DUNGA

THE ECO FISHING VILLAGE

- Improving public space in a sustainable way

ALEXANDRA BLENNOW

Dunga - The Eco Fishing Village.
Improving public space in a sustainable way

Master Department of Architecture
Architecture and Urban Design Programme
Chalmers University of Technology
Göteborg, Sweden 2015

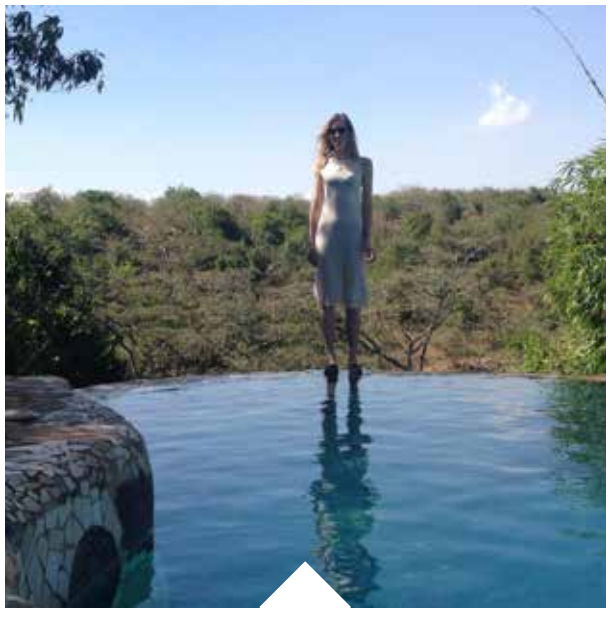
Examiner: Catarina Östlund,
Project assistant in the Department of Architecture,
catarina.ostlund@chalmers.se

Tutor: Anna Kaczorowska,
Project assistant in the Department of Architecture,
anna.kaczorowska@chalmers.se

Keywords: sustainable development, developing countries, public space, rural, environmental awareness and urban planning

FOREWORD

This master thesis took its start in a search of a broader context, outside of Europe. After having studied three and a half years at Chalmers University of Technology in Gothenburg, Sweden, one year at Universtitat Politècnica de Catalunya, Escuela Técnica Superior de Arquitectura del Vallès in Barcelona, Spain and spent two summers at an architectural firm in Barcelona as an intern I felt that the theoretic part of my architectural education had given me a lot of knowledge. At the same time, I found myself a little limited and stuck in my frame of reference around architecture in the European context and felt a need to broaden my horizons. From my perspective, it is important to see new environments and work in new contexts that challenge you not only as an architect but also as a person. To take the step from being a student into the working world and develop not only as a person but as an architect I believe it is essential to work with real community needs and human centred design to tackle social and environmental challenges. This aspiration led me to a master thesis in Kenya, where I had never been before. There I've been working with improving public spaces in a sustainable way in the rural fishing village of Dunga.



Kenya, February - April, 2015

ABSTRACT

Dunga is a rural fishing village located south of the city of Kisumu by Lake Victoria, in Kenya. Currently, it is developing as an eco-tourism site. Its main qualities are the lake, its wetlands and their rich biodiversity and recreational atmosphere, the location close to Kisumu City and Lake Victoria, the strong character and identity of the village and the initiatives to start small-scale businesses. Dunga is an informal settlement and therefore lack adequate infrastructure and public spaces such as drainage, sewage system, shadow and places to rest.

The rapidly growing population in Kisumu County has caused massive environmental problems, such as an overuse of the natural resources and a highly contaminated lake. This results in biodiversity loss, and questions the future and status of Dunga as an eco-tourism site. Much of the environmental problems are due to poverty, high unemployment and lack of environmental awareness. About 75% of the people rely on fish as their source of income, but the lake's severe condition makes this unreliable. For a secure future, the locals need to be provided with the facilities to create alternative sustainable work opportunities.

The primary aim of this thesis is the learning-experience and learning of working in a different context. The thesis seeks to propose a possible idea of how to improve public space in a sustainable way. The thesis investigates which sustainable strategies and principles could benefit the local community and promote a sustainable future.

The outcome is a spatial plan describing a more accessible and user-friendly public space. The thesis provides principles for ideas of green roofs, water-, energy-, and waste management.

Fig.1: Fishermen and fishmongers by the lakefront in Dunga (S. Boggs, 2010)

Contents

01

Introduction

02

Pre-study

03

The voice of Dunga

04

Analysis

05

Design proposal

06

Closure

01

INTRODUCTION

This first section contains the framework of the thesis. It describes the subject and aim of the research, research questions, delimitations and method. It also contains a project time-line and a diagram of the creative process. The introduction will provide the reader with a quick understanding of the thesis, it's structure and the process.

INTRODUCTION

Fig.3: Fishing-boats (H.Fiebig, 2013)

INTRODUCTION

This thesis has a focus on a particular site: Dunga, a small fishing village. It focuses on how to improve the public space in a sustainable way.

Dunga is situated a few kilometres outside of the city of Kisumu on the north-eastern coast of Lake Victoria in Kenya. One of the many challenges that Kenya, Kisumu and Dunga community faces is a rapidly increasing urban population. By 2039 the population in Kisumu is estimated to rise from 1 million to 2 million inhabitants (Tuts et al. 2012, p. 7). This brings a lot of challenges that also effects Dunga, such as pollution, waste management, and poverty. This affects even more as the government already has a hard time catching up with infrastructure and public services such as education and employment to the speed of its growing population (Agong, S, n.d; UN-Habitat 2009, p. 3).

Dunga has a shortage of planned public space, parks, and public facilities since it is an informal settlement (Fälted et al. 2012, p. 8). Solutions to existing environmental and social issues in Kisumu County are often viewed by politicians and experts in a long-term perspective, but due to economic limitations solved on a short-term perspective[1]. Politicians and researchers in the developed world increasingly emphasise the importance of planned public space, greenery, and sustainable waste management, as well as the importance of looking to the long-term perspective.

One of the places where people tend to meet, create their homes and find job opportunities is by the water. Fishing and trade has been two of the most important activities around the shores of in Dunga for decades and is a big part of Dunga's history and identity (Jernsand and Kraff 2013a, p. 8, 9). Much of the public space in Dunga is focused on trade, selling, and other commercial activities. These are activities that produce a lot of waste. What sustainable solutions to waste management, water, and sewage management could improve the public space and conditions for the locals? How can the public space be developed to support a sustainable way of living?

A lot of the material and information used in this master thesis has been gathered during a seven weeks field study in Kisumu and Dunga, Kenya in February to April 2015. The thesis is a Collaboration with Reality Studio 2015. Reality Studio is one of the studios of the Master Program Design for Sustainable Development at the Chalmers University of Technology in Gothenburg, Sweden. Chalmers is a UN-Habitat Partner University, and they collabourate within the field of sustainable development for human settlements. Many existing organisations, as well as the government of Kenya and municipality of Kisumu, are investigating the environmental situation and how to deal with the growing population in Kenya. They are open to ideas about sustainable development and renewable resources, but there is not enough incentives, economic resources or plans of management for implementation of the ideas. In my thesis limitations to Dunga area has been made since it has a rich biodiversity and natural resources and is planned to be developed as an eco-tourism site, but still, faces a lot of environmental problems.

1 Belinda Nyakinya, Deputy Director of Environment, Kisumu County Admin, Interviews 2015-03-05 & 2015-03-09

PROBLEM DESCRIPTION

A growing urban population of the expanding city of Kisumu is challenging the economic and natural resources in Dunga. (Darwininitiative, 2010, p. 13) The local authorities have a hard time catching up with the speed of growth (Agong, S, n.d; UN-Habitat 2009, p. 3). This causes problems such as high unemployment, low educational level, poor infrastructure, waste management problems, insufficient public spaces, and poverty as well as a shortage of educational facilities and opportunities. This, among other factors, leads to environmental problems such as water pollution, soil erosion, declining biodiversity, diminishing wetlands, and overfishing. In a broader perspective, we can also notice global environmental problems such as climate change.

Since Dunga is an informal settlement (Fälted et al. 2012, p. 8) it does not have enough planned public recreational space, there is a lack of a place to play, sit down and have lunch without paying for an expensive meal or just relax in the shadow. The entrance to the village is unclear, and the main road which leads to the lakefront is hard to define. One part of the main road is blocked by parked vehicles and one unused building blocks both the path and the visual access. The centric and maybe also the most scenic part of the village is the lakefront with its pier out to the lake and the fish market. But the market is hard to access from the main road since it is elevated with a concrete slab without stairs or a ramp leading up to the market. The market also lacks a clearly defined entrance. The pier divides the beach into two parts and makes a continuous stroll along the water difficult.

Lake Victoria has gone from delivering 1,5-ton fish/boat per day to 1 fish/boat per day in ten years[1]. Still, 75% of the working population in Dunga works with fishing, and there are few alternatives (FAO, 2006). Many people have a low educational level and no internet, electricity (only 18% has electricity in Kisumu County), water or place to sit and therefore no opportunity to work or study at home. (Ngugi et al., 2013, pp. 12-14)

One investment from KLIP and Mistra Urban Futures among others have been to improve the current situation has been developing Dunga as an eco-tourism site. There have been some initiatives working with water hyacinth to create crafts that have created new job opportunities (mistraurbanfuture, 2013). But the issues are far from solved. It has been shown in research that education and security of employment are two important factors to decreasing both poverty and environmental issues (Krantz, 2001). Many people in Dunga have a lot of social, human and natural resources. These are important to strengthen and secure to find a balance and a possible solution to the lack of economic resources.

1 Evance Odhiambo, Lead Coordinator at Zingira Nyanza Community Crafts, Interview 2015-03-09 & 2015-03-15, site visit in Dunga 2015-03-18.

RESEARCH QUESTION

Which strategies and interventions are relevant and could be implemented to result in a more sustainable, accessible and user-friendly public space?

AIM

The primary aim of this thesis is the learning experience and experience of working in a different context. It is about the learning process, to investigate the location and its problems, challenges and limitations but also potentials and opportunities.

The aim is also to explore how to improve public space in a sustainable way. It is to develop sustainable strategies and principles that could be used to be able to take advantage of the existing qualities, resources and eco-services without damaging them.

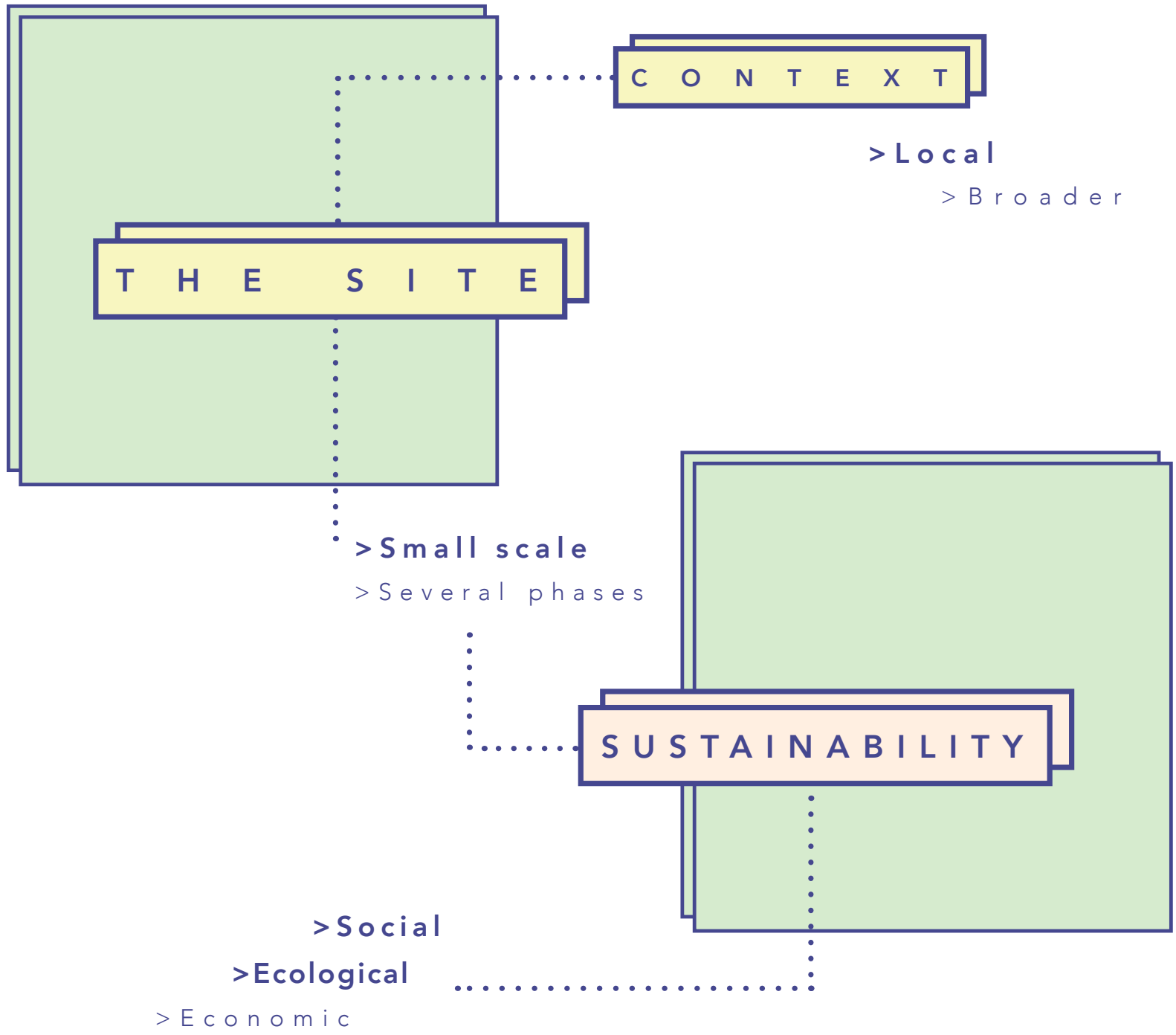
LIMITATIONS & DELIMITATIONS

Since I have a certain amount of time on the project site and it is my first time visiting Dunga, there are some limitations such as the availability of contacts and information but also a limited possibility of understanding of the site, it's character and structure. Therefore the approach will be research for design.

I have adjusted the work to the Kenyan conditions and context, but not to its full complexity in this project. The thesis is mainly focused on the social and environmental aspects of public space. It is focused on a local context, even though the broader context is considered throughout the project. Larger scale planning questions, for example infrastructure and traffic will not be included. The design proposal is delimited to a bigger scale and does not address construction or detailed plans. It provides ideas and conceptual principles of how to manage water, energy and waste, but does not go into technical details.

Once I got back from Kenya I had a certain amount of information, and since I could only work with what I had, delimiting has been essential for the quality of the outcome and my final result.

BOUNDARIES


CONTEXT
>Local
>Broader
THE SITE
>Small scale
>Several phases
SUSTAINABILITY
>Social
>Ecological
>Economic

METHOD

DISCOVER 1

- DEFINE THE PROBLEM
- LEARN ABOUT STAKEHOLDERS
- DISCOVER GOALS AND NEEDS
- HOW IS IT DONE NOW?
- WHAT IS WANTED?
- IS THERE ALREADY OTHER EXISTING SOLUTIONS?
- DO RESEARCH
- GATHER INSPIRATION

ANALYSE & COLLECT 2

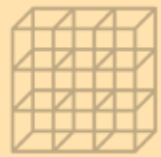
- TELL STORIES
- FRAME OPPORTUNITIES
- COLLECT MATERIAL

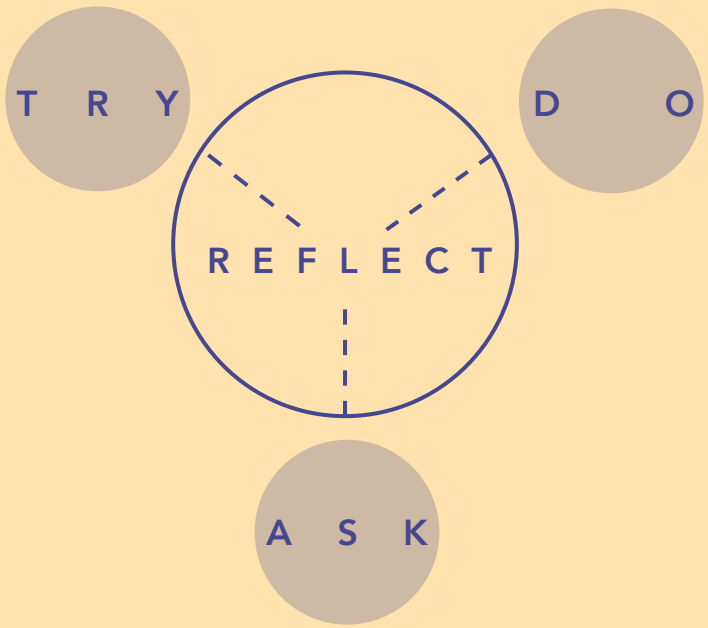
IDEATE & CONCEPTUALIZE 3

- GENERATE LOTS OF IDEAS
- ANALYSE & REFINE IDEAS
- GRASP ISSUES AND POTENTIAL SOLUTIONS

EXPERIMENT & DESIGN PROPOSAL 4

- PRODUCE SOMETHING TANGIBLE
- MAKE PROTOTYPES
- IDENTIFY CHALLENGES
- PRODUCE





EVALUATE 5

- GET FEEDBACK
- DISCOVER PROBLEMS
- IMPROVE YOUR DESIGN
- DETERMINE NEXT STEPS

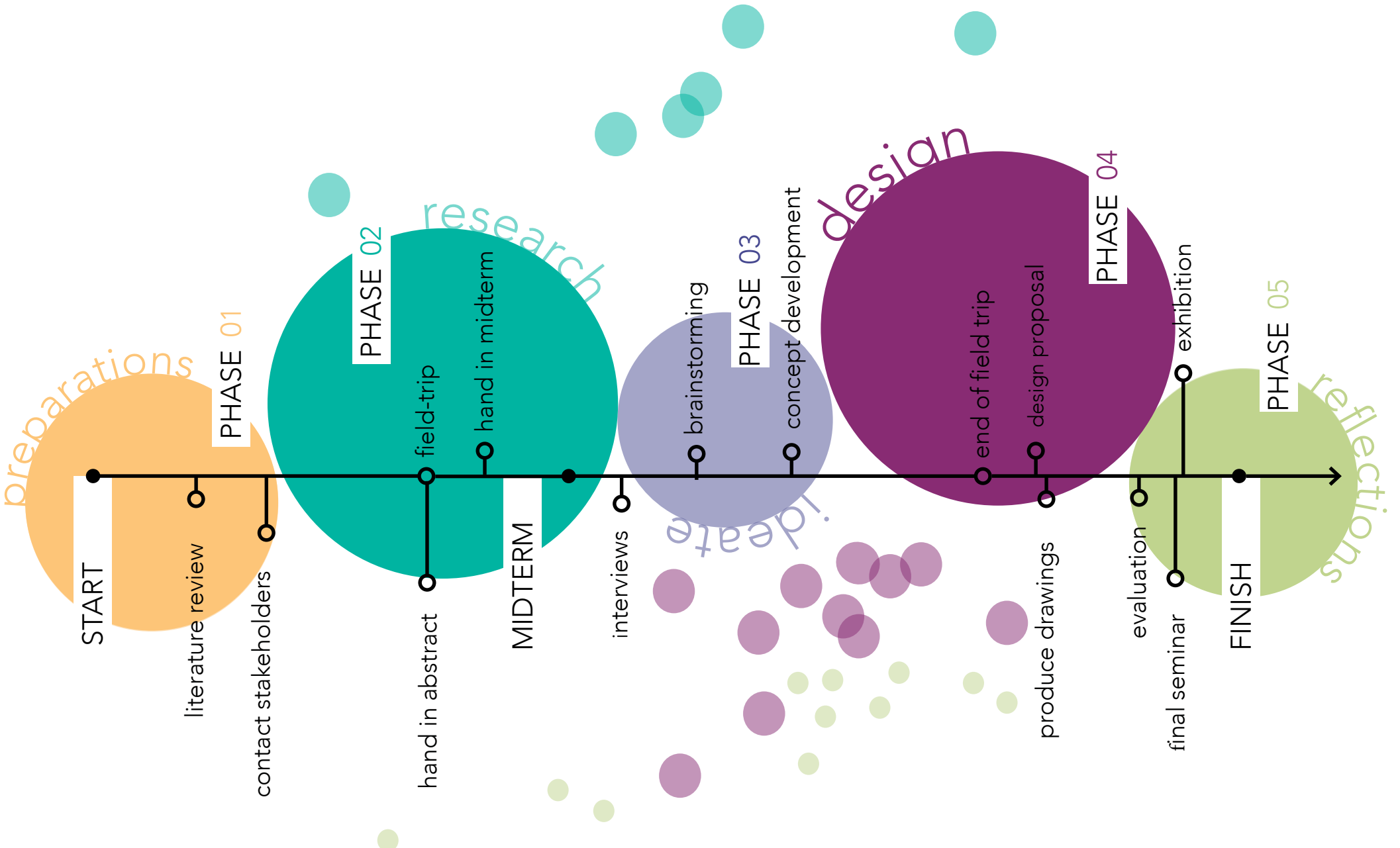
THE FIVE STEPS OF THE CREATIVE PROCESS

The project is made in six phases; **first** identifying the gap and understanding the problem. What makes this context particular and very complex is the quantity of urgent issues. What do the people actually need? What do they need in a long-term perspective? What is the responsibility of an architect? It is important to get a wholesome understanding of the problem and thereby framing the question and the context of the thesis.

To get a broader understanding of the background, local context and develop a design that is based on real community needs, a seven weeks field study in Dunga, Kisumu county, Kenya is made.

Step **two** is to collect material and analyse the subject and site. The analysis starts with visiting and mapping the area, the existing activities and relations between the different activities needs to be mapped out and a swot analysis needs to be done. The aim is to understand the users and their needs. In the interview part I will meet, interview and discuss with different people from different fields and occupations to get a wider and profound understanding of the system as well as people responsible at the site, stakeholders and inhabitants. Together with literature studies and tutorial discussions, I will build up a base for the design process and finishing discussion in Sweden. It's especially important in this situation to involve the inhabitants during the whole process. Through the analyse, the idea and the concept are developed, which functions as frame for the design proposal. That is the **third** step. In phase **four** I will experiment and come up with a tangible design proposal. Along the process, it is necessary to stop and reflect, take a step backwards to get distance, think forward and remember the aim. Interacting with the locals and participatory conceptual design will be an important part. Phase **five** is the evaluation, and from there I will continue to produce the final material. The approach I've decided to use is "research for design", which means that the research is used as frame for the design proposal. Most of the design work will be done in Sweden and in Kenya the focus will be on the contextual understanding and meeting with stakeholders.

PROJECT TIME-LINE



SUMMARY PRE-STUDY

This first chapter contains the framework for the thesis. It is a base that describes the aim, research questions, delimitations and method. It also contains a project time-line and a diagram of the creative process. The introduction provides the reader with a quick understanding of the thesis; it's structure and the process. In the beginning of each chapter the reader is introduced to the chapter and in the end the reader can find a summary of the chapter.

The thesis focus is the environmental and social aspect in a developing country context, with emphasis on and improving public space in a sustainable way. A field study in Kisumu and Dunga, which is the project site, was made to create a better base for the research. The framework and particularly the time-line, research questions and aim have been something to look back on every once in a while in order to not loose focus on the theme and to easier follow the line of argument.

02

PRE-STUDY

The pre-study is meant to give a basic knowledge about the location. It describes the local context and conditions in Kenya, Kisumu and the chosen project site: Dunga. The reader will be presented a brief summary of history, geography and economy as well as demography. It also contains a description of current issues. In addition the pre-study describes how the different areas have developed and grown through time.

CONTEXT KENYA

Fig.4: Mount Kenya (mpala.org, 2009)

AFRICA

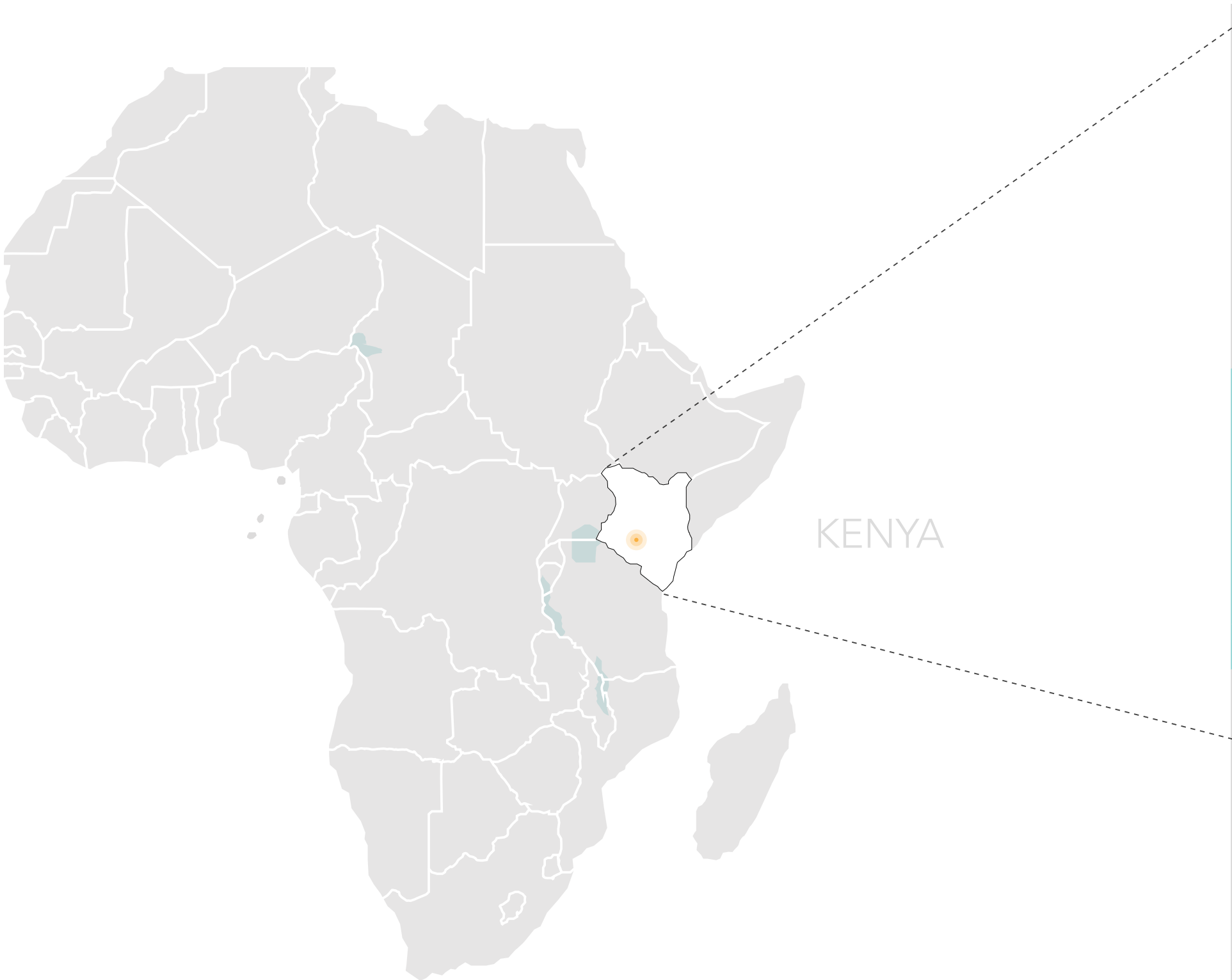


Fig.5: Africa

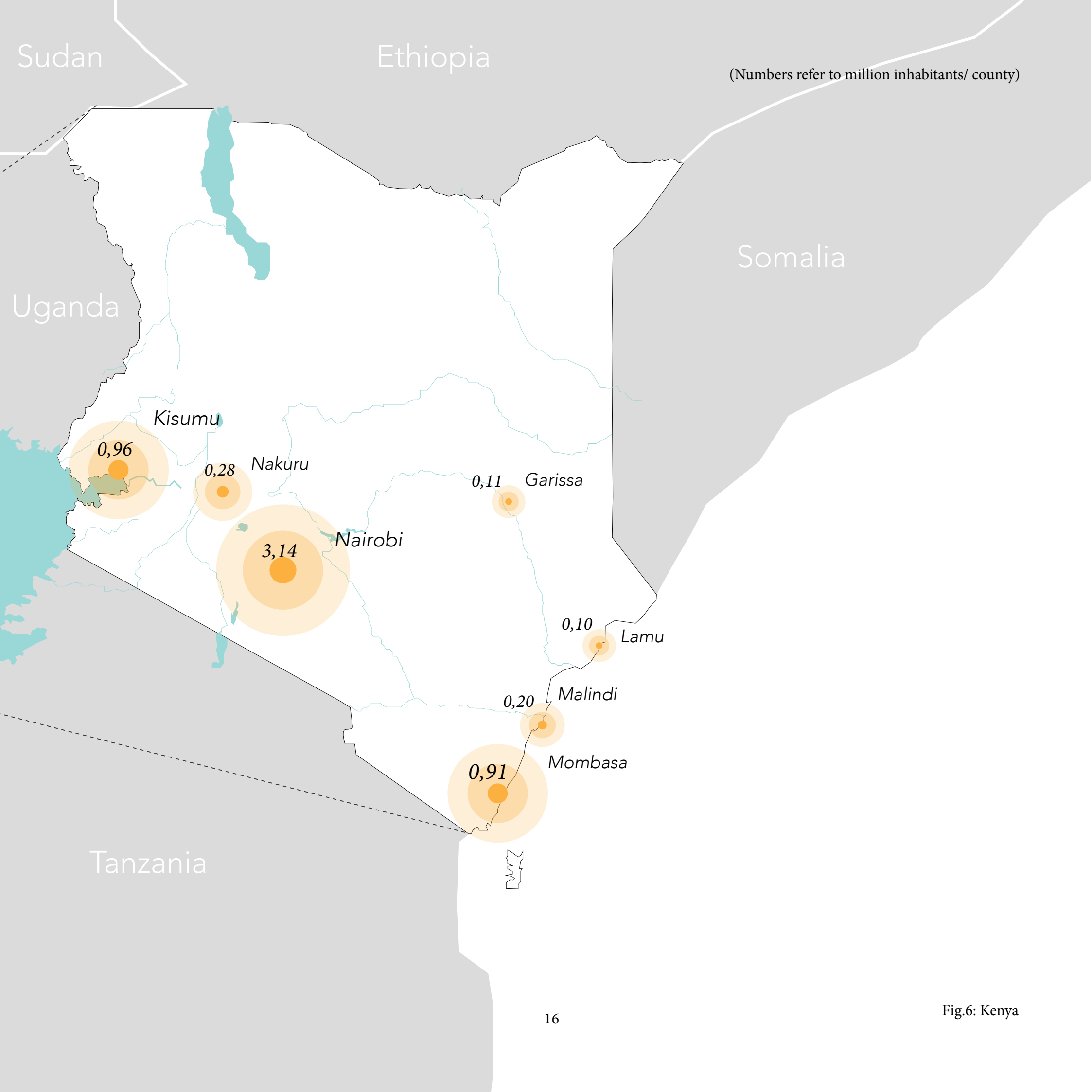

Sudan
Ethiopia
(Numbers refer to million inhabitants/ county)
Somalia
Uganda
Kisumu
0,96
0,28
Nakuru
0,11
Garissa
3,14
Nairobi
0,10
Lamu
0,20
Malindi
0,91
Mombasa
Tanzania

Fig.6: Kenya

ABOUT KENYA

HISTORY

The hunter-gatherers were the first people to inhabit Kenya, but about 800 AC the Arabs that later came to create the Swahili culture came to Kenya. In 1498 Vasco Da Gama sailed to Kenya, and the Portuguese controlled the country for two centuries. In the year 1885, the European governments split Africa amongst them, and Kenya became governed by the British. The Africans resented the treatment and wanted to fight for their rights and therefore established the East African Association. A state of emergency was affirmed in 1952 and 1963 Kenya became independent,x and Jomo Kenyatta became the first president in 1964. Today Uhuru Kenyatta rules the country (kenyaembassy, n.d; Lambert, 2016; Wikipedia, 2016a).

GEOGRAPHY

Kenya is situated on Africa's east coast and has the Indian Ocean on the south-east, Lake Victoria on the west and border with Tanzania, Ethiopia, South Sudan and Uganda. Kenya has a rich flora and fauna. The Kakamega rainforest is the home of approximately 380 plants and 367 birds, of which nine birds and nine orchids cannot be found anywhere else on the planet. Kenya's natural assets include gold, limestone, and hydro-power (IIASA, 2000).

DEMOGRAPHY

Kenya is a dense country with 46 million inhabitants (The World Bank, 2015a) and a density of 81 people / km2 in 2015 (The World Bank, 2015b). There are 67 languages, the main languages are Swahili and English (ethnologue, n.d.). Today Kenya has 553,912 refugees mostly from Somalia and South Sudan (UNHCR, 2015). Asians have also migrated to Kenya since the construction of the Uganda railway and today there are 100.000 Kenyan Asians playing representing a big part of the economy (CNN, 2014).

ECONOMY

The currency in Kenya is the Kenyan Shilling. The economy is market-based. The economy is not strong since it is diminished by high corruption (Wikipedia, 2016b). Kenya is considered the 25th highest corrupt country in 2014 (Transperency, 2016). Another reason for the weak economy are the low prices on exported and imported goods. Kenya is traditionally an agricultural country (including forestry and fisheries) and it employs almost 75% of the labour force (FAO, 2006 pp. XII, 41). This though only 10,2% of the total land area is arable, meaning it has sufficient fertility and rainfall to be farmed. (Worldbank, 2015c) Agriculture, manufacturing and tourism being the main source of income in Kenya, makes the country vulnerable to international economic fluctuations. After years of economical growth in the 2000nds the economy started to decline due to the international financial crisis and the turbulences during the election in 2007. Population growth has been exceeding economic growth for years and a longer drought period has enforced power rationing and degrading infrastructure. Another consequence has been segregation and limiting possibilities for huge parts of the population to improve their knowledge and skills (Embassy of Kenya, 2015).

LIVELIHOODS

A livelihood is a way of making a living. It enables people to secure their basic needs, such as shelter, food and water. Participating in livelihood activities includes gaining the knowledge, skills, social network, raw materials and other resources to meet individual needs on a sustainable basis. A sustainable livelihood is a livelihood that improves people's well-being without damaging the natural environment or ecosystem services and helps people to handle and recover from shocks and stresses (natural disasters and economic conflicts.) (SIDA, 2001, pp. 6-10) Kenyan livelihoods are dominated by agriculture, tourism and manufacturing. (researchictafrica, 2007, p. X)

In the gathering of this information for the diagrams Tourism was not included as a separate category, but divided into the other categories. Tourism does, of course contribute to the GDP with about 4,8 % in 2013 and is predicted to rise to 5,2% until 2024. (WTTC, 2014, p. 1)

Fig.7: Housing in Dunga

KENYA - *In relation to Sweden*

KENYA

Size	582 650 km²
Population	44,86 million
Population growth	2.7%
Population density	66,27 pers/km²
Life expectancy	61 years
Mean years of schooling	6,3 years
Expected years of schooling	11 years
Gross national income per capita (GNI)	$ 1,160
Population living below the poverty line	45,9%
Rural population with access to water	55%
CO^2 emissions (metric tons /capita)	0,3%
Footprint	1.11 GHA/pers

SWEDEN

Size	449,964 km2
Population	9, 55 million
Population growth	0,75%
Population density	22.85 pers/km2
Life expectancy	82 years
Mean years of schooling	11.7 years
Expected years of schooling	16 years
Gross national income per capita (GNI)	$ 61,760
Population living below the poverty line	0%
Rural population with access to water	100%
CO^2 emissions (metric tons / capita)	5,6%
Footprint	5.88 GHA/pers

(The World Bank Group, 2015a; The World Bank Group, 2016c).

