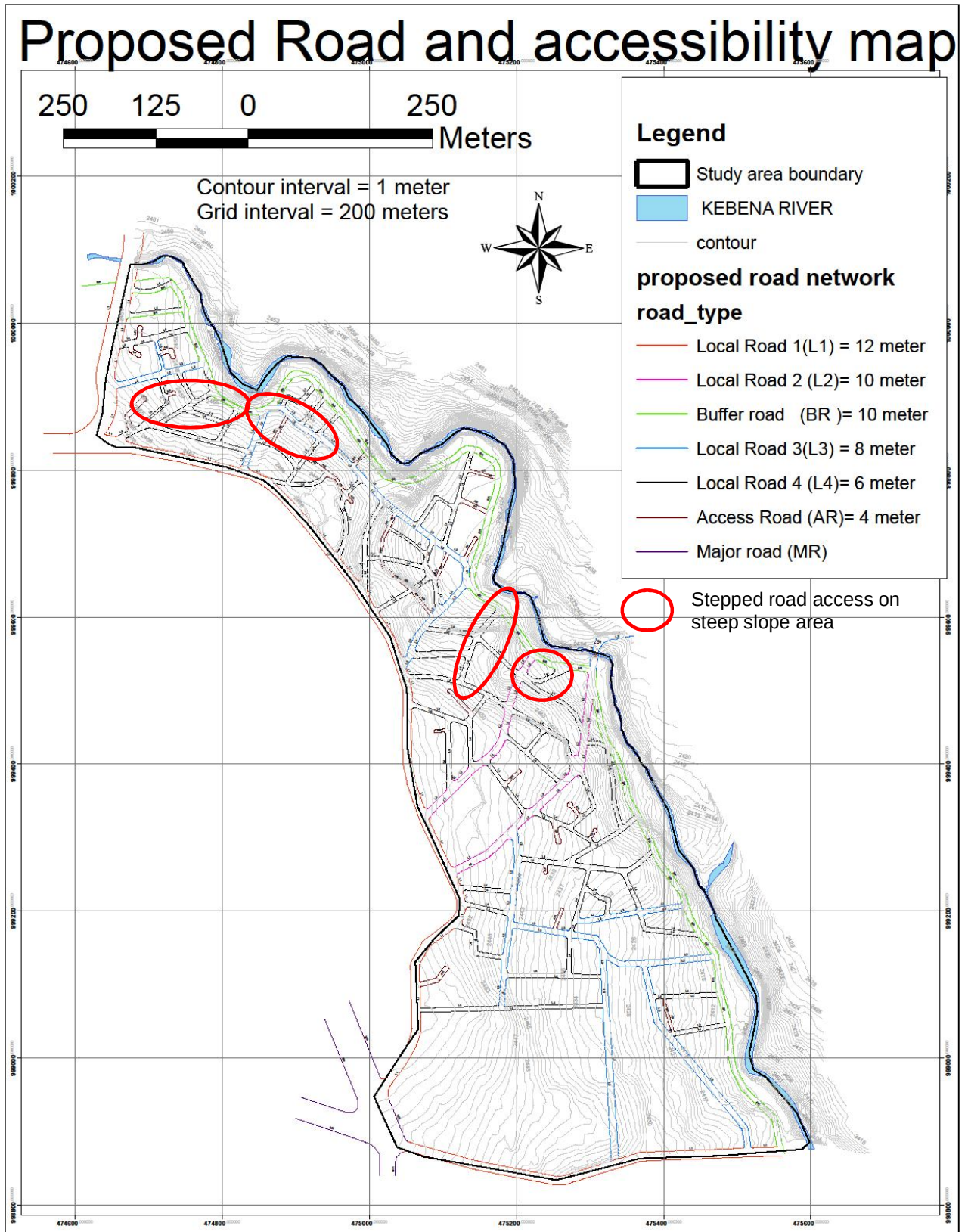
Therefore, the basis for the road proposal is the road hierarchies provided on neighbourhood design manuals 2006 and the efforts to minimise demolishing of houses. The different size or widths of road taken during the proposal, new proposals and improving the existing roads, are 12, 10, 8 and 6 which are assumed to enhance free movement of vehicles and human being. 4 meter access road was also proposed to facilitate accessibility and mobility through overcrowded areas. The uses of cul-de sac have been advocated for those access roads that end up on buildings or individual plots. This road will facilitate easy access of dwelling units for emergency service vehicles.

The design of the road is performed to enhance pedestrian movements: biking and walking which considers the slope of the route. Thus, stepped roads and roads fairly parallel to the contour are proposed.

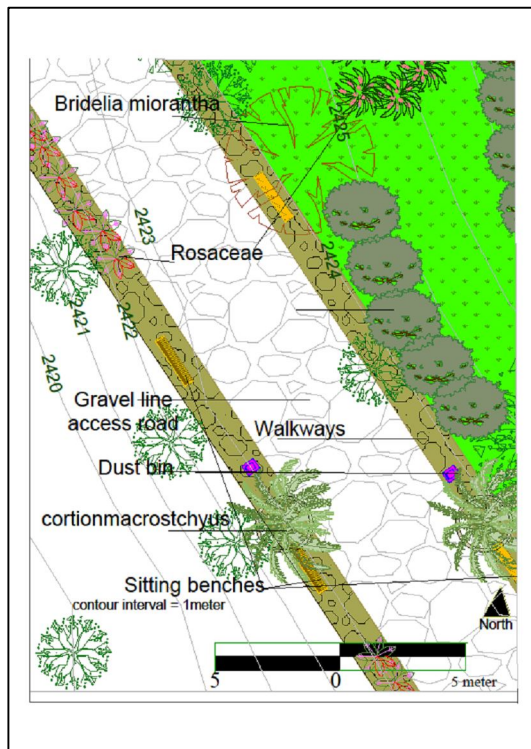
The stepped access is provided for areas situated on steep slopes and deprived of easy accessibility. The sustainability of this site is enhanced by the dry coursed road pavements that promote water infiltration and plantations on the green steps which are designed to abstract potential flood that come from the upper catchments.

Roads on slopes less than 15% are provided to enhance easy accessibility and mobility to the entire neighbourhood. The surface condition of the roads shall be cobble stone or pavements that facilitate infiltration of storm water and the sides are provided with walkways, sitting benches, dust bins and plantations with shading, ornamental and conservation values.

Map 5.2 proposed road and accessibility map.

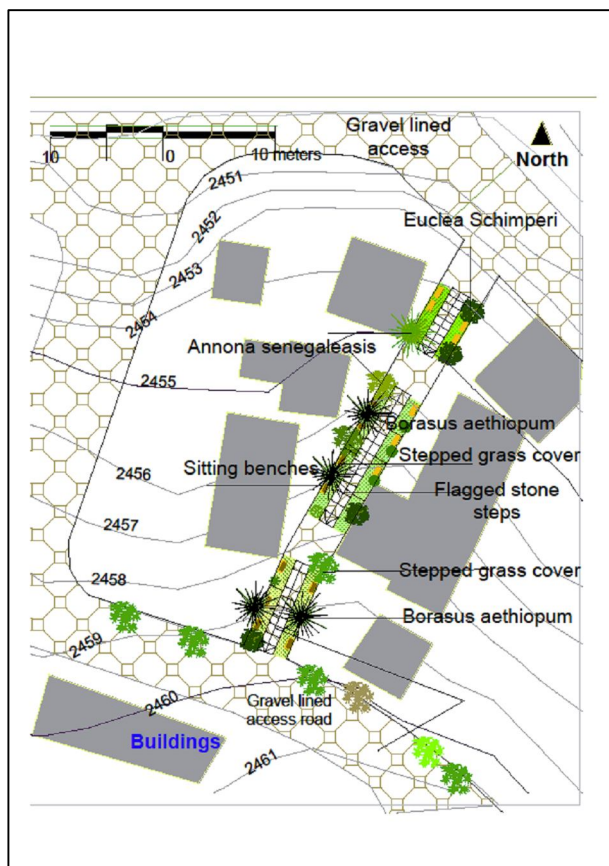


Source: own computation. 2012



Detail of road on slope less than 15%.

