



Master's thesis

Marie Juul Madsen

The crucial need of urban open spaces in the adaptation to climate change

- A case study of the use, function and perception of the open spaces in the unplanned settlement Kawe Ukwamani in Dar es Salaam



Academic supervisor: Lise Herslund

Submitted on the 15th of May 2014

Master's thesis:

The crucial need of urban open spaces in the adaptation to climate change

- A case study of the use, function and perception of the open spaces in the unplanned settlement Kawe Ukwamani in Dar es Salaam

Author: Marie Juul Madsen, M.Sc. Stud. Geography and Geoinformatics

Department of Geosciences and Natural Resource Management

Faculty of Science, University of Copenhagen

Academic supervisor: Lise Herslund, Associate professor, Department for Rural and Urban Studies at Forest & Landscape.

Submitted on the 15th of May 2014

Signature: Marie Juul Madsen

© Marie Juul Madsen

ABSTRACT

Major climate change hazards, such as urban flooding, are affecting African cities like Dar es Salaam, and there is an urgent need to find solutions to these changes.

This study is associated with the partnership research project: “Water Resilient Green Cities For Africa” (WGA), initiated by University of Copenhagen, which investigates the options for using the urban landscape as a strategy to manage water in Dar es Salaam, Tanzania.

The essence of this strategy is the presence of urban open spaces, however, the open spaces are threatened to disappear to development as Dar es Salaam is experiencing growing population numbers.

The overall objective of this study is therefore to create a better understanding of the driving forces at community level behind the process towards a more densely built Dar es Salaam. Through fieldwork analysis of the use, function and perception of the urban open spaces in the unplanned settlement Kawe Ukwamani, the aim is to find suggestions on how these spaces in the future can be maintained, made greener and increase in numbers in order to reverse the process towards a more densely built city.

The fieldwork findings indicate that the browning process is due to general natural growth and ongoing rural-urban migration. Moreover, the development at community level is dependent on the urban planning at city level, where lack of proper city plans and provision of cheap housing has contributed to uncontrolled encroachment of urban open spaces. Lastly, when settling down in Kawe Ukwamani, it means a lot to have a place to live close to the city due to increased job opportunities, and living close to other people is also an important factor regarding economic and social activities.

The open spaces in Kawe Ukwamani, that form part of people’s livelihood, are highly valued by the residents and are therefore protected from disappearing, while other spaces are more susceptible to change as they are not considered very important. All the open spaces in the area have potential to be upgraded in terms of green elements and in that way function better as ecosystem services, but the green elements should be integrated in the highly valuable spaces, as the green elements are not in themselves very important to the residents, or contain some kind of economic value, such as tree plantation or cropping in order to be best protected from disappearing.

To reverse the process towards a more densely built city, the suggestions are to transform the area into vertical housing style and in that way create more space, or to create greener spaces by tearing worn houses down and transform the land into public spaces with some kind of economic value. It is paramount to establish better communication, trust and relationships between the residents, the Subward office and the urban authorities, as the Subward office, and especially, the urban authorities play a crucial role in terms of protecting the open spaces in the future, and may act as economic and professional supporter in the transformation process.

PREFACE

This Master's thesis has been drafted and submitted as the completion of the Master of Science degree in Geography and Geoinformatic at the Faculty of Science, University of Copenhagen.

The supervisor of the thesis is Associate professor Lise Herslund from the Landscape architecture and Planning section at Department of Geosciences and Natural Resource Management. This thesis is seeking to contribute to the partnership research project "Water Resilient Green Cities For Africa" (WGA), which is initiated by the University of Copenhagen in close collaboration with Ardhi University (Dar es Salaam) in Tanzania and Addis Ababa University in Ethiopia. The research project is in its initial phase and will be running until 2017.

This thesis is based on a field case study in the unplanned flood prone area Kawe Ukwamani in Dar es Salaam, Tanzania, and the fieldwork took place in the period 23rd of January to 21st of February 2014. The fieldwork methods consisted of space use mapping, observations, photography, semi-structured interviews, workshops, casual talks, guided tour, and overlay analysis. Supplementary, a literature review is made in order to triangulate knowledge.

The author wishes to thank all the persons who have been involved in the process of making this thesis. Thanks to the supervisor Lise Herslund for great sparring and sharing of practical and theoretical knowledge, and to the research team and the other master thesis student Lagiya Khatib for great ideas, inspirational knowledge and good company.

Also a huge thanks to the residents in Kawe Ukwamani, especially the four Ten Cell Unit Leaders, for helping, welcoming and participating in the fieldwork. Furthermore, enormous thanks go to the interpreter Ali Toli for great support and friendship, and interpreter Alpha Mangula for talks and help during the fieldwork period. Without these two interpreters this study could not have been completed. Finally, the author is thankful for the economic support from Danida Fellowship Centre, NØBU, Dansk Tennis Fond, Oticon Fonden and the University of Copenhagen.

TABLE OF CONTENTS

| | |
|---|------------|
| ABSTRACT | I |
| PREFACE | II |
| TABLE OF CONTENTS | III |
| APPENDICES | IV |
| INTRODUCTION | 1 |
| Outline of the problem | 1 |
| Objective and research question | 2 |
| Reading guidance | 4 |
| BACKGROUND | 5 |
| Urbanisation in Africa | 5 |
| Characteristics of Dar es Salaam | 6 |
| Institutional level and planning in Dar es Salaam..... | 6 |
| Informal and unplanned settlements in Dar es Salaam | 8 |
| LITERATURE REVIEW | 10 |
| Urban green spaces | 10 |
| Benefits | 11 |
| Urban open space and public space | 15 |
| Open and public spaces in developing countries | 15 |
| Categories of urban open spaces | 18 |
| METHODOLOGY | 22 |
| Case study | 22 |
| Case study methodology | 22 |
| The case study area | 22 |
| Fieldwork methods | 25 |
| The fieldwork approach | 25 |
| The field methods..... | 27 |
| Limitations of applied methods | 35 |
| ANALYSIS OF FINDINGS | 37 |
| The area | 37 |
| Open spaces | 48 |
| Overall view of the open spaces in the area..... | 48 |
| Types of open spaces | 48 |
| DISCUSSION | 55 |
| Browning at local scale | 55 |
| Lack of successful plans at city level | 56 |
| The open spaces' susceptibility to change | 58 |
| Kawe Ukwamani in the future | 62 |
| CONCLUSION | 65 |
| PERSPECTIVES | 67 |
| REFERENCES | 68 |

APPENDICES

- Appendix 1. Guided tour with Subward office employee Faustini Ally Mpinga
- Appendix 2. Semi-structured interview with Ten Cell Unit Leader Bernadetta Masawe
- Appendix 3. Semi-structured interview with Ten Cell Unit Leader Aisha Anton
- Appendix 4. Semi-structured interview with Ten Cell Unit Leader Herswida Ki Mapunda
- Appendix 5. Semi-structured interview with Ten Cell Unit Leader Mwatano Ally
- Appendix 6. Semi-structured interview with urban planner Mary Komba
- Appendix 7. Space use mapping
- Appendix 8. Workshop participant list
- Appendix 9. Workshops
- Appendix 10. Selection criteria made by Ardhi University, Dar es Salaam

INTRODUCTION

Outline of the problem

Urbanization, flooding and need for solutions

Urban flooding, drought, and water scarcity are major climate change hazards affecting African cities. Flooding, in particular, has already had a negative impact on human lives in cities like Dar es Salaam (WGA, 2014). While this thesis has been finalised the rainy season has started in Dar es Salaam, where heavy downpour over three days has costed several people's lives, flooded various residential areas in the city as well as heavy damaged major bridges and other important infrastructure connecting the city and the regions (Allafrica.com, 2014). This indicates that there is a huge need for finding solutions to these present and future challenges.

In Europe, the United States and Australia there has over the last three decades been a gradual response to precipitation and flooding in cities by the use of the landscape to manage the water.

The basic idea is to delay and infiltrate stormwater runoff in the city via urban green infrastructure, rather than discharging the water through sewer systems and rivers (WGA, 2013). In Denmark, this idea has provided an alternative to sewer system enlargement in response to increased precipitation, and has been coupled with revitalization of existing cities with focus on the multiple values of the green in the city (WGA, 2013). Hereby the trick has been to integrate the urban green infrastructure in the cities so they appear as attractive recreational green and blue elements that have a function other than to manage rainwater (Rasmussen, 2014). The presence of the water and green areas in public spaces have thus added qualities such as created a better climate and especially created identity and atmosphere in the city (Clemmesen, 2014).

In African cities like Dar es Salaam where the lack of proper sewer system is the case, the urban green infrastructure can be seen as a soft infrastructure that can provide some of the same functions and at the same time strengthen the urban green elements, reduce the risk of flooding, improve the urban water supply, and support local livelihood activities, if appropriately planned and implemented (WGA, 2013).

What is the essence of this idea is the presence of urban open spaces, understood as the open spaces remaining after carving out all development, which has a great responsibility in providing critical solutions. However, the open spaces are threatened to disappear to development as the African cities including Dar es Salaam are experiencing growing population numbers due to natural growth and increase in rural-urban migrations, which causes uncontrollable spatial expansion of the cities (Mng'ong'o, 2004).

This process towards a more densely built and populated city, where open spaces are turned into development and taken up by other functions, is called browning by Mng'ong'o (2004). Urban open spaces are seen as an integral part of cities, providing a range of services to people, the environment and the wildlife living in the urban areas (James et. al., 2009), thus the browning process is a major problem in African cities. The driving forces behind this process are manifold and exist at different structural levels, which make the solutions to reverse this process difficult to address.

However, by studying the browning process on a smaller scale and *in the field*, it might be possible to get an understanding of the driving forces behind the browning process in a community, and also how it may be reversed. Moreover, as 70% of Dar es Salaam's population lives in unplanned settlements without urban planning authorities being able to control the ongoing tremendous development, it makes sense to look at the browning process in an unplanned settlement in Dar es Salaam and the flood prone unplanned settlement Kawe Ukwamani is used as case.

The specific case is chosen as this study is seeking to contribute to the transdisciplinary partnership research project "Water Resilient Green Cities for Africa" (WGA), that investigates the options for using the landscape as a core element for increasing the climate resilience of larger African cities and for providing inclusive urban open spaces, and better local planning and governance. The project is initiated by the University of Copenhagen in close collaboration with Ardhi University in Dar es Salaam and will be running from 2013-2017. In the project Kawe Ukwamani is chosen as case but no further studies are made so far. Therefore it is anticipated that the findings in this study may contribute to the larger research project, and that the local findings in Kawe Ukwamani can be generalized to other unplanned settlements in the city and thus provide suggestions and give an indication of the driving forces behind the browning process at city level too.

The following objective and research question of the study have been created on the basis of the above raised problems.

Objective and research question

The overall objective of the study is to create a better understanding of the driving forces behind the process towards a more densely built and brown Dar es Salaam. This focus is chosen in order to find suggestions on how open spaces can be maintained, made greener and increase in numbers, as they are the essence when wanting to use the landscape for managing water.

The study mainly seeks to investigate how the browning process unfolds at community level with the unplanned settlement Kawe Ukwamani in Dar es Salaam selected as case. Through analysis of the use, function and perception of the urban open spaces in this area, the aim is to find suggestions on how these spaces in the future can be maintained, made greener and increase in numbers in order to reverse the browning process in the city.

Research question:

- Understood at community level, what are the driving forces behind the process towards a more densely built and brown Dar es Salaam, and how can this process be reversed at community level?

An elaboration of the research questions and delimitations:

To answer the research question a study of historical orthophotos of Kawe Ukwamani is made in order to explore how the development has taken place over time. In continuation of this, the local people in Kawe Ukwamani is involved in the study to unfold their perception on the past, present and future development of the area. Furthermore, the characteristics such as shape, size, use, function, perception, ownership, vegetation, surface and appearance of the open spaces in Kawe Ukwamani is studied. This is done to 1) categorize the open spaces in order to say something more on how they differ from each other according to how they function and how local people use and perceive them, 2) to find out how vulnerable they are to disappear as well as how they can be maintained, made greener and possibly increase in numbers. The categorization is inspired by Stanley et al. (2012) who present seven categories of urban open spaces made on the basis of historical research on urban open spaces all over the world. Moreover, to support the findings from Kawe Ukwamani, different literature on open, public, green spaces, especially in unplanned settlements in developing countries, is also included in the study.

The focus of this study is Kawe Ukwamani and other areas or city levels have not been studied in detail. However, it is assumed that this case study may contribute to new insights on the driving forces behind the browning process at a more generalized level too. The small-scale study and focus on the residents in the area is also highly relevant since 70 % of Dar es Salaam's population is living in unplanned settlements, and because the urban planning authorities of Dar es Salaam are not capable of catching up with the rapidly growing development of the city, whereas the lack of control of the unplanned areas is creating more or less autonomous unplanned settlements.

The focus on urban open spaces will in this study be holistic and not specified on one single thing such as health, ecological or social aspects. It is kept broad to unfold and explore all the local aspects of the open spaces, and to study the social and economic benefits of the open spaces as well as to include environmental benefits of the green elements in the open spaces, such as ecosystem services. Therefore the study includes literature on ecosystem services, especially by Bolund and Hunhammer (1999), but does not include any detailed calculations of how much "green" it takes to alleviate flooding, as the open spaces and the "green" no matter quantity is seen as a crucial factor for improving the liveability of the city in multiple ways.

Reading guidance

This thesis is divided into 9 chapters. Chapter one constitutes an introduction to the study. Additional information and the background for this study is presented in chapter two. Chapter three intends to present the chosen literature in a literature review, which is used to interpret the empirical data. Chapter four constitutes the study's methodology, followed by the analysis of the study's findings in chapter five. Chapter six contains a discussion of the study's findings. In chapter seven the objective of the study will be answered leading to the conclusion. Perspectives of the study is presented in chapter eight, and finally, chapter nine constitutes the study's references.

BACKGROUND

In this chapter additional information about urbanisation in Africa, characteristics of Dar es Salaam, the city's institutional and planning level and the informal and unplanned settlements in the city is presented.

Urbanisation in Africa

Moving to the city has been a global trend throughout the twentieth century and at worldwide level the urban population, that already witnessed an increase from 13% in 1900 to 29% in 1950 and reached 49% in 2005, is destined to constitute 60% of the global population (UN-Department of Economic and Social Affairs-Population Division, World Urbanization Prospects. The 2005 Revision, in Locatelli and Nugent, 2009).

There are several significant factors involved when it comes to understanding human development and the future development of cities. In 2007 The Global Environment Outlook identified five drivers for human development: 1) demographics, hereunder economic processes, such as consumption, production, markets and trade, 2) scientific and technological innovation, such as distribution pattern processes, 3) cultural, 4) political, and 5) institutional processes (UNEP, 2007 in James et al., 2009). It is certain that these drivers will have substantial consequences for the urban development in the future, although it is uncertain how the urban areas will be affected (James et al., 2009).

The African cities are expanding dramatically in terms of population and space, and cities have been transformed into megacities. Africa appears as the least urbanised continent, however, Africa has been characterized by unprecedented rapid population growth the last few decades. These transformations have mostly been taking place within an economic and social context with lack of industrialisation and even economic development (Locatelli and Nugent, 2009). The growth of many African cities is therefore unguided and unregulated, which fosters and perpetuates the proliferations of an unplanned, informal city, where land development processes and procedures are carried out independently from the formal systems. The unplanned, informal city often develops in the gaps between formal developments or in areas of ecological importance, and the results of such development combined with the weak capacity of the respective planning system to handle such rapid urbanization leads to degradation and inadequacy of employment opportunities, infrastructure and services, lack of proper open spaces and general decay of the urban living environments (Mng'ong'o, 2004). This urban development is also to a large extent seen in Dar es Salaam.

Characteristics of Dar es Salaam

Dar es Salaam is the national centre for industry, education, culture and commerce, and the city is located in the eastern part of the Tanzanian mainland along the Indian Ocean. The total surface area of Dar es Salaam City is 1,800 km², which growth sporadically and extends 35km from North to South and 25km from Coast to the West (Lupala, 2002).

Based on the last population and housing census in 2002, Dar es Salaam had about 2,5 millions inhabitants, but currently the population is estimated to be 4,5 million people (CLUVA, 2010). In 2002 the population density was 1887 people per km², and with a yearly population growth at 8 %, the city is one of the fastest growing cities in sub-Saharan Africa (World Bank, 2002). The rapid growth in Dar es Salaam is largely a result of natural high birth rates and a result of rural urban growth (World Bank 2002).

The city experiences a modified equatorial climate. It has generally hot and humid climate throughout the year with an average temperature of 29-Celsius degrees. Humidity is around 96% in the mornings and 67% in the afternoons and the average rainfall is 1000mm.

Climate change impacts include sea level rise, rising temperatures and increased occurrence of extreme weather, including flooding, rainstorms and droughts. The heavy rainfall impose additional hardships and increase disease incidence and accentuate vulnerability especially threat to life and property among the people living in the informal, unplanned settlements (CLUVA, 2010).

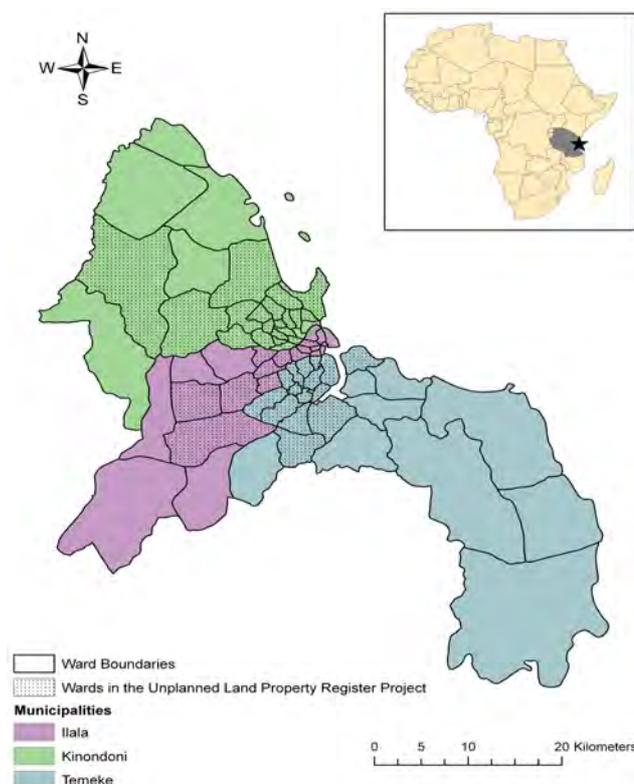


Figure 1. Dar es Salaam. (www.plosntds.org/, 2014)

Institutional level and planning in Dar es Salaam

The city comprises three municipalities (figure 1); Kinondoni, Ilala and Temeke and a City Council, which among other things in principle coordinates trans-municipal matters such as infrastructure and waste management. Furthermore, the city consists of 74 administrative Wards, which inter alia have a say in the enforcement of land use regulations. For administrative purposes, more than a few hundred Sub-ward areas constitute the Wards. The Ward Executive Officer and the Sub-ward Leaders are the government representatives in their local area (Kombe and Kreibich, 2000 in Nguluma, 2003). The government appoints the Ward Executive Officers, while the residents living

in their Sub-ward elect the Sub-ward Leaders. The size of a Sub-ward area varies according to geographical size of the ward and its distribution of people. The Sub-ward areas are furthermore divided into Ten Cell Units, that consist of 10 households each (Figure 2), and are led by volunteer Ten Cell Unit Leaders, who are elected by the residents. The Ten Cell units are the smallest political-administrative units in Tanzania established during the mono-party era in the country (1977-1992). Some of the primary objectives of establishing Ten Cell Units were to ensure party supremacy (Bahendwa, 2013).

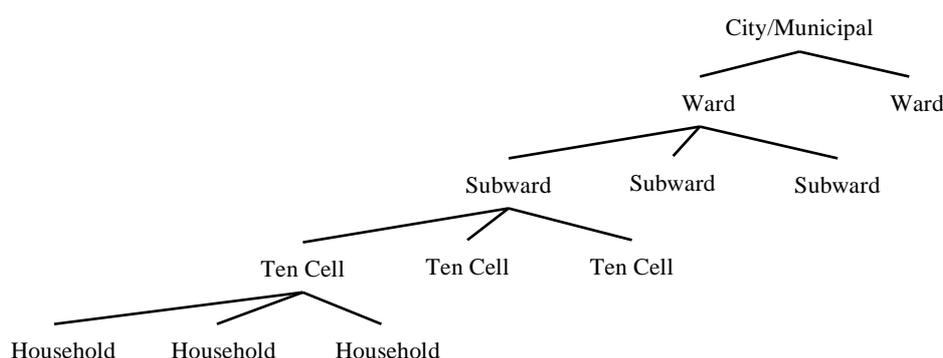


Figure 2. Administrative structure of the local government in Dar es Salaam

All land is vested in the state of Tanzania, which means that the president has right to all land in the country. The president may acquire any land for public use, and provided compensation for exhaustive development is assessed and paid. Therefore land has legally no value than the houses and developments made upon (Nguluma, 2003). However, in actual practice land is sold like any other commodity and often residents in unplanned settlements are informally selling plots of land.

Planning in Dar es Salaam has been taking place in a vacuum without following set plans and regulations. The Dar es Salaam City Council is poorly coordinated and lacks the adequate human and financial resources to respond to the challenges of rapid urbanisation. Such a situation has led to spatial disorder in the city, and to significant challenges with respect to providing new or even maintaining existing basic infrastructure and services (START, 2011).

A new masterplan for Dar es Salaam 2012-2032 was on the drawing board in the Ministry of Lands, Housing and Human Settlements Development together with a consortium of foreign consultant firms and co-opted local consultants. The purpose of the masterplan 2012-2032 was to place a spatial plan to guide the growth of the city over the next 20 years (START, 2011), but as several things, including references to climate change, were missing, it was rejected.

The urban planner Mary Komba, who was engaged in the masterplan, states in the conducted

interview (appendix 6), that the masterplan did not solve the problems of a fast growing city and did not come up with new ideas for infrastructure, housing and open spaces. Therefore the latest masterplan accepted and conducted for the city was back in 1979, which create a huge demand for new strategies and plans for the future Dar es Salaam (START, 2011).

There are different sectorial plans touching upon themes relevant to informal unplanned settlements, open spaces and adaptation to climate change. They count e.g. the National Land Policy (1995), the National Human Settlements Policy (2000), the National Environmental Policy (2000), and The National Adaptation Programme of Action. They have only to a limited degree been implemented; among other things because implementation plans are lacking and the policy statements do not take into account how to address data and knowledge deficiencies (Nguluma, 2003).