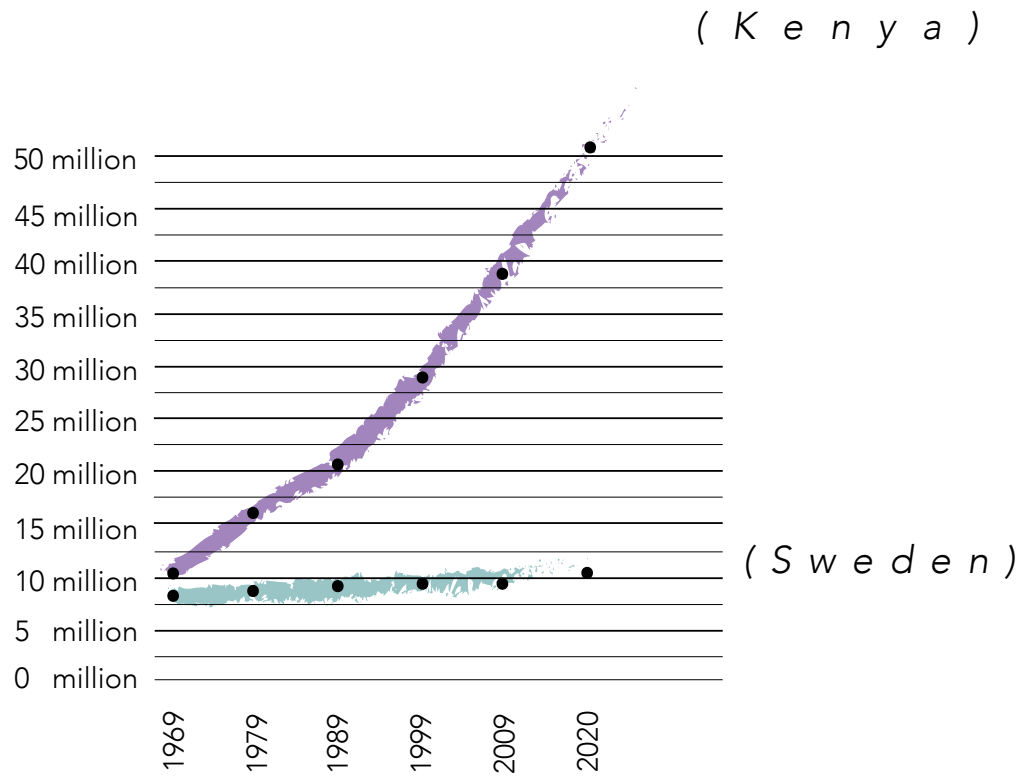


Fig.8: Population growth of Kenya in relation to Sweden (The World Bank Group, 2016a; The World Bank Group, 2016b).

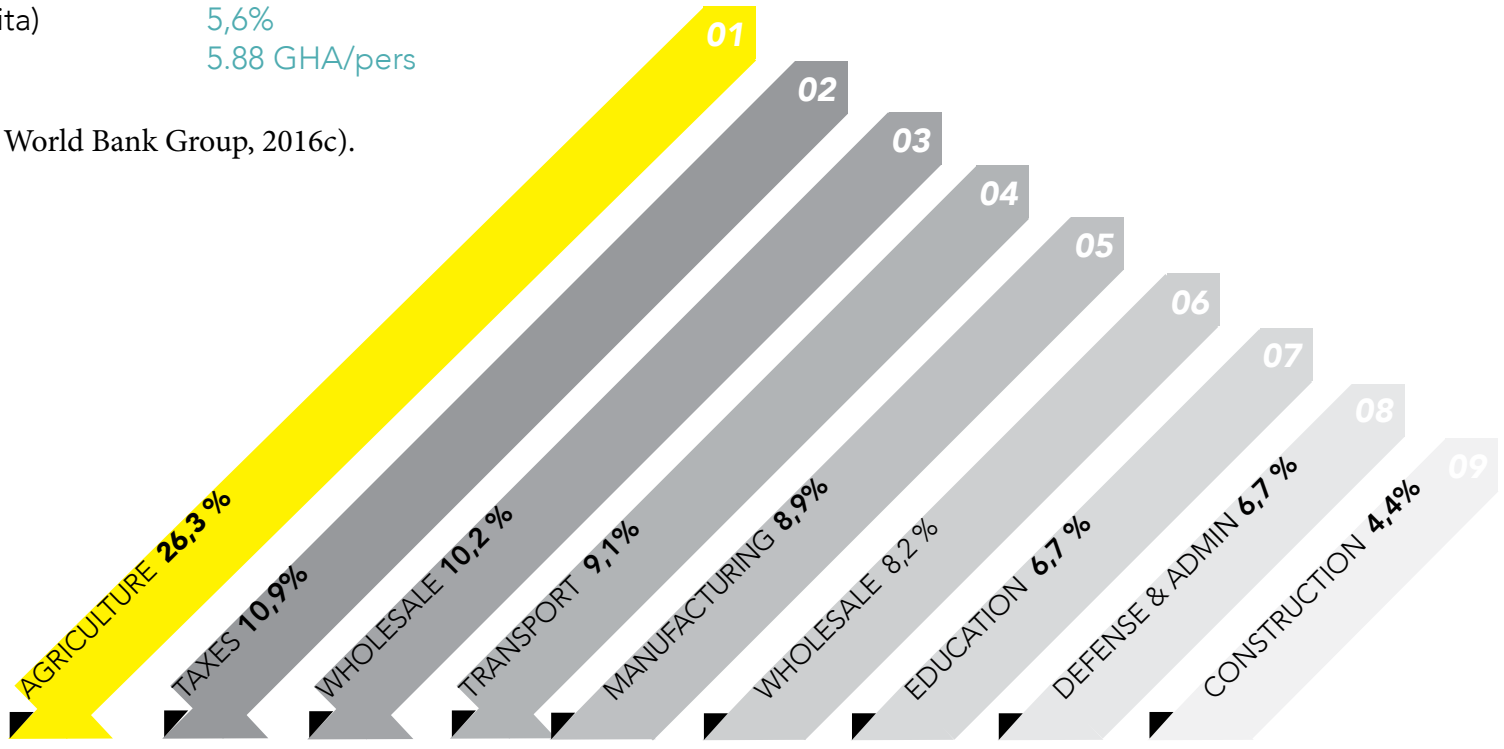


Fig.9: Contribution to GDP by activity in 2013 (Kenya facts and figures, 2014, p. 8)

CONTEXT DUNGA

Fig.12: Dunga fishing-boats

LAKE VICTORIA AND DUNGA BEACH

Lake Victoria is one out of nine lakes in the African Great Lakes region. It is the second largest freshwater lake in the world and the largest tropical lake. The lake has a 4,828 km coastline which belongs to three countries, Kenya, Uganda, and Tanzania. Lake Victoria receives 80% of its water from direct precipitation. The lake has an average depth of 40m and reaches a maximum depth of 84m. Lake Victoria is because of its shallowness, large surface and limited river inflow sensitive to the consequences of climate change. (World Heritage Encyclopedia, 2016)

ENVIRONMENTAL ISSUES

The existence of Nile perch is one explanation to why the ecosystem of Lake Victoria has been damaged, and many species of native fish are near or entirely extinct. Fish die-off is many times Recognised as the first visible sign of environmental stress in an aquatic system. Another cause for fish die-off is the lake's eutrophication (this is how the lake reacts to humans adding artificial or natural substances like detergents, fertilisers or sewage) to an aquatic ecosystem. Lake Victoria's fertility relies on how fast nutrients can be brought into solution. The nutrients that Lake Victoria's rivers bring are not enough in proportion to its size. Much of Lake Victoria's nutrients are stuck in deposits on the lake bed. The cichlid played a crucial part in bringing back detritus and plankton into solution since they feed on off detritus. The cichlid transported nutrients and biomass down to the lake bottom and horizontally through the water, like a recycling system. Scientists believe that the decrease of cichlids is one of the causes of the increase of algal blooms and the cause of fish die-off. Bringing the Nile perch into Lake Victoria the 1950's was done to increase fish catches. This has had substancial consequences since this fish doesn't have any natural enemies, and the natural balance of the lake's ecosystem was therefore disrupted. Now that those fish species (for example the cichlid) have disappeared, the algae are growing at an extreme rate and choking the lake. While algae keep on multiplying, so does the volume of particles of dead plants falling further down towards the bottom of the lake before it decomposes. This decreases the amount of oxygen at the bottom of the lake, making it difficult for fish to exist there and forcing the fish to the narrower depth. This also damages the fishing industry, not only because many native species are extinct but also because the Nile perch, just cause of its weight, damages the fishing-nets. This makes it not cost effective for the smaller fishing industries and they have to leave their work. The Nile perch's food stock decline by every day passing by as well as its population slowly dies, making it unsustainable.

Lake Victoria functions as food and energy supply, drinking water and for watering plants, shelter, transport, and as an archive for human, agricultural and industrial waste. With the populations of the riparian communities growing at rates among the highest in the world, the multiple activities around the lake have increasingly come into conflict. This is one reason that researchers have come to the insight that the lake is environmentally sensitive.

FUTURE LAKE VICTORIA

Collaboration within the fishing industry between Kenya, Tanzania, and Uganda began early in Africa. In 1928 a united authority for regulation and collection of statistics was implemented. All the countries around the lake have prepared a National Environmental Action Plan (NEAP) that address problems like pollution in aquatic systems, biodiversity decline, land, and wetland degradation, deforestation. They recognise that regional cooperation and immediate support is needed for Lake Victoria. Researchers increasingly prompt that working with a regional management framework could save the future of the lake. Furthermore, there is also a SAP (Strategic Action Plan) developed in 1994. Many small-scale projects fall short of realising their potential due to the lack of an organised management in the lake basin.

So what is the future of Lake Victoria? Sida recommends that Lake Victoria programme and Sida should monitor the development closely and try to mitigate negative welfare developments. The program should also facilitate the development of infrastructure projects that integrates impoverished and marginalised regions, as well as facilitate cross-border exchange in the area to establish a regional market economy. (The GEF, 1996)

Fig.10: Exiting Dunga by boda-boda (Larsson, M., 2015)

Fig.11.

Fig.12.

Fig.13.

Fig.14.

Fig.15.

Fig.16.

Fig.17.

Fig.18.

Fig.11: Tilapia fish caught in Lake Victoria by a fisherman in Dunga, 12: Dried fish for sale at a stand in Dunga, 13: Woman rinsing fish at the lakefront in Dunga, 14: A typical meal at a hotel in Dunga (Author: F. Bard, 2014), 15: Fishing-boat docked at the lakefront in Dunga, 16: Fishermen and fishmongers in Dunga (Author: F. Bard, 2014), 17: Fishing-boats in Dunga, 18: Fishermen fishing by the mangrove reeves in the wetland nearby Dunga.

Other recommendations from Sida are social stability, conflict prevention, and peacebuilding as well as additional institutional support; Sida says it should consider extending its capacity building support to EAC beyond its current focus on the Lake Victoria office. Sida also recommends that it should support sustainable development. This could include support to eco-tourism and nature trails within the region and facilitate risk capital to local fishermen and fishermen organisations. (SIDA, 2004, pp. 82-90)

According to an article in BioSience, the resurgence of some indigenous species evident in areas of Lake Victoria has given new hope for the maintenance of biodiversity in the region. It has also created an augmented curiosity of a more careful management that encourage a sustainable fishing industry and conservation of biological diversity. Some also say that excessive fishing of the Nile perch can contribute to increased biodiversity. But it needs to be investigated further. (Bioscience, 2015)

Regarding the people living around the lake, it is not possible to wait for the governments, researchers, fisheries and politicians to do something about it. The main part of the inhabitants economy is already unstable, and it is clear that the lake needs to recover and the resources it provides needs to be handled with care and expertise. The lake can no longer provide a reliable source of income. Awareness and knowledge of the situation, not only among professionals is possibly the first step towards a more sustainable relationship between the lake and its users.

DUNGA

GEOGRAPHY

Dunga is a small rural community situated in the north-eastern region of Lake Victoria, in the core of the African Great Lakes region. Dunga is located close to Nyalenda, only 6km south of Kisumu central business district (CBD) and is a part of the Nanga region. (Dungakenya, 2014) Four main geographical features surround Dunga, the plateaus, the three highlands, the wetlands, and the two most significant plains. The three highlands areas are the Nandi Hills to the northeast with its steep tea plantations, the Riat Hills and Kisian Hills chain to the north. The Kano plains extending to the east, with black cotton soil that is very fertile. The wetlands of Dunga Beach and Nyalenda in the north with very rich flora and fauna. Dunga is part of Kisumu county, where you can find several monad rocks, isolated rock hills or small mountains that rise suddenly from a gently sloping, surrounding plain. Most of them are located north-west of Dunga. You can also see several rock outcrops, the most famous one is Kit Mikayi, about 40 m high, also situated north-west of Dunga. (Nodalis Conseil, ISUD-Plan, Part 1, 2014., p. 24; Wikipedia, 2016c)

CLIMATE

Dunga is situated close to the equator, leading to a hot and humid climate and little annual rainfall of approximately 1200-1300 mm. The rain mainly falls in two seasons, March-May and August-September (Nodalis Conseil, ISUD-Plan, Part 1, 2014., p. 23) The climate in Dunga is very affected by the closeness to Lake Victoria. The humidity is high the whole year, around 80-90 % and dropping in the evening to about 40-50%. The mean annual temperature is around 23 C. There are usually problems with flooding, especially during the rainy seasons (Kisumu City Council, 2012).

DEMOGRAPHY

Kisumu County has a surface of 2,085.9 km2 and has with its 968 900 people almost reached one million inhabitants. This makes Kisumu County the third most populated in Kenya. Dunga has a population of 4500 inhabitants (Dungakenya, 2014). The majority of the people in Dunga belong to the Luo community, one of the largest ethnic tribes in Kenya. The primary language is Dholuo, but many people also speak Kiswahili and English. (Wikipedia, 2016c)

EDUCATION AND EMPLOYMENT

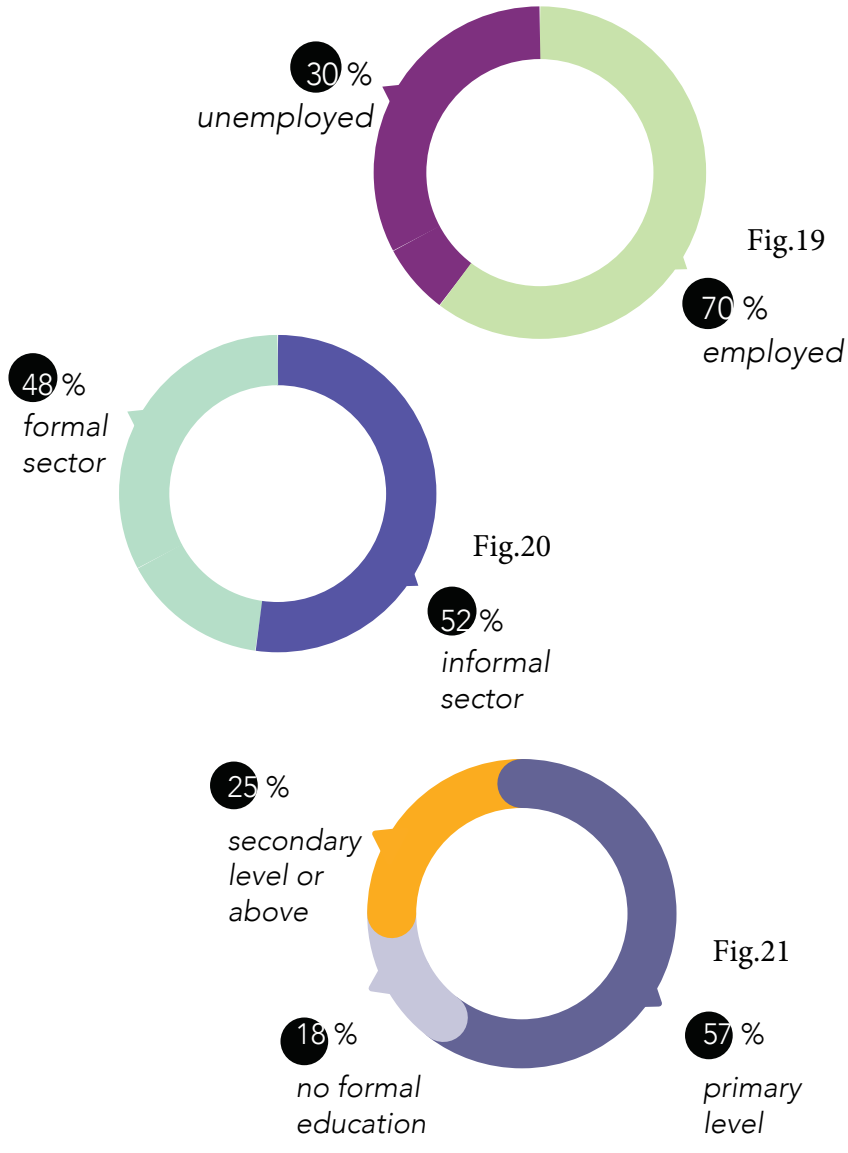


Fig.19

Fig.20

Fig.21

Fig.19: Employment level in Kisumu County 2015, 20: Amount working in the informal sector in Kisumu County 2015 (African Community Development Overseas, n.d. p.9). 21: Educational level in Kisumu County 2013 (Kisumu County, 2013, p. 12)

ECONOMY

The most important industries in Dunga are fishing and small-scale agriculture. People also work within transport and tourism, among other activities. The area hosts production of maize, beans, and sweet potatoes among other things. Dunga's location gives the village a great potential for fishing and fishing industry, but as mentioned before it is threatened by the condition of the lake, with problems such as pollution, water hyacinths, and overfishing. You can also find some backyard industries such as tailoring and boat-building. Tourism is a big part of the economy, and it's expected to grow. The new airport of Kisumu City plays a significant role in this. (Wikipedia, 2016c)

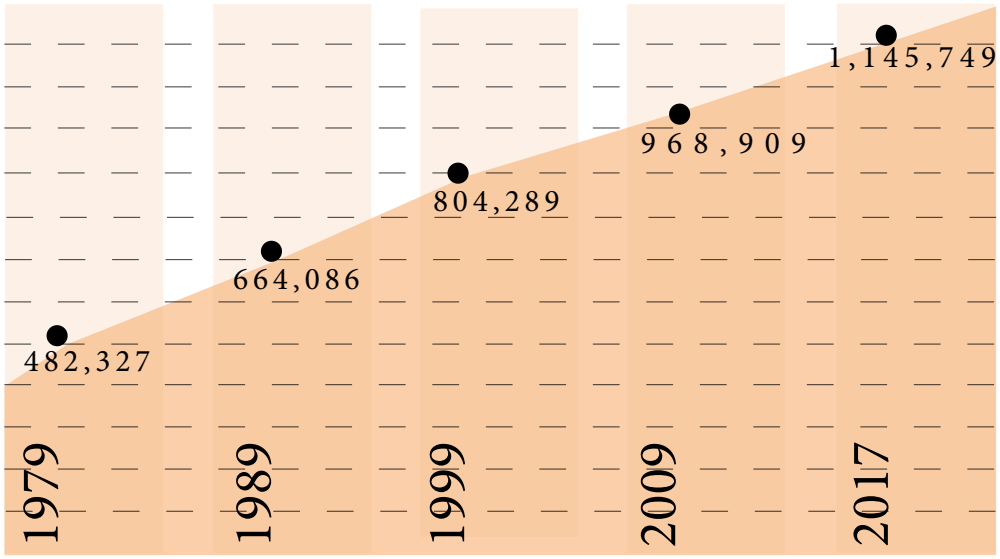
EDUCATION

Dunga has an adult literacy of 48%, which means that less than half of the adult population can read and write (Kisumu City Council, 2004, p.9). This is a quite low in comparison with the national Kenyan average of 85% (UN-Habitat, 2006, p.11). In Dunga, there is one public primary school started in 2010 and one ecology school supported by Eco-Finder Kenya, DECTA, and Dunga Eco Tourism. In Kisumu city, there are 118 public primary schools, 42 public secondary schools and one university (Nodalis Conseil, ISUD-Plan, Part 1, 2014., p.97).

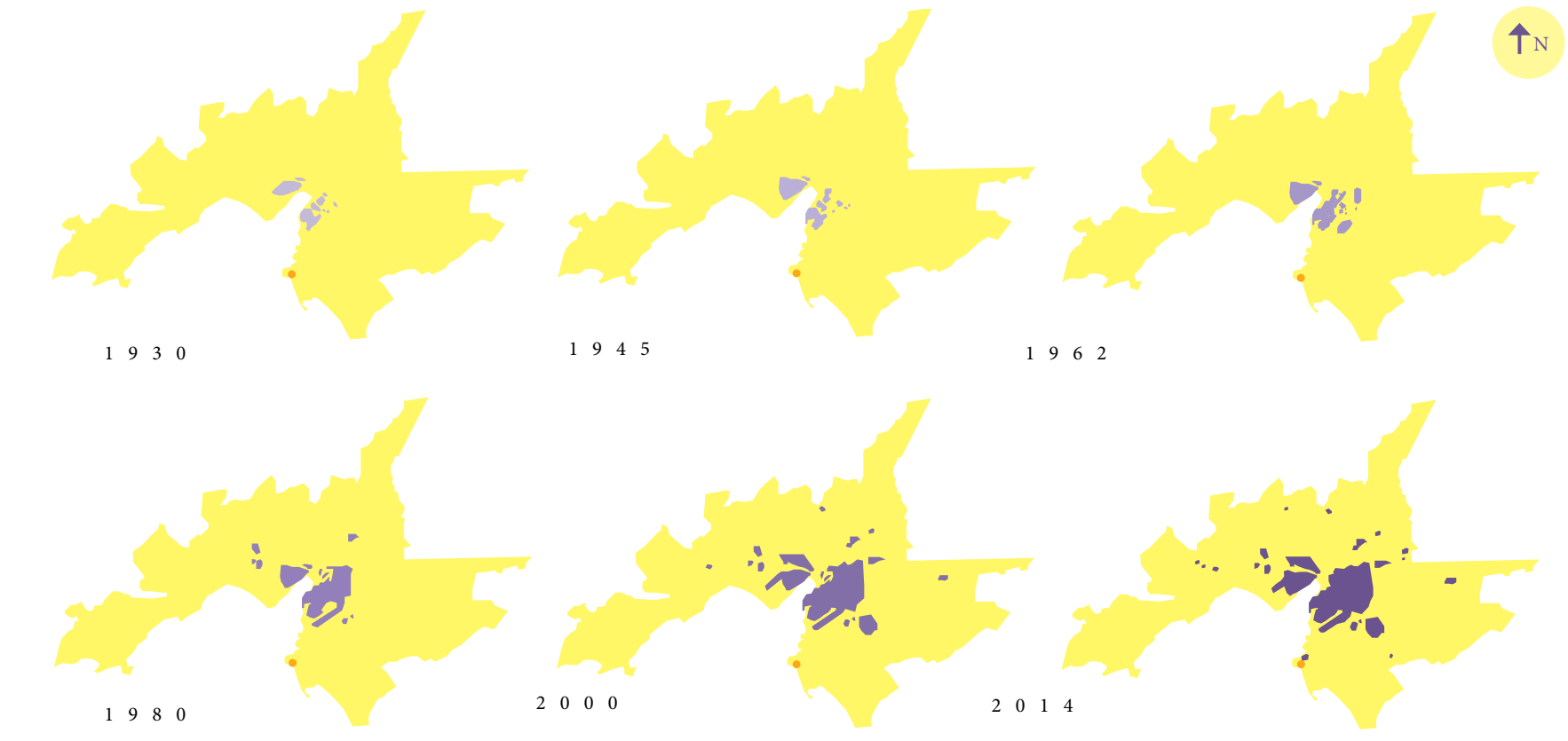
KISUMU COUNTY - GROWTH OVER TIME

The population has grown from 482,300 in 1979 (Nodalis Conseil, 2013) to 968,909 in 2009. The population is estimated to increase to 1,145,800 by 2017 (Population Action International, 2014, p.1).

The annual population growth rate in Kenya lies at 2,6% in 2015. This in comparison with a country like Tanzania at 3,1%. Sweden is as low as 1.1% in 2015 (The World Bank, 2016d). The annual fertility rate in Kisumu county is 4.8 children/ woman in comparison with Kenya in general that has an average at 4,3. children/woman 2014. Sweden was below with 1,9 children /woman in 2013. (The World Bank, 2016e)



(Fig.24: Population growth of Kisumu county, Citypopulation, n.d.)



(Fig. 25: Kisumu city growth over time, Nodalis Conceil, ISUD-Plan, Part 2, 2013, p.7)

SUMMARY BACKGROUND

The pre-study has given the reader a basic knowledge about Kenya and it's location in order to be able to easily follow the analysis, the design proposal and discussion. It describes the local context and conditions. The reader was presented a brief summary of the history, the geography and the economy as well as the demography. It also described current issues and possibilities. In addition, it describes how Kisumu have developed and grown through time.

Kenya is a part of Sub-Saharan Africa and situated between the countries Tanzania, Uganda, Somalia, Sudan and Ethiopia. Kenya has the Indian Ocean to the east and Lake Victoria in the west. Kenya has a rich biodiversity and a very varied landscape with everything from sandy beaches and rainforest to mountains and savannah. The country has Swahili and English as main languages, but within the country, it also exists many tribe-languages. Kenya is a very multicultural country, where both Indians and Chinese have had a lot of influence in the culture and the economy. Kenya also hosts a big number of refugees and has many tourists visiting every year. The density in the country is high, especially in Nairobi, the capital. Even though Kenya is not much bigger to its area than Sweden it hosts almost 4 times as many inhabitants. In Kenya almost 50% live below the poverty line and half of the rural population have no access to water, in comparison to Sweden's 0% in both cases. In 50 years the population in Kenya is estimated to rise with 40 million inhabitants (until 2020) while in Sweden just 2 million.

The unemployment rate in Kenya is high, and in Kisumu county even worse than in many parts of the rest of the country. A majority of the activities are within the informal sector, which can result in an entrepreneurship spirit and engagement to find sources of income amongst people. But can also imply insecurities such as a lack of security-net if unemployed or while sick. Since many people in Kenya rely on agriculture and fishing (75%) as an income and are mostly self-employed they become very dependent on the demand and availability, but also to seasonality. This means that a drought can be devastating. The activities that the locals engage in are often not very sustainable. A high unemployment rate and poverty are known factors to push people to look for the closest solution without reflecting on whether it is sustainable or not.

There is a lack of available education, which results in a low level of knowledge and doubtlessly also affecting the level of environmental awareness. There are several environmental challenges facing Kisumu county and it's surroundings, including Dunga. A majority are caused by human impact. Among them are: flooding, littering, a polluted lake, invasive species in the lake (both animal and vegetation species), overfishing, decreased vegetation and wetlands due to development, no existing sewage system and soil erosion. The solid waste management is poor and the water supply is inadequate.
Kisumu and Dunga are situated on the coast of Lake Victoria and have a history as a place of trade due to its strategic location by the lake and closeness to Uganda and Tanzania. Kisumu is Kenya's third largest city and it is growing fast. The city is mainly expanding in two directions, towards Dunga in the south and towards the east. The main industries are fishing and small-scale agriculture. Tourism is another industry that is expected to grow.

03

THE VOICE OF DUNGA

This section let's the locals voices be heard through interviews, questionnaires and dialogues . It gives the reader an understanding of the ideas and needs that the local community has expressed.

INTERVIEWS AND QUESTIONNAIRES

Fig.26: Fishmonger (Enca, 2014)

SUMMARY OF INTERVIEWS & QUESTIONNAIRES

During my visits to Dunga, I realised that many times it is not as easy as you think to talk to people, to connect, to ask questions. Many times you get an honest answer, but sometimes people embellish the reality. Maybe because no matter how little they have, they are proud of it and don't want to speak about the negative matters.

A few times during my stay in Kenya I decided a time and date for an interview or meeting, and it was cancelled at the last minute, the person didn't show up or show up late (when I already needed to be at the next place). The cultural differences are sometimes bigger than one could imagine. To record someone or take photos of people is of course accepted if you ask first, but many times it made me feel even more like a tourist or out of place. Why do I come there to interview them or take photos of them? What can I do? What do I think I can do? After hearing that people are somewhat tired of workshops and interviews without results attending the Reality Studio meeting, before leaving I thought of ways to incorporate the locals, without interviews or workshops, but this wasn't easy, and would probably have taken a longer time. Getting to know everyone you interview personally would have been another option. But that would also be much more time consuming. The time I didn't have.

During my field studies in Kenya and Kisumu and Dunga I developed questionnaires, that a tour-guide, George Oweke helped me with, presenting me to different people and developing the questions. This was a good way to receive information about opinions since people could write more freely.

Apart from the questionnaires I also went out on the roads of Dunga, to have random more spontaneous conversations and regular dialogues with locals. I found out that many people said that they didn't have any ideas about Dunga or what they would like to improve when they were confronted. It was easier to reach a relevant discussion with a regular dialogue than with direct questions. When they had time to reflect for some minutes they actually had a lot of ideas. The locals were quite consistent about their village. The result is compiled on the next pages.

Many people thought that the beach needs cleaning and that there is no place to leave waste. This is very contradictive because both the locals and the tourists leave a lot of trash on the ground. A lot of people also wanted more shadow or benches/places to sit down without having to pay for something to drink or eat, considering that many people cannot afford that, said one woman. Less parking, more greenery and better accessibility were also common thoughts. The people of Dunga actually did have a lot of ideas and opinions about their village in the end, but don't have the means or time to improve it.

Regular interviews were also done with experts on different matters. Among them; Belinda Nyakina, Silas Maujih and Evance Odhiambo.

Fig.27

Fig.28

Fig.29

Fig.27: Rural landscape, Dunga (Larsson, M., 2015), 28: Tilapia fish caught at Dunga beach, 29: Hairdresser in Dunga

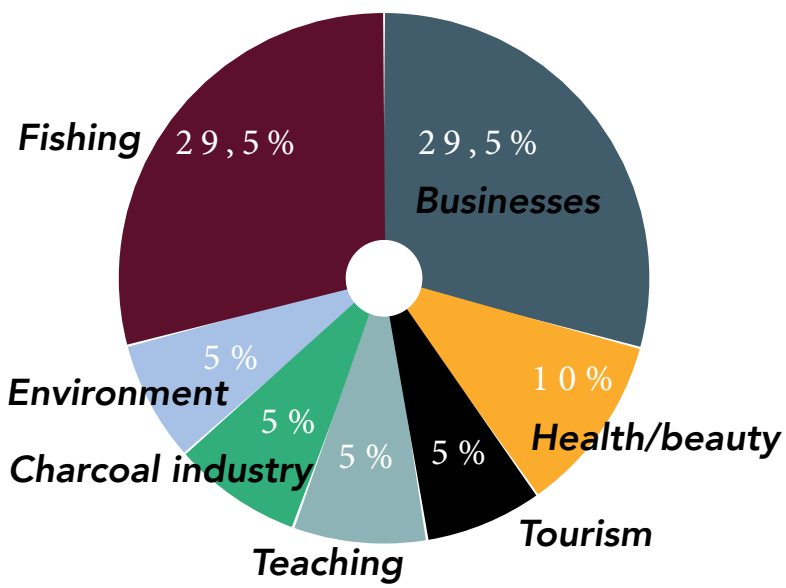
On the following two pages are the results of the questionnaires. The 20 people that participated in the questionnaires were all locals of Dunga or the immeadiate surroundings that all worked and/or lived in Dunga.