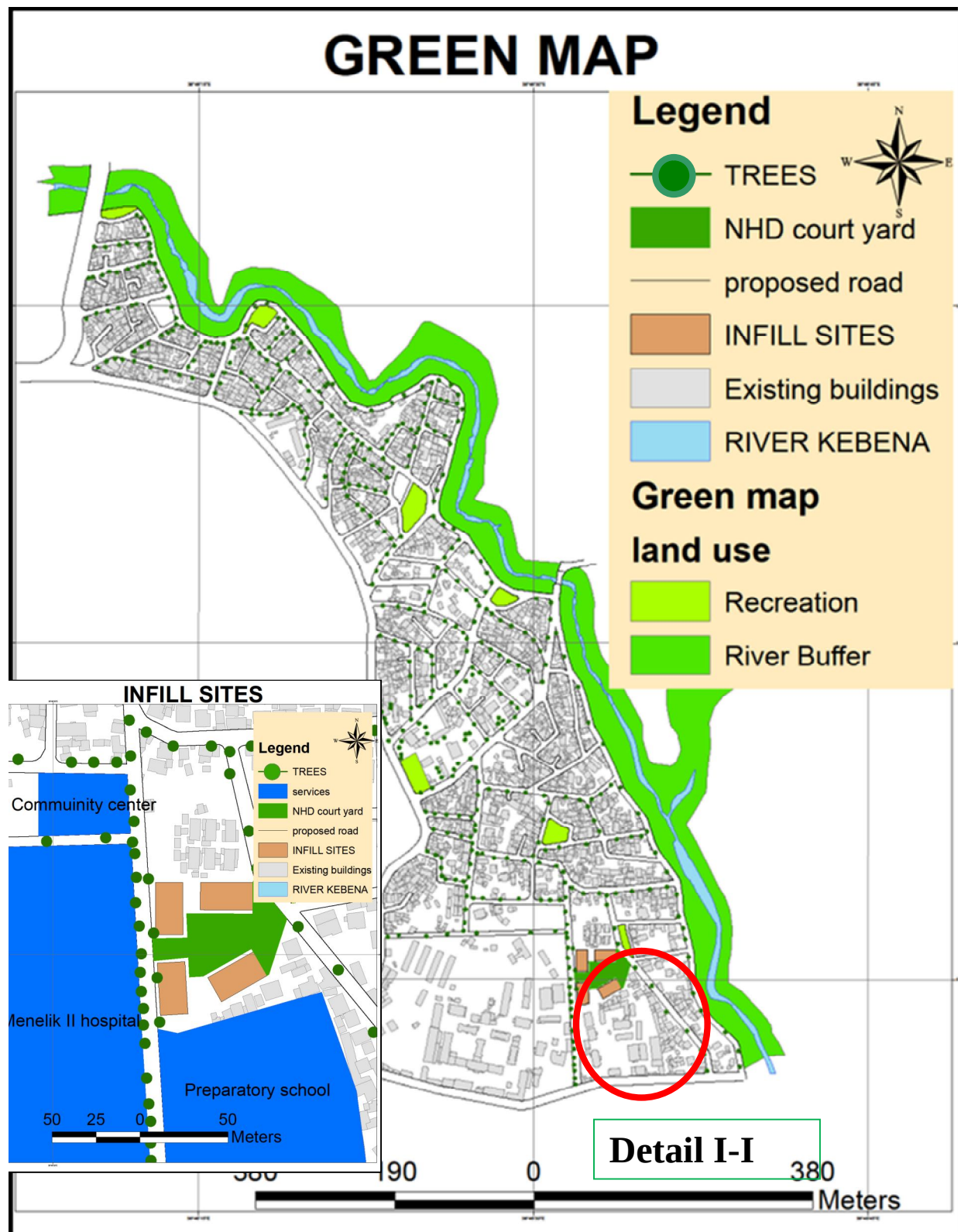
Detail of accessibility on stepped roads on steep slope (slope >15%) areas



Source: own computation. 2012

5.2.2.3. Proposed green map of the study area

Map 5.3 proposed green map of the study area.



Source: own computation, 2012

5.2.3. Landscape design proposals

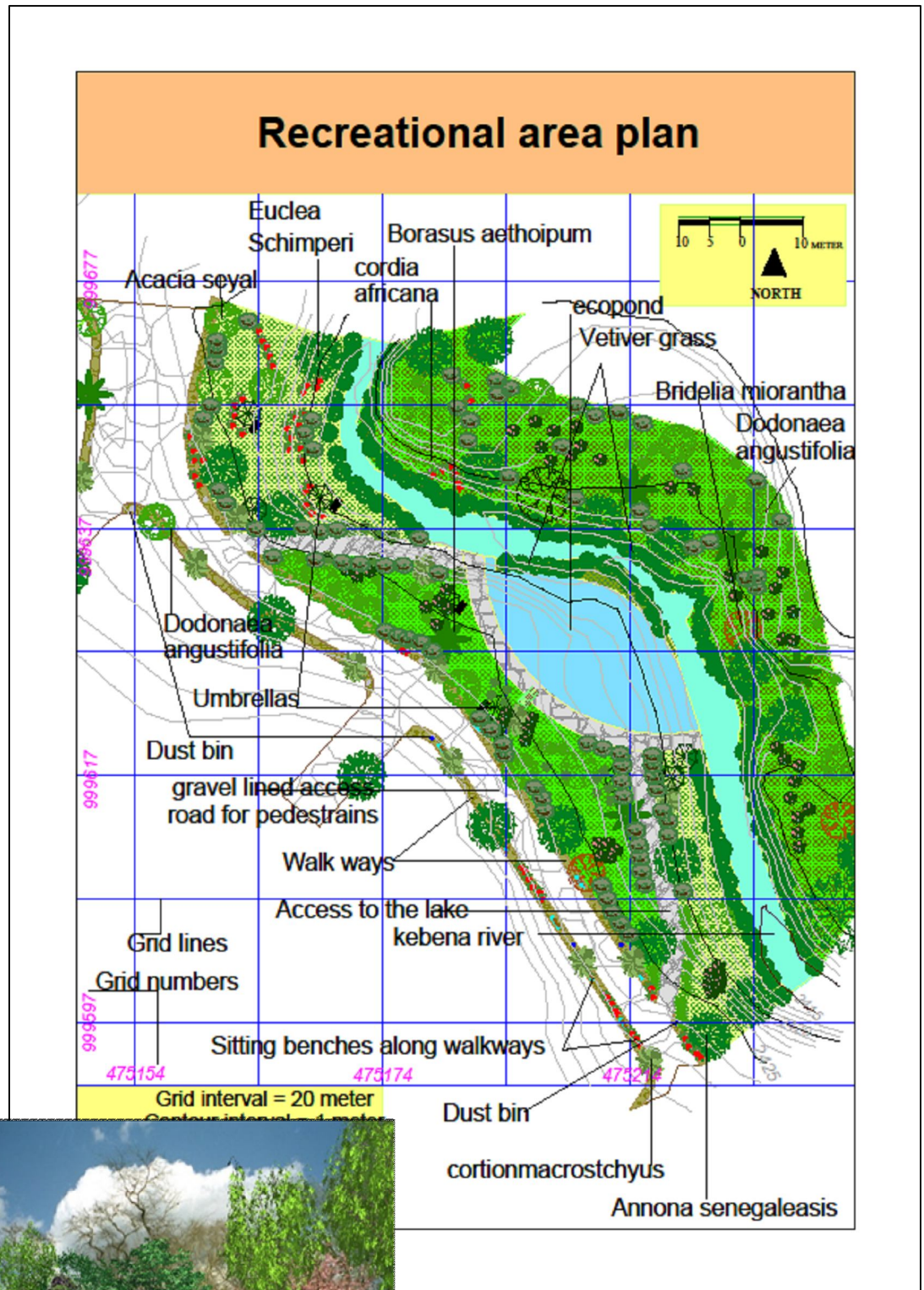
5.2.3.1. River buffer zone recreational area designs