At municipal level, informal, unplanned settlements upgrading programs have been ongoing for the last decades. Several institutions such as NGO's as well as Subward and Ward institutions have been important in this work. Projects as "Citywide Strategy for Upgrading Unplanned and Unserviced Settlements in Dar es Salaam" and "Community Infrastructural Upgrading Program" (CIUP) have been initiated to improve physical infrastructure as stormwater drainage networks and strengthens the capacity of informal and unplanned communities to better help themselves (World Bank, 2002). Some of the programs have succeeded to some extent, but as Mary Komba explains (appendix 6), it is difficult to implement the projects due to lack of resources such as money. In stead, Mary Komba says, the urban authorities try to guide the informal, unplanned settlement, providing standard guidelines and regulations when e.g. building a house. In that case, she says, the unplanned areas get supervision from engineers who put up guidelines for the house construction concerning things such as accessibility and plot size to house size. However, Mary Komba says, it is very hard to enforce these rules and guidelines, as the density of the houses are already very high.

Informal and unplanned settlements in Dar es Salaam

Informal and unplanned settlements are areas not designated for residential use or which often lack basic infrastructure services including storm water drains, proper roads, and decent sanitation services etc. (World Bank, 2002). Dar es Salaam consists of more than 150 unplanned settlements, and approximately 70 % of the city's population lives in these settlements, as well as more than 50 % of the residential land in the city is covered by these settlements (Kombe and Kreibich, 2000 in Nguluma, 2003) (figure 3). The informal and unplanned settlements are often located in flood prone areas such as wetlands, river valleys and flood plains and the people living here face a number of challenges including flooding. The settlements accommodate a wide range of social and economic groups of people, from poor to wealthy households (Nguluma, 2003), but they are characterised by accessibility/transportation constraints, high density of buildings, and high occupancy rates (75%),

where the main income source is informal activities. This means that people do informal activities such as casual jobs, temporary jobs, unpaid jobs and subsistence agriculture often very locally (Bahendwa, 2013). The informal sector generates a large portion of the city's GDP, but their impact is not accounted for in the formal economy. About half of the residents in informal settlements in Dar es Salaam live on an average income of US\$1 per day and the life expectancy in informal unplanned (World Bank, 2002).

It is apparent that the majority of people in Dar es Salaam are living in private houses in both formal and informal settlements and are sharing houses through room renting (Nguluma, 2003)

In 1982 the National Housing Policy proclaimed an official recognition of informal settlements in Tanzania. The present government policy on informal settlements has generally been supportive, except for housing on flood prone areas. The state started initiating upgrading of the settlements by provisioning of basic services and facilities hand in hand with improving the supply of surveyed and serviced residential plots, but very few informal settlements have been upgraded until now (Nguluma, 2003).

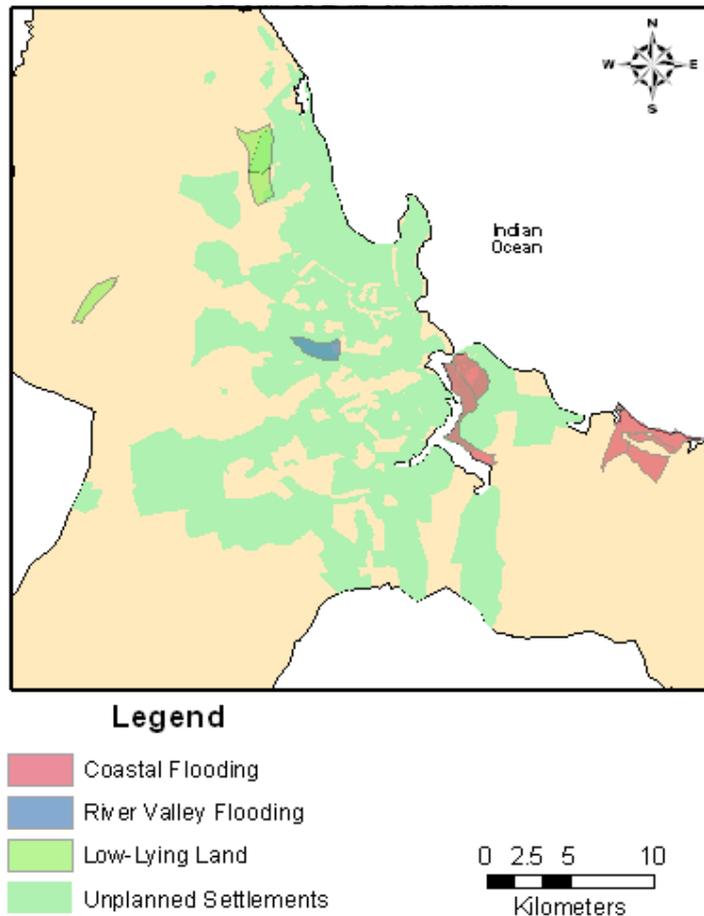


Figure 3. Unplanned areas in Dar es Salaam (www.start.org, 2014)

LITERATURE REVIEW

In order to study the use, function and perception of the urban open spaces in Kawe Ukwamani, and to find out how urban open spaces can contribute to the city, different terms and perspectives on the urban open spaces will be introduced in this chapter. These different terms and perspectives will serve as analytical approach as well as framework of understanding for the conducting fieldwork and data collection. Furthermore, this approach forms the basis for analysis of the collected field data.

The purpose of the following chapter is to provide an overview of the relevant and useful terms and perspectives on urban open spaces, as well as to operationalize the presented terms and perspectives so that they fit into the context of this study. The chapter will in the first subsection come across another term of urban open space, that is urban green space, where the ecosystem services, social as well as economic benefits of the green spaces is presented. In the next subsection, an extension of the urban green space term will be combined with perspectives on open and public spaces for a more holistic picture of what these common terms contain. Included in this section is also perspectives on the open spaces in unplanned settlements in developing countries, in order to find out *if or how* they differ from open spaces in developed countries, as well as a categorization of open spaces made by Stanley et al. (2012), containing seven different categories of open spaces each divided into three scale levels; city, intermediate and residence level.

Urban green spaces

Urban green spaces are pieces of land that are undeveloped, which means they are empty for buildings or other built structures. Urban green spaces can exist at different scales; from cracks in the pavement and private backyard gardens to more extensive urban landscapes such as green parklands, woodlands, unused vegetated allotments and abandoned fields (Kitha & Lyth, 2011). To characterize the differences in the scales, terms such as *urban wildscape*, *green space* and *green infrastructure* have been used. The term *urban wildscape* is used to describe the urban spaces where natural processes have been shaping the land. This is for example spontaneous growth of vegetation in an area without human intervention, quarries or expanses of industrial waste. *Urban green space* is heterogeneous in size, shape and nature, which to a greater extent can facilitate survival of some wild species or support biodiversity in the urban habitat (Kitha & Lyth, 2011). These urban green spaces include forest patches, parks and other small areas. *Green infrastructure* is composed from well-designed green wildscapes and green spaces, and can be defined as an interconnected system of green spaces that provide natural ecosystem values and services. Green infrastructure therefore consists of trees, parks, green roof, and has multi-functional benefits, as it, for instance, provides unique opportunities to address both climate change mitigation and adaptation, a wide range of benefits to wildlife, as well as socioeconomic functions to people (Kitha & Lyth, 2011). In this study the green areas are looked at on community level and they are therefore anticipated being either

urban wildscapes or green spaces. These local green spaces, if existing, are important parts of the bigger scale picture, as they contribute to a stronger green infrastructure at city level.

Benefits

This section reviews the literature discussing the degree to which urban green spaces make a valuable contribution across the spectrum of ecosystem, social, and economic benefits. The ecosystem benefits are described and weighted the most, as it is the focus of this study.

Ecosystem benefits

Urban green spaces provide cities with ecosystem benefits ranging from maintenance of biodiversity to the regulation of urban climate. Humanity is increasingly urban, but continues to depend on nature for its survival, therefore cities are dependent and benefit from internal urban ecosystems (Bolund & Hunhammar, 1999).

Moll and Petit (1994 in Bolund and Hunhammer, 1999) define an ecosystem as a set of interacting species and their local, non-biological environment functioning together to sustain life. To create an easier definition of the urban ecosystems, Bolund and Hunhammer (1999) choose to use the term for all natural green and blue areas in the city, e.g. trees and ponds.

To bring scale into play in the case of the urban environment, it is both possible to define the city as one single ecosystem or to see the city as composed of several individual ecosystems such as parks and lakes (Rebele, 1994 in Bolund and Hunhammer, 1999). When looking at the city as one single ecosystem, street trees are too small to be considered ecosystems in their own right, and should rather be regarded as elements of a larger system. Whereas when seeing the city as composed of several individual ecosystems, Bolund and Hunhammer (1999) identify seven different urban ecosystems; street trees, lawns, parks, urban forests, cultivated land, wetlands, lakes, sea, and streams.

Human beings benefit from a multitude of resources and processes that are supplied by ecosystems. Collectively, these benefits are known as ecosystem services. Constanza et al. (1997 in Bolund and Hunhammer, 1999) define ecosystem services as the benefits human populations derive, directly or indirectly from ecosystem functions. A number of these benefits are not consumed by humans directly, but are needed in order to sustain the ecosystems themselves.

Ecosystem services can be available on the local or global scale, as well as beyond and within the city limits. Costanza et al. (1997 in Bolund and Hunhammer, 1999) identify 17 major categories of ecosystem services out of which eight of them are considered to have a major importance in urban areas (Bolund and Hunhammer, 1999) and in the context of this study. The urban ecosystem services are air filtering, microclimate regulation, noise reduction, rainwater drainage, sewage and waste treatment, food production, erosion control, as well as recreational services (Figure 4).

| ECOSYSTEM SERVICES | Which kind of problem does the service contribute to solve? | What ecosystems are involved in the generation of the service, and how? |
|-----------------------------------|--|--|
| Air filtering | Air pollution caused by transportation and heating of buildings, among other things. | Vegetation reduces air pollution by filtering pollution and particulates from the air. Filtering capacity increases with more leaf area, and is thus higher for trees than bushes or grassland |
| Microclimate regulation | Large areas of heat absorbing surfaces, in combination with high amounts of energy use in cities creates higher air temperature, reduced solar radiation by up to 20%, and lowered wind speed by 10–30%. | All natural ecosystems in urban areas will help to reduce these differences. Water areas in the city will help even out temperature deviations both during summer and winter. Vegetation is also important, e.g. city trees can lower temperatures via their transpiration and evaporation, and they can create shade. |
| Noise reduction | Noise from traffic and other sources creates health problems for people in urban areas. | A soft lawn, rather than a concrete pavement, decreases the level by 3 dB(A). Vegetation also contributes to the decrease, but at what level is uncertain. |
| Rainwater drainage | The built-up infrastructure, with concrete and asphalt covering the ground, results in alterations of water flow. A higher proportion of rainfall becomes surface-water run-off which results in increased peak flood discharges and degraded water quality. | The soft ground of vegetated areas allows water to seep through and the vegetation takes up water and releases it into the air through evapotranspiration. In vegetated areas only 5–15% of the rainwater runs off the ground, with the rest evaporating or infiltrating the ground. |
| Sewage and waste treatment | Dealing with sewage costs cities large amounts of money, and the nutrients that are still released contribute to eutrophication of the surrounding water ecosystems. | Natural systems, mainly wetlands, are being used to treat sewage water. The wetland plants and animals can assimilate large amounts of the nutrients and slow down the flow of the sewage water, allowing particles to settle out on the bottom. |
| Food production | Having more people moving to the cities put at huge pressure on the food | Food production areas in the cities such as small fields with different types of crops |

| | | |
|--------------------------------------|--|---|
| | production, which also have to get transported over longer distances. | can contribute to an increasing local food production as well as they may function as rainwater drainage. |
| Erosion control | A changed climate and increased population pressure on the cities may cause problems with flooding, which may lead to increased erosion along the riverbanks. | Vegetation can help decreasing the erosion by keeping the soil in place with the roots. |
| Recreational/cultural service | A city is a stressful environment for its citizens. The overall speed and number of impressions cause hectic lifestyles with little room for rest and contemplation. | The recreational aspects of all urban ecosystems, with possibilities to play and rest, are perhaps the highest valued ecosystem service in cities. All ecosystems also provide aesthetic and cultural values to the city and lend structure to the landscape. |

Figure 4. Ecosystem services in urban areas (Madsen, 2014 on the basis on Bolund and Hunhammer, 1999)

Landscape based stormwater management (LSM)

The urban green landscape can create better resilience to climate change by the use of green elements to manage water. This concept can be called Landscape based stormwater management (LSM) and is the concept used by the WGA research project. It may also be described as an ecosystem service regulating, for example, flooding in the urban areas. Due to climate change impacts such as droughts, more intense precipitation and rising sea levels, human welfare will be adversely impacted through increased flood risk and changes in food and water supply (Jha et al, 2005; Mora et al, 2013 in Mguni et al., 2013). LSM is using the green infrastructure in the urban landscape via natural hydrological processes such as temporary storage, infiltration into the soil, evaporation into the air, conveyance of the water, as well as treatment of the water (Mguni et al., 2013). This means that LSM is a replacement or an addition to the conventional sewer-based handling of stormwater, which has some undesirable effects on the urban environment such as lowering the water quality of receiving water bodies due to increased sediment yields and related contaminant fluxes and is expensive in terms of the costs of developing and maintaining the hard infrastructure (Charlesworth et al, 2003 in Mguni et al., 2013). Furthermore, it is the desire of LSM to address multiple objectives of economic, environmental and social character, and unlike conventional stormwater drainage, the implementation of LSM in a given area, requires an understanding, not only of the technical aspects of drainage, but also of the socio-political, institutional and biophysical contexts of an area. Therefore, in order to release the full potential of LSM, a highly transdisciplinary approach is essential (Fryd et al., 2012; Chocat et al, 2007 in Mguni et al., 2013).

Social benefits

With regards to the **social benefits**, the urban green spaces both have an existence value, as people know they exist, and a use value for a wide range of different activities (Swanwick et al., 2003). This means that urban green spaces not necessarily need to be used by people to obtain a positive value. The urban green spaces also contribute to social inclusion, as they are free and accessible to all, as well as provide a neutral available ground to all sectors of society and can become the focus of community spirit through the many and varied opportunities provided for social interaction (Swanwick et al., 2003). Furthermore, they can contribute to child development with room for outdoor, energetic and imaginative play, and may positively influence the behaviour of both individuals and wider society (Harvey, 1989; Noschis, 1992; Taylor et al., 1998 in Swanwick et al., 2003).

Economic benefits

Urban green spaces are difficult to relate to a quantifiable economic value, as the value of green spaces is a rather complex issue. However, it is worth trying to quantify the value of green spaces since nature and landscape are important to our quality of life and sustainable development (Cilliers, 2009). Cilliers (2009) comes across some of the benefits of and needs for green spaces. In terms of social aspects studies have proved that employees with a view of green spaces, experience greater job satisfaction and less job pressure, which means the green element increases employees' productivity and thereby results in an economic benefit. In terms of health aspects, the everyday environment is of great importance to people's stress level and health. Moreover, green spaces perform important functions that protect and enhance city dweller's health and property, and create a feeling of space. This means that green spaces play a vital role in enhancing the quality of urban life. Green spaces can also improve the retail activity and thereby the economic growth in the cities, as they will attract more shoppers and residents to the urban areas. Furthermore, it is shown that well-planned improvements to public green spaces within the city center can boost commercial trading (Cilliers, 2009).

The term urban green space often creates associations of green elements in the city, and the focus when using this term is regularly the benefits of green elements in urban areas. However, the term is also composed of two other space terms; open and public space, which are important parts of the urban green space term. Therefore open and public space is introduced in the next subsection to expand the term of urban green space.

Urban open space and public space

Urban space and public space is often used interchangeably, therefore a section describing the two terms separately is presented to get an overview of each of them. Both terms have their origins in the literature based on a developed country context, and have first later been applied to open spaces in developing countries. Therefore a distinct section about open and public space in developing countries, primarily in unplanned settlements, is introduced to see which differences, if any, there are in the two perspectives.

Urban open space is according to Francis (1987) defined as being publicly accessible open space designed and built for human activity in urban areas. This definition is a clear definition of open spaces in developed countries as it emphasizes that the space is designed by people and not naturally grown. Furthermore Francis' definition is drawn from the work of Kevin Lynch who argues that open spaces are open when they are accessible. This means that the spaces should be public accessible at all time, e.g. a shopping centre that is closed during nighttime does not count in the definition. In continuation of this, a basic definition of public space is that it is open to and shared by all people and often provided by and taken care of by government institutions (Madanipour, 1996). This definition is also based on the basis of the culture and society in developed countries as it emphasizes a Western democratic and institutional background. Carr et al. (1992) states that public space is where the communal life unfolds and the streets, squares and parks, for instance, in a city give form to the ebb and flow of human exchange. This is supported by the Danish architects Juul and Frost (2009), who believe the inherent diversity in the cities allows people to meet regardless of their interests, age, social and ethnic background, and therefore public space in cities have throughout history functioned as meeting places for people. Public spaces are dynamic spaces that evolve with changes in the economic, technological and social condition, and are therefore essential counterparts to the more fixed places for work routines and home life. The public spaces provide channels for movement, nodes of communication and a common ground for play and relaxation (Carr et al., 1992). Public spaces have a unique status as it defines people as citizens rather than as private individuals (Mrema, 2013a), which supports the ideas of Juul and Frost.

Open and public spaces in developing countries

This section deals with a broad perspective on open, public and green spaces in cities in developing countries. Since the study deals with the unplanned Sub-ward Kawe Ukwamani, literature about open and public spaces at community and residential level will be introduced.

The importance of open spaces has over time been receiving limited attention in many developing countries as they are often perceived as being associated with beautification projects, which are considered a luxury, benefiting only the wealthier part of the population (WGA, 2014). In addition,

Moll et al. (1983 in Mng'ong'o, 2004) argue that many cities in developing countries are designed from an engineering perspective, which means that the urban open spaces, especially urban green spaces often are considered less important than buildings, roads and other services. These spaces have therefore often not been included and maintained in any planning process of the cities, and thus they become threatened, as they become part of an ongoing browning process. The browning process involves fragmentation or extinction of open spaces due to illegal encroachment of the open spaces. Often this encroachment occurs when the use of land potential for the green is changed into new development and housing, and therefore open spaces are disappearing quickly at the cost of physical and population densification (Mng'ong'o, 2004). However, Moll et al. (1983 in Mng'ong'o, 2004) argue that these spaces must be included in the future planning process as the spaces, among other things, can play an infrastructure role and a role if healthy ecosystems are to be achieved (Moll et al., 1983 in Mng'ong'o, 2004).

Open spaces in unplanned settlements are what remain after carving out individual homes or territories, and these unpartitioned spaces between buildings, produce a series of interlinked spaces, which are used as plazas, roads, streets and paths in different situations (Mrema, 2013a).

In densely built unplanned settlements most public open spaces are located on private land where property boundaries are deliberately not demarcated but recognized due to compactness and the need for spatial continuity and access to the area (Mrema, 2013a). This means that the open spaces are conceived publicly accessible both when publicly owned and managed or privately owned, which differs from the open spaces in cities in developed countries, as the spaces here are primarily public accessible only when publicly managed and controlled.

From a research study in Msasani Makangira, Dar es Salaam, made by Mrema (2013b) it was noted that the hardly noticeable boundaries between buildings facilitate a sense of freedom of use by the general public and such hardly noticeable setbacks produce a network of public open spaces (figure 5). However, physical characteristics of territories, such as treatment of property boundaries, public-private interface and accesses to plots and entrances to houses, express how residents make use of the public and private spaces, and this can be an important identification mark that enables both outsiders and insiders to recognize the informal rules of the use of space (Mrema, 2013b).



Figure 5. Hardly noticeable boundaries between buildings (HousinginAfrica.org, 2014)

It can be argued that open spaces in unplanned settlements function quite differently from the open spaces in cities in developed countries, as the unplanned settlements lack spaces for things such as commerce and social services, whereas open space can serve a multitude of functions for the residents across age, gender, weather conditions etc., and function as key ingredients in the residents' livelihood (Lekule, 2004). This means the residents rely on them since they socially connects residents, accommodates playing children, avails possibilities of economic transactions, create space for food production, animal feed and wood, define buildings surrounding them, as well as makes the entire neighbourhood accessible to pedestrians and vehicles (Mrema, 2013b).

The open spaces are therefore important for the residents as they use them in the creation of everyday life in an urban environment, which differentiate them from open spaces in cities in developed countries that are more of recreational use and not in the same way seen as vital component in everyday life. The residents protect them from further encroachment primarily via informal social norms and rules (Wilhelm, 2012), and in a study made in Dar es Salaam by Mng'ong'o in 2004, it is shown that residents living in the unplanned settlements take the responsibility of supplying, using and caring for their green plants and spaces. However, it is also observed in the study that they nevertheless keep on building more and more on a limited plot space. Mng'ong'o (2004) states that this is due to economic reasons, as another room is more worth economically than some vegetables or the shade of a tree. Open spaces in the unplanned settlements are therefore not preserved, prioritized and highly valued in the same way as private gardens or community spaces in developed countries due to other more critical important things, such as having a place to live and gaining a little bit extra for living.

The open spaces in between the houses in the unplanned settlements are closely linked to the houses and a sense of identity between the person from a particular house and the place in front of the house

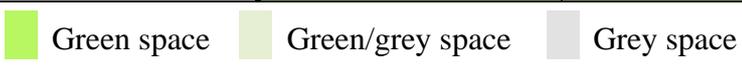
is created. From a study made by Lekule in Keko Magurumbasi in Dar es Salaam, people explained that the spaces in front of their houses were part of their private spheres, and according to Mrema (2013a) these spaces can stand as urban living rooms as the outdoor area becomes the versatile platform for activities that would otherwise take place indoors. This is also due to the indoor environment, which becomes too hot and unbearable during the day (Lekule, 2004).

From Lekule's study it is found that urban open spaces in the settlement Keko Magurumbasi are continuously re-created through the activities of the residents and that they in doing so unconsciously produce significant spatial structures. Therefore it can be said that open spaces in unplanned settlements are endowed with significant social, spatial and cultural qualities, but are also dynamic, changeable, threatened by development, and defined. Therefore they differ from the open spaces in developed countries, as the spaces are defined conceptually by the individuals' everyday use of the space rather than physically designed and defined by professionals for a special recreational use (Lekule, 2004).

Categories of urban open spaces

Categories of urban open spaces made by Stanley et al. (2012) are presented in this section. The categories are made on the basis of studies of worldwide historic and contemporary open spaces, to help analyse any kind of open space. Stanley et al.'s categories are therefore also introduced in this study to support the process of categorizing open spaces in Kawe Ukwamani.