AGE:

FUTURE & ECONOMY:

SCHOOL LEVEL:

OCCUPATION:



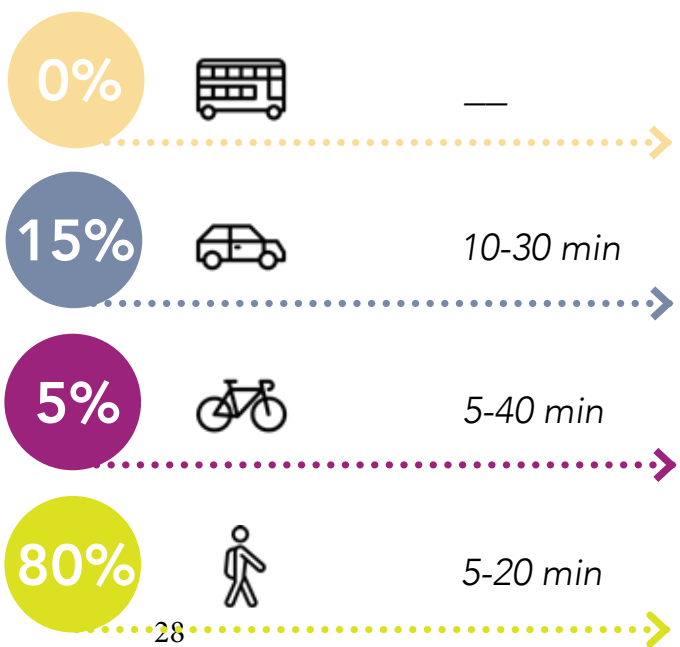
70% WORK MORE THAN 5 DAYS/WEEK

2/3 *WORK MORE THAN 8 HOURS/DAY*

70% *FEEL THAT THEY ARE HAPPY AT WORK AND THAT THEY HAVE ALL THE TOOLS THEY NEED*

... but

90% *FEEL THAT THERE IS ONE OR MORE THINGS THAT NEED TO IMPROVE AT WORK AND THEIR WORKSPACE*

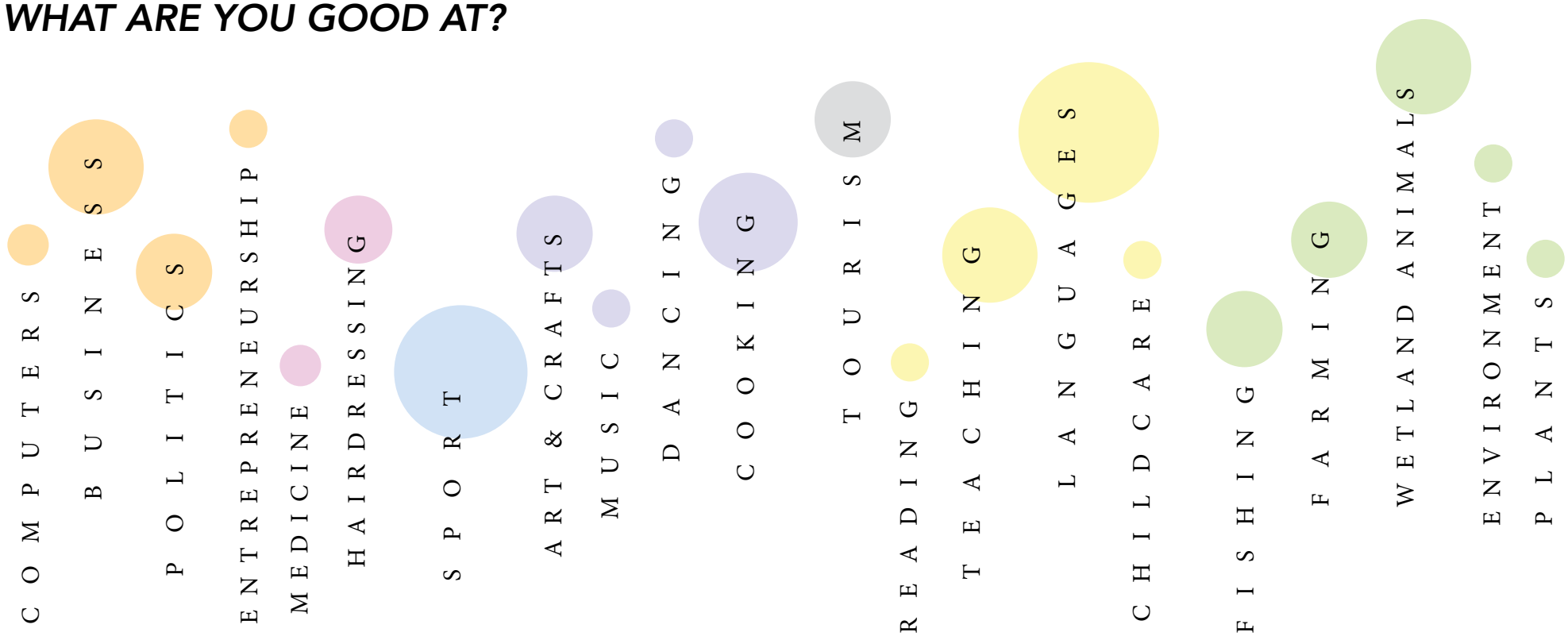


MODE OF TRANSPORT AND TIME SPENT TO GET TO WORK

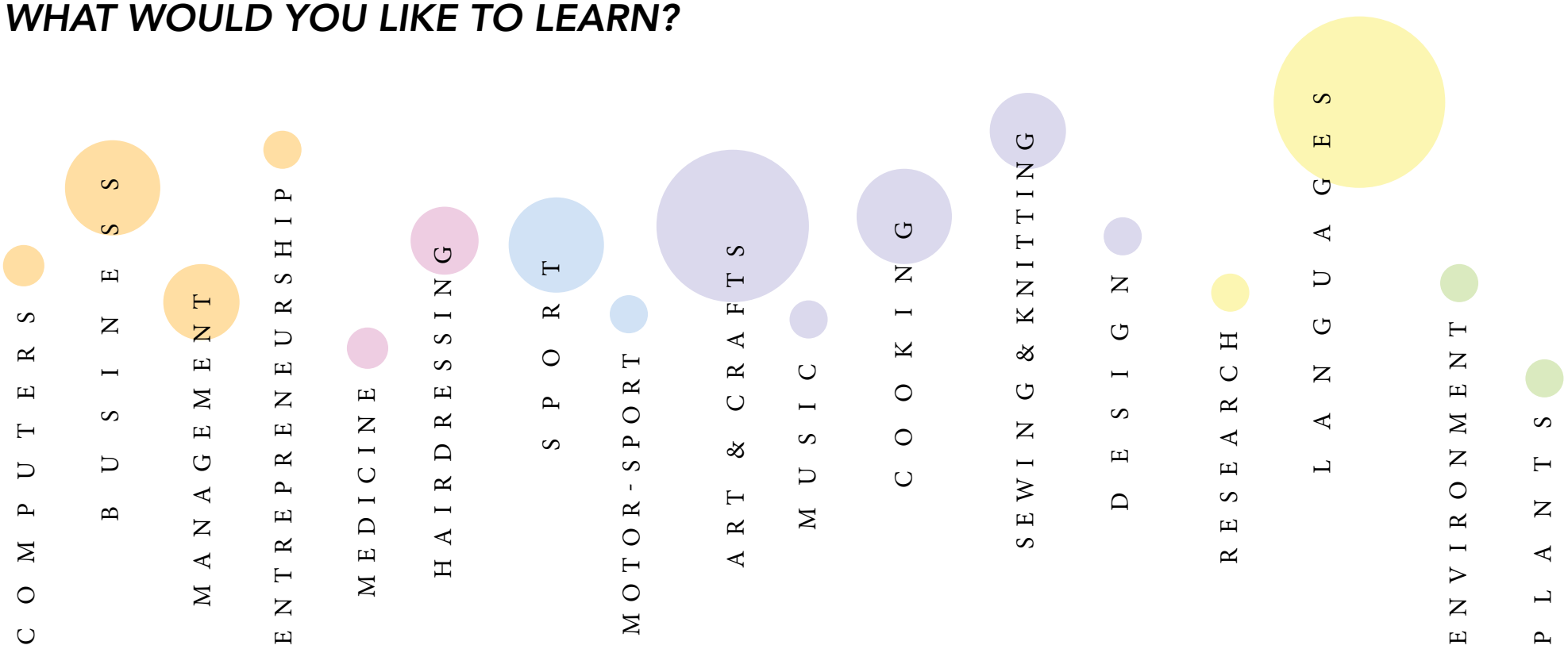
QUESTIONNAIRE ANSWERS FROM LOCALS IN DUNGA

Amount of persons that answered the questionnaires corresponds to size of bubble, where the smallest is between 1-2 persons and the biggest bubble is 8-10 persons.

WHAT ARE YOU GOOD AT?



WHAT WOULD YOU LIKE TO LEARN?



STORIES FROM DUNGA

Fig.30: Dunga road (Amadeo, A., 2015)

STORIES FROM DUNGA

During the process of the analysis, I have used several different methods that completed each other, one of them was regular dialogues with locals. When having dialogues with the locals I would take some notes meanwhile, but also write down a longer recap of my impressions, further questions for next meeting and ideas. Beneath and on the next two pages are some of the comments and the story behind each meeting. Most of the locals I had dialogues with also answered the questionnaires. I had dialogues with more than thirty locals. Some of the dialogues were valuable as a direct base for the analysis and the thesis as a whole, while some of the dialogues were interesting meetings for understanding the culture and added value to my experience of Kenya.

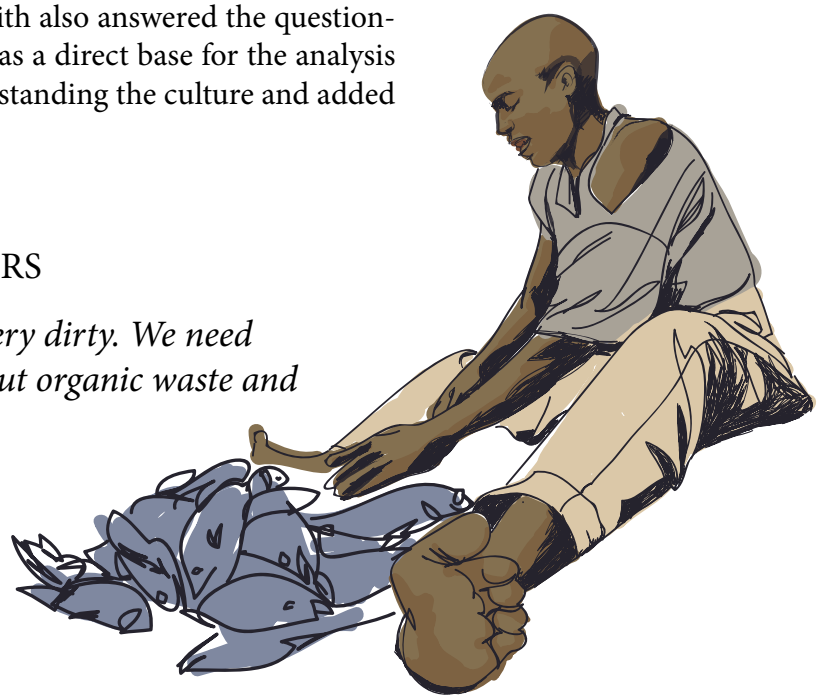
MARY, 23 YEARS

"Maybe a recreational centre or somewhere to just hang out".

When I met Mary and her kid, that both live in Dunga village, I got to know that she comes down to the beach every day to work. She tells me that this makes her forget about the value of living so close to the lake, wetland, the scenic view and vivid atmosphere. She also talks about her working hours and what they do while waiting for the fishermen to arrive: *"We don't have so much time over after work. During the day we have to wait a lot"* I ask her what they do while waiting for the fish. *"We gather here under the tree; there are not so many places to go,"* I ask where and what she´d like to do or be during the time they wait. *"Maybe a recreational centre or somewhere to just hang out"*. It is important to enhance the already existing qualities and develop meeting places and recreational areas where locals can enjoy their village, and it´s assets!

MIKE, 32 YEARS

"The beach is very dirty. We need somewhere to put organic waste and waste papers".



Mike is a shy fisherman (for my experience of Kenyans). He works from early in the morning and comes home late in the evening. He still lives with his mother, but he talks about having a place for himself. His sister and her two kids also live in the same house, and it gets crowded. "*I want to learn more about eco-tourism*", he says, maybe become a tour-guide. But our home is small. *"I have nowhere to sit in silence and read."* When I ask about what he likes about Dunga he instantly replies that the best thing about Dunga is the wetlands and all the different birds you can find there. When asking about what he would like to make better the answer is not coming out so easily, but in the end, he notes *"The beach is dirty. We need somewhere to put organic waste and waste papers"*.

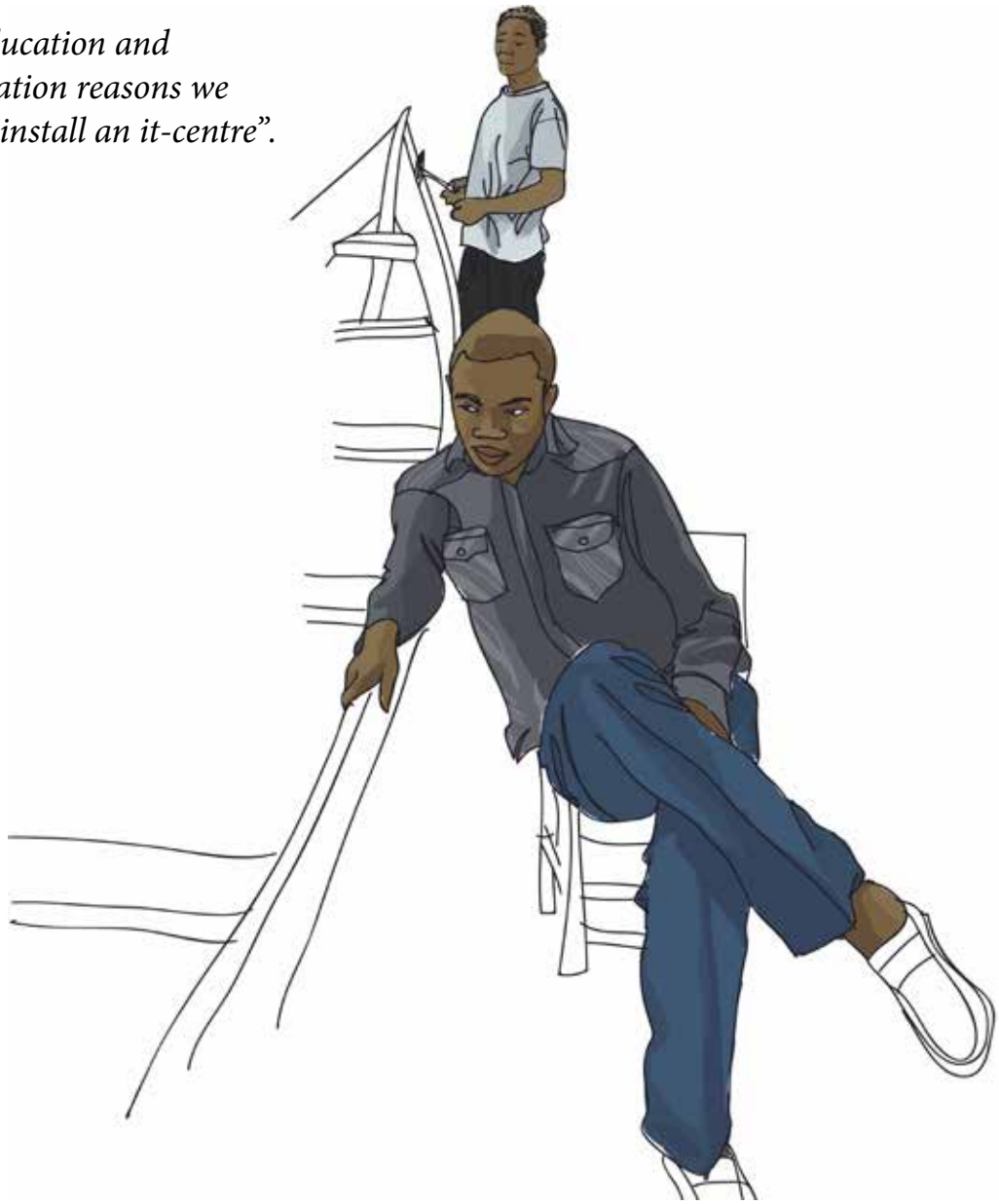
Sitting in front of a kiosk, drinking soda in the heat I meet Atieno, she works with the charcoal that comes from Uganda. I ask about her day, what she does and how it looks. I get to know that the charcoal comes with boat once a day, at 10am. One of the problems they face is that the sun destroys the bags for the charcoal, and they have no storage. The cows also chew on the bags, and then die from the plastic. Both the climate and the sun are hot and during the rainy season it can be very wet, and some parts of the area get flooded. She also tells me about the lack of washrooms. "*It is much needed a public washroom*". It is important to improve the public space, where most of the locals spend their time.

ATIENO, 19 YEARS

"It is much needed a public wash-room".

JOHN AND SUNDAY,
22 & 28 YEARS

"For education and information reasons we should install an it-centre".



While walking with Evance Odhiambo, coordinator at Zingira Community Crafts, up in the residential area of Dunga he presents me to some carpenters that make the typical Kenyan fishing-boats. John and Sunday are both young, and John is just a trainee, while Sunday has been working for several years. The fishing-boats and the boats for visiting the wetlands are both made out of Eucalyptus wood, sometimes Grevellea (silky oak) and one boat is made in ten days. They are two very well skilled carpenters and some trainees, and together they make about four boats/month. One boat costs about 50.000 Kenyan Shilling (4500kr) according to John. Sometimes they also make boats out of the more expensive Mvule tree (also known as African teak). The carpenters work beneath some trees; they have currently no place to meet or store materials or tools. Both John and Sunday think that they need a place to connect to the internet, they want to learn about new techniques and ways to improve their boats. *"For education and information reasons we should install an it-centre,"* John says.

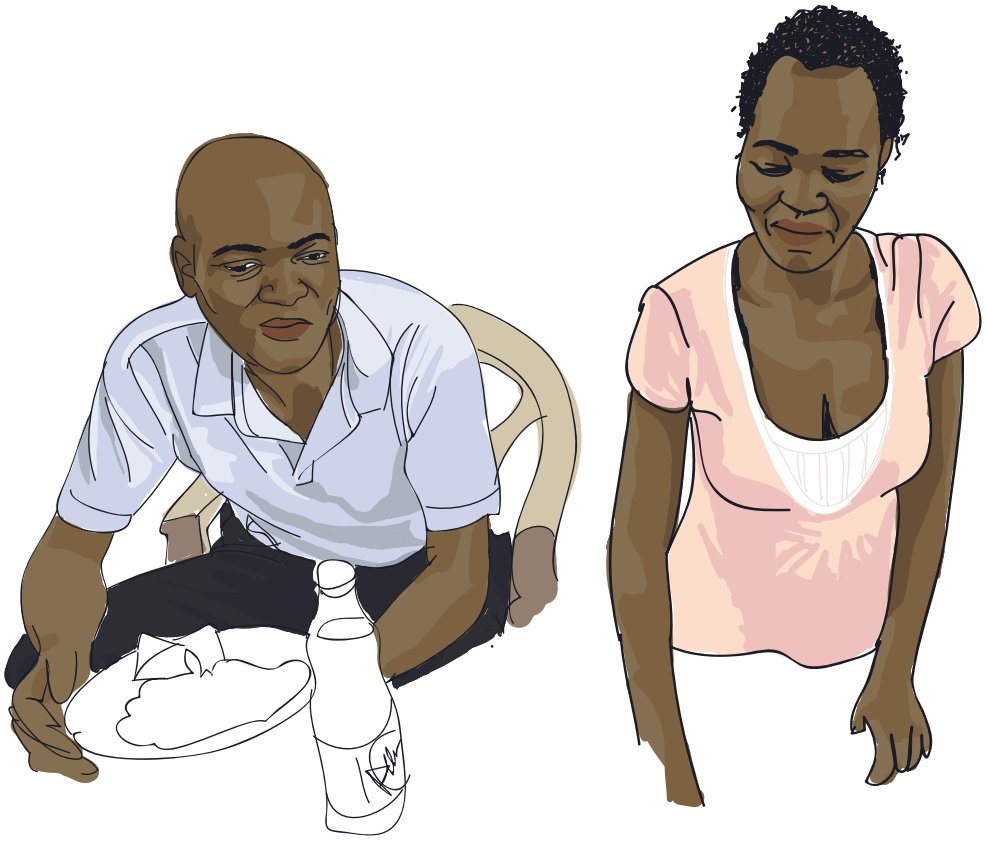
ROSE, 41YEARS

"Shade in form of trees or place to sit with shade, without having to pay a drink or similar".

Rose works as a fishmonger, the thing she likes most about it is talking to her colleagues. She considers it important to have some place to rest or sit even if you don't have money when we talk about what they do during their breaks and what could improve. *"Shade in the form of trees or place to sit with shade, without having to pay a drink or similar".* She tells me that they don't really have breaks anyway, they always have something to do. This though the fish generally comes only twice /day, and they seem to be sitting around a lot. But they are actually having a meeting. Rose also comments on the lack of wells. It's hard work to go every day back and forth with the heavy water to the well. Sometimes they end up using the water from the lake for washing, cooking and drinking. There are some tablets that you can use to clean the water she explains.

JOSEPH AND ANNE,
42 & 39 YEARS

"The need of a place to park outside the area".



Joseph and Anne own a hotel at the beach. Joseph is eating when I pass by, and Anne is wiping off some tables. They have a small "terrace" for their guests. They talk about the cars and buses that park just outside their restaurant. *"The need of a place to park outside the area, this is what is important for us"* says Joseph, when he talks about us, he means all the hoteliers working in Dunga. *"This is the beach, and people are working, eating delicious fish, enjoying the breeze, but the cars are in the way. They park just outside".*

Adhiambo means born in the evening, and it is a typical Luo name for girls. Adhiambo has four kids, and two of them are already grown up. One works as a teacher, and the other one is a fisherman. She, herself has been in primary school, but she'd love to learn to use a sewing machine, maybe start making dresses, just as her husband's sister does. She mentions that it is important to educate the children so that they can go to university and make something out of their lives. *"It's important to educate the children"*. Maybe send them to Nairobi for good education could be a good idea, she mentions but later adds that it is very expensive to travel to Nairobi, so it would be hard.

ADHIAMBO, 48 YEARS

"It's important to educate children".

SUMMARY STORIES FROM DUNGA

In the chapter, the reader heard the locals voices and opinions through interviews, questionnaires and dialogues. It gave the reader an understanding of the ideas and needs that the local community expressed. The chapter provided an important base for the design proposal and discussion.

From questionnaires, interviews and dialogues it is understood that most people in Dunga walk to their job and that the main part of the people working in Dunga lives relatively close by. Since there is no public transport and few people own a car, one possibility for the future could be to promote bicycling, a mode of transport that already is being used vastly in Dunga and in Kisumu. This could be done through improving bicycle lanes, defining and separating the bicycle lanes from motor-driven vehicles lanes in order to improve security, and provide bicycle stands or other safe ways to store your bike.

Few locals in Dunga feel content with their economic situation. Even though the majority of the people in Dunga work a lot, in comparison to what would be recommended for health reasons, the majority have little or no free time. Many of the locals would like to learn new things, in particular languages, arts and crafts, business and management. They also feel that they have a lot to teach and much knowledge that they could share, things that they are good at. There are many possibilities for development in this. The wish to improve and learn is important to achieve change. Since many people have little free time and money and spend much of their time at work, but have a lot of will to learn and share what they know it is important to improve the conditions for learning and sharing, and enhance this quality.

When talking about what the locals would like to add or improve or what is needed in Dunga the things that are mentioned are shadow and places to sit or just hang out, an IT-centre or recreational center. Other things mentioned are the littering and solid waste management, as well as parking space. Another comment is about the cattle and the charcoal bags that are stored on the beach; there is no meeting-point for the charcoal workers or place to store the charcoal. Weather conditions such as the sun and rains that cause flooding, cattle that eats the plastic bags used for the charcoal are problems today. During the dialogues, I found out that there is a lack of places to sit or rest or find shelter from the discomfort of the hot sun, as well as a lack of places for some workers to do part of their job. Things that are important to improve in order to improve public space and to be able to enjoy the little free time they have. Some things that I discovered through the interviews are such that one could never have imagined, and shows the importance of having a dialogue with the locals. Since some structures and buildings that are unused, there is a possibility that these could be used more efficiently.

04

ANALYSIS

This part includes a site-, spatial-, character- and SWOT-analysis. The context of Dunga is described, as well as the challenges, problems, visions, functions and uses, the stakeholders, observations, movement, access and mental barriers.

ANALYSIS

Fig.31: Kenyan kids (Ganeys.com, 2014)

Fig.32: View over Dunga (Google maps, 2015)

IDENTITY AND CHARACTER OF DUNGA

The surroundings of Dunga are believed to be some of the oldest settlements in Kenya and has become an important area for African trade, especially Dunga's neighbouring city; Kisumu. It's an informal settlement with rural character and history of being a fishing village. The name Dunga comes from Luo and means "A place of deep waters." Dunga is known for its abundant wetlands and the strategic location just by Lake Victoria and closeness to Kisumu city. (Kraff and Jernsand, 2013, p.8)

In the latest century, Kisumu city has expanded a lot (see fig.25), and Dunga is one of the rural communities that faces the possible consequences of the expansion of Kisumu, which now have grown more than triple its area since 1930. If Kisumu keeps growing and the population keeps rising Dunga will soon become a part of the city. This rapid development threatens both Dunga and other rural communities and fishing villages in the region to be moved or pushed away. It also threatens their genuine identity and rural character. If a growing Kisumu starts to infiltrate Dunga, this might lead to gentrification and Dunga might lose its characteristic valuable features it has today. The poorly controlled expansion of Kisumu could result in people inhabiting ecologically vulnerable areas where fish breed or animals habit, such as the wetlands. Another threat might be the pressure on natural resources, such as vegetation and animal life.

The main livelihood in Dunga is fishing, which is a job for men, women commonly rinse and fillet the fish. Some fish are sold in Dunga, directly at the beach, and some are taken to Kisumu by the fishmongers and being sold there at the market. The fishermen mainly catch Nile Tilapia, Nile Perch, and Omena, also commonly called Dagaa. (LVFO, n.d.) Many people also work in small-scale agriculture, tourism, wholesale, tailoring and other family businesses. (Wikipedia, 2016c)

ROADS AND PARKING

The road to Dunga is made of the typical red dusty soil and is quite bumpy. This makes it difficult to access Dunga by tuk-tuk or car. Boda-boda or bicycle is also a quite bumpy ride to get to the village but more common. There is no "real" public transport, even if the matatu is a kind of bus that works as public transport, but is privately owned, and does currently not stop in Dunga. The road is maintained now and then but does not improve, keeping the same standard over time. Heavy school buses driving on the road every day wears the road down, and the low standard makes it hard for people to travel to and from town. According to Eva Maria Jernsand and Helena Kraff in their study of Dunga only small quantities of fish can be brought at a time to the market, since the only possible means of transport for fishmongers is on motorbikes. The roads in Dunga are in general quite narrow and many of them could rather be considered small paths than roads. The roads many times get flooded during the rains, and it can become muddy and hard to move around the area. The entrance to the village is not well defined and easy to miss. Private buses and boda-bodas do generally not stop by the entrance but drive all the way down to the beach area and many times drop you off by the BMU. This makes it hard to keep track of the amount of visitors, and the visitor misses the entrance (which normally would be the first impression) and therefore also an essential overview and understanding of the structure of the village. There's no real parking area, and today the vehicles park directly on the beach. This is a problem, and it has been mentioned before in previous reports from students at Chalmers in the Reality Studio course as well as in a workshop with the local community held by PhD students Helena Kraff and Eva Maria Jernsand. Many locals would prefer that the parking was situated at the entrance.

CHARACTER

The village can be divided into two parts, Dunga village, and Dunga beach. Dunga has a rural feeling and is surrounded by green areas and wetlands. The central part have no bars or "hotels", but if you are lucky you can find a vegetable stand along the road. Dunga beach is more touristic than Dunga village, with hotels, bars, and other commercial activities. It's also considered to be more scenic with its fishing boats, birds, and various plants. For a Swedish student like me the less touristic village ambience, with hens and goats walking around and the genuine houses made out of mud and straw feels so much more charming. It is also the part that seems to be taken care of best. Dunga beach has many qualities, but plastics are to be found in many shrubs, and an empty milk cartoon was eaten by a cow just by the entrance the first day I visited. The locals have pride and a strong connection to the lake, and this seems to origin from its history as a fishing village. Many people see the lake and beach as an opportunity for recreation with its breeze and green surroundings. Others find the possibility for education on site, learning from and about the rich nature. A common thought is that Dunga is a unique place and very authentic and calm. What stroke me the most was the difference between the calmness, harmony and closeness to nature that you feel while on a boat on the lake in comparison to the busy, active beach area, with all the people, hens, cows and goats and their noises.

Fig.33: Hawkers in the shadow under a tree at Dunga beach

My first impression of the lake and the beach was not similar to what I had read; that it was a green lake and that you could hardly see the water. Maybe my first impression was different because I was there at a good time of the year. The problems with water hyacinth are said to fluctuate and are sometimes bigger and at times not so noticeable. One of the first things I thought about was the immense size of the lake and how calm it was. During my visits, I didn't experience big waves or the wind. Of course, when it rained or was really awful weather I stayed at home. What I am used to is that lakesides often are windy, just like the oceans are. But Lake Victoria was calm, almost sleepy. On the first trip with a boat on the lake, guided by George from Dunga, we saw a variety of plants, birds, and hippos. I got the perception that the guides seem very knowledgeable and have a lot of stories to tell about the animals and the plants, their characteristics and history. As a visitor and in particular a first-time visitor, you get the image that there is a lot of activities going on in Dunga, and they first seem very disorganised. But after a while you get an understanding that they are quite organised, there is an organisation that maybe not is so easy to see to an untrained eye.

BUILT ENVIRONMENT

The buildings are of small scale, especially in the part that is residential. All buildings are between one-two stories, though the main part is one story. The houses seldom have a clearly defined limit between different owners backyards or gardens. The semi-public spaces seem to be dominant. Outdoor public space is also ubiquitous, like roads, market places, unplanned green areas such as grassy hills or forest-like areas and wetlands. People spend a lot of the day outside, which could perhaps affect the treatment of the outdoor space. This is perhaps because of the climate, perhaps because of the small indoor space.

The main part of the buildings have a rural character with walls made of clay and wood, then plastered with clay mixed with cow dung. The roof is made out of straw. Other materials used for building is concrete, corrugated iron, rammed earth, brick, stone, bamboo, papyrus and steel.

There seem to be no rules applied to how buildings should look, what materials should be used, how it should be constructed or function. This is probably because Dunga is an informal settlement. It is hard to know whether buildings are temporary or permanent. Some buildings are unfinished or abandoned. Several places seem unused or are temporarily used for dumping trash. See map of unused places on page 54, fig. 48. There is no physical planning in Dunga and no urban furniture nor planned recreational space. The most "commercial area" seem to have been developed rapidly and is both crowded and somewhat chaotic. The access from the entrance and along the main road and down to the water is unclear due to the existing building in the middle of the road blocking the view. The village is surrounded by beautiful green wetlands. In the north-west, the residential area of Dunga stretches out and will at one point merge with the neighbourhood of Nyalenda. The area is not accessible for physically challenged people. Roads are bumpy, and the solution to a change in height is usually stairs. Light as a guidance doesn't exist, the only light at night is coming from inside the buildings.

WATER AND WASTE MANAGEMENT

Water and waste management is poor. There are bins, and some of them have a separate system for plastic and paper, but they are all used as regular bins. There are plastic bags everywhere, as well as parts of buildings such as metal, cardboard, plastic pieces etcetera, that have been left at the construction site or the surrounding area. You hardly see any organic waste left in public places except for in the markets or at the beach area where some of the uneatable parts of fish and plants are left on the ground. There is no sewage system, and latrine pits are drained directly into the lake.

ORGANISATIONS AND COLLABORATIONS

One thing that seems characteristic for Dunga (and also for Kisumu and its surroundings) is all the small and big organisations. Two of the most known being Osienala and Eco-finder. Eco-finder collabourates with Bike Ventures, which is located in Kisumu and organises bike day-trips where one destination is Dunga. Eco-finder is a community-based organisation that focuses on education and wetland conservation. Eco-finder also has an Eco-tourism business in cooperation with the local community. In the western part of the village, you can find the organisation Osienala. Osienala consists of three buildings and is surrounded by a wall, which makes it quite inaccessible to the public. Osienala is a non-governmental organisation funded by various other organisations and partly community driven. It also hosts a local radio station. Osienala is focused on environmental issues around the lake. Unfortunately, the two does not collabourate, but according to Kraff and Jernsand, compete with each other for visitors. Other organisations that operate in Dunga are Nema, Umbrella group Organic Farmers, and the Beach Management Unit among others. (Eco-finder Kenya, 2010; Osienala, 2015; Kraff and Jernsand, 2013, p.19) Future Collaborations between organisations and stakeholders could strengthen and enhance the economy, the vulnerable wetlands, the identity and character of the village among other things. When many actors go together, it is normally easier to reach the goal.

Fig.34: Livestock in Dunga village (Bard, F., 2015)


(Fig.35)


(Fig.36)

(Fig.35: Wetlands just outside of Dunga, 36: Fishing-boat being built, 37: Boat and fisherman at the lakefront in Dunga (Larsson, M., 2015), 38: Sinage Dunga, 39: Charcoal-workers and Bags of charcoal on the beach in Dunga)


(Fig.37)

(Fig.38)


(Fig.39)

ECO-TOURISM DEVELOPMENT

Dunga is supposed to be developed as an eco-tourism site. From where does this decision come? And how did the idea emerge? Since many visitors come to Dunga for recreational purpose or for educational reasons, to learn about the wetlands and the lake, and since the wetlands of Dunga is habitat to some rare species, Dunga could be seen as the perfect eco-tourism destination. But this is not at all as natural as it might seem. Dunga does not have a sustainable way to take care of much of their waste, of their sewage and many people cut the papyrus that grows in the wetlands to use it as fuel for cooking. During a visit to Dunga a guide that called himself an eco-tourism guide talked about the importance of preserving the wetlands and in the next moment, he threw the plastic wrap of the candy he was chewing on in the lake. This is contradictory. To develop Dunga as an eco-tourism site sustainable strategies and principles should be developed and followed as much as possible while developing the village further. It is essential to promote education and awareness as well as ways to make for example recycling "fun". It is also important to stress the emphasis of understanding not only that it is important with sustainability, but why.

Fig.40: Ovens for drying fish at Dunga Beach

It's not obvious where the idea and decision to make Dunga an eco-tourism site comes from, but some different initiatives exist. One is *"Eco-tourism with a focus on Climate Change, Environment and Poverty Alleviation for Sustainable Community Livelihood towards a Greener, Fairer, and Dense Kisumu City and Its environs"*. (Mistra Urban Futures, n.d. a) The project is a Collaboration between many organisations and authorities, among them Chalmers, Kisumu City Council, Maseno University and Eco-finder. But why in Dunga? On Mistra Urban Futures webpage it is stated that the project is working with developing eco-tourism in three different places: Dunga, Miyandhe, and Seka. The aim of the project is *"to facilitate improved planning and transformation of eco-tourism sites and to promote eco-tourism as a viable source of livelihood. When developing the eco-tourism sites the natural environment and sustainable development is important, however creating jobs and reducing poverty levels is just as important. The project will include a dialogue with the citizens on how the sites should be developed and the citizens will also be involved in the actual work. By this, local capacity is created, and employment is enhanced as eco-tourism becomes an alternative livelihood" (Mistra Urban Futures, n.d. b)*

The idea about alternative livelihoods that are more sustainable is an idea that I thought about myself, even before reading about this project. I believe that it is essential to develop Dunga in a sustainable direction. Jobs that exhaust the natural resources and damages the ecosystems are of course not an alternative whether Dunga is to be developed as an Eco-tourism site or not. A job is what provides the population financial capital to supply things such as food, shelter, and education. Therefore it is necessary to, for example, reduce poverty and increase knowledge. Since it is crucial for surviving it is important that it is sustainable, and Eco-tourism could be one possible alternative livelihood. But is it the best one? One possible future threat to Dunga if it develops as an Eco-tourism site is the number of visitors that of course bring economy, but that also will require infrastructure, proper waste management, and sewage systems not to damage the already vulnerable ecosystems even further. Eco-tourism could imply that the already scarce natural resources are pressured even more. It could also suggest a future stronger economic community. The question is if the need for the financial security that Eco-tourism could bring will affect the identity and character of Dunga? Will it challenge the natural resources too much? Probably not if it is implemented in a good and strategic way. But if handled in a nonsustainable way and only promoted as Eco-tourism site without being sustainable, it could imply that the situation gets even worse than it is today.

