REALITY STUDIO

in collaboration with

MISTRA URBAN FUTURES

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CONTENT

PREFACE

Sustainable Development is a political vision and a social construct of the United Nations. It was launched in the report "Our Common Future" of the World Committee on Environment and Development 1987, and manifested at the World Conference on Environment and Development in Rio de Janeiro 1992.

More recent the concept Sustainable Urbanisation was adopted at the first World Urban Forum in Nairobi 2002 and launched by UN HABITAT and their partners at the World Summit in Johannesburg later the same year. It concerns urbanisation processes at a global level, that are described both as causes of local and global environmental problems and as a precondition for achieving sustainable development. Urban practices in rich societies are unsustainable due to huge energy and resource dependency. Such practices are neither applicable, nor recommendable, in developing countries. Thus, there is a crucial need for social and technical innovation, based on a combination of local traditional knowledge and future-oriented high-tech thinking. In this way, developing countries can become the forerunners for an urban development that the old industrial countries have to learn from if not to be left behind in an increasingly resource sensitive global metabolism. We therefore like to transform the old connotation of "third-world" to third option and approach this by confronting the traditional pedagogical approach within design- and architectural education through the recent Reality Studio where students and

teachers are moved out of their university setting into an unknown environment and social situation. For the fourth time this brought us back to Kisumu, Kenya's third largest town situated in the Lake Victoria region in 2012.

Programs for higher education should be grounded in local reality, e.g. in form of experience based learning. In such approaches students may play important roles for the development and implementation of locally grounded vision, policies, strategies and plans for sustainable urban development. Through increased options for continuing education and support of networking activities these young future practitioners play significant roles also in a longer-term perspective on urban development. Based on this experience and insights, Maseno University, JOOUST, Göteborg University and Chalmers University of Technology - Department of Architecture have agreed on extended co-operation for capacity building and research, where the cooperation in education and the student projects are regarded as important tools and vehicles in such an extended approach.

Reality Studio is not an aid project, rather a capacity building project for the students and teachers and with the local partners involved. Mutual learning is the key concept. Students from higher levels of education constitute one important target group for capacity building. First, they are a great resource in data collection, idea generation and communication with local people. Second, student projects have proven to be useful "neu-

tral" tools for communication between researchers and practitioners, experts and laymen. Third, the students are the practitioners and leaders of the near future and, as such, the best disseminators of research results and normative guidelines into practice.

It has to be emphasised, that the first priority is education and training of our students for their future professional tasks as designers and architects. Systems design is the common language of design and the students are regarded as key producers of knowledge. The pedagogical goal is to make the students:

- aware of the social context of their future work
- capable to analyse that context as a necessary point of departure for their design work

The students are gradually trained to use research methods for systematic investigations, to formulate questions and define problems to solve, instead of starting with answers. Project design is central and the students are expected to gradually be able to develop their own projects. Accordingly, the field studies contain the main stages:

- Read and Discover, a systems analytic survey of the local situation and context
- Project Area Definition (PAD) including strategy and program design
- Project Design, formulating the issues of study and their boundaries
- Exhibition and Communication

Reality Studio has its history at Lund Institute of Technology, Architecture and Development Studies (Ark3) where the pedagogy was developed in the early 70's. Studios with major field studies in developing countries had already started in 1967 in Bagamoyo, Tanzania. The studios in developing countries expanded to Vietnam, Algeria and Tunisia in the seventies; to Costa Rica and Nicaragua in the eighties, continued in Vietnam, Zanzibar and Tanzania in the nineties; Lamu Island and Masai Mara (Kenya) developed in 2004 and Kisumu since 2005. The studios are operating in cooperation with local universities involving students, researchers and teachers.

Reality Studio as a concept was born in 2006 and run together with UN HABITAT, Chalmers and University of Nairobi. Since 2008 the Reality Studio is hosted by Chalmers in cooperation with Maseno University and Bondo University College.

This year's Reality Studio has been conducted in collaboration with Mistra Urban Future and the Kisumu Local Interaction Platform (KLIP).

Mistra Urban Futures is an international centre for sustainable urban development hosted by Chalmers University of Technology. The centre has four regional platforms in Cape Town, Kisumu, Gothenburg and Manchester. The centre is financed by the research foundations Mistra and Sida, together with a consortium comprising: Chalmers University of Technology, the University of Gothenburg, the City of Gothen-

burg, the Gothenburg Region Association of Local Authorities (GR), IVL Swedish Environmental Research Institute, the County Administrative Board of Västra Götaland, and the Region of Västra Götaland, along with funders on the various regional platforms.

The students have formed and worked with projects within KLIP's two flagship projects, Eco-tourism and Marketplaces, and in close collaboration with involved stakeholders and PhD students. This book presents the resulting student projects from 2014. The series of Reality Studio pocket books are the following:

Designing Development - students in Kisumu and Homa Bay, Malmö 2006. ISBN 917740 082 8
Reality Studio - students in Kisumu and Kabondo, Lund 2007. ISBN 978-91-977068-1-0
Reality Studio 2008 - students in Zanzibar Stonetown, Nairobi 2008. ISBN 978-91-977068-2-7
Reality Studio 2009/2010 Kenya: Kisumu, Shanghai 2010. ISBN 978-91-977068-3-4
Reality Studio 2010/2011 Göteborg 2011. ISBN 978-91-977068-4-1
Reality Studio 2012 Kisumu, Göteborg 2013. ISBN 978-91-977068-5-8

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UP for CO-OP

by Aldina Eriksson, Amanda Stehn, Klara Mörk and Sofia Park

This project is a proposal for the upgrade of Otonglo market, situated in Kisumu, Kenya. It uses a bottom up approach and is based on information gathered through interviews, workshops and observations on site. The point of departure was to increase the economic resilience of the traders by introducing co-operation as a concept. Through interviews, a need for education and guidance as well as increased trust between traders, were identified as key-factors for achieving this. The market structures of today are also not adequate to accommodate co-working, which we as designers saw as a first step we could influence.

Further the project deals with the many challenges the market faces today such as: the construction of a new road removing one third of the market, regular flooding, lack of security, lack of lighting and the need to protect stalls from hungry cattle which today walk freely through the market.

Intro and Background

Marketplaces in Kenya function as important economic forums, as well as social meeting-places. The marketplaces are among the most important income possibilities for poor people in Kenya. Both for traders being able to start from nearly nothing, and for small scale local food producers who can easily sell their goods. The markets are thus an important factor of the local economy, where profits remain in and develop the region.

There are many different types of traders, but in general they can be divided into two categories; the ones that travel around and sell on different markets every day, and the ones that sell every day in the same market. The traders in the case mentioned last are mostly women. They are geographically bound to their neighbourhood, since they have the responsibility for children and household.

During the last decade, the number of supermarkets has surged in Kenya and Kisumu. This has increased the access to food, and also the possibility to buy a larger variety of goods for the growing middle-class. Despite this, most food consumed still passes a traditional marketplace but to survive over time the marketplaces must be upgraded to higher standards to be able to compete with the benefits of the supermarkets. This is vital both to secure work possibilities for the ones without any other chance to earn an income and to preserve the cultural and social importance the market holds as a part of community life.

Problem statement
There is an immediate demand for a new built-up marketplace in Otonglo. At the same time, many market structures that are built around Kisumu are never used, often due to bad planning. In this situation, how can Otonglo market be upgraded to be a well functioning, resilient marketplace for the future? And how can the design of it benefit and improve the social and economic status of the women trading in the market?

Aim and purpose
Our aim is to propose a market design that promotes long term socio-economic resilience for, and self empowerment of the traders. As well as to strengthen the marketplace as such and make it a viable alternative to supermarkets in the future.

Project idea
We believe that increased co-operation is a key to this resilient market and we want to propose a design that allows and promotes a different business model in the future.

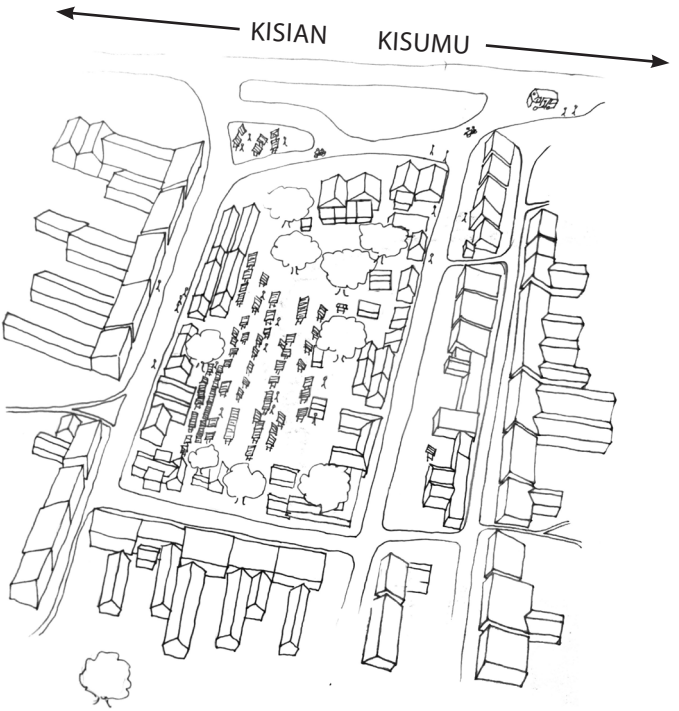
Otonglo market today

Otonglo market has a long history, deriving from colonial times when the British railway station by lake Victoria was first built close to Otonglo in 1901 and Indian railway workers settled in the area. The railway station was moved to its present location in Kisumu 1903 and the Indian community moved with the railway. (Skarp & Folkesson 2013)

The market has no specific market day but is most active in the evenings around 17-19 when commuters come back from work and truck drivers stop for the night at the nearby motels. The amount of traders differs from day to day but is estimated to be around 500 and they sell a wide variety of products, ranging from vegetables to furniture. The trade is to a large extent informal but a daily revenue is collected of about 30 shillings for the small scale traders, while traders with premises in the permanent structures often have registered business permits and pay revenue on a monthly basis.

The road expansion which is under construction will on the one hand bring positive effects such as an expanded customer base and easier access but on the other hand, use one third of the current market space, causing several of the market sheds as well as facilities such as the toilets and water pump to be demolished.

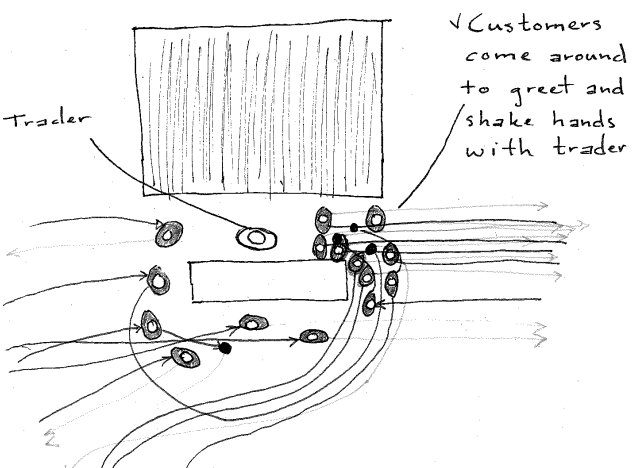
Today the water pump and pit latrines are well managed by the traders, and a small fee is taken for usage of the services. The money collected is used for market needs



such as employing a night watch and buying chairs to use for meetings. There is also an older, filled up pit latrine, no longer used due to incapability to empty it.

One of the main issues in urgent need of care is the lack of a drainage system, which causes parts of the market to flood and most of the ground to be muddy during the rainy season.

Other pressing issues are the lack of lighting at night, impeding traders from working past sunset, and the lack of guards and storage spaces forcing stall traders to carry heavy loads to and from their homes each day as well as going in to town frequently to buy more supplies. This being a heavy and tiring task on foot or very costly task if with help of motorcycles or tuk-tuks.



Sketch showing the movement patterns of customers around one stall

The Actors involved

KUP

The city of Kisumu is planning for an upgrade of Otonglo market. The upgrade is managed by Kisumu Urban Project, KUP, which is a project within Kisumu city planning department, financed by the French Development Aid Agency, AFP. Consultants are to be brought in for planning of the new market later in 2014 and planning and construction is meant to take about a year from that. The cost for the market upgrade is estimated to 150 000 000 KES (KUP, 2014). The upgrade also includes a new bus-station and a trailer park, but no site is yet identified to accommodate these functions.

Grassroots Trust
for Community Organizations in Kenya

The grassroots trust is an NGO concerned with increasing community awareness and engagement in planning projects. At Otonglo they have held meetings and workshops aiming at mobilizing the traders to share their own views on what is best for the future market.

Our Role

As students, without any political or financial agendas, we have had the opportunity to meet both sides in the planning process in an unbiased way. Our goal has been to take part of and help lead the workshops held as well as document and analyse as much as possible of the market in order to hand over a proposal in accordance

with the traders needs, both to the market traders and KUP. For the traders, this means they have a document to support their views and for KUP we hope it will serve as a form of guide for the future consultants that will be commissioned to plan for the upgrade of the market.

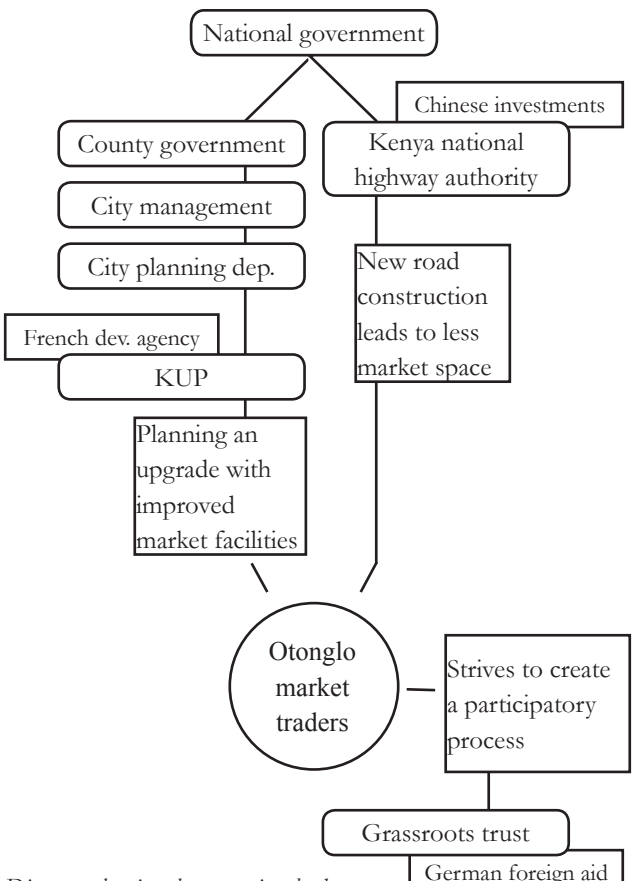


Diagram showing the actors involved

Workshops

Together with the Grassroots trust, we organized two workshops at Otonglo; one with all the market traders and one with an elected market committee of thirty traders.

The workshops gave us crucial knowledge on what functions need to be placed where and why, and also information on wind directions, flood-prone areas and insight in security issues and preferable stall designs. It was also an important first step to involve the traders of Otonglo in the process of developing the market.

Workshop with all the traders at Otonglo market

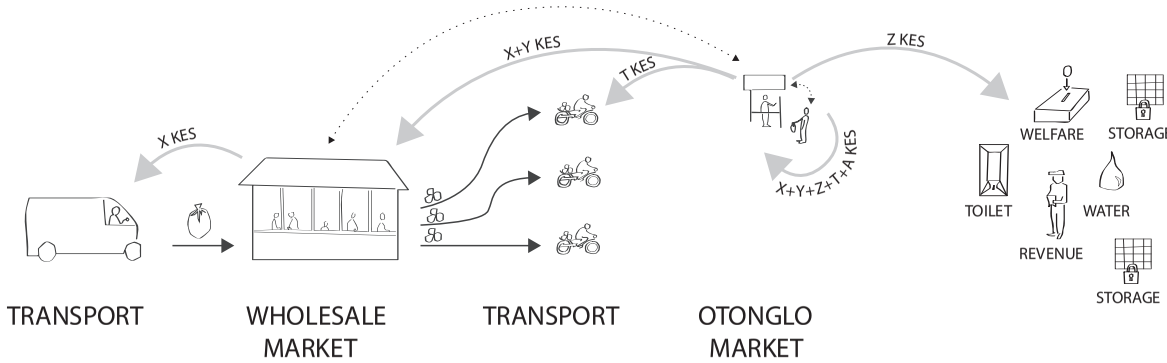


Diagram showing the business model of the vegetable traders in Otonglo today

Current vegetable trader business model

Currently most traders in the inner market of Otonglo work individually. They go to the wholesale markets in Kisumu several times a week to buy supplies and arrange their own transports of goods back to Otonglo, usually via Piki-piki or Tuk-tuk. The means of transport, the lack of sufficient storage and a small cash reserve makes it difficult to buy larger quantities at once. This raises the costs and the financially strained traders are vulnerable to changes in costs or incomes. The traders also need to pay for every service they use individually, such as water, storage, toilets and revenue. There is an ongoing discussion at the market about starting up a welfare group for the stall traders. This would help the traders save money individually and make it possible for them to get bank credit, but the lack of trust between traders makes many traders reluctant to start it.

Trader interviews

10 women at Otonglo market where asked the following questions:
1 Describe your day (and week)
2 How did you get in to the business?
3 Do you have a family?
4 What did you do five years ago?
5. What do you think you'll be doing in five years?
6. What makes you feel good?

1. In the morning I wash clothes, clean the house, cook food. At 2-7p.m. I'm in Otonglo trading. 4 days/week. Sundays I trade in Kibuye. 2. My husband died so I needed to make some money. I started trading in Kibuye 3. I had two kids, one boy and one girl, but the boy died so now I only have a girl. She's 21 years old and has finished her school. 4. I started trading. 5. I don't know. I don't think about the future. Nobody supports me. 6. When I get big money and see my daughter.

1. Every day is boring. I come in the morning. I work from 10am-18pm every day. 2. I started small. 3. I have 5 children, they all go to school. My husband is a driver. 4. We've got everything we wanted. 5. I want everything! 6. Nothing makes me happy.

1. I'm here from 9.am to 8.30 p.m. every day. Even Sunday. In the morning I prepare the kids for school. 2. Three years ago. First I only sold charcoal in Otonglo. 3. I have 4 children: 9,12,16 and 18 years old. No husband. 5. I don't know. I'd like to have a duka. 6. When I wake up in the morning, see my children and send them to school.

1. I am here, all the time. From noon. 2. Otoglo is close to my home. 3. I have 7 children. My husband is a business man. 4. I think I am still into business. 5. In the future, I have a small farm. 6. When I wake up!

1. I wake up, make breakfast, fetch water and then come here to the blanket to sell. I sell 7 hours per day. Yesterday I earned 100 Shilling, today I have earned 300 Shilling so far. 2. I have been here for 2 years. First I sold only vegetables, now I have more things. 3. I am one of 12 children, 5 are dead. My mother is dead so I live with my father. I am 24 and unmarried. 4. I was training to become a tailor, but couldn't finish because of money. 5. Good knows. 6. Because I am alive.

1. Every day looks the same, I make Sukuma wiki. I am here between 10-14. Sunday is free. 2. I have been in this business for over 10 years. 3. 4 children, my husband is dead. The children are in school. 4. I don't know. 5. I want to own my own shop. 6. The day I sell items.

SWOT

Strengths

- Close to road
- Brings food close to consumer
- Market functions as community centre
- Low starting threshold for new vendors.
- Welfare groups and market organization provide some social security.
- Relationships between vendors and customers
- Support from family members

Opportunities

- An increase in gas-prices will make it more profitable to produce and buy food locally
- The road expansion will provide and easier access to Otonglo
- A growing population in Otonglo leads to more customers
- A growing Kenyan economy leads to more economical possibilities for upgrading.
- A decreasing childbirth rate will lead to less time conflict between work and childcare.
- Growth of ICT services may decrease possibilities for corruption and will facilitate buying and selling

Weaknesses

• Lack of hygiene and a risk for contamination of food.
• No lights limits the time of selling.
• Lack of storage facilities
• Lack of security measures leads to unwillingness to invest in market.
• No proper waste handling
• Not so much value added at the market (besides distribution)
• Flooding
• No re-investment in Otonglo by municipality
• Lack of secure tenure
• Lack of trust between traders
• No secure income
• Low access to childcare

Threats

• Expansion of Supermarkets
• Increase in flooding due to climate change (long-term)
• Expansion of road leads to less space for market
• Expansion of road leads to better access to markets in town and therefore more competition for customers.

Conclusions from SWOT and analysis

The purpose of the SWOT is to identify strengths to be kept, weaknesses to be dealt with, opportunities to take advantage of and threats to prevent. On the physical level for instance, we identified the market's function as a community centre to be something we wanted to develop further and flooding was an important weakness to be dealt with. The opportunity of a higher population made us go for a flexible, expandable design and we decided to mitigate the threat of future supermarkets by upgrading the market with better materials and structures - increasing the hygienic conditions.

On the individual scale we want to keep the low threshold for new start-ups and increase the possibilities for building trust between vendors. An opportunity we have not dealt with in the project but of which we have high hopes, is the growing possibilities within ICT. We believe that a cash-free revenue collection might contribute to less corruption and the increased use of money transfer service Mpesa could facilitate the ordering of goods.

These aspects together with our observations and the results from the workshops and interviews led us to formulate five design criteria, aiming towards the long-term goals we set up at the start of the project. The goals have been revised during our process based on our findings, for example we where initially not aware of the great importance of trust and the difficulties that a lack thereof can induce.

GOALS

To promote self-empowerment and socio-economic resilience of the traders

To strengthen trust within the community

Make the marketplace resilient to future changes

Make the market a viable, local center for the community

Design criteria

Design Space for start up businesses
For many of Kisumu's poor women the possibility to start trading with a few goods is a way to survive in desperate times, but also a way to create a better life and future for the family. When the market is upgraded and becomes more formal, it is important that this possibility is not lost, but instead secured.

Design that allows Flexibility over time
Kenya is changing fast and it's impossible to know for certain what the future holds. Therefore the design needs to enable the market both to shrink, grow and host different kinds of traders over time.

Design that encourages cooperation
Cooperation strengthens the individual traders and a co-op can be more resilient to change than individual traders. At the same time a co-op needs trust between traders which takes time to build. The design should make it easier to cooperate at different levels and build up trust with time.