Stanley et al. (2012) develop seven categories and divide each into three different scales; city, intermediate and residence level. The categories are transport facilities, streets, plazas, recreational space, incidental space, parks and gardens, and food production areas. These are shortly explained in figure 6 and afterwards more detailed explained in order to understand the specific differences in the various spaces and scales. The category transport facilities is not explained deeper as it is anticipated that the category is not useful in the study of the unplanned settlement Kawe Ukwamani.

| | | City | Intermediate | Residence |
|---|----------------------|---|--|--------------------------------------|
| Form | Transport Facilities | Harbour, Airport, and Train station parking | Transit stations, City gate areas | Driveways, parking areas |
| | Streets | Central boulevards | Street space | Pedestrian alley, paths |
| | Plazas | Large formal plazas | Smaller neighbourhood plazas | Interior courtyards |
| | Recreational space | Stadium, Green belts and beaches | Sport facilities, playgrounds | Houseyard, playspace |
| | Incidental space | Natural features and semi-wild areas | Empty lots, Transit borders | Marginalized space between buildings |
| | Parks and gardens | Major formal parks and Garden space | Institutional gardens, small parks, cemeteries | Household gardens |
| | Food production | Orchards and agricultural fields | Grazing commons, community gardens | Kitchen gardens, small horticulture |
|  | | Figure 6. Categories of open spaces (Stanley et. al, 2012) | | |

Streets function as pedestrian and vehicular corridors as well as crucial locales of social interaction, political demonstration, ritual, recreation, economic production, and trade. At *city level* the streets are monumental boulevards for transport, but have also a symbolic meaning, political display, and economic activity attached. At *intermediate level* the streets are beside transport corridor, the cultural and functional heart of urban open space and home to a diversity of uses. In informal settlements in developing countries the transportation is forced to share the streets with a variety of household, social, recreational and economic activities due to the lack of planned open space. At *residence level* streets are alleys or pathways, which are too small for large vehicular transportation or multipurpose commercial activity. These streets are sort of a transition zone between the private sphere of the household and the public sphere of the street, where more intimate and social neighbourhood interactions can occur and access is dictated by informal social norms.

Plazas are defined as intentionally established open space framed by buildings on most sides and usually hard surfaced. At *city level* the plazas are large and often planned by government or religious authorities. The plazas are distinctive at the city scale due to their centralized position, large size, and associated with major civic or religious buildings. Typically they are used for multiple purposes, such as central events, military assemble, local trade, and social interaction. At *intermediate level* the plazas are qualitatively different because of their smaller scale, relative abundance, as well as more localized uses. They exist in local neighbourhoods and are quite common in a variety of cultures, but

relative sizes and positions are contextually different in each case. At *residence level* exists the smallest plazas, which are courtyards, normally private or semi-private for residents.

Recreational space includes functionally specialized green and grey spaces designed or used for leisure activities, such as sports or exercise. At *city level* the urban greenbelt, often semi-wild represent this scale. Often the areas are built upon vacant agricultural land and are greenbelts surrounding the city. These belts may function as recreational spaces but also function as buffers between residential and industrial zones. Also beaches and stadiums are common recreational spaces at this scale, whereas stadiums are separated from parks or large formal plazas as they are planned to be specialized for recreation and viewing. At *Intermediate level* recreational spaces besides multi-purpose neighbourhood places, such as streets, plazas, and empty lots, are multiple ball courts in the neighbourhoods. At *residence level* residential spaces are individual gardens and courtyards that tend to accommodate family recreation.

Incidental space, also referred to as marginalized or amenity space, is defined as any green or grey space located on the margins of other spaces or buildings that is either ignored or not intended for a specific use other than safety, visual amenity, or physical separation.

At *city level* the incidental spaces are either planned or unplanned semi-wild and natural open spaces. The semi-wild spaces are sometimes wildlife habitats or green buffers in an urbanized environment, and become easily dumping grounds for waste or spaces of social deviance. At *intermediate level* the incidental spaces are of smaller scale and are somehow leftovers at the base of high-rise buildings or function as separation between buildings. These spaces are sometimes also planned for particular reasons. Some of the incidental places are, for example, found along transportation corridors such as highways and railroads, being an aesthetic, safety corridor between traffic and housing. At *residence level* space around dwellings and commercial buildings can be seen as anonymous, incidental space, but it is hard to determine where purposive space stops and incidental space begins.

Parks and gardens are defined as partly landscaped, mostly green areas intended for social and recreational activities as well as aesthetic or display purposes, although historically these functions have been intertwined with food production. At *city level* gardens and parks are the ones surrounding the central state institutions and have been significant source of open space in urban history, ranging from enclosed spaces to fully public spaces serving as spaces for social interaction and recreation. At *Intermediate level* smaller parks and gardens at the neighbourhood level have surrounded religious buildings or civic institutions, and at *Residence level* the degree of focus on green space associated with residences has varied across different societies, but kitchen gardens providing foods, condiments, and medicines have a long history.

Food production areas are green spaces utilized predominantly for crops and livestock. They are at *city level* often patterns of “leapfrog development” driven by rapid urban growth, which thereby have created an unplanned mosaic of older farmland and newer residential developments within the metropolitan boundaries, often referred to as peri-urban areas. At *intermediate level* the food production areas are common in many contemporary cities as small community gardens, showing a new ideological focus towards urban sustainability, local farming and organic foods. In lower-income neighbourhoods in developing countries the food production areas at intermediate level and residential level represents a critical supplement to household income and nutrition rather than being motivated by ideological reasons (Stanley et al., 2012).

Stanley et al. (2012) emphasize that the spatial scale of any specific open space is clearly related to its size, function and urban context, but moreover, it is defined in terms of the cultural importance. Stanley et al. give the example that a garden may be small in size, but due to the society-wide importance of the sponsoring institution, it is important at city scale.

Summing up

This chapter has presented a literature review of the terms and perspectives of urban open spaces, and included examples to specify the use, function and perception of these spaces.

The open spaces are spaces in between urban development, and have various terms such as open green space, public space and open space. These terms stand after all for the same and have multiple characteristics. The spaces may, besides functioning as open and useful corridors and connection points in the build environment, benefit socially, economic and environmentally to the city and to the people living in the city, for instance, via ecosystem services. Furthermore, they are perceived and used differently depending on the context, for example, in terms of gender, age, weather and geographical location such as developed and developing countries. In the developed countries the spaces are often public and designed with a specific recreational use, where the spaces in the unplanned settlements in developing countries are rather spontaneous occurred and have multiple of uses of more vital character. In this chapter is also included Stanley et al.’s categorization of open spaces, as it sums up seven categories of open space and creates a good overview of the different space characteristics.

METHODOLOGY

In this chapter the study's methodology is presented. The first subsection describes the case study hereunder the case study methodology and a description of the specific case area Kawe Ukwamani. Thereafter follows a section about the fieldwork methods hereunder the fieldwork approach and a presentation of the different applied methods behind the fieldwork. Lastly, the limitations of the applied methodologies will be presented.

Case study

Case study methodology

A case study approach was used in carrying out this research primarily because a deeper understanding was sought of how residents in the flood prone area Kawe Ukwamani in Dar es Salaam use, interact and perceive their open spaces, how the open spaces can be maintained and improved in the future in terms of green elements, as well as how the process towards a more densely built city can be reversed. Therefore, the study is based on a hermeneutic approach, which means that an understanding of a phenomenon is obtained based on studies of the phenomenon, its parts, but also in the overall whole it forms part of, and vice versa. Moreover, since this study is associated with the larger research project Water Resilient Green Cities For Africa (WGA), which examines the possibilities of landscape based stormwater management (LSM) in Dar es Salaam, it was ideal to make a case study within the same framework taking new perspectives into the research project.

In general, the case study approach allows the investigator to focus on one case while retaining a holistic and real-world perspective. A case study approach is relevant the more the research questions require an extensive in-depth description of some complex social phenomenon (Yin, 2014), thus it is relevant when studying contemporary phenomena in their natural context, where both the phenomena and context must be studied (Flyvbjerg, 1988). In addition to that, the strongest advantages of the case methods compared to formal methods are, according to George and Bennett (2005), their potentials of fostering new hypothesis, achieving high conceptual validity, as well as addressing causal complexity. The case study approach was a logical methodological choice and the study is based on multiple types of qualitative primary data.

The case study area

As this study is associated with the research project WGA, the case area selected in the study is the unplanned settlement Kawe Ukwamani in Dar es Salaam, which is one of WGA's two selected pilot sites in the WGA selected catchment area Mbezi River. The catchment area Mbezi River was selected on the basis of some weighted criteria; multiple outlets, mixed land use, flooding problems,

where Mbezi River scored the highest. For a detailed description of the selection process made by Ardhi University, see appendix 10.

Mbezi River is about 20 kilometres long and covers a catchment area of about 56 km². The river is one of four main river systems in the coastal plain of Dar es Salaam and it flows from Mbezi Juu to Kawe. Since this study focus on urban open spaces it was obvious to pick the downstream area Kawe Ukwamani as case, as the area is closer to the inner city of Dar es Salaam, more densely populated and built, as well as more urbanized than Mbezi Juu (figure 7). In the study, a certain area of Kawe Ukwamani is studied, as it all would be too extensive (marked area on figure 8).

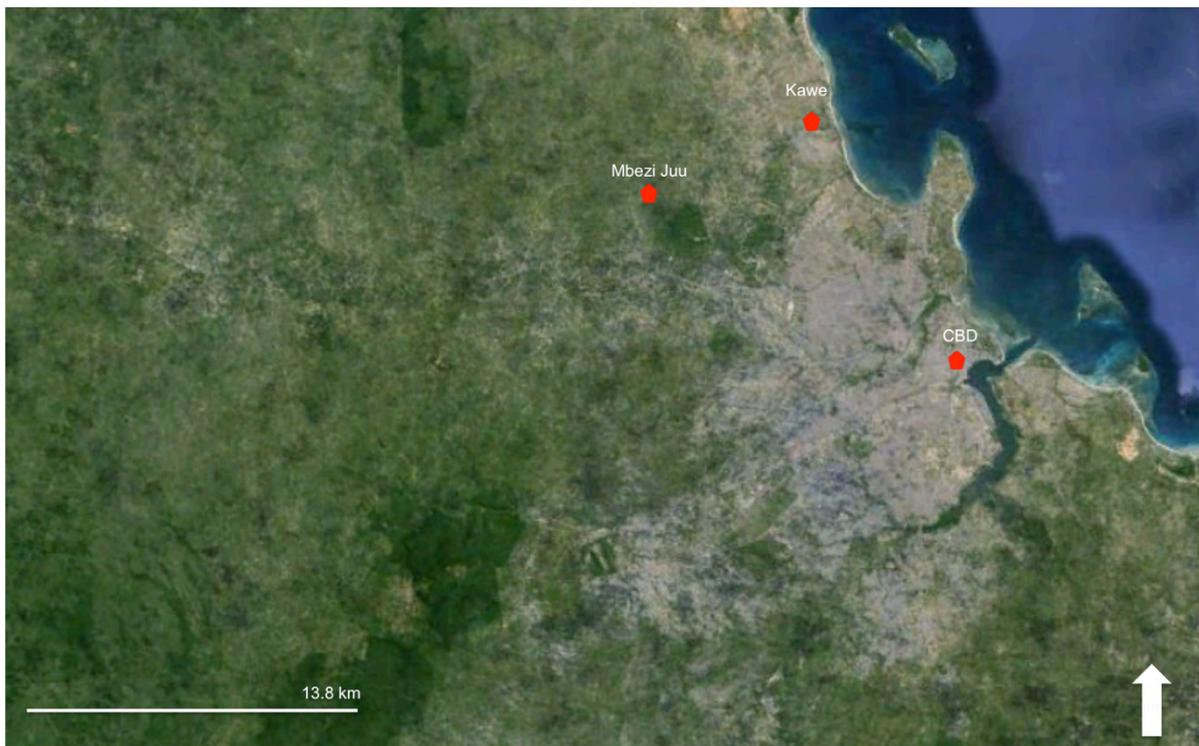


Figure 7. Photo of Dar es Salaam with marked areas; Kawe, Mbezi Juu and CBD (Google Maps, 2014)

Kawe Ukwamani

Kawe Ukwamani is an unplanned settlement from approximately 1990 located close to the riverbanks of the Mbezi River and the area covers approximately 122.500 m² (figure 8). The terrain in the area is quite flat but is rising towards the back of the area, where it nearly tends to slope. The main land use in the area is particularly unplanned residential area and the houses found in Kawe Ukwamani are primarily one-story houses built of sand cement blocks roofed with corrugated iron sheets and only a few houses built of mud, roofed with corrugated iron sheets.

The majority of the houses in the area is privately owned and people rent out rooms, and live with their tenants in the same house (appendices). Furthermore, the most people who build houses in the area access land through informal mechanisms such as purchasing of land from local landowners, allocation by local leaders, inheritance or occupation without permit (UN-HABITAT, 2009).

Furthermore, as the houses are built very close to each other and are continuously extended or redeveloped, a huge pressure on the open spaces in the area is seen.

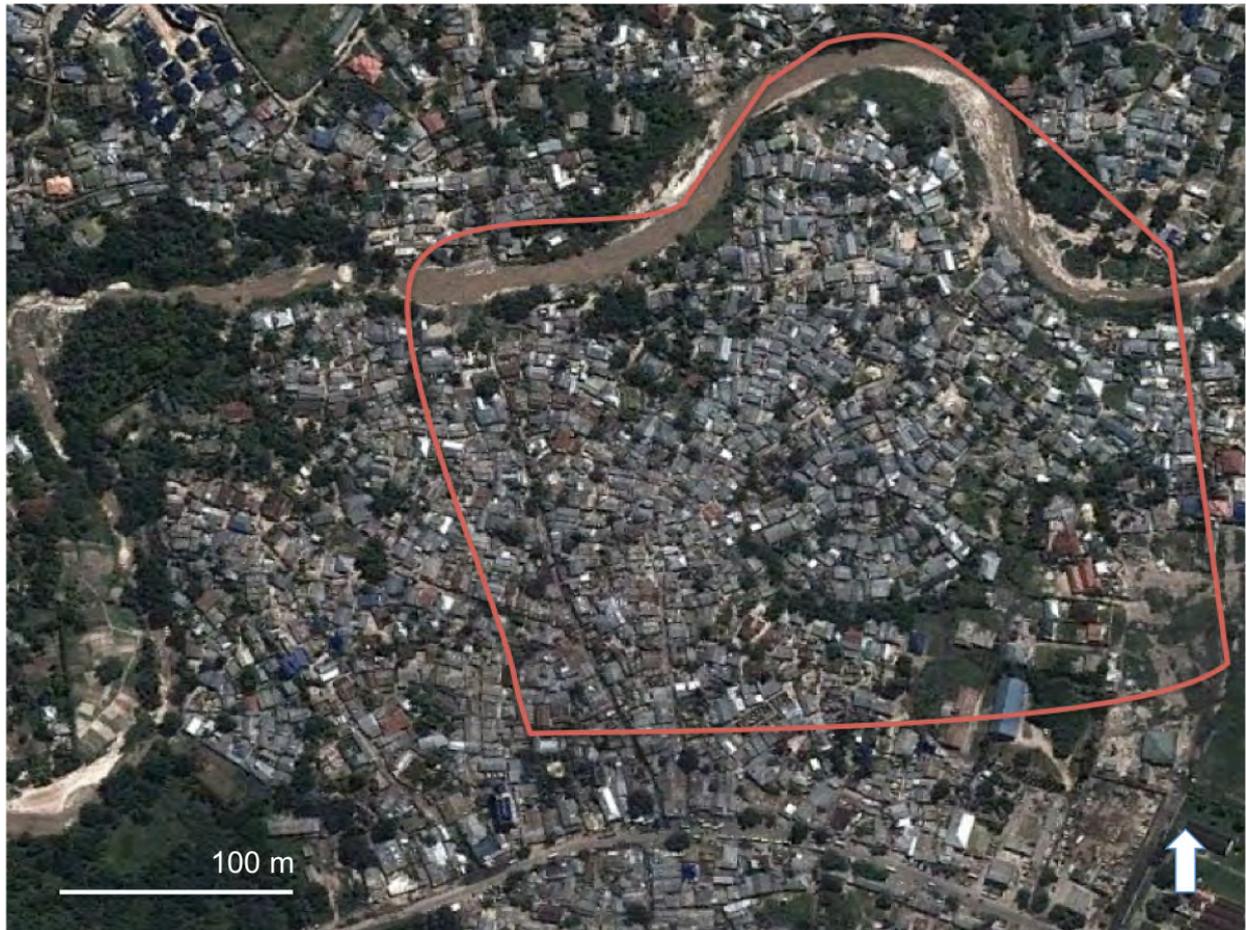


Figure 8. Selected case Kawe Ukwamani (Google Earth, 2014)

Administrative structure

Kawe Ukwamani is a Sub-ward in Dar es Salaam with one Subward office employing four people, and approximately 40 Ten Cell Unit leaders who have the responsibility of 10 to 30 houses each (the number of houses per leader has increased over time due to the rapid increase in the number of new houses in the area). The Ten Cell Unit Leaders work voluntarily for the community's welfare, and the household members constituting each cell elect the Ten Cell Unit Leaders.

The responsibilities of the Subward office are among other things to make sure that property registrations work properly and to handle disputes about land. Furthermore, they have to report and

keep the contact to the Ward office and the urban authorities at the municipal level, regarding things, such as, checking the land-use development and spatial orderliness and administration of the provision of basic services (appendix 1).

The responsibilities of the Ten Cell Unit Leaders concern family problems, reporting all kinds of issues to the Sub-ward office, meeting up with the other leaders talking about the general welfare of the area, youth problems, flooding, people's working issues and so on (appendix 2-5).

Density issues

The population density in Kawe Ukwamani has increased steadily over time and at the latest national census in 2002, the population of the area was counted to 18,000 people. The high population number has proven to be a serious challenge in the access to housing and essential services such as water, sanitation and health care, which contributes to spreading of diseases, including cholera, malaria, lymphatic filariasis, and diarrhea, particularly during flood episodes. Only 25 % of the population receives water supplied by Dar es Salaam Water and Sewerage Authority (DAWASA), which means that much of the water needs must be met through private boreholes (UN HABITAT, 2009). In Kawe Ukwamani only a few households are having their own borehole, while the rest are buying water from the borehole owners.

The area has several times to a varying degree experienced flooding when the Mbezi River rises to a level where it overflows its natural banks. What is seen at least two times a year during rain season (March and December) is that water overflows the area and rise to a water level of between 10 cm to 60 cm for a couple of days before it runs back again. More rarely reported episodes (10 years event), the water level rises to above the house doors, filling up all the houses at the flat terrain level, with water. During these events, the water will stay longer in the area and the people affected by the flooding will have to move temporarily (appendix 1-5). Furthermore, when the heavy rains in the rain season hits the area, the water accumulates in the area, as it is difficult for it to infiltrate, evaporate, runoff etc.

Fieldwork methods

The fieldwork approach

According to Yin (2014) the case study allows use of multiple data collection techniques and among social scientists there is a growing consensus that research programs advance more effectively through the collaborative use of different research methods than through the use of only one single method. This is also why several qualitative data collection methods were used in this study.

The data collection methods involved were:

- Photography
- A guided tour with an employee from the Subward office,
- Casual talks with local people
- Overlay analyzes of orthophotos from Google Earth.
- Direct in situ observations
- Space use mapping
- Semi-structured interviews with four Ten Cell Unit leaders
- Semi-structured interview with an urban planner.
- Conducting of two participatory workshops with 13 residents of Kawe Ukwamani

The collected qualitative data is first used to provide an overview of the given case and to create exact ideas of the change in the area, and second used to provide local knowledge and understanding of the perception and use of open spaces, flooding issues and community welfare as well as new perspectives and visions for the open spaces in the area.

The obtained data from the various sources and at different levels were pattern-matched, triangulated and used as findings. Following, findings were illuminated with relevant literature about the use, function and perception of open spaces in order to produce conclusions. The study applies an ad-hoc analysis, which according to Kvale and Brinkman (2009) is characterized by the use of different data collecting methods and techniques for the generation of new understandings and meanings.

The fieldwork and data collection structure is illustrated in figure 9.

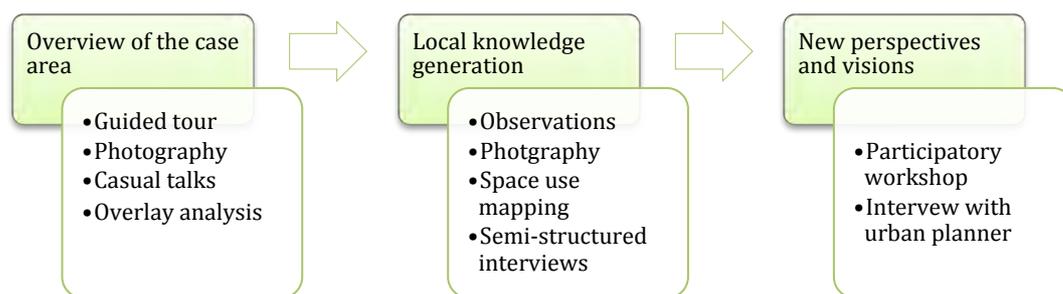


Figure 9. Illustration of the fieldwork structure and data collection

The field methods

In the next section the field methods are presented, but first is a section about the considerations of the use of interpreters when conducting fieldwork.

Interpretation

Most of the fieldwork was conducted with the help of two interpreters. It was necessary as almost everyone in the area only speak Kiswahili and just a very few understood a little bit English. Without the help of the interpreters the task of understanding the area in holistic and in-depth would not have been possible. Of course this also creates some thoughts, limitations and uncertainties, which will be mentioned below.

For all the fieldwork except the two workshops, I used, a Tanzanian man as interpreter. The interpreter was well spoken in English, but his vocabulary was limited and he did not know much about the topic beforehand. On the one hand, it was a positive thing, that the interpreter did not had any prior knowledge subject, so that he did not have any biased opinions about the topic and the case. On the other hand, I had to spend some time explaining things he did not understand while we were doing the interview, which might have been a bit confusing for the interview persons. The interpreter did not have a fixed schedule, which was a great advantage since I could work and collect data as long as I wanted to.

For the workshops I was using an academic employee from Ardhi University, who was very well spoken in English and knew quite a lot about the topic. This was a conscious choice in this situation, as I wanted the workshops to be more precisely understood and detail-oriented, as well as explained properly for the workshop participants. Moreover, it was important that we did not spend time on any doubts between the interpreter and me during the workshop session as I wanted it to be professional and I knew the workshop would be time-consuming. This academic interpreter was very busy, which was also the reason why I did not use him during the whole fieldwork period.