Fig.41: Wetlands outside of Dunga (Bard, F., 2015)

Fig.42: Pier and fishing-boats, Dunga beach

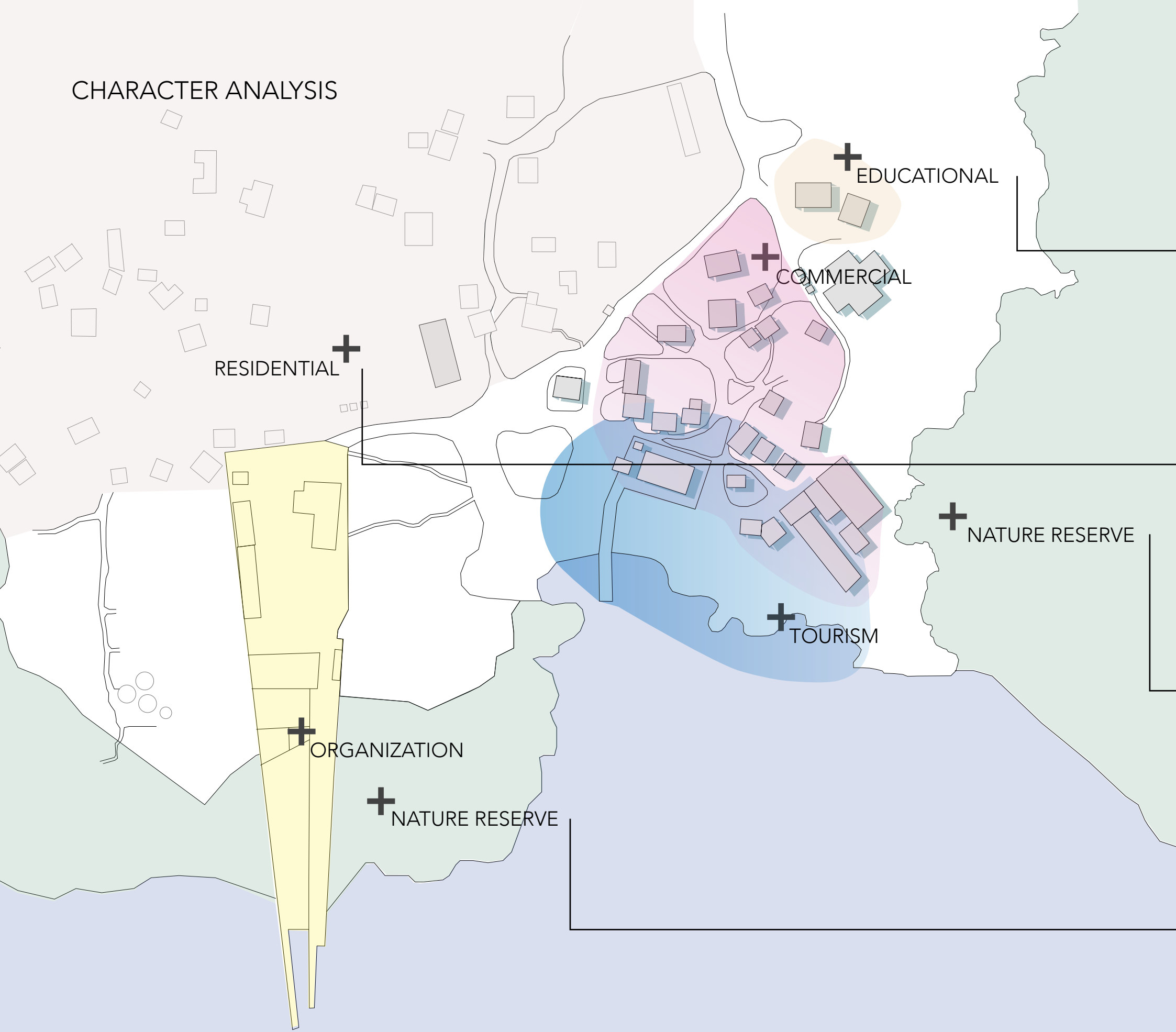


Fig.35: Plan over Dunga showing different characters

Fig.36

Fig.37

Fig.38

Fig.39

Fig.36: Playground, Dunga (Sollerhed, C., 2015) 37: Residential building, Dunga (Bard, F., 2015) 38: Lake Victoria seen from Dunga beach, 39: Eco-finder fishingboat Dunga.

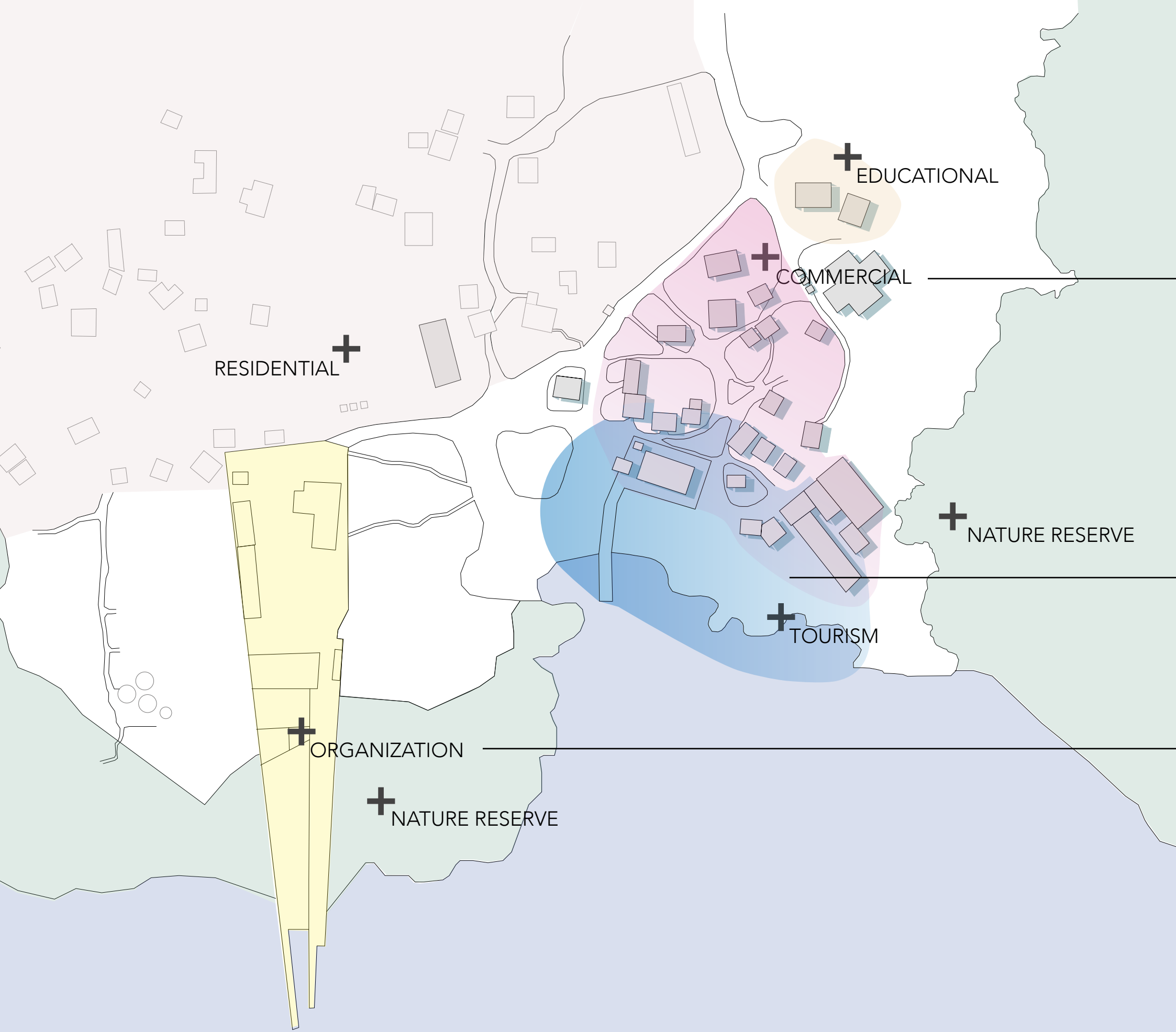

EDUCATIONAL
COMMERCIAL
RESIDENTIAL
NATURE RESERVE
TOURISM
ORGANIZATION
NATURE RESERVE

Fig.40

Fig.41

Fig.42

Fig.40: Fish market, Dunga, 41: Students at the busy beach, Dunga,
42: Osienala organisation, Dunga

USES

1 Empty buildings
2 Residential buildings
3 Public toilets
4 Kiwasco
5 Fish market
6 Daycare centre
7 Office for daycare centre
8 Storage
9 Hairdresser
10 Crafts & souvenir shop
11 Beach Management Unit
12 Umbrella group organic farmers
13 Osienala - organisation
14 Co-op society admin office
15 Eco-finder - organisation
16 Red Cross
17 Ovens for drying fish
18 Benches
19 Waste bins
20 Pool hall
21 Restaurant / “hotel”

10 20 30 40 50
SCALE 1:800 m

Fig.43: Plan over Dunga showing different uses

GREEN STRUCTURE

10 20 30 40 50
SCALE 1:800 m

Papyrus
Tree nursery
Tree
Mangrove
Hippo grass
Water hyacinths
Grass

Fig.49: Plan over Dunga showing green structure

ACTIVITIES - *where and when they happen*

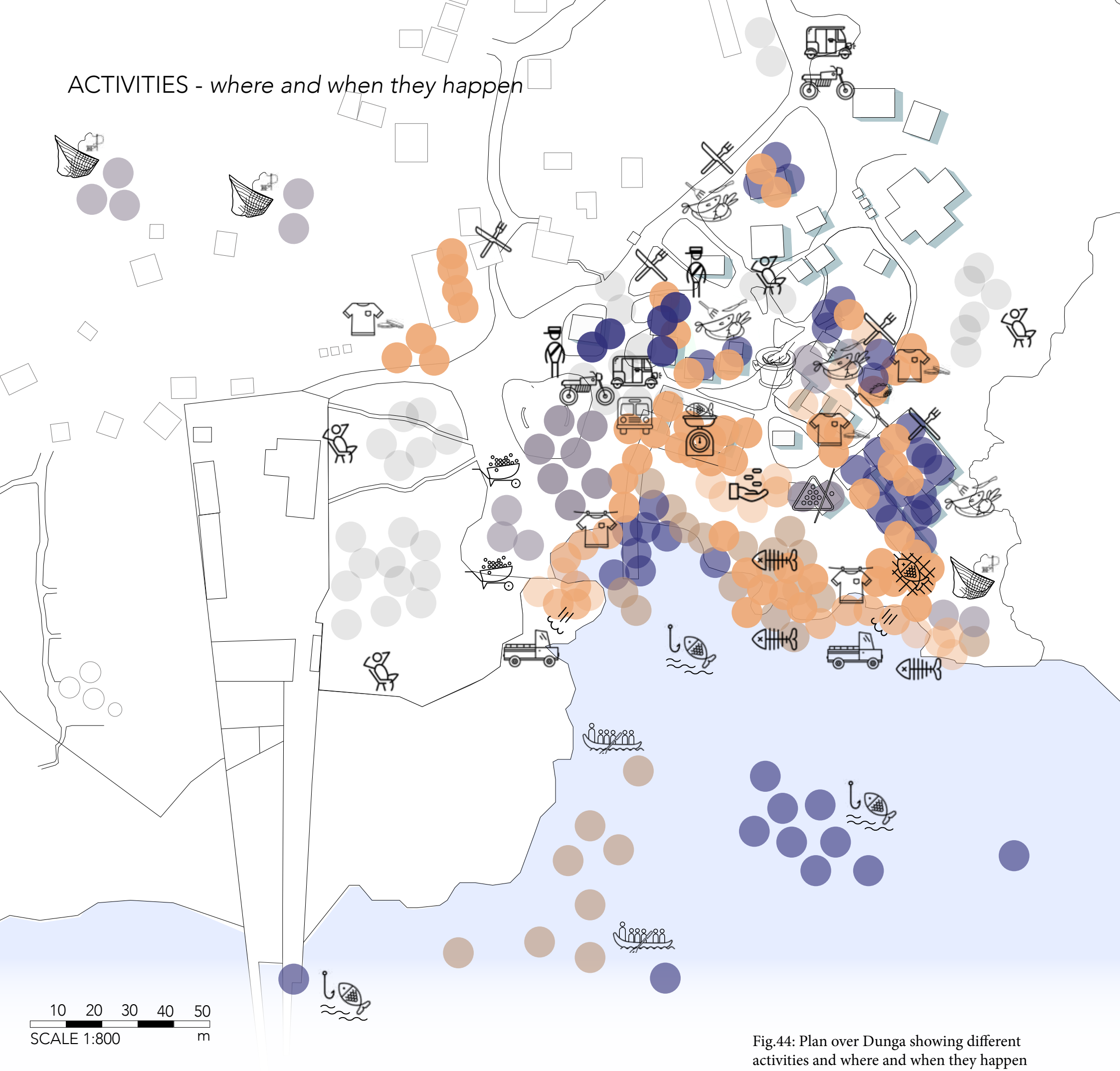
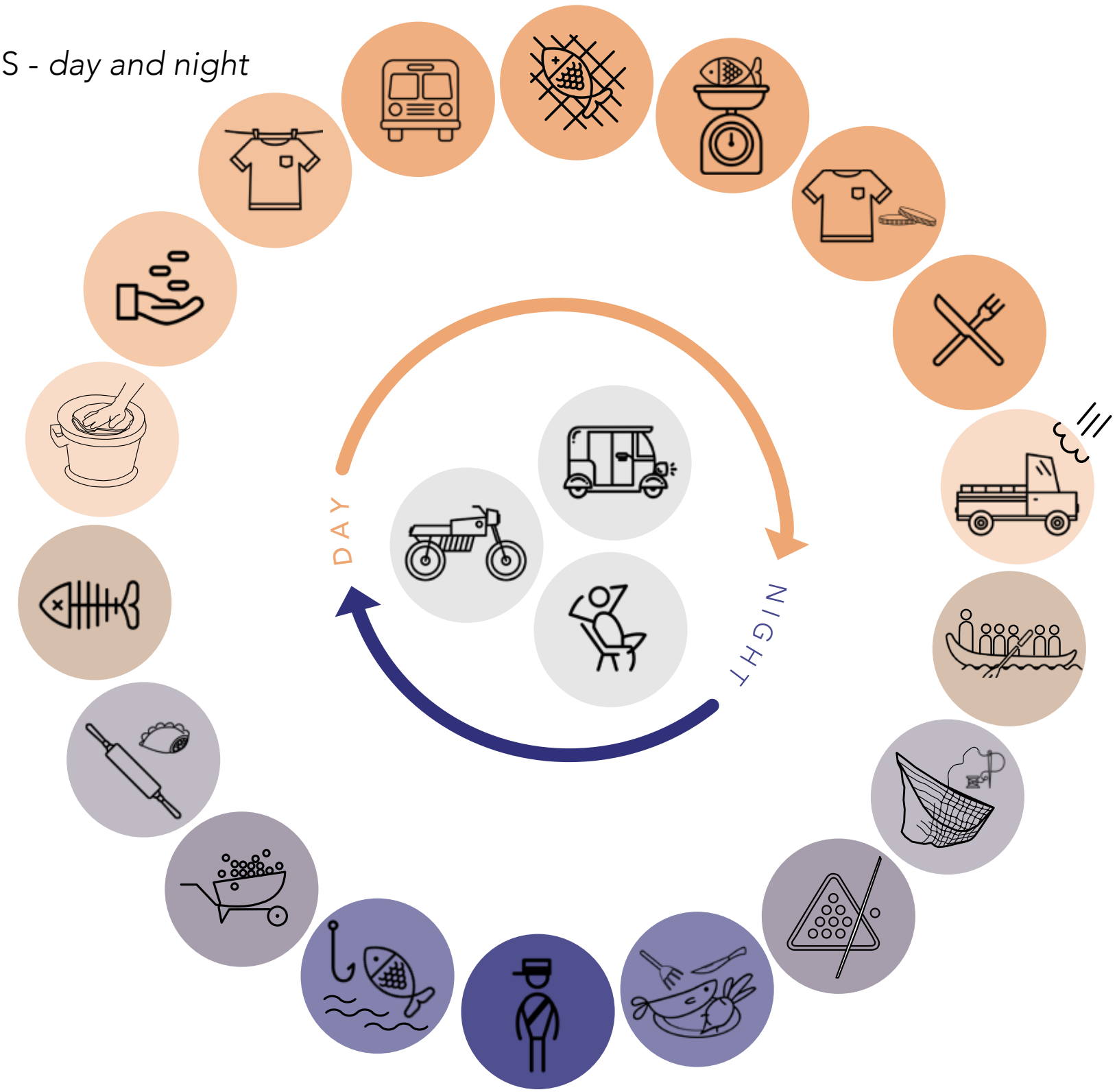


Fig.44: Plan over Dunga showing different activities and where and when they happen

ACTIVITIES - *day and night*



MENDING FISHING NETS

BOAT TOURS

CAR WASH

LUNCH

SELLING CLOTHES

FISH MARKET

DRYING FISH

BUS PARKING

WASHING CLOTHES

COLLECTING MONEY

BAKING CHAPATI

RINSING FISH

BAKING MANDAZI

CHARCOAL

FISHING

SECURITY/ BMU

DINING

PLAYING POOL

INFRASTRUCTURE

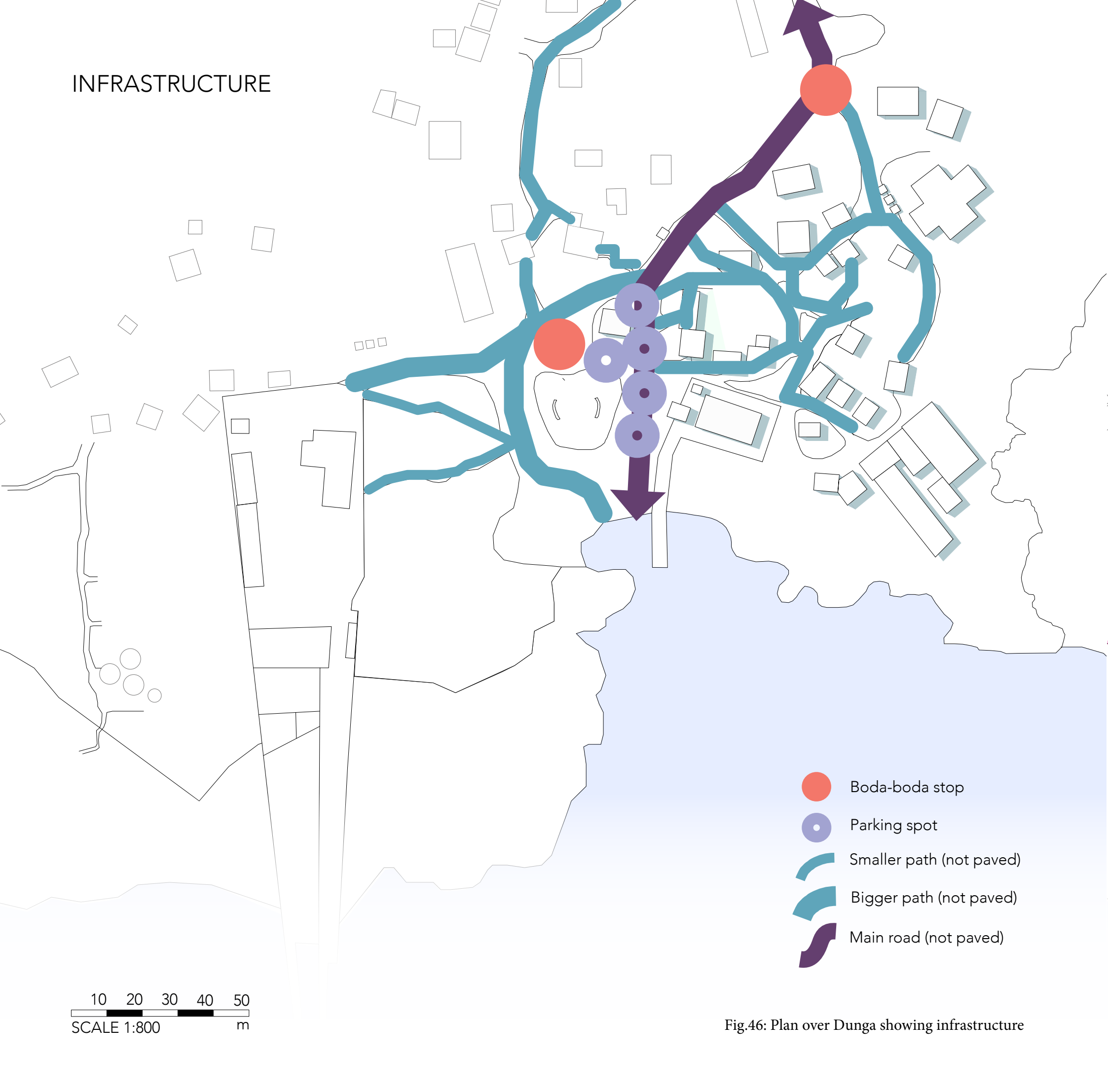


Fig.46: Plan over Dunga showing infrastructure

BARRIERS TODAY

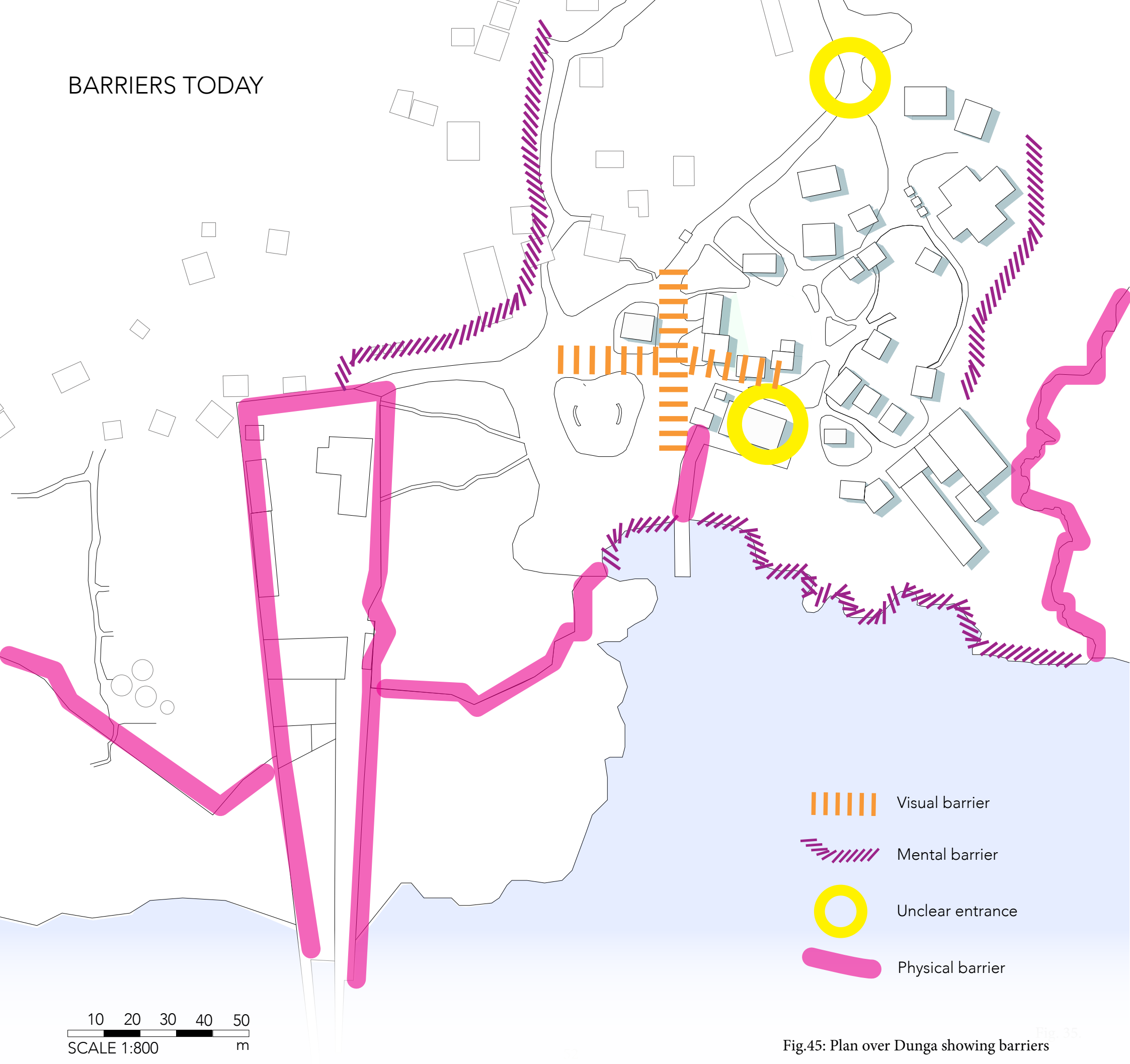


Fig.45: Plan over Dunga showing barriers

PUBLIC CONCENTRATION

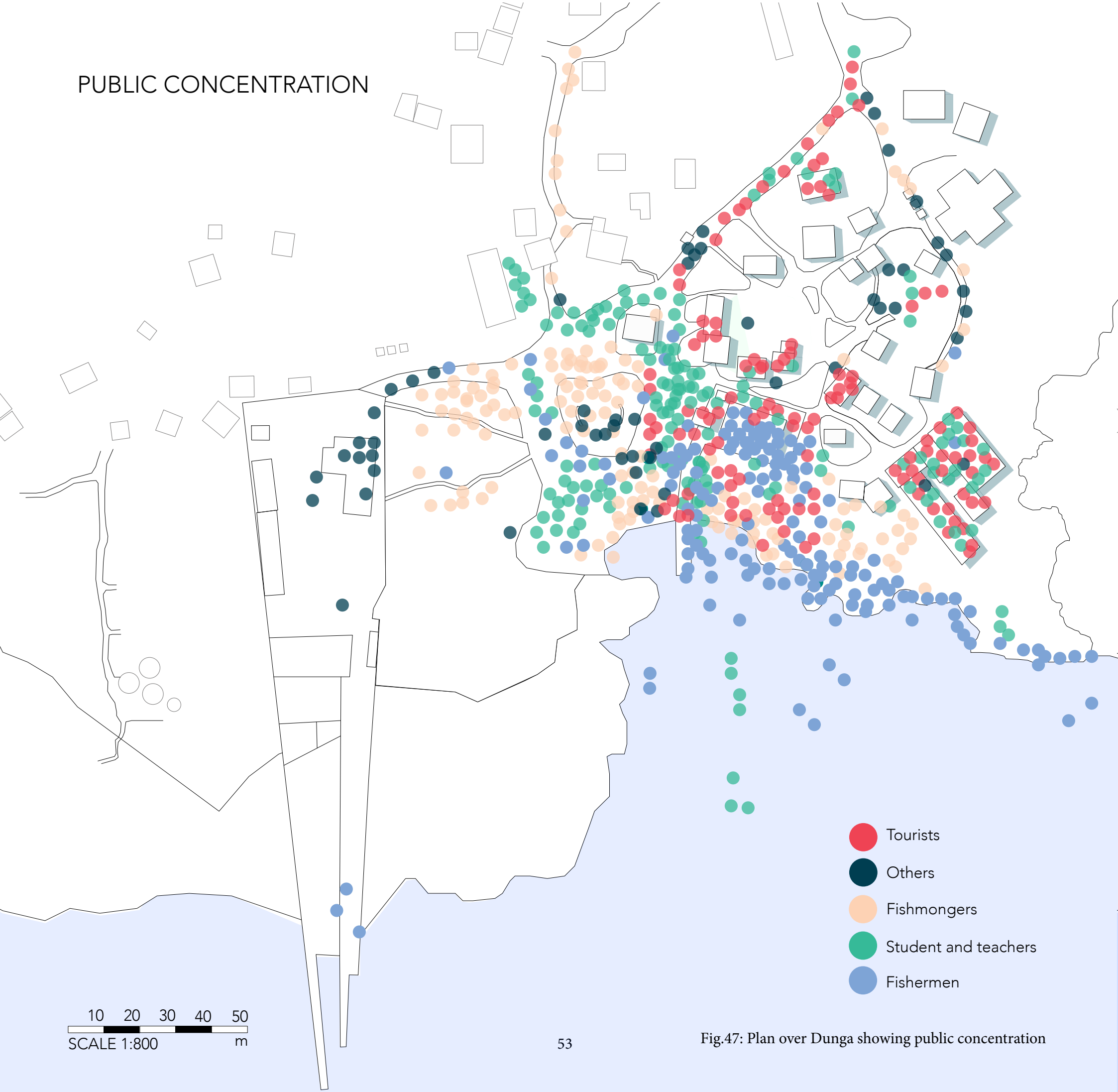


Fig.47: Plan over Dunga showing public concentration

UNUSED SPACES

10 20 30 40 50
SCALE 1:800 m

Fig.48: Plan over Dunga showing unused spaces

SWOT ANALYSIS DUNGA - *based on observations, interviews and literature*

+ STRENGTH

- ***Dunga has a strong fishing village identity and character with rich cultural heritage***
- ***Recreational qualities, closeness to nature and Dunga wetlands***
- ***Many activities and ongoing businesses (especially in Dunga beach) that creates atmosphere and income for livelihood***
- ***Situation directly by the water and Lake Victoria*** - Home to fish species and key source of livelihood in the area

Strengths not directly connected to the focus of this thesis are: Small-scale cultivation that enhances mixed use, greenery and food security., availability of human resources, the strong internal social welfare system.

+ OPPORTUNITY

- ***Eco-tourism initiatives*** - there are several sustainable initiatives in Dunga that are meant to benefit the village and conserve the environment
- ***Negative things like waste or water hyacinths are (or could be) turned into material for biogas or to produce crafts***
- ***The rich and unique biodiversity in Dunga wetlands***
- ***Pro-environmental organisations*** - Several organisations working to preserve the environment are situated in Dunga
- ***Potential in renewable energy resources*** - Solar, hydro, wind and biogas energy can be a future opportunity, and biogas is already in use
- ***The majority of the existing activities in Dunga have potential to be developed in a sustainable way***

- WEAKNESS

- ***Selling on charcoal on the beach*** - Makes the beach inaccessible for recreational purpose
- ***Poor infrastructure*** - There is no official parking, roads are flooded during the rainy season, the division between road & built environment is unclear
- ***Poor waste management and degradation due to disposal of garbage*** - There are too few bins for the number of visitors and inhabitants
- ***Low knowledge on wetland conservation*** - Results in unsustainable harvesting of valuable papyrus and non-environmental friendly lifestyles
- ***Lack of planned public recreational space and shortage of shadow and cool places to relax and sit***
- ***Lack of public spaces***
- ***Rainwater runoff causes flooding and soil erosion***
- ***Unsustainable use of energy, water & waste. No existing recycling, almost no production of renewable energy & reuse of water***
- ***Lack of planned public meeting places***
- ***The pier and concrete slab around the fish market, 0,6m elevated from the ground surface creates a barrier along the lakefront***
- ***Insufficient arable land*** - Leads to people pressuring the wetland and using it for farming
- ***Lack of coherent path and access to the lake*** - The lake is inaccessible to locals that cannot pay a boat ride
- ***Lack of access to the wetland*** - There is no way to access the wetland but by boat, which is expensive for locals
- ***The parking area is a barrier***- The parking area is a visual and physical barrier on the main road and blocks the view and access to the lake
- ***Unused space*** - There is an abundance of unused space. Still, people continue constructing and farming in the wetland
- ***Lack of street lights and light sources limits opening hours and activity in evening hours***

Weaknesses not directly connected to the focus of this thesis are: High unemployment, few alternative sources of livelihood, low educational level.

- THREAT

- ***The biodiversity and wetlands are diminishing*** - Agricultural activity in the wetland and cutting vegetation(such as papyrus) for fuel for cooking threatens the existence of the wetland & reduces its potential to sustain the natural characteristics of Dunga
- ***Increasing population growth of Kisumu and Dunga*** - Exertions high pressure on the already scarce natural resources
- ***Water pollution*** - Pollution into the lake from domestic sewage system with unprocessed effluents & industries pollutes the water.
- ***Climate change leads to increased risk of flooding, higher temperature, loss of biodiversity, drought, etc.***
- ***Kisumu's expansion towards Dunga*** - Kisumu's development threatens to consume Dunga and wetlands. This implies increased pressure on available land threatening to densify and not leave land for public use. This could increase land rates and push locals without possibility to buy land away

Threats not directly connected to the focus of this thesis are: Overfishing, water hyacinths and algae.

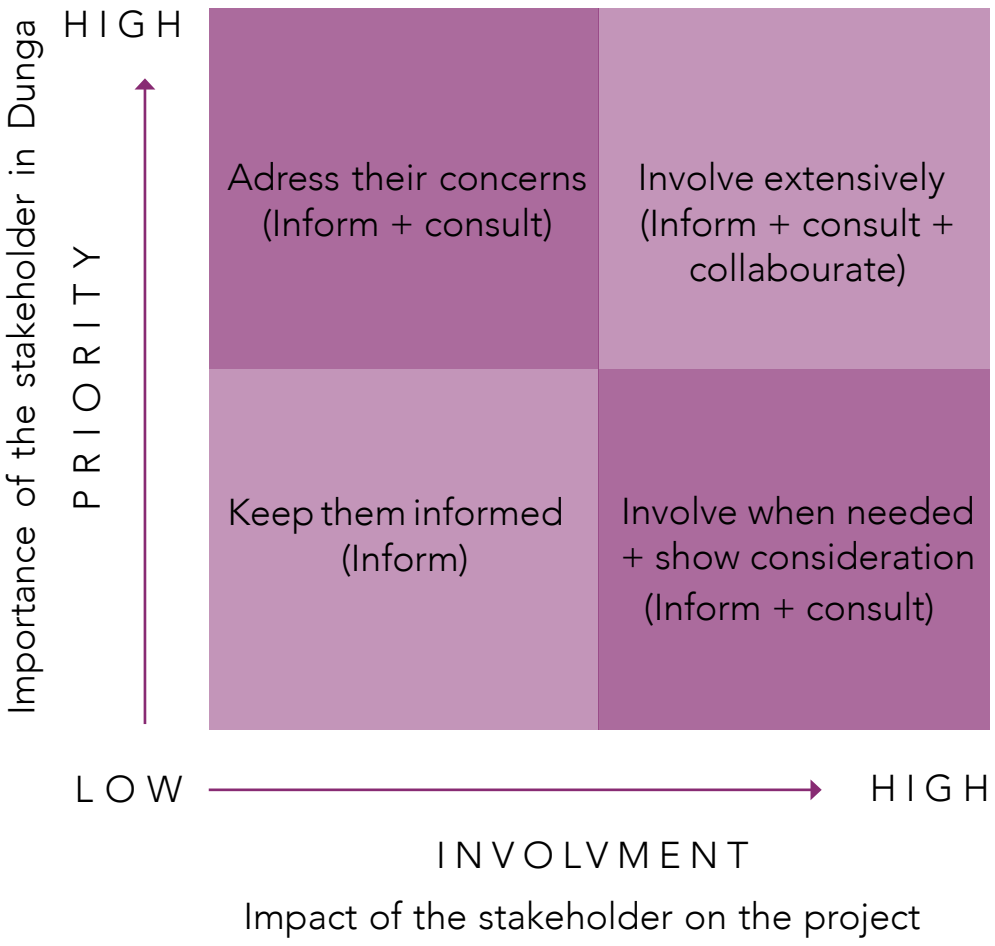
STAKEHOLDERS

There are many stakeholders in Dunga today. All stakeholders affect and are affected by (or perceive themselves to affect or be affected by) activities, decisions, plans and development (and the outcome of them).

WHAT IS PARTICIPATION?

There are several forms of participating as a stakeholder or user of a site. It is usually grouped into five types.

- Information significate that you receive and provide information, ask questions and give replies. The method to do this can be through a local newspaper, the web, flyers or a big assembly.
- Consultation significate that you provide your opinions or ask about other people's concerns. It can be through a questionnaire, focus group or consultation.
- Dialogue significate an exchange of thoughts, generally during various sessions. This can be done through a regular dialogue, a dialogue group or a dialogue seminar.
- Collaboration is when certain activities are planned and then implemented. This can be done through a work-group.
- Involvement is when there are collective decisions. This is for example done through a counsel.



(Community Tool Box, n.d.)

When working with participatory methods in planning it has been shown that it is important to be very clear with what kind of participation is promised to the stakeholder and users. If the purpose is unclear, it can easily lead to participants getting unreal expectations, which can lead to disappointment and frustration. It is also important to answer a few questions before starting to involve the locals; what do we want to achieve? How are we goning to use the result? Which methods do we want to use and what type of participation can we offer? Another important question is that the participants have to perceive their involvement as meaningful. To achieve this, it is important that the subject is perceived as important to the participants. The most important question of all is communication, to communicate feedback and progress so that the participant to see that their time and effort to participate had value. It is also important to analyse and evaluate afterwards and continuously, both internally and with the participants.

WHY PARTICIPATION?