Design for sustainable material use
Concrete is the worlds most used material but it uses some of the worlds limited resources, has a high embodied energy and often requires long transportation. When choosing building material, focus should be on local material with low embodied energy that can be maintained by the traders themselves

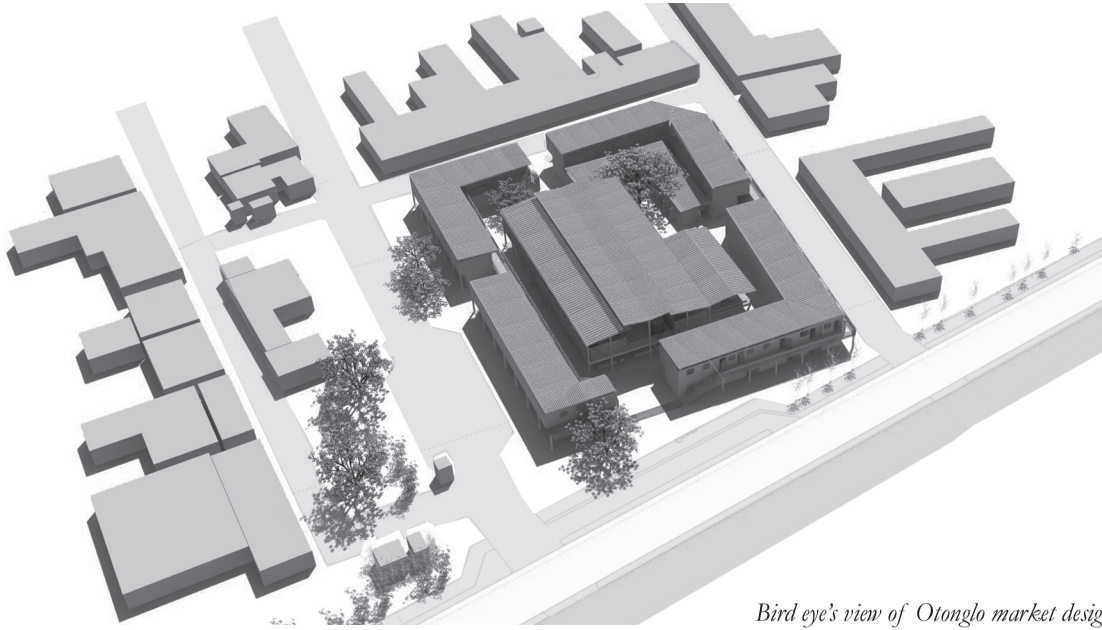
Involve traders in design of the new marketplace
For the marketplace to be of use to the traders and for them to care about the space, their perspective and views need to be taken into the design.

Market design

Our proposal for the design of Otonglo market has a perimeter of shops facing both into the market and out to the street. None of the shops face both the street and into the market so that the buildings work as a part of the fencing keeping the market secure at night. The northern part needs to have an upper story already in the first building phase in order to fit all the current businesses, whilst it is possible to add another story to the southern part as the market grows in the future.

The market has four gated entrances with stairs leading to the upper floor where the businesses are reached from access balconies running along the facades. Inside the market there are two open market halls, one for fish and one for fruits, vegetables and cereal. The upper floor of the main hall contains community oriented services like a clinic, a cyber café, a daycare and a community hall. Water is collected from the roofs, and a drainage system keeps the market operational also during heavy rains. In the area east of the market the existing semi-permanent buildings will be kept for welders and carpenters, but also an open area for recreation, overlooking the flow of people, with bamboo arbours providing spare parts for the maintenance of the market buildings.

The permanent buildings, surrounding the whole market area remain, and another floor could possibly be added as the demand for commercial space increases.

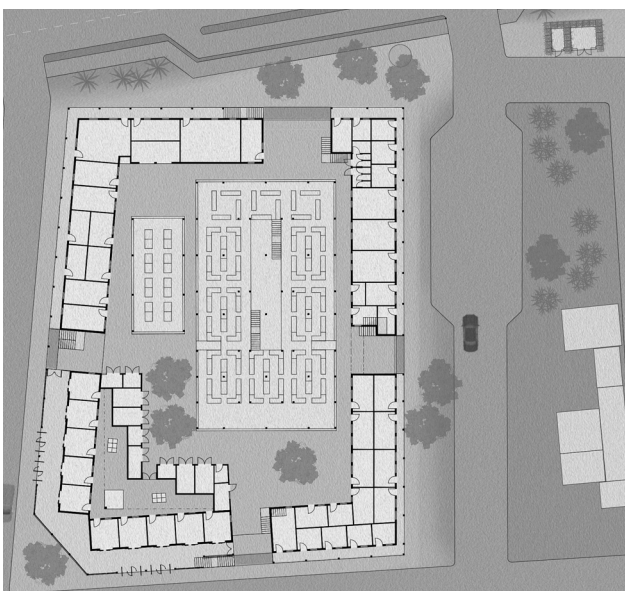


Bird eye's view of Otonglo market design

The plans

Having assessed the needs of and possible collaborations between the different businesses we made a floorplan where all the current traders fit and receive adequate premises.

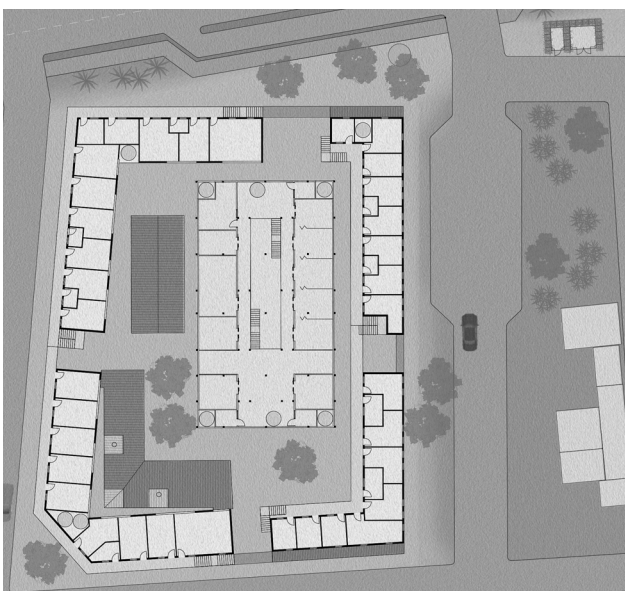
Restaurants or *hotels* are situated side by side sharing a common seating area for guests, as well as a back yard with cooking and washing facilities. This area is surrounded by an active wall of shops and cafés with a gate making the washing area accessible for others as well, during market opening hours.



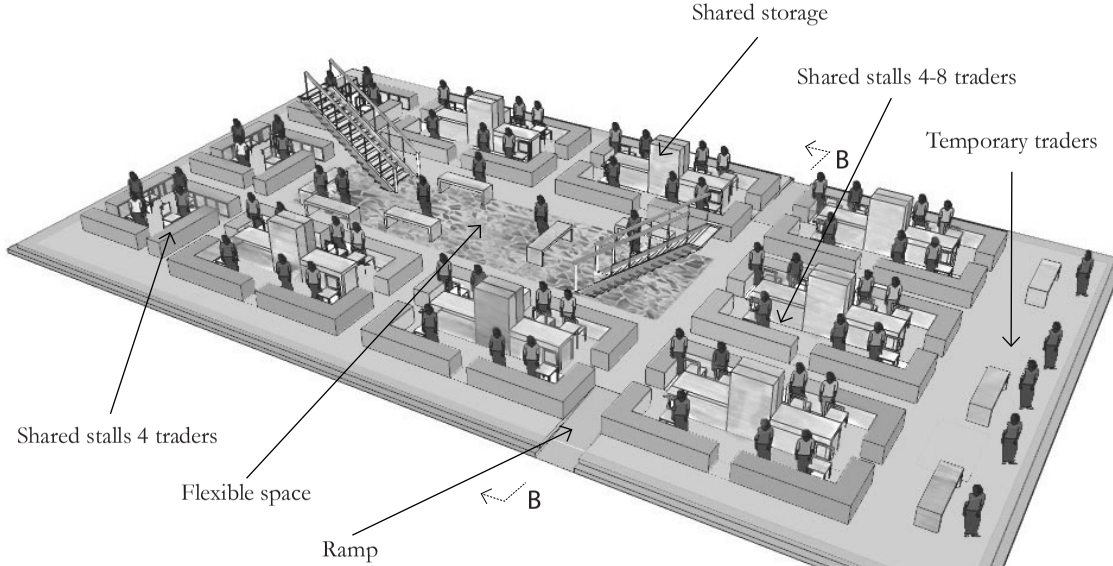
0 5 25m N *Plan of ground floor scale 1:1000*

The social functions of the market are centrally placed on the upper floor of the main market hall. Gathering the social functions makes it easier for different groups to meet and pass information between them. Placing it here directs a flow of people to pass the traders on the ground floor during daytime, creating more business opportunities for them. It also allows for the food traders to participate in meetings and education without being far from their stalls.

The flexible community hall can be used for daycare, schooling as well as meetings. It can be divided in up to five separate smaller rooms, or opened up to one big hall. Renting these spaces out to associations etc. also



Plan of upper floor scale 1:1000



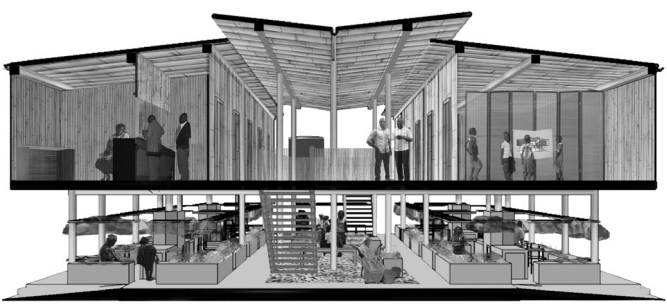
Perspective of main market hall, ground floor

The main market hall

The building has an open ground floor with fixed stalls and mobile benches that can be rented to use for seatings at meetings or as slabs for temporary traders.

The stall slabs can be separated for each trader but the proximity to the neighbour makes it easier to survey each others stalls and work together. Each slab holds storage underneath and the openings make it easy for traders to move in and out of their stalls to meet customers. Above the slabs, hanging racks allow for more goods to be displayed. In the middle, an open space defined by a community art mosaic floor, can be used for trading during the busiest hours and for meetings and gatherings at other times.

The upper floor has community oriented services and the premises are defined by bamboo panels. The roof is inverted to let light in and to harvest rainwater that is collected in tanks on the upper floor in order to get a natural pressure in the taps below.



Section B-B of the market hall

Less costs
More finances to invest
Trader social security
More sparetime
Larger customer network

CO-OP

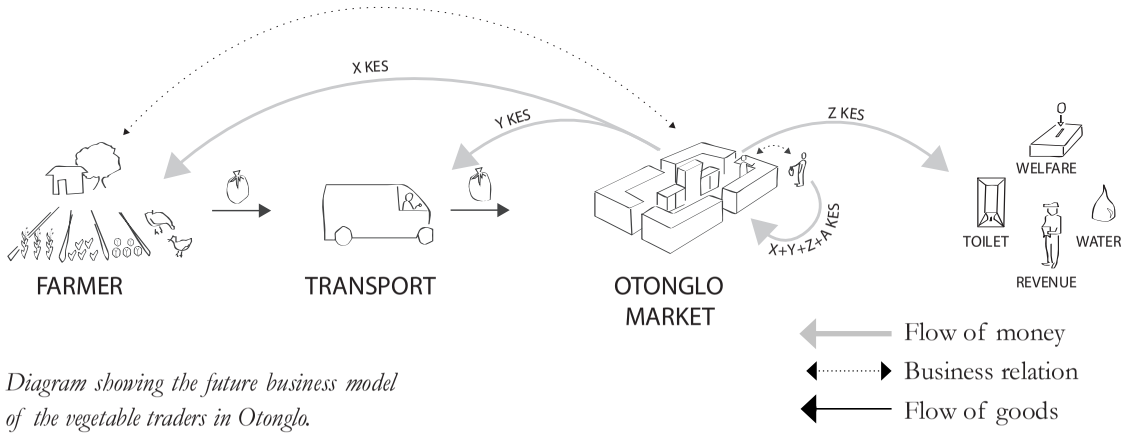


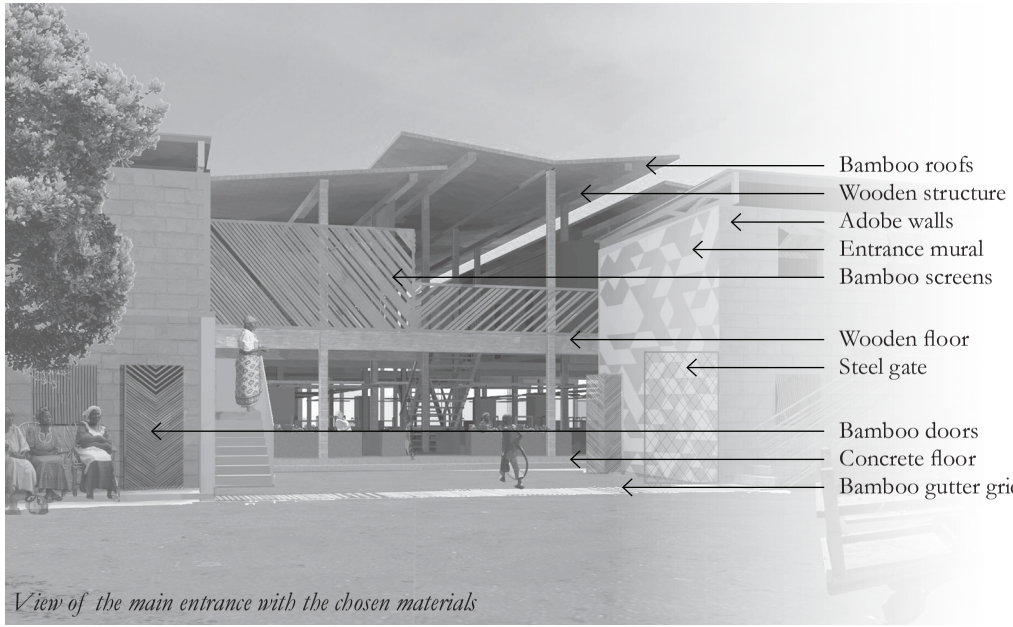
Diagram showing the future business model of the vegetable traders in Otonglo.

Trader CO-OP

When working together in a co-op, the traders would be able to order larger quantities of particular goods, which makes it possible to order straight from the farmers, giving them a better price on their goods. Sharing transport and storage would also limit the costs. The co-op would be financially stronger than the individual trader, making investments easier. If one trader would get ill or be preoccupied by household chores, the others could temporarily cover for her, providing some social security for the traders. They could also survey bigger stalls, permitting fewer traders to do the same work as all of the traders would do before, liberating time for an expanded business, education or childcare. A co-op has the advantage of sharing customer contacts, giving each trader a broader network and becoming more resilient to the loss of a single customer.

Materials

Normally in Kisumu new buildings are constructed in reinforced concrete. This is generally perceived as the modern way of building, as opposed to the vernacular architecture often using organic material. We have chosen to propose natural, local materials that are sound in a long-term sustainable perspective, and are easy to maintain and repair. But in the design we strive to express a contemporary feeling i.e. by working with graphics in the murals, tile floor and bamboo panels.



View of the main entrance with the chosen materials

From criteria to implementation

Flexible space in market hall which can be used by blanket traders. Blanket traders can also rent a mobile bench in order to get their goods off the ground. Arcades outside shops can be used by street-food vendors in much the same way as is done today.

The shops are general structures and businesses can shift shops. A part of the 2nd floor is left unbuilt at a first stage in order to host future growth. The second floor can also be partly unused if the market would be less active, without making the market feel empty.

Market slabs are designed so that traders can easily watch over each others stalls, working side by side. The hotels shares common working and seating areas. The market has several spaces for meetings and gatherings.

The main materials used are adobe and bamboo. Load bearing structures are made from wood. These materials can be found nearby, has a low embodied energy and can easily be repaired.

Workshops are being held with the traders, both men and women, to make plans for the future market. The traders are invited to design the murals and mosaic floor together, to strengthen the feeling of ownership.

Conclusion

In order to make things happen and work in a longer perspective, people need to be involved and projects need to take time. As students, our involvement is short term, while the effects might sometimes be big and long term for the people involved. To address this problem we tried to connect with local organisations, groups and people that can continue the work even after our course is over. Working with local groups helps us to better understand the context.

This market design is aiming at empowering the traders themselves, and in particular women with small economic possibilities and many mouths to feed.

Many of the women we meet at the markets had a low level of education, little English skills, little or no capital and as a result small possibilities to affect and take part in decisions that affect their lives. Our concept of cooperation, enabling them to empower themselves could be a way to tackle this situation, but the situation in itself also makes trust very difficult between them. In order for our ideas to not be enforced upon these traders, we chose to make a proposal that could help build trust over time. As designers we can make a design that enables for something to happen, but never force it to happen. We want to enable trust.

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For our project we have gathered most of our information from talking to traders, mostly at Otonglo but also at other markets. Further we have built our understanding of the context on knowledge gained from interviewing city and county officials and PhD students at Maseno University.

LAKE VICTORIA KNOWLEDGE PARK

by Anni Stockeld, Isa Sverneborn
Jessica Kos and Veronika Mikolasevic

The aim of the project is to create and spread knowledge and awareness regarding Lake Victoria and its preservation, as well as its resources and potentials. This is done through *Lake Victoria Knowledge Park* - a building that provides information about Lake Victoria and functions as an attraction point for the lake region, linking activities along the waterfront. It aims to create a sustainable relation between Lake Victoria and its users through information, participatory education, awareness and understanding.

Exterior - Lake Victoria Knowledge Park

Introduction

Life around Lake Victoria is threatened today. The roots to the problem are overfishing, overcutting of natural vegetation, spreading of diseases, discharging of unprocessed effluents and the growth of algae and water hyacinths. Based on observations on site, the disruption and the irresponsible usage of the lake are related to the lack of information.

Project

Lake Victoria Knowledge Park will highlight the issues of the lake, reveal the lake's possibilities and bring the inhabitants physically closer to the water. The vision is a cleaner lake where wildlife and nature can coexist with a society that takes care of and depends on the

lake and its resources - a society that understands the importance of a healthier lake.

The knowledge park will play a part in the puzzle to improve Lake Victoria's aquaculture. It will also be a starting point for touristic sightseeing explorations that can bring economy and growth to existing projects in the area. It will be a hub for researchers and ongoing initiatives connected to the lake, working towards Lake Victoria's recovery. The project strives to contribute to the development of Kisumu's social, environmental and economic sustainability.

Background

Lake Victoria: Resources and water issues
The severely polluted lake is a result of historical, cultural, socio-economic and planning factors in the Lake Victoria region. Lake Victoria stretches out on an area of more than 68 000 km^2 and is a huge water resource that most East African countries rely on. The lake has a rich wildlife and the wetland along the shore provides habitat to intricate ecosystems.

The region is one of the most densely populated rural areas in the world. The lake supports 30 million people living in the Lake Victoria Basin, which includes parts of Burundi, Kenya, Rwanda, Tanzania and Uganda. While Lake Victoria has contributed to society and its growth, it has also suffered from the consequences of the development. Today, the severely

polluted and eutrophic water is causing ecosystems to fail. The lack of properly planned infrastructure and poor regulations in urban areas are causing disposal of industrial pollution and untreated sewage right into the lake. The smaller villages and small scale businesses are also important actors, since they represent a large portion of the society around the lake.

The conditions in the lake affect the daily life of people. Many rely on the lake for their income and survival. The shortage of clean water force people to use untreated water directly from the lake for everyday use. It causes diseases such as diarrheal and bilharzia, which are major health issues in the lake region.

The lake's well being is important for several countries down to the human scale and each individual.

Kisumu: The city and its development

Kisumu is situated on the northeastern shoreline of Lake Victoria. The Kenyan part of the Lake Victoria Basin is the most densely populated area in the region, and Kisumu is the urban centre with a population of around one million people in the county. Kisumu's strategic location has throughout history made the city an important centre for industries, transportation and trade, which are the main economic drivers in the city today. With the harbour and railway, Kisumu became an important node, linking Lake Victoria to Mombasa. At the same time, the railway became a barrier between the city and the lake which made Kisumu develop facing from Lake Victoria.

Public space and access

In the CBD (Central Business District) there is one main axis, Oginga Odinga Road, leading down to Lake Victoria. In general, there are few public places in Kisumu that are located by the water. For the citizens, the lake is often unavailable and distant. The overall access to public space in the city is also limited.

Suggestions of future development

A future plan of the development of Kisumu suggests a densification of the city towards the lake with mixed used functions. The planned development creates a new axis in the city connecting Kenyatta Sports Ground to the lake. The shipyard and harbour would then be moved and the shore dominated by parkland. A public path would stretch along the shoreline.

Methodology

Field studies and interviews

During the stay in Kisumu, several study visits were made to organisations and businesses such as KICK, JOOUST and Dunga Beach. Many places have shown a great variety of creative businesses related to the lake. In addition to the field studies, information was gathered through meetings. Interviews were held with local people in Kisumu, the staff at Kisumu Museum, the minister of tourism Rose Kisia-Omondi, the staff at the tourism information centre at Kenyatta Sports Ground, the harbour guide Michael Denga, DECTA (Dunga Eco tourism and Environmental Youth Group) and LVTA (Lake Victoria Tourism Association).

Reflections on gathered information

Without the lake there would probably be no city. However, Kisumu's inhabitant's connection to the lake is diminishing. The lack of knowledge about the consequences of human actions along the lake is evident. The problems are not only affecting the environment but also societies and their economies. The prospected population growth makes it more important to start using the lake in a sustainable and responsible way. The counties and municipalities can't address the issues alone, the citizens also have to get involved. This is especially important because the majority of businesses in the Lake Victoria Basin are small scale and mainly small villages occupy the shores. A key for a sustainable solution is therefore to inform the local communities and involve them in the process.

This notion should be the starting point for *Lake Victoria Knowledge Park*. In response to the future development of the city, the project means to emphasize the need of public space and access to the lake. An improved relation could lead to improved consciousness. It also aims to raise the question on how the development of the city could give something back to the lake.

The lakefront is considered as a major asset for the city's growth, but its potential remains unexploited. In addition to the lake's fish source, there are a number of areas of usage that can be further explored such as water irrigation, a system for water purification and rice field fisheries that respond to the issue of over fishing. *Lake Victoria Knowledge Park* could be a place where these potentials are explored and displayed as part of the building's program.

Only a small fraction of boats are coming to the harbour today, compared to its glory days 50 years ago. The decreased activity around the harbour and railway station has made the area neglected. Although the port trade has stagnated, the port has a historic importance reflecting Kisumu's identity, which is something that could be highlighted in *Lake Victoria Knowledge Park*.

An improved Lake Victoria will possibly also attract more tourists and the turnover of money will potentially improve the waterfront even more.

Sustainable devlopment and the three characters
The target groups of *Lake Victoria Knowledge Park* are defined by three characters; the local, the tourist and the researcher. All the three target groups benefit from the project by taking part of the information and program as well as interacting with each other.

The target groups are related to sustainable development through social, environmental and economic aspects.

The social sustainability focuses on the relation between human action and its consequences. The locals interact with the lake in their everyday life, a change of mind-sets and habits could potentially have a vital impact on the lake. The environmental aspect of the project is to increase the knowledge about Lake Victoria and the environment. In *Lake Victoria Knowledge Park*, students and researchers can interact and collaborate through workshops, exhibitions, lectures and a digital archive. In terms of economic development, the aim is to attract tourists to Kisumu. Creating a place that acts as a starting point for touristic explorations could enrich surrounding businesses.