When working with both interpreters it was important to me to brief them beforehand and explain the exact task for them in order for them to feel comfortable with the situation. Still, in some situations I felt frustrated during the fieldwork as I could sense that something went over my head and was not translated to English. For instance, in situations where I posed a question to an interview person, and the interpreter explained it to the interview person, where after the interpreter and the interview person talked for a long time, but the reply to me was just a single sentence. Furthermore, it was important to be alert of the situation where the interpretation is interpreted, since the interpreter gets accustomed to the questions and topics and somehow knows the “right” answers to the questions.

Still the data was collected according to the plan, and the data has been validated through triangulation and comparison of data from different sources.

Guided tour

The fieldwork's starting point was to get insight knowledge about the unplanned settlement Kawe Ukwamani. This was important in order to understand the area and to be on eye-level with the local people when talking with them. To obtain that knowledge a lot of background literature concerning unplanned settlements in Africa was read beforehand, as well as a guided tour around the area with Faustini Ally Mpinga (figure 10), an employee from the Subward office and resident of the area, was completed (Appendix 1).

The guided tour involved walks around the area, stopping up asking clarifying questions to Faustini and other curious passing persons.

The tour gave me as a researcher an overall view of the area and some new insights in the area about housing, flooding, and the administrative structure of local government. By walking around with an employee from the Subward office, elected by the



Figure 10. Faustini Ally Mpinga
(Madsen, 2014)

community, I gained more respect and got accepted by the local people, which I think helped me a lot in the further fieldwork.

Photo documentation

The fieldwork also included walking around the area taking photos of both the unspoken and obvious things in the area. This included pictures of interactions between people; children's play, groups of people hanging out, bridge construction, sand digging, homely activities, as well as physical structures such as houses in general, demolished houses which had nearly fallen into the river, pit latrines, visible water pipes, self-made boundaries of tires and bricked walls, erosion of the riverbanks, open spaces as well as green structures.

Remembering to ask the people of accept of taking a picture, and by telling them the background and the relevance of the exact picture, it was relatively easy to document the diverse things. Some people were although a bit sceptical and asked for a copy of the study project or of the picture.

Casual talks

Casual talks in the community helped clarifying possible queries and brought up new topics not previously considered. The small conversations occurred very naturally, as I, as a researcher attracted some curiosity from the local people, while at the same time, the local people where doing different activities, which I got the urge to ask about. These were activities such as digging sand and making sand walls in front of the house, having a public pool table as the only thing in front of the

house, sitting underneath a tree relaxing in the shadow. In that way I got the chance to ask about the activity and ask to their perception of the activity or the open space they were in. The casual talks were also contributing to a mutual trust, which was useful in the further work in the area.

Overlay analysis

In order to study the change and development of the area, an overlay analysis in Google Earth was made on the basis of three orthophotos of the area from respectively 1992, 2003 and 2014 (figure 11 and 12). The photo from 1992 was obtained from Dar es Salaam Ministry of Land, Housing and Settlements, and the two others from Google Earth. The exact years were therefore not chosen on my own but used as it were the years I was able to get pictures from.



Figure 11. Overlay analysis 1992 – 2014 layers



Figure 12. Overlay analysis 2003-2014 layers

Observations

The observations were made in order to support some of the other methods in the fieldwork as well as to get an objective impression of how the local people use and interact in the open spaces.

The observations were taking place over several of days and during various times of the day. This was done in order to get a broader picture of the actual use of the area and to match it with other data results.

Space use mapping

Mapping of the urban open spaces in Kawe Ukwamani was conducted in order to figure out if it was possible to put the open spaces into categories. Therefore the local's use, function and perception of the spaces, together with information about the different spaces such as size, shape, user group, ownership and function got obtained (Appendix 7). The information was conducted via picture documentation, area measurements, observations of the use and the user groups, casual talks with the users or the neighbours of a certain space, as well as by doing participatory mapping with some of the users, creating similar understandings of the investigated spaces (figure 13). Subsequently, the different spaces were divided into fewer categories in order to refine the definitions of the spaces and to create a clearer picture of the open spaces in Kawe Ukwamani.



Figure 13. Mapping process (Madsen, 2014)

Semi-structured interviews

Semi-structured interviews were also conducted during the fieldwork period. According to Kvale and Brinkman (2009) the semi-structured interview aims to obtain descriptions of the informants' life world in order to interpret the meaning of the described phenomena. As Andersen (1999) recommend I had beforehand prepared an interview guide containing the topics I wanted to be elucidated, but the guide was not followed to the letter, and it was therefore open to new perspectives and information. Key individuals in the form of Four Ten Cell Unit Leaders and one urban planner were chosen for the interviews.

Ten Cell Unit leaders

The four Ten Cell Unit Leaders in Kawe Ukwamani were chosen based on an anticipation that they had a particular insight into the research topic. As they were all four living next to the river it was also assumed that they to a certain degree were affected by flooding, which was one of the hubs in the semi-structured interview (figure 14). The interviews took place in front of each of the four women's house, which contributed to a safe and casual interview situation, and it was possible to ask directly to the household situation and take pictures. Moreover, as the leaders are elected and highly respected by the local people, it helped a lot in gaining trust from the local people when, for example, going with one of the leaders to a certain family asking a question about the family situation. Lastly, as the four Ten Cell Unit Leaders are both ordinary people living in Kawe Ukwamani and local community leaders, the leaders are viewed as an important resource when it comes to knowing the area and the people best, and they were therefore, in this study, seen as a

representative voice for the whole community and not only themselves. Below is a presentation of the four leaders.

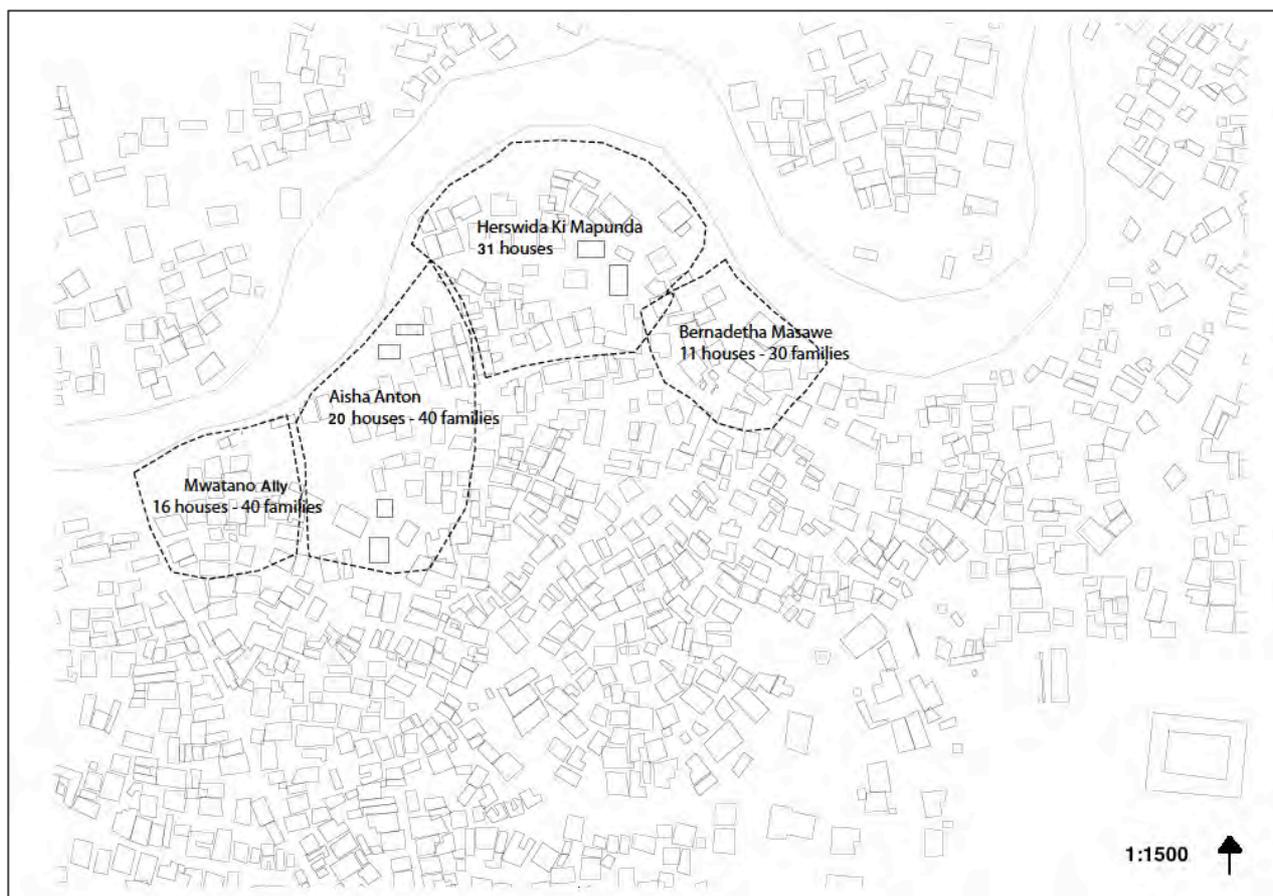


Figure 14. Map of the area with the 4 Ten Cell Units near the river (Khatib, 2014)

Bernadetta Masawe

Bernadetta Masawe is one of the Ten Cell Unit leaders living next to the river (figure 15). She is the leader of 11 houses, equals to 30 families and about 93 people. Bernadetta moved to the area in 1987 and moved closer to the river in 1996 to get more space to build a bigger house. She has been living in the area most of the time together with her husband and two sons. She is a housewife and works voluntarily as a Ten Cell Unit leader, which may take up a lot of her time. Her husband is working with timber outside the area and her two sons are adults and are not living in her house anymore. Both of the sons have an academic degree and work within the wildlife area. Besides her husband and herself there live four other people in the house. These are renting two rooms in the house, but are seen as being close family (appendix 2).



Figure 15. Bernadetta Masawe (Madsen, 2014)

Aisha Anton

Aisha Anton is also one of the Ten Cell Unit leaders in Kawe Ukwamani (figure 16). She is having the responsibility for 20 houses located next to the river, that is 40 family's equals to approximately 200 people. Aisha has been living in the area for many years together with her husband and three children. She is taking care of the children, cooking, as well as other practical stuff, while her husband is working outside the area doing different small day-to-day jobs. Being Ten Cell Unit leader takes up a lot of time and there is no set schedule for the work. Aisha Anton's and her family is the house owners, while two other families are renting a room each in the house (appendix 3).



Figure 16. Aisha Anton (Madsen, 2014)

Herswida Ki Mapunda

Herswida Ki Mapunda is another Ten Cell leader near the river in Kawe Ukwamani (figure 17). She is having the responsibility of 31 houses, where each house contains about 5 families. Herswida has been living where she lives now for 8 years. Before she was renting a place further up in the area, but she and her family bought land here 8 years ago, because the land was cheap and they wanted to be house owners. Herswida lives with her husband, her old mother and one other family, who rents a room in the house. Her husband is doing small informal jobs in the area, such as helping the neighbours with house construction, digging soil etc. Herswida is taking care of all the practical stuff concerning their home, her mother and the Ten Cell Unit (Appendix 4).



Figure 17. Herswida Ki Mapunda (Madsen, 2014)

Mwatano Ally

Mwatano Ally is a fourth Ten Cell leader in the area (figure 18). She is the leader of 16 houses next to the river, which are almost 40 families and a total number of 100 people. Her parents moved to the area from another region to improve life, therefore she has been living in the area a great part of her life. Mwatano has a husband and four children. While she is having the responsibility for the house and all the practical stuff, her husband is working outside the area. Her children are still attending primary school, which is situated in the area. Mwatano and her family are house owners, but they live in the same house as two other families, who are renting a room in the house (appendix 5).



Figure 18. Mwatano Ally (Madsen, 2014)

Urban planner

To get another perspective and view on unplanned areas and urban development projects in Dar es Salaam in general, the urban planner Mary Komba from Kinondoni Municipality was interviewed (Appendix 6). She was selected as she was part of the conference concerning landscape based stormwater management (LSM) held by the research project WGA, and therefore it was assumed that she was interested in LSM. Furthermore, it was assumed as Kawe Ukwamani is situated in Kinondoni Municipality, that she could explain some more about the case area and give me some new overall insights about the case. Moreover, she was involved in the development of the latest presented (but rejected) Masterplan of Dar es Salaam, which made me assume that she also knew a lot about the general urban development in Dar es Salaam and had some opinions on open spaces and unplanned settlements. The interview was held in Mary Kombas office at the municipality and thereby she was able to discuss topics and involve other colleagues as well as show me diverse city plans while we were talking. Since she knew me beforehand from the WGA conference, it was quite simple to get to talk to her, but since we sat in a small room with six other people the conversation was kept at a somewhat superficial level. However, the interview came across different stuff and gave me new insights of the perceptions planned and unplanned areas, as well as a better overview of the projects and work in the urban planning authorities in Kinondoni Municipality in Dar es Salaam.

Workshop

The objective of the workshop was to get the local residents into play in a more active way than just to explain about the current situation of the area, they had to deal with the past and the future as well (Appendix 9). After the conduction of the semi-structured interviews with the four Ten Cell Unit leaders it was easier to find participants for the two workshops since the leaders knew almost everyone in the area and could appoint different people based on my selected criteria; mix of gender, age, variety in house location. Especially one of the leaders, Bernadetta and her adult son David, were helping a lot concerning the organization of the workshops. This included finding 13 diverse participants (see appendix 8 for participant list), sending participant list to me beforehand, finding a perfect workshop location, getting the participants to meet up in two groups at two different times, as well as giving the participants a small briefing about the workshop beforehand. Furthermore, I found that the participants had greater trust in me as a researcher as they knew a local leader accepted me. The decision of doing two similar workshops with a fewer amount of participants in each workshop group was due to the assumption that it would be easier to keep track of a smaller group than a large, to create a comfortable environment as some of the people were unknown to each other and due to the mix of gender, as well as a simple thing, such as not being sure of where to conduct the workshop, was a reason to keep the amount of participants down. The reason for mixing people in many ways was to get the most nuanced picture of the people living in Kawe Ukwamani. The workshop sessions took place in a small “cafeteria” hidden behind the main street and the sessions took about two hours each (figure 19).



Figure 19. Some of the workshop participants in action (Madsen, 2014)

Besides an introduction, the workshop consisted of three sections:

1. The participants had to discuss their perception of the physical and intangible land use change of the area from 2003 to 2014 based on two orthophotos of the area from 2003 and from 2014 from Google Earth.
2. Based on the participants' statements in the first section, they had to discuss a 0-alternative meaning that, if nothing were changing in the area and the development of the present would continue in the future, how would the area then look like. To support and exemplify the more visible-to-everyone statements, pictures taken beforehand of the more critically things in the area, were shown, which created a common frame of reference (figure 20).
3. The participants had to discuss their dream-alternative with focus on a greener structure in the area and their suggestions on how to reverse the process toward a more densely built area. To help activate the discussion I showed the participants some pictures taken of green elements in the area (Figure 21). These were taken to show the variety in green elements and to show that the area to some extent already contains green elements at different scales. The pictures were functioning as good examples and the participants were commenting on them and discussing new ideas, advantages and disadvantages.

The overall purpose of this threefold division was to help creating an impression among the participants that Kawe Ukwamani is undergoing constant change, and that the people living there have already changed the area and may affect the area in the future too.



Figure 20. Critical things in the area (Madsen, 2014)



Figure 21. Green elements in the area (Madsen, 2014)

Limitations of applied methods

In general, since the study is investigating only one unique case it is difficult to draw more general conclusions on the use, interaction and perception of urban open spaces. Should the study have drawn more general conclusions, it should have included two or more cases in a *multiple case design* (Harboe, 2006). The study produces unique documentations on the everyday life in Kawe Ukwamani, which contributes to an in-depth knowledge about the specific area, and although a study at the micro level would vary from country to country and even within the same city between settlements, such study may contribute to an understanding of the macro level reality of the general African urban development.

The phenomenon *selective perception* is important to be aware of when making observations (Harboe, 2006). The observation method can only provide insight into highly restricted areas and can only rarely be used directly in a broad social context (Harboe, 2006). Therefore the yield is limited, as I, as researcher, can only observe and record certain phenomena, while others are either overlooked or deselected. Furthermore, it is important to be aware of the Rosenthaler Effect, where the observer unconsciously has a great impact on the outcome of the investigation (Harboe, 2006). The Rosentahler Effect is due to the fact that the observer or researcher easily attracts attention when doing fieldwork. In addition, it is also important to consider the Control Effect, where the people observed might act differently than normal because of the situation (Harboe, 2006). These things

have been considered in the study and therefore in-depth questions to the local people and several observations have been used to verify the observed situations.

Time has also been a considered limitation in the study. Since the fieldwork took place over three weeks only, I had a tight plan of data collection. Even though my fieldwork was conducted as planned it would have been more optimal to stay in the case area for a longer time. It could also have been more optimal to visit the case area again in another season or another year, but due to the limited time it has not been possible. Although, the collected data are sought more representative by asking the local people to different events, the history and change of the area as well as by triangulating obtained data.

When doing semi-structured interviews I did not have the chance or the approval to record them. This can be considered as a source of error as some parts may have been understood wrong when conducting it, or some parts of the interview are missing. Moreover, it made it a bit difficult to have the energy to follow up on interesting new insights, as I was busy writing down answers.

The interviews with the four Ten Cell Unit Leaders were held in their familiar surroundings, which also contributed to natural interruptions by neighbours, children, as well as one alcoholic husband who was sceptical about the situation. All this are seen as natural processes in the collection of data in a case area as Kawe Ukwamani, and the small interruptions and oddities witnessed, are only seen as helping to generate new knowledge about the area.

Concerning the workshops conducted in the area a potential limitation could be the selection of participants. As I was only guiding a person to do the selection of participants, I do not know how they have been asked to participate, the relation between the inviter and the participants, or how the workshop and topic have been presented. This may have affected the workshop situation, as some of the people might have felt more or less obliged to be there. Furthermore, photos were shown in the workshops in order to illustrate and exemplify some of the spoken, and it is important to be aware of that photos plant a certain mind-set in people, which are difficult to change. It was sought avoided by showing different examples of, for example, how green elements can look like.

The applied methods have some limitations, which are recognized and not sought tucked away, but with this in mind, the obtained data is seen valid and used to answer the objective and research questions of this study.

ANALYSIS OF FINDINGS

In this chapter the field data results are presented. The chapter is divided into two subsections. The first subsection is a holistic in-depth description of Kawe Ukwamani, including obtained data from casual talks, interviews with the Ten Cell Unit Leaders and the two workshops. The second subsection is a more detailed analysis of the open spaces in the area, and a division of the spaces into different types.

The area

In this subsection Kawe Ukwamani is characterized and described in order to create the most fulfilling picture of the studied area. The section comes around sections such as the change of the area, the river, flooding and rain, households and use of space, housing and area control, employment, community welfare, as well as prospects for the future area.

Area change

The studied area is marked with red on the photos below and is part of Kawe Ukwamani. From analyzing the orthophoto from 1992 of the present Kawe Ukwamani it is seen that there is an emerging settlement in the Eastern part of the area near the Old Bagamoyo Road and the Bagamoyo Road (Figure 22). In 1992 the area close to the river is still deserted and not settled. When analyzing the orthophoto of the area from 2003, one can see that there has been a huge development in the area during the ten-year period, as much more houses have been built down towards the river and in the Western part of the area towards the ocean (Figure 23). When studying the area in 2014 the area has to a very high degree increased the number of houses, and the area is fully developed today (Figure 24).



Figure 22. Kawe Ukwamani 1992 (Dar es Salaam Ministry of Land, Housing and Settlements, 1992)



Figure 23. Kawe Ukwamani 2003 (Google Earth, 2014)



Figure 24. Kawe Ukwamani 2014 (Google Earth, 2014)

The studied area is measured to approximately 122.500 m^2 ($350 \text{ m} \times 350 \text{ m}$), and consists of approximately 1000 single-story houses, each housing between 1-8 families. As a comparison, it appears from the orthophoto of the area from 2003, that the number of houses in the area at that time was about 300 houses. This means, without accuracy, that the population number has increased by over 12.000 people in 10 years, calculating by the fact that there on average live 5 families in each house and that each family consists of 5 people. Each house is about 70 m^2 , which means that the built-up area in 2003 covered about 17 % of the total area and almost 46 % of the total area in 2014. These observations and calculations easily show that the population in the area is increasing and that the houses are taking up more and more space in Kawe Ukwamani. However, as the houses are only single-story houses, the population density in relation to the density of the houses is not as big as it could be, but since there live many people in each house, the density is higher than other single-story housing areas.

Moreover, Faustini Ally Mpinga explains that the population number in Kawe Ukwamani in 2002 was counted to 18.000 people, but that they do not know the exact number of the population today. Although, he thinks that the yearly growth rate in Kawe Ukwamani is around 17 %, which is much higher than the growth rate on city level (8%).

The main visible changes observed from the workshop participants is the significant higher density of houses in 2014 than in 2003, and the striking less open spaces in the area in 2014 than ten years before. One workshop participant is explaining that the area before was full of trees and green areas, but that these are now gone due to the increasing migration from the rural areas to the urban areas. Another participant supports that by saying, that Kawe Ukwamani has become more popular over time due to the proximity to the central city, which people are more dependent on now due to, for example, job opportunities. In addition to the very physical changes the workshop participants also focus on the increase in garbage smell and increase in air temperature, as well as the wind circulation in the area has become worse, which create a very humid environment. The participants explain that the observed changes are due to increased human activity and due to fewer open spaces in the area.

Relative to the previous development of the area, some of the workshop participants think that the area will become even more densely built in the future, while some others are saying that the area has already reached its limit concerning the amount of space for houses. However, they think no matter what, that more people will live in the area in the future due to its popularity and to a new type of house construction. Concerning the open spaces, one is saying that she is not sure that there will be any left in the future, and she is afraid that the air temperature and the humidity in the area will become even higher. One participant is also mentioning the fear of a rising number of diseases and epidemics in the area, as he think that the possibilities of providing services to the area in the future will be even less than now, which create inferior sanitation systems, waste management, sewage system as well as ambulance service etc.

The river

When studying the river on the three orthophotos there is a noticeable change in its course over the 30-year period. The conducted overlay analysis is easily showing how the river has moved over time, which emphasizes the power and dynamic of the nature.