Buffer zone

The basic components in the design of river buffer zone are recreation and urban agriculture.

Map 5.4 proposed buffer zone design

Three-D
view of the
recreation
area.



Source: own computation, 2012

5.2.3.3. Open space design /play ground/

One of the issues of sustainable development in the study area is absence of play field where children's can interact, play and admire nature. Thus, designing play ground for the actual transformation of the site is vital.

Map 5.5 play ground plan (located in the central area of the



Source: own computation, 2012



Three Dimensional view of swinging area

Source: own computation, 2012

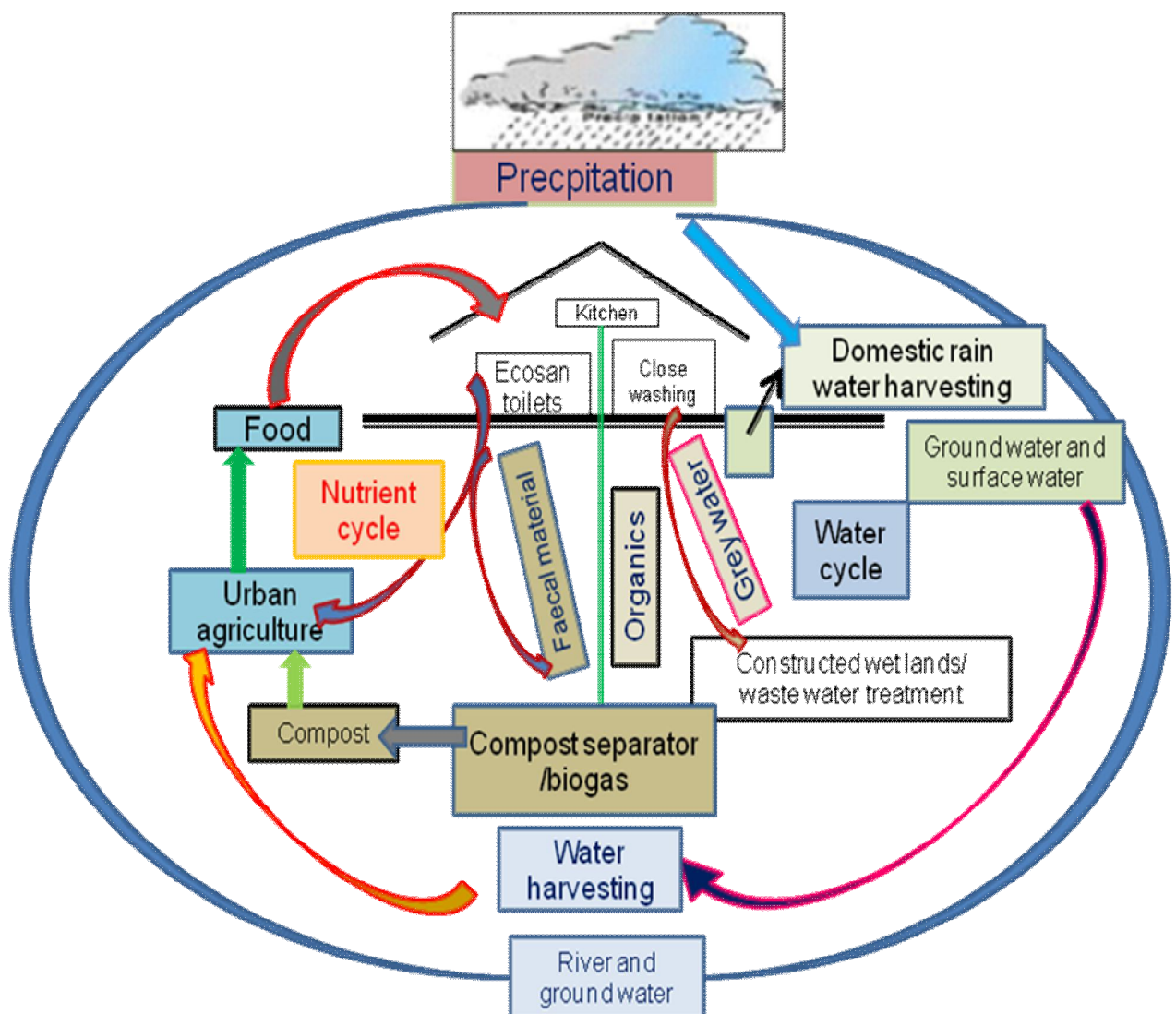


Three Dimensional views of sliding and climbing area

5.2.4. Ecosan projects.

It is an approach based on an ecosystem-oriented view of material flows where the utilisation of human excreta is a vital environmental resource.

Fig 5.1 conceptual summary of the components of ecological sanitation

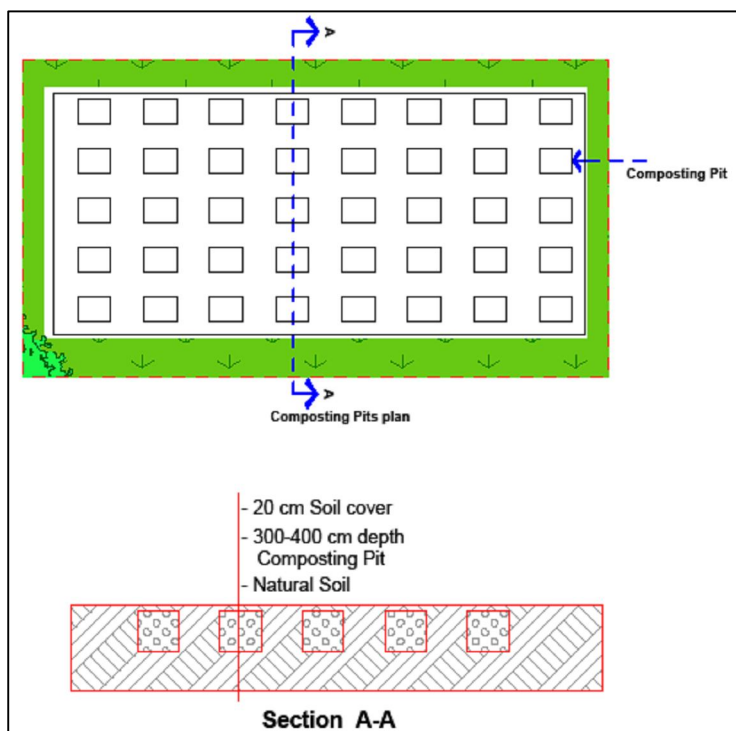


Source: Own computation, 2012

5.2.4.1. Bio waste/composting/

The proposed land use map has assigned the existing vacant land to serve for composting and recycling centre to enhance the economic and environmental benefits of the wastes found in the study area. The design of the composting pit:

Fig 5.2 composting pit design



Top cover of the composting pit is 20 cm thick soil cover to protect the compost from external damage or to protect damage from animals.