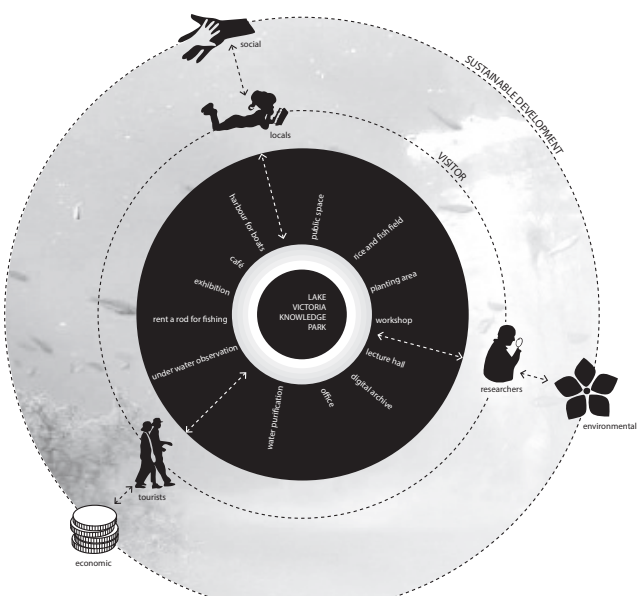
The three target groups shape the project's program to give a holistic approach towards a sustainable development.

Interventions
Interventions were organised in Kisumu to interact with the three target groups. The intervention focusing on the locals was the memory game *What's hiding in*

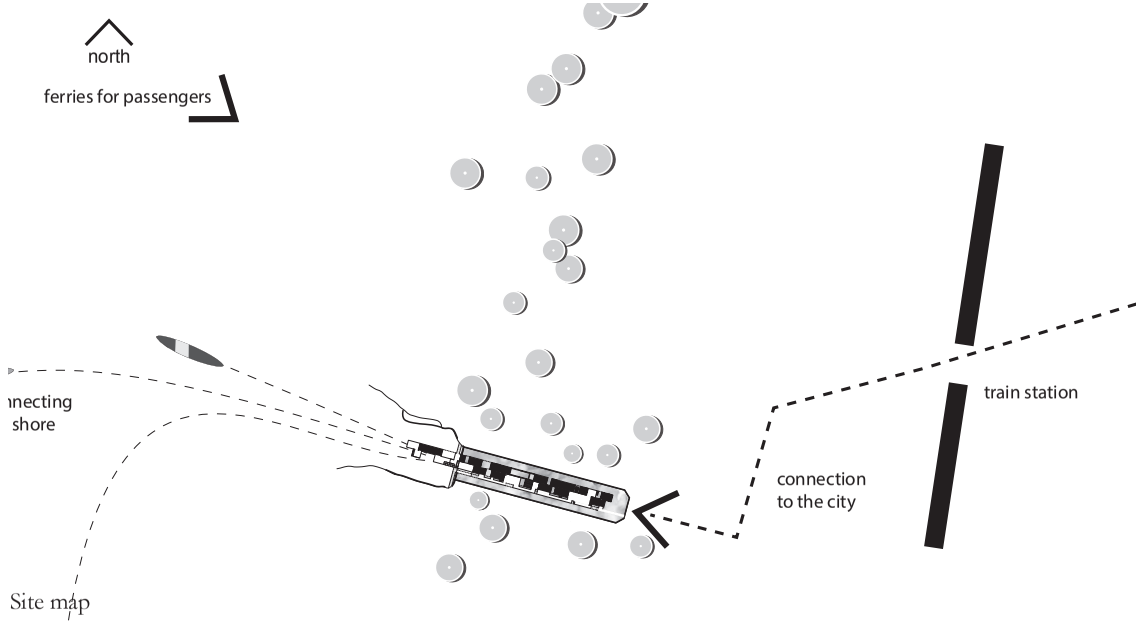
the lake? where the players learn about the lake. The intervention was made together with Golden Girls Foundation in Miwani. The girls also drew postcards sharing their experiences from Lake Victoria.

The intervention targeting the researcher took place at a public project exhibition in Kisumu on the 12th of April. Facts about the condition of Lake Victoria were displayed visually to catch people's attention.

To provide information for visitors, the intervention for the tourist was posted online. Tips about activities is shared on the website www.tripadvisor.com.



Different levels of sustainability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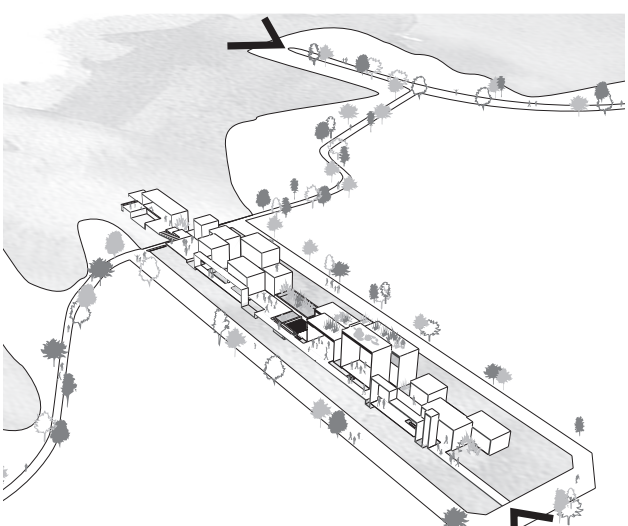
Site map

Lake Victoria Knowledge Park

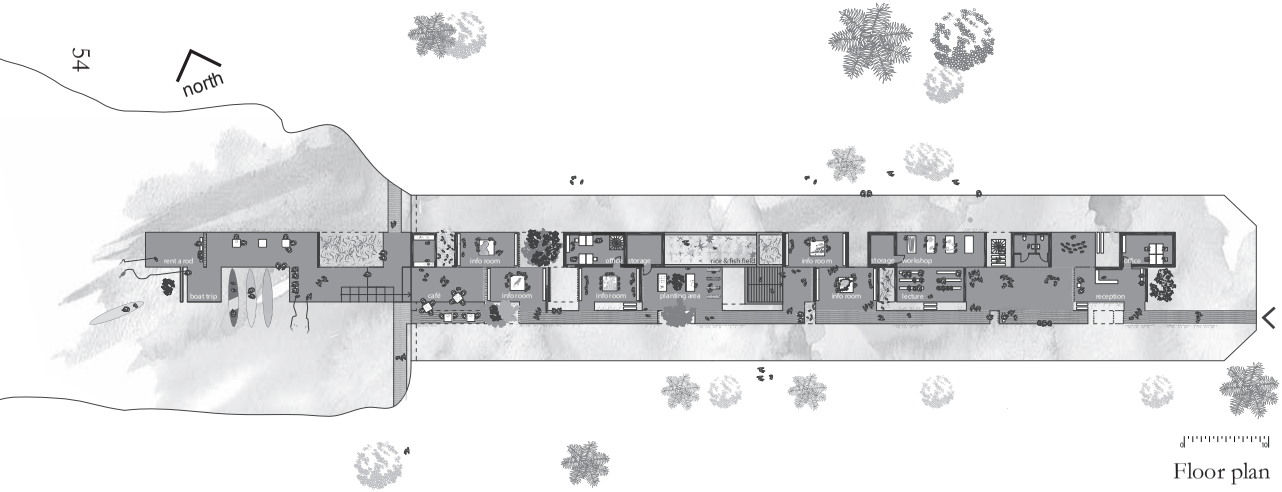
Chosen site - the dry dock

Lake Victoria Knowledge Park is contributing to the future activities along the axis between Kenyatta Sports Ground and the lake. Currently the road ends by a harbour and shipyard, which is planned to move to deeper waters.

Lake Victoria Knowledge Park preserves a part of the history of the harbour by using the existing dry dock in the shipyard. The dry dock is suitable for the building's program. It is resistant to heavy water loads and works well with the proposed under water scheme.



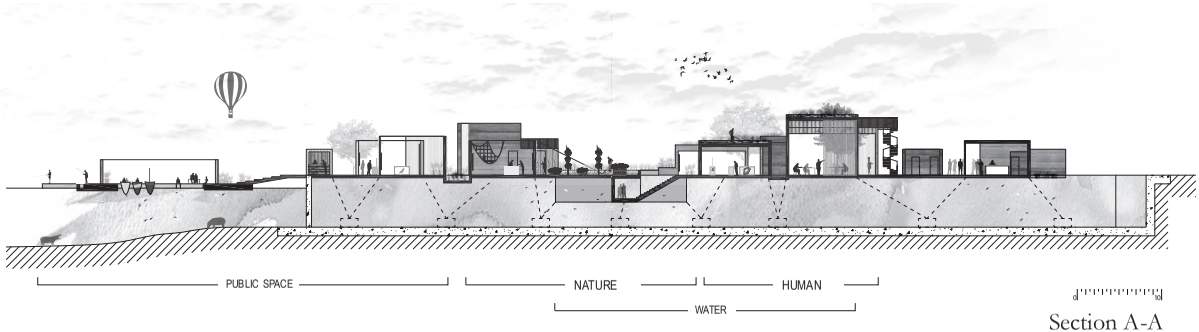
Dry dock and the proposal



Floor plan

Program

The activities within the building are designed to suit the three target groups, the local, the researcher and the tourist. The different activities are closely connected to allow the groups to interact. The program is focusing on information, participatory education, consciousness and understanding.

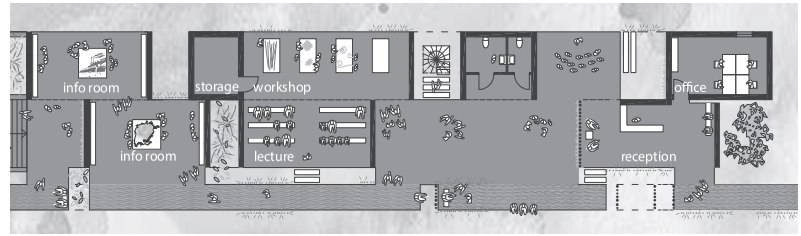


Section A-A

Knowledge and information about Lake Victoria can be found in the info rooms spread throughout the building. The installations are divided into four parts; human, nature, water and public space.

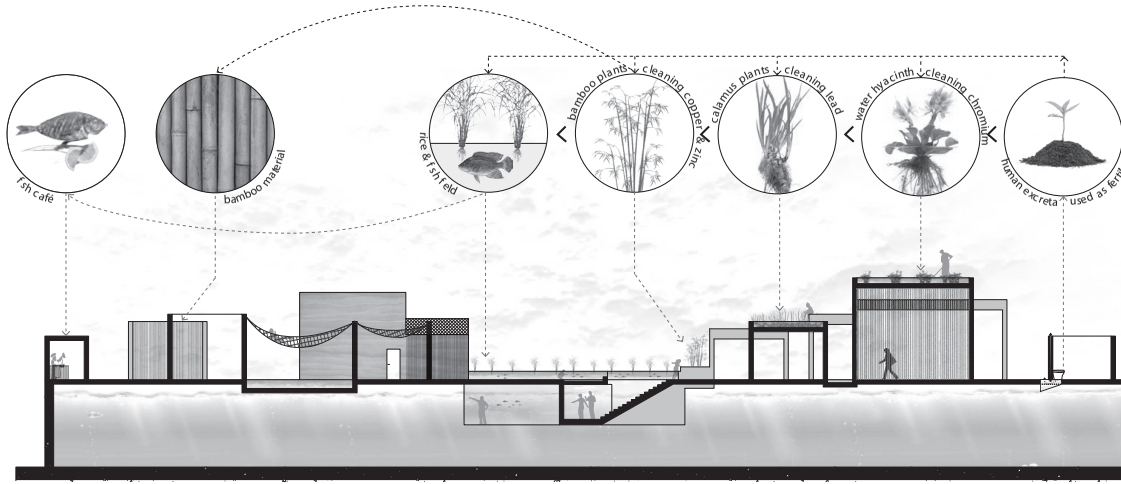
Human

This part presents human activity related to the lake. It explains how people use the lake and the affects of human impact. It will also show how people use the lake's resources in positive and creative ways, through local business initiatives.



Floor plan and section

Information rooms



Section illustratating water purification

Water

The second part will bring the visitors closer to water. Lake Victoria's water world is revealed in the under water observation. The contrast between Lake Victoria's polluted water and the purified water inside the dry dock is exposed though the different steps in the water purification process.

Roof vegetation and water purification

Water from the lake is being cleaned through multiple steps of reed beds on the roofs of the building. All plants that are used are found locally. Intentionally the local inhabitants can apply the gained knowledge in their home environment. The visiting tourists can through the reed beds learn about the flora in Lake Victoria. For example they can learn about the water hyacinths and its positive and negative impact on the lake and its surroundings.

Under water observation

Complex ecosystems can be found under the surface of Lake Victoria. The underwater observation will allow people to interact with the life in the lake.

Under water observation

Nature

The third stage demonstrates how the lake region could be if human and nature worked together. Visitors can learn about the wetlands and their importance for nature. They can also learn about effective usage of manual irrigation to support agriculture. Furthermore, they will be able to apply their gained knowledge about agriculture and irrigation on site.

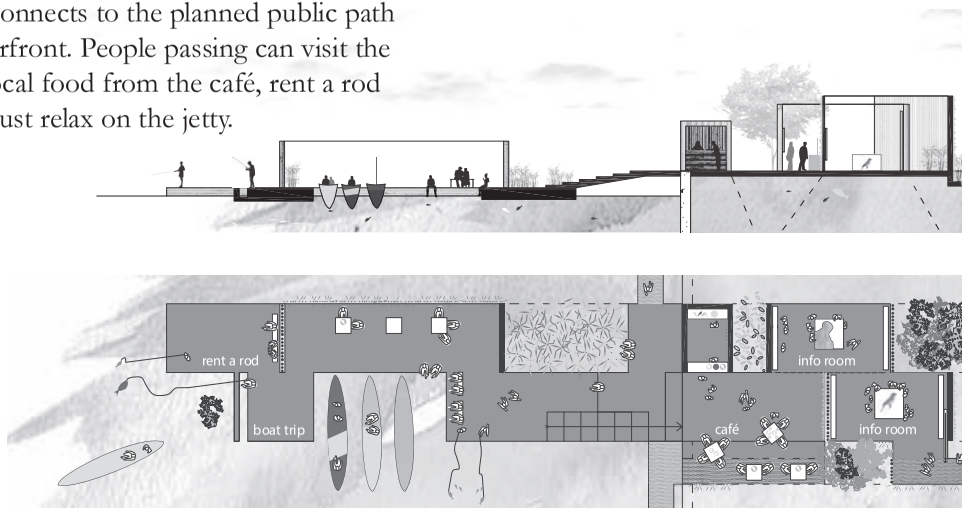
The *Lake Victoria Knowledge Park* demonstrates a possible method that combines rice and fish farming and uses purified lake water from the reed beds as a water source. The visitors can learn about the method and hopefully use their gained knowledge in their local context.

Floor plan and section

Water purification

Public space

The part closest to the lake is open to the public. The building connects to the planned public path along the waterfront. People passing can visit the building, eat local food from the café, rent a rod for fishing or just relax on the jetty.



Floor plan and section


Public space

Reflections

The Reality Studio has brought forward the key ingredient in architecture - interacting with reality and connecting to people living in it. Information from urban planners and local politicians about the future city plan was put against the current situation on the streets of Kisumu. Reality revealed a desperate need for change and the proposed city plan opened up for it. One mission with the city plan was to reconnect Kisumu to the lake. The plan revealed physical improvements where an increased number of streets linked the city to the shoreline. However, we did not see any plan on how to improve the lake's critical condition. We had seen how inhabitants suffered from diseases from the lake, we had observed people who drank polluted water, we had talked to fishermen who returned from fishing journeys empty handed, we had met farmers who required better irrigation and we had met locals who never had visited the lake. One piece in the city plan was missing - something to improve the general knowledge about the lake and its potentials. Something that mentally and physically could connect the inhabitants to the lake.

Lake Victoria Knowledge Park could be one of the first steps in the waterfront development. As an attraction point it could encourage people from Kisumu to visit the lake. However, if not managed properly there is a risk that the building excludes under privileged groups in society. A lot of land in Kenya is privately owned which prevents mixed use. Kenyan values of

land ownership differ from the Swedish values of the right of public access. We understand that *Lake Victoria Knowledge Park* is influenced by Swedish values. However, we believe that more public access would improve the local context. *Lake Victoria Knowledge Park* has handled the issue of public use by permitting free access to parts of the building. Since the building is a natural part of the planned pedestrian path along the shore, it will make people instinctively access the building. The open structure allows anyone to observe the ongoing activities, which makes the building more transparent and welcoming. It is vital since people with various incomes will gain from experiencing *Lake Victoria Knowledge Park*. For that reason, it is important that future investors and active partners value the importance of not secluding groups in society from the area.

The building could change over time since it is constructed on floating units, it could even be divided and moved. There is a division between permanent and temporary units. For example permanent offices of rammed earth are built to last while other units built of bamboo has a shorter life span and needs to be rebuilt. This creates opportunities for change in the design and program.

Other future possibilities could involve an expansion of the knowledge park to enhance its connection to activities around the lake. The concept could extend to where the knowledge park links to pavilions or smaller parks, located along the shoreline. Local communities

should manage these places. It creates opportunities not only to educate and inform, but also to activate the locals in projects concerning the preservation of the lake.

Sustainable low-tech solutions don't have a high status in Kenya and can be hard to introduce. To enhance the status of local methods, we aimed to find a contemporary expression using traditional techniques and materials. Expectantly the building strategy will inspire people in Kisumu to use sustainable traditional building techniques in a contemporary way.

During the process, questions regarding open spaces for big groups and free public access have been discussed. Kenyan families are more than twice as big as Swedish households and Kenyan school classes have twice as many pupils compared to Sweden. The differences need to be taken into consideration when designing a public building. The floor space has therefore been adapted to enable big groups to visit the knowledge park. Therefore, foldable walls and furnishing that easily can be rearranged have been incorporated.

In conclusion, *Lake Victoria Knowledge Park* strives towards the common goal of Kisumu's future city plan - to reconnect Kisumu to the lake. It adds an important element to the proposed improvement of the waterfront. *Lake Victoria Knowledge Park* could be an attraction point that re-establishes a sustainable physical and mental relationship between the lake and its users.

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Meetings
Conference at Kisumu Hotel, Planned City Extension, 12 March 2014

WATER HYACINTH BOARD EXPERIMENT

by Sarah Franzén, Atte Kiianen & David Kvarnström

This project has been performed as part of the Reality Studio at Chalmers University of Technology during the spring of 2014. The participants have different academic backgrounds; Atte Kiianen is an architect, while David Kvarnström and Sarah Franzén have a background in civil engineering.

In Lake Victoria, the invasive water hyacinth plant has been present since the late 1980's. During parts of the year, the plants cover large lake areas around Kisumu, inhibiting lake related activities. Since fishing is a big part of the livelihood of the Kisumu population, this complicates daily life and makes it even harder for families depending on fish related business.

With a wish to make some use of the water hyacinth plant, we chose to study its suitability as raw material for a building material or component. Quite soon, we decided to experiment with boards made out of dried hyacinth stems, with the goal of trying to come up with a material that could be used as a basic type of thermal or acoustic insulation. Our hope was to create an insulation product that could improve the life quality of people living in steel sheet buildings, common in informal settlements.

The production implementation turned out to be less smooth than expected. Provision of raw material was the main hindrance, and we ended up with very limited experimentation conditions. A total of nine boards were eventually produced on site, and three of those were tested for various properties back at Chalmers. The lab results indicate fairly good thermal resistance capacity, quite poor sound absorption qualities, and high moisture adsorption properties. Although having determined some of the basic characteristics of the material, the limited time frame restricted us from reaching a more extensive feasibility study.

Project Overview

Housing situation in Kisumu

The city of Kisumu was founded in 1901 and is the third largest urban settlement in Kenya (Trillo 2010 p.252, Government of Kenya 2009). The city is localised about 10 km from the equator. The climate in this

region is warm and moist with a drier winter in June-August, and two rainy seasons: one shorter in November and one longer in March-April (Nationalencyklopedin 2014a).

A large part of the housing stock in Kisumu is informal and populated by low income households. Most buildings in these settlements are of the following types:

- Load-bearing timber frame with walls made out of corrugated steel sheets or mud and wattle, typically.
- Masoned walls constructed with industrially produced clay bricks or locally manufactured earth bricks. Surfaces are usually plastered.

Roofing is in most cases constructed with corrugated steel sheets, supported by a wood structure. Within low-income settlements, almost all corrugated steel sheets used for wall cladding, roofing and fencing is second-hand material. While the larger pieces are saved for the roof, the walls are often compiled of several smaller pieces of varying size, shape and quality.

Steel roofs and walls are not very suitable for the hot and humid climate in Kisumu. The steel transmits heat that brings high indoor temperatures. Heavy rainfalls cause loud noise. Also, condensation of water in the ceiling occurs in night time when temperatures are decreasing.

Photo showing a wall made by steel sheets

The water hyacinth plant (SFRC 2014)

The water hyacinth issue

Water hyacinths originate from South America. It is a free-floating, perennial aquatic plant with an enormous reproductive capacity; population size may double in six to 18 days. Lake Victoria is the largest freshwater body in Africa and currently supports approximately 30 million people. The water hyacinths were first recorded there in 1989, and have since been a large issue in the region.

Large populations of water hyacinths can directly or indirectly cause a variety of problems at social, environmental and economic levels. Growth of native plants, plankton and fish is negatively affected by blocked sunlight and reduced oxygen levels. Lake based businesses, such as fishing, are inhibited by obstructing plant presence and reduced fish stock. Lake water quality is reduced and conditions for reproduction of malaria transmitting mosquitoes, cholera and bilharzia parasite vectors are enhanced.

A wide range of means - manual, mechanical, chemical, biological - have been tried in order to reduce the prevalence of water hyacinths, but they have turned out to be either too inefficient or too expensive. Utilisation control, that is using the plant for different purposes, such as fodder, biomass energy, fertiliser, and for waste water treatment, may be considered as a positive effort to control attempts (EEA 2012 p.61-63 & UNEP 2013 p.7-11).

Utilisation of plant fibres as building material
In the initial stage of the project, various utilisations of plant fibres as building material were studied. Among those were straw bale and cement composite techniques. We eventually decided to focus on fibre boards because of the simple production means.

Research on making boards out of water hyacinth fibres has taken place in different parts of the world. A note-worthy example is the House and Building Research Institute in Dhaka, Bangladesh, where boards for general purposes as well as bituminised boards for use as a low-cost roof material have been studied. The properties of the general purpose boards are apparently good enough for use as indoor partition walls and in ceilings (Calvert 2002 p.5 & Jafari 2001 p.46).