The workshop participants are telling that the river has been moving over time and has changed its appearance. Before the river was wider, but due to house construction, it is now narrower and more wedged in, one participant says. Another participant is mentioning that the riverbanks are eroding a lot and have become deeper due to a natural process, but also because people are making a business out of digging up sand illegally and sell it for house construction. Furthermore, a participant lists that she thinks, that the river will be eroding even more in the future, and that it will to a even higher degree become everyone's use, meaning that everyone will use it for what they want to, e.g. waste

dumping, sand digging etc. One workshop participant explains, that the dynamics of the nature creates an uncertainty among the locals, as it is difficult for them to calculate on where the river will run as well as where the heaviest erosion will be in the future. It somehow shows the locals' awareness of the changeability of the area they live in, and that they know, they cannot do much about it. However, it is seen at the orthophoto from 2014 and from direct observations, that people are building houses closer and closer to the river, which contributes to greater vulnerability to the changing environment, but also reflects the increasing population pressure on the area.

Flooding and rain

Flooding and rain is an increasing challenge in the area. Some people from the workshop are explaining that the issue of flooding has increased due to the increased human activity, and the area has turned into a very densely built area where the surface run off has increased.

The definition of flooding varies among the Ten Cell Unit leaders. Two of them think the area is flooded when there is a constant water level of 30-60 cm in the area in a couple of days during rain season. The other two explain these events as just "normal", and define flooding as being those times where the water has come to a level above 60 cm. This has, according to the leaders, happened recently in 1997, 2002, and 2012.



Figure 25. Mwatano Ally showing the water level during worst times (Madsen, 2014)

Furthermore, the rain in the rain seasons is contributing to even more water in the area. The rain is accumulating in the lowest parts of the area towards the river, coming from the highest terrain near the Old Bagamoyo Road. No matter the definition of flooding the four Ten Cell leaders are telling that water have been destroying several of houses in the lowest lying parts of the area, both due to

heavy erosion along the riverbanks where houses are almost washed away, or due to the water that is standing in the area for a long time and therefore is destroying the base of the houses (figure 25).

The water has no proper space to run, and therefore it is destroying already fragile public infrastructure such as roads and paths, which results in mobility problems for the local people (figure, 26). The local leaders explain that they sometimes during rain season have to stay in door, as they cannot move around in the area, and while they stay inside they try to avoid the water coming into the houses by making hard structure walls of bricks or sandbags.



Figure 26. Main road in Kawe Ukwamani after 3 hours rain (Madsen, 2014)

The four leaders are stating that the amount of water coming from the upstream area over time has increased and that water also comes more heavily now.

In the workshops, the fear of increase in floods is mentioned. A few of the participants are thinking that flooding will increase in the future, and that the flooding issues will become worse as the residents do not take care of the area and maintain it as it should be maintained. For example they are mentioning the missing maintenance of the roads and the drainage channels in the area, and that the area will not be able to withstand the future amount of water coming.

The Ten Cell Unit Leaders explain, that over the last two years, the water has taken up approximately 6 meters of land along the river. However, the women are not making flooding a huge problem as they see it as a normal thing that the area is flooded once in a while, and have to move out of the house or built up hard structures of trees, plants and sandbags along the riverside and the houses, to prevent water in their houses and avoid erosion of the riverbanks. Moreover, the leaders are saying that they would rather have a house with water in that not have a house at all, which says a lot about the people's housing situation.

Households and use of space

Concerning housing, the four leaders are explaining that people in Kawe Ukwamani live very close and often together with more than just their family. Mwatano is explaining, that there is a mix of renters and owners in the area. A family can own a house and rent the whole house out for other families, or own a house and only rent out some rooms in the house while living in it also. Thus they have their own separate space while sharing the kitchen facilities and toilet with the other families.

In that way they become very close with the other families in the house and after a time they see them almost as family.



Figure 27. Out door space between houses (Madsen, 2014)

Because of the high degree of built-up area people also live very close to their neighbours. The leaders explains, that they often share the same outdoor space with their neighbours and use the space around their houses as meeting space and space for house activities such as cooking, dishwashing and clothes washing (figure 27). From observations it seen that the plot boundaries are blurred and it is difficult to say where one plot stops and another plot begins. People cross each other's land without thinking of it and no one is taking notice of it either, says Bernadetta. For example, Bernadetta explains, a household can have an open space with trees on, which is used by everyone as a place to relax and find shade. Or everyone can use an open space in front of a certain house for everyday activities such as cooking, dishwashing and clothes hanging. Although, it is observed that a few people have put up or planted visual boundaries around their houses, such as tires or trees, but this seems to be only the ones living next to a central place, such as the main street in the area where many people come by. A local man living in a house next to the main street is explaining that the marked boundaries is to delimit the plot from the street as cars can pass here and are getting too close to the house if the boundaries were not established (figure 28).



Figure 28. Boundary of tires (Madsen, 2014)

Housing and area control

Regarding the ownership of the houses in Kawe Ukwamani, Faustini Ally Mpinga explains, there has been a long period where people were unsure about whether they were owners of their houses or if they could be asked to move out of them tomorrow

Therefore, he says, it is and has been a very sensitive topic to the local people as the Sub-ward office just recently came to start a process of registering the houses so as the people could be sure of the ownership. This registration is shown on the houses in the form of a little copper plate with a number and a name on, telling everyone that the Subward office has approved and registered the house (figure 29).



Figure 29. Registered house (Madsen, 2014)

Faustini Ally Mpinga explains that the responsibilities of the Sub-ward office among other things are to make sure that these property registrations work properly and to handle disputes about land. This ought to be done by the urban authorities, but is now unofficially organized by the Sub-ward office. Faustini tells that often the Sub-ward office is delegating some of the tasks to the Ten Cell leaders, who are in closer contact with the different households. When asking the Ten Cell leaders about how they manage and administrate their tasks and watch their houses, they explain that they often, very informally, visit their houses and communicate with the people through these visits or by convening meetings whenever necessary. From several observations and talks with the local people, one senses quickly a deep respect for these leaders and for their work in the area as mediators and facilitators.

Employment

When asking the four leaders about employment in the area, they explain that many people in the area are either housewives, informally employed or jobless struggling to find work, and the people in the area is spending mostly working hours, leisure time and daily life within in the area.

From observations it is seen that some local people are running small stalls and shops in the area such as fruit and vegetable stalls, homemade buns and pancake stalls, hairdresser salons, dry food shops, kiosks, electricity shops as well as health and beauty shops (figure 30). From talks with the four leaders about employment and division of labour, they explain, that many of the women in the area are the ones administrating and controlling the households, taking care of the practical stuff concerning the family and the house, and during the day are taking care of the small children while perhaps having a small stall selling stuff in front of the house. The men are either having formally or informally jobs outside or within the area. From daytime observations it is seen, that several of men are hanging out in small groups, playing cards, talking, drinking beers, smoking etc. From casual

talks with some of the men in these groups it is elaborated that they hang out as they do not have anything else to do, but if someone asks them to help with something or know a small job they can get, they stop playing cards and prioritize the job opportunity.



Figure 30. Small vegetable stall in the area (Madsen, 2014)

Community welfare

The four Ten Cell Unit leaders think that there in general is a positive tone in the area and that there are good relations between residents, especially between neighbours. They help each other with everyday things and during bad times such as flooding periods, and they collaborate when a problem is coming up. For example, Herswida Ki Mapunda tells that neighbours are collaborating when a road has to be fixed. Households around the bad road then meet and talk about the possible solutions, and although it is often not fixed immediately, she senses a good cooperativeness among the neighbours. Furthermore, Mwatano Ally tells that when flooding occurs, e.g. December 2012, then unaffected people living further up the area, were housing the most affected households during the worst periods, and they were helping each other building up hard structure walls of bricks and sandbags (figure 31).



Figure 31. Work to protect houses from water (Madsen, 2014).

However, Faustini and the four leaders are all mentioning that the area at the moment is struggling with petty crime among young boys, who do not have anything to do and therefore is stealing and harasses the people in the area, as well as problems with unemployment among the residents, which leads to alcohol and drug abuse especially among the men in the area. The leaders are telling in continuation of this that their joint meetings with all the Ten Cell Unit Leaders at the moment is concerning how to solve these things, but in a few months when the rain season sets in, they certainly talk about problems related to that. The area and its residents have several issues to consider, and some issues will be shelved if other more critical and current issues arise.

Future prospects for the area

In general, the workshop participants agree on that a lot of things could be changed in the area and they have several dreams and thoughts about what could be done.

Almost all the participants are dreaming of more space and better service level in the area. This includes better waste disposal, improved sanitation and sewage system, as well as improved infrastructure and access to ambulance help. When asking how to change these things, they have difficulties in answering the question, but one says, that they will need some support from the municipality both concerning facilitation and economic support. Another one is following by saying that the residents might do a lot on their own, e.g. the more practical construction tasks, but that they will need some help from outside the area to implement the changes.

The participants are also mentioning housing as something to improve in the future, and one participant comes up with the dream about multiple-storey houses in the area. Construction of these houses would create more space in around their houses and in general, which could then be used for cropping, tree plantation or common open spaces. A few participants do not like the idea as they

think it would be too complicated to figure out how the ownership of the new houses should be, and they are questioning where the people should live meanwhile the houses are constructed. Furthermore, some think that the construction of multiple-storey houses is too difficult and expensive, as the construction process would be very long and they would need professional help from outside the area.

Turning the focus towards green elements, one workshop participant thinks it would be a good idea to plant some more trees in the area, but emphasizes that the only space left is along the riverbanks.

Another participant thinks it would be beneficial to plant trees along the riverbanks, as they would contribute to less erosion and flooding. Furthermore, one is suggesting that they could have tree plantation along the riverbanks, which would benefit themselves economically.

Another participant is more sceptical towards a more green structure and states that a greener area demands for more space and that some people therefore would have to move. Hereafter she is stating that she do not think that people voluntarily will move, as she does not think that the municipality will support the idea and resettle the people or give them any money for the provision of new land. Some participants are continuing saying, that the housing problem is a very difficult topic, as the residents do not trust the municipality and therefore do not want to leave their houses.

When talking about the space issue and green elements, one participant is suggesting that 10 households could go together and buy up some land or a plot in the area and turn it into a park or another recreational space. Another participant goes on and says that they could make a rule for all households for example saying that each household should have at least three trees, which could contribute to a greener area. Another participant supports it by saying that it would be nice to have an open space locally, so they will not have to go to the beach every time to relax. Furthermore, one participant is stating that by having open spaces with green elements, the air temperature and wind circulation would be better and it would therefore be more comfortable and less intolerably to stay in the area. One workshop participant is emphasizing that it is a good idea with more green elements in the area, as long as the residents get empowered to take care of, for example the trees, and know what kind of seeds they will have to buy. When talking about buying seeds, a participant is mentioning that she thinks that everyone in the area would be willing to put money in the upgrading of green elements in the area, and therefore will buy seeds and trees themselves.

In continuation of this, one says, that people know the importance of green elements but that it is a delicate balance, as they rather want a place to live or money than open spaces. One participant is exemplifying that by saying, that he would prefer selling land and get a lot of money immediately out of it, than making a green recreational space or planting banana trees, where he would have to wait for many years to get just a little bit of money out of it. Another one is saying that establishing of a greener area is a long-term investment and that people will not necessarily wait for that. Lastly, one is mentioning the challenging part, that they would have to collaborate in the area and perhaps

with the municipality, and he is saying that everything else considered is depended on how the collaboration is working out.

Open spaces

This subsection concerns the open spaces in Kawe Ukwamani and comes around the characteristics of the open spaces in the area, including their function, and how people use and perceive them. On the basis on observations, mapping and casual talks with the local people, the open spaces are described and analyzed. First is presented an overall view of the open spaces in the area, secondly comes a section about the different characteristics and types of open spaces in the area.

Overall view of the open spaces in the area

From observations it is seen that the open spaces in Kawe Ukwamani are in a threatened position. Over time more people have been moving to the area, and more or less every not built area that could fit the size of a house, is transformed into new houses. From casual talks with some of the local people it is explained that the incentive for having an open space around their house is very little, so they rather sell it to someone to get some money out of it. The remaining's are only smaller open spaces, which to a certain degree are left aside for good reasons such as being corridors. These small open spaces are in the next section reviewed and analyzed in order to find out if they have some certain characteristics associated with type, use, ownership and value for the residents in Kawe Ukwamani.

Types of open spaces

From space use mapping, map - and photo studies, observations, casual talks as well as from interviews, four different types of open spaces have been found in Kawe Ukwamani. Those types I call *streets, food production areas, squares and random space*, where each type may be divided into central or non-central areas according to spatial location. The different types of spaces are illustrated on figure 32.



Figure 32. Mapping of the open spaces in Kawe Ukwamani (Madsen, 2014)

The overall impression of the *streets* in Kawe Ukwamani is that they are public, of small scale, very narrow and made of soil and gravel. Streets can be observed in Kawe Ukwamani as central streets or non-central streets. The central streets are marked on figure 32 in the colour orange, the non-central streets are any other streets in the area and are therefore not marked on the map.

The central streets are defined central, as they are the centrally located main streets through the area, the streets leading one to and from the area and the streets connecting all other open spaces in the area. Some of the central streets are having trees growing in the side of the street others are defined according to house walls or stalls (figure 33).



Figure 33. Central street in the area (Madsen, 2014)

From observations and casual talks it is found, that the spaces are used by everyone for activities such as social interaction, relaxation, economic production and shopping. It is also where the streets are wide enough for a car to pass. The central streets are linking all the non-central streets together, which are winding their way in between the houses and are too small for a vehicle or even a bicycle to pass. They are more isolated, narrower and less known by everyone (figure 34). From casual talks with some locals and from the guided tour by Faustini it is certain that the non-central streets are used very locally and only residents living near the streets are using them for e.g. household activities.



Figure 34. Non—central street (Madsen, 2014)

Another type of open space is the *food production areas* (figure 32). The general characteristics of the *food production areas* in Kawe Ukwamani are that they are on a small scale but vary in size depending on their centrality, as well as have various crops.

The largest of the areas are non-central located along the riverside where the difference in terrain between the river and land is not very big. From direct measuring and map studies it is found that the food production areas at the riverside occupies about 500 m² of land. The areas are privately owned by two different households who live right next to them (figure 35).



Figure 35. Not central food production area (Madsen, 2014)

The two households explain that they bought it for very little money some years ago when the area was flooded and no one else wanted it. The food production here is used for own consumption and for small sale. The households also explain that the area during rain season will be flooded, and that the water in this regard is destroying the production. But as the two households explain, the area contributes to that the water will not reach the houses right behind the area, and this is a very important thing.

As the areas are located on the backside of Kawe Ukwamani along the river and moreover are privately owned, they are in some kind of way isolated from the rest of the area, decentralized, and only used by the owners.

Besides the bigger food production areas, smaller, sporadic food production areas in between the houses in the area are observed. The areas are small and sometimes only made up of a few more or less wild growing fruit trees. They are semi-public as the households next to them take ownership of them, and when asking the households what they think of the spaces, they answer that they

appreciate having fruit trees such as papayas or bananas next to their houses. Moreover, it is observed that some people are lying underneath the trees relaxing in the shade and the trees somehow contribute to the creation of boundaries and space between neighbours (figure 36).



Figure 36. Central food production area (Madsen, 2014)

A third type of open space found is the *squares*, which is present on a scale between 30 m² and 100 m². They are surfaced with soil and are framed by either houses on the sides or semi-framed with a mix of houses and trees on the sides. Therefore they are not necessarily squared in shape but are typed as squares due to their function and use. The squares are more or less public; some of them are found in the extension of the streets and are therefore central and used by the public, while others are more private and hidden (see figure 32).

Via observations and casual talks it is found that the more public and central squares are hosting different activities. Some local people are telling, that they are occasionally used for ceremonies such as weddings and funerals, as well as for trading, local meetings and gatherings (figure 37).

A local woman is explaining that the public, central squares may be privately owned, but that due to the location and practical reasons such as space for ceremonies and access, everyone uses them. It is mentioned that these spaces are much used by everyone, and through informal rules, everyone knows that there cannot be developed houses here.



Figure 37. Public central square (Madsen, 2014)

Other squares in the area are less central and public and more like closed private courtyards, where the households surrounding them are taking ownership of them, although they do not actually own them (figure 38). They are often quite empty only having a couple of trees sporadic standing. From observations it is seen that the more private squares are used for household activities such as cooking, dishwashing, clothes hanging, social interaction among neighbours and children's play, and when walking there you feel more unwelcome and looked at as a stranger who is in the wrong place.

When talking with some of the people living next to one of the more private squares they are telling that the square is seen as an outdoor space connected to their houses.



Figure 38. Locally anchored square (Madsen, 2014)

A fourth type of open space is *random space*, which in Kawe Ukwamani are the spaces located on the margins of other spaces or houses and are either ignored or not intended for a specific use. In Kawe Ukwamani the majority of all open spaces seem like being random space as not many of the open spaces are planned or intentioned. It is observed that the random spaces in the area are either in the outskirts of the area or leftovers in the more central part of Kawe Ukwamani (see figure 32). The spaces found in the outskirts are blurred in shape, are surfaced with a mix of soil, wild vegetation and solid waste, and the size of them vary depending on the specific area. Along the riverside there are a few random spaces used for non-organized things such as waste dumping and hang out/smoking/drinking places for young men. When asking some of non-users about the spaces, they explain that since these areas are located on the backside of the area, things are not controlled or monitored by the public, which contribute to the creation of a “free space” for not accepted activities such as dumping waste into the river (figure 39). The user group of these spaces are therefore limited to a few people and although the spaces are public, some people might feel unwelcome here, as the men hanging out here may seem a bit unaccommodating when walking by. When talking to some of the men hanging out in the area, they tell that these spaces are the only areas in Kawe Ukwamani where they can be alone and relax with their friends.



Figure 39. Random space in the outskirts of the area (Madsen, 2014)

The other random spaces more central in Kawe Ukwamani are small leftovers from house construction and narrow gaps between buildings (figure 40). Some of them are wildly grown with trees, grass and plants, others are empty and covered by gravel or soil. From observations it is seen that the spaces are used as narrow corridors or for children's play. Moreover, when talking with some random people they explain, that they also function as buffer zones between houses. Therefore they are kept free and public, whereas everyone can use them as they want to. For instance it is observed that some people is relaxing and finding shade underneath a tree standing here.

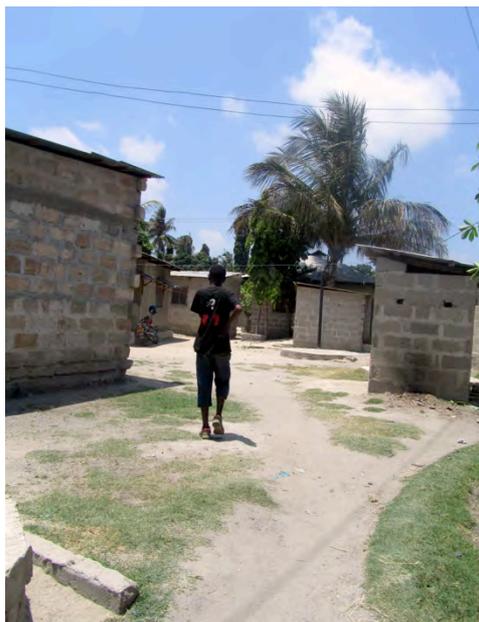


Figure 40. More central random space (Madsen, 2014)

Summing up

In this chapter the study's fieldwork results have been presented. The objective of the chapter was to present a holistic description and analysis of Kawe Ukwamani, containing both visible and non-visible characteristics of the physical, social and economic aspects of the area.

This included an overview of the area change seen from above based on three orthophotos and from the residents' point of view, a description of the residents' everyday life in Kawe Ukwamani, as well as a holistic study of the open spaces in the area. On the basis of the fieldwork it was found that the open spaces were functioning, used and perceived differently, and this led to the division of the spaces into four types each divided into central and non-central subtypes according to location.

DISCUSSION

In this chapter the results will be discussed in relation to the research questions, the literature review and the context provided in previous chapters of the thesis.

The overall objective of the study was to create a better understanding of the driving forces behind the process towards a more densely built and brown Dar es Salaam, and the study has aimed at investigating how this process unfolds at community level in the unplanned area Kawe Ukwamani. Through analysis of the use, function and perception of the urban open spaces in this area, it was the objective to find suggestions on how these spaces can be maintained, made greener and increase in numbers in the future in order to reverse the process of browning and the increasingly built space in the city, and to make the city more resilient to flooding and climate change.

Browning at local scale

As the United Nations Environment Program are stating (2007 in James et al. ,2009), there are several significant drivers involved when it comes to former, present and future development of cities. These drivers illustrate how urban development is dependent on a wide range of processes, which may seem intangible and untransparent. Therefore this study has attempted to shed light on the development process towards a more densely built and brown Dar es Salaam by looking at the urban development and the driving forces at smaller scale in Kawe Ukwamani.

The steady loss of open spaces is the fundamental part of the “browning” process the process has also taken place in Kawe Ukwamani, where currently 46% of the area is built up. This study shows that a rapid, expansive and continuous settlement has taken place in the area since approximately 1990, which indicates that the settlement is relatively new in Dar es Salaam. As people inhabited the large open green area along the Mbezi River, now called Kawe Ukwamani, and the city expanded spatially, the area has changed from a green area in the outskirts of the city to an urban environment not far from the inner city. The area was inhabited later than some of the more central areas in the city, but Kawe Ukwamani is now one of the more central unplanned areas in the city, as new unplanned areas have appeared further out and new roads and transport facilities have improved the accessibility to the city centre.

In general, the reasons why people move to Kawe Ukwamani is because it is possible to find a rather cheap place to live, either when buying a house, renting a room in a house or buying land relatively cheap with the purpose of building a house on it. However, the possibility for building a house in the area has decreased due to the present housing density and the considerable increase in housing prices due to an increased demand.

Furthermore, Kawe Ukwamani is located quite near the inner city, which also attract people to the area, as the job opportunities, at least in theory, are better here.

Living close to other people also means a lot. The residents help each other with everyday practical activities, such as keeping an eye on each other's children, assist in the small stall or cook for each other once in a while, but also through difficult periods, such as in case of illness, during rain season where parts of the area is flooded and some houses are full of water, accommodating affected families of flooding, lending each other money. Furthermore, finding a job is easier with a network of people close by.

The incentives for and driving forces behind people's move to the unplanned settlement Kawe Ukwamani is both of social and economic character, as the relationships to neighbours and other residents mean a lot, while the relatively cheap housing prices, increased job opportunities and other economic earnings are also the reasons for moving to this unplanned settlement. Moreover, the failing government capacity to supply surveyed and serviced plots has left residents without any alternative, but to construct and transform houses in unplanned settlements. To buy, construct and transform a house may be seen as an empowering process to the residents, as they are attempting to improve their lives by establishing good living conditions for their families. It is thus understandable that people extend their houses to accommodate more tenants and thus increase their income, while giving lower priority to the outdoor areas. Furthermore, since the State of Tanzania owns all land all individual value is in the house.