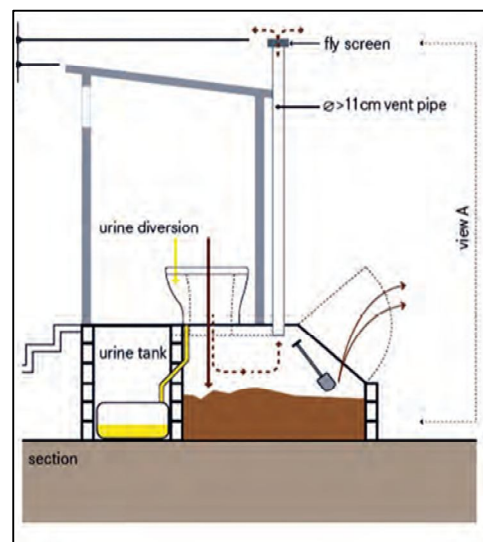
- Compost enriches soils
- Compost helps cleanup (remediate) contaminated soil
- Compost helps prevent pollution.
- Brings economic benefit to inhabitants.

Source: Own computation, 2012

5.2.4.2. Ecosan toilets /faeces and urine diversion/

Ecosans promotes health through environmental sanitation. It furthermore helps the community to sustain and earn additional income by practicing small scale backyard agriculture. The collection of containers is to be handled by MSEs.

Map 5.6 proposed ecosan toilets and urban agriculture



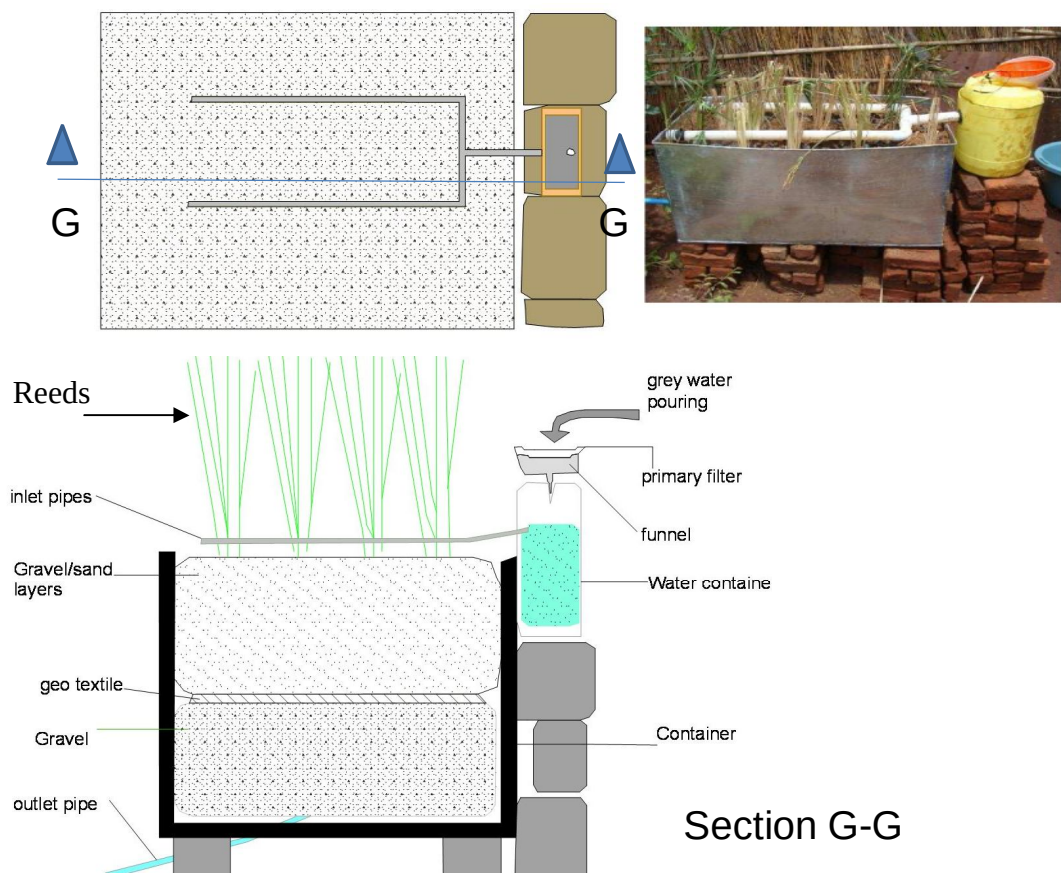


Source: Own computation, 2012

5.2.4.3. Grey water treatment

The existing drainage lines are clogged with wastes. Therefore, the application of biological waste water treatment is essential where the run off can be treated and collected for further uses. Moreover, the provision of domestic grey water: washing, kitchen and shower, shall be treated at individual household or plot level.