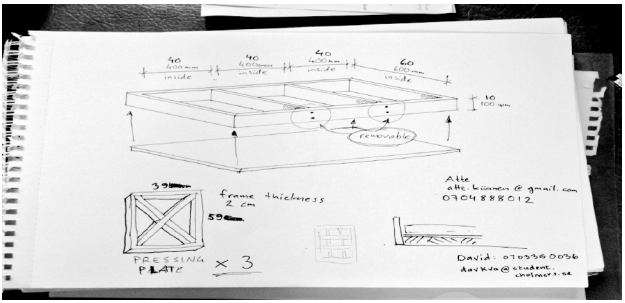
Project strategy
The main aim with the project was to make and evaluate a water hyacinth based building material that could be a potential business idea and provide an affordable end product for low income households. Although what kind of product to be created during the experiment phase was yet to be determined, some general application qualities, manufacturing aspects and possible local impacts were endeavoured. These thoughts were specified as product development criteria with the following topics:
1. Positive impact on water hyacinth infested areas
2. Simple production and affordable end product
3. Assembly and maintenance
4. Improved indoor conditions

The first step was to study previous research on water hyacinth utilisation and other natural fibre materials. Then, we could determine what product to focus on and start the production. The plan was to make as many boards as possible before heading back to Sweden. The remaining weeks at Chalmers were intended for lab testing and evaluation, as well as preparing the report.

Board Production Process

The making of the boards took place in Kisumu. Background knowledge was unfortunately quite limited, but some inspiration came from the literature review; the local expertise of making paper at Zingira Nyanza Community Crafts; as well as a previous Reality Studio project.

Preparations
In order to start the experiments, we needed to get a pressing device and raw materials. We designed a basic wood frame with a bottom plate, two dividing pieces, and three pressing plates. Apollo Amondi at Zingira brought our design sketch to a carpenter at Kibuye market, and about a week later, we obtained the completed frame.



art of the frame design sketch given to the carpenter

The raw material was provided by harvesting ourselves, as well as placing orders through Zingira. The good quality plants were unfortunately not available close to Kisumu, but had to be harvested in Osiri, about one hour's drive from town.

The hyacinth stems intended as raw material had to be treated before pressed into boards. We split them, let them dry for one day, treated them with sodium metabisulfite, and then let them dry for another day. Then they were ready for production.

Board-making manual

1. Split fresh hyacinth stems
2. Let dry in the sun at least one day
3. Soak in a water/metabisulfite solution (the metabisulfite acts as a preservative)
4. Let dry one more day
5. Mix wood glue and water (a little less water than glue proved to be a good mix)
6. Add the glue mix to the stems and stir

7. Put the glue-covered stems in the frame (grease contact surfaces first)
8. Compress at least three hours
9. Take the board out of the frame and let dry for 1-2 days for increased rigidity

Experimenting with different board types

Our plan was to mix the dried and processed stems with wood glue and then compress the material in the frame, using water tanks as weights. We learned that using an amount of water slightly smaller than the amount of glue seemed to work the best, and that the pressing time did not seem to affect the results as much as expected.

Experiments with different fibre shape and distribution

One of the biggest concerns when working with plant fibres like the hyacinths is fire-proofing. Therefore, one experiment with a fire-dampening chemical, Borax, was made. The chemical reacted with the glue/water mix and turned into something similar to slime without any cohesion, precluding further attempts with this chemical.

We also did some experiment reinforcing a board with chicken wire, but realised that having the right glue/water ratio resulted in a board that was even more rigid than the reinforced one. Because of this, and since the chicken wire is quite expensive, we decided to proceed without it.

Due to a delivery of already dried hyacinths, some plants had to be split when they were dry. This turned out to a change in colour when finished. It was browner; while the others were more of a greenish colour. The effort of trimming and splitting the dry material was also considerably larger compared to fresh, still moist ditto.

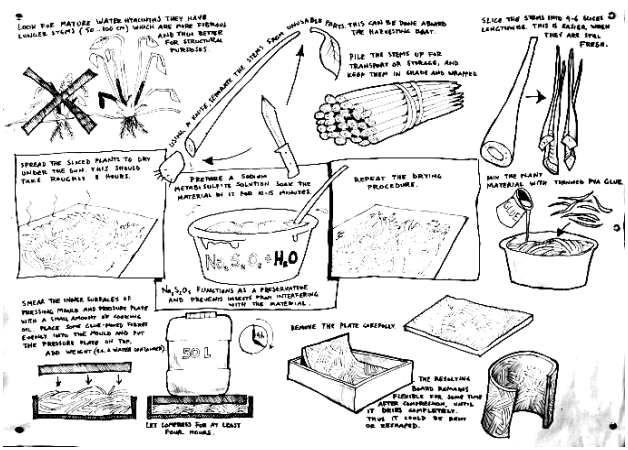
Different approaches to fibre thickness and length were tested. Initially, only long fibres were used, but later also fibres that had been cut into shorter pieces. The fibre distributions were also focus of some experiments: long fibres were arranged parallel in the frame, and also put into a mesh-like grid. One larger board (120 cm × 60 cm) was made and formed into a cylinder, successfully proving the flexibility of the still moist material.

Feedback at the exhibition

People were curious and interested in seeing what we had done with the hyacinths. There were quite different levels of knowledge about the plants among the visitors; some recognised it immediately and some did not know about it at all. Some gave the impression of seeing a potential business idea. Others were already

involved in making crafts out of the hyacinths and were excited about the idea. Some persons just liked the idea of utilising the weed.

There was also some very valuable feedback given to us. One gentleman insisted that the glue was a weak point in the product idea since many targeted households cannot afford a product with that much glue needed. Another issue brought up was the fire risk. This had been a concern since the start of the project, but unfortunately not further studied due to time restraints.



The production process as presented at the exhibition

Laboratory Testing

Once back in Sweden, we did some lab testing with the aim to determine relevant physical properties of the boards. Three boards with different compositions were chosen for the tests: one with long fibres distributed

in parallel, and two with randomly distributed fibres: shorter and longer, respectively.

Environmental impact on building materials

There are many climatic factors that impact the performance and durability of a building material. The lab tests at Chalmers investigated thermal conductivity, moisture adsorption and sound absorption of the chosen boards, respectively. The results, as well as a brief summary of each aspect, are presented below.

Thermal conductivity

Thermal conductivity of a material is denoted as the λ-value (lambda value) (Nationalencyklopedin 2014b). It describes the performance of a material as a thermal insulator. A low λ-value means that the material has good insulating properties.

The λ-values of the boards were measured by two different devices: Throttle Positioning Sensor (TPS) and Guarded Hot Plate (GHP). Both tests show that the boards have a quite good insulating capacity, but this might not be representative since the testing environment deviates from a real situation with wind present. Still, trapped air in a material enhances its insulating properties, while moving air through the material has the opposite impact.

The best λ-value measured was by the GHP for board C; 0,0415 W/m·K, which actually is in the range of mineral wool material commonly used for insulation. A calculation model for a steel sheet house was esta-

blished to determine possible effects with the boards installed. It was based on $\lambda = 0{,}05$ W/m·K and an air gap between the boards and the sheets, and indicates potential improvements with regards to indoor temperatures.

Moisture adsorption

In areas near the equator, buildings are exposed to all sorts of moisture mechanisms, and building materials are hence at high risk of moisture related problems. Moisture can lead to deterioration and disintegration of both natural and artificial materials and affect their thermal conductivity negatively (Burström 2007 p.52, 79-81).

The boards were tested for their moisture adsorption properties by weighing them at different relative humidity levels, as well as completely dry. The results show quite high adsorption behaviour - not too surprising given that the fresh plant consists of more than 90 % water (Calvert 2002 p.4). Two of the three samples put in a 100% relative humidity environment had mould growing on them only after a few days, which obviously presents the rapid impact from moisture, and emphasise required proofing measures.

Sound absorption

Indoor noise is often the result of vibrating surfaces. A recommended noise level limit in bedrooms, according to Swedish standards, is 30 db(A) (Nationalencyklopedin 2014c). Rainfall can cause noise above 75 dB(A), which clearly explains the resulting discomfort in houses

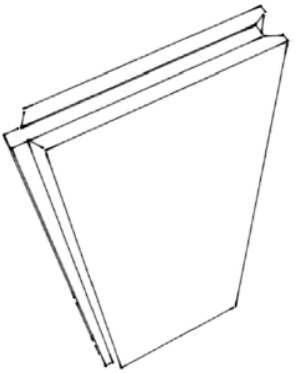
with steel sheet roofs, and the need for proper sound insulation (Ford et al 1993).

The sound absorption of the different boards was measured using a Kundt's tube device. The conclusion is that the absorption is poor for low frequencies while there is a potential for decent absorption for higher frequencies. However, since the model tested is not adapted to the real-life conditions we had in mind; further testing is required in order to tell something about possible applications.

Application Study: Wall Panel

During the experimentation phase, we had several thoughts about potential application for the boards, such as sound absorbent, partition wall, cooling box, etc. We decided to proceed with a wall panel concept, presented below.

Panel structure
The wall panel is meant to function as a building component. It could be composed of three layers of compressed water hyacinth boards, giving it a combined thickness of 60 to 100 mm. The boards could be held together by tubular eyelet rivets, limiting required adhesive between the board layers.

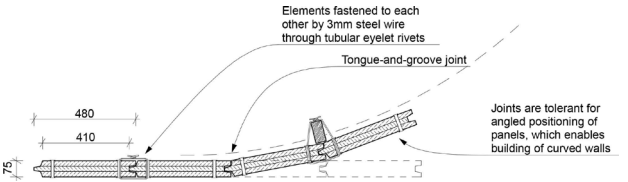


Model of wall panel

The middle board is offset from the outer ones so that once assembled, they get an interlocking tongue-and-groove functionality. Another function of the eyelet rivets is that using the holes, adjacent elements can be bound together with steel wire. In a similar manner, the wall elements can be attached to a supporting timber frame.

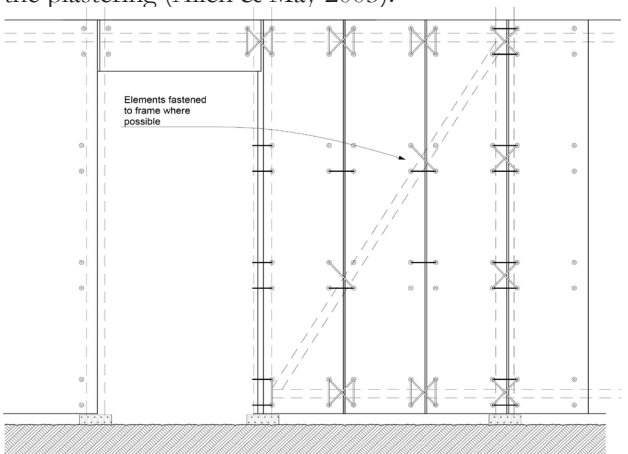
Wall properties

It is essential for a plant fibre wall panel to have a protective layer. Compressed water hyacinth shares some typical properties with straw bale, which has established a steady foothold in the field of sustainable building. Some methods used in straw bale construction are hence likely eligible for adopting.



Plan view of wall panel

Straw bale walls are typically covered with plaster, which protects them from weather and fire. Plaster also provides a wind-proof layer, which contributes to the thermal insulation performance. The plaster has to be hygroscopic, in order to draw the moisture from the fibres. Clay-based plaster is the best option in this regard, but it is also more vulnerable to direct impact, compared to e.g. lime plaster. Clay should also be protected from direct rainfall, as it may quickly erode the plastering (Allen & May 2003).



Elevation view of wall panel

Areas of utilisation

The structure proposed could be best suited for semi-permanent or secondary buildings in rural homesteads or peri-urban residential areas, in the East African context; the elements allow construction of straight or curved walls, so the form of the building can be optimised depending on the local context and density. Typology of a traditional house is quite simplistic; many buildings consist of only one room, and in a rural homestead these rooms are typically situated around a courtyard. In denser areas, rectangular multi-room design is adopted, since it allows a greater density and functionality.

In addition to the above, water hyacinth wall elements would serve a purpose as material for temporary shelters at displacement camps. According to UNHCR statistics, there are currently over 400 000 Somali refugees situated in Kenyan territory, most of them at Dadaab area in Eastern Kenya (UNHCR 2014). As the long term durability remains unknown, it could be assumed that the panel could serve its purpose successfully for at least a limited period of time. The product would be biodegradeable apart from the metal parts; water hyacinth is completely organic, while PVAc possesses low toxicity and is biodegradeable if appropriately treated (Berge 2007, p. 376).

This aspect can be relevant to the fact that when conditions change, displacement camps can be quickly deserted, which in turn leaves large amounts of demolition waste to be disposed of upon disassembly of

the camp. Biodegradeable materials could possibly be disposed of at the site or its vicinity, which contributes to further reduced transportation costs.

Analysis

Here, a SWOT analysis and an evaluation of the product development criteria are presented.

SWOT analysis

Strengths

- Plant material is prevalent in Lake Victoria and retains itself.
- Manual processing and manufacturing methods are simple and easy to introduce. Simple methods also consume less energy, and as manual labour is cheap, product prices remain low.
- No complex equipment is needed for basic production; requirements for initial finances to establish a workshop are relatively low.
- Workshops could be established in several locations. Decentralised production reduces commuting and transport.
- Compressed fibre material has notable thermal insulation properties.
- In smaller craft workshops, primary relationship between the producer and the user (as well as between the producer and the product) is maintained; this can contribute to better quality of work.

Weaknesses

- Fresh plants are heavy and bulky compared to dry material; production of compressed boards requires large quantities of plant material, therefore mechanical harvesting equipment would be needed for extensive production.
- Large-scale or distributed production requires definition of quality and standards.

Opportunities

- Successful utilisation could significantly reduce local populations of water hyacinth and therefore contribute to other management efforts.
- Structures could be easily assembled, disassembled and transported due to low material density.
- Inter-compatibility of products from different manufacturers.
- Manual harvesting and production is labour intensive, which would provide employment opportunities.
- Mechanised production becomes more cost-effective when larger quantities are produced. Economy of scale reduces prices, although employment is reduced.
- Industrialised production could enable market at national or international scale, adding to the local economy.
- Machines provide more powerful means of processing (fragmentation, pressure, etc.), which can result in better physical properties of the product. However, highly developed products may become too expensive for consumers at lower levels of income.

Threats

- Population size of water hyacinth varies so that sometimes it can be almost absent at certain locations. Production may require raw material when it is unavailable, which may provide a perverse incentive to maintain the plant prevalence. This would contradict one of the main purposes of the concept, and be detrimental to environment and economy of an influenced area.

Evaluation of product development criteria

In order to assess the project outcome, the results from our work is evaluated in relation to the set product development criteria. Since the end application was not completely determined from start, but rather depending on the product experiment outcome, the criteria function more as guidelines for the product experimentation than a grading basis for the final product and the evaluation is partly based on the SWOT analysis. Additionally, the criteria are quite open for interpretation, being very unspecific, and some have been insufficiently assessed, due to time restraints.

1. Positive impact on water hyacinth infested areas

In an area where fishing business is inhibited by obstructed lake accessibility due to water hyacinths, a significant reduction of its presence could have a positive impact. In a larger context, however, small scale harvesting won't affect the total prevalence and proliferation in Lake Victoria. The larger harvesting activity, the larger potential for positive impacts, and being a proposal for small scale business, the outcome has to be evaluated in local contexts.

2. Simple production and affordable end product
The end product cost and associated affordability is complex to assess. It is uncertain if the wood glue component makes the product too expensive for its targeted user group, and we can only speculate in cost estimations for labour, means for manufacturing, transports, actual application and marketing. Further studies are most definitely necessary, but the basic idea of utilising almost costless available raw material in a simple production process could hold potential for a low cost end product.

3. Assembly and maintenance
The handling of the boards has to be assessed in relation to what it could be replacing, e.g. the wood stick wattle common in mud walls. The proposed board design has the aim to be easily assembled as interlocking components, forming a wall infill structure. With the same load bearing wood frame structure as basis, the boards should not be much more complicated to assemble, if not easier, compared to a wood stick wattle composition. Maintenance is difficult to assess without any data on time related effects on the boards, but considering the flexible shaping possibilities, it holds a decent potential.

4. Improved indoor conditions
The thermal conductivity properties of the board material have proven to be well suited for thermal insulation. Results from the calculation model indicate a positive impact on indoor temperatures, although the specific model used did not produce any large

differences when compared to the uninsulated case. An improved calculation model and actual testing in a real steel sheet house could possibly determine the potential for application in this context. Indoor noise levels due to heavy rainfall is likely to be reduced with the boards installed in the ceiling and/or walls, but no calculation models have been made to confirm this assumption. In any case, sound absorption could be an additional and indirect positive impact from installing the boards as thermal insulation.

Important aspects for further study
As this project was very limited in both time and resources, a lot of questions and issues remain unsolved. The ones considered most relevant are mentioned below.

- Water proofing
- Fire proofing
- Proofing against vermin
- Structural quality
- Long term performance

Discussion

This project has been interesting, challenging and rewarding, in many ways. Here, reflections on the project, credibility and relevance of the study, and some obstacles encountered are discussed.

Project work evaluation

We have carried out nothing but a very simple testing procedure, intending to give some clues about the actual properties of the material. Many aspects are yet to be studied. What comes in mind is the simple question asked during the exhibition at the Jomo Kenyatta Sports Ground: 'Does it work?' Honestly, this question remains without an answer. The next step could be to build some kind of prototype to test in local conditions, especially considering moisture and mould.

During the period we were in Kisumu, March-April 2014, there were no large mats of water hyacinths covering the lake, as expected. This made us realise that the plants not necessarily are an abundant resource, like we initially took for granted. This obviously has a large influence on the concept of our project.

However, could some kind of business idea be created around the concept of water hyacinth boards, it could lead to both new employments as well as improvement of local housing conditions. Even if the usability of the boards remains unknown, it was worth all the effort put into this project should it somewhere, somehow come to any use.

Relevance and credibility

Water hyacinth utilisation, employment creation and potentially appropriate building materials are all important aspects in places like Kisumu. To find new applications of the water hyacinth as a raw material could potentially have several positive impacts on local

level, such as clearing of infested lake areas, creating value of an almost freely available resource and bring unqualified employment opportunities. All of these things are of course complicated to accomplish in reality, and the aim with this report was to investigate one possible application of the hyacinth, which potentially could be developed into a small business.

This report does not claim to be scientifically flawless, but rather has the intention to provide basic information about the studied subject. Previous research on water hyacinth fibre boards has been made, but access to specific information from these sources was unfortunately very limited, if not non-existent, leaving the experimentations with very little background knowledge. Being an independent university project, influences from potentially biased sources are obviously avoided, although some oral sources referred to might not be completely objective.

Obstacles encountered during the project

The major obstacles that influenced the work progress are presented below.

One main purpose with the studio is to understand the local context, and cultural differences also proved to have influence on our progress. Although the collaboration with the personnel at Zingira was very open and friendly, some setbacks occurred, partly due to insufficient communication. Our inquiries were usually received as easily feasible, but then the impression of what was initially agreed upon could differ. It affected

costs and, more importantly, time. We learned the significance of being very clear with what we asked for, and also to make sure that it was actually possible and convenient under the current circumstances.

We found some helpful material during the literature review, but at some points, the limited internet access and lacking response from contacted persons were really slowing us down. Due to time restrictions, we had to start the production phase before too long, which consequently affected our knowledge base and premises for setting up goals.

Our conception of the water hyacinths as easily and abundantly available turned out incorrect. The mature, good quality plants were not present anywhere close to our location, but rather in a remote area not easily accessible. Hence, the actual provision of the raw material claimed much more time than we had expected, leading to delays in the production process.

The intention was to make as many boards as possible and to do lots of experiments with composition, fibre size et cetera. Due to the difficulties getting the raw material, only a limited number of boards could be produced. A small sack of hyacinths was brought back to Sweden for further board production, but because of time restraints, this could not be pursued. Also, the extent of lab testing had to be kept to a minimum.

Because of the academic mix of architecture and engineering, we have aimed to balance the project, not

letting it become too much of either discipline. There were no difficulties in doing this in the initial phase in Kisumu, when producing the boards. What to make out of the boards once back in Sweden was more challenging. The testing at the labs took a lot of time, leaving the design process a bit out of focus.

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BEYOND WASTE OF WASTE

by Angela Sewe, Aron Wetterlund,
Sofia Ek and Ylva af Kleen

This project is about on site waste management at Manyatta Peace Market in Kisumu. Manyatta Peace Market pilot project is an already initiated project, by the Kisumu Local Interactive Platform, Kisumu County Government, Maseno University, Manyatta Residents Association and the Manyatta Peace Market traders. The pilot project aims at encouraging separation of waste at source to facilitate recycling and reuse of market waste, thereby reducing the amount of waste evacuated to the city dumping site. It is a new concept that is being tried out at Manyatta Peace Market and if successful, will be replicated to other markets in Kisumu. Beyond Waste of Waste aims at improving the implementation plan of the pilot project by making suggestions based of the areas of weaknesses and threats from a SWOT analysis. The suggestions are categorised into: Information and communication, Looping systems of waste, Physical design and Management approaches.

Introduction

Waste as a global issue

The extent, effect and disposal of waste is one of the major challanges in a local and global perspective, concerning sustainable development (Brandy, 2012). The issue of handling waste tend to become especially troublesome when it is connected to developing countries and urban areas with rapid population and economical growth.

Waste handling in Kisumu

Kisumu does not have a functional waste management system. The County Government has the capacity to collect 20-30 percent of the waste generated. The remaining percentage end up in the streets and other areas in the city, and this poses a great threat to public health, aesthetics and environment of the city. Kisumu city exhibits a linear system of waste handling, where mixed waste is evacuated to the city dumping site. The County Government is currently exploring the option of Public Private Partnership (PPP) and Community Based Management (CBM) to supplement service provision in waste collection and management. Manyatta Peace Market project is one of such interventions. (Rashid, 2014)

Manyatta Peace Market and The pilot project

Manyatta Peace market has two formal market structures built in 2009. There are shops around the market structures, forming a market square at the center. At the open spaces of the market square, there are tem-

Sketch of waste in a drainage channel.

porary stalls from which other traders operate. Most of the market traders are women while men are mostly in the shops. The children are also present at the marketplace. The market is active during daytime from 10am but is more active in the evening from 4pm to 9pm. Manyatta area is a residential area and thus most of the goods traded at the marketplace are food items, for example fish, fresh fruits and vegetables. The shops however stock a variety of household services and there are other services such as dressmaking and hairdressing.

Manyatta Peace Market project aims at actively involving market traders to sort their waste. It also aims at showcasing waste management as a potential avenue for increasing incomes for the traders. The project has been started, with training of 40 participants on waste recycling and reuse. There has also been purchase of large plastic garbage bins, gloves and gumboots for the project activities. The implementation of the project is rather slow and at the marketplace, there is no sign of the project existence. A SWOT analysis of the pilot project showed the following results.

Strengths

- There are strong social ties among the people of Manyatta.
- The project work has already been started

Weaknesses

- The first step of the project only focuses on the traders inside the market structures and exclude

shops, visitors and households.
- The pilot project mainly address the issue of organic waste while other kinds of waste are equally important.