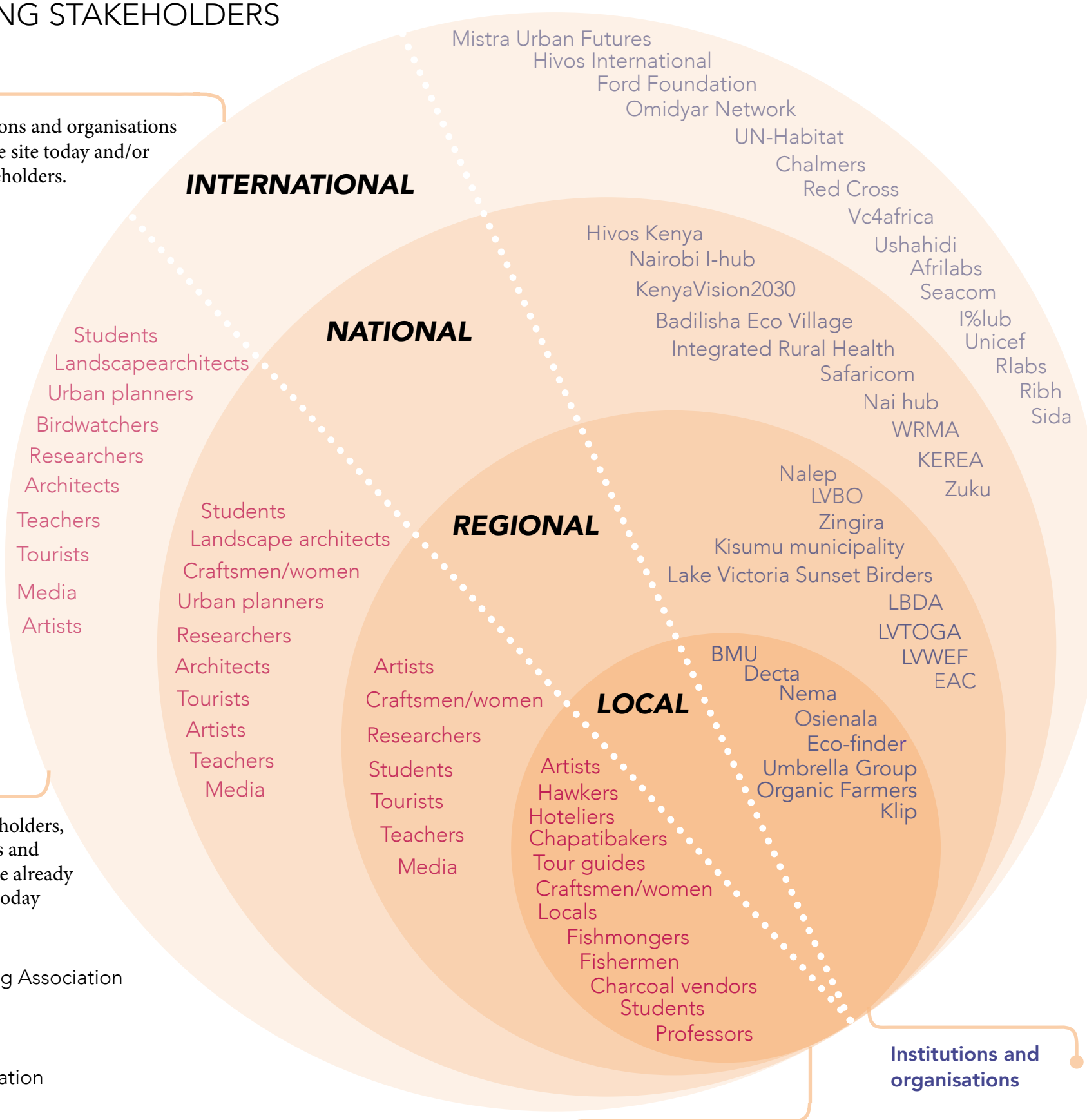
To include the locals whose voices are usually not heard it is important to have an open dialogue among locals, politicians, and professionals. It is also important to involve the stakeholders to get a result that is user-friendly and sustainable. The users need to feel involved in the project and that they are a part of the development of their village to feel that they are part of it and care enough to later take care of the area and manage it well. A sense of ownership or being a part of the creation of something is not only good for the well-being but also encourages the stakeholders to take care for the outcome.
(Lindholm and Moritz, 2007, pp. 4-35)

COLLABORATION BETWEEN STAKEHOLDERS

Although some cooperation between stakeholders exists, there is still a long way to go. There is a lack of collaboration between governmental stakeholders and stakeholders based on site. But larger organisations such as UN-habitat and Mistra Urban Future, Sida and Red Cross plays a vital role linking the stakeholders, and there is hope for further collaborations. (Kraff and Jernsand, 2013, p.19), 2013, p.19)

IDENTIFYING STAKEHOLDERS

The people, institutions and organisations listed are users of the site today and/or possible future stakeholders.



Other possible stakeholders, many of them NGOs and organisations that are already active in the region today could include:

- Family Planning Association
- FPAK
- Wowesock
- Decemac
- Omega foundation
- CCF
- Actionaid
- World Vision
- Care-K
- Social Needs Network
- IDCCS
- Sanitation need in Africa Int

MAIN STAKEHOLDERS ON SITE (LOCAL)

HAWKERS

Hawkers sell a variety of things, often specialised in one type of item, e.g. clothes, DVD's or fruit. They have an unstable source of income since it is very dependent on tourism and seasons. They mainly move around the fish market and in the northeastern part of the village.

CRAFTSMEN/WOMEN

The craftsmen/women make and sell all types of crafts. Many of them work with baskets made out of water-hyacinth. There are currently two spots in the area selling crafts. One is a tent structure that is open most time during the day and evening. Some art pieces are also shown/sold outside of the fish market. The other is the organisation Eco-finder. The craftsmen/women bring an economy to the village, but it is also very dependent on seasons and tourism. Some craft makers sell their products through organisations such as Zingira Nyanza Community Crafts.

STUDENTS

Students visiting Dunga come for educational and recreational reasons and often arrive with their professors in big school buses. There are also foreign students, university students and researchers visiting. They all contribute a lot to the littering of the beach. The students arriving in school buses come for regular visits and go for educational tours in the area. The buses pollute the air and have no official place to park. They many times park their buses outside of BMU office, which is situated on the main road leading down to the lakefront. Their busses block the physical and visual access down to the lake, both for visitors, workers, boda-boda drivers (motorcycle taxi drivers) and locals.

CHARCOAL VENDORS

The charcoal vendors are mainly women. They have their gathering point in the beach area, on the western side of the pier. They basically move around their meeting point and down to the water. The charcoal vendors do a hard job every day waiting for, receiving and transporting charcoal arriving by boat from Uganda. They lack storage for the charcoal bags, both as a protection from the rain in the rainy season, flooding and mud, as well as protection from the animals that are walking freely and chew holes in the plastic fibre bags that holds the charcoal. The bags are also damaged by the sunlight. They also lack shadow and places to sit. Their activities pollute the beach and give a messy and dirty impression.

HOTELIERS

The hoteliers represent a big part of the activities in Dunga. They are the largest consumers of natural resources such as papyrus and wood that they use for cooking fuel. Waste from their kitchens and restaurants pollute the public space and the lake. They bring an economy to the village, but it is noticeable that a majority are low-income earners struggling to keep their business. There are about 10 hoteliers in Dunga Beach that all serve the local Tilapia fish with traditional ugali and sukuma wiki. Eating Tilapia fish in Dunga is a well-known tourist attraction by Kenyans and therefore an important part of Dunga's identity and character. (Fälted et al., 2012, pp.10-14)

Fig.49: Hawkers under a tree, 50: Making of crafts (Larsson, M., 2015), 51: Students, 52: Charcoal arriving from Uganda (Megan, 2010), 53: Man working at a hotel.

TOUR GUIDES

In general, the tour guides also work as fishermen. They have a lot of knowledge about the lake, flora and fauna. They are the ones that spread the most knowledge about Dunga, the wetlands, the lake and sustainable behaviour and development. Unfortunately, they do not always apply their knowledge when engaging in activities such as fishing. This is mainly due to economic reasons. They mostly move around the wetlands and the lake. Many of them are trained by Osienala or Eco-Finder.

FISHERMEN

They mainly work in the wetlands, the beach area, the market and on the lake. The fishermen have a lot of knowledge about the lake and the wetlands. They bring an economy to the village. Some problems are emerging from their activities, such as careless and extensive fishing, improper waste disposal and encroachment into the wetlands. They are also the main reason for prostitution(and therefore spreading of sexual diseases) enforcing women to sexual favours in exchange for a permit to sell fish.

FISHMONGERS

The fishmongers are the women in the beach area selling and cleaning fish. They are primarily women. They move in the beach area, around the shadowing trees and the market. They spend the whole day at the beach, arriving early in the morning to buy fish from the fishermen that they later sell at the beach or in the fish market in Kisumu. Their activities result in pollution of the beach and the lake.

LOCALS

The people living in Dunga and the immediate surroundings. They have various sources of livelihood and include children and elderly. They bring an economy to Dunga, but they are also responsible for degrading the natural resources and disturbing eco-systems. In general, they have no or low educational level (Fälted et al., 2012, pp.10-14).

Fig.54: George - tour guide and fisherman in Dunga, 55: Fishermen on Lake Victoria (Larsson, M., 2015), 56: Fishmonger rinsing fish in Dunga, 57: Locals

CONTRIBUTION FROM STAKEHOLDERS

The diagram below is a kind of sociogram that illustrates what the primary stakeholders can contribute with for a future sustainable Dunga. In order to reach the full potential of the stakeholders and to give as much value as possible back to them, it is important to identify them and their strengths. While some of them might have an overflow of time to give, such as younger kids, students or elderly, others might have no time, but a lot of experience or knowledge. Tourists can, for example, contribute with money, something that students seldom can, but students have a lot of motivation.

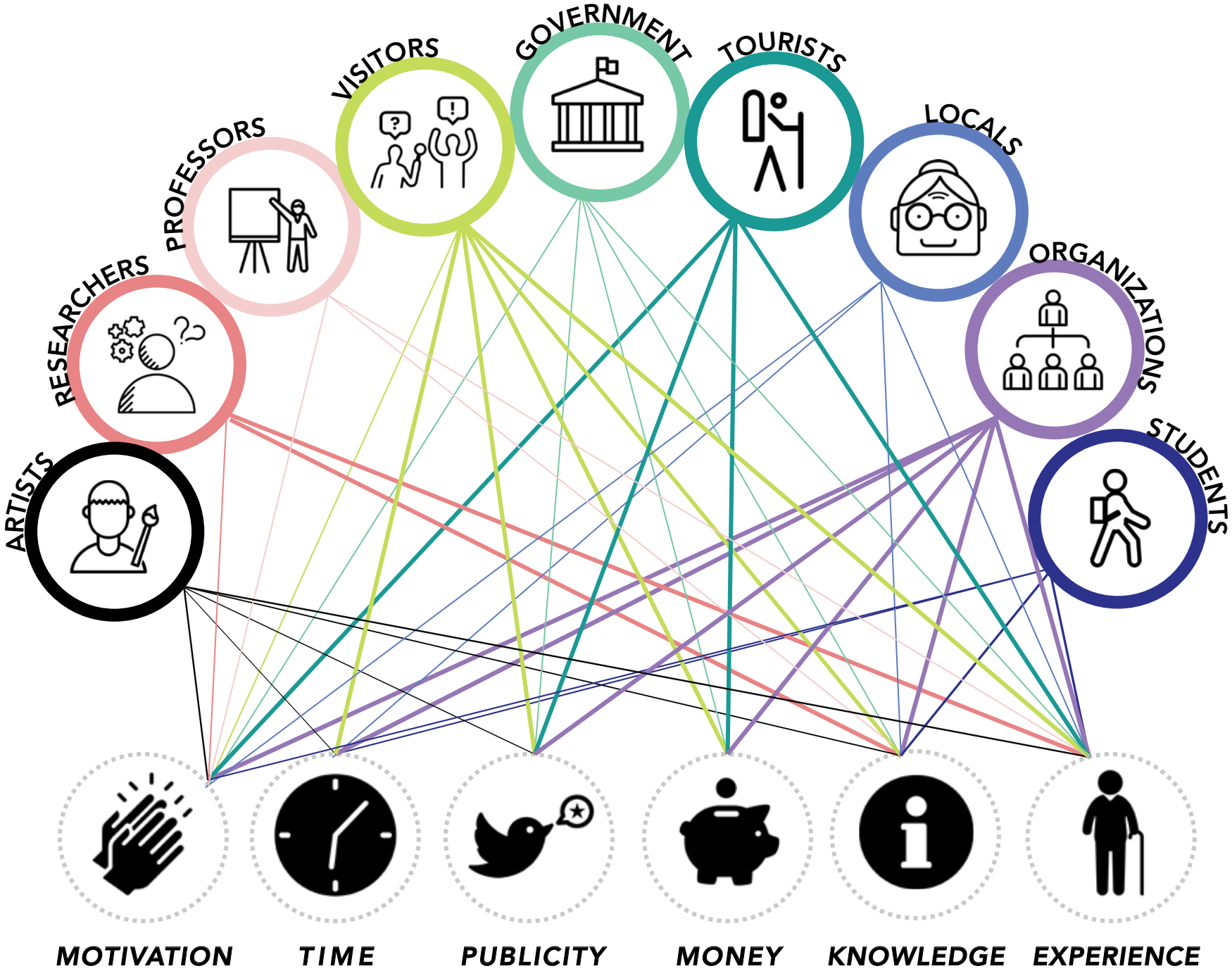


Fig.58: Diagram showing how different stakeholders can contrubute

SPATIAL ANALYSIS

Empty or unused places

Main path

Path

Node / meeting place

Landmark

Zone

Construction area

Charcoal workers area

Fishing area

Recreational area

Parking area

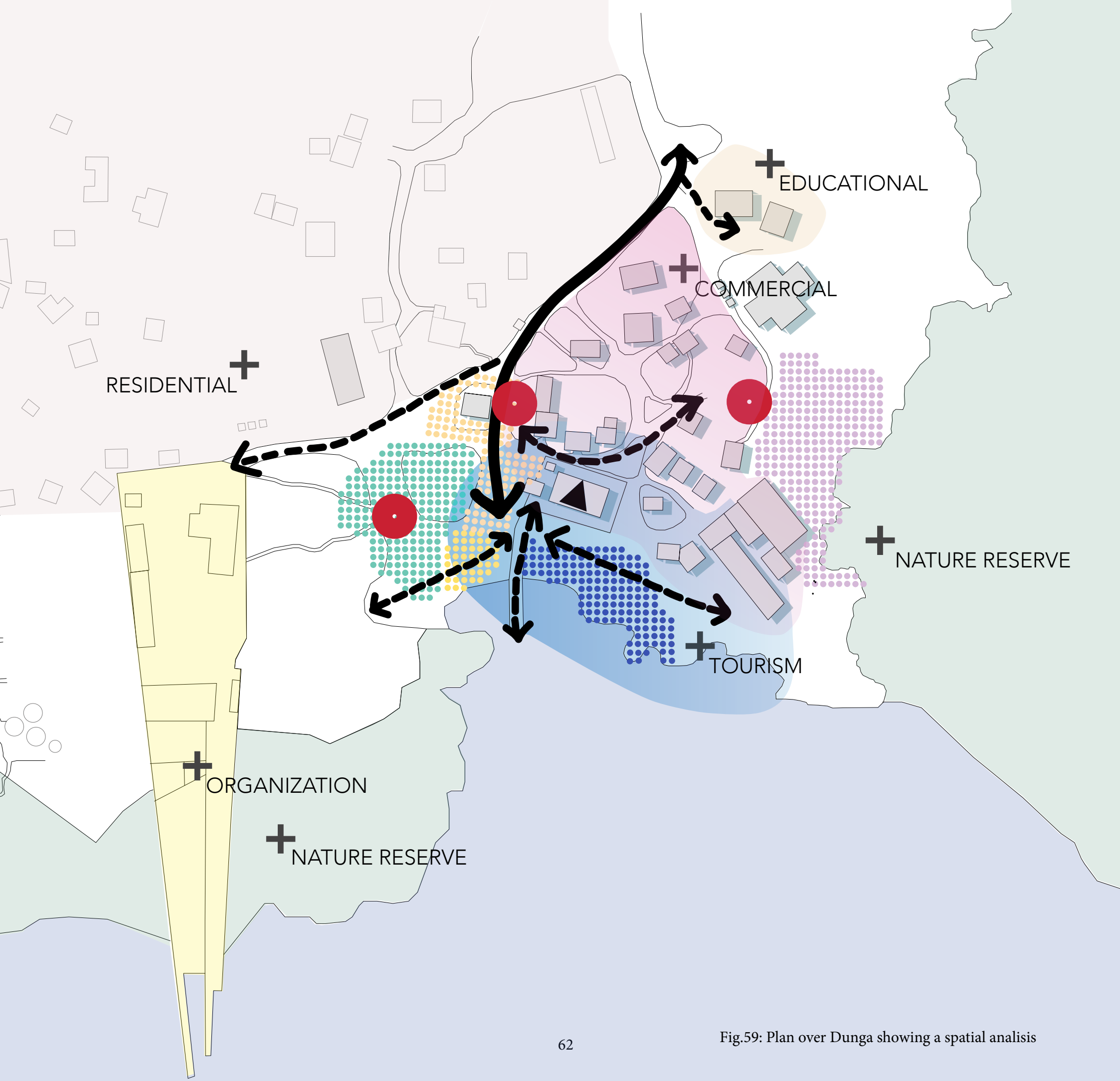


Fig.59: Plan over Dunga showing a spatial analisis

SUMMARY AND SYNTHESIS OF ANALYSIS

The reader has been introduced to the context of Dunga both through text and a character analysis. The reader has been given an understanding of the strengths, weaknesses, opportunities and threats in a SWOT-analysis. A spatial analysis has also been presented. The uses, the stakeholders, observations, movement, access and mental barriers have been described in order to give the reader an understanding of the structure of the village and the on-going activities.

From the analysis, we can understand that the village turns towards the water, but the sight towards the water is blocked. Partly by vehicles and buildings that are placed without thought of visual access. One of the strategies was to enhance existing qualities. I, therefore, believe it is important to open the visual (and physical) access towards the lake and the wetlands.

From the spatial analysis, we also learn that there are no paved roads in or around Dunga. Most of the roads are soil roads and therefore quite bumpy. They are not suitable neither accessible for biking, roller blading, skating or for people in a wheelchair or with other disabilities. The fish market is the only building that could be seen as a landmark, and it is also one of the few public facilities. Since the fish market is one of the places that are used the most it is relevant to improve the accessibility both to the market and around it. In order to increase the accessibility for everyone, it is important to create an easier physical entrance to the market, as well as the lakefront, that as understood by both the spatial analysis and character analysis are two of the most important and characterising features for the identity of Dunga. A ramp up to the fish market could enable an easy access as well as provide a possibility to extend the market out on the slightly sloped ramp. It can also contribute to a more clearly defined entrance.

The analysis also lets us know that the roads are made out of soil and quickly gets flooded. In order to improve the physical and mental accessibility and also improve the conditions of the public space, it is essential to find a solution to the problems with flooding. There is no clear hierarchy between bigger roads and smaller paths. The “street system” is entirely human-made, and paths arise from people walking the same way over and over again, wearing down the grass and creating a new path. This decreases the readability and possibility for a visitor to orient oneself. Hence I believe it to be necessary to create a clear hierarchy and define the main road.

The majority of visitors and tourists arrive by bus. Parking is allowed where there is space, and the vehicles drive all the way down to the water. The main movement in the area is pedestrian. Some locals move by bicycle or motorcycle. All the buses park around the commercial area and the fish market, even though it is just a three minutes walk to cross the whole area. The vehicles parked are buses, motorcycles and private cars. The bigger vehicles block the view and access down to the lakefront and hide entrances to the buildings. The boda-boda stops are not well marked and hard to understand where they are. In order to enhance the recreational value of the calm, breezy fishing village and enable space for pedestrian movement, green areas and public space moving the parking area is relevant. This will also make the entrance point to the village and the stops for different taxis more evident.

A building that is currently out of use interrupts the main path. Between the building and what is supposed to be the continuation of the main path is the parking area blocking the access down to the lakefront and the pier. To create a defined main road and an easily understandable structure, I think it is a good idea to remove the building and the parking that is blocking both the physical access.

The elevated pier interrupts the path along the lakefront, making a continuous promenade along the water difficult. Since one of the strategies is to build on existing strengths and qualities, I find it necessary to make the beach accessible and enable a continuous promenade in order to enhance the existing quality of the lake, and it´s recreational value.

There are three existing primary meeting places. One is situated just under the tree in the recreational area; this is where the fishmongers rest, talk, work and hang out. The other one is located just outside of the BMU office and the small hotel. Some plastic chairs and shadow make the meeting place for boda-boda chauffeurs, locals, lost foreigners and the hotel owners. The third one is also under a huge tree, behind the fish market, this is where some men sell second-hand clothes, and both visitors and locals meet here. The collection of huge charcoal-bags interrupts and cuts off the main road, and prevents the path to reach their end destinations, which are of course the lakefront and the pier. This also makes the beach inaccessible for those that would like to use the beach for recreational purpose. As understood in the chapter "The voice of Dunga" the charcoal workers have their workplace and meeting point as well as storage on the beach, just by the water (yellow zone). It is also understood that they lack both a well-functioning meeting place and storage. Since two of the strategies for a sustainable Dunga is to improve existing meeting places and create new ones and to provide facilities to work, learn and share and the people of Dunga has stressed the importance of a storing place for charcoal I find it necessary to provide a new and improved storage and meeting place. Here it is also possible to reuse of the unused buildings.

Activities during the night are limited to hotels and pool halls. In the early morning, fishermen move on the lake and the pier. During the day people walk around a lot and everywhere, the majority of movements are along the main road, along the coast, around the fish market, and around the hotels. Fishermen and fishmongers mainly move and work around the lakefront and the fish market. As one of the principles for a sustainable Dunga proposes, I find it essential to provide areas that are open 24h in order to increase the safety and make the area user-friendlier. It is also important, as commented by locals, and seen in the chapter "The voice of Dunga" that these places are places where one can rest or sit without having to pay. The village should be enjoyable for everyone, no matter economic situation. There is one main area for new constructions in the eastern part of the village. The buildings being constructed there are of commercial character. There are several buildings in the village that today are unused. Instead of using valuable green space or wetland I propose a more efficient use of existing and buildings and unused places in the village.

The wetland is close to the recreational area, which basically consists of a tree with some benches, but a big grass area that today is unused and filled with trash is separating the two. If the two were connected, a bigger recreational area could be defined. This would not only correspond to the local's wish of more places to sit or rest with shadow but also with the strategies for a sustainable Dunga; improve existing meeting places, to focus on human scale and people-centred design, aim for sustainability and encourage a sustainable behaviour.

As understood by comments in "The voice of Dunga" and in the analysis, there is a lack of clean water for drinking, washing and cooking, this leads to locals collecting wood and papyrus from the wetland to use as fuel for their stoves to cook or heat water. This threatens the wetland and it is, therefore, important to find an alternative energy source. Waste management is poor, and the locals don't seem to find the existing solution to be working, I will, therefore, provide a well functioning proposal for waste management. Reading the analysis, we also comprehend that Dunga is a place with a vibrant and bustling atmosphere, with many different users and stakeholders. The lack of collaboration between stakeholders, such as hotels, many times leads to environmental degradation. If all organic waste were used for biogas, for example, maybe there would be no need for cutting papyrus for cooking. I will therefore in the next chapter provide principles of ideas for biogas and other renewable energy resources.

05

DESIGN PROPOSAL

This section is about my proposal for Dunga. From the analysis, brainstorming and interviews came several visions and ideas for a more sustainable Dunga, and from those ideas a selection was made. I have based on this choosed to work further with a spatial plan.

The aim of the spatial plan is to create a well functioning and well designed rural space, to enhance the existing qualities and create new opportunities for Dunga to become a more socially, economically and ecologically sustainable place. To create a green oasis which is bursting with life and diversity. The strategies from the previous part are here connected to different elements in the spatial plan.

DESIGN PROPOSAL

Fig.52: Dunga wetlands and Lake Victoria

10 SUSTAINABLE STRATEGIES FOR DUNGA

Based on my analysis and the three sustainability pillars (economic, social and environmental sustainability)
I've developed 10 possible sustainable strategies for Dunga to take into consideration for further development.

1. ENCOURAGE A SUSTAINABLE BEHAVIOUR

Display and enlighten about Dunga's natural resources and eco-systems
adding elements that provide knowledge and incitement.

2. ENABLE MORE JOB OPPORTUNITIES

Provide facilities for work, collaborating, sharing expertise and networking.
Encourage entrepreneurship and sustainable sources of income.

3. IMPROVE EXISTING MEETING PLACES

and create new ones. Provide possibility to play, sit down, rest, meet or talk
and at the same time raise awareness of the environment.

4. CLOSED LOOP ECOSYSTEM

Create a closed loop system with sustainable management of water, waste & energy through reuse and recycle.

5. ENCOURAGE AWARENESS & KNOWLEDGE

Provide facilities and opportunities for learning, reading and playing.

6. IMPROVE THE EXISTING SHARING-COMMUNITY

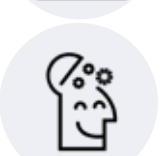
Provide facilities & opportunities for sharing clothes, sewing machines, tools, equipment or even your time.

7. BUILD ON STRENGTHS & EXISTING QUALITIES

Take advantage of the strengths rather than focusing on the problems and needs.

8. AIM FOR SUSTAINABILITY

9. FOCUS ON HUMAN SCALE & PEOPLE-CENTRED DESIGN



10. SUSTAINABLE ENTREPRENEURSHIP

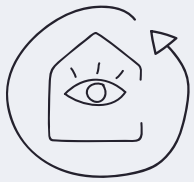
Provide facilities for training, sharing, learning & networking to
develop entrepreneurship & sustainable sources of income.

20 SUSTAINABLE PRINCIPLES FOR DUNGA

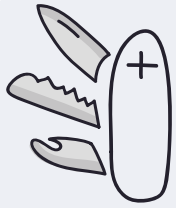
Based on the strategies, I have developed 20 possible sustainable principles for Dunga village to take into consideration for further development.

OPEN ENTRÉE FLOORS

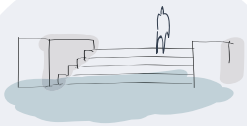
ILLUMINATED ENTRÉES & PUBLIC FACILITIES



24 HOUR OPEN AREAS



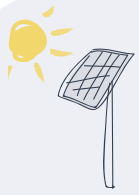
MULTIFUNCTIONAL & MIXED USE



STAIRS TO THE LAKE AS AN URBAN FURNITURE & SCALE OF THE WATER LEVEL

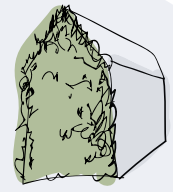
GREEN SURFACES TO ABSORB RAINWATER & FOR AGRICULTURE

PERMEABLE SURFACE PREVENTS FLOODING

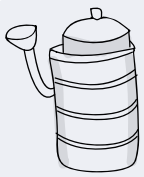


SOLAR POWER FOR LIGHT & ELECTRICITY

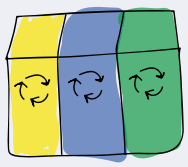
URBAN FURNITURE FOR RECREATION



VERTICAL GARDENS, INSTEAD OF USING THE WETLAND



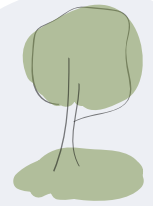
BIOGAS SYSTEM AS FUEL FOR COOKING



SOLID WASTE MANAGEMENT SPOTS

GREY WATER COLLECTION & RE-USE

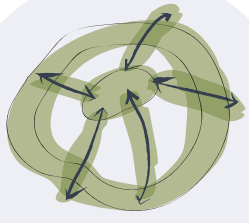
NATURAL VENTILATION



ADD TREES & VEGETATION FOR SHADOW & WIND PROTECTION

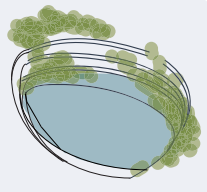
LOCAL MATERIALS

RECYCLABLE MATERIALS



PUBLIC, OPEN & INVITING

BIO-SWALES THAT REMOVE POLLUTION



COLLECTION OF RAINWATER FOR CLEAN WATER

SPATIAL STRATEGIES

A

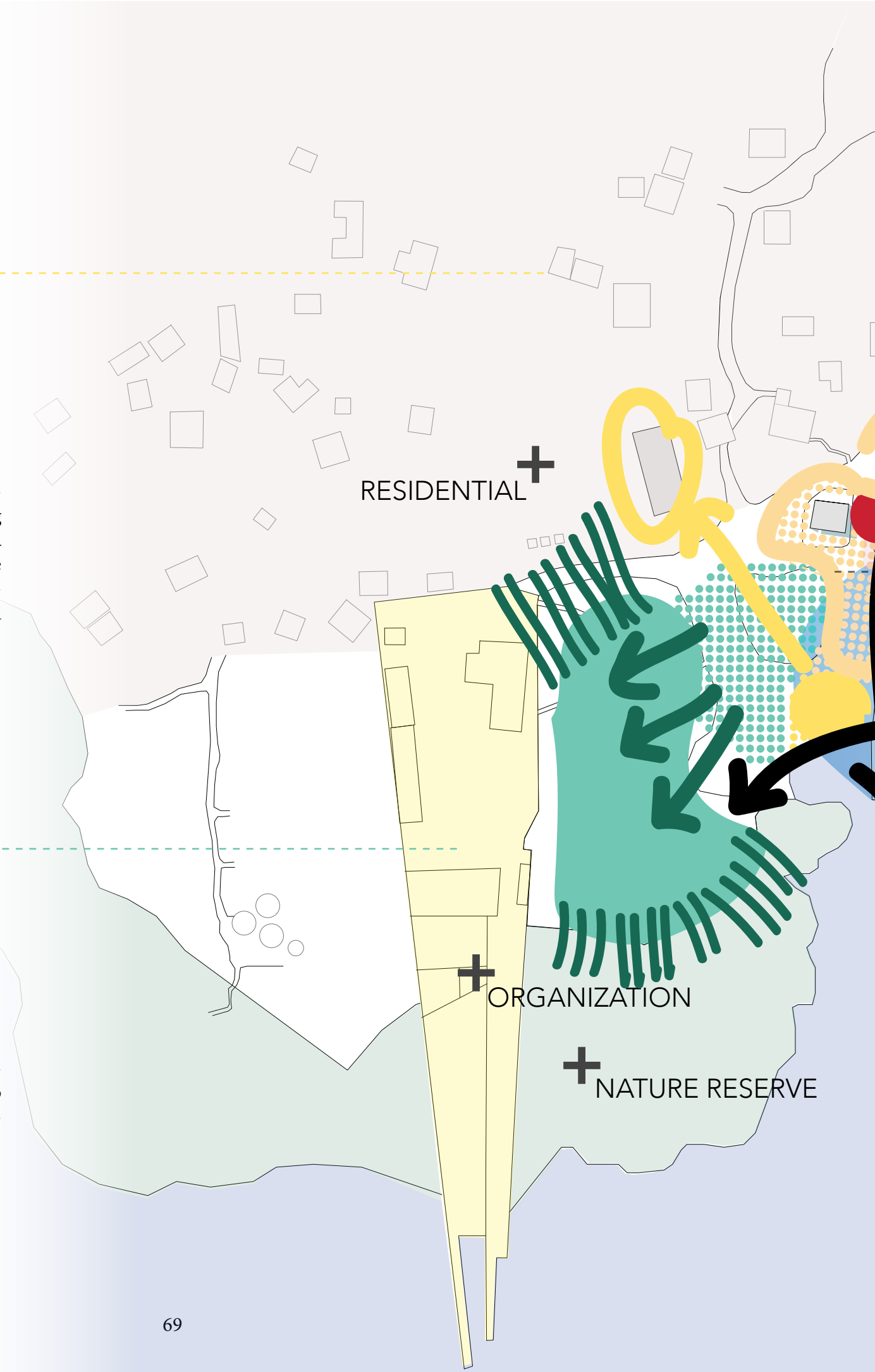
IMPROVING MEETING PLACE AND STORAGE

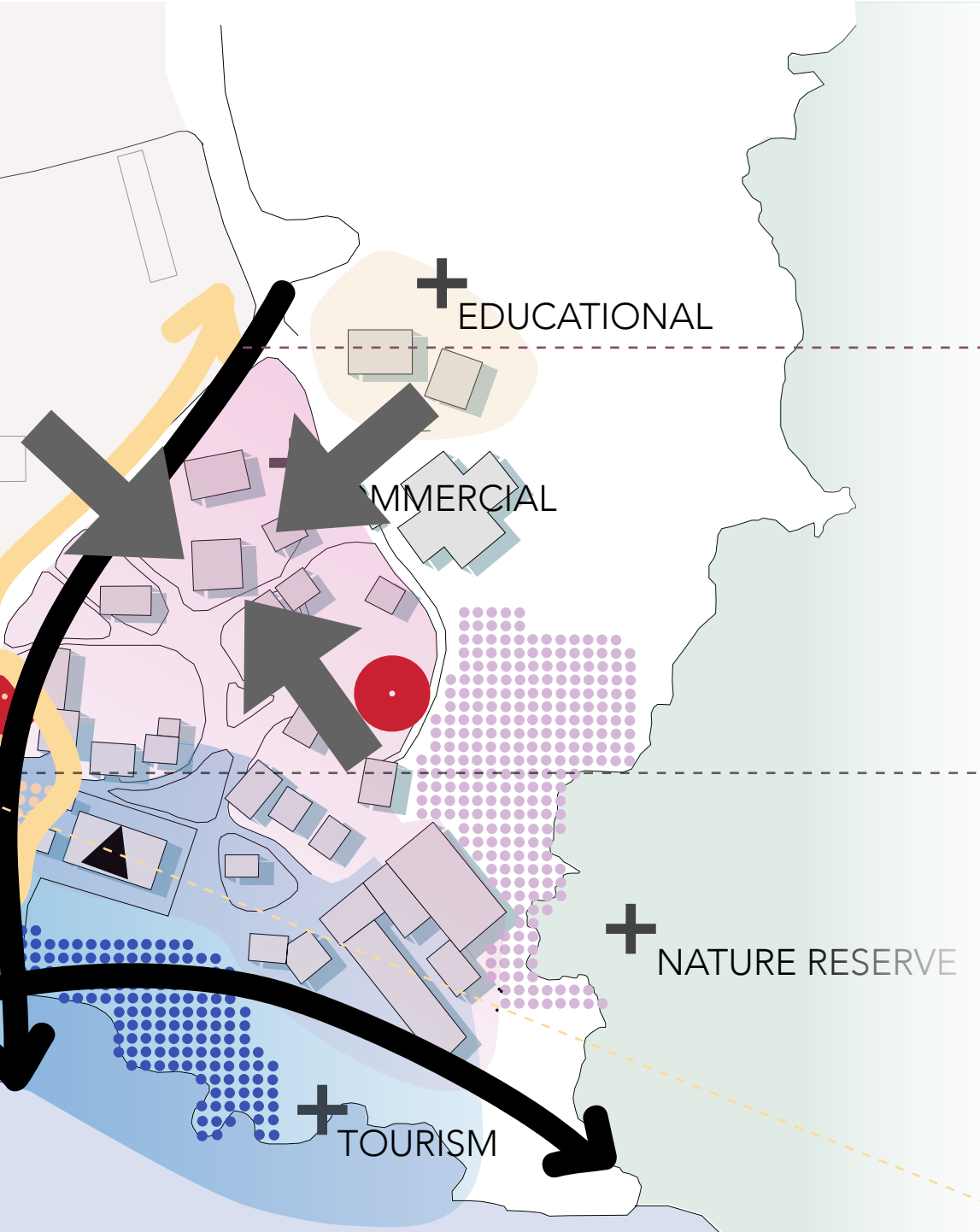
Charcoal workers get a new storage and meeting point. Today the charcoal workers have no facilities, but are working and have their storage directly on the beach. Moving the activity would not only give the charcoal workers a better storage with a roof for rainy days but also provide shade and a place to gather for meetings, lunch, etc. Furthermore, the beach is cleared to be used for recreational purposes and becomes more accessible for everyone.