Fig 5.3 Grey water treatment at domestic level

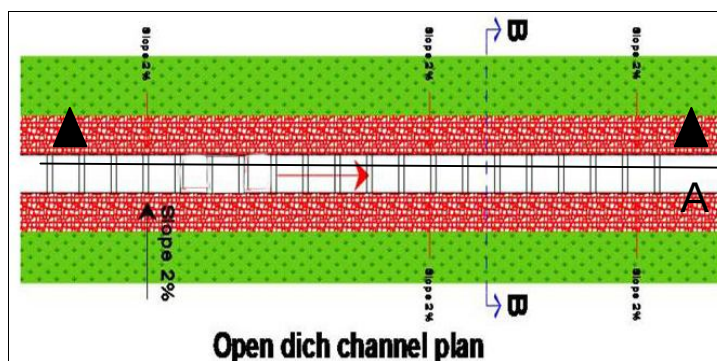
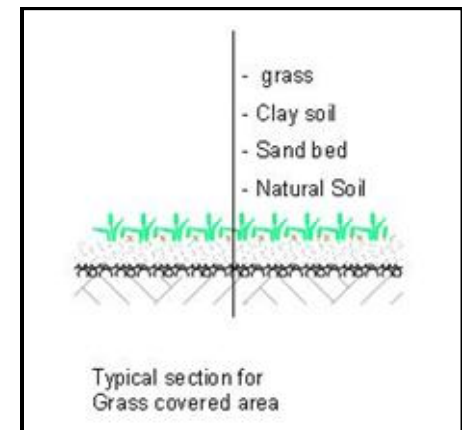
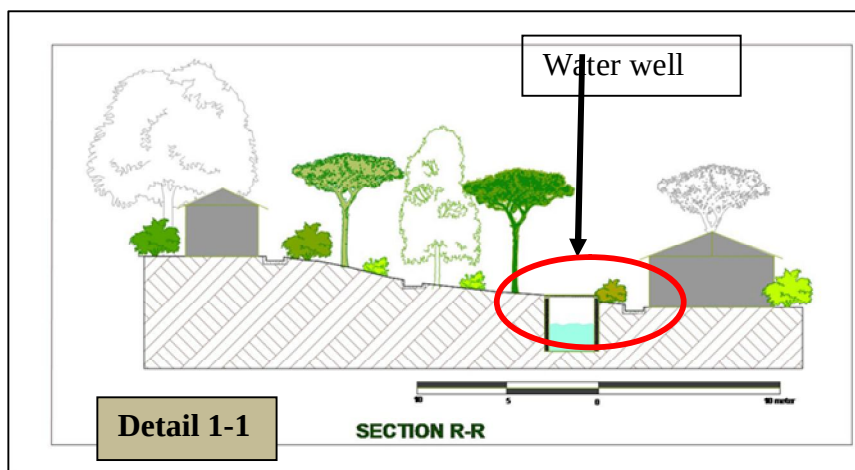
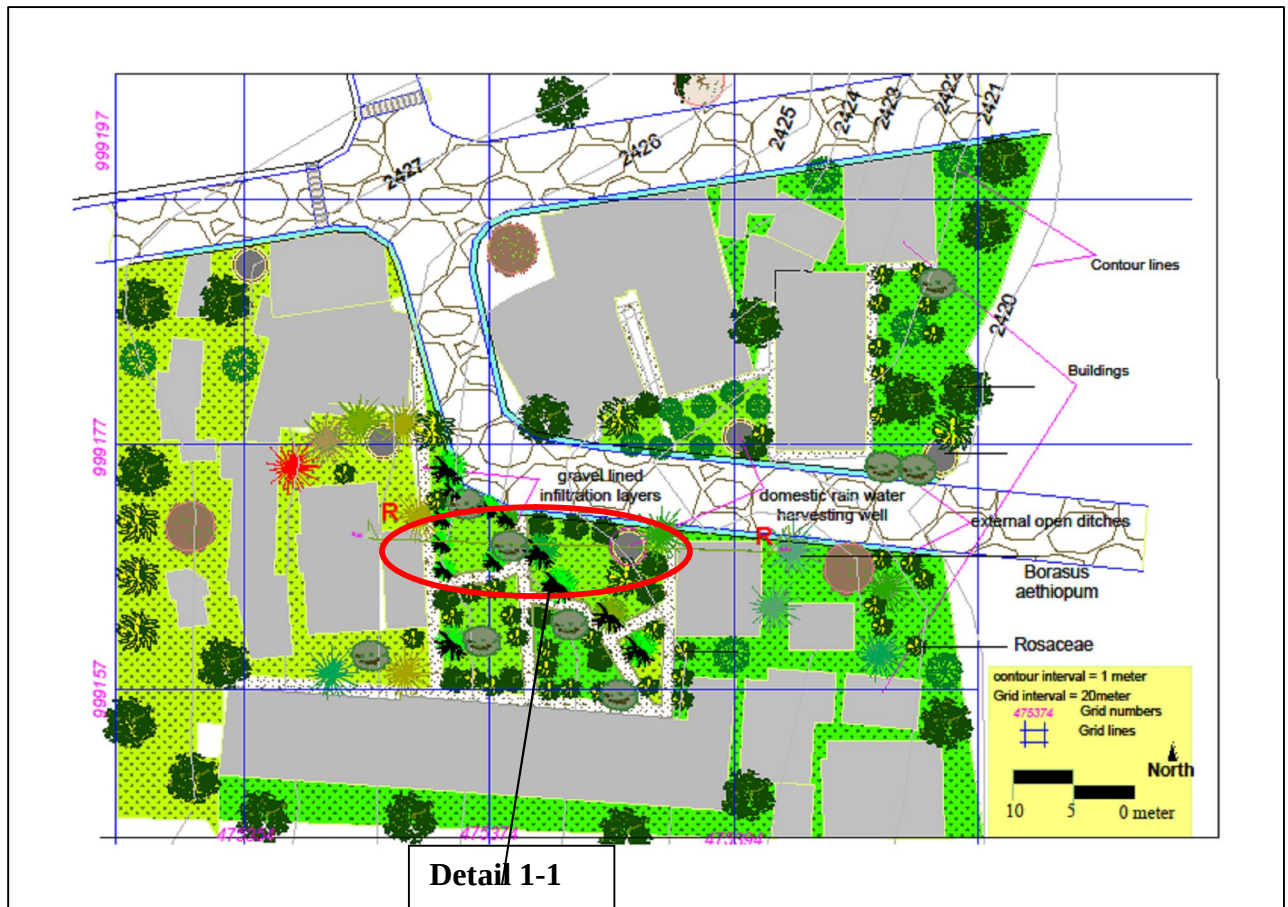


Source: Own computation, 2012

5.2.4.4. Rain water harvesting

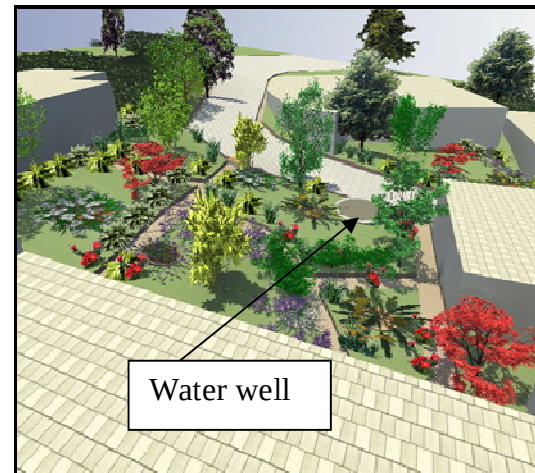
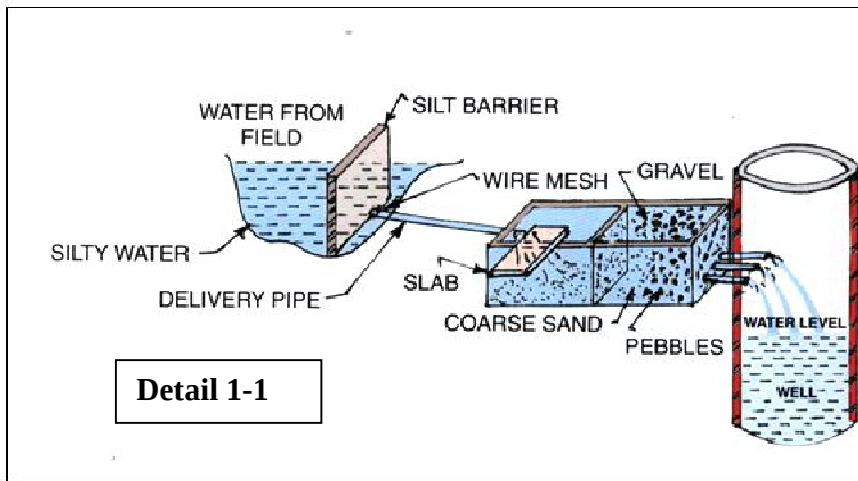
One of the issues of environmentally sustainability of the site is flooding. It is the problem of riparian occupants and settlements found at the foot of steep slope. However, the problem is aggravated by poorly maintained drainage lines. Hence, the importance of domestic rain water harvesting takes precedence to curb the situation.

Map 5.7 Plan views of domestic/parcel/ rain water harvesting.