Opportunities
- Already active market groups can be key holders when developing new activities.
- The marketplace attracts all groups of people; men, women and children

Threats
- Lack of documentation and coordination between the stakeholders.
- As much as the project implementation had begun, there was no clear strategy as to how the project will be implemented at the market.
- Informal interviews indicated that a significant number of traders did not understand nor identify with the project and thereby lacked sense of ownership.
- The general population thinks the Government should be responsible for waste handling and don't understand their own responsibility.

Beyond Waste of Waste project goals

Based on the results of the analysis, the Beyond Waste of Waste project propose suggestions that will help in eliminating the threats and strengthen weaknesses of the pilot project using the opportunity and strengths available. Suggestions are classified into four main areas:

1. Information and Education: we incorporate information, communication and education component to ensure continuous and widespread communication of sustainable waste management.

2. Looping systems of waste: what more can be done with waste generated at the market?

3. Physical design proposals: we look at how design can offer solutions to make the waste sorting easy and accessible for the target groups.

4. Management of services: we aim to explore and bring out possible implementation scenarios and their pros and cons for the pilot project.

Information & Education

People at Manyatta Peace Market blame the County Government for not taking care of the waste and do not view themselves as important stakeholders in waste management. Public participation is an important element of a functional waste management system. It increases chances for success in waste management initiatives through behavior and attitude change. Public awareness and attitudes to waste can affect the population's willingness to cooperate and participate in adequate waste management practices. (Ahmeda and Alibm, 2006)

Sketch of audience at a public meeting.

For the pilot project to succeed, general environmental awareness and information on health risks are important factors to include in the project. The public should also get adequate information regarding the pilot project and be assisted to play their role of sorting their waste. By doing that the feeling of ownership can increase.

The marketplace will be a good starting point for information and education since all the target groups can be found here. Other locations are for example schools, neighborhoods and public forums. Information and education will be disseminated through various techniques.

Criteria for information techiques:

- Easy to understand and adapted to age and context: This would entail using the local language, simple terminology and commonly known symbols.

- Capture interest and attention so that the information can stir up conversations for further discussion.

- Fast and effective: Don't take up much time or is hard to reach. For instance short films may be more effective than long films.

Information and education component can only be effective if undertaken with other project activities. As such, it has been incorporated into the overall physical design of the proposals. Other initiatives to reach the public such as short films, posters and brochures can

also be arranged for the public to compliment the pilot project activities. Waste management can also be incorporated in school activities to target the children.

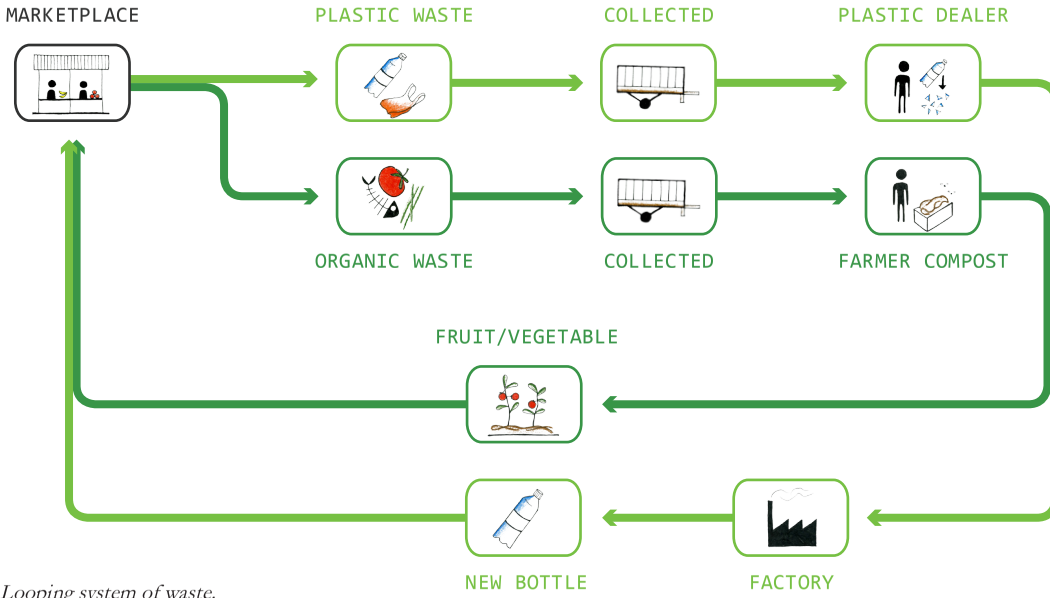
Looping systems

There is a lot of solid waste generated from production and consumption of goods by the human population. Most of the waste can be reused and recycled while some is hazardous waste.

At Manyatta Peace Market there are three main categories of waste generated: food waste (cooked, stale fruits and vegetables), paper and soft plastic bags.

Currently, the food waste (collected and dumped on the market streets or the market dumping site) is consumed by free range ducks, goats and cows, while some of it is collected by farmers to feed their animals at home. Paper and soft plastics, mainly used for packaging of food items are left on ground and since they do not decompose, they remain at the marketplace.

The pilot project focus on recycling of the food waste by decomposing it into manure to be used for farming or animal food. Soft plastics and paper also need to be incorporated in the recycling and reuse activities of the pilot project if the project should have visible impact on the cleanliness of the marketplace.



Looping system of waste.

Food waste

Food waste can be handled at market level and at household level. At the market level, it is possible to use the food waste together with other biodegradable waste to produce biogas. At Manyatta market, biogas can be used to produce electricity during the dark hours of market operations. This will help in improving security and the businesses at the marketplace. Production of biogas is however only possible after upscaling the pilot project.

At the household level, it is possible to compost food at home, avoiding central collection entirely. This would entail providing the households with composting bin systems. The compost can then be used for growing vegetables in the neighborhood.

Plastic

An easy and common way to handle polythene waste is in the handicraft industry. Plastic bags can be cut into threads to knit baskets and handbags with. This is an already existing initiative in Kisumu with CBOs such as Zingira in Kibuye and Ghasia Poa at Manyatta. There are also other groups in Kenya that use polythene bags as stuffing material for sofa cushions and mattresses. Reuse of polythene bags can also involve children in making soccer balls and dolls.

Paper

At Manyatta Peace Market newspaper seems to be the most common kind of paper, reused for packaging of fish (according to the pile of paper material we collec-

ted at the cleaning day). Paper can also be recycled and used for production of new paper products and household items such as paper bags, books, brochures, writing paper, necklaces and briquettes (green charcoal).

Physical Design proposal

Good design is important when developing new products, buildings, services and environments. It helps determine how we experience and interact with the product/service. Good design is problem solving based on the user's needs and requirements and it takes into account what is affordable, useful, accessible and pleasurable. (Innovation toolbox, 2014)

Universal design, also called Inclusive design, is a term used to describe products or built environment designed to be accessible for everyone regardless of background, education, age and disability. The term can also be applied in the design of technology, instructions and services. The Center for Universal Design at North Carolina State University has developed seven principles for universal design: (Mieczakowski et al. 20xx)

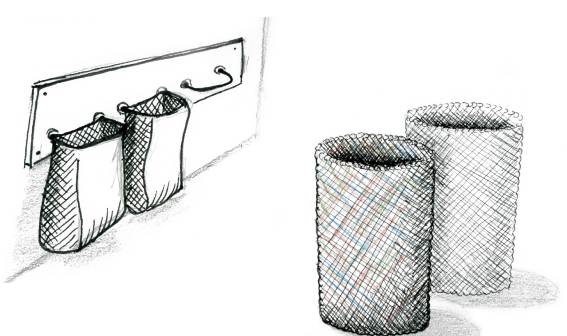
1. Equitable use
2. Flexibility in use
3. Simple and intuitive
4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach and use

These principles are all important to consider when designing something meant to be used by a lot of people with different prerequisites. The design of a product can in itself clearly show its purpose and how it is supposed to be used.

The Beyond Waste of Waste project includes suggestions for a system at Manyatta Peace Market that can make waste management easy for the stakeholders involved. The aim with the physical design proposal is to support this system with functional sites for collecting and sorting. The design solution for Manyatta Peace Market includes a small sorting system with small sorting stations spread out inside the marketplace and one larger scale collection station on site that can be used also by households and other shops in the area.

Small sorting stations

The small stations are spread out in the market and located on strategic spots where they are available for both the traders and the person/cleaner who is responsible for emptying the bins.



Alternatives for the small sorting station.

Design criteria:

- Easy to use, accessible and convenient located for sorting, collecting and emptying
- Easy to maintain (clean and repair/replace)
- Light weight (easy to move and empty)
- Accessible information (clear, easy to understand, visualized with both text and symbols, use colors)
- Visualize material cycles (create awareness and knowledge about recycling/loop systems)
- Cheap
- Made of materials that is easy to access, and if possible of reused material

The stations will consist of a few bins; the size number depending on the amount of different kinds of waste collected. These bins can be made of hard plastic or woven with water hyacinth or reused polythene.

The main collection station

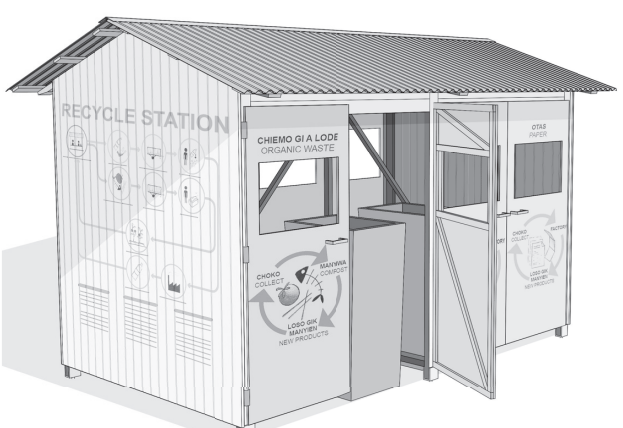
The main collection station will be used to empty the contents from the smaller sorting stations. It is basically composed of a structure which houses the bigger garbage bins that has already been bought for the pilot project. The different bins will be used for different kinds of waste. There are a number of possible sites for the main sorting station.

Design criteria:

- Easy to build, use and maintain
- Accessible information (clear, easy to understand, visualized with both text and symbols, use colors)
- Strategic location (located close to the marketplace

and to the main road)
- Local materials (Materials that is easy to access. If possible; reused materials.)
- Expandable (The construction should be easy to expand so it allows the project to develop)
- Security (Possible to lock, prevent theft and other sabotage)

The structure is adapted to accommodate several dustbins of a standard model (Green model, 0,75*0,85*1,20m, with a lid and wheels). Each bin is placed in a compartment and has its own door/opening. The doors are lockable, only the people in charge of maintenance and collection will have access. To make it possible for everyone to throw waste the doors will have a gap just above the bin inside. To have a door/an opening in front of every bin makes it easy to roll the bins in and out without any difficult movements or heavy lifting when it is time to empty them.



Design suggestion of a collection station.

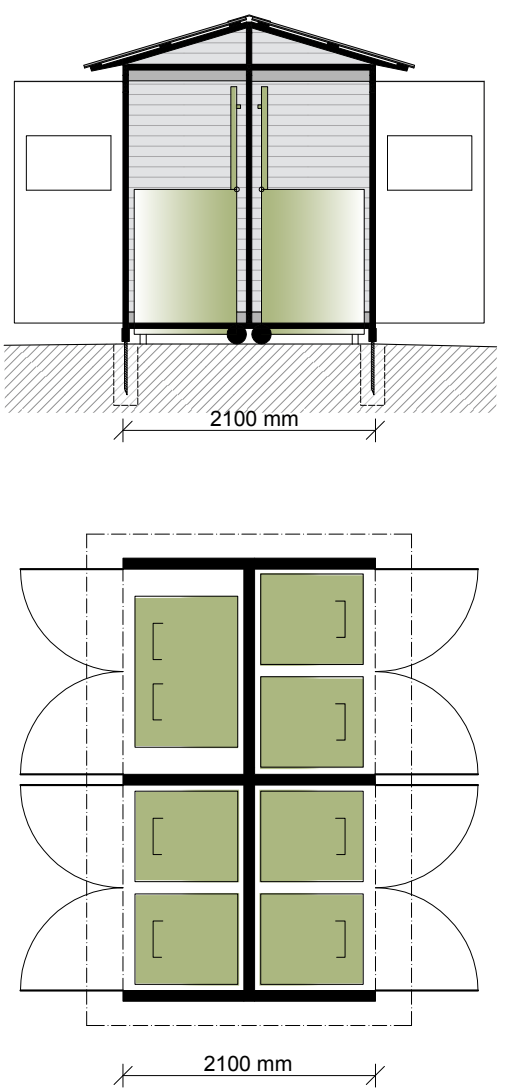
The station consist of a simple stud structure with a stabilizing core system made of wood or steel. Exterior walls are made of wood or sheet material. It is important to shelter the bins from rain to avoid that the waste is being destroyed. The top is constructed as a simple gable roof with sheet metal resting on trusses.

Since the garbage will be collected in bins the floor can be very simple. The suggestion is to put up the construction directly on the ground if it is flat and hard enough. This can be done using anchors or pole holders. An option is to cast a concrete foundation.

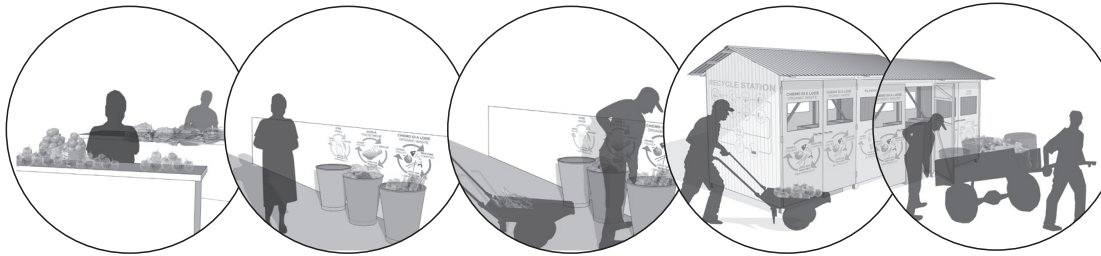
The doors and the exposed ends on the station are used for information. Each door is used to show what waste to throw in each gap and the specific looping system for that kind of waste. Color coding is used to enhance the understanding. The gavels have room for more detailed information about reduce, reuse and recycle initiatives.

How to use the stations
The proposals presented here have sequences, one activity lead to the other.

Traders at the market sort their waste at the nearest sorting station, located close to each of the traders' stall. The cleaner collect the waste from the small sorting stations all around the area and from the streets. He/she will then gather it all at the main station, which the private waste collectors in Manyatta will empty continuously. They distribute the waste to dea-



Section and floor plan of collection station.



A trader sells her tasty vegetables at Manyatta Peace Market

Some of her tomatoes have been crushed. She takes them to the Small Sorting Station, just next to her stall, and throws them in the bin for organic/food waste.

When the cleaner comes, he takes the waste….

…and transport it to the big recycle station in the market area.

Waste collectors arrive continusely and empties the station. They take care of the waste and make sure that it is properly reused or recycled.

Series describing the system at the marketplace.

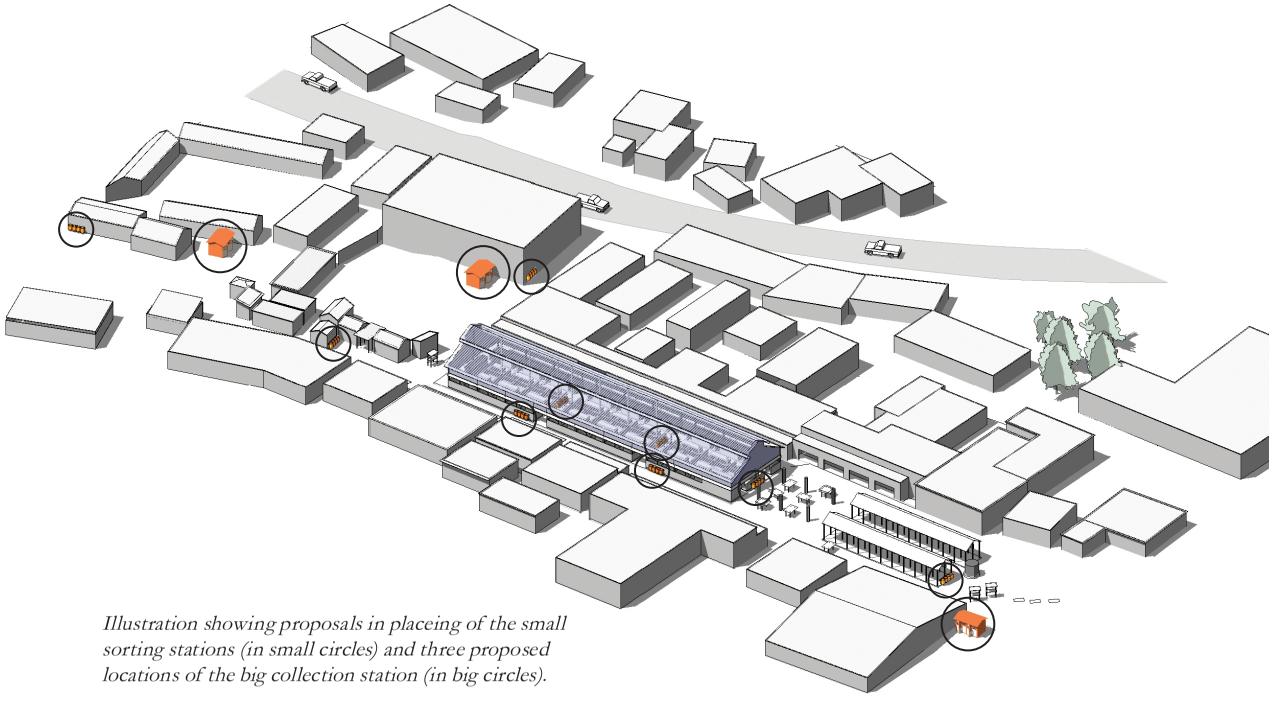


Illustration showing proposals in placeing of the small sorting stations (in small circles) and three proposed locations of the big collection station (in big circles).

lers, farmers and factories so that it will be turned into new products and part of a circular system of waste management.

Management of services

Management is the function that coordinates the efforts of people to accomplish project goals and objectives using available resources efficiently and effectively. For a project to be effectively implemented there is need to clearly define actors in the various areas of responsibilities of the project activities. The services that would be necessary for the pilot project to run effectively include: management, security, cleaning, maintenance, payment, investment, sort at source, collection and transportation (see description on next page).

Interviews conducted during the field study revealed that the stakeholders of the pilot project had two different perceptions of how the project would be managed. One saw the market traders organizing themselves to manage the project while the other saw the Manyatta Solid Waste Management task force as the manager on site.

There are major factors that need to be kept in mind while deciding upon the management approach for the pilot project. First, there is need to motivate the waste generators to sort their waste. How do we ensure the market traders stays motivated to sort their waste? What kind of motivation is required? (It could be fi-

MANAGEMENT
Overall overseeing the day to day winning of the project

SECURITY
Ensuring that the equipment and sorting station is safe during day and night

CLEANING
Ensuring cleanness of equipment and sorting station

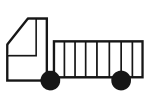
MAINTENANCE
Ensuring the equipment and sorting station are in the correct state and operational

PAYMENT
Paying for the workers and cleaners

INVESTMENT
Purchase of equipment and the construction of the sorting station

SORT AT SOURCE
Separating waste generated at the market

COLLECT
Collecting waste from the small station to the big station



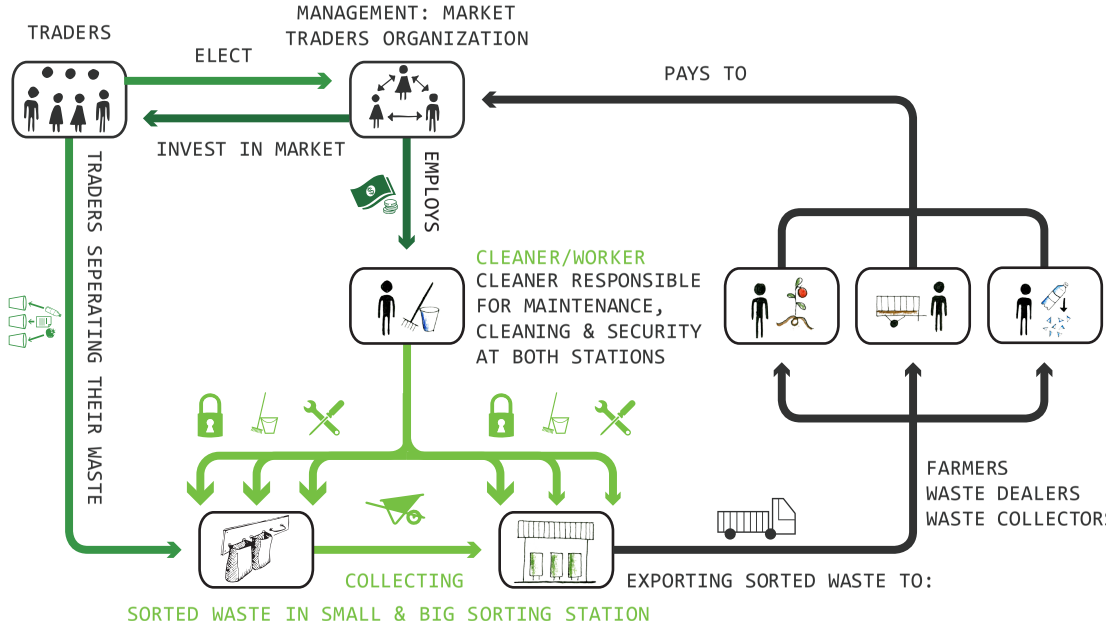
TRANSPORT
Exporting the sorted waste to waste dealers and waste collectors outside the market

nancial benefit or clean environment). Secondly, who will take time to run the project, when all traders are busy with their own business? These two major questions led to the development of two management scenarios, with each one of them having pros and cons.

Scenario 1: Market Traders Organization approach
This scenario is focused on the market traders as the managers of the project and takes advantage of the existing social organizations within the traders. They organize themselves to elect a management committee to run the project on behalf of the traders.

The management (the market traders organization) hires employees who collect, sort and sell market waste and also ensure the cleanliness of the market area. Potential customers for the waste are livestock farmers, waste collectors and dealers. The market traders can also organize to compost manure out of the organic waste and sell it to crop farmers. The money that is obtained from the sales is directed to the market group bank accounts and can be used for market improvements such as electricity, or welfare activities.