B

IMPROVING & DEVELOPING THE RECREATIONAL AREA

The recreational area is extended, connecting the residential area with the wetland and therefore creating access to the wetland. Recreational infrastructure is provided, enhancing existing qualities and contributing with recreational values such as shadow.





C

REUSING SPACE

The old un-used metal structure is reused for a library and mixed use space, connecting the educational area with the residential and the commercial area, creating a new meeting point for the locals.

D

DEFINE A CLEAR CORRIDOR & ENABLE EASY ACCESS ALONG AND TO THE LAKEFRONT

The main road is extended out to the pier, and the unused building is removed. It is important to extend the main road and provide a clear access towards the lakefront and along the lakefront. This will connect the pedestrian path to the lake and open the visual access and provide a continuous promenade along the lakeside.

E

PROVIDE VISUAL & PHYSICAL ACCESS TO THE LAKE

The parking area is moved to the entrance of the village. It is important to improve the visual and physical access to the lake in order to enhance the existing quality of the lake as well as the nearness and presence of the wetland. Moving the parking area will unblock and enhance the visual access, provide a clear access and movement towards the water. People are allowed to drive through on the pedestrians conditions.

Fig.59: Plan over Dunga showing spatial strategies

DESCRIPTION OF SPATIAL PLAN

P

N

SECTION A-A

Fig.54: Spatial plan over Dunga

50
SCALE 1:900 m

Boardwalk
Rain garden
Wetland
Grass
Wooden bench
Plantation
Tree
Replanted wetland
Reused structure with green roof
Existing building with green roof
Existing building
Entrance
P Parking

CO-WORKING SPACE

STORAGE & MEETING PLACE CHARCOAL WORKERS

SOLID WASTE MANAGEMENT SPOT

EXTENDED MARKET & CONTINUOUS PROMENADE

EXTENDED PIER

WETLAND RESTORATION PARK & VIEWPOINT

SECTION A-A
SCALE 1:200

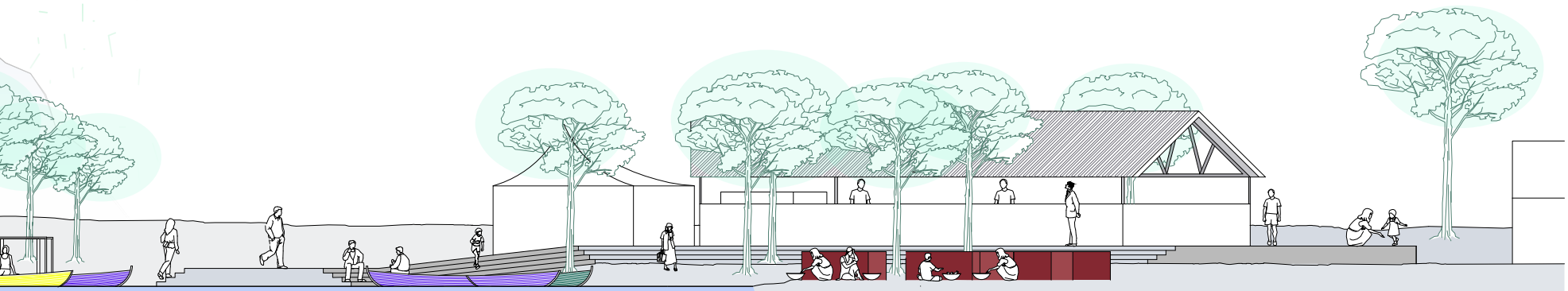


Fig.60: Section A-A over Dunga, showing the pier, fish market and wetlands

EXTENDED PIER

Define a clear corridor and provide access towards the lakefront

Providing a clear access towards the lakefront is important. Therefore the main road is extended out to the pier. A clear division between road and built environment is made in the form of a rammed earth edge. Trees and solar powered street lights are placed by the entrance of the village, parking and along the main road, making the area feel safer and defining a clear corridor towards the lakefront. Trees are added on both sides of the main road. Micro bio-swales along the main road simplifies for the rainwater in the rainy season to soak slowly into the earth and prevents flooding.

The parking area that was situated in the middle of the main road was blocking the view towards the lake and was creating a physical and mental barrier. The parking is moved to the entrance of the village. It is important to improve the visual and physical access to the lake in order to enhance the existing qualities of the lake and the wetlands. Moving the parking area will unblock and enhance the visual access as well as provide a clear access and movement towards the water. People are allowed to drive through on the pedestrians conditions, and in a future phase cars, buses, tuk-tuks, and boda-bodas will be banned from the village. The parking has four spots for buses and six spots for cars; the rest is for bikes and motorcycles(boda-boda). The car parking can also be used of tuk-tuks, even though they seldom reach the beach because of the bumpy road. The amount of parking space is somewhat more than what is used today.

REPLANTED WETLAND

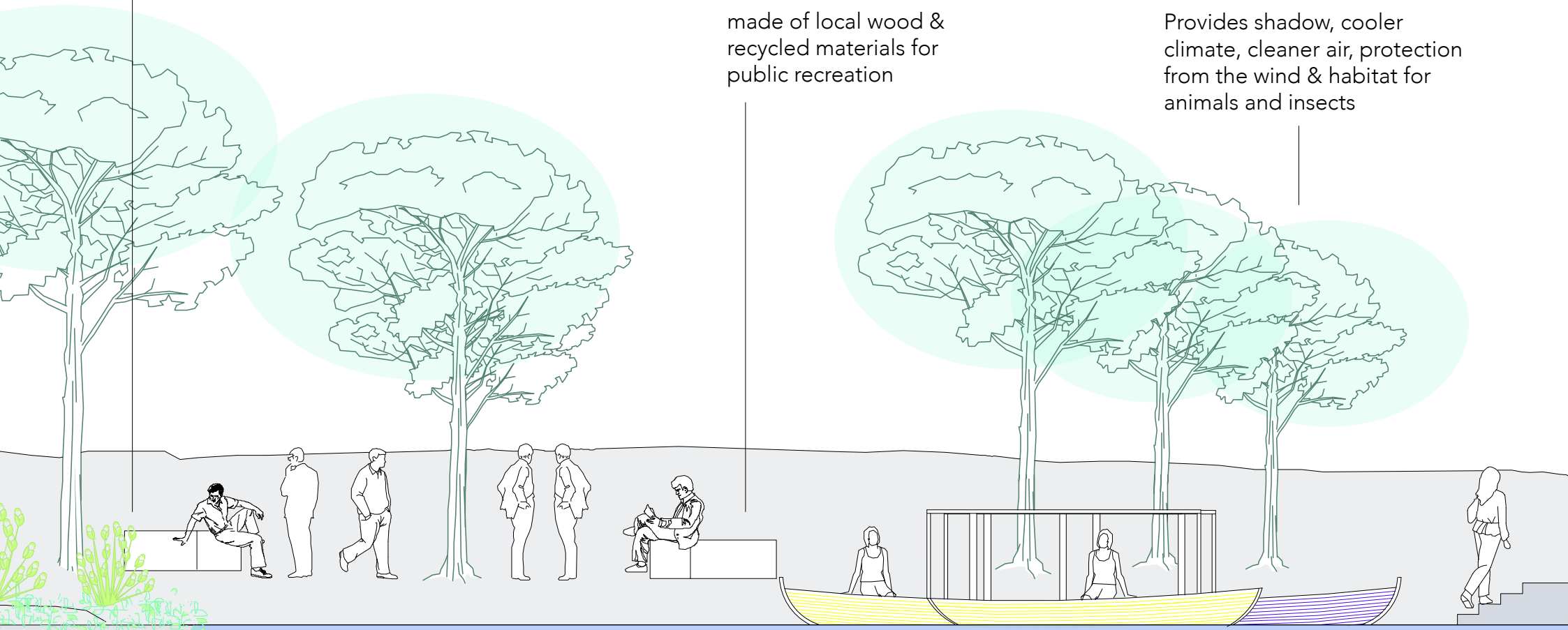
for public recreation & cleansing of polluted water

SEATING

made of local wood & recycled materials for public recreation

NEW TREES

Provides shadow, cooler climate, cleaner air, protection from the wind & habitat for animals and insects



SECTION A-A
SCALE 1:75

EXTENDED MARKET & CONTINUOUS PROMENADE

Improving public facilities & enable easy access along the lakefront

Providing a clear access along the lakefront is important. Today the existing pier divides the beach into two areas and makes movement along the beach hard since it is 0,6 meters high and this makes it hard to pass. The pier is of concrete and connected to the concrete slab beneath and around the fish market. No stairs are leading up to the market or pier as it is today.

Therefore stairs along the pier and a ramp leading up to the pier and market would not only connect the pedestrian path along the lakefront but also provide a continuous promenade for the locals to enjoy. A ramp creates an easier access to the market. The ramp has several levels and extends itself as a natural expansion of the market and becomes a part of the existing meeting place. The ramp can be used as seating but also as an occasional outdoor market for both fishmongers and independent craftsmen from Dunga and the region. Furthermore, it will improve the conditions for the people working on the beach, that every day needs to move up and down to the fish market, get in and out of the boats and move along the beach.

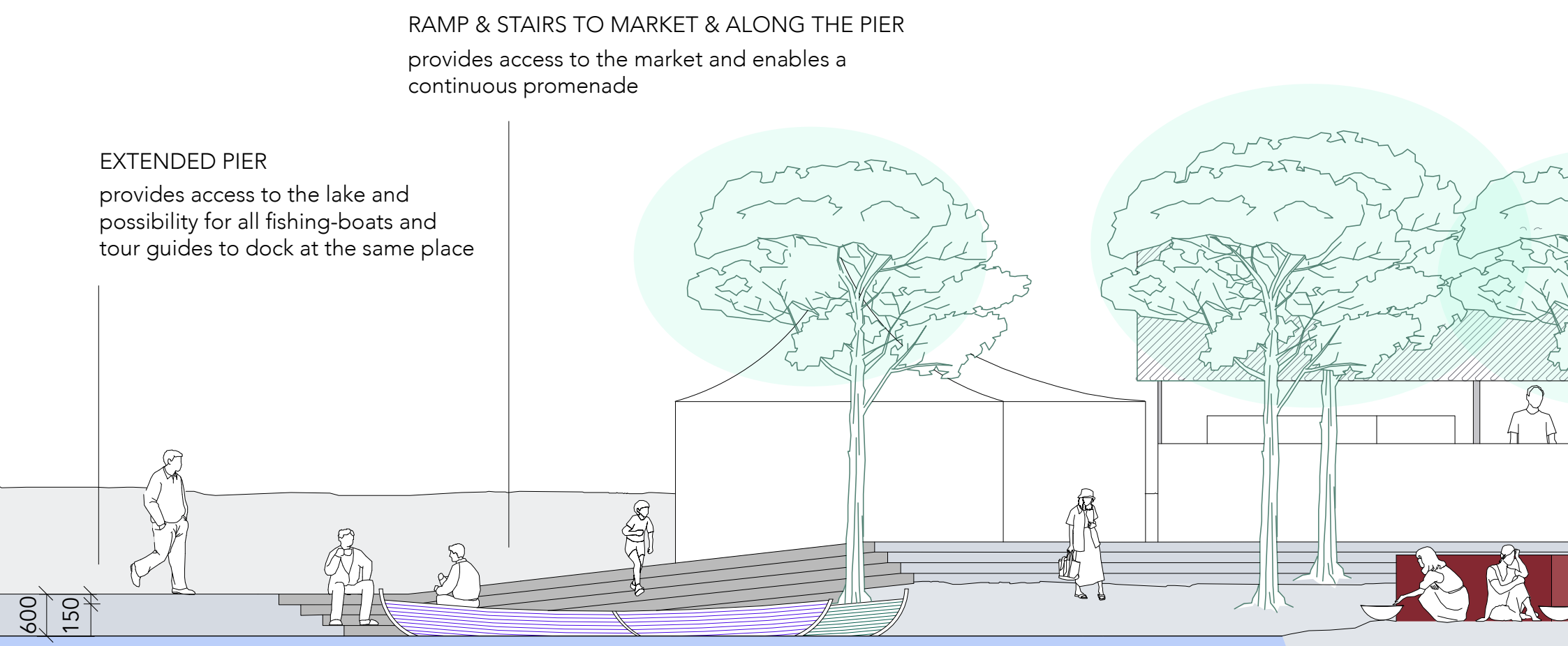


Fig.61: Section A-A over Dunga, showing the pier, fish market and wetlands

CO-WORKING SPACE

PROGRAM

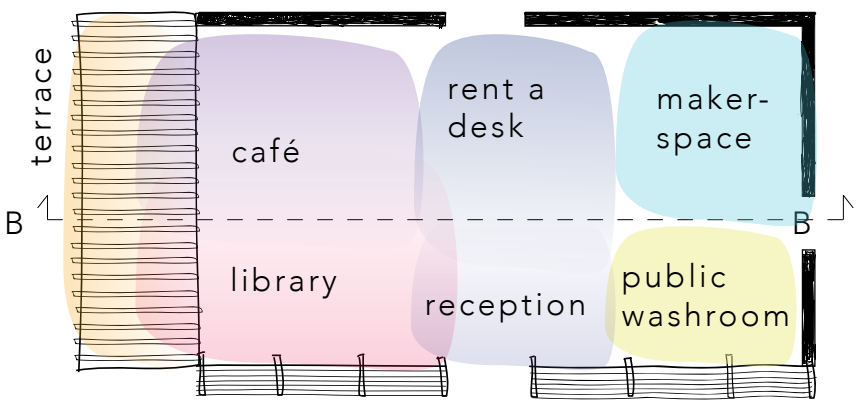
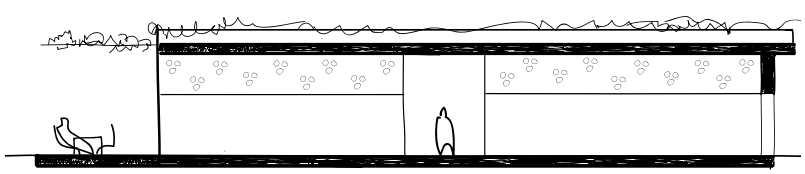


Fig.62: Program Co-working



SECTION B-B
SCALE 1:200

Fig.63: Section Co-working

Reusing space

The un-used structure is reused for a 24h open mixed-use, naturally ventilated public building with a co-working space, makers space and library. This will create a new meeting point for the locals. It will enhance the existing qualities and wishes by the locals to learn, share and create. It promotes sustainable entrepreneurship and encourages the locals to create new, sustainable livelihoods. It is a place to network, share experiences, knowledge and time. But also to share tools such as a sewing machine, bike or a hammer or just read a book and relax. The library provides a computer spot and a possibility to borrow or rent a temporary or permanent desk. The building is guarded by the BMU and students as staff. The building is constructed with local materials and techniques, with the help of the locals. The construction process is as much a way to affect social, economic and ecological change as the building itself.

MICRO BIO-SWALES
as a recreational element with a variety of local aquatic plants reduce runoff & filter contaminants

NEW TREES
for shadow and to reduction of surface runoff and erosion

GROUND PAVING
to create a coherent patio & connect the 3 buildings, prevents mud, but lets surface runoff pass

GREEN ROOF
an aesthetic quality, acts as an insulator, reducing cooling & heating demands

SOLAR PANELS
provides energy for lighting during night

VERTICAL GARDEN
for small-scale agriculture, improved air quality and as an aesthetic element

BIOGAS
Provides gas for cooking and Fertilisers for small-scale farming

RAIN GARDEN
as a playful element to reduce flooding, surface runoff and filter stormwater.

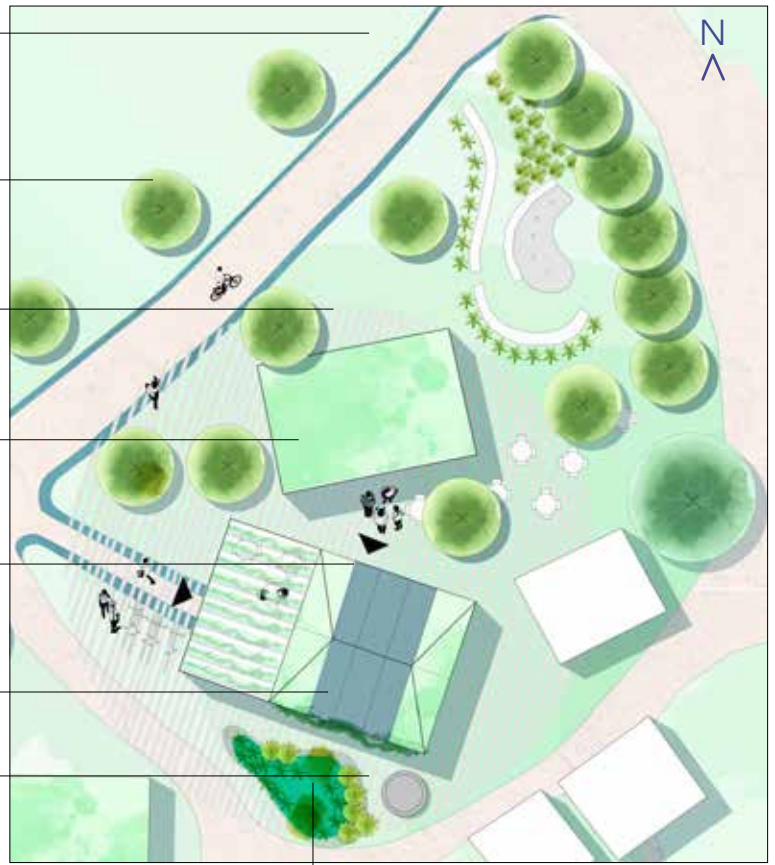


Fig.64: Plan Co-working

Reusing space

The unused building is removed and replaced with a green area for waste management. The one that exists today is not functioning properly, and not well designed. People still throw all trash in a random bin and don't care for sorting it. The new waste management spot provides functions that will increase the advised usage. One of the problems of the old waste management system was that people still thought they had now where to leave food waste or waste papers. The existing bins are both too small and too few for a village that some days have hundreds of visitors. The new solid waste management spot has bigger containers, with four different colours for paper, metal, plastics and glass, but also two bins for food waste. One for vegetable and one for animal food waste. The locals that keep animals can then come to pick up the food waste to use for animals food or biogas production. In a village where everybody knows each other, it's encouraging to sort your waste if your neighbour can use it the next day to feed his chickens or produce gas for a common dinner. The bins all have a clear and pedagogical headline, explaining text and graphic to show what kinds of waste to throw where. The wooden roof structure with green plants provides shade while sorting your waste a water point with filtered rainwater to clean your hands. The spot is lighted by night through solar power. The structure is made out of recycled materials and local wood and is placed at several places around the village.

CHANGE PEOPLE'S BEHAVIOUR?

ENCOURAGE THEM TO RECYCLE?

HOW?

MAKE IT FUN!

Fig.65: Sketch waste management spot

WETLAND RESTORATION PARK & VIEWPOINT

Improving & developing the recreational area

The recreational area is extended, connecting the residential area with the wetland and therefore providing easier access to the swamp. Today the place is a un-used mess of bushes, grass, clay and trash close to an existing meeting point by some trees for workers in search of shadow. The park will bring not only recreational values such as shadow and protection from the wind and rain from new trees but also become a welcoming area with urban furniture with seating possibilities and a playscape, equipped with lighting from solar power. Providing values such as shadow, breeze, places to sit, play or relax. The playscape is built with local and or recycled materials and is multifunctional with both a recreational purpose and an educational purpose. Wetland is replanted with papyrus, hippo grass and local vegetation and purifying plants. A fruit garden with local fruit trees plays with all senses. The elevated boardwalk leads to a viewpoint of both the wetlands, the lake and the village. Lookouts along the path with pedagogic information about the plants and animals you can spot will provide not only knowledge but also awareness. Dipped platforms placed along the boardwalk provides physical access to the lake. The mooring system by the viewpoint performs as an artificial fish habitat.

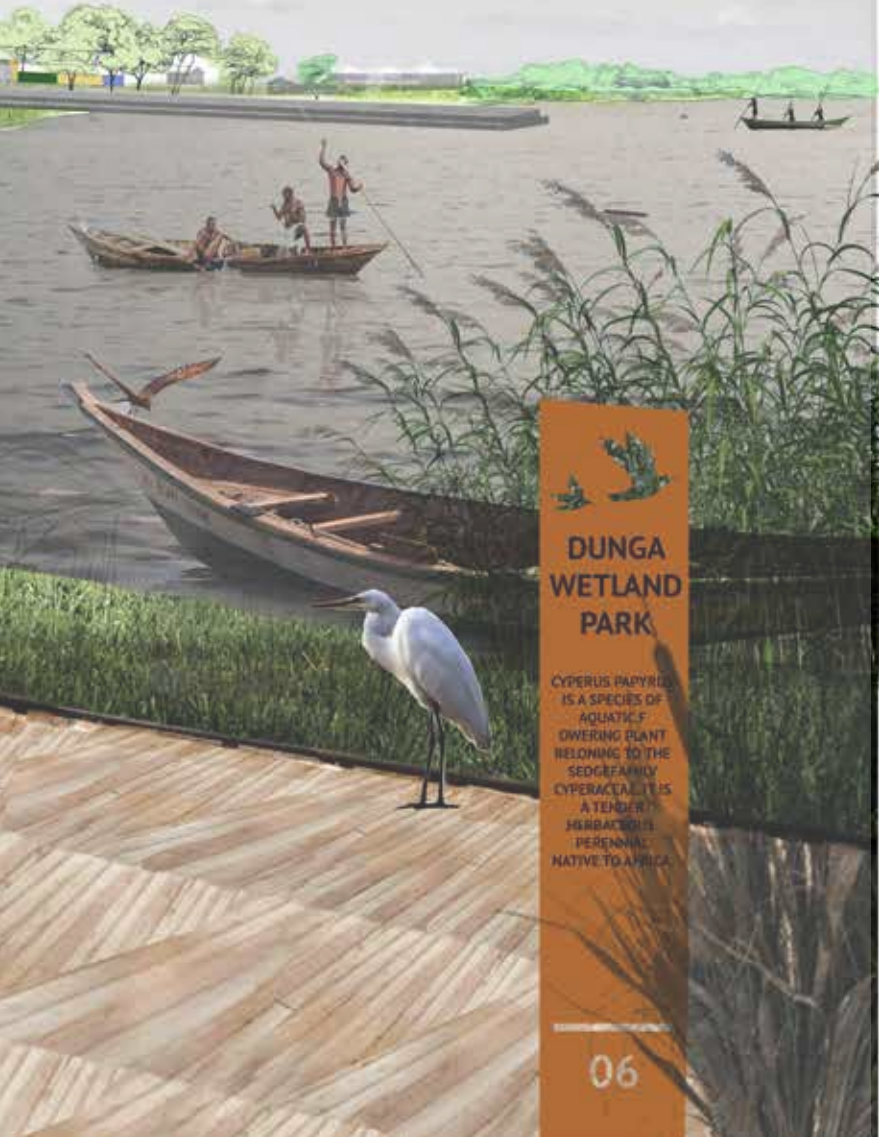


Fig.66: Visualization - wetland restoration park and boardwalk

STORAGE & MEETING PLACE FOR CHARCOAL WORKERS

Enabling the lakefront for recreational purpose

Charcoal workers get a new storage and meeting point. Today the charcoal workers have no facilities, but are working and have their storage and meeting point directly on the beach. The charcoal arrives from Uganda with boats and huge masses of charcoal on the beach not only gives a messy and dirty impression but also prevents visitors and locals from enjoying the adjacent lakefront. Moving the activity does not only give the charcoal workers a better storage with a roof for rainy days but also provide shade and a place to gather for meetings, lunch and sharing ideas, experiences and time. Furthermore, the beach is cleared to use for recreational purpose and becomes more accessible for everyone.

Fig.67: Visualization - wetland restoration park and viewpoint

STORAGE & MEETING PLACE
for charcoal workers

RAIN GARDEN
as a recreational element with a variety of local aquatic plants reduce runoff & filter contaminants

NEW TREES
on both sides of the main road for shadow, weather protection, a cooler climate and to reduction surface runoff and erosion

PLANTATION
with native plants and grass for recreational purpose

NEW SEATING
seating made out of local wood & recycled materials functions as recreational furniture

REPLANTED WETLANDS
playing an important role in habitat for animals & increase community resilience to the impacts of climate change

BOARDWALK
to provide access to the wetland, to experience the wetlands rich biodiversity closer and raise awareness of the value of wetlands

VIEWPOINT
provides a possibility for an overview over the wetlands, the village and its beauty as well as a possibility to come closer to the bird life

Fig.68: Plan over Dunga beach

DUNGA TODAY

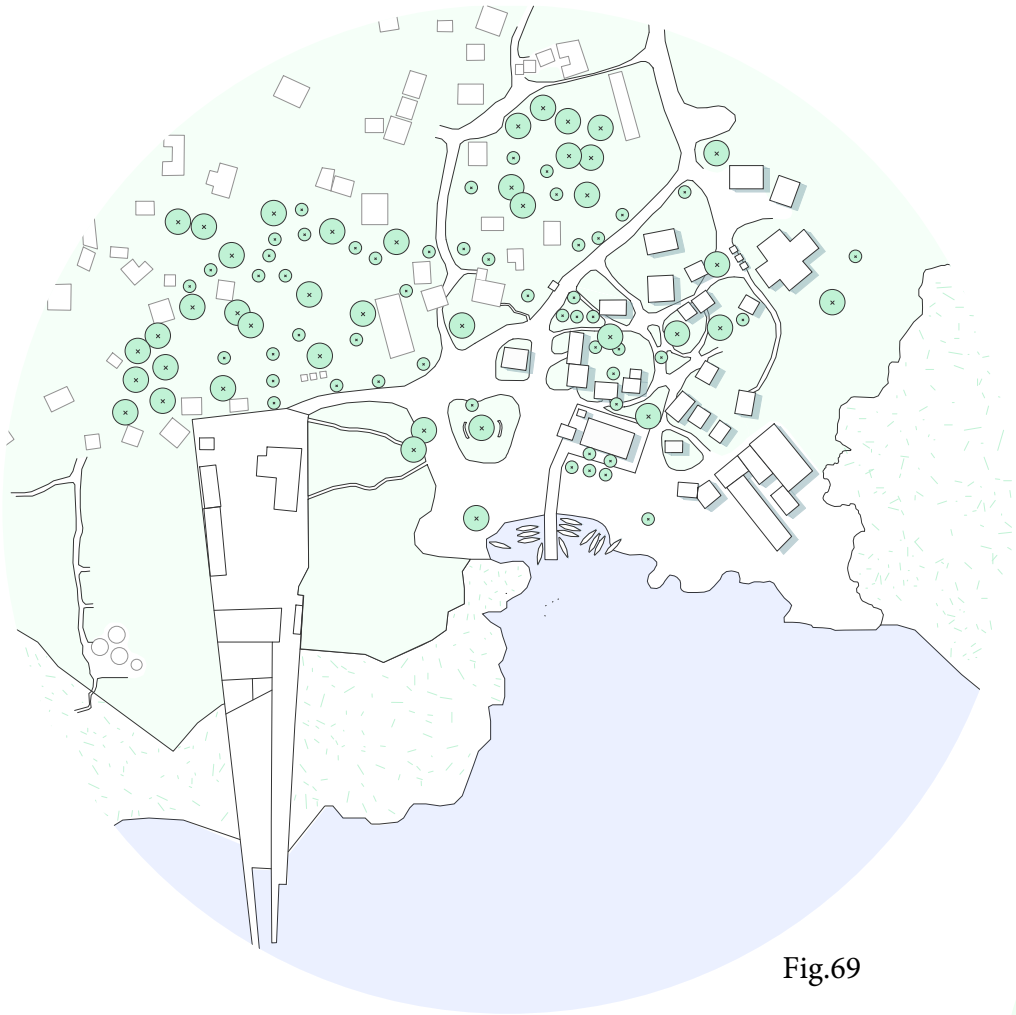


Fig.69

SPATIAL PLAN

- Sustainable proposal for Dunga

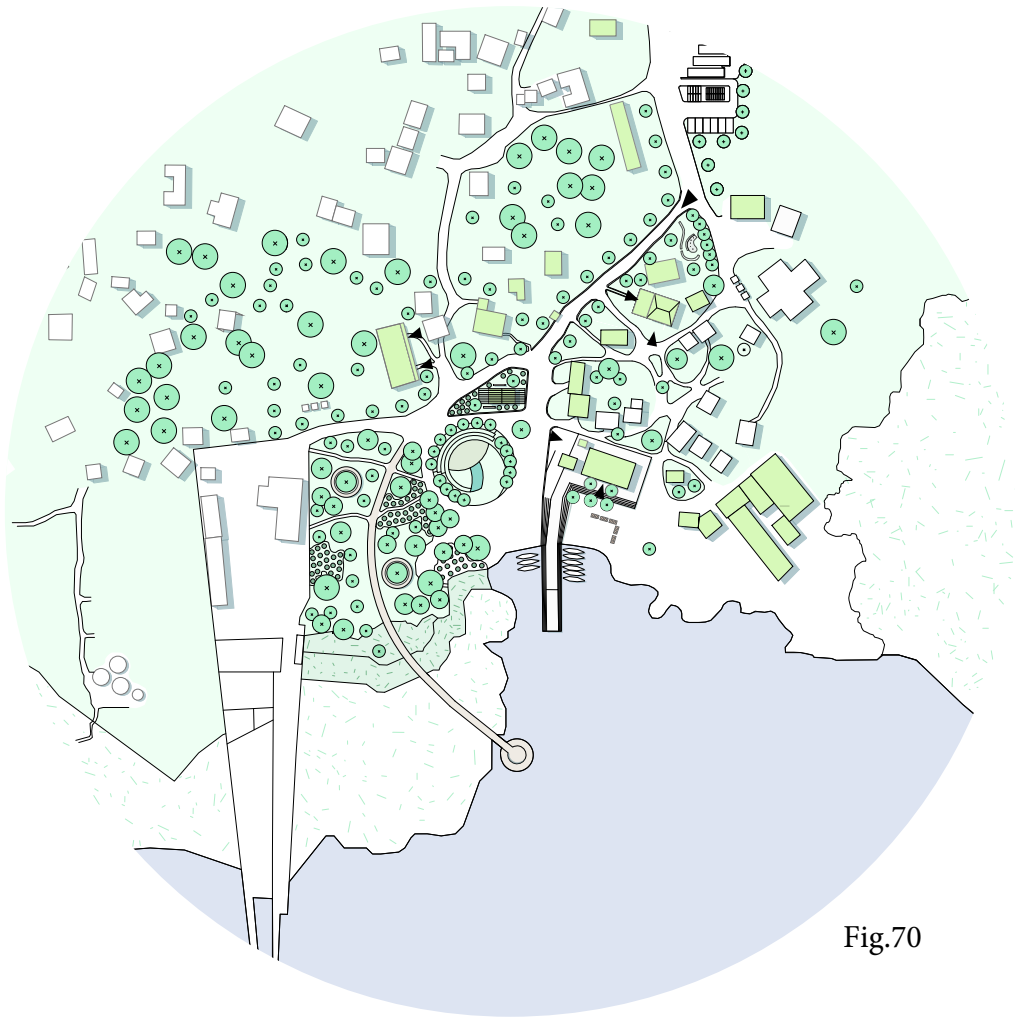


Fig.70

Fig.69: Plan over Dunga before, 70: Plan, sustainable proposal over Dunga

PRINCIPLES FOR
WATER & ENERGY

Fig.71: Kids in slum (Hansen, J., 2011)

BIOGAS SYSTEM PRINCIPLE - *Flexibiogas*

Biogas is becoming more popular as a energy resource for rural communities in the developing world, and particularly in Africa. It is a low-cost integrated system that provides an alternative energy based on organic manure. Biogas a solution to decreasing gas emissions and improving soil fertility. Supporting biogas could contribute to reducing the use of wood and papyrus, that the locals first cut down and then burn to use for fuel, and therefore help to restore degraded land. The technique "flexi biogas" is developed in Kenya and is suited for people with little or no livestock since you can feed it with anything that is biodegradable. A "flexi biogas" system is portable. This implies that the user can bring it if they move or resell it. Its cost is half the price of a conventional system (1000 USD). It generates gas almost instantly in comparison to traditional biogas systems that can take months to start. The flexi biogas system needs 60kg of organic material to give 1000 litres of gas, which is approximately what a rural household needs per day. In addition, the reduction in the use of wood and papyrus is about 1 tonne/person per year and person, considerably reducing greenhouse gases and emissions. The use of the system has shown that *"With biogas only, farmers tend to use all the gas to provide light in the house instead of cooking, and they go back to fetching wood to cook."* Says Dominic Wanjihia, founder of Biogas International. Therefore it can be a good idea to complement the biogas system with solar panels (IFAD, 2012; Biogas International, 2015; IFAD, 2013).

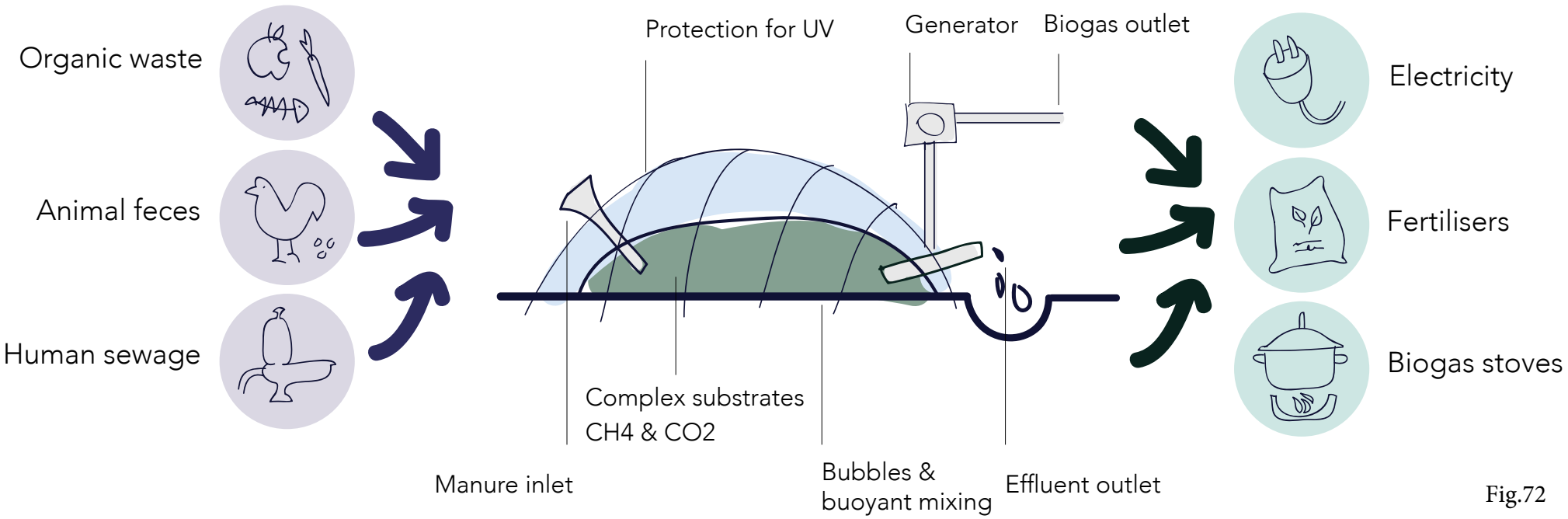


Fig.72

1. Everyday the community produce a lot of waste that can be used to feed the biogas system. Even water hyacinth can be used.