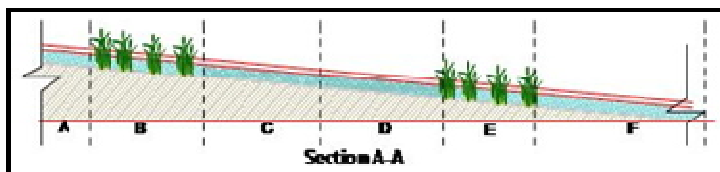


Section view of rain water harvesting components





Three dimensional view of rain water harvesting



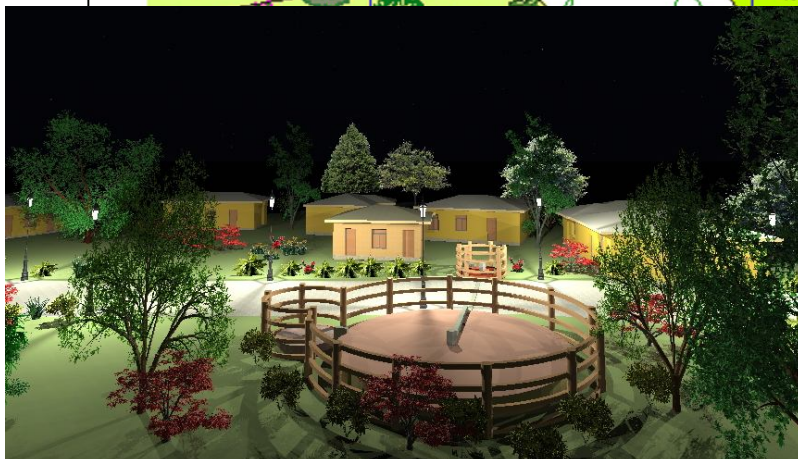
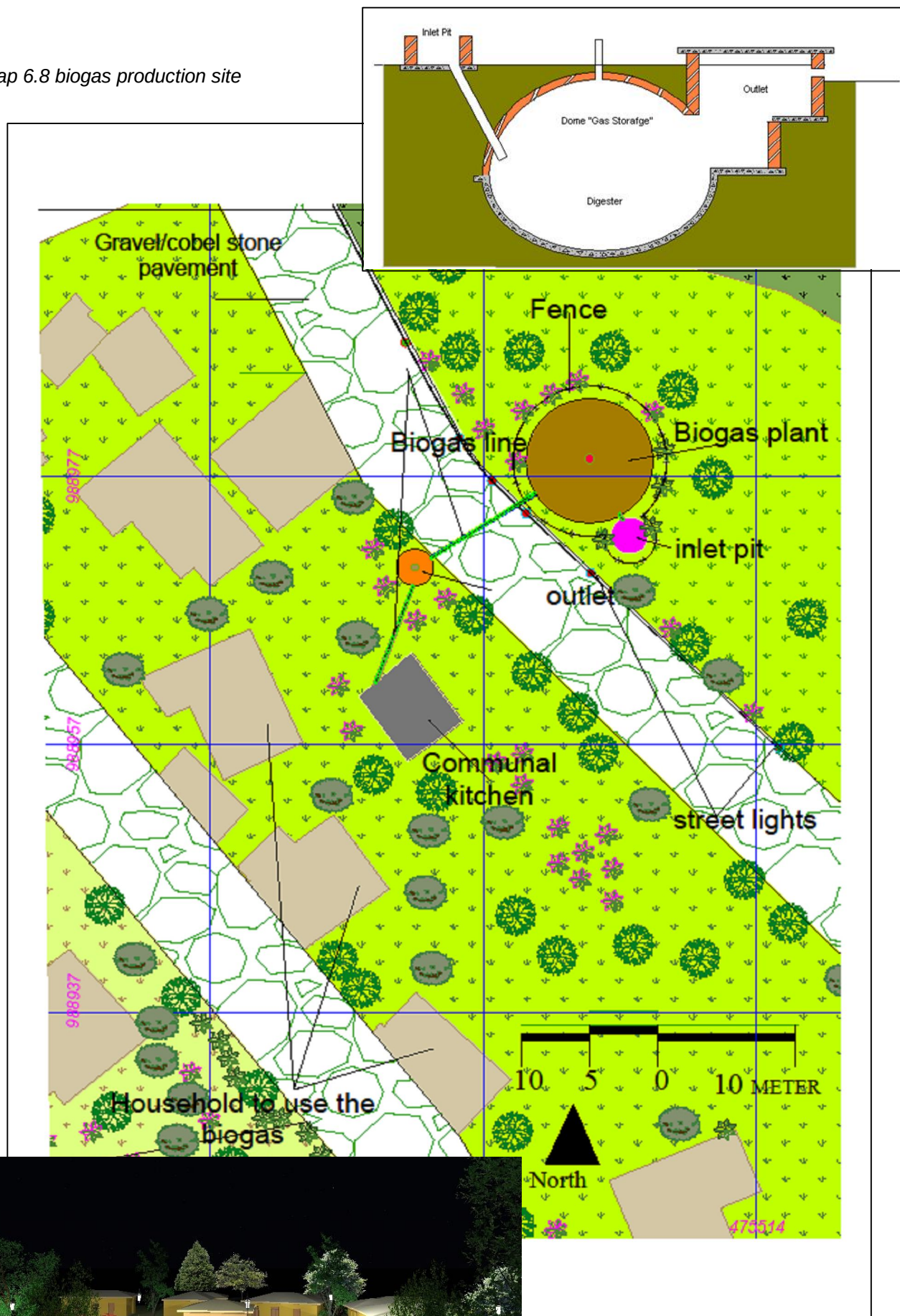
Source: Own computation, 2012

5.2.4.5. Biogas production

Manure, the best resource for energy production is left unconsidered and contributing to the indoor and river side pollution in the site. One of the resources that can be harnessed for biogas production, Therefore, the need to propose biogas production plant is inevitable with due consideration of the potential benefits that can be obtained from it.

- Reduction in polluting matters – organics wastes which otherwise host disease causing organisms – are now converted into energy form.
- Reduction in indoor air pollution by replacing fuel wood and other poor quality fuels used for cooking.
- Reduction in deforestation by cutting down on the quantity of fuel wood consumption, fuel wood collected from forests.
- Reduction in water pollution with connecting ecosan toilets to biogas systems and thus preventing the flow of sewer to the rivers, thus also preventing the effect of water borne diseases on animals and people living at the down stream.

Map 6.8 biogas production site



Source: Own computation, 2012

5.3.IMPLEMENTATION STRATEGY

- ✓ The transformation shall begin by creating jobs through the provision of composting sites on idle but accessible areas. This activity will create employment opportunity for the existing as well as newly formed MSEs willing to engage in waste management.
- ✓ Next the existing but closed toilets shall be transformed into ecosan toilets. This task will also create employment for the unemployed work force.
- ✓ The idle open spaces shall be utilised for constructing houses for those residents to be displaced due to buffer zone protection and provision of social amenities such as community centres.
- ✓ The river bank shall be protected and activities including urban agriculture, recreation and play ground can be carried out afterwards.
- ✓ The transformation of the roads to enhance accessibility and circulation shall be carried out simultaneously at different locations. However, it is the steep slope areas that need to be made comfortable for pedestrian movement through the provision of vegetative external steps.
- ✓ Plantation activities will be carried out on wards.
- ✓ The mobilization and involvement of the various stakeholders shall be undertaken at the different implementation stages of the proposals.