Other than the geographical location in relation to the city centre, the physical characteristics of the area are not mentioned as a reason to move to the area. It is noticeable that the residents do not mention the fact that the area is a flood prone area which could be a reason not to move to the area, but as the local people explain, they would rather have a place to live, whether it be in a flood prone area or not, than not having a place at all. This indicates that flooding is only one of out of many things that people have to deal with.

Another factor affecting the development at community scale is the planning, regulation and administration of Dar es Salaam at municipal and national level.

Lack of successful plans at city level

The fact that the newly made masterplan for Dar es Salaam was rejected means that the most recent approved masterplan for the city is dating back to 1979. This masterplan from 1979 has to some degree been followed and implemented, but as the city is rapidly expanding demographically and spatially, there is a great need for implementation of new overall plans. The open spaces suffer from

the expansion and the lack of plans, and according to Moll et al. (1983 in Mng'ong'o, 2004), such areas have been considered less important than buildings, roads and other services, and therefore often have been excluded in the planning process at city level.

The situation of not having any proper city planning and regulation, as well as not providing any help to people without a place to live, has led to an illegal and informal encroachment of the open spaces. People settling in these areas are primarily from rural areas or local people who used to rent a room in a house, but now want to build their own house. As it is now, the urban authorities cannot do much about it, and the failure of handling the population growth and the physical development in the city creates many environmental problems and a steady loss of open spaces. Moll et al. (1983 in Mng'ong'o, 2004) argue that the open spaces must be included in the future planning process as the spaces, among other things, can play an important infrastructural role and possibly provide healthy ecosystems.

According to earlier mentioned plans, the municipalities and the City Council of Dar es Salaam have several times attempted to initiate plans and projects targeting unplanned areas, and these have succeeded to some extent, although the success criteria might vary according to whom you ask. Urban planner Mary Komba states in the conducted interview that the unplanned settlements gives her headache, and that it is difficult to change much in the settlements (appendix 6). When talking to Mary Komba you kind of sense a form of unconcern for these areas and lack of insight into the lives of the people living in unplanned settlements. You are left with a feeling that the unplanned areas are considered less important compared to the planned areas in the city.

Perhaps the urban authorities' negligence of the unplanned areas is the reason why the Sub-ward office in Kawe Ukwamani, in Faustini Ally Mpinga's words, rather inappropriately and unofficially has been assigned several tasks that were previously dealt with by the urban authorities. The urban authorities have somehow given up and transferred the responsibility to the local Subward office, which already has many things to look after. The Sub-ward office is a local voice, who acts on the locals' needs, the people working at the office have been elected by the local population, and live in Kawe Ukwamani. Therefore they will nearly always be on the locals' side. The Subward office's relationship to the local people and lack of the same to the urban authorities, creates a somewhat free zone for the Subward office for them to work independently as no one is watching them. After studying the area it seems like the Subward office might have a rather relaxed relationship to regulations, for instance, concerning housing requirements. Relating to this is the issue that the local people does not trust the urban authorities due to several failures concerning anything from resettlement to unemployment to flooding issues, and therefore it becomes even more difficult for the Sub-ward office to represent the urban authorities at local community level. This dilemma is further complicated by the fact that the Subward office is dealing with the lives and problems of their friends and families, where it is difficult not be emotionally affected. The lacking recognition of the

unplanned settlements and the needs of the people living there, as well as the lack of proper governance, leaves the unplanned settlements on their own, only guided by the Subward office and the various Ten Cell Unit Leaders.

The open spaces' susceptibility to change

Open spaces in the local neighbourhood is not mentioned and articulated as neither a good nor a bad value when settling down in the area and it would therefore have been obvious to conclude that the open spaces do not have a specific importance and value to the people. Furthermore, on the basis of Stanley et al.'s categorization (2012), one might be able to call all the open spaces in Kawe Ukwamani random spaces, as the open spaces seen in the area are often not intended or planned. However, when studying Kawe Ukwamani through observations, interviews and casual talks with the local people, it appears that the open spaces in the settlement are functioning, used and perceived in different ways, which make them more or less important and susceptible to change.

This emphasizes this study's creation and use of new and refined open space types that fit to unplanned areas in developing countries to obtain a more nuanced picture of the spaces. However, Stanley et al.'s categorization (2012) is used as a basis for comparison.

The central streets and central squares are essential in Kawe Ukwamani as everyone use them and they link the whole area together, as well as play a critical part of people's livelihood. The **central streets** correspond with Stanley et al.'s (2012) categorization of streets at intermediate level as the streets besides being central transport corridors also function as the cultural and functional heart of the area with a diverse use. Stanley et al. (2012) state that the transport is forced to share the streets with households, social, recreational and economic activities due to the lack of proper planned open space for these activities, but in Kawe Ukwamani vehicles and bicycles are rarely seen and the main transportation form is walking, so the clash between different activities is not a problem here. Moreover, the central streets in Kawe Ukwamani differ from Stanley et al.'s category, because they have a more critical use and function, as they are part of the residents' livelihood. This inconsistency is due to Stanley et al.'s (2012) development of category from a developed country perspective.

The functions and use of the **central squares** in Kawe Ukwamani are corresponding with Stanley et al.'s plazas at city level although on a smaller scale, as they are typically used for multiple functions such as central events, ceremonies, local trade and social interaction such as meetings, children's play, card playing, beer drinking and talking. Therefore the squares also fit Stanley et al.'s category recreational space at intermediate level and residence level as they accommodate recreational activities too.

These two central types of spaces in Kawe Ukwamani are highly valued by all the residents in the area as they function as a place to meet up with other people, act as public gathering spaces for the

whole community, and function as some of the only places in the settlement with room for a lot of people and activities to gather at the same time. Therefore they are not seen as very vulnerable to be turned into new development, but as they appear now, the spaces could easily be upgraded in terms of green elements and physical condition. Only a few of the central squares and streets are vegetated and covered with trees, and the soil surface is destroyed and lack maintenance after massive amounts of water has been running there. Since the central squares and streets are some of the largest open spaces in the area and highly used by all the residents, it would be ideal to upgrade these spaces by planting trees or making a pond. This could lower the air temperature in the area, create shady places and create space for the water to run. The local people participating in the workshop are much aware of the ecosystem service from the trees, and as they can feel the increase in air temperature and bad wind circulation on their own bodies, they are willing to put money in upgrading the area as long as they get some help finding the right trees and guidance to the construction of the pond. Moreover, as all the central squares and streets in the area are surfaced with soil, they create an ecosystem service, where the water during flooding may accumulate, retain for a while and infiltrate into the soil. However, this depends on the specific location, as the soil surfacing some of the streets and squares is rather compact and therefore will conveyance the water instead. According to Bolund and Hunhammer (1999) this type of compact surface, vegetated or not, can decrease surface runoff.

The **central random spaces and central food production areas** in Kawe Ukwamani are of a very small scale, but are important as they create spaces between the houses and act like boundaries between neighbours. These spaces may be comparable with the urban wildscape term by Kitha and Lyth (2011), as they have emerged naturally and wildly grown.

The **central random spaces** can resemble Stanley et al.'s incidental space at intermediate level, as they are not intended for any specific use, wildly grown with trees and plants, while others are empty covered by soil. The size and shape of the central random spaces vary according to the specific place and they are constantly changing as the houses around them are converted and redeveloped. The **central food production areas** differ from Stanley et al.'s category food production area since this category contains more defined food production areas. Looking at the perception of the central food production areas, the people living next to them appreciate the fruits from the trees, and tell that they use them to create boundaries between neighbours, as well as they enjoy the shade from them when the air temperature is high. The two types of spaces are used as narrow corridors, buffer zones between houses or for children's' play, and they are therefore kept free and everyone can use them.

The two types of central spaces are nearly too small to be turned into new development, but they could well become a victim of redevelopment or extension of houses located next to the spaces. However, these spaces could also act as small green patches or belts in the area, as their potential is not fully exploited. A more overlooked function is that the spaces might function as an ecosystem

service as they, and according to Bolund and Hunhammer (1999), can create shade and adjust the microclimate by lowering the air temperature via transpiration and evapotranspiration.

The **non-central streets and non-central squares** are semi-private spaces in Kawe Ukwamani, and from observations and talks it is clear that the users of the non-central streets and squares are the people living right next to them. The people living next to these spaces are protecting them from intruders, maintaining them when needed, and take to a certain degree ownership of them. The **non-central streets** resemble Stanley et al.'s streets at residence level and are seen as sort of a transition zone between the private sphere of the household and public sphere of the street, where more intimate and social interactions may occur. This relates to the perception of the non-central streets in Kawe Ukwamani as they are more isolated and less known by everyone than the central streets. The **non-central squares** resemble Stanley et al.'s categorization of plazas at intermediate level, as the squares are relatively abundant and normally private or semi-private for residents.

The two types of non-central spaces may to some extent decrease or change shape in the future, as people are redeveloping their houses, but one thing is almost certain, the spaces will be protected as they function as outdoor living rooms and corridors for people living close to them. In terms of green elements, the spaces could contain more vegetation and the workshop participants suggest that it would be possible to establish small condiment gardens here. Moreover it was suggested to establish a rule dictating the minimum amount of trees each household should have, making this rule start a process of generating more trees in the area. Even though the non-central streets and squares are public, it is the local neighbours of these spaces who maintain them, as no one else is doing it, but this would be an advantage in the process of upgrading the spaces, as the local people could be a great part of the decision process.

The **non-central food production areas and non-central random spaces** are either private or perceived private as one user group is taking ownership of the spaces. The **non-central food production areas** correspond to some extent resemble Stanley et al.'s food production areas at intermediate and residence level due to their size, and due to the fact that they represent a critical addition to the household income. The **non-central random spaces** may be fitting to the term urban wildscape, as these spaces, according to Kitha and Lyth (2011) are spaces where natural processes have been shaping the land. Moreover, they may on a smaller scale be similar to Stanley et al.'s incidental spaces at city level, as the spaces function as buffers in an urbanized environment and easily become dumping grounds for waste or space of social deviance.

These two non-central types of spaces are not seen as significant spaces to be protected by most people in the area, but as the areas are located in the outskirts, in the flood vulnerable spaces and on steep slopes, people are not considering these spaces for development of housing. The local people

are aware of the spaces' sensitivity to flooding and erosion, which may be why the spaces are not inhabited. The non-central food production areas and non-central random spaces along the river may, in accordance with what is described by Bolund and Hunhammer (1999), function as an ecosystem service, as they may be able to function as buffer between the river and the houses, retaining and infiltrating water when the river overflows its banks and the water flows towards the houses. According to Bolund and Hunhammer (1999) vegetated areas will only have 5-15 % run off, with the rest evaporating or infiltrating into the ground. However, a massive cover of solid waste is seen in the river course and in the non-central random spaces, which have an impact on the efficacy of the green. The non-central random spaces further up the area are situated on the steepest slopes in the area and they are mostly covered with trees, whereas according to Bolund and Hunhammer (1999) they may function as an ecosystem service reducing erosion and lowering the air temperature in the area.

These two non-central space types would be ideal to integrate more into the area, and turn into recreational public spaces, keeping them free from solid waste, creating new social gathering points and improving the green elements in the areas. This would improve the ecosystem services and the resilience towards flooding in the future. Participants from the workshop stated that more open spaces would benefit the area, but in general the areas had to contribute to economic development in order to be kept free of development. This could be in the form of shared tree plantations or cropping, where tree plantation is preferable as it is a more long-term and strong structure in the flood prone areas.

To sum up, the open spaces differ in their susceptibility to change. The central streets and squares serve a multitude of social and economic functions for the residents across age, gender, household etc., and as Lekule (2004) states, these central spaces function as key ingredients in the residents' livelihood. Therefore the residents rely on these spaces and protect them from disappearing primarily via informal social norms and rules. This is also the case for the non-central streets and squares, however they have more private use and functions, as they, like Mrema (2013a) discovered, function as urban living rooms for the households living next to them. The central and non-central food production areas, and the central and non-central random spaces are spaces considered less important to the residents, as they are either private used or public used by a smaller user group. Therefore they would be more susceptible to change than the other spaces in the area. However, more or less all the open spaces in Kawe Ukwamani might on a small scale function as ecosystem services, have the potential of being greener, and could, as Mguni et al. (2013) argue, be integrated into the larger picture of using the urban landscape to manage the water via natural hydrological processes, such as temporary storage, infiltration into the soil, evaporation into the air and conveyance of the water, while creating more attractive urban spaces with multiple values and functions of the green.

Kawe Ukwamani in the future

It is crucial to include the residents of Kawe Ukwamani in the transformation process of the area, and to figure out what matters to the local people.

This study shows that spaces, such as streets and squares, where economic and social activities can unfold are fundamental spaces of the residents, and these spaces are maintained and protected by the local people. Other than tree plantation or cropping, it is found, that open spaces or green elements and the associated ecosystem services are not considered very important to the residents, as they are not seen as contributing to economic and social value. This fits well with Cillier's (2009) argument that urban open spaces are difficult to relate to a quantifiable economic value, as the value of open space and green elements is a rather complex issue. If the desire is to increase the amount of green elements, the green elements should therefore be in the form of cropping or tree plantation, or be included in the existing highly valued open spaces where the economic and social activities take place. This would upgrade and make these open spaces more economic valuable, while at the same time, enable them to manage water and according to Carr et al. (1992) create new and better opportunities for communal life and social interaction between the different groups in Kawe Ukwamani, which would be a further advantage for the area.

If going to reverse the process towards a more densely built area, one has to go one-step further than just maintaining the existing open spaces. It should also be discussed how to create more open spaces in the area. As the local people are sceptical about getting any help from the urban authorities to find new land, the solutions should be found within the area without having to move any residents.

The open spaces in Kawe Ukwamani are reduced due to horizontal one-story densification of houses, which indicate poor economic conditions of the residents and lack of guidance from professionals on how to build multi-story houses. However, one solution to create more open spaces is to transform the area into vertical building style, at least up to two-story houses, which the local people could learn how to make. This transformation would result in wider streets, more open spaces and a better microclimate. However, it can be discussed if this new type of house construction would fit into the residents' livelihood, as the outdoor spaces in front of the one-story houses are very important, and it can be discussed how the ownership of the new houses should be. Moreover, it is crucial to find solutions to how the newly created open spaces can be protected and not encroached, as the area is attractive to settle into. A solution to protect and maintain the open spaces could be to make the Subward office clearly responsible for controlling the developments in the area via control of and restrictions on further housing development and especially horizontal densification. Furthermore, the Subward office and the urban authorities would have to get more involved in the transformation process and approve and support the ideas economic, professional and by providing accommodation while the houses are constructed. The provision of affordable low-cost housing and secure tenure for the unplanned settlements could also be a way to protect the open spaces in the future.

This transformation requires a better relationship between the urban authorities and the residents in a short-term as well as a long-term perspective. The transformation process should be managed on the residents' premises, while the urban authorities should act as professionals guiding the process. In the unplanned settlements, the participation of all stakeholders is central, and having the urban authorities to meet up in the area and interact with the residents could contribute to a better trust between the two parts. If the residents feel heard and respected by the urban authorities it would also contribute to sort of an empowering of the local people and they would be able and willing to take care of, protect and improve the open spaces in the future.

Another suggestion from the residents on how to increase the amount of open spaces in the area is that a group of residents could go together and buy up a worn left house, tear it down and establish an open space that everyone would benefit from mostly socially. This idea indicates willingness from the residents to develop and change the area and good relationships among residents, but also here it would require professional help, economic support and commitment from the Subward office and the urban authorities to implement the idea.

If going to reverse the process towards a more densely built city and turn the city into a greener environment more resilient to flooding and climate change in the future, it is paramount necessary to initiate new thinking and mind-set at city level and at community level. The landscape may in many ways play a crucial factor in the future, and the benefits of the green should be integrated in the further planning of the city. However, is important not to pull something down people's throats, but make sure they are involved and listened to, and a recommendation to the research project WGA is therefore to involve the citizens and planners from the beginning which would empower the locals in the process.

In a place like Kawe Ukwamani it would be helpful to establish a pilot test zone where the benefits of green elements and other house construction types were studied over a period, as it would be easier for the residents and the planners to see the benefits of the initiatives. This pilot test zone could be functioning as an example for other areas, and be adjusted to the specific context.

The results from the test zone would have to be rather convincing to be sufficiently strong incentives and driving forces for both the residents and the urban authorities to invest their time and money in, but if it was incorporated how the green elements could help alleviate other problems too, people would be better convinced. Kawe Ukwamani is among other things struggling with unemployment, illness, and lack of basic public services, so if the green elements also could improve these things, for example, by generating new jobs and reduce diseases, the transformation process towards a more open and green area would be helped along.

It can also be discussed whether these problems could be better solved if the state of Tanzania handed over the ownership of land to the residents, whereas the state could charge commercial land rents, which could contribute and result in the provision of essential services to the residents. By handing over land rights, the chance of residents' taking responsibility to maintain and take care of the area and the environment might also be improved.

This transfer of land rights to the residents in Kawe Ukwamani and other unplanned settlements would be a strong recognition that the unplanned areas form part of the city and they should not be removed but rather become more integrated into the overall planning of the city. Moreover, as the unplanned settlements generate a large portion of the city's GDP via informal activities, there is also a need to incorporate unplanned settlements into urban planning and decision-making processes not only to prevent the formation of informal settlements, but also to capture the economic potential of the informal sector economy. By doing this it would create better opportunities for cooperation between residents and urban authorities regarding better living environments for the residents and common future upgrading of the unplanned areas.

CONCLUSION

In this chapter the study's research question will be answered and the conclusion will be presented.

The objective of this study was to investigate the driving forces behind the process towards a more densely built and brown Dar es Salaam and the study has aimed at investigating how this process unfolds at community level in the unplanned area Kawe Ukwamani. Through analysis of the use, function and perception of the urban open spaces in this area, it was the objective to come up with suggestions on how these open spaces can be maintained, made greener and increase in numbers in the future in order to reverse the process of browning for therefore to use the open spaces in managing water.

The driving forces at community level behind the browning process is due the general continuing rural-urban-migration, natural population growth, and lack of proper city planning and provision of affordable housing for the citizens in Dar es Salaam. The missing city plans put people in a situation where there is no other alternative than to settle down in an already dense unplanned area. The ongoing division of land into smaller and smaller plots in the unplanned areas is due to economic issues, and redevelopment and enlargement of already existing houses can be seen as an empowering process contributing to better conditions of life. Moreover, people move to Kawe Ukwamani as it is possible to find a rather cheap place to live, either when buying a house or renting a room in a house. Furthermore, since the area is located quite near the inner city, the job opportunities, at least in theory, are also better here, which also attract people to the area. Moreover, living close to other people also mean a lot, as people help each other with everything from everyday matters to more critical things. This indicates that the driving forces behind the browning process at local level is of economic and social character.

To come up with suggestions on how the browning process could be reversed at community level in terms of increase in greener elements and more open spaces, the open spaces in Kawe Ukwamani were studied. It was found that residents in Kawe Ukwamani take good care of and protect open spaces with certain economic and social values such as the central and non-central streets and squares. These spaces can, beside facilitating movement, also contain multiple things, such as small meetings, larger ceremonies, commerce, children's play, cooking etc., and they play therefore a critical role in the residents' livelihood, which protect them to changes.

The other types of open spaces in the area, food production areas and random spaces, are either limited to a certain user group or located in the outskirts of the area, and are not seen as essential spaces in people's livelihood, which make them more susceptible to change, however, as some of these spaces are located in flood prone areas or are very small, they are not turned into housing as one might think.

Therefore these remaining open spaces are not seen very vulnerable to change into new house development, as they are either crucial spaces in the residents' livelihood, too small for housing, or located in flood prone areas, but they might be a victim of house enlargement and could easily contain more green elements.

The open spaces in Kawe Ukwamani are already providing ecosystem services in the form of infiltration, evaporation, retention and conveyance of water, as well as improving the microclimate, but flooding is occurring anyway, why provision of greener spaces is necessary. Since the green elements is not considered very important in themselves, as they are not possessing any economic or social value to the residents, the suggestion is to integrate the green elements in the existing high-valuable streets and squares, as they are the most critically affected when flooding occurs and since they are protected by the residents. This could be a starting point in the process of making the area greener and more resilient to water.

It is also a suggestion that the state of Tanzania sells the land to the local residents and provides a more formal ownership of the spaces. By doing this, the residents would be more anchored in the area and feel ownership and responsibility for the development and protection of the area and the open spaces, while the state could charge land rents and thereby provide better basic services to the residents.

To reverse the browning-process in terms of an increase in the number of open spaces in the area, it is suggested to transform Kawe Ukwamani into vertical housing style and construct one to two story houses that could be made by the residents. Moreover, a suggestion is to create more open spaces by having residents to buy up small pieces of land collectively and turn them into public open spaces with an economic value. If the newly generated open spaces should be protected in the longer perspective, it is suggested that they should contribute to some kind of economic value, such as tree plantation or crops, and the Subward office and the urban authorities should support the initiatives by controlling the development in the area and via economic support.

Moreover, to protect and increase the open spaces in Kawe Ukwamani, there is a great need for new overall city plans to be initiated, and a change in mind-set is required, where the open spaces are going to be put in focus as vital contributors of social, economic and environmental character, and crucial players in the creation of a more climate change resilient city. Another crucial thing in this transformation process is to establish a stronger relationship between the residents and the urban authorities. This bond should be build upon trust and good communication and it could be established via participatory processes and through visits of the unplanned settlements from the urban authorities in order to show willingness to listen to the residents' wishes and thoughts, while empowering them to act on their own.

PERSPECTIVES

This study has sought to come up with new understandings of how the browning-process can be reversed at community level by figuring out how the open spaces in the unplanned settlement Kawe Ukwamani are functioning, used and perceived by the residents in the area. There are a lot of factors affecting the browning process and the change in the area use at local scale, which means that there are several issues that could be addressed if further work was enabled.

It would be beneficial if a new study could conduct a more in-depth description of the work of the urban authorities and their view on the unplanned areas, as this would contribute to a better understanding of the challenges and visions when planning the future city. Furthermore, as found in this study, the establishment of a better relationship between citizens and the urban authorities is paramount if the city is going to change in the future, and it could therefore be essential to look more into the collaboration process and the inclusion of citizens in the planning process in order to come up with recommendations on further participatory work.