This scenario has the advantage of giving traders ownership of the project and hence sustainability. They learn how to manage their own waste and thus can transfer this knowledge to other persons. It also gives the income as a motivation directly to the traders who sort the waste. However, since income from the waste may not be as high as that of the individual businesses, perhaps traders may prefer to run their own business


TRADERS
MANAGEMENT: MARKET
TRADERS ORGANIZATION
ELECT
INVEST IN MARKET
PAYS TO
EMPLOYS
TRADERS SEPERATING THEIR WASTE
CLEANER/WORKER
CLEANER RESPONSIBLE
FOR MAINTENANCE,
CLEANING & SECURITY
AT BOTH STATIONS
FARMERS
WASTE DEALERS
WASTE COLLECTORS
COLLECTING
EXPORTING SORTED WASTE TO:
SORTED WASTE IN SMALL & BIG SORTING STATION

neglecting the pilot project activities. This scenario will also need time to take off since the traders must 'learn the ropes' and organize themselves for the project activities.

Scenario 2: Private waste collector approach
This scenario is based on the services of the project run by a private waste collector who already exist within the residents association. The private waste collector runs the project as his business and therefore keeps all the profit from it.

He hires employees to clean, collect and sort waste at the marketplace. The market traders will benefit by having a clean working environment without having to pay for the services provided while the waste collectors will be in business. This scenario has the advantage of keeping the traders focused on their own business and gives opportunity to the private waste collectors to do what they know best. Since the private waste collectors already exist in waste collection services in Manyatta, starting off the project would be with immediate effect. However, this scenario does not empower the traders because they are not involved in any activity other than sorting their own waste. It also does not give any financial incentives to the market traders.

TRADERS
TRADERS SEPERATING THEIR WASTE
MANAGEMENT: PRIVATE
WATSTE COLLECTOR
EMPLOYS
PAYS TO
CLEANER/WORKER
CLEANER RESPONSIBLE
FOR MAINTENANCE,
CLEANING & SECURITY
AT BOTH STATIONS
COLLECTING
SORTED WASTE IN SMALL & BIG SORTING STATION
EXPORTING SORTED WASTE TO:
FARMERS
WASTE DEALERS
WASTE COLLECTORS

Future development

Beyond Waste of Waste project proposals outline a basic waste management system that can be applied from the basic level of the society, but at the same time, if upscaled, can be used to cover a wider region. The design criteria for the information and education, looping systems, physical design and management make the proposals easy to replicate in other areas of Kisumu. If the pilot project at Manyatta Peace Market is proven successful the idea is to implement this waste management system on other markets in the city. In order to create a system that is available for everyone, including households, it is important to make collection points that are accessible, easy to use and located close to the people. Recycle stations can further on spread to other facilities in society in order to reach as many people as possible. The stations can be placed in connection with for example water kiosks, schools and other facilities that people visit regularly. In order to make this waste management system spread there is a need to develop cooperation between the community based waste collectors and the County Government.

Another future possibility is to complement the recycling station with a compost system or a biogas plant. This way the waste can be recycled and used again at site. This is a good alternative if the responsible facility is in need of for example electricity or compost for farming.

Conclusion

Constructing a functional and effective waste management system for Kisumu will require conscious efforts from all stakeholders. Major stakeholders include waste generators, regulators, service providers such as organizations involved in waste collection and disposal, and organizations involved in recycling and recovery. Each stakeholder has a specific, clear and active role to improve the efficacy and efficiency of Solid Waste Management by active participation and continuous interaction.

If all the stakeholders can strive to make the Manyatta Peace Market pilot project successful, scaling it up to a number of markets and neighborhoods will significantly propel the wheel towards the attainment of a functional and sustainable waste management system for Kisumu City.

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Film

Candida Brady, *Trashed*, Blendheim Films (2012)

Picture

Sketches are made by the authers

REJUVENATION OF KIT MIKAYI TOURIST SITE AND LUO ARCHITECTURE

by Amy Namwakira and Fredrick Nyandiko

Kit Mikayi is a tourist attraction composed of a series of huge rock formations sitting atop each other and standing at 40m high above the ground. It is located in a rural part of Kisumu County in Kenya. This project was conceived with the aim of branding Kit Mikayi on the map as an important tourist destination to attract more local and international tourists, encourage the preservation of the environment and promote economic development of the local community that manages the site. This goes hand in hand with the Kisumu county government plans to promote tourism activities in the county.

As part of the field study, we have carried out a detailed study and documentation of Luo architecture. The design proposal will borrow from the local building techniques and materials to promote sustainable development in all its aspects.

Introduction

Tourism is the second largest contributor to the Gross Domestic Product of Kenya's economy. It is one of the few industries with a perpetual growth curve, with the discovery of new attractions and improvement of existing ones.

Moreover, the country is endowed with a unique combination of tourist attractions comprising of tropical beaches, abundant wildlife in natural habitats, historical sites and monuments, scenic beauty, and geographically diverse landscape. In addition, tourism, through its multiplier effect has the capacity to promote regional development, create new commercial and industrial enterprises, stimulate demand for locally-produced goods and services and provide a market for agricultural products. Tourism therefore needs to be developed sustainably to ensure its continued growth seeing as it is heavily dependent on local resources.

The Kit Mikayi sacred site was chosen for this study because it is an emerging tourist site in Kisumu County, featured in tourism guides produced annually in Kenya. It's also located in the Lake Victoria region, which the government of Kenya has earmarked for niche tourism development in the Vision 2030.

Kit Mikayi which means 'stone of the first wife' in Luo has a rich historical and cultural value dating back to the 1600s for the people of the area called Seme. Furthermore the stones lay on each other to form a series

of caves and passages which provide a fascinating experience in exploration and great views within and of the surrounding landscape.

Kit Mikayi Tourist site

Having been in existence for a long time and being of great value for the locals, together with it being branded as a tourist destination in the recent past, it is unfortunate to note that there is very little facilities present, which support these activities at Kit Mikayi. Presently there is a small reception area and two pit latrines as the only facilities. There is need for more facilities that would attract more tourists and encourage longer stays that would promote tourist visits not only to Kit Mikayi, but also to the various attractions on the western part of Kisumu city.

Objectives

- To brand Kit Mikayi on the map as an important tourist destination to attract more local and international tourists, encourage the preservation of the environment and promote economic development of the local community
- To formulate an architectural design that is informed by the locals needs, through participation from the locals and the country government
- To promote appreciation and preservation of the Luo culture
- To raise environmental awareness by contributing to research
- To encourage sustainable growth of the tourism industry in the country
- To propose ways through which existing and potential challenges can be addressed

Present Situation

Kit Mikayi is a rock formation referred to as a tor in Geography that stands 40 metres tall. It is situated 29km west of Kisumu City in western Kenya. It is about 1 km off the Kisumu - Bondo Road in an area called Seme. Kit Mikayi is considered a veritable tourist attraction and is listed by the Museums of Kenya as one of the historical sites and monuments.

The site measures approximately 4.5 acres on a relatively steep slope with scattered rock outcrops. The site is largely covered with shrubs and some patches of trees. 37 indigenous plants have been documented to have been used medicinally throughout history.

Panoramic view of site

Kit Mikayi Tourist Cooperative Society manages the operations of the site and is comprised of members of the local community who also donated their land on which the site lies.

Access to basic services search as water, electricity and waste disposal system is non-existent due to the lack of financial ability of the custodians.

The main activity at the site is the exploration of the Kit Mikayi rock, visiting homesteads, taking photographs and worshipping.

Reflection on Situational Analysis

The site has a lot to offer as a tourist attraction but is being grossly underutilized. The facilities that exist work against the site in terms of promoting visitors experience. The society acknowledges that there is a lot that is lacking and they also loose a lot in terms of the economic benefits that they would accrue. During one of my visits the chairman of the society pointed out that visitors only spend their money on the gate charges and after that they leave, there are no facilities to expand visitor experience which would translate to more revenues such as restaurant facility.

Given the low income generated from entrance fee, the management team has been unable to market the site satisfactorily. Additionally, the team lacks the necessary marketing expertise. Though the society would like to increase their gate fees their desire is to first improve the facilities.

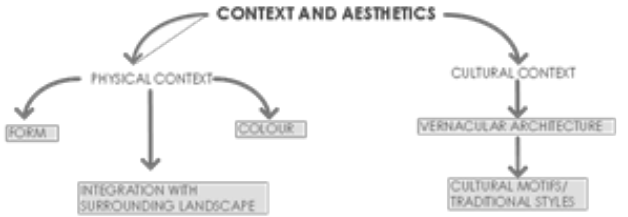
Existing reception building *Existing toilet facilities*

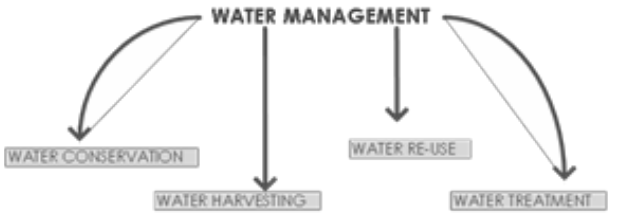
Artefacts gallery with no displays *Illegible signage to site*

The site and the project have great potential to bring growth and benefits for the community if the challenge of funding can be tackled. The strategy is to exploit the available opportunities and even create new ones. The design will endeavor to emphasize the strengths that already exist and use them to create a niche product for the facility such as promoting cultural preservation through the human rights based approach to cultural heritage in the design. The proposal will endeavor to eliminate the weakness. Over and above the design the project will make an outline of a business model to address the main threat posed.

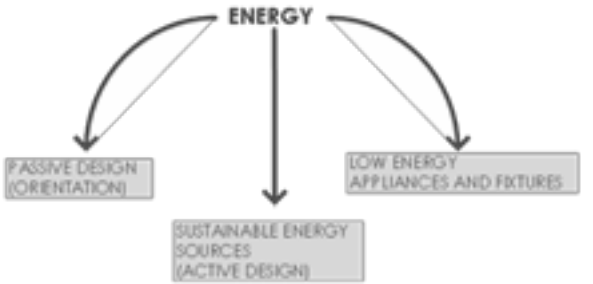
Design Criteria

In designing an eco-tourism facility it is important to understand ecotourism principles. The design criteria encompass these principles and which also support the community's and site specific needs. They are discussed in seven areas as outlined in the following diagrams:


CONTEXT AND AESTHETICS
PHYSICAL CONTEXT
FORM
COLOUR
INTEGRATION WITH SURROUNDING LANDSCAPE
CULTURAL CONTEXT
VERNACULAR ARCHITECTURE
CULTURAL MOTIFS/ TRADITIONAL STYLES

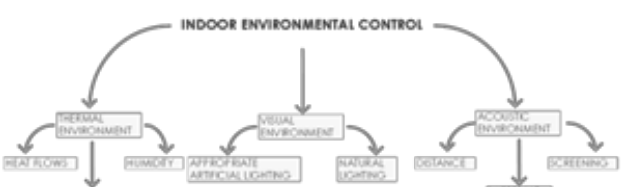

WATER MANAGEMENT
WATER CONSERVATION
WATER HARVESTING
WATER RE-USE
WATER TREATMENT


WASTE MANAGEMENT
CONSTRUCTION WASTE
SOLID WASTE
WASTEWATER TREATMENT


ENERGY
PASSIVE DESIGN (ORIENTATION)
SUSTAINABLE ENERGY SOURCES (ACTIVE DESIGN)
LOW ENERGY APPLIANCES AND FIXTURES


SUSTAINABLE TECHNOLOGIES AND MATERIALS SELECTION
APPROPRIATE CONSTRUCTION ACTIVITIES (MORE LABOUR INTENSIVE)
MATERIALS SELECTION
RECYCLE
LOCALLY SOURCED
HYBRID TECHNOLOGIES (TRADITIONAL COMBINED WITH MODERN)


SOCIAL COMMITMENT
CONTRIBUTE TO LOCAL COMMUNITY
HIRE LOCALS
WORK WITH LOCAL COMMUNITY
CULTURE CONSERVATION


INDOOR ENVIRONMENTAL CONTROL
THERMAL ENVIRONMENT
HEAT FLOWS
HUMIDITY
AIR MOVEMENT
VISUAL ENVIRONMENT
APPROPRIATE ARTIFICIAL LIGHTING
NATURAL LIGHTING
ACOUSTIC ENVIRONMENT
DISTANCE
SCREENING
BUFFERING

Further to the above design criteria, a detailed study of Luo Architecture has been carried out as outlined in the following sub report.

Building Materials and Techniques of the Luo

This is a report on the building materials and techniques used by the Luo tribe of Nyanza, Kenya in the construction of their principal architectural structures and how this building materials and techniques can be applied in the context of the emerging architectural trends in the Lake basin region.

This report was necessitated by the need for documenting the traditional methods of building and traditional materials used, owing to the fact that this methods and materials are fast taking a backseat or totally disappearing altogether as the general population switches to more "modern" techniques and materials to construct.

Background

The background of this report was prompted by the visit by the Reality Studio team to the Miyandhe Beach "eco-tourism" site, where despite the facility being an eco-facility, lacked many of the principles of use in eco-tourism, and the key among them was the use of local building materials and techniques to ensure preservation of the same, and rope in the community to make it feel as part of the project.

In addition to this, by observation and interaction with the locals, it was clear that the use of traditional methods and building techniques was fast waning due to the blind embracing of modern building materials and techniques

A trip to Dunga beach also brought to my attention interesting manifestations of the traditional building materials and techniques that presented a unique opportunity to begin the documentation process of this evolutionary tangent and analyse it in the context of evolutionary change and how it can be applied progressively.

Problem Statement

1. The evident knowledge gap in traditional building techniques and materials, vital in the progression of the alternative building industry in Kenya
2. Need for insight and analysis into the evolutionary progression and manifestation of traditional building techniques and materials
3. Need to archive and document traditional building techniques and materials for future generations and also for educating the current generation

Aims

1. The documentation and archiving of the traditional building materials and techniques for the preservation of Luo culture. A databank of Knowledge for the population
2. Create a basis for the development of alternative building technology as an alternate method of

building and construction as well as policy formulation in terms of building regulation
3. To provide a reservoir of knowledge from which researchers and other like-minded people can tap into, learn and share their experiences and knowledge

Brief introduction to the Luo People

The Luo (also called Joluo, singular Jaluo) is an ethnic group in western Kenya, eastern Uganda, and in Mara Region in northern Tanzania. They are part of a larger group of ethno linguistically related Luo peoples who inhabit an area ranging from Southern Sudan (South Sudan), South-Western Ethiopia, Northern and Eastern Uganda, South-Western Kenya and North-Eastern Tanzania. (wikipedia)

The Kenyan Luo probably originated at Wau in southern Sudan, near the confluence of the Meride and Sue rivers. The Kenya Luo migrated into western Kenya via today's eastern Uganda, the first wave arriving sometime around 1500 AD. Arrivals came in at least five waves arriving at different times:
The Joka-Jok
Those migrating from Alur joined the Joka-Jok
The Jo-K'Owiny
The Jok'Omolo
The Abasuba

The Luo are the third largest tribe in Kenya, about 13 % of the Kenyan population. The main town in the Luo inhabited area is Kisumu. (K.B.S data 2012)

The main Luo livelihoods are fishing, farming and pastoral herding.

The Luo had various architectural structures of interest such as:
1. The Homestead (Dala)
2. The Hut (Ot)
3. The Granary (Dero)

Luo Homestead (Dala)
Luo homesteads ranged in size traditionally from 2 to 20 buildings arranged according to a well-established pattern. When establishing a new home a man first decided on the position of the fence and the gate. He then built a house for his first wife opposite the gate, close to the fence, and another one for himself in the middle of the compound. Traditionally, the Luo men married more than one woman as a show of might to his peers, it also showed wealth. As men of status and relative wealth, chiefs were able to marry more wives than most Luo men (Tyman 1982)

The man's hut was called Duol and was primarily used to entertain other male guests. Mikai was the woman who was married first in the Home, whilst Od Mikai referred to her house. The house is given a lot of respect as accorded the owner. Most of activities in the home are centered around it. When he took a second wife, her house was built to the right of the first wife (as viewed by a person entering the gate) and the third wife's house was built on the left; and so on. This pattern was followed religiously. Each wife would also have at least one granary beside her house.

Fencing

The Luo homestead's (Dala) eternal perimeter boundary was secured in a variety of ways. These was to keep off intruders and also contain livestock within the premise of the Dala. It also acted as a visual indication of the hierarchy of a homestead in relation to other homesteads and also within the hierarchy of the internal family affair. One could easily tell where each wife and son was, just by looking at the morphology of the perimeter fencing. The most common fencing types included (but not limited to) :

Euphorbia (Ojuok) Fence

The Ojuok plant was used primarily for fencing because it was a hardy plant capable of surviving the hot climate and also because it could withstand termite attacks due to its toxic sap. It also grew quickly.

Earth embankments (Bur)

This is an earthwork of a typical Luo defended homestead enclosure dating to the eighteenth and nineteenth centuries. The dug ditch and bank structure is called bur in Luo. People lived within the earthwork, where houses were built and cattle tethered, protected by both

the earthwork and the surrounding ring ditch. (Ogot, B., 1967) There have been instances where, archeological finds have traced this embankments around abandoned villages called Gunda, in such cases the earth embankment is called a Gunda bur

Loose stone walls (Ohinga)

During the early 14th century the luo people built fortified villages using loose rocks and stones and assembled them into walls ranging from 1.0m to about 4.5m in height. This stone walls were referred to as Ohinga. (pl. Ohingni)

They were designed to ward off the hostile neighbours who frequently attacked them.

The inhabitants would access the enclosure through a small gate (Rangach). This gate was deliberately designed to be small and narrow so that incase of an invasion the enemy would access the enclosure in single file in a bent posture therefore exposing him to attack.

Ohinga was meant as a defensive structure. They were also quite thick for additional stability.

The best known example of this kind of fencing is at Thimlick Ohinga in South Nyanza

Structures in the Luo compound (dala)
The structures in the luo homestead comprised the following:
1. The Huts (sing: Ot, Pru: Ute)
2. The Granaries (sing: Dero, Pru: Deche)
3. The Cattle Kraal (Kul)

The granary (Dero)
Deche or Dere (singular Dero) are traditionally cylindrical granaries made of a variety of plant material such as Olando (Pliable Twigs), Oundho (Papyrus), Odundu (Reeds), Tiang' (Millet Stalks), Minya (Twilling Vine), woven together using Poyo or Togo (Papyrus) and daubed with cow-dung (Owuoyo) and whose conical roof was covered with grass.

A structure of great skill and adept workmanship, dero was characteristic of every Luo homestead built close to the family houses in which was stored all varieties of grains and nuts (millet, groundnuts, maize, sesame), dried foods like aliya (meat) and seeds of every kind. (Nyamanga 2013)

Any home that did not have it was looked at with pity since dero symbolized wealth, prosperity and food security. Usually constructed during harvest times, the number of deche depended on the number of women in each homestead as well as the different kinds and quantities of produce generated by the family fields (Nyamanga, NMK, 2013)

Building Materials And Techniques

First the walls of the Dero were woven. The walls of the Dero are traditionally woven using a variety of

plant material such as Olando (Pliable twigs), Oundho (Papyrus), Odundu (Reeds), Tiang' (Millet stalks), Minya (Twilling vine), woven together using Poyo or Togo (Papyrus) daubed with cow-dung (Owuoyo).

The base of the Granary was then constructed using stones (Kidi) as pedestals for the elevation of the Granary. Poles were then used to make the resting base for the Granary before a circular final base was made of intertwined Papyrus (Oundho) or Reeds (Odundu) or Twining vine (Minya).

The granary was elevated of the ground to prevent rodents and other vermin from accessing the grain and also to prevent contact with ground moisture or rain runoff in the event of rain.

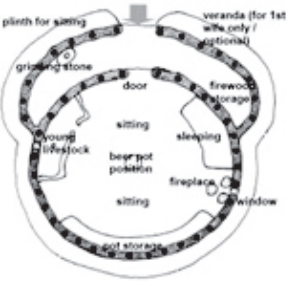
The walls of the Dero were then attached to the base and either woven into place or held by a ring of mud (chuodho) mixed with cow dung (owuoyo). This was left to dry out and provided a firm edge or seam. The walls then were daubbed with cowdung to fill in any gaps between the interwoven surfaces of the wall. This was done to fend of vermin and insects.

The shell of the roof was then constructed from pliable twigs (Olando) and twining vines (Minya) or Sisal fibre. This was then placed on top of the structure and tied down in similar fashion using Sisal fibre .

The structure was then roofed using grass (Lum) especially the Elephant Grass, which was tied in tufts and then laid.

Traditional Hut

The hut (Ot) was the main dwelling unit for the individuals within the homestead (Dala). The most important hut in the Dala was the First wife's (Mikayi) Hut, known as Od Mikayi. The owner of the homestead had a hut called the Duol.



Plan of a Luo Hut (Abonyo 2005)

Building materials and techniques

The circular walls of the hut (ot) was marked using a rope and a predetermined radius.The center of this, is where the center pole would be positioned and would act as a principal support for the roof structure later on in the process.

The foundation holes were dug and the poles for the wall support put into them and the edges of the filled up holes would be compacted to create a firm base. Since the hut (Ot) uses wood for its main structures, termite protection is essential.

Hence, poisonous plants were used usually euphorbia with its thick white sap. The sap is a toxic irritant for the termites. The plant material is broken up, mashed and buried in the trench around the base of the uprights. This local protection lasted several years depending on the various conditions of the surrounding.

The most common type of wall construction was the mud and wattle technique. The horizontal members, mostly of pliable twigs (Olando), would then be tied in using tree bark fibre or sisal fibres (Twaro) around the upright members. Note that the horizontal members would be tied in on the inside and outside of the upright members for additional sturdiness to the structure and also to provide a wider space for the placement of the mud.

Once the horizontal members had been tied onto the upright members and the construction was sturdy, the center post was fixed in firmly and the rafters were gradually fixed onto it and the base of the rafters would rest on the wall. This would be given an allowance to form a roof eave as it was important to protect the earthen walls from the rain to ensure longevity. Note that the walls would only be filled in with the mud (Chuodho) and cow dung (Owuoyo) once the roof was properly in place and thatched. Sometimes the poles from the sisal plants, known as Konga were used.

Once the roof structure was completed, the process of thatching would begin. The thatch would be primarily of grass (Lum) in particular the elephant grass, which

was long. This would be tied in bunches and the process of thatching would begin from down at the base of the roof upwards to ensure the upper layers overlapped the lower layers.

Sometimes the thatched roof would be finished in a monolithic manner devoid of the clear overlaps of the picture above. The roof would then appear similar to the one below and the thatch would usually be held in place additionally by sisal ropes along its upper surface. This was usually done in expansive roofs.

In some cases, the inner rafters would be additionally secured with a circular ring beam on the inside as shown below. This ring beam would be made from Papyrus (Oundho) or Pliable twigs (Olando). Sometimes a horizontal bracing would suffice.

Once the roof was thatched, then the task of daubing the wall would begin. This was done using a mixture of earth (loo) and cow dung (owuoyo). The cowdung was added to make the earth more sturdy and stable.

The process was done roughly at first, making sure to fill in the gaps and ensuring common consistency through the wall and gradual buildup of volume. Once the spaces and the volume between the wattle structure was completed, then the rough patches would be filled in and smoothen to create an even surface.