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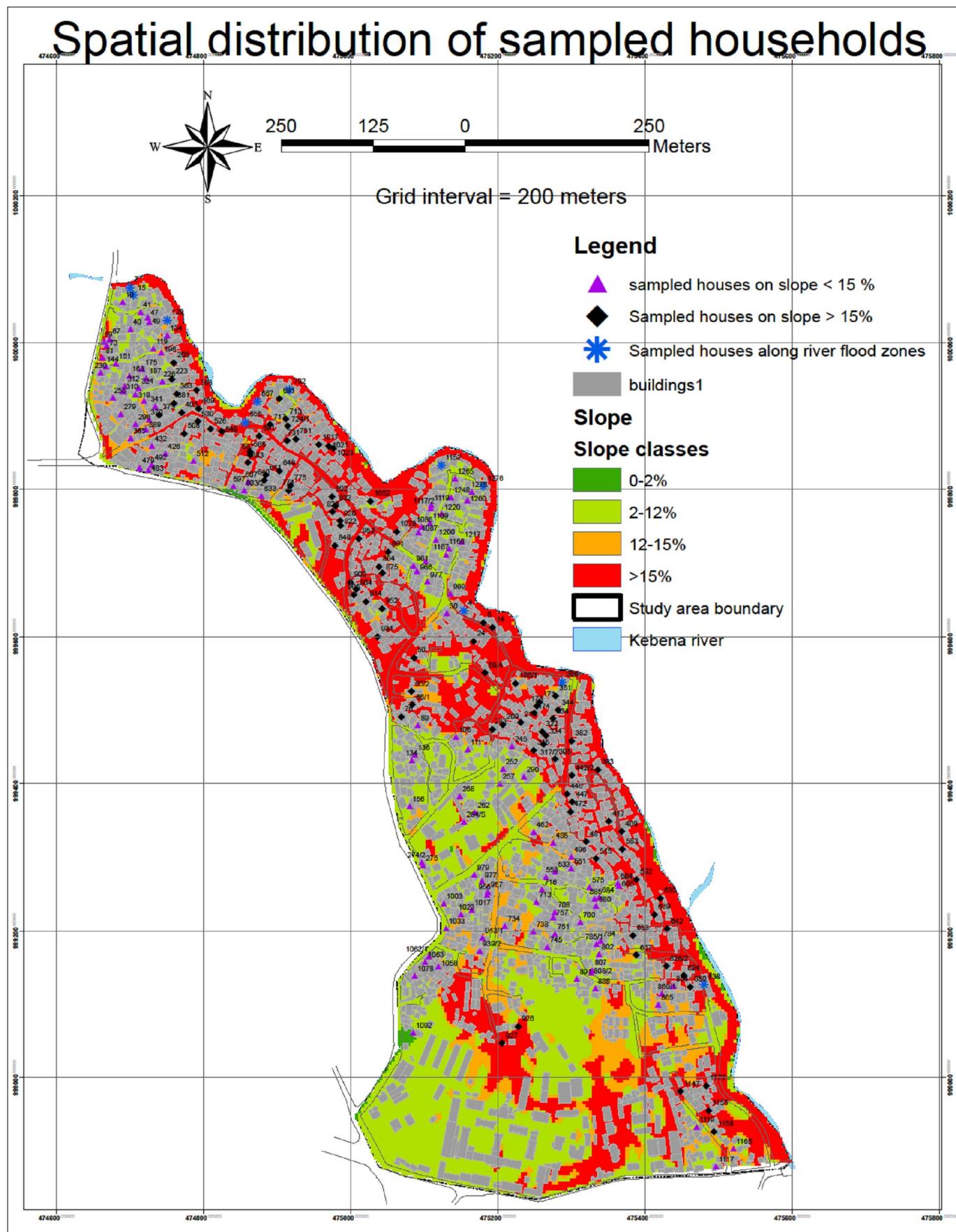
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Annexes



Annex 2- Household questionnaire.

Dear respondents,

I request your cooperation in providing information requested in this questionnaire to address the issue of sustainable development in slum areas. It is provided to collect primary data needed for the preparation of a thesis research paper for the partial fulfilment of the degree of Masters of Sciences in Environmental planning and Landscape Design.

A. REASERCH INFORMATION:-

Research Title: *Transforming slum settlements on environmentally sensitive areas to sustainable neighbourhood based on adaptive strategies: The case of 'Korea sefer' Addis Ababa.*

University: Ethiopian institute of Architecture Building Construction and City Development /EiABC/, Addis Ababa University south campus.

Chair: Environmental Planning and Landscape Design.

Prepared By: Mulugeta Maru

Supervised By: _____ Abraham Workineh /MSc/.

B. Purpose: - The purpose of this questionnaire is to collect primary data on the physical, socio-economic and environmental issues in 'Korea-sefer' which are an important issues for the sustainable transformation of the site.

Household data

1. Respondent's age.....
2. Family relation: - Household head.....wife.....son/daughter.....other.....
3. Respondent's sex_____ Female (01) Male (02)
4. Marital status____ Single (01) married (02) Divorced(03) Widowed (04)
5. Number of years in the house/ neighbourhood?

Year of residency	Below 10 years	10-20 years	20-30 years	>30years
Remark				

6. Household size_____
7. Age category of household members

Age category	0-4 years	4-19 years	20-55 years	>55years
Number				

8. Housing ownership:

ownership	private	kebele	RHA	Rented from private
Remark				

9. Purpose of the housing unit.

Purpose	Pure residence	commercial	mixed	others
Remark				

10. Education level of household members_____

School grades	No.	Within the Neighbourhood	Outside of the Neighbourhood.
Kg			
1-8			
9-10			
TVET			
Preparatory.			
University, colleges.			

Special training_____

Socio-economic conditions.

11. Current occupation of household members.

- a. Self employed (formal/informal).
- b. Employed.
 - i. Government.
 - ii. Non Governmental.
 - iii. Private company.
- c. Unemployed.
 - a. If unemployed. What type of job would you like to do?
 - b. What skill/entrepreneurship/ you have?

12. Please state if the occupation is self employed

a. What is the business?

Business	Petty traders	Solid waste collection.	Wood work.	Baltina	Handicraft.	Small shops	construction	Urban agriculture.	Others specify
Remark									

b. No. Of employees employed under your business.....

13. What are the major problems in the area to start/expand the existing business?

Problem	Working /marketing/area.	Lack of Entrepreneurial skill.	Lack of market.	Financial limitations.	Others, specify.
Remark					

14. Is there any disabled person in the household? Yes ☐ No ☐

If yes, what type of work are they working?.....

15. Is there an HIV/AIDS victim in the household? Yes ☐ No ☐

What major problem does this person face?

.....

16. How do you get access to participate in any income generating activities in the site?

- a. Woreda MSE
- b. Different associations.
- c. Others please specify.....

17. What are the social, safety and security problems in the neighbourhood?

	Description of the problems	Yes	No.	Remark
a.	Land/house tenure.			
b.	Fear of eviction.			
c.	Flood.			
d.	Traffic accident.			
e.	Violence, Crime, Theft.			

Land use and accessibility related questions.

18. What is your opinion about the availability and Accessibility of services and facilities?

No.	Services	accessibility		Average distance from your house.	How long does it take?
		Within the site	Not in the site		
a)	Social institutions • Health services. ✓ Hospitals ✓ Health centres. ✓ Clinics ✓ Pharmacy. • Educational services. ➤ KG, ➤ Primary (1-8) ➤ Secondary. ✓ TVET. ✓ Preparatory				
b)	Market area				
c)	Green areas. • Urban agriculture • Open spaces • Parks. • Youth centres. • Recreation areas.				
d)	Manufacturing and industries				

Environmental and infrastructures.

19. Were there any upgrading activities in the neighbourhood?

Yes ☐ No ☐

If "yes" then in what form did you contribute?

a) Money b) Labour c) Other _____

20. What was the focus of the upgrading program?

Upgrading /improvement/ areas	road	houses	Retaining walls	Construction of public toilets	others

21. How do you get access to drinking water?

Water meter.	Private	Shared	communal	others

22. Which toilet facilities do you use?

Toilet facility	Private	Shared	communal	others

23. How do you see its sanitation and quality?

a. Good b. needs some maintenance c. bad

If 'Bad' what problems did it cause to you and your family members?.....