Starting a process of integrating more green elements in the unplanned area on the residents' premises would help motivating the involved participants, and a trial and error-process should be initiated in order to test the needs in the specific area. This study has looked at the green elements as a crucial factor for improving the liveability of the city in multiple ways no matter quantity, but focus so focus has not been on how much "green" it takes to see a noticeable difference or to alleviate flooding, which would be interesting to look at in further studies.

REFERENCES

Allafrica.com (2014, April 28): More Than 40 Feared Dead After Dar Floods.

Retrieved from <http://allafrica.com/stories/201404160211.html>

Andersen, I. (1999): Den skinbarlige virkelighed - om valg af samfundsvidenskabelige metoder. Forlaget Samfundslitteratur. København.

Ardhi University (2013) Catchment and Pilot Area Selection for Dar es Salaam City (Unpublished – internal use in WGA). Dar es Salaam, Tanzania.

Bahendwa, F. (2013): Urban form through residents' practices: The unconventional transformation processes in suburban areas in Dar es Salaam, Tanzania

Bolund, P., and Hunhammar, S. (1999). Ecosystem services in urban areas. In *Ecological Economics*, 29(2), 293–301. Environmental Strategies Research Group, Natural Resource Management, Department of Systems Ecology, Stockholm University, Stockholm, Sweden.

Carr, S., Francis, M., Rivlin, L. G., & Store, A. M. (1992): *Public space*. Cambridge University Press.

Cilliers, E.J. (2009): Bridging the Green-Value-Gap: A South African Approach. *International Journal of Social and Human Sciences*, 3 2009.

Clemmesen, S. (2014): Ny eksempelsamling om regnvand i byen. In *Klimatilpaning i Danmark og Skåne*. Medlemsblad for Foreningen Bæredygtige byer og bygninger. February 2014.

CLUVA (2010): Assessing vulnerability of urban systems, populations and goods in relation to natural and man-made disasters in Africa. *Climate change and urban vulnerability in Africa*. University of Copenhagen, Denmark.

Flyvbjerg, B. 1988): *Case studiet som forskningsmetode*. Udgiver: Institut for Samfundsudvikling og Planlægning. Aalborg Universitet. Aalborg.

Francis, M. (1987): *Urban open spaces*, in the journal *Advances in environment, behaviour and design*. Publisher Plenum

- George, A. L. and Bennett, A. (2005): Case studies and theory development in the social sciences. Belfer Center for Science and International Affairs. MIT Press. Cambridge, Massachusetts. London, England.
- Harboe, T. (2006): Indføring i samfundsvidenskabelig metode. 4. udgave. Forlaget Samfundslitteratur. København.
- James, P, Tzoulas, K, Adams, MD, Barber, A, Box, J, Breuste, J, Elmqvist, T, Frith, M, Gordon, C, Greening, KL, Handley, J, Haworth, S, Kazmierczak, AE, Johnston, M, Korpela, K, Moretti, M, Niemela, J, Pauleit, S, Roe, MH, Sadler, JP and Ward Thompson (2009): 'Towards an integrated understanding of green space in the European built environment. Urban Forestry & Urban Greening, 8 (2009) p 65-75.
- Juul Frost Arkitekter (2009): Byens rum 2 - Det kendte i det fremmede. Udgiver: Fonden til udgivelse af Arkitekturtidsskrift. København.
- Kitha, J. and Lyth, A. (2011): Urban wildscapes and green spaces in Mombasa and their potential contribution to climate change adaptation and mitigation 2011 23: 251 Environment and Urbanization. SAGE. Sydney. Australia.
- Kvale, S. and Brinkman, S. (2009): Interview. Introduktion til et håndværk. 2. Udgave. Hans Reitzels Forlag. København.
- Lekule, C. T. (2004): Place Dynamics. Meanings of urban space to residents in Keko Magurumbasi unplanned settlement Dar es Salaam Tanzania. Ph.D. Thesis. Royal Danish Academy of Fine Arts School of Architecture - Copenhagen – Denmark
- Locatelli, F. and Nugent, P. (2009): African Cities. Competing Claims on Urban Spaces. Brill. Leiden. Boston.
- Lupala, J. (2002): Urban types in rapidly urbanising cities. Analysis of Formal and Informal settlements in Dar es Salaam, Tanzania. Doctoral Thesis. Department of infrastructure and urban planning. Division of urban studies. Royal Institute of technology. Stockholm.
- Madanipour, A. (1996): Design of urban space: An inquiry into a socio-spatial process. John Wiley & Sons Ltd. West Sussex.

P. Mguni, L. Herslund, M.B. Jensen (2013): Soft infrastructures for flood risk management in Dar es Salaam and Copenhagen. Danish Centre for Forest and Landscape. University of Copenhagen (Submitted).

Mikkelsen, B. (2005): *Methods for development work and research a new guide for practitioners*. Second edition. Sage Publications. London.

Mng'ong'o', O. S. (2004): *A browning process. The case of Dar es Salaam city*. Doctoral Dissertation. Division of Urban Studies. Stockholm.

Mrema, L.K. (2013a): *Creation and Control of Public Open Spaces: Case of Msasani Makangira Informal Settlement, Tanzania*. Volume 2, Issue 7, pp 200-213, July, 2013. Online Journal of Social Sciences Research. Ardhi University, Dar es Salaam, Tanzania

Mrema, L. K. (2013b): *Childrens' Everyday Architectural Aesthetics of Public Open Spaces: Case of Msasani Makangira Unplanned Settlement*. Volume 2, Issue 7, pp 181-189; July, 2013. Online Journal of Social Sciences Research.. Ardhi University, Dar es Salaam, Tanzania

Nguluma, M. H, (2003): *Housing Themselves. Transformations, Modernisation and Spatial Qualities in Informal Settlements in Dar es Salaam, Tanzania*. Department of infrastructure division of urban studies. Stockholm.

Rasmussen, J. G, (2014): *Københavns Kommunes Klimatilpasningsplan*. In *Klimatilpaning I Danmark og Skåne*. Medlemsblad for Foreningen Bæredygtige byer og bygninger. February 2014.

Stanley ,B.W., Stark, L.B., Johnston, K.L., Smith, M.E. (2012): *Urban open spaces in historical perspectives. A transdisciplinary typology and analysis*. *Urban Geography*, 2012, 33, 8, pp. 1089–1117. Bellwether Publishing.

START (2011): *Urban Poverty & Climate Change in Dar es Salaam, Tanzania: A Case Study*. Pan-African START Secretariat. International START Secretariat. Tanzania Meteorological Agency Ardhi University, Tanzania

Swanwick, C., Dunnett, N., & Woolley, H. (2003): *Nature, Role and Value of Green Space in Towns and Cities: An Overview*. *Built Environment (1978-)*, Vol. 29, No. 2, *Perspectives on Urban Greenspace in Europe*(2003), pp. 94-106. Publisher Alexandrine Press.

UN HABITAT (2009): *Tanzania: Dar es Salaam City Profile*. United Nations Human Settlements Programme publications. Nairobi, Kenya.

United Nations (2014, April 15): Urbanisation. Retrieved from <http://data.un.org/CountryProfile.aspx?crName=United+Republic+of+Tanzania#Map>

WGA (2014, March 5): Water Resilient Green Cities For Africa. Retrieved from <http://ign.ku.dk/english/research/landscape-architecture-planning/landscape-technology/water-green-africa/>

Wilhelm, M. (2012): Private Appropriation of Public Space in Unplanned Settlements in Jakarta, 15–16. Pacific News #37 • January/February 2012.

Worldbank (2002): Dar es Salaam Case study. Overview of climate change, disaster, risk, and the urban poor: Cities building resilience for a changing world.

Yanda, P., Mushi, D., Henku, A.I., Maganga, F., Minde, H., Malik, N., Kateka, A., Bird, N., and Tilley, H. (2013): Tanzania National Climate Change Finance Analysis. Overseas Development Institute, London and the Centre for Climate Change Studies, University of Dar es Salaam. Odi.org.

Yin, R. K. (2014): Case study research, design and methods. 5th edition. Sage Publications. Los Angeles.

Appendix 1:

Guided tour in Kawe Ukwamani and talk with Faustini Ally Mpinga

– Monday 3rd February 2014

Tour in the area and casual talk with Faustini Ally Mpinga local youth leader (maybe subward leader) contact: 0718 359322 and 0782 454647. Faustini is living in the area together with his wife and two children. They live in a house together with 7 other families. The local community voted for him to be local youth leader in the area. He is very well known in the area.

1. What is your role as an employee at the subward office in Kawe Ukwamani?
 - We do different kind of work, also things, which were meant to be done at the urban authorities. To a high degree we do a lot of administrative work in the area. We do the authenticating and registering of land rights, arbitrating land disputes, checking land-use development and spatial orderliness and sometimes administrate the provision of basic services. But we also look at more personal stuff such as employment and family issues.
2. In Dar es Salaam the population growth rate is 4,39 % a year. How do you experience that in Kawe Ukwamani?
 - I think the growth rate is about 17 %. People are registered every year. In 2002 the population size was 18.000 people. We don't have an exact number of the people today.
3. I want to ask about the ownership – how is it here?
 - Houses are getting registered and a copper plate with number and name is attached above the door (see photo). More and more people are getting registered as house owners, but is a long slow process.
4. Where can people build houses? What is restricted?
 - People know in some kind of way where to build houses and where not to. Places as transport nodes, plazas and small gaps of space are left aside to practical matters.
5. Do you know what the future plan (if any) is for Kawe Ukwamani?
 - No.
6. How about the green structure and infrastructure in the area. Do you have a plan for that?
 - People do green initiatives on their own. For example did the school planted trees and plants with its own money and the 10 houses and their chair leader (every 10 houses have one chair leader (“ten cell leader” - wajumbe) – subward office is above chair leader) are financing their

own small roads, paths and stairs. They gather and collect money for the project. The subward office gives advices but no money.

- The municipality is building a bridge across Mbezi River but the local people have had nothing to say about the design. The local people think it is not constructed well and that it will collapse when the water comes (rain season in March).
7. Big area in front of the school and mosque – what is it and who owns it?
- Government owns it. It is former industry area. Future plan is to build apartments there.
8. What about solid waste, is there any plan or service for it in the area?
- No car can access the area, the roads/paths are too narrow, and therefore the waste would not be picked up. In another area a municipality truck is coming to collect the trash.
9. Do you experience flooding in the area? Do the local do anything to prevent flooding?
- There will be flooding many places in the area. Many people experience it. Twice (xxxx and 2012) they had water coming up to the middle of their houses.
 - The local people do not collect the water and there is no water harvesting taking place.
10. Problem/potential for LSM from Faustinis point of view:
- Minus: No open space – no good environment
 - Plus: People will participate and there are good relationships in the area.
11. Structure of the local level:
- Ward office – subward office – ten cell leaders – 10 houses each – household

Some wastewater is running in the street from a broken toilet chamber. Reported to the municipality officers, but nothing has happened yet.

We met Mr Shabani Ally Madega from Poverty Fighters and Development , Society of Tanzania (matco.tz@gmail.com and madegashabani@yahoo.com). He would like a copy of the thesis.

Appendix 2:

Semi-structured interview with Ten Cell Unit Leader Bernadetta Masawe – Wednesday 5th February 2014

Tour and talk in the local area with Bernadetta Masawe, one of the Ten Cell Unit Leaders next to the river. She is the leader of 11 houses, 30 families, which is approximately 93 people.

Bernadette moved to the area in 1987 and moved closer to the river in 1996 to build a bigger house. She has been living in the area most of the time together with her husband and two sons. She is a housewife and works voluntarily as a Ten Cell Unit leader. Her husband is working with timber outside the area and her two sons are adults and are not living in her house anymore, but both have an academic degree and work within the wildlife area. Besides her husband and herself there live four other people in the house. These are renting two rooms in the house, but are seen as being close family

1. How many wajumbe leaders are you in Kawe Ukwamani?
 - Approximately 40 leaders.

2. What are your tasks and responsibilities as a leader?
 - I am helping the households when they run into some problems. It could be problems concerning flooding and house boundary problems. And if they want to find a job, they come to me to register and get an approval that they live in Kawe.

3. What are the good things in the area?
 - We have a good collaboration and a good relationship between the neighbours.
 - When Bernadetta moved to the area (1987) the land was really cheap.

4. What are the biggest challenges here?
 - The main road, which connects the area to the rest of Kawe, is in a very bad condition.
 - Permission from the municipality to built and live here. First you will need a permission to built from the wajumbe leader, this you will need to get in a letter. Then the letter should go to the subward office and get approved. After that the letter should go to the municipality who might give the person a license to build. It is difficult to get a license in the area, as it is a flood prone area.
 - Crime among young people “ Sakadas”.

5. Do you experience flooding here in the area?
 - In 25 years they have experienced flooding 3 times (1997, 2002, 2012).

- Yes, last time there was flooding was in December 2012 where 3 houses near by the river where demolished by the water from the river. The people living there moved to Mawependa and got new land from the government.
 - In 1997 they also experienced flooding. People who got affected from the water got new land from the government and sold their old land very cheap to other people.
 - In 2012 they had water approx. 50 cm up the house walls. It flows away from the roads very quickly (within 1 hour) but it happens many times in a row. This is a normal thing amount of water in the area.
6. Can you explain what you mean by saying flooding? What is your understanding?
- Water goes very high (approx. 1.80 meters).
7. Where does the water come from?
- The water comes from the river. Water flow and nature of the river has changed so the water comes more heavily from upstream the river.
8. Can you explain how you get affected by the flooding?
- We have to clean the place. Children cannot go to school. People stay at home. You prepare for the flood by providing enough food to your home. Cholera occurs.
9. What do you do to prevent flooding?
- We build up harder structures with sandbags and bricked walls.
10. Do you help each other and work together?
- We help each other finding sandbags and we built up walls.
11. Do you have any green spaces where you live?
- No not really. Some trees. We buy food and vegetable in local shops. The local farmers provide the food.
12. Do you use the rainwater/ water from the river for anything?
- No.
13. What about water supply? Where do you get your water?
- Dawasco (water supply company). We have a pump by the house and some houses share the water. They always have water here in the area, no scarcity. Good quality of water.
 - Possible focus group interview participant: David A. Temu (Bernadettas son) – Tel: 0888951705

We had a small casual talk with David about the situation in Kawe.

We asked what the incentives could be for the people to move from their houses?

- If people get money for their land they would move.

What do you think about LSM?

- It is a good idea. More urban agriculture could be a good idea. There has to be an economic benefit for the people otherwise it would not be a success. The things implemented should be tangible and create a quick change. The government should support the ideas and give some money.
- The challenge could be about the ownership of the new places. And that government support would be non-existing.

Appendix 3:

Semi-structured interview with Ten Cell Unit Leader Aisha Anton - Tuesday 4th February 2014

Tour and talk in the local area with Aisha Anton, one of the Ten Cell Unit Leaders next to the river. She is the leader of 20 houses, 40 families, which is approximately 200 people. Aisha has been living in the area for many years together with her husband and three children. She is taking care of the children, cooking, as well as other practical stuff, while her husband is working outside the area doing different small day-to-day jobs. They live in a house, that they own, while two other families are renting a room in the house.

1. How many wajumbe leaders are there in Kawe Ukwamani?
 - 42 leaders.

2. What are your tasks and responsibilities as a leader?
 - I am responsible for looking at family problems and for reporting all kinds of problems to the subward office. Sometimes I meet with other wajumbe leaders very informal to talk about specific problems. I am the one asking the subward office for help if it is needed from the local people.

3. Do you experience flooding here in the area?
 - Two times a year we experience flooding in the area. In March/April and in November/December.

4. Can you explain what you mean by saying flooding? What is your understanding?
 - Flooding is when the water is standing 30 cm above ground level.

5. Where does the water come from?
 - The water comes from rain in the upper area and from the river. At the same time.

6. Can you explain how you get affected by the flooding?
 - In November 2012 a family house got demolished from the heavy water flow in the river.
 - Another man moved to Kampara after his house was washed away. That is 3 years ago.
 - 15 years ago the river was placed perhaps 15 meters more to the other side. The river was only 2 meter wide but now it is very wide and has removed a house on the riverbank (se photo).

7. What do you do to prevent flooding?

- We prepare for the April flooding by building up harder structures with sandbags along the riverside. We plant plants and trees in the river basing to protect the banks and avoid erosion.
8. Do you help each other and work together?
- We help each other finding sandbags and we built up walls.
9. Do you think this flooding has getting worse over time?
- More water comes from the upstream area, it has increased over time, and the speed of the water has also increased. When it is very strong it can carry on beds, dead bodies and trees.
 - In two years time, the water has taken approximately 6 meters of land.
10. Do you use the water for anything?
- No, because the water is very dirty.
11. If the river is eroding more of the area and the water becomes heavier do you then have any plans?
- If it does so, the only solution is to move from the area.
12. How is the ownership here? Does people own their own house or rent a house/room in a house?
- Here people mostly have their own house but further down the river people are renters.
- Possible focus group interview participant: Herpenes – Tel: 0757222012

Appendix 4:

Semi-structured interview with Ten Cell Unit Leader Herswida Ki Mapunda – Friday 7th February 2014

Talk in the local area with Herswida Ki Mapunda, one of the Ten Cell Unit Leaders next to the river. She is the leader of 31 houses, every one house, is housing approximately 5 families. Herswida has been living where she lives now for 8 years, before she was renting a place further up in the area. Herswida lives with her husband, her old mother and another family, who rents a room in the house. Her husband is doing small informal jobs in the area, such as helping the neighbours with house construction, digging soil etc. Herswida is taking care of all the practical stuff concerning their home, her mother and the Ten Cell Unit.

1. How long time have you been living here?

- 8 years. Before she lived further up in the area. But she was buying land here because it was cheap to get.

2. Are you affected by flooding in your area? How?

- Yes. But there is no water where I live. Two houses near the river were flushed away by the river. That was in December 2012. The river is eroding the riverbanks, before you could easily jump across the river (1.5 meters). The river has moved, before it ran other places (see map).
- Also the water comes from above the area during rain season.

3. What do you do to prevent flooding?

- We cannot do anything. We cannot block the water.

4. Has the water increased during time?

- Yes. Water comes very heavily from Kihaba (up stream area)

5. What do you think is the solution to this flooding?

- The subward office or municipality should find new land and give to the affected people.

6. Do you use the water for anything?

- We use it only for cloth washing because when it falls on the iron roof it mix up with rust from the roof.

7. Do you have any green spaces in your area?

- Not so many. But we have a few places with agriculture and a few small open spaces.

8. Is flooding the main problem, or are there other issues in the area?
 - The roads are bad. There is no space for the water to pass. When people built a house they do not care about making proper water channels.

9. If parts of the road are broken, do you then fix it on your own?
 - We are supposed to do that. We meet with the neighbours and talk about the problem, but very few times the problem get fixed. A man in the area sometimes go on his own with a caterpillar and fix the road.

10. Have you thought about making water channels in the streets?
 - Yes, we have thought about it, but people are not collaborating and there is not enough space for such a solution.

Appendix 5:

Semi-structured interview with Ten Cell Unit Leader Mwatano Ally – Wednesday 5th February 2014

Tour and talk in the local area with Mwatano Ally, one of the Ten Cell Unit Leader next to the river (see map). She is the leader of 16 houses, 32 (almost 40) families. That is approximately 100 people. Her parents moved to the area from another region to improve life, therefore she has been living in the area a great part of her life. Mwatano has a husband and four children. While she is having the responsibility for the house and all the practical stuff, her husband is working outside the area. Her children are still attending primary school, which is located in the area. Mwatano and her family are house owners, but they live in the same house as two other families, who are renting a room in the house.

1. What are the good things in the area?
 - There is a good relationship between people.

2. What are the biggest challenges here?
 - Flooding, no drainage for wastewater, not enough roads, young people do not have a job.

3. Do you experience flooding here in the area?
 - In 1998.

4. Can you explain what you mean by saying flooding? What is your understanding?
 - Water comes from the river and intrudes the area and people have to move.
 - In April and December every year the rain season is causing a lot of water in the streets (30 cm water level), but this is normal. Water comes from upstream.

5. Can you explain how you get affected by the flooding?
 - Water moves very quickly so trees and stones block the houses. Before there were houses close to the river, they are gone now. Families move further up in the area.
 - People cannot walk in the streets and there are no ways to pass.
 - People are worried that the water will hit their houses.

6. What do you do to prevent flooding?
 - We build up harder structures with sandbags and bricked walls.

7. Do you help each other and work together?
 - People living further up the area is housing the most affected people during the worst periods.

- Local government promises to find new land for the affected people, but it is a very slow process.
8. Do you have any green spaces/open spaces where you live? Who owns them?
- Yes. The spaces are private owned but people can use for everyday life activities such as relaxing, cooking, washing clothing.
9. What about ownership of the houses – how is it here?
- Some people own a house and rent out the whole house to one or more families. Other people own a house and rent out some of the rooms in the house while still also living in the house themselves. Therefore there is a mixture of renters and owners in the area.
10. Do you use the rainwater/ water from the river for anything?
- Yes, we use it for dishwashing and cloth washing.
11. What about water supply? Where do you get water from?
- Dawasco (water supply company). We buy water from the neighbour who has a pump by his house. It costs 100 shillings for 20 litres of water (100 shillings = 0,33 Danish kroner). They have never experienced water scarcity. The quality of water is good.

Appendix 6:

Interview with Mary Komba, Principal Urban planner in Kinondoni Municipality, Dar es Salaam.

- Monday the 10th of February 2014

Contact information: Mknngalewa@hotmail.com

What are your responsibilities as a principal town planner?

- Local authority, control development, building permits, upgrading of settlements.

How is the procedure of the building permit?

- If it is a planned area, we look at the plot and the ownership of the plot. People have to fill out an application form with very detailed measurements, drawings and calculations of the house. Hereafter the UBC – Urban Planning Committee, goes through the application and accept or reject it. Normally we have a committee meeting every second or third month where we look at many applications at a time.

And what about unplanned areas?

- We mostly ignore them. They cause headaches. People are building multi-storey houses but without any supervision from anyone. It is difficult to control and there is nothing to do there.
- The standard procedure is that the people in the unplanned areas get supervision from engineers who also make some guidelines for the house construction. People have to fill out a form from the municipality and the subward office needs to specify the ownership of the plot and approve that there is accessibility to and from the plot. This is important due to fire or ambulance help. But is a common conflict because the density of the houses is very high.

How do you enforce these rules in the unplanned areas?

- The local leaders (the subward office) are the ones to do that task. They try to define the areas and talk with people about how to built properly. But this is very difficult.
- We also work with regulations. E.g. a plot has to be 200 m², but since this is very difficult to enforce in the unplanned areas, we work with new guidelines saying that e.g. two houses can share one plot.