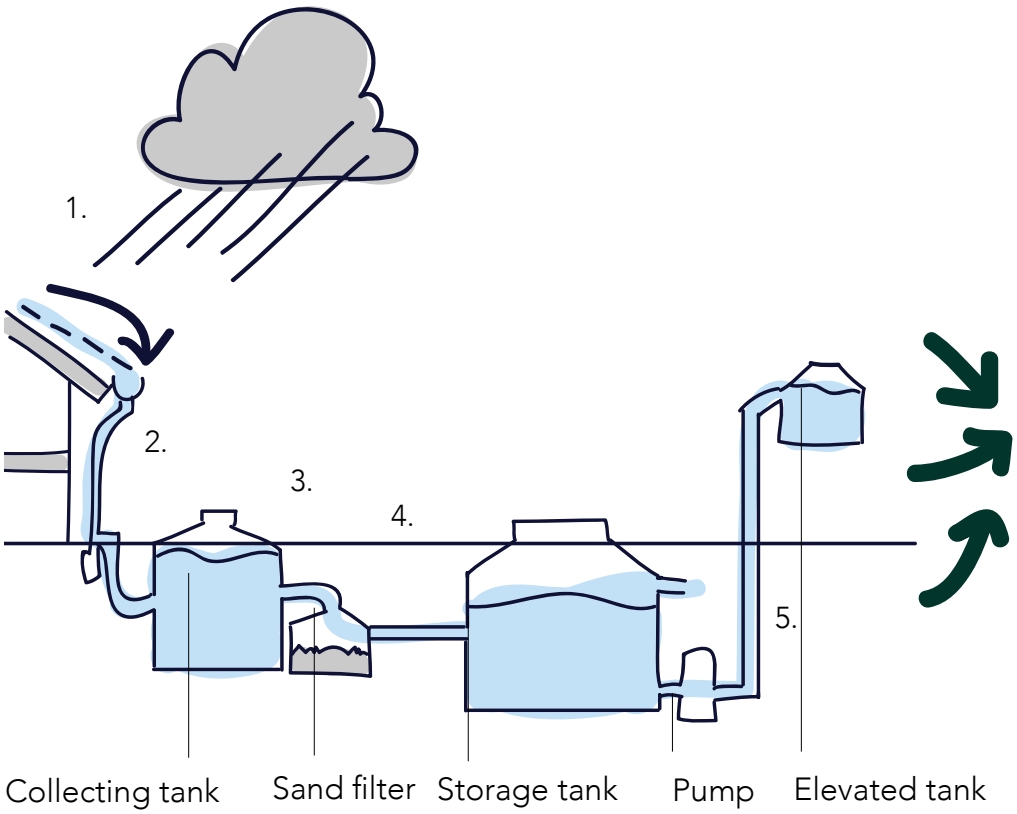
2. The biomass is digested by anaerobic micro organisms. This process produces methane and carbon oxide - the biogas.

3. The generator produce electricity or gas for the stoves, effluent can be used as fertilizer. The locals can sell the Fertilisers to farmers and then gain an economic profit.

Fig.72: Diagram - Flexibiogas system (IFAD, 2012)

RAINWATER HARVESTING PRINCIPLE

Women in the rural parts of Kenya spend about three hours every day carrying water from distant sources to their homes, according to amshaafrica.org. The time women and girls spend in transporting water reduces significantly the time they could spend in school or earning a viable income. Drying water sources (like Lake Victoria) drives locals to use excessively contaminated water, and through that catching in water-borne diseases when consumed. One of the cheapest, most uncomplicated, and most effective solutions to the water crisis in a village like Dunga is the construction of sustainable rainwater harvesting system. (Fig. 03) But this type of system is more suitable for a public building like a school or library, for a household, this can be expensive, and it might be more recommendable with the Rainwater2Hog system, which is a simpler and cheaper installation over the ground with plastic containers. This design is modular, and therefore the user can buy one module, and later add more when the users economy allows it. The module can be stored both vertically and horizontally. (Fig.74.) The RainwaterHo2g has almost the same principle with a pump and a filter (Rainwaterhog, 2005).



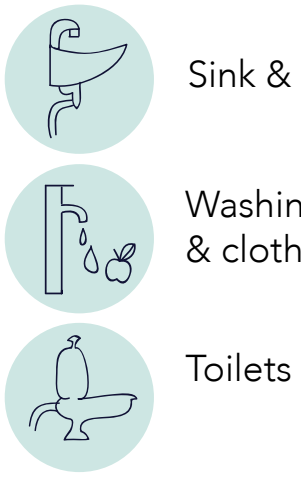


Fig.73:

RainwaterHo2g

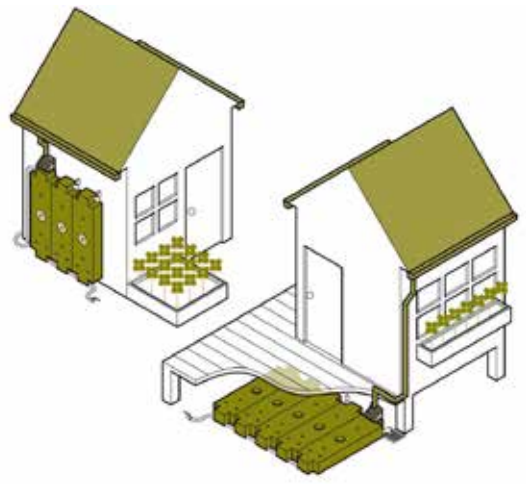


Fig.74:

1. A rain gutter collects the rains from the roof.

2. A container collects the first dirty rainwater. When the container is full the water pours into the tank.

3. The water passes directly to a first collecting tank.

4. The sand filter purifies the water and the water is stored in an underground tank.

5. Water is pumped to the elevated tank when it is needed. It is not in constant use which gives an advantage during power failure.

Fig.73: Diagram - rainwater harvesting principle, 74: Diagram of RainwaterHo2g (Dominguez, S., rainwaterhog, 2005)

DRINKING-WATER HARVESTING PRINCIPLE - *Solvatten*

One challenge is to provide drinkable water to Dunga and its population. Due to lack of an acceptable energy resource people use natural resources, mainly wood, charcoal and papyrus in order to heat water for cooking, washing and drinking. It is expensive in a long-term perspective and leads to smoke inhalation, deforestation and increased carbon dioxide emissions. According to solvatten.se 70% of the energy that a conventional household in Kenya uses is for cooking, washing clothes and dishes and heating water. Solvatten is a portable water treatment and solar water heater system forfamilies. It's made of plastic and requires no batteries, chemicals or spare parts. Buying water from vendors in Kenya cost about 2-3 USD / m^3 water. This water is many times cold and not safe. 1 m^3 of water that is heated with a charcoal stove until reaching 55°C would need 60 kg of firewood or charcoal, which costs about 20 USD. In the end, this water has a price of 23-25 USD, and it still not safe to drink, according to solvatten.se. One Solvatten unit can treat 6 m^3 of water/year in a country with climate as in Kenya. It can last 10 years, and if used during the whole time it could yield 60 m^3 of drinkable water for 150 USD, which means 5 USD /1 m^3 of potable water (Solvatten, 2006).


Fig.75


Fig.76


Fig.77


Fig.78


Fig.79

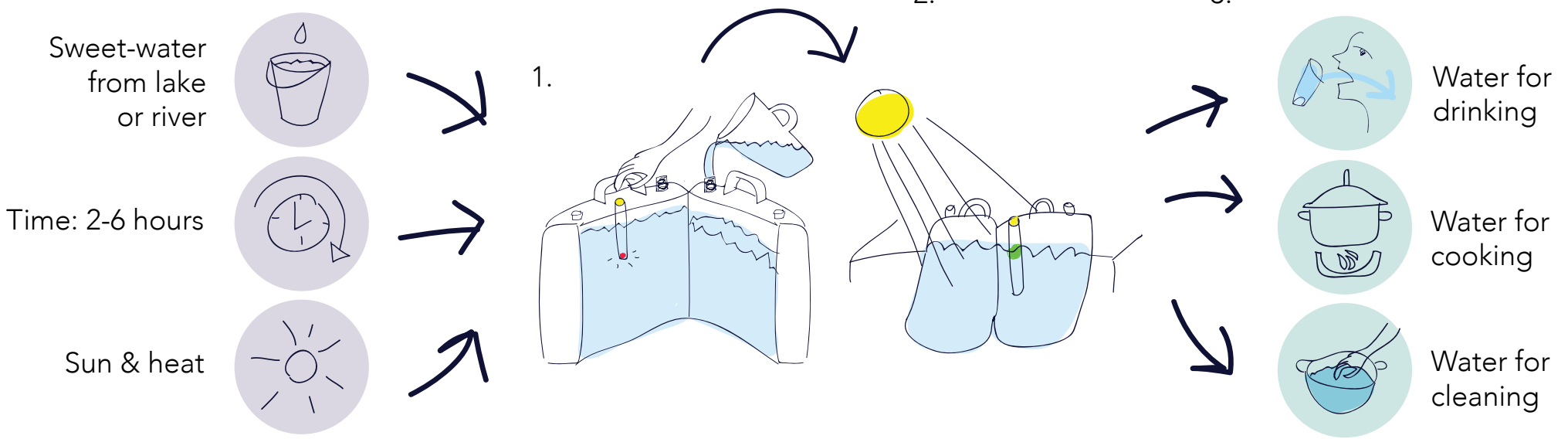


Fig.80

1. Open up like a book and fill the Solvatten unit with freshwater from any lake, river or stream.

2. Place the Solvatten unit in direct sunlight to simultaneously heat & expose the water to ultraviolet radiation. This purifies the water & it will be free of pathogenic material. An indicator tells the user when the process is complete and a sad red face changes to green & happy.

3. The water is ready to drink, use for washing or cooking and meets the World Health Organisations safe drinking water standard.

Fig.75, 76, 77: The added value of Solvatten (solvatten.se, 2006) 78: Solvatten unit (solvatten.se, 2006) 79: Children with Solvetten unit (facebook.com/solvatten.se, 2013), 80: Diagram of how Solvatten works (Solvatten, 2006)

MICRO-BIOSWALE PRINCIPLE

One challenge in Dunga is flooding, the roads are made out of soil, and there is no drainage system. The bioswale is a landscape element that is used to redirect rainwater runoff for plant use and storm-water filtration. Water flows into the bioswale, over its sloped edges, and contaminants and inorganic materials are filtered by the soil, gravel and also through the root system before entering the drainage system, and back to natural streams and lakes. The bioswale is able to soak up a lot of water. Vegetated bioswales like the ones suggested for Dunga contributes a lot to improve the water quality. Without a suitable storm-water management, the poor water quality can result in the loss of these habitats for fish, birds and other wildlife. Chemicals that are not filtrated could also lead to aquatic ecosystem disturbance (Green Camps Initiative, 2015).

Fig.81

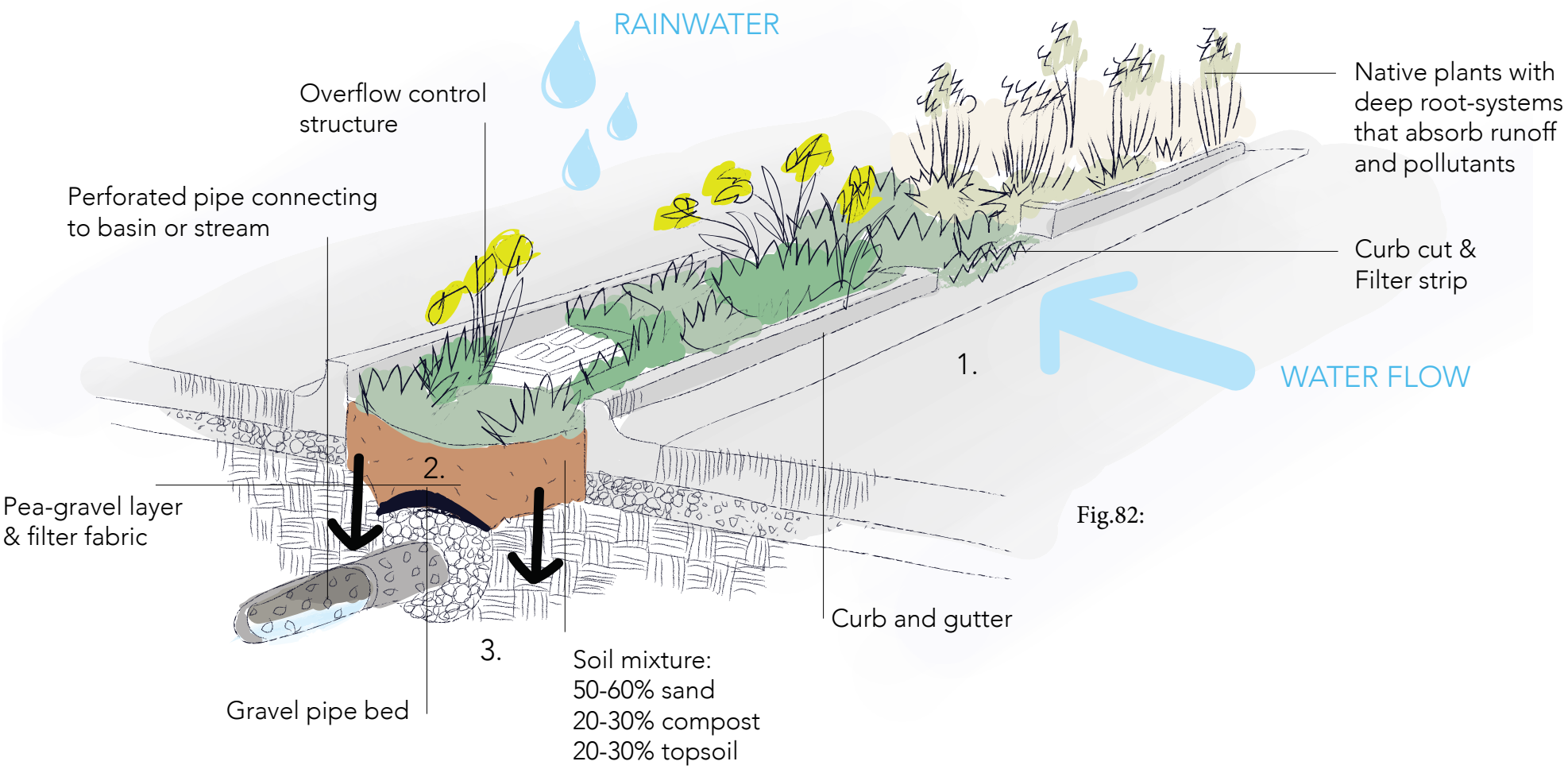


Fig.82:

1. Sloped edges direct storm- water runoff from the streets into the bioswale.

2. The water slowly filters through root-systems of plants that redistribute moisture and sustain microbial populations, as well as filter contaminants. The water passes through the soil, and then a secondary filtration layer made out of sand gravel or rock.

3. The water slowly makes its way to the local waterways.

Fig.81: Stormwater filtration from bioswales (Brooks, O., 2012), 82: Diagram of a micro-bioswale´s components

RAIN GARDEN PRINCIPLE

The rain garden takes care of rainfall and stormwater runoff. It works in the same way as the bioswale but on a bigger scale. Two types of rainwater gardens are placed in Dunga. One rain garden is placed close to roads and areas that don't previously have many green plants that can absorb the rainwater. The amphitheatre rain garden is placed by the wetland park. The amphitheatre can be used as an outdoor classroom, a theatre or just a place to sit down and have your lunch in the shadow.

Fig.83

Fig.84

Fig.85

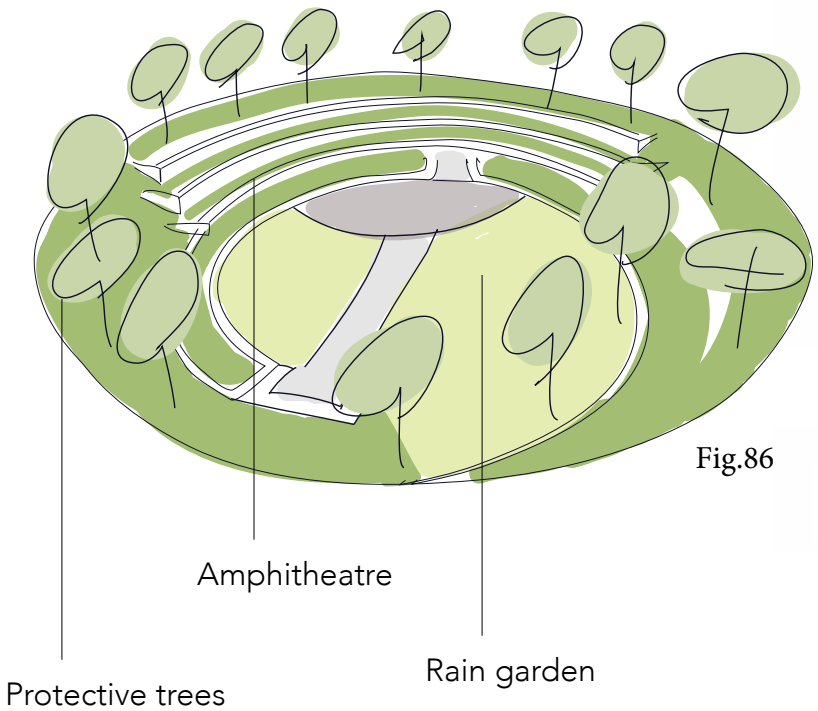


Fig.86

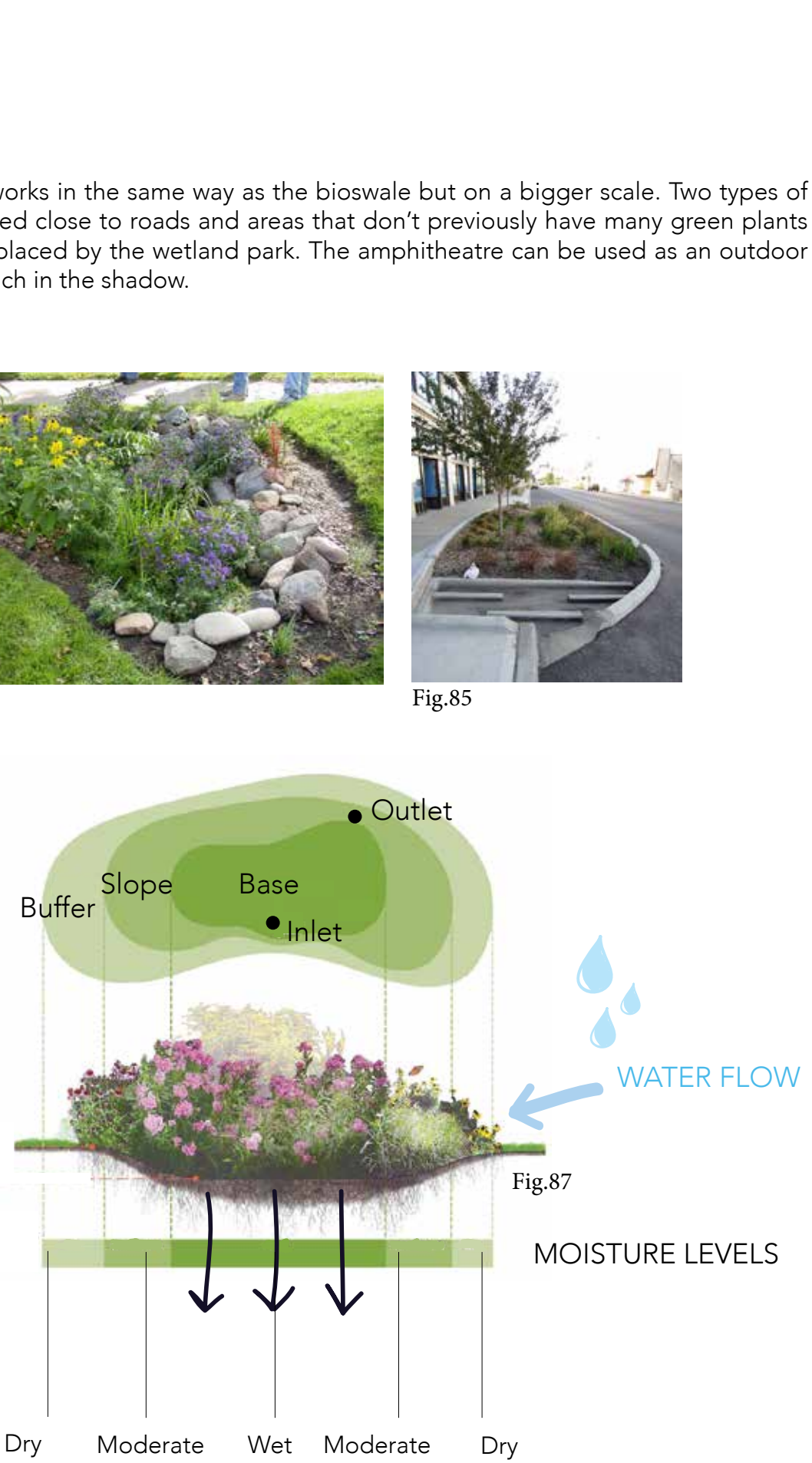


Fig.87

Fig.83: Rain garden (Brenner, M., 2013), 84: Backyard rain garden (Bolincreek.org, 2014), 85: Curbside rain garden (Mc, J., 2012), 86: Mixed use amphitheater rain garden 87: Rain garden diagram (landskapsarkitekt.tumblr.com, 2016)

SOLAR POWER PRINCIPLE

Electricity for households and public buildings is important. Even if you can get some electricity from biogas, maybe it's not the best option for a public building like a school that is used by many people and therefore uses a lot of energy. As mentioned before, many households will need to complement their biogas system with solar panels, especially to achieve light since with only biogas the families tended to use the total amount of gas to supply light (and not for cooking) in the house according to the founder of Biogas International (Biogas International, 2015). The panels can be installed on the roof, and the climate in Dunga is perfect for solar power. Something that is understandable since it's situated close to the equator. One factor that also shows that solar power is a good idea to provide the village with electricity is that Kenya is already the most active country in Africa to produce renewable energy (Wikipedia, 2016d).

Fig.88

Fig.89

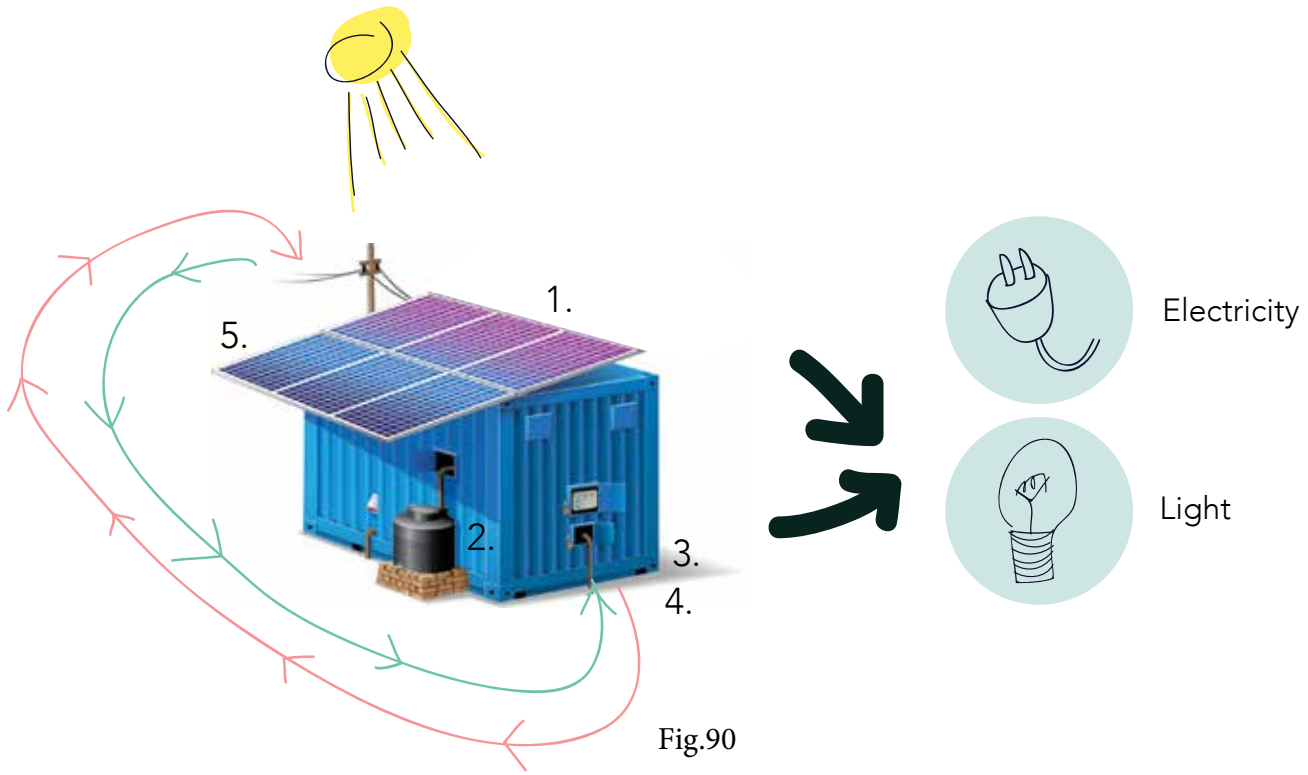


Fig.90

1. Solar panels absorbs energy from the sun and turns it into DC current.

2. An inverter converts DC to AC current and controls the production.

3. Later, the electrical panel distributes the electricity to your home.

4. Any access solar power will flow back through the grid and through the utility meter.

5. The utility grid provides the user with electricity the days you exceed the amount.

Fig.88: Rechargable lamps powered by a joint solar power installation in Ikisaya, Kenya (Berg, L.M., 2014), 89: Solar panels being installed in Kenya (Cervantes, J., Greenpeace, 2014), 90: Diagram explaining the convertion of sun rays to electricity or light

LIVING ROOF PRINCIPLE

There are several categories of green roofs. They are often divided into intensive, semi-intensive and extensive roofs. Where extensive has the shallowest depth, and intensive has the deepest. Intensive roofs are similar to a park, while extensive are more like a green mat and are highly self-sufficient and are mostly accessed to be maintained. In a place like Dunga with Sub-Saharan climate and conditions, green roofs will improve not only air-quality but also absorb 80% of the rainfall, improving conditions with flooding. It also absorbs sunlight and lowers the building's interior temperature with up to 14 C less. Another advantage is that a green roof resists fire better than a normal roof since plant life retain water the roof will act as a natural form or resistance. Green roofs can also increase the efficiency of rooftop solar panels by helping absorb heat and making the panels more effective. A green roof can also provide habitat and food supply for insects, birds and other small animals (Greenrooftechnology, 2016).

Dunga is a village that lacks space for farming and animal keeping. But it also lacks space to keep growing as a village. The locals are cutting down valuable wetland to get the square meters they need for building, farming and keeping their animals. This results in biodiversity loss and wetland degradation. Green roofing could add space for small-scale farming and animal keeping, provided that it is an intensive green roof. It could be argued that the extensive green roof has the same effect as the intensive one and is easier to maintain, but it would not add the space the locals need. Therefore the intensive or semi-intensive green roof would be better suitable for Dunga. Green roofing is already being used in Nairobi.

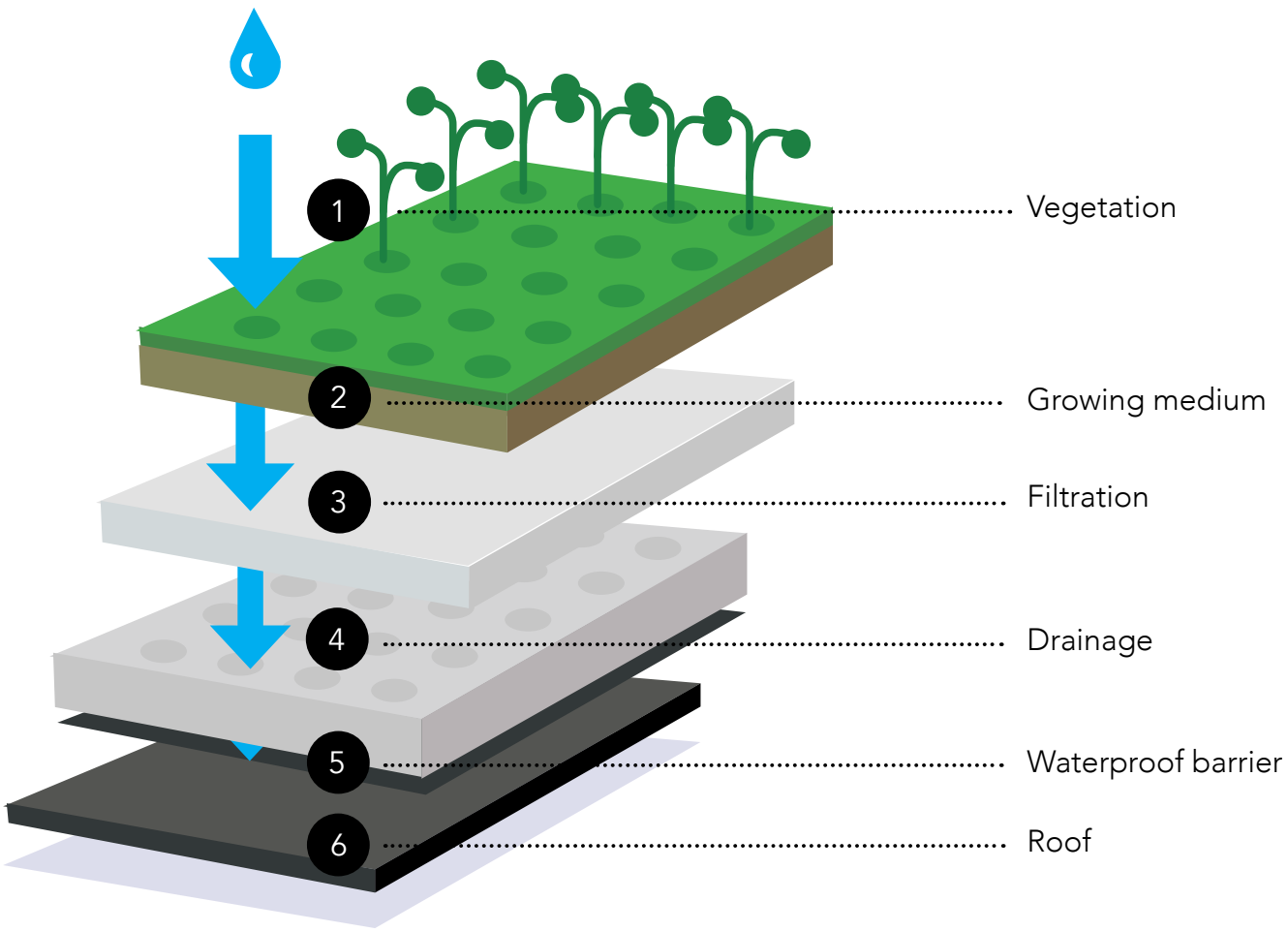


Fig.91: Diagram of layers of green roofing explaining how the water passes

PROJECT REFERENCES



Fig.92: Interior Educational Building (Zoëga, O., 2011), 93: Exterior Educational Building (Sem-Olsen, I.B., 2011), 94: Construction Educational Building (Hansen, B., 2011)

SCHOOL IN CHIMUNDO
BERGEN SCHOOL OF ARCHITECHTURE.
Brejo Chimundo, Moz ambique, 2009.

The educational building by Bergen school of architecture in Mozambique is interesting because of the way that they dealt with re-use of materials, as well as the use of local materials. They wanted to combine vernacular methods with new interpretations (Archdaily, 2011).



Fig.95: Exterior Ithuba School Mzamba (Studio Mzamba, 2013), 96: Interior Ithuba School Mzamba (Studio Mzamba, 2013), 97: Exterior Ithuba School Mzamba (Studio Mzamba, 2013)

ITHUBA SCHOOL MZAMBA,
STUDIO MZAMBA.
Mzamba, Eastern Cape South Africa, 2011.

Ithuba school Mzambra in South Africa is a project that has an interesting natural ventilation and lighting, due to the lack of electricity. It is a building that is constructed entirely by locals, students and volunteers, implementing local craftsmanship and construction methods (Designboom, 2013).



Fig.98: Exterior Library of Muyinga (BC architects, 2014), 99: Interior Library of Muyinga (BC architects, 2014), 100: Interior Library of Muyinga (BC architects, 2014)

LIBRARY OF MUYINGA, BC
ARCHITECTS & STUDIES
Muyinga, Burundi, 2012.

The library of Muyinga is a community project and partly a school for deaf children. All material research, design decisions and construction site organisation was aimed at keeping a short supply chain of expertise, labour, and materials, and through this trying to reinforce the local economy. It's also a building that used almost only local materials and techniques (Archdaily, 2014).

SUMMARY & DISCUSSION

The ideas and design proposal for Dunga presents a potential approach for improvement of the public space. It provides a proposal of a possible way to raise environmental awareness. After the interviews and dialogues, I understood that there is a lack of space for working, but also for resting. There is also a need and an immense will to learn new things. Therefore the proposal provides an idea for a mixed-use space where creativity, networking, knowledge and entrepreneurship can be practised. The existing old hotel structure close to the Eco-finder building is reused since I found out that it has been standing for a while and without capital to continue building. As it is now, there are a lot of hotels in Dunga, and more commercial buildings are planned in the area for new constructions, but public buildings are a shortage. For that reason, the idea is to work with something that is already there, but has no current efficient use. One essential thing has been to understand how important and unique the wetland is in Dunga, both for the locals and the visitors. Therefore the interference with the wetland is almost non-existent. The boardwalk leading out to the wetlands is raised on pillars and therefore it isn't necessarily permanent and allows plants to grow, and fish to swim beneath it. The green area next to Osienala is replanted with wetland plants to partly restore lost functions. But the wetland is not just a natural resource with rich flora and fauna. The wetland also brings economy through its many visitors, publicity through its authenticity and unique species. It also brings knowledge about the species and their properties. What has been missing is an understanding of human impact on this so important ecosystem. The proposal shows a green lung for Dunga, where you can learn about the wetland, enjoy the cool breeze, relax and play. The proposal gives knowledge about recycling where the users can see how easily organic waste can be turned into biogas or how rainwater can be reused for drinking, toilets or sinks. The proposal has a focus on sustainable use of resources and provides possible principles of how resources can be managed and reused. One of the many qualities that have been mentioned by many is the calm and beauty of the lake. Therefore it seems of relevance to enhance this. One way has been to enable a continuous path along the lakefront. Another improvement is the wetland restoration park and the viewpoint where one can view the village from the lake, and also get an overview of the wetlands or just watch birds.