Once the wall was put up, work on the floor would begin. Water would be poured on the dirt floor and a

muddy consistency would build up to which cowdung (owuoyo) would be added to keep insects at bay and then the mixture would be evenly compacted by beating down on it with a wide flat surface. This would be done from the farthest corner to the door. It would be then allowed to dry and it would form a hard surface. In some cases a second layer of the mixture would be applied and patterned to give the floor a decorated surface.

In some cases the external agola space would have an additional raised area that would be used for relaxation, known as ndiri. This is shown in the picture above.

Analysis And Conclusions

Traditional building techniques and materials offer an alternative that is not only cost effective but readily available. The building techniques and methods are also easy to learn and implement. Besides there is a pertinent need to preserve the building techniques owing to the rapid adoption of mordern day building techniques and methods. However this should not be mis-

contrued that the two methods are in competition,but rather should be complementary to each other as its possible to learn lessons from each, that is applicable to the other. This is clearly evident in the manifestation of present construction techniques in the lake region.

There is need for the establishment of an archive for the traditional building techniques and methods used by the Luo. This will facilitate preservation of the knowledge and its passage to the next generation.

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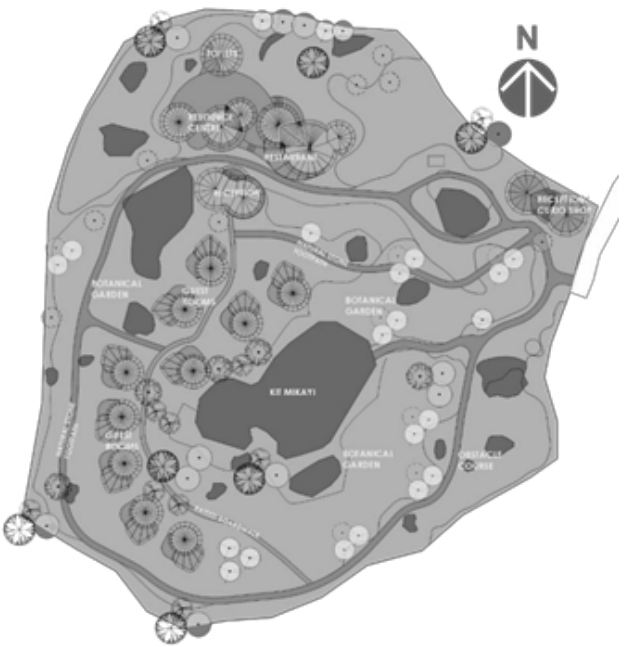
Design Proposal

Being a community cultural site, a religious sanctuary but yet a tourist site, Kit Mikayi requires unique approaches that aim at enhancing environmental and cultural preservation, bring economic benefits and improve the overall experience of the visitor.

Spatially the design intervention is to expand the use of the site to the 'back' to expand the potential of the site. The following functions will be accommodated on site: Day reception (existing), curio shop, 10 no. guestrooms/bandas, restaurant and bar, resource centre,

public washrooms, botanical nature walk of indigenous plants, obstacle course site, waste treatment site, existing artefacts gallery refurbished, existing toilet retained.



Site plan

View of site from the west

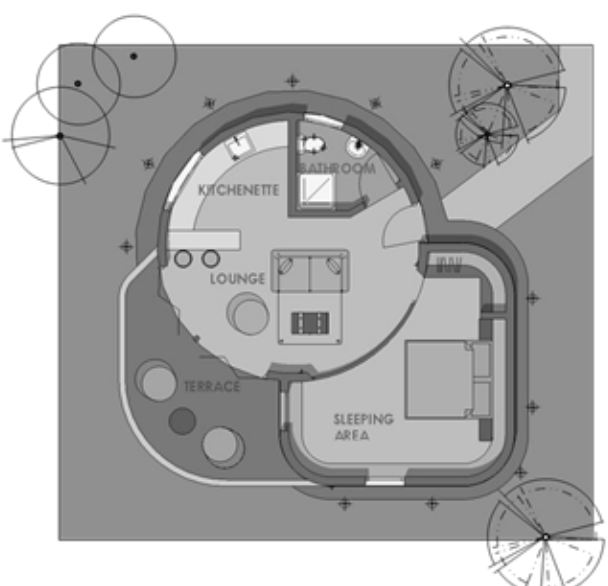
Sectional elevation

The Banda

The Banda is fashioned like a small guest house with a small kitchen and separate lounge. There are also sleeping areas separated by a screen wall and an outdoor terrace. The Banda can accommodate 2-4 people as the lounge furniture can be converted to a bed. It is consciously styled as self-catering to simplify the management of the facility which is to be run by the local com-

munity. The design proposes use of low flow faucets and the toilet should be a composting toilet. The light fixtures should be low energy and water heating should employ the use of solar energy.

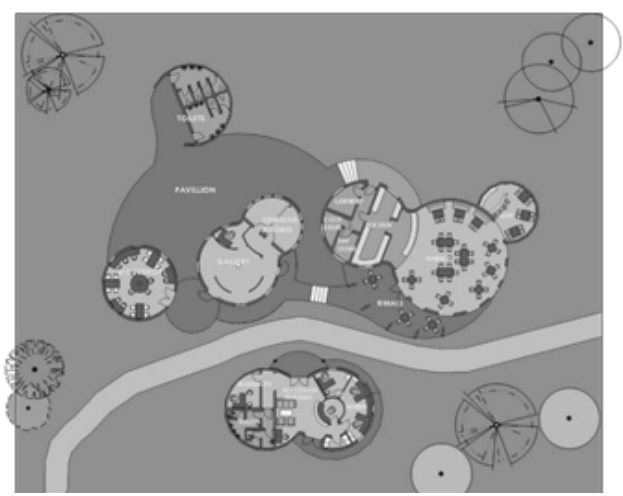
The guest rooms are ideal for short stay visitors. The form of the Banda has been inspired from forms within the surrounding context. The circular form is adapted from a traditional hut. The rectangular form with curved corners as seen on the plan also has curved vertical walls to mimic the curved nature of the Kit Mikayi rocks.



Floor plan

3D Impression of the bandas on site

Public Area



Layout

These buildings also take the form of a hut but organized in an abstracted way according to the spaces required and the sizes.

The restaurant is designed to serve mostly day visitors, in this way the visitors can stay for extended periods and may be engaged in cultural and environmental activities that the site would offer.

The spaces in the gallery, seminar rooms and workshop are designed to be adaptable to different uses as the need may arise. The pavilion is an extended outdoor space for cultural activities such as traditional dances.

The toilets are placed in the farthest end of the site for privacy and also to encourage more experience and discovery around the site before you come by them.

The buildings are placed to follow the slope of land and some areas are elevated to reduce building footprint and allow growth of vegetation.

3D Impression on site

Timeline of Implementation

Financial Model for the Project

Financing the project proves to be one of the key bottlenecks if the scheme is to be implemented. We therefore brainstormed on the best way to involve the community in: 1) Financing the project themselves 2) Self-empowerment through participation 3) Managing and maintaining the facility themselves.

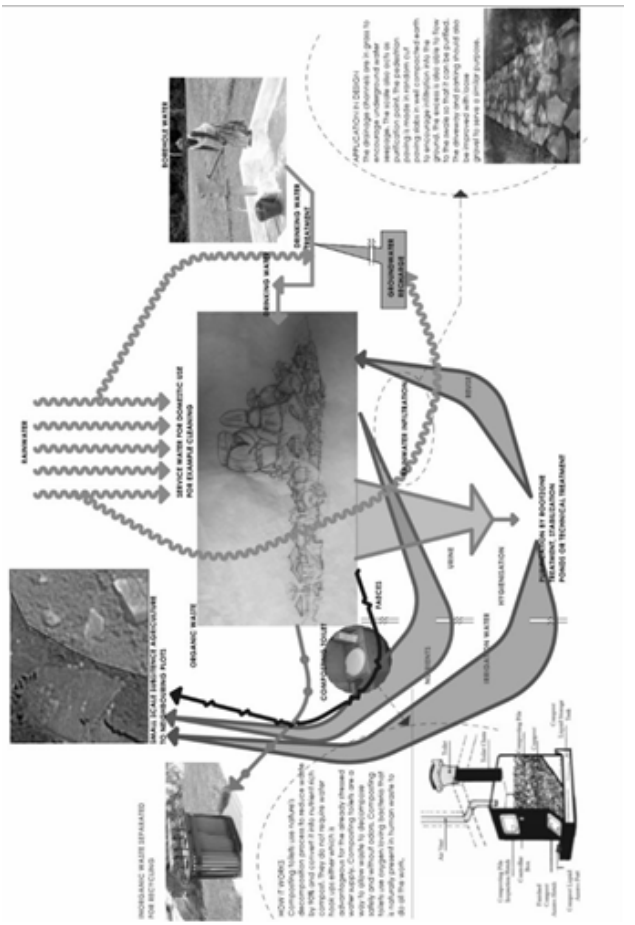
To this end we proposed to have a trust would be entrusted with: 1) Raising finances for the project and keeping tabs on the shareholdng and equity held by the various self-help groups 2) Implementation of the project once finances suffice 3) Maintenance and management of the facility in the long term 4) Implementing the community payout scheme to each self-help group involved 5) Investment in future community projects

and also future expansion plans for the project. 6) Acting as an umbrella body for the self-help groups involved in the project.

We looked at the financing not only in tangible terms (cash) but also in intangible terms (labour, land, materials etc) that can be easily transformed into various equities depending on the contribution and/or effort.

To be able to participate in this manner, the community members will form self-help groups that will organize themselves to offer the services etc that will then be given as equity sharing in the projects. Payouts will be made via the self-help groups.

Initially it can be proposed that once a service or good is offered then the group will be paid 30% in cash and the remaining 70% will constitute their equity contribution to the project. This will enable the members to at least have some income as the project is implemented.


RAINWATER
SERVICE WATER FOR DOMESTIC USE
FOR FLUSHING/CLEANING
DRINKING WATER
DRINKING WATER TREATMENT
BOREHOLE WATER
GROUNDWATER RECHARGE
ORGANIC WASTE
COMPOSTING TOILET
FAECES
URINE
GREYWATER
GREYWATER INFILTRATION
HYGIENISATION
SMALL-SCALE SUBURBAN AGRICULTURE
FOOD PRODUCTION PLOTS
INORGANIC WASTE SEPARATED
FOR RECYCLING
HOW IT WORKS
Composting toilets use nature's
decomposers (worms, bacteria, fungi, etc.)
to break down human excreta. Aided
by WSR and consort it into nutrient-rich
compost. They do not require water
(dry composter) or only a relatively (mixed)
water supply. Composting toilets are a
way to allow waste to decompose
naturally in a dry environment. Composting
toilets are oxygen (living) biomass that
is naturally present in human waste to
do all the work.
APPLICATION IN DESIGN
The drainage channels are in place to
encourage underground water
infiltration and to act as a water
purification point. The purification is
done by the gravel and sand
mixing media in which the
plants are rooted. The media is
planted with reeds which are
grown in soil compacted earth
ground. The excess is also able to flow
to the reeds so that it can be purified,
and the water from the drying product also
be intermixed with clone
grown to serve a similar purpose.

Reflection and Future Scenario

Through the proposals we have made, we believe that the goals set out would be achieved if the project is implemented.

The upgrading of the site by improving existing facilities and introducing new ones will expand the services that the site has to offer. This will go a long way in fulfilling the goal of mapping Kit Mikayi as an important tourist destination by reaching a wider audience.

The localised focus on aspects of the environment, culture and community emphasizes the niche of the site in terms of its attractiveness. This raises the profile of the site and would mean more tourists, which will eventually lead to economic development of the locals. The preservation of culture and environment is encouraged through the design by providing space for cultural activities, replanting indigenous plants that the site has been famous for over the years and elevating of the buildings off the ground to minimize impact by reducing the footprint.

An important lesson for us, is that as architects we may be required to go beyond the depths of our knowledge and practice as architects, and into the finance discipline, especially when dealing with project where economic capacity is a big challenge. For the project to be successful we recommend that the Kit Mikayi Tourism Cooperative Society should collaborate with other groups as demonstrated in the business proposal.

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https://www.unwto.org

KISUMU - ADDING UP

by Pia Larsson

The background and core of this project lies in reflections of the definition and principals of eco-tourism and in a questioning of the contradictive composition of the words 'eco' and 'tourism'. The definition of eco-tourism is "responsible travel to natural areas that conserves the environment and improves the well-being of local people." The requirements of eco-tourism project limit such a project in Kisumu to be outside the city centre, since the green areas in the city basically is arranged parks - natural areas already transformed by human hands to fulfil a non-existing purpose. Though the ongoing urbanisation rather would benefit of having tourists coming into the city.

Browsing the Internet to find things to do in Kisumu, will give you information about Impala Park, Kisumu Museum, boat rides on Lake Victoria, Dunga Beach and other attractions outside the city. That is to say

"usual" tourist activities, but of course unique for Kisumu. In the same way "bier gartens" is a must while visiting Berlin or the architecture of Gaudí is mandatory during a trip to Barcelona, Kisumu needs to brand what is significant for the city. What things you only can experience here. In that sense Kisumu have a great advantage of being a relative undiscovered city by tourists in East Africa, since it therefore hasn't been overexploited with all-inclusive hotels, souvenir shops and other tourist traps. Today Kisumu is not adapted to fulfil the general expectations tourist destinations have, but still the city has all components a lot of tourists seek while visiting cities, such as authentic restaurants with the local traditional food, historical monuments or places of importance for the city, local markets etc.

Something that makes Kisumu special for someone coming from Scandinavia for instance is the market. The way the markets are used, the key role they play in the everyday life of inhabitants in Kisumu, is very different from the way markets appear in northern Europe. In Kisumu the markets are everywhere, in different appearances and scale. It is something honest about coming to a city with well over half a million inhabitants in the 21st century where the market place still is the core and of most importance for socializing, trade and work. And that could be something to emphasise and highlight in the branding of Kisumu - to attract people to come and see what is already there instead of build new things in attempts to satisfy tourists. This minimizes the environmental impact, since nothing needs to be built.

Project description

The Object

The result of this project is a book. It will be a book describing selected parts of the markets in Kisumu and with some comparative studies between three different markets. It will be shown from my point of view, the way I see the beautiful and characterized features at the markets places. The book will show what might not be obvious for many people to see at the first glance of the markets. It will be encouraging to see the markets in another way. Some images will be showing my perceptions of situations at markets places and some drawings will architectural diagrammatically show how markets or components at the markets look. The drawings will be generalized yet realistic, they will be both inspiring and informative. It can be regarded as a guidebook, picture book, coffee table book, inspirational book; it can fit into various genres if it needs to be categorized. What it will be is a conservation of the appearances of the market places in Kisumu in the spring of 2014.

Aim

To Speak Up

The aim of this project is to raise a voice for Kisumu, make people know about the city. It shall trigger curiosity about the city and attract people to visit and/or experience Kisumu. And doing this by brand it by the cities' strongest character feature, which are the market places. One of the goals is that this product in the

long run should benefit the people in Kisumu. Benefit them in an economical point of view - if people find their way to Kisumu or in other ways, by other means, contribute to the development of the people's well-being. This book is one step in the attempt of reach the commonalty and spread information to a bigger crowd than only the charity workers visiting the city, which the majority of the tourists coming to Kisumu today are. The aim of this product is to make information about the Kisumu fun and easy to grasp. It is to be appealing and attractive to pick up and dip into. It is to be aesthetic attractive so that the owner of the book is encouraged to have it visible for friends and guests.

The information in the drawings in the book can be read many times and there is always a possibility of discovering new details and facts when having a second look.

This is a personal way to attack the topic eco-tourism without leaving any imported thoughts or materialistic impress in the city.

The Target Group

The target group of this project is people who are interested in experience the market in a way they are not used to. To see beyond the first layer of what drags your attention and see what is next to it. By using the language of colours and shapes with additional captions it has the potential to speak to a lot of different peoples, since the information can be taken in in various ways.

This book is to be read by people going to Kenya, to gain bigger interest for Kisumu and chose to visit the city and its' markets. To see the second and third layers of information, which will be in front of you but might disappear in the procession of other information. It will in that sense contribute to the economic improvement of locals which will be in line with the criteria of eco-tourism. The book is to be read by the locals and nationals to help them see the city with other eyes and be tourists in their close surroundings. My general impression of Kenyans is that they are proud and inventive people, and that is valuable features that should be cherished in the development of the city and the country. It is something that should be given space instead of being ignored and the main focus rather than spend time looking too much at how things are done in in terms of development in the western world. By this I mean change should come from within, but it might need a helping hand. After all, the idea of implementing eco-tourism in Kisumu and emphasise it within the branding of the city, is to make a change to improve the well-being of the locals.

The book is also to be read by people without the possibility, need or wish to go to Kisumu,. The book will tell my story of my experiences of the city, it will be painting images, yet abstract, of what you will or can experience when you visit the markets in Kisumu. It will trigger the imagination and give helping guidelines of how to draw your picture of the city. And fact is, the best way to experience a city, in terms of sustainability, is to not go there at all.

Method

Markets

The topic 'market places' in Kisumu is unlimited. As already described they impregnate the whole city and to map all of them in all aspects would be impossible for one person to do in only seven weeks. That is why I have limited my work and chosen to look a bit closer at four markets: Jubilee Market, Oilé Park, Otonglo Market and Kibuye Wholesale Market and compared the three first-named. The three primary fields in which I have compared those three markets are spatial organisation, sound and colour scale in section. The reason I choose to compare the spatial organisation is because of the fact that these markets are very different in their appearance even though they follow the same basic principles of having the different categories of goods in different zones within the market. It is to give an evident picture of how different the markets can be. The story about the markets inspired me to show the comparison of sounds. Depending of where the markets are situated, they are used by different kinds of people and in different contexts. This is something that becomes really clear while listening and comparing the sounds. To compare the three markets by their colours gives a final touch of how different they are in their appearances, it gives a hint of the feeling you could get while walking in between the stalls. The psychology of colours is hidden but extremely present in the total impression and state of mind while visiting the market. I have chosen to schematize the process of fish, second hand clothes and fruits and vegetables at the market, from source to

buyer, and show this in diagrams as well. The reason for this is to raise awareness of how complex the system behind those products at the markets actually is and to show how many actors are participating. It is a bit of an eye-opener. Other parts of the markets I have shown in the diagrams; a schematic map of where the markets are situated, how shade are being cast at market places, where people of different gender and age are at Otonglo market and the most realistic drawings are of goods built as towers. These areas I have described in order to cover a lot of different areas and various situations present at the market. The investigations I have done are from my point of view and my personal experiences when visiting the markets, which is something that needs to be taking into consideration while processing my results.

People

I have been talking to a lot of people, both vendors and visitors and people working in close relation to the markets, to get their stories of their thoughts about the markets and in what way they use it. I have critically reflected upon facts being told to me due to the fact I many times got different information about the same thing. The information presented in this report is primarily from my experiences and from information I have been told in Kisumu, from people at the market and from Jennifer Otieno, PhD student at Maseno University. In her studies of market places she focuses on the women at the markets.

Mzungo

The results I present from my own experiences in the diagrams summarize the general picture I have from visiting the different market places several times and during different times of the day. At site I have been walking around, listening and observing. Since the majority of the local people act differently around me since I am a "mzungo" to them, a white person, I have tried to keep a low profile within the market to make my presence as unnoticeable as possible, which have been hard and most of the time impossible. The situation people paid least attention to me were when I was walking together with a Kenyan. By then basically no one was calling for me or came to me to start a conversation. That is why I at bigger markets sometimes walked really close to people to give the impression I was in company with them but it almost never worked. Before entering the market place area I observed it from a distance for a while to see how people acted when I was not there, that gave a quite fair picture of the actual situation at the market, which I have taken into consideration while compiling the final diagrams. Depending on if you are a "mzungo" or not the atmosphere at the market will be different. It will be diverse experiences if you are in a group or if you visit the market alone. The results presented in this report are my personal experience how the market appears without, or with very little influence of the presence of a "mzungo".

Idiom

I have used triangles in the aggradations of the diagrams. It is an expressive geometrical form, which easily can give different information and expression depending on size, form (that is what type of triangles used), how it relates to other triangles, direction and what image or illustration the combination of the triangles shows. Triangles are good in the sense it is an easy form to successive build up the wanted feeling within an illustration. It is an incremental process where gaps are filled when needed, in this way it is similar to the process of the elevation for a city and in this case Kisumu. It ones started with one market, then it added up with more markets, more houses, buildings and more people. Gaps were and still are being filled up and where there is no space left, there is always the possibility to share the occupied area into two or several parts.

I choose to present the information in architectural diagrams and drawings instead of using pictures and/or technical correct maps because it leaves space for the imagination of the reader to personally visualize the space.

The Field Study

The Definitions

The number of people living in Kisumu equals the number of ways of selling goods. Walking around the city you find vendors everywhere. There are fourty-one

open-air markets counted in Kisumu today. These are defined as 'gatherings of traders and customers in public spaces with clear boundaries at a known time and where transactions of relatively small quantities are conducted between the actors'. The noun 'market' is defined at oxforddictionaries.com as 'a regular gathering of people for the purchase and sale of provisions, livestock, and other commodities'. Because of the mobile markets - the fact that a lot of people carry around fruits, accessories, snacks, beverages etc. to sell at the street, one can say the markets and the trade are everywhere; they complete the constitution of the market web covering the whole city. Hence the number of vendors in total is impossible to count.

The Sun Issue

A big concern the vendors in Kisumu have to face is the heat from the sun. The ways to find shade can be done in numerous ways by the use of different materials, structures, objects and organisations. By looking at the solution for the protection from the sun it is possible to estimate the prosperities of the vendors' business, since good and comfortable shading is highly valued and more effort is given if there is possibility to. Well-established vendors at open-air markets usually have stalls of wooden structures with materials, such as plastic sheets, straw mats or corrugated steel functioning as walls and roof to protect themselves and the goods from weather being considered as unpleasant; sun and rain.

To Infiltrate

If you haven't been born into a family with already established businesses at the markets, if you for instance move in to the city to find economical happiness at the market, the take-off run can be long and hard. One challenge is the difficulty to get a space set off at the market if you don't have any contacts. The most common way to get a place where to sell at the market is by being given it from someone you know. Someone with mercy enough to share the space he or she possess into two and give away one and be satisfied with running the business on a smaller plot. For there is no plan to be followed at the market, the vendors regulate it themselves, with a guiding hand of the so-called 'Chairlady' or 'Chairman'. The Chairperson is in the highest position at each market and is responsible for its development, like the market headmaster.