What about the settlement upgrading – what is that about?

- We have several of programs, e.g. CIUP (Community Infrastructure Upgrading Program) that deal with the problems and issues in the settlements. These are e.g. sanitation, green spaces, waste. They work more or less well.

- The problem is that we don't have much money for the upgrading, so we are very much depended on donors.
- We are trying to upgrade and find people a new plot in another area to make space in the old area, but for people living in the flood prone areas we can't compensate.

Have you been part of the new Masterplan for Dar es Salaam?

- Yes. I have been in one of the local working groups.

Why was it rejected?

- It didn't solve the problems of a fast growing city. It didn't come up with new ideas for infrastructure, housing and open spaces. We had some Italian consultants helping us making the Masterplan, but some of the problems, in my perspective have been that they were basing the plan on the population number from 2002 and that nothing were very detailed planned.

So, what is happening now?

- The consultants will come up with a new suggestions based on our comments.

What were the good things in the new Masterplan?

- The problems we have in Dar es Salaam were addressed and defined. These were e.g. congestion and lack of open spaces.

What about green structures in the city? Is there any plan for that?

- We are trying to define open spaces and green spaces, so that is difficult to encroach them. They are defined and delineated by houses and roads and often we put up signboards saying that this is a public open space.
- In a neighbourhood we plan that every 10 units should have one open space. This is e.g. done in Bunju and Mbeni in a project called "20.000 plots".
- In unplanned areas these spaces are very difficult to keep free from houses etc.

How is the waste management in the city?

- It is not very well addressed and it is not working properly. We have some collection points, which are used as transfer stations before a truck is taking the waste to the combustion station.
- People living next to the collection points don't like them because of the smell.
- We will need a new and better system in the future.

How is it working in the unplanned areas?

- I don't think it is working at all. Some people make an agreement with a private company that collect the waste on subscription, but this is rarely happening.

So, the municipality is not doing anything?

- No. Also because of the lack of access.

What do you think about LSM?

- It needs a certain design but it is a good way to address the stormwater problem. Although, we need to do some zoning of the affected areas, which is very difficult. Moreover, it is important that we reduce the paved areas since the rain won't have any places to infiltrate into the soil.

What are the difficulties of LSM?

- We don't have any clear defined drainage system right now, so this needs to be mapped before anything else.
- Also our road network needs to be defined before starting.

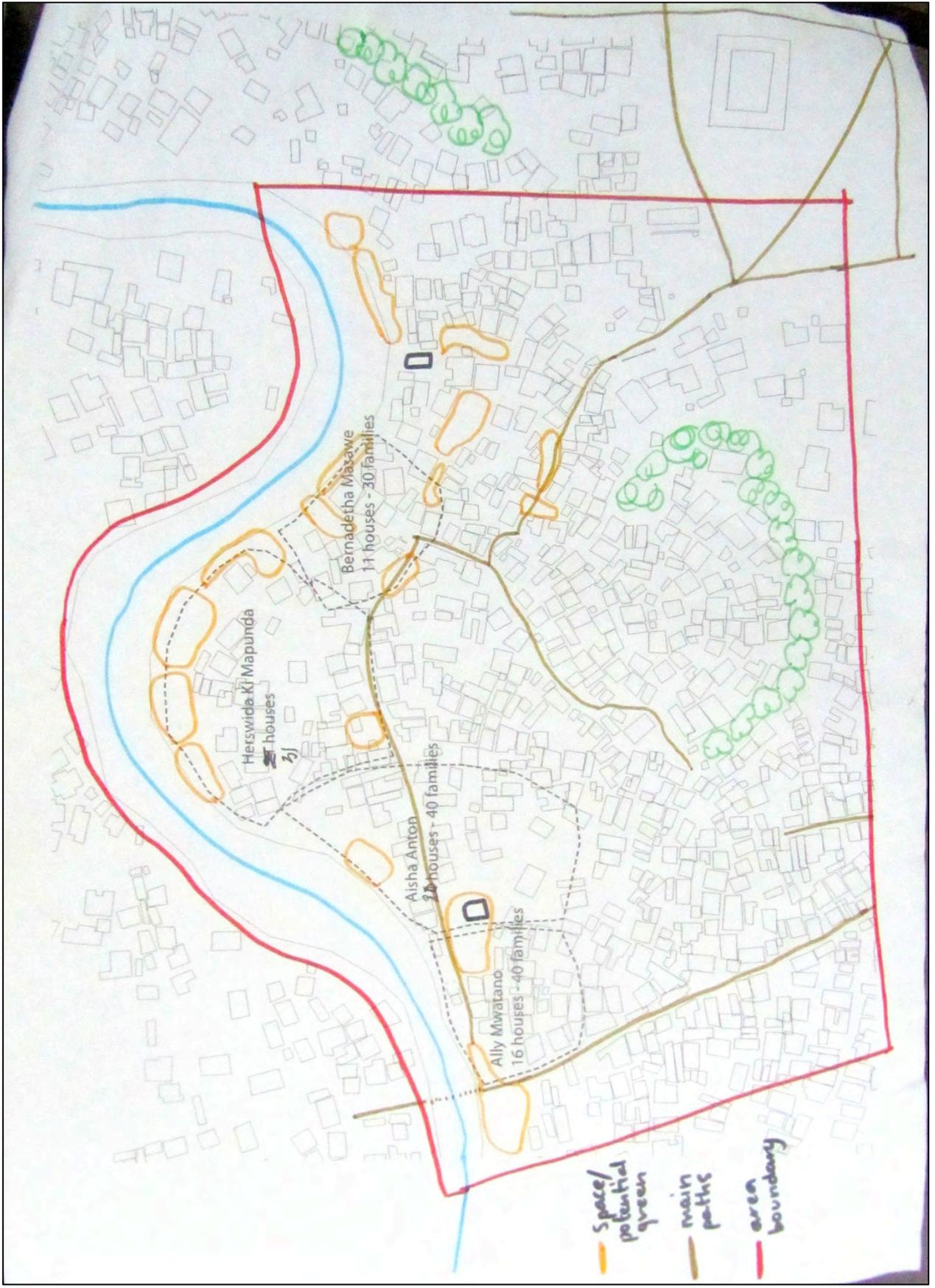
Appendix 7:

Space use mapping – 2nd – 11th of February

| Space & Characteristics | Size, shape, type | Ownership | Function | User |
|--|--------------------------------------|-------------------------------------|---|---|
| <ul style="list-style-type: none"> Space 1 <p>Open space with few trees</p> | <p>Square</p> <p>15x 15 m</p> | <p>Private (Semi-public)</p> | <p>Used for ceremonies, e.g. funerals and parties</p> <p>Clothes drying</p> | <p>Only a few, but everyone at the ceremonies</p> |
| <ul style="list-style-type: none"> Space 2 <p>Space with many big trees</p> | <p>Rectangle</p> <p>5x10 m</p> | <p>Private</p> | <p>Used as boundary</p> <p>Creates shade</p> <p>Casual playground</p> | <p>The owner of the house</p> <p>(Children)</p> |
| <ul style="list-style-type: none"> Space 3 <p>Open space near river</p> | <p>Non-square</p> <p>30x20 m</p> | <p>Public</p> | <p>Used for waste dumping</p> <p>Hang out place</p> | <p>Everyone</p> <p>(Young men)</p> |
| <ul style="list-style-type: none"> Space 4 <p>Potential open space</p> <p>House ruin near river</p> | <p>Rectangle</p> <p>7x10 m</p> | <p>Private, but owner moved out</p> | <p>Ruin, no use</p> | <p>No one</p> |
| <ul style="list-style-type: none"> Space 5 <p>Open space with palm trees</p> | <p>Rectangle</p> <p>3x 10 m</p> | <p>Private (semi-public)</p> | <p>Hang out place</p> <p>Creates shade</p> | <p>House owner</p> <p>Neighbours</p> |
| <ul style="list-style-type: none"> Space 6 <p>Open space near the river, in low terrain.</p> <p>Green spots</p> | <p>Non-rectangle</p> <p>5 x 15 m</p> | <p>Public</p> | <p>Waste dumping</p> <p>Green structure for protection</p> | <p>People near by</p> <p>Everyone</p> |
| <ul style="list-style-type: none"> Space 7 <p>Open space with crops (maboga)</p> | <p>Rectangle</p> <p>20 x 7 m</p> | <p>Private</p> | <p>Urban agriculture for selling and eating themselves</p> | <p>Landowner</p> |

| | | | | |
|--|--------------------------------------|------------------------------|---|--|
| <ul style="list-style-type: none"> Space 8 <p>Open space with different types of crops</p> | <p>Non-rectangle</p> <p>20x 20 m</p> | <p>Private</p> | <p>Urban agriculture for selling and eating themselves</p> | <p>Landowner</p> |
| <ul style="list-style-type: none"> Space 9 <p>Open space near the river Sloping a bit</p> | <p>Non-rectangle</p> <p>5 x 20 m</p> | <p>Public</p> | <p>Waste dumping</p> <p>Green structure for protection</p> | <p>People near by</p> <p>Everyone</p> |
| <ul style="list-style-type: none"> Space 10 <p>Open space in front of house, near river, big tree in the middle</p> | <p>Non-rectangle</p> <p>25x15 m</p> | <p>Private (semi-public)</p> | <p>Creates shade, Gathering place</p> | <p>House owner</p> <p>Neighbours</p> <p>Everyone</p> |
| <ul style="list-style-type: none"> Space 11 <p>Bigger open space, potential cropping</p> | <p>Non-rectangle</p> <p>30x50 m</p> | <p>Private (semi-public)</p> | <p>Casual playground</p> <p>Potential agricultural land</p> | <p>Owner</p> <p>Neighbours (Children)</p> |
| <ul style="list-style-type: none"> Space 12 <p>More narrow open more space</p> | <p>Non-rectangle</p> <p>7 x 10</p> | <p>Private (semi-public)</p> | <p>Corridor</p> <p>Latrine pits</p> <p>Green structure</p> | <p>Owner</p> <p>People near by</p> <p>Everyone</p> |
| <ul style="list-style-type: none"> Space 13 <p>Open space covered with grass</p> | <p>Square</p> <p>15 x 15 m</p> | <p>Private</p> | <p>Clothes drying</p> | <p>Landowner</p> |
| <ul style="list-style-type: none"> Space 14 <p>Narrow open space near the river, sloping a bit</p> | <p>Rectangle</p> <p>5x30 m</p> | <p>Public</p> | <p>Waste dumping site</p> | <p>Everyone</p> <p>People near by</p> |

| | | | | |
|--|-------------------------------------|--|---|--|
| <ul style="list-style-type: none"> Space 15 <p>Open with grass and trees</p> | <p>Rectangle</p> <p>10 x 35 m</p> | <p>Private (semi-public)</p> | <p>Crops (banana, papaya)</p> <p>Clothes drying</p> <p>Grass land</p> | <p>Landowner</p> <p>Neighbours (Women)</p> |
| <ul style="list-style-type: none"> Space 16 <p>Big open space, the first thing you meet when turning down to the area from Old Bagamoyo Rd.</p> | <p>Rectangle</p> <p>200 x 300 m</p> | <p>Public</p> | <p>Corridor</p> <p>People passing by</p> <p>Meeting place</p> <p>Shops (plastic collection, fruit, vegetable, iron, bricks, carpenter), mosque, NGO</p> | <p>Everyone</p> |
| <ul style="list-style-type: none"> Space 17 <p>Open space, first you meet when entering the area</p> | <p>Rectangle</p> <p>8 x 15 m</p> | <p>Public</p> <p>Private towards the end</p> | <p>Corridor</p> <p>Few shops (fruit/vegetable), space for ceremonies, meetings</p> | <p>Everyone</p> <p>People can lend the area for meetings</p> |
| <ul style="list-style-type: none"> Space 18 <p>Wider road</p> | <p>Rectangle</p> <p>5 x 20 m</p> | <p>Public</p> | <p>Corridor</p> <p>Shopping street (hair dresser, fruit, vegetables, rice, pool table, electricity, sanitary</p> | <p>Everyone</p> |
| <ul style="list-style-type: none"> Space 19 <p>Open space towards the street</p> | <p>Square</p> <p>15 x 15 m</p> | <p>Private</p> | <p>Drying clothes, Hanging lines used as boundaries</p> | <p>Landowner</p> <p>Neighbours</p> |
| <ul style="list-style-type: none"> Space 20 <p>Open space further up the area</p> | <p>Rectangle</p> <p>20 x 30 m</p> | <p>Private (semi-public)</p> | <p>“Living room”</p> <p>Cooking, dishwashing, clothes drying, playing, small shop, meeting place</p> | <p>Landowner</p> <p>Neighbours</p> <p>Everyone</p> |
| <ul style="list-style-type: none"> Space 21 <p>Open area, green</p> | <p>Square</p> <p>20 x 20 m</p> | <p>Private</p> | <p>Cropping, trees, grass</p> | <p>Landowner</p> |



Appendix 8:

Workshop 1+ 2 participant list - 13.2.2014

| Workshop 1 | Workshop 2 |
|--|--|
| <p>Janny Saimoni (F)</p> <p>Lived here no. of years: 15 Employment: Small business (selling fish)</p> | <p>Benadetta Masawe (F)</p> <p>Lived here no. of years: 15 Employment: housewife</p> |
| <p>Hypson Obadia (M)</p> <p>Lived no. of years: 7 Employment: no formal work</p> | <p>Rahel Richard (M)</p> <p>Lived here no. of years: 10 Employment: Small business</p> |
| <p>Veronica Daniel Ngoji (F)</p> <p>Lived here no. of years: 5 Employment: Housewife</p> | <p>George Masanja (M)</p> <p>Lived here no. of years: 20 Employment: small business</p> |
| <p>Justice Machavuko (F)</p> <p>Lived here no. of years: 14 Employment: Business</p> | <p>Mwita Manyanya (F)</p> <p>Lived here no. of years: 14 Employment: Small business</p> |
| <p>Jabil Seif (M)</p> <p>Lived no. of years: 7 Employment: Unemployed</p> | <p>Zuhura Zaidi (F)</p> <p>Lived here no. of years: 10 Employment: Small business</p> |
| <p>Godfrey Malisa (M)</p> <p>Lived here no. of years: 9 Employment: Carpenter</p> | <p>Joseph Masawe (M)</p> <p>Lived here no. of years: 10 Employment: Security</p> |
| | <p>Eneles Lukosi (F)</p> <p>Lived here no. of years: 12 Employment: Small business</p> |

Appendix 9:

Comments from workshop 1 + 2 – Thursday the 13th of February 2014

The concept of the workshop was to introduce 3 scenarios for the participants; one showing the change of the area from 2003-2013, another showing a “0-alternative” if nothing is going to change and the development of the present will continue in the future, a third one making a “dream-alternative” with focus on a more green structure in the area.

1. Changes 2003-2013: The participants were introduced to two orthophotos of the area, one from 2003 and another from 2013. Hereafter they had to discuss the visible change of the area and their perception of the change.

2. “0-alternative”: The participants should focus on the recently discussed issues and discuss what the future would look like if the existing development of the area would continue.

3. “Dream-alternative”: How would the future look like if a greener structure was implemented in the future? What kind of green structure would be preferable? Which possible challenges would this implementation have? What to keep in mind when changing the area?

Answers workshop 1

1. Changes 2003-2013:

Person 1: High density compared to 2003.

Person 2: In 1998 houses were taken down by flooding that is why some of the areas along the river are empty. Since then people were turning back and built up new houses.

Person 3: People built here because it is cheaper to get land and they want to live close to the city centre as they are depended on that in relation to food supply and jobs etc.

Person 2: Before the area had a good wind circulation. Now it is always very warm and humid here.

Person 3: We also had more green elements in the area. More trees for example.

Person 4: People remove them to build up a house.

Person 5: River used to go this way (pointing at the map), but waste was washed to the area and filled up the river. Now it is running here (pointing again).

Person 6: Waste is dumped to the river; we don't have any other alternative.

2. “0-alternative”:

Person 1: Basically it will be denser.

Person 2: This area has already reached its limit of houses. No more space for house construction.

Person 3: The flooding issues will only become worse in the future as the residents do not take care of the area and maintain it as it should be maintained. For example the roads are not fixed and so on.

3. “Dream-alternative”:

Person 1: It would be nice if we could plant some more trees in the area, but the only place where you can plant trees is along the river. The only area left for that.

Person 2: It is a good idea with more green elements in the areas as long as we get empowered to take care of the trees, we know which seeds that we have to buy etc.

Person 3: I think we have space for making a greener area and people would be willing to buy trees themselves.

Person 1: I don't think there is any space for planting trees.

Person 4: Fruit trees would be a good idea.

Person 5: Some people would have to move to provide space for such a solution, so the problem would be if the government would resettle them.

Person 6: And how much money should people get to move from the area?

Person 7: This is a very difficult topic, as the government doesn't do anything.

Person 2: We don't trust them.

Person 4: The service level in the area is very bad now, so it would be nice if we could get better access to ambulance, waste system.

Person 1: Yes, and better sanitation and sewage systems.

Person 1: I have an idea of building multi-storey houses and create more open land. Then people would have to go together with their neighbours and built new houses. The only problem is just how the ownership would be. Who should own the house?

Person 3: This idea is impossible, who would do that.

Person 4: I am also problematizing the ownership issue. How should it be done?

Person 6: The house construction process would be too long. It is very difficult to built up a house quickly as we don't have all the money from the beginning, so a house can easily take 10-20 years to be finished.

Answers workshop 2

1. Changes 2003-2013:

Person 1: Housing density is higher now.

Person 2: Air temperature has increased. It is a very big issue here.

Person 3: Before we had a lot of trees, now we have many houses.

Person 1: The river was wider, now it is very narrow and built up by houses.

Person 4: The riverbanks are eroding and they have become deeper. It is a natural process because the soil is sand material. Also so people are digging up sand illegal and sell it for house construction.

Person 5: Flooding has become worse. This is due to the human activity in the area. The area is built up by houses, which creates big surface runoff. Also leaking pipes is creating this water flow.

Person 1: The number of urban spaces has decreased while the number of people has increased.

Person 6: There are no services here (fire stations, waste service, sanitation, sewage system, and ambulance access – now people have to carry the sick person to the ambulance.

2. “0-alternative”:

Person 1: Diseases will increase in the future.

Person 2: Flooding will occur more often.

Person 3: There will be even less possibilities to provide services to the area. E.g. fire stations, sewage systems, sanitation system, waste, and ambulance access.

Person 5: River has been everyone’s use meaning that everyone do what they want e.g. dump waste to the river without thinking of the future and the environment.

3. “Dream-alternative”:

Person 1: Having a big green space in the area is my idea. Instead of people going to the beach to relax they could stay here.

Person 2: It would be very nice with the air circulation if we had more green.

Person 3: But we don't have any space for that.

Person 4: The space issue is a problem. People will still come here to find a space to built a house so there will not be any space for green elements.

Person 6: It is impossible to find an area for more green.

Person 1: It could be possible if e.g. 10 people bought some land in the area together and started making a park or something like that.

Person 7: Activities along the river should be green and for everyone.

Person 2: The green could also avoid the erosion.

Person 4: Maybe we could put up a rule for each household saying that every household should have at least 3 trees or something like that.

Person 1: We could start in the small as showing on the picture (a photo taken in the area of the a green bed) and perhaps it would motivate people to do more.

Person 4: People know the importance of green structure but it is an economic balance, as they rather want money than green spaces. E.g. if I had this empty land I would prefer selling it and get a lot of money than planting banana trees where I would have to wait many years to get just a little bit of money.

Person 7: Yes, it is a long-term investment and people won't necessarily wait for that.

Person 1: We would have to collaborate in the area and depending on the relationship among the neighbours, the agreements and ownership issues, we can change something.

Person 2: It would be difficult to make an agreement on these shared green spaces.

Person 4: You would need a very good partnership.

Person 1: I think a transformation to a more high rise building area will happen to Kawe Ukwamani in the future due to population growth and market forces.

People: It would be nice with a higher service level in the area.

Appendix 10:

Case selection criteria made by Ardhi University, Dar es Salaam

In the WGA project the catchment area in Dar es Salaam has been selected on the basis of some criteria and the identified selection criteria were weighted from 1 to 3, with 1 indicating as Low fit with the descriptions; 2 indicating Medium fit, and 3 indicating High (Ardhi University, 2013).

As listed below, the catchment area Mbezi River was selected, as it scored High on almost all the criteria. In the catchment area both an upstream site, Mbezi Juu, and a downstream site, Kawe Ukwamani, were selected in order to study the different ways in which the water from the river can be retained or managed to protect people from the impacts of floods. Subsequently, academic visited the sites to verify the relevance of the criteria identified. Furthermore, discussions and meetings were held with the Ward leaders to get their opinion on the selection.

Selection criteria

1. **Area without multiple outlets** – This refers to areas where the inflow of water from up stream is long and largely contained and channelled to discharge body through a preferably single outlet.
2. **Area with mixed land use** - Preferably residential (planned and unplanned) more or less with continuing activities especially urban agriculture but without significant industrial activities.
3. **A motivated local community** – An area where local leaders and community members in general are willing and ready to work closely with the research team.
4. **Area where there are local concerns about flooding and storm water management** – This relates to information rich cases as well as potential case for piloting i.e. pilot test sites.
5. **River site with permanent water flow** (albeit with fluctuations) and **where flooding is reported to have increased** in recent years. This is important so as to provide possibilities for conducting studies throughout the year.

| | Catchment Area | Selection Criteria | | | | | Total Weights | Remarks |
|---|-----------------|--------------------|---|---|---|---|---------------|--|
| | | 1 | 2 | 3 | 4 | 5 | | |
| 1 | Msimbazi River | 3 | 3 | 3 | 3 | 3 | 15 | <ul style="list-style-type: none"> - Has experienced several interventions related to flood water management - Few open spaces |
| 2 | Mbezi River | 2 | 3 | 2 | 3 | 3 | 13 | <ul style="list-style-type: none"> - Multiple outlets - Planned residential along the riverbanks especially downstream, but not much developed. - Moderate to severe flooding problems. |
| 3 | Tegeta River | 1 | 3 | 1 | 1 | 2 | 8 | <ul style="list-style-type: none"> - Planned residential downstream. - Sparsely populated. - Informal residential areas upstream. - No severe flooding experienced. |
| 4 | Bunju River | 3 | 1 | 1 | 1 | 1 | 7 | <ul style="list-style-type: none"> - Agriculture dominant upstream - No flooding problems |
| 5 | Mlalakuwa River | 2 | 3 | 3 | 3 | 2 | 13 | <ul style="list-style-type: none"> - Highly polluted - Several residential investments up and downstream. |