24. Kitchen you use?

Kitchen facility	Private	Shared	communal	others

25. How do you see its contribution to good sanitation and indoor air pollution?

a. Good b. needs some maintenance c. Bad

If 'Bad' what problems did it cause to you and your family members?.....

26. What is the source of energy you use for cooking, heating etc purposes?

	Wood	electricity	Fossil fuel /kerosene/	others
Source of energy				

27. How do you dispose solid waste from your house?

Waste disposal mechanism.	Garbage container	Door to door		Throwing to			others
		MSEs	Municipal vehicles	Open fields/ditches	streets	river	

28. How do you dispose waste water from your house?

Place to dispose waste water	Septic tanks.	Use ditches,	Sewerage pipe	Directly connected to the river.	Others specify.
Remark					

29. Is there pollution in your neighbourhood? Yes ☐ No ☐

30. Which pollution is more serious?

a. Noise, b, Air /indoor/ c, visual pollution d, Land pollution.

31. What specific health problem did the pollution create on you and your families?

32. How do you see the availability of vegetations in your compound and the neighbourhood?

a. Trees

i. One. ii. More than one.

b. Hedges, flowers, etc.

i. Available ii. Not available.

33. Do you or your families use parks, play grounds, recreation areas? Yes ☐ No ☐

i. If no Why? _____

ii. If yes where exactly is the park? _____

How do you reach there?How frequently do you go there?.....

34. Is there a problem of flooding in your compound/neighbourhood? Yes ☐ No ☐

If yes, what is the primary cause for flooding?.....

What need to be done to curb the problem?

.....

35. Are there sidewalks in your neighbourhood? Yes ☐ No ☐

If yes, how do you evaluate their quality?

36. Are the sidewalks comfortable to all inhabitants i.e. children, elderly, disabled, etc. Yes ☐ No ☐

37. How do you rate the quality of roads in your Neighbourhood in terms of facilitating accessibility?

a. Pavement. Good ☐ Bad ☐

b. Size of the road. Adequate ☐ Not adequate ☐ Wide ☐ Narrow ☐

38. Are the roads suitable for disabled persons? Yes ☐ No ☐

Land use and landscape suitability related questions.

39. Which topographic issue affected your livelihood in the neighbourhood?

a. Slope? How did it affect your livelihood?

b. Drainage.

c. Settlement pattern.

40. Which risk is more frequently happening in your compound and neighbourhood?

a. Flooding. b. Landslide. C. Accessibility. D.Noise.

41. Do you like your plot and consider it comfortable and suitable for your livelihood? Yes ☐
No ☐

If 'No', please specify why you do not see it as comfortable and suitable for living?

.....

Please specify what need to be done to improve the situation?

.....

Sustainable development related questions.

42. What is sustainable development in your opinion?.....

.....
.....

43. Do you feel that you are living in a sustainable neighbourhood? Yes ☐ No ☐

If 'No' what is your vision for your neighbourhood?

.....

44. If 'not', how do you prioritise the issues of sustainable development?

Sustainability issues	Issue to prioritise	rank
Economic issues.	Economic opportunities have to be established and financial support and entrepreneurial training to be provided.	
Social issues	settlement pattern and housing conditions to be improved, access and availability of infrastructures be enhanced, social services provided at the proximity of your house or in the neighbourhood, location of your house changed within the neighbourhood etc.	
Environmental issues.	Waste management strategies employed effectively. Green areas to be provided adequately. Riversides to be protected and quality of river improved. Different trees, shrubs and bushes to be planted.	

	Road side plantations to be promoted.	
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45. How do you expect the area to be transformed?

- a. Fully demolished and renewed, and relocated to other site away from the neighbourhood
- b. First buildings to be built on vacant lands, and transfer inhabitants on fragile areas to these blocks and demolish. Continue the task in the same manner and implement other socio-economic and environmental projects coherently phasing activities.
- c. Just only upgrade existing houses, roads, river banks, etc no new construction activity to be made.
- d. Other options.....

46. If your answer is 'C' then does this option allow you to achieve your 'vision' and transform the site? Yes ☐ No ☐

47. What would be your position in the process?

- a. Participate in labour.
- b. Contribution in money.
- c. Other, please specify

Annex 3: tree species proposed in the study area

Common name	Scientific name	Type	Benefits	Location in the proposed neighborhood functions.
1.Wacho	• <i>Acacia seyal</i>	• Tree	• .Nitrogen fixation • .Soil conservation • .Shade • .Wind break	• River bank • Road
2.Garadumenenz	• <i>Acokanthea schimpri</i>	• Tree	• .Ornamental • .Shade	• Play ground
3.Sesa	• <i>Albizia gummifera</i>	• Tree	• .Nitrogen fixation • . Ornamental • .Shade • .Medicine etc	• River bank • .Road
4.Giishra,yeberelib	• <i>Annona senegaleasis</i>	• Shrub	• .Wind break • .Ornamental • .Timbe • .Fire wood	• River bank
5.Bedeno,kudkuda	• <i>Balanites al sypptiaca</i>	• .Shrub	• .Shade • .Wind break • .Ceremonial meeting	• Play ground
6.Yeneber tifer	• <i>Bridelia miorantha</i>	• .Tree	• .shade • .Mulch • .Fire wood	• River bank
7.Vertiver	•	• Grass	• .Soil • .Water • .Food	• River bank
8.Agam	• <i>Carrisaedulis</i>	• .Shrub	• .Ornamental	• River bank
9.Wanza	• <i>cordiaofricana</i>	• .Tree	• .soil conservation • .Ornamental • .Shade	• Road • Play ground • River bank
10.Bisana	• <i>cortionmacrostichus</i>	• Tree	• .Mulch • .Soil conservation	• River bank • Play ground
11.Kitkita	• <i>Dodonaea angustifolia</i>	• Tree	• .Wind break • .Soil conservation	• .Road • River
12.Enset	• <i>Ensete Ventricosum (E.edule)</i>	• .Tree	• .Soil conservation • .Ornamental	• Urban agriculture
13.Dedehe	• <i>Euclea</i>	• .Shrub	• .Ornamental	• Road • River

	<i>Schimperi</i>			
14. Shold	• <i>Sycomorus</i>	• .Tree	• .Shade • .Ornamental • .mulch • .Soil conservation and improvement	• urban agriculture
15. Kosso	• <i>Hagenia abyssinica</i>	• ..Tree	• .Fire break • .mulch • .Soil conservation • .Ornamental	• Road • Play ground • Urban agriculture
16. Tid	• <i>Junipers Procera</i> •	• .Tree	• .Ornamental • .Shade • .Wind break	• Road • Play ground • Urban agriculture
17. Injori	• <i>Morus Mesolygia</i>	• .Shrub	• .Shade	• Road • Play ground • Urban agriculture
18. Indod	•	• .Shrub •	• .Soil conservation	• River bank
19. Tikur inchet	• <i>Pronusafrilan</i>	• .Tree	• .Mulch • .Shade • .Wind break	• River bank • Urban agriculture
20. Zigba	• <i>Podocalpus falactus</i>	• .Tree	• .Ornamental • .Shade	• Play ground • Urban agriculture • River bank

Annex 4 Kindergarten, plant species, shops, found in the study area.



Kindergarten found in the study area



Trees found in the site



Shops in the study area



One of the economic activities in the site



Stepped access in the study area