In the analysis, I understood that one important thing is to connect the two sides of the beach that are now divided by the pier. Therefore a stair up to the market from the beach, and up to the pier and along the pier is one of the proposed ideas. Alongside with a ramp leading up to the market, and creating access for someone in wheelchair or people with carts with a lot of heavy goods. Since the fish market is a well-used place, mostly by men, and the fishmongers many times sell directly on the beach (if they don't go to the market in Kisumu). One good alternative is to use the wide ramp as an extension of the market that can be used for sitting, selling fish or even crafts. Through the analysis and site-visits, I found that there are many vehicles parked just outside of the BMU-office and the nearby hotel and that this is something that bothers the owners. The movement of vehicles in such a small area, just by the beach, threatening the main quality of the area is unsustainable. Therefore the proposal suggests to move the parking to the entrance and allow motorised vehicles only on the pedestrians conditions, and if necessary (in cases such as delivery of goods to a hotel or an ambulance). This will not only decrease the noise and the amount of emissions from the vehicles but also strengthen Dunga's character as an eco-site. The proposal reflects a Dunga where it is easy to move around and orientate oneself. It is a green oasis where one can escape the noise and chaos in Kisumu. A place where the local community feels involved, and where they are users of the space that they, themselves came up with the ideas to improve. A Dunga where the lake and the wetland are present and accessible. Where the lake and wetland and enhance the image of the village as a sustainable fishing village, a place where existing qualities are utilised. The proposal shows a Dunga that is seen as an example and a kind of "role model" for other villages in the area. A place where the humans respect the ecosystem and take care of their natural resources in a sustainable way, without damaging them.

The proposal can be used as a possible guidance for further development of the area and is mainly built on information gathered at the site. Ideas are built and developed from comments from the locals as well as my observations and information gathered from interviews with professionals working in Dunga or Kisumu that have a great knowledge about the area.

06

CLOSURE

This last part contains reflections on the project and personal reflections as well as a discussion. This part is meant to give an understanding of the conclusion and result, as well as about what could have been done differently and what has worked well.

DISCUSSION

Fig.101: Kisumu/Dunga road (Bard, F., 2015)

REFLECTIONS ON THE PROJECT

I have learned that it is necessary for a project in a developing context such as Kenya to be flexible and let some parts of the project self-grow. It is hard to have an idea from the beginning on what is going to be the focus of the project and follow it strictly. With this said it doesn't imply that it is not important to have a focus and line of argument along the project and to know what you are interested in working with before starting. In this project, I have realised that it is important to have a some clearly defined boundaries and aim from the beginning, as well as research questions. I see myself as a very spontaneous person with many ideas and interests and many times I work like this as well. Being on site and not having a weekly follow up with a supervisor during two months was a challenge. Self-management is not easy and especially since this project is the first project I do individually within my master program and the first individual project since 2010. Even though I enjoy the challenge and have learned a lot, I have come to the conclusion that I prefer working in a group and having one or more persons for brainstorming and discussions. Of course, this made me discuss more with the locals, on site, which was positive. If I started over, one thing I would try would have been to try to work in a group with a landscape designer or an engineer. This would have shown a different outcome and could have made the result even better. At the same time, working by myself has given me other possibilities such as taking all the decisions I felt was right and being able to move faster in the process. On the other hand maybe sometimes it could have been good with some more discussion. It has, though, helped me to improve my skills, having to work with every phase of the project, from background and analysis to the design proposal. Working with Dunga has allowed me to learn a lot about the process of developing a design project and writing a master thesis, about the site and its current situation.

Some questions can't be fully dealt with or solved by one single architectural or planning project, mainly structural complications on a large scale, such as corruption, poor infrastructure, and the notion of formal and informality. Since the site is very complex finding the right information to develop an architectural or planning proposal has been very problematic. A too technical project would have been hard and would have probably failed due to the lack of availability of information that we are used to in Sweden and the incomprehension of how to achieve it. One challenge has been achieving an AutoCad file or similar that is recent and up to date. Since Google streetview has not mapped Dunga yet, find things that you missed photographing or measuring is not easy.

One of the biggest challenges has been to work with so many on-going activities and people at the same time, and on such a small site. There are many layers of activities and events that you, as a visitor don't notice or understand. There are a vast variety of opinions and thoughts, of needs and wishes, and it is hard to know which ones to focus.

Maybe the most important learning from this project is the things I've learned from the contact with the users of the site and the locals. By getting to know them a little bit, and observing how they work, how they move, at what hour and in what way I came to many conclusions such as the understanding of the structure of the village and the roads. How the parking functioned or which area is the most active during day and night. The users of the site that I had a dialogue with or made a small interview with gave me the understanding of the everyday life and provided information that was more personal than just observing.

I am conscious that there are certain existing problems with land ownership, such as disputes between different stakeholders and poor Collaboration between stakeholders and officials also threaten to prevent further development. Many different actors (public and private) and individuals claim that they own land in Dunga. One could believe that the cause of the issues is the high corruption. To achieve something sustainable in a long term perspective, it is important that the community or municipality owns the land. The locals fear the risk that the municipality will just come and grab their land. I did not consider working with land ownership in my master thesis since Dunga is an informal settlement and the issues with land ownership are very complex. Working with land ownership could be interesting in a future report where Collaborations with the municipality and locals are set. To work with land ownership issues in this thesis would have been too complicated and time-consuming. To not work with land ownership was a decision I took when I learned that Dunga is an informal settlement. In some informal settlements in Kisumu's land has gone through a process of adjudication and a high percentage has been registered as individual interests on freehold tenure. This is mostly because neither the municipality nor the government has been able to acquire an interest in this land due to the costs involved according to UN-Habitat, 2005.

When talking about ownership in general, the aim of this thesis has been towards a common ownership with the community and the municipality.

The local ownership is preferably collaborative between the locals, mainly the users and the municipality, but depends on each case. A private ownership could result in conflicts since the proposals are of public character. A common ownership between locals and municipality would keep the proposal nonprofitable. This would also result in the proposed public spaces being for everyone and non-dependant on the level of income. There has been expressed a desire for places of recreation that are free and for everyone by locals in Dunga. Maintenance and construction are suggested to be made by people active on the site to create a feeling of ownership, resulting in a lower probability for vandalism to take place. It is important to advocate for self-management.

.

I am aware that the project should be divided into phases of implementation, and that the implementation process might be complicated due to all the different stakeholders, as well as the different land-owners and their desires. This is a question that is important to address to be able to enable implementation. Another obstacle that could prevent implementation is corruption. A project like this demands not only time to implement, but also a Collaboration between stakeholders, users, construction workers, different organisations providing their economic or moral support and the county government. I believe that one of the biggest challenges that is also important is that all stakeholders are participating throughout the process and that the implementation is followed up to achieve the desired result and sustainable development. For the proposal to be successful, the stakeholders need to believe in the project, and that it will work, they need to be engaged and have a wish to implement it. There is always a risk that people do not see the potential or the direct benefits for the village or them personally and doesn't work to reach the desired end-result. It is not possible to force people to act sustainable. One must themselves want it and understand why. I do, though, believe that if all the stakeholders feel that they are seen and listened to, and you that involve them, they will feel a belonging and a personal connection and therefore work to achieve the goal.

There have been cases in Dunga that has failed. One example was a playground built with "soft" materials. The playground was quickly vandalised by locals that took parts of the construction material and used it for other purposes, even though their own kids played there and they were using the playground, they (supposedly) felt that the playground was not for them. Perhaps the materials were not very durable and someone thought and partially rebuilt the playground with steel and concrete, materials that are maybe not the most suitable for children to play on/with. I believe that this failure had more to do with the involvement of everyone. If everyone felt that they were heard and that they had a part in the project, it would have been partially theirs, and it maybe wouldn't have been vandalized.

I am also conscious of the fact that there has to exist an economic source for a project and that the interest in implementing a project many times is economic. I believe that the proposal could be carried out through a collaboration between the government, organisations and the stakeholders. The suggested proposal might not bring economic distribution in the short term. Though, I do believe that in the long run, it will contribute to a more stable economic situation. Both through increased value for eco-tourism and through creating more job opportunities and possibilities for entrepreneurship.

The aim of this thesis was: "The learning experience and experience of working in a different context. It is about the learning process, to investigate the location and its problems, challenges and limitations but also potentials and opportunities. The aim is also to explore how to improve public space in a sustainable way. It is to develop sustainable strategies and principles that could be used to be able to take advantage of the existing qualities, knowledge, resources and eco-services without damaging them." The information that I collected resulted in a proposal of one possible way to answer the aim. However, there are several ways and many ideas that could solve or improve the question. Another student might have gathered different material and spoken to different persons, interviewed other professionals or held a workshop that resulted in something completely different. One opportunity for Dunga could be to focus entirely on eco-tourism, another could be to invest in sustainable fishing methods. If nothing is done at all with the current situation it could also result in so much degradation of the environment and the lake that tourists and visitors would stop coming, or that the aquatic life in the lake dies completely. This, could in turn result in that people would have to leave their homes and the village. The identity and history of the community would then be completely lost. Focusing on eco-tourism could be a solution, but it needs to be followed up. It could result in a sustainable Dunga, but eco-tourism brings tourists and of course it would have to be set a limit to the amount of visitors/tourists and the capacity so that the village doesn't turn into a theatre like a backdrop. In worst case scenario eco-tourism could, if not restricted and controlled lead to even more environmental damage. For Dunga to become a role model within sustainable fishing is perhaps another way to go, but the question is where that proposal comes from? Do the locals want to work with sustainable fishing and could it provide economic resources and jobs for everyone? Who will invest in it? Perhaps the solution is not one solution, but many different components.

This proposal is a possibly a small step in the direction towards a more sustainable Dunga and discovering responsible ways of living in symbiosis with nature. It is hopefully a proposal that could provide valuable information about possible future development and improvements.

For further studies of Dunga and as a possible guidance for further development I recommend a deeper research on similar projects in Kenya and understanding not only about the project but if it has succeeded or not, and why. It could also be interesting to investigate other recent projects in Kisumu or around Kisumu. Another research area that is very complex and challenging to work with, and maybe even a project in itself is gender equality and working with improving women's situation. This has been mentioned by Evance Odhiambo, and also stressed by Jennifer Otieno at Maseno University. Recommendations of further investigations also include how to implement the proposal, create a time plan and divide the project into phases and make a financial plan. Potential investors are something that is necessary to investigate further. Who could have incentives to invest? What would be the benefit for this organisation or investor?

The experience has been a great way of growing and learning both personally and as an architecture student. Even though I had been working in another country before, working in a country with a completely different culture and a language that you don't speak has been challenging.

PERSONAL REFLECTIONS

I have enjoyed working with Dunga and all the people I've met there and in some way interacted with by exchanging ideas and thoughts, interviewed or spoken to.

The seven weeks field study has been important for the project and to understand the Kenyan context. Without the site visits it would have been impossible to comprehend the site, it's character, the bustling ambience, the ongoing activities and stakeholders. It has been valuable working in a real context and scenario with specific needs. The site visits and the visit in Kenya have clearly affected my work and the outcome. Due to the limitation of time at site workshops with users and different stakeholders were not made. I am sure that the outcome would have been different if the communication with the locals would have been more thorough and workshops were held. Getting feedback from the everyday users of the site and the locals would have been rewarding both for the outcome and for personal learning, and could have been an important step to be able to develop the project further. However, I changed my focus quite late before leaving to Kenya, and this among other things has resulted in having less time. Preparing and hosting a workshop is often time-consuming and it would probably have resulted in having less time for the design process and making the project transparent and understandable.

I am aware that many parts are missing to be able to start to implement the project. To be successful and complete, a project for such a complex site as Dunga needs more time and also an interdisciplinary project group and approach.

The learning process has been a journey of acceptance, acceptance that your plans don't always go the way you had thought. Acceptance that sometimes you have flow in your design process, and sometimes you get stuck. It's possible that your ideas contradict the reality. The reality is sometimes so much more compllicated than what you have imagined. It is not easy to take a step forward when you are left without guidance and feedback. The learning outcome has therefore continued to increase both when returning to Sweden, where the majority of the design work was made and after the final seminar. My curve of learning has been filled with high ups and downs. I do believe that I have learned the most while in contact with users, stakeholders and the people that have read my thesis. I have learned with them and from them. The field trip to Kenya and the last phase of my thesis, while going through and evaluating all my material and reflecting on it, have given me a lot of knowledge. It has also been the most valuable experience for further development in my career.

The journey with my thesis has been evolving and given been me a further wish for working with projects in developing contexts, and I hope to be able to acknowledge this desire in my future career.

REFERENCES

ACRONYMS

BMU - Beach Management Unit
CBD - Central Business District
DECTA - Dunga Ecotourism and Environmental Youth Group
EAC - East African Community
KUP - Kisumu Urban Project
LVBO - Lake Victoria Birders Organisation
LVWEF - Lake Victoria Wetland Forum
MPESA - M=mobile P=money in Swahili
NALEP - National Agricultural & Livestock Extension Program
NEAP - National Environmental Action Plan
NEMA - National Environment Management Authority
SAP - Strategic Action Plan
UNEP - United Nations Environment Programme

EXPLANATION OF WORDS

Bioswale - Landscape element designed to remove pollution from surface runoff water.

Boda-boda - A motorcycle or a bicycle-taxi.

By-catch - The capture of unintended species.

Chapati - A flat-bread from Bangladesh, India, Nepal, Pakistan and Sri Lanka.

Cichlid - A fish from the family Cichlidae.

Co-working - A shared working environment. The social gathering of a group who are still working independently, but share values.

Detritus - Dead particulate organic material.

Eco-system - A community of living organisms in conjunction with the non-living components, like air, water and soil, interacting as a system.

Ecosystem services - Humankind benefits in a multitude of ways from ecosystems. Collectively, these benefits are becoming known as ecosystem services.

Eco-tourism - Tourism visiting fragile and pristine natural areas. A low-impact, small-scale alternative to commercial tourism.

Eutrophication - The ecosystem's response to artificial or natural nutrients, (phosphates), through detergents, Fertilisers, or sewage, to an aquatic system.

Fishmonger - Sells raw fish and seafood, can be both wholesalers and retailers.

Grevillea - Grevillea robusta or Silky oak, of the family Proteaceae.

Hippo grass - Name for several plants, many within the grass family commonly: Echinochloa stagnina or Vossia cuspidata.

Hotel - Simple restaurant with Kenyan food, serving only one or two dishes.

Human scale - The set of physical qualities, and quantities of information, characterizing the human body, its motor and sensory. In architecture or planning - buildings or elements that fit well to the average person.

Informal settlement - Unplanned residential area lacking adequate infrastructure.

Mandazi - A fried bread that originates from the Swahili Coast.

Mangrove - Extensive medium height trees that grow in saline coastal sediment habitats in the tropics and subtropics.

Mental barrier - Noise, feeling, smell that prevents access to a certain area.

Micro-entreprise - A small business employing max 10 people. Mostly family.

Mooring system - Refers to any permanent structure to which a vessel may be secured. For ex. quays, jetties, piers, anchor buoys, and mooring buoys.

Mvule tree - Or Milicia excelsa. Tree from Africa threatened by habitat loss.

Nile perch - A freshwater fish, widespread in the Afrotropic ecozone.

Nyalenda - An established slum suburb of Kisumu.

Omena - Also named the Silver cyprinid is a species of small freshwater fish.

Overfishing - Fishing from the sea faster than the populations can reproduce.

Papyrus - Aquatic plant from Africa. Belongs to the sedge family Cyperaceae.

Permanent structure - Stable building often made of concrete or bricks.

Pier - A pier is a structure that projects from the land out into water.

Physical barrier - Element, vegetation or building that blocks the physical access to a certain area or place.

Play-scape - A playful landscape characterised by the occurrence of enjoyment by the public.

Sewage system - A system that transport sewage through cities/areas to sewage treatment plants to prevent disease and control water pollution.

Soil erosion - One form of soil degradation. Soil erosion is a naturally occurring process on all land.

Temporary structure - Simple structure of wood and/or iron sheets.

Tilapia - A mainly freshwater fish inhabiting shallow water and sometimes found living in brackish water. Tilapia is part of the Cichlid family and of major importance in artisan fishing in Africa.

Tuk-tuk - A motor-driven three wheeled rickshaw providing taxi services.

Visual barrier - Vegetation/building blocking the visual access towards a view.

Water hyacinth - Or Eichhornia crassipes. An aquatic plant native to the Amazon basin. A highly problematic invasive species outside its native range.

REFERENCE LIST

A

African Community Development Foundation and Voluntary Service Overseas (VSO). *Improving Livelihood and Food Security in Kisumu, Kenya.* [Internet] http://docplayer.net/9433508-Title-here-improving-livelihood-and-food-security-in-kisumu-kenya-vso-evaluation-report.html [2015-07-08]

Agong, S. *Kisumu - Major Challenges to the City.* Mistra Urban Future [Internet] http://www.mistraurbanfutures.org/en/kisumu [2016-08-01]

Alila, P. O. and Atieno, R. (2006) *Agricultural Policy in Kenya: Issues and Processes.* Food and Agriculture Organisation of the United Nations (FAO) [Internet] http://www.fao.org/fileadmin/user_upload/fsn/docs/Ag_policy_Kenya.pdf [2015-07-07]

Amazing Kisumu. *What to do by the lakeside – Kisumu.* (2015) [Internet] http://www.amazingkisumu.co.ke/tag/kit-mikayi/ [2015-07-09]

Amsha Africa Foundation. (2001) *Rainwater Harvesting in Rural Kenya.* [Internet] https://www.amshaafrica.org/projects-and-clients/projects-pipeline/rain-water-harvesting.html [2015-12-01]

Archdaily. (2011) [Internet] *Educational Building In Mozambique / Masterstudents of Bergen School of Architecture*. http://www.archdaily.com [2015-12-01]

Archdaily. (2014) *Library of Muyinga / BC Architects.* [Internet] http://www.archdaily.com [2015-12-01]

Awange, J. and Ong'ang'a, O. (2006). *Lake Victoria: Ecology, Resources, Environment.* New York.

B

Balirwa, J. S., Chapman, C. A., Chapman, L. J., Cowx, I. G., Geheb, K., Kaufman, l., Lowe-McConnell, R. H., Seehausen, O., Wanink, J. H., Welcomme, R. L., and Witte, F. (2015) *Biodiversity and Fishery Sustainability in the Lake Victoria Basin: An Unexpected Marriage?* Bioscience [Internet] http://bioscience.oxfordjournals.org/content/53/8/703.full [2015-07-09]

British Broadcasting Corporation (BBC News) (2001) *Identity Problems in Kenya* [Internet] http://news.bbc.co.uk/2/hi/programmes/from_our_own_correspondent/1243587.stm [2015-07-07]

Biogas International. (2015) *Flexi Biogas Solutions.* [Internet] http://biogas.co.ke/en/# [2015-12-01]

C

Carlstén, Freija. (2014) *Wetland Development in the Context of Ecotourism*. Uppsala: Swedish University of Agricultural Sciences - Department of Urban and Rural Development

Citypopulation. *Kisumu (County) Population - The population development of Kisumu.* [Internet] http://www.citypopulation.de/php/kenya-admin.php?adm2id=42 [2016-07-30]

Community Tool Box. *Identifying and Analyzing Stakeholders and Their Interests.* [Internet] *http://ctb.ku.edu/en/table-of-contents/participation/encouraging-involvement/identify-stakeholders/main* [2016-07-30]

D

Darwininitiative. (2010). *Dunga Swamp Important Bird Area Conservation Management Plan.* [Internet] http://www.darwininitiative.org.uk/ [2016-07-27]

Designboom. (2013) *Bauen fur Orange Farm Opens the Mzamba schools in South Africa.* [Internet] http://www.designboom.com [2016-07-21]

Deskmag. (2013) *Where would you like to work every day?* [Internet] http://wpmedia.calgaryherald.com/2013/05/858657_589475021082173_564228520_o.png [2016-07-21]

Dunga Kenya Development Foundation. (2014). *Dunga, what are we talking about?* [Internet] http://www.dungakenya.nl/ [2016-07-30]

E

Eco-finder Kenya. (2010) [Internet] http://www.ecofinderkenya.org [2015-07-30]

Embassy of the Republic of Kenya. (2015) *Economy.* [Internet] http://www.kenyaembassy.com/economy.html [2015-04-04]

Ethnologue (2015) *Country - Kenya* [Internet] http://www.ethnologue.com/country/ke [2015-04-04]

F

Feed the Future. The U.S. Government´s Global Hung-er and Food Security Initiative. (2015) *Country profile Kenya.* [Internet] http://www.feedthefuture.gov/country/kenya [2015-12-04]

Food and Agriculture Organisation of the United Nations (FAO) (2015) *Kenya* [Internet] http://www.fao.org/nr/water/aquastat/countries_regions/ken/index.stm [2015/11/12]

Fälted, T., Rhedin, J., and Wanga, J. (2012) *Dunga Beach and Wetlands.* Gothenburg: Chalmers. University of Technology - Department of Architecture

G

Gascoigne, Bamber. (2001) *History of Kenya.* HistoryWorld [Internet] http://www.historyworld.net/wrldhis/PlainTextHistories.asp?historyid=ad21 [2015-11-10]

Global Environment Facility (GEF). (1996) *Lake Victoria Environmental Management.* [Internet] http://www.thegef.org/gef/sites/thegef.org/files/gef_prj_docs/GEFProjectDocuments/International%20Waters/Regional%20-%20Lake%20Victoria%20Env.%20Manag/Project%20Document%20for%20WP.htm [2015-07-09]

Green Roof Technology. (2016) *Modern Green Roof Technology* [Internet] http://www.greenrooftechnology.com/biodiversity [2015-08-01]

H

Hagegård, Karolina. (2008) *Small-Scale Biogas by Lake Victoria - analyzing and implementing the biogas technology for cooking in rural African households.* Gothenburg: Chalmers University of Technology Department of Chemical and Biological Engineering

I

International Fund for Agricultural Development (IFAD) (2012) Rural Poverty Portal. *A new biogas system for Africa.* [Internet] http://www.ruralpovertyportal.org/country/voice/tags/rwanda/rwanda_biogas [2015-12-01]

International Fund for Agricultural Development (IFAD) (2015) *The Sustainable Livelihoods Approach.* [Internet] http://www.ifad.org/sla/ [2015-07-31]

International Fund for Agricultural Development (IFAD) (2013) *Kenyan Biogas system - interview with Dominic Wanjihia.* [Internet] https://www.youtube.com/watch?v=qh3mmgiybTw [2015-08-01]

International Fund for Agricultural Development (IFAD) (2012) *Flexi Biogas systems: inexpensive, renewable energy for developing countries.* [Internet] https://www.ifad.org/documents/10180/2b0e6bfe-da33-4c56-99ee-e2125c188766 [2015-08-01]

International Institute for Applied Systems Analysis (IIASA). *CIA - The world factbook 2000.* (2000) [Internet] http://www.iiasa.ac.at/~marek/fbook/00/fields/natural_resources.html [2015-11-10]

J

Jernsand, E.M. and Kraff, H. (2013a) *Dunga identity and image - a pre-study.* Gothenburg: Gothenburg University.

Jernsand, E.M. and Kraff, H. (2013b) *Dunga ecotourism development - emerging ideas and possible continuation.* Gothenburg: Gothenburg University.
Jernsand, E.M. and Kraff, H. (2014a) A *day in Dunga- reflections and ideas from test tours.* Gothenburg: Gothenburg University.

Jernsand, E.M. and Kraff, H. (2014b) *Ecotourism development in Dunga - with a focus on culture and waste.* Gothenburg: Gothenburg University.

K

Kenyan Embassy (n.d.) *History* [Internet] http://www.kenyaembassy.com/aboutkenyahistory.html [2015-07-25]

Kenya National Bureau of Statistics (KNBS) (2014) *Kenya facts and figures 2014.* Nairobi: Republic of Kenya, Kenya National Bureau of Statistics (KNBS)

Kiruga, Morris. (2013) *How the Luo, Kisii came up with names of key places.* Daily Nation [Internet] http://www.nation.co.ke/lifestyle/DN2/How-the-Luo-Kisii-came-up-with-names-of-key-places-/-/957860/1929528/-/view/printVersion/-/uay3ntz/-/index.html [2015-07-09]

Kisumu City Council. (2012). *Kisumu's Climate.* [Internet] https://kisumucitycouncil.wordpress.com/2012/11/22/kisumus-climate/ [2015-07-10]

Krantz, Lasse. (2001) *The Sustainable Livelihood Approach to Poverty Reduction - An Introduction.* Swedish International Development Cooperation Agency (SIDA). Division for Policy and Socio-Economic Analysis. [Internet] http://www.sida.se [2016-07-26]

L

Lake Victoria Fisheries Organisation (LVFO) *Lake Victoria Fisheries: An Introduction* [Internet] http://www.lvfo.org/index.php/lvfo/lvfo-secretariat/5-lake-victoria-fisheries-an-introduction [2016-07-27]

Lambert, Tim. (2016) *A Short History of Kenya.* [Internet] http://www.localhistories.org/kenya.html [2016-07-26]

Lindholm, T. and Moritz. M. (2007). *Handbok i delaktighet - Från vision till verklighet.* Huddinge: Huddinge Kommun.

M

Marhoum, A., and Samper, D.A. *Kenya -Ethnic Groups.* (2015) [Internet] www.africa.upenn.edu/NEH/kethnic.htm [2015-12-04]

Marhoum, A. and Samper, D. A. (2015) *Kenya- Languages.* East African Studies Center. [Internet] http://www.africa.upenn.edu/NEH/klanguages.htm [2015-12-04]

Methu, Soni. (2014) Cable News Network (CNN) *The Indian migrants who built Kenya's 'lunatic line'.* [Internet] http://edition.cnn.com/2014/12/11/world/africa/kenya-railways-india [2015-07-07]

Mistra Urban Futures. (2013) *Cities that give more than they take - Examples from Dunga, Kenya.* [Internet] http://www.mistraurbanfutures.org/en/st%C3%A4der-som-ger-mer-%C3%A4n-de-tar-exempel-fr%C3%A5n-dunga-kenya [2016-07-27]

Municipal Council of Kisumu, *Lake Victoria Region City Development Strategy for Improved Urban Environment and Poverty Reduction: Kisumu City Development Strategy 2004-2009,* 2004

Mistra Urban Futures. a. *Ecotourism.* [Internet] http://www.mistraurbanfutures.org/sv/projekt/ecotourism [2016-07-30]

Mistra Urban Futures. b. *Kisumu.* [Internet] http://www.mistraurbanfutures.org/en/kisumu [2016-07-30]

N

National Geographic. (1996-2015) *Sustainable fishing.* [Internet] http://education.nationalgeographic.com/encyclopedia/sustainable-fishing/ [2015-09-06]

Ngugi, E., Kipruto, S. & Samoei, P. 2013. *Exploring Kenya's Inequality - Pulling Apart or Pooling Together.* Nairobi: Kenya National Bureau of Statistics (KNBS) and Society for International Development (SID)
Nodalis Conseil. (2013). *Kisumu The Integrated Strategic Development Plan (ISUD-Plan). Part 2 Planning for Kisumu Future.*

Nodalis Conseil. (2014). *Kisumu The Integrated Strategic Development Plan (ISUD-Plan). Part 1 Understanding Kisumu.*

Nodalis Conseil. (2014). *Kisumu The Integrated Strategic Development Plan (ISUD-Plan). Part 3 Implementing the ISUD-Plan.*

O

Olson, J.S., (1996). T*he Peoples of Africa - An Ethnohistorical Dictionary.* London.

Osienala - Friends of Lake Victoria. (2015). [Internet] http://www.osienala.org/ [2015-07-30]

P

Pliakis, Filip. (2015). *Agriculture in Kenya.* Delft: Delft University of Technology (Tu Delft) [Internet] http://tudelft.gingerresearch.net/page/11439/agriculture-in-kenya [2015-07-07]

Population Action International. (2014) *Population Dynamics, Environment, and Sustainable Development in Kisumu County* [Internet] http://pai.org/wp-content/uploads/2014/07/PAI_Kisumu.pdf [2015-07-27]

R

Researchitafrica. (2007). *Kenya Vision 2030 - A Globally Competitive and Prosperous Kenya.* [Internet] http://www.researchictafrica.net/countries/kenya/Kenya_Vision_2030_-_2007.pdf [2016-07-29]

S

Stockeld, A., Sverneborn I., Kos, J., and Mikolasevic, V. (2014). *Lake Victoria Knowledge Park.* Gothenburg: Chalmers University of Technology - Department of Architecture

Swedish International Development Cooperation Agency (SIDA). (2004). *Strategic Conflict Analysis - Lake Victoria Region.* [Internet] http://www.sida.se/contentassets/0707be9f2cec4854bdfc701df3294472/strategic-conflict-analysis-of-lake-victoria---input-to-sidas-lake-victoria-strategy_424.pdf [2016-07-29]

T

The Kenya Wildlife Service (KWS) (2015) *Overview parks and reserves.* [Internet] http://www.kws.go.ke/content/overview-0 [2015-12-04]

The Ohio State University. (2009) *Adaption to Chimate Change in Africa. Livelihoods: Concepts* [Internet] http://digitalunion.osu.edu/r2/summer09/yoon/livelihood_concepts.html [2015-07-30]

The World Bank Group. (2015a) *Country Kenya.* [Internet] http://data.worldbank.org/country/kenya#cp_w [2015-12-04]

The World Bank Group. (2015b) *Population density (people per sq. km of land area)* [Internet] http://data.worldbank.org/indicator/EN.POP.DNST [2015-12-04]

The World Bank Group. (2015c) *Arable land (% of land area) - Overview per country* [Internet] http://data.worldbank.org/indicator/AG.LND.ARBL.ZS [2015-12-04]

The World Bank Group. (2015) *Country Sweden.* [Internet] http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries/SE?display=-graph [2015-07-29]

The World Bank Group. (2013) *Country Kenya.* [Internet] http://www.worldbank.org/content/dam/Worldbank/document/Africa/Kenya/kenya-economic-update-june-2013.pdf [2015-07-29]

The World Bank Group. (2016a) *Population, total - Kenya* [Internet] http://data.worldbank.org/indicator/SP.POP.TOTL?locations=KE [2016-08-01]

The World Bank Group. (2016b) *Population, total - Sweden* [Internet] http://data.worldbank.org/indicator/SP.POP.TOTL?locations=SE [2016-08-01]

The World Bank Group. (2016c) *Country Sweden.* http://data.worldbank.org/country/sweden [2016-08-01]

The World Bank Group. (2016d) *Population growth (annual %)* [Internet] http://data.worldbank.org/indicator/SP.POP.GROW [2016-07-29]

The World Bank Group. (2016e) *Fertility rate, total (births per woman)* [Internet] http://data.worldbank.org/indicator/SP.DYN.TFRT.IN [2016-07-29]

The World Travel & Tourism Council (WTTC) (2014) *Economic Impact 2015*
Kenya [Internet] https://www.wttc.org/-/media/files/reports/economic%20impact%20research/countries%202015/kenya2015.pdf [2015-07-30]

Transparency International. *Corruption Perceptions Index 2014: Results* [Internet] https://www.transparency.org/cpi2014/results [2015-07-30]

Tuts, R., Kebede, G., Oballa, B., Mwaura, J., Stellmach, T., Crispi, G., Selebalo, C. (2012) *Kisumu Rapid Urban Planning Studio - Workshop Results.* Nairobi: United Nations Human Settlements Programme (UN-Habitat) - Regional office for Africa and the Arab States. Urban Planning and Design Branch.

U

United Nations Environmental Programme (UNEP). *Kenya Atlas.* [Internet]http://www.unep.org/dewa/africa/kenyaatlas/PDF/KenyaAtlas_Chapter3.pdf [2015-07-12]

United Nations Human Settlements Programme (UN-Habitat). (2006) *Kisumu urban profile. Nairobi: United Nations Human Settlements Programme* - Regional office for Africa and the Arab States. Urban Planning and Design Branch.

United Nations Human Settlements Programme (UN-Habitat). (2005) *Situation Analysis of Informal Settlements in Kisumu. Nairobi: Cities Without Slums Sub-Regional Programme for Eastern and Southern Africa.* Kenya Slum Upgrading Programme. United Nations Human Settlements Programme - Regional office for Africa and the Arab States.

United Nations Human Settlements Programme (UN-Habitat). (2009) *Kisumu City Development Strategies (2004-2009) Kisumu City - A Strategic Framework.* Lake Victoria Region City Development Strategies for Improved Urban Environment and Poverty Reduction.

United Nations High Commissioner for Refugees (UNHCR) *Livelihoods* [Internet] http://www.unhcr.org/pages/4ad2e7d26.html [2014-07-30]

United Nations High Commissioner for Refugees (UNHCR) (2015) *UNHCR Global Focus - Kenya* [Internet] http://reporting.unhcr.org/node/2537#_ga=1.48363110.1399598266.1470060139 [2016-08-01]

United Nations Office for the Coordination of Humanitarian Affairs (UN Ocha). (2013) *Kenya: Floods kill two as calls mount for release of funds.* [Internet] http://www.unocha.org/aggregator/sources/69 [2015-07-12]

W

Wanga, J.O., Hayombe P.O., Agonga, S.G. and Mossberg, L. (2014) *Stakeholder Involvement in Tourism Destination Development: A Case of Dunga Beach and Wetland, Kisumu County, Kenya.* Gothenburg: Chalmers University of Technology and Gothenburg University, Bondo: Jaramogi Oginga Odinga University of Science and Technology, Maseno: Maseno University and Kisumu: Kisumu County Government.

Wikipedia, (2016)a. *Imperial British East Africa Company.* [Internet] https://en.wikipedia.org/wiki/Imperial_British_East_Africa_Company [2016-07-27]

Wikipedia, (2016)b. *Economy of Kenya* [Internet] https://en.wikipedia.org/wiki/Economy_of_Kenya [2016-07-27]

Wikipedia, (2016)c. *Kisumu County.* [Internet] https://en.wikipedia.org/wiki/Kisumu_County [2016-07-29]

Wikipedia, (2016)d. *Renewable Energy in Kenya.* [Internet] https://en.m.wikipedia.org/wiki/Renewable_energy_in_Kenya#Solar_power [2016-08-01]

World Heritage Encyclopedia. (2016) *Lake Victoria* [Internet] http://www.gutenberg.us/articles/Lake_Victoria [2016-07-29]

INTERVIEWS AND PERSONAL CONTACTS

The interviews and conversations have been realized through structured, semistructured, spontaneous interviews and spontaneous dialogues with the locals. The material has been gathered with hand written notes and sketches during the conversation and has therefore not been transcribed entirely.

Belinda Nyakinya, Deputy Director of Environment, Kisumu County Admin, Interviews 2015-03-05 & 2015-03-09

Evance Odihambo, Lead Coordinator at Zingira Nyanza Community Crafts, Interview 2015-03-09 & 2015-03-15, site visit in Dunga 2015-03-18

George Oweke, Guide and Fisherman, Dunga Beach, Interview and site visit in Dunga 2015-03-27

Head of Beach Management Unit, Dunga Beach, 2015-03-06

Hotel owners at Dunga Beach, 2015-03-27

Patrick Nyamita, Project Manager, KUP, 2015-03-09

Silas Maujih, Sociologist and Coordinator, UN-Habitat in Kisumu, Interview 2015-03-03 & site visit in Dunga 2015-04-15

GRAPHICS

All graphics and photos are made by author unless otherwise stated.

THANK YOU!

Thank you to everyone that has in some way helped and contributed to this master thesis. A special thank you to Silas Maujih, Evance Odhiambo, George Oweke, Anna Kaczorowska, Catarina Östlund, Patricia Gibbs Cánova, Tobias Ekblom, Frida Bard, Madeleine Larsson and Johanna Lenmalm.