The Revenue

The way the Council is engaged within the activities at the markets is by collecting revenue from the vendors. This is done at all open-air markets where the activity and amount of vendors, from whom to collect revenue, is beneficial for the council economy. That is no revenue is collected at markets where the activity are low and the cost of hire a revenue collector cost more than the gathered revenue. For someone moving into the city and is about to start up their business those markets could be an alternative, but they are in general outside the city, and the transportation back and forth everyday might not be beneficial if activities at the markets are low. One result of this is mobile vendors;

vendors carrying baskets with bananas, beverages, snacks, accessories, food etc. and sell to passers-by or at places where a lot of people are in movement, such as the bus station. An advantage of being a mobile vendor is the chance of not being charged. There are revenue collectors who charge mobile vendors as well; they learn to remember the faces of the vendors who always are moving around in the same area. If a mobile vendor on the other hand moves around the whole city he or she will be more anonymous and consequently might escape the payment. To reconnect this to the issue of shade, it is clear those mobile vendors are suffering from lack of shade. A basket on the head protects from the hot midday sunbeams but it doesn't give the same cooling effect as a shaded space gives. As soon as the vendors reach a position to sell at the markets the imagination of how to create shade kicks in. Different solutions and inventions are visible at the markets, from hats made by umbrellas to umbrella-supported structures, to solar sails stretched between neighbouring trees, to wooden shelters to and findings of the best spot under a flourishing tree.

The Displaying

Something striking while walking through a market is the effort the vendors have put into displaying their goods in an appealing way. The guideline for displaying seems to be "everything that can be built as a tower, should be built as a tower." To put the products vertically makes them more visible for the costumers and it gives a proud expression of the vendor, it gives me as a buyer the impression that she or he is confident about

Mango pyramid

the products and knows it is of good quality. Potatoes are being put four or five on top of each other, mangoes are used as components in order to build up pyramids, figureless vegetables such as red onions are being put close together to level them as much as possible, fishes are being put on top of each other to create towers of fish, cereals which are being sold from sacks standing on the ground about 80 cm high and have a can on top of all the cereals filled with more cereals to elevate it slightly more. By only passing by a row with mango pyramids, tomato peaks and orange installations make you hungry. But it is not only the eatable goods which

are being built towers of. Shoes which are being displayed at plastic sheets on the ground, are lined up each pair beside each other and with another pair sticking up from the holes in which you usually put down your feet. Fabric displayed at the ground are folded into packages of approximately 40x25 cm and put really close together in rows, every other lying down and standing up to make them more visible. Displaying the goods at street level could be seen as a tactical strategy and not only a question of economic possibility to invent some kind of displaying apparatus since it pushes the products closer towards the buyers. Due to the fact that the walkways at market places can be uneven and/or muddy, especially during rainy seasons, and the sidewalks in the city appears with sporadic holes down to the sewers, forces the pedestrians to be aware of where to place their feet, it forces them to look down.

Jubilee Market

The start of building the Jubilee Market was in 1935, by then it was used for trade of products like fruits, vegetables and cereals from the colonial farm. It is a large structure where the stalls of the vendors are lined up along three pathways, which are about one and a half meters broad, stretching straight through the building. The stalls are about one meter high, 1-1,5 meters wide and 80 cm deep and they are all connected as a long concrete bench on which the vendors display their goods. There is a narrow pathway between each pair of stall/row of benches, where there is space for the vendors to stand while selling. But most of them sit on chair in front of the stall, which narrow down the

pathway substantially. The organization inside Jubilee Market is apparent. The categories of goods are vegetables, fruits and cereals, just like when it was built, and you find the same kind of goods besides each other, which is something basically all open-air markets have in common. This is due to regulation controlled by the market management in co-operation with groups of traders. This is because of sanitary regulations, but it is not unusual for exceptions to emerge, for example a fruit and vegetable seller start to sell Omena, a small dried fish. This is something that can trigger vendors next to each other to do the same thing; it is all about being as attractive to the costumers as possible.

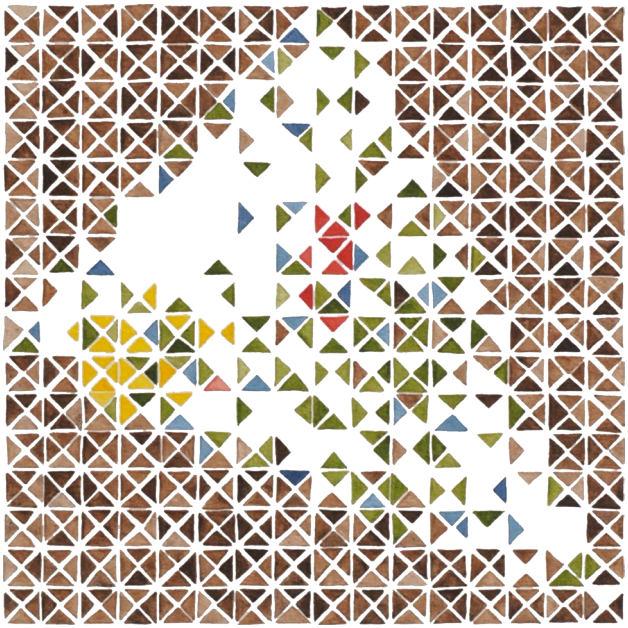
On the right hand side outside the main structure of Jubilee Market, seen from the entrance towards Busia Road, the market expands in form of a small square framed by low buildings. Here fish is being sold. At the opposite side of the Jubilee structure there is another small market square, also surrounded by buildings that contain shops and restaurants. At this square a big variety of products are being sold, everything from naturopathic drugs to vegetables, plastic bowls and clothes. Behind the uttermost part of Jubilee Market is a narrow square where there is a water pump and also a small market for clothes and chickens. One can imagine vendors in Kisumu have been attracted to start up their business in close relation to Jubilee Market, since it is a very established one. Today the area where Jubilee is situated is like an onion with layers of markets, in which Jubilee is the protected core. Observing the atmosphere within the structure you can easily feel the calmness

with a slow pace and a low sound level. It gives a contradictive feeling within such a large space with many vendors. Maybe there is no need or time for the buyers to peel of all the layers of if you're happy with the outmost. Jubilee Market partly operates as a second wholesale market after Kibuye Market. It is not unusual vendors from smaller markets in the suburban areas buy their goods from vendors at Jubilee Market.

Oilé Park

As already mentioned there is trade stretching out from Jubilee Market in all directions; one big appendix is Oilé Market. It is on the opposite side of Busia Road and have transformed from a public park to a market. It is shaped as a triangle and is surrounded by busy roads. It contains a big variety of products; fruits, vegetables, cereals, fish - raw, dried and cooked, charcoal, furniture, second hand clothes and shoes, music and magazines. There are also restaurants, a public toilet and a storage area where the vendors can leave their goods during the night. There is a lot of people and movement at Oilé Park throughout the day, but with its' peak during the afternoon. It is a place with a lot of sounds from the surrounding traffic, but also from people socializing, vendors calling for each other or marketing their products. It is a living environment in comparison to the Jubilee Market. Walking through Oilé Park you experience a lot of different situation and spaces. Coming from the corner by the crossroad where Acheing' Oneko Road and Angawa Avenue meet you enter between the stall selling CD records and magazines and a shoe stall, a big tree provides with shade and make the space intimate.

The traffic noise gradually disappears and is replaced by the loudly played music from the stall to your right. Just a couple of steps further you are totally disconnected from the traffic, it's not visible and you barely hear it thanks to the trees at this corner and stalls along the roads. In front of you, you find fruits and vegetables along a narrow pathway under the crowns and during rainy seasons you might have to zigzag to not step into wet or muddy parts. With the music slowly quieten down behind the sound is replaced by people talking, socializing, arguing about prices and as the space become more open and pathway broader you can once again hear the traffic as a white sound between the people. You are now by the area where a lot of second hand clothes are being sold. They are lying in piles on plastic sheets on the ground and here chiefly young men are promoting the pieces to interested women. A bit further away a man is loudly promoting his products, the pathway to your right is an almost empty street, beside the vendors. It is the area where charcoal is being sold and the usually brown pathway is black of coal dust. It's a quiet place but the traffic becomes more palpable. At the end of this path is an area of living room sitting devices and an intersection of many pathways within the market. Here it is a lot of people, movement and activities. To your right you see the area for the fish and the traffic at the road. To the left are more pieces of furniture, clothes and the traffic at Busia Road. Walking along the edge of the market parallel to Busia Road there are stalls with clothes, some fruits and an area with more fish at the corner by Acheing' Oneko Road. Between this pathway and the road is what can be

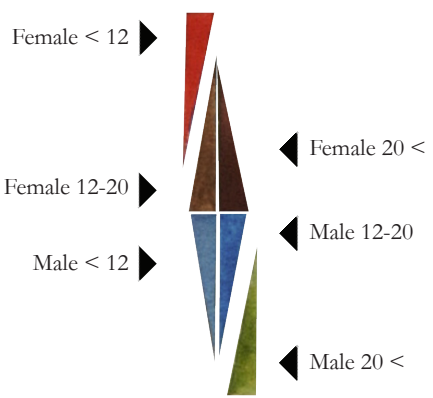


Sound at Oilé park. Green: People socializing. Blue: People trading. Brown: Traffic noise. Yellow: Music. Red: People shouting.

perceived as the official dumping site for the market. It is about three meters wide and stretches along almost the whole northeast side of the park. The smell of old fruits, vegetables and fish waste is not appealing. Taking a stroll through Oilé Park gives a lot of different impressions. The market is unpredictable in sense of activities and movements. It is impossible to know what to expect inside the market by watching it from a distance. A big different from the situation at Jubilee Market where you get a brief overview of the area from the entrance.

Otonglo Market

Otonglo Market is situated outside city centre. Busia Road that stretches between Jubilee Market and Oilé Park ends in Uganda in the west, but about 10-30 minutes from Jubilee Market, depending on means of transportation, is the suburban located Otonglo Market. It is mainly an evening market, but there are some businesses going on at daytime as well. The categories of goods at Otonglo Market are mainly vegetables, clothes, fish and cereals. Two layers of buildings surround the market with a road in between. In these two rows of buildings are other products being sold, such as CD records, ropes, candy, beverages etc. There are also other services there, like hairdressers, restaurants and Mpesas. There is a relatively obvious division of gender and age in this area - the market with the surrounding shops. Even though there are some male vendor at the markets today the majority still are the women. At the Otonglo Market there are only two male vendors to be seen, you'll find them in the outskirt where they sit together and sell snacks. The other men in the area are chiefly by the surrounding buildings at the east or by some means south of the market. In those buildings there are barbers, woodwork factories, technical devices, restaurants, kiosks etc. A lot of men also meet to socialize in the restaurant in the building closest to the market at the western side. Since this is a suburban market are the costumers coming here quite constant, which result in the market as a great meeting place for people living in the area. When the market is as most active, in the evening, people combine their social life with necessities. The market is a place for gossip and chitchat.


Female < 12
Female 12-20
Male < 12
Female 20 <
Male 12-20
Male 20 <

Due to the fact that the circle of costumers is comparative constant and costumers usually buy their goods from the same vendor every day, not much business talk is needed - there is more space for socializing.

The pluralities of the female and male youths are by the building west of market, here the buildings houses restaurants, as already mentioned, shops with magazines and music, hairdressers, pool for playing etc. The youngest kids, both female and male move quite equally around the whole area, but it is common to see them with their mothers at the market. Obviously are there exceptions and variation in this mapping of people since this is a gross generalization, but it is noticeable at site.

At Otonglo Market it is easy to feel the warm atmosphere among traders and the visitors. The activities at the market runs in a slow pace both according to movement and state of mind, people take time to be there and then. By the look of them it doesn't seem like they are elsewhere in their minds, which gives an expression of presence that characterize the whole space. Standing by the trees in the northern part of the market, seeing the people, hearing them sedate socializing, a sound concurring with the birds in the crowns above you and a hint of the music from the record store gives a feeling of belonging. Even for a mzungo.

At Otonglo Market the stall construction, which basically all vendors use is covering an area of approx. 1,5 x 2 meters. The length of the stall is divided into two

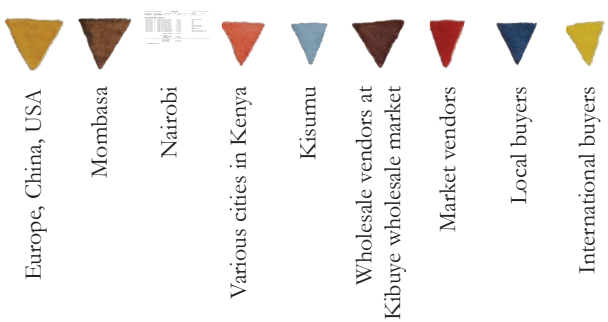
parts, one meter each. The part open towards the pathway, usually contain a table construction, on where goods are displayed. The other part gives space for the vendor to stand. Depending on the prosperities of the vendors business and the income the vendor can incrementally develop the stall by adding a roof and walls. Materials common to use is sheets of plastic, straw matt and corrugated steel. A stall protected from wet weather conditions is more beneficial during the rain seasons is also more comfortable for the vendor in as much it provides shelter from both the rain and the sun. But, when it is not raining the majority of the vendors at Otonglo Market prefer to sit in front of their stall and place the products on the ground to come as close to the buyers as possible.

Facts - Second Hand Clothes

Clothes donated by private people to social organisation in Europe, China and the USA are shipped to Mombasa, where an organizer buys the clothes. When the clothes arrive they are already packed in sacks and sorted by type of clothing. From Mombasa the clothes are transported to Nairobi where several actors buy the clothes and transport it to different places in Kenya, Kisumu among others. In Kisumu the clothes are delivered to Kibuye Wholesale Market, where vendors buy the sacks. They either sell it themselves at markets in and around Kisumu or they sell it to other vendors, which they do at the street just outside the area marked out for the wholesale vendors selling fruits and vegetables. Here they pull out plastic sheets on the ground and private people and other vendors fumble through

the piles to find something they find appealing. As with all goods at the markets the categories of buyers who are private people are either local people or tourists. This means from time to time the chain reconnects within the process of second hand clothes. Since one can assume it is mainly wealthy people from the donation countries that can afford to give away clothes for free and mainly wealthy people who afford to travel far. When these tourists buy clothes at the market it is hypothetically possible it is the tourists' neighbour who has donated the piece. It is therefore not unusual to find clothes at the market that originally was sold by H&M or Primark. The clothes reaching the locals in Kisumu is ergo donated at start and then processed through four or five actors where the price increase every time before it is possible for them to buy pieces. See the belonging diagram on next page.

Above: diagram showing the process of second hand clothes, from source to buyer. Below: colour explinations.



Project evaluation

Time and space

As so many times before, limiting time is not beneficial for my imaginary mind. Or seen the other way around, it is positive in the sense that the projects need to come to an end at some point. Anyhow, reflecting upon the outcome and result of this project the first thing crossing my mind is the volition of possess more time to spend on the project in order to be able to complete more drawings and increase the project and the product. Areas I would have liked to investigate more and shown in the finished product are: 1. Movement patterns related to a. activity at the market, b. depending on the sun and c. differences between the genders. 2. The relation between the markets and the transport systems. 3. Body languages. 4. Smells. If I had the possibility of continuing this project those are topics I would investigate. I feel a bit sorry for not being capable of covering more areas while in Kisumu. To explain it with some kind of rational theories why I didn't manage to accomplish this is the fact that Kisumu was totally unknown for me before going there, even though I through literature had gain some information it still is difficult to know how it will be being there. If I would go back to complement the work I would be able to prepare and structuralize my work before entering the market places. Even though this was the second time I did this kind of field study (first time was to Dharavi) - to an entirely different culture and a context then from what I am used to, where I as a white person get a lot of attention just because of fact that I am white and

therefore becomes overloaded with prejudices of how I as a white people should be, act and capable of doing. Despite the little experience I've had from earlier it is still many times hard to meet all people with their wish and longing for something else, something better, something they see in me, something they see me capable of helping them with. That is one aspect why it is hard to be out on the field, another is the fact that it was hard to be alone and doing my studies in peace and quiet. When I was at the market alone, it was in general always someone talking to me, it was very different from when I was accompanied by someone, then not nearly as many talked to us. Talking to people has been a great source of information and base on with I have developed my project, it is definitely nothing I complain about. It is just in some situation I would have been incredible more effective if I had been undisturbed. But doing effraction in another society, where the people in general not are used to white people and naturally are curious when meeting one, comes with a great responsibility. To talk to them is the least I can do in order to outweigh when I sneak around and paint and write in a language they don't know. I owe them that. And more. I haven't met one single person who has been mean, threatful or by any means unsympathetic. Everybody have been really gentle, hospitable and helpful!

To finish this text about the people and situations in Kisumu I will focus this last paragraph on me, on my personal development during this project. If there are some things I should point out of what I have learnt

during these weeks in Kisumu, it is to be in such a different context, from what I am used to, and move around, talk with people and find solutions to problems occurring, all by myself. To do this project alone depended on my independence and that have been good for my development on a personal level. I have learnt to rely on my self, my instincts and ability to initiatives in another culture and with a constant hint of food poisoning. I know this experience is something that will benefit me in my profession in all the things I will be doing. I now know I can rely on myself in these kinds of situations. I can, with taking the risk of make it sound like a cliché, honestly say this have made me grow as a person. When I attack a new task to reach a specific goal I have decided myself to achieve, no matter if it is baking macrons, squat 100 kg or fill up a 16x16 cm square on a paper with 2048 triangles in different colours, I put almost unhealthy much effort in doing it as good I possibly can. And so I have done in this book project, I am happy of what I have accomplished in terms of drawings. Even though I would like to redraw some of them and add a few. But with the condition provided I feel I have done the best I could and have my heart in this project. I actually feel rather sad writing these last sentences. Because despite the monster cockroach in the wardrobe, my stomach diseases or re-emerging situation when I stepped into something unpleasant lying on the ground, there is nothing that can overgrow everything else that have just been amazing. So far this is the best and greatest adventure and journey I have experienced!

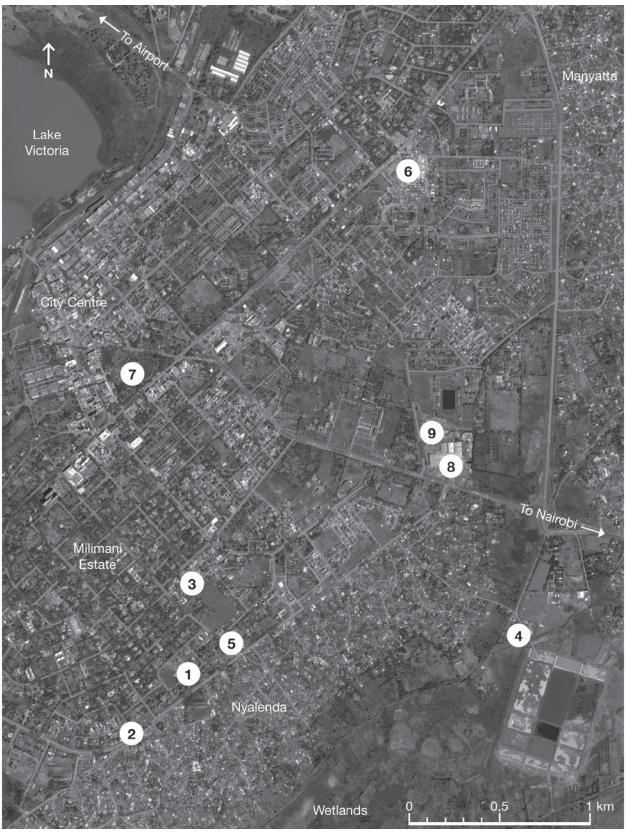
RE:FUEL

by Johan Franzén

Kisumu is the third largest city in Kenya with a population of over 400000 people, and everybody needs energy, every day. With a history of deforestation and tradition of cooking with biomass like wood and charcoal, there is a need for alternate fuels.

By reading about projects and research from different parts of the world, getting to know the local context through excursions and talking to people in the markets I got a better understanding of the problem and what could be done.

I chose to look into the market systems regarding charcoal, firewood and different fuels used for cooking. Together with a local organisation I started producing biomass briquettes out of waste materials easily acquired in an urban setting. This was a try to learn a process, connect different issues and explore what impact a small scale intervention could have on the local fuel market.



Map over Kisumu

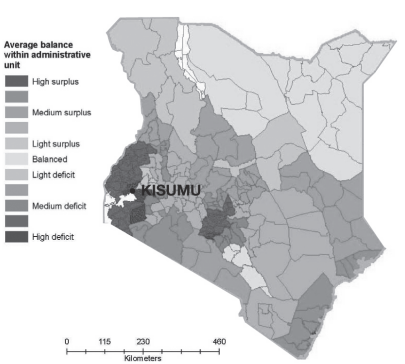
1. Friends Pioneer / Guesthouse
2. Friends Pioneer / Internet Café
3. Practical Action Office
4. St Joseph Secondary School
5. Edwin Achola carpentry
6. Kibuye Market
7. Jomo Kenyatta Sports Ground
8. Mega City Shopping Mall
9. City dump

ISSUES

Jobs, Waste and Deforestation

With a decreasing amount of fish in Lake Victoria and an increasing population, there is a need for jobs, waste is in abundance in the streets and solid-waste management is halting. Deforestation is a big problem in Sub-Saharan Africa (SSA). In early 2000 the forest cover in Kenya was only 1,2%. Since then the situation has improved on paper, and today it is about 7%, reaching for 10% by 2030. But with growing population and agricultural expansion and a majority of the population dependent on charcoal and wood for cooking, the problem is still very pressing. (KFS, 2014)

An estimate is that 700 000 people are employed in the informal charcoal industry in Kenya and competition for available resources can lead to heightened tensions between local communities as well as to political issues. (GVEP International, 2012)



Supply-Demand.
This map shows the balance between supply and demand for biomass energy. The consumption includes fuelwood and wood used for charcoal production. (FAO, 2005)

FUEL

Of 900-million people living in Sub-Saharan Africa, 76% rely on traditional biomass energy to meet part of their household energy needs.

Everybody needs energy. For cooking, for heating, for charging mobile phones and for lighting after sunset.

Depending on your socioeconomic status, where you live and what traditions you keep, you will choose different fuels for different purposes.

The following fuels are the top five fuels used for cooking in Kenya and the East African Community.

Firewood
Firewood is the most commonly used fuel in the rural settings. It is considered cheap and easily accessi-

ble. But with deforestation it is harder to get and takes longer time to collect. A burden that falls on women and children.

Firewood is rather cheap in rural areas, but expensive and scarce in urban settings. It is smoky and affects the health of users.

Charcoal

Charcoal is used all over the world as a cooking fuel. Charcoal is produced in a Kiln by heating wood in a slow combustion with controlled oxygen supply. It is a light and energy-rich fuel that burns for longer and with higher temperature than firewood.

Charcoal is easy to use, but produces harmful smoke and contribute to the cutting of trees.

Kerosene

Kerosene (or paraffin) is a liquid fossil fuel that is used both for cooking and lighting. It ignites fast and gives a consistent heat. It is often used as a complementary way of cooking to charcoal or wood.

Kerosene is an energy dense fuel and saves time, but it is expensive, a bit smoky and needs a separate stove. Not available in the rural settings.

Gas

Liquified petroleum gas (LPG) is used to some extent in the urban settings of Kenya, mainly for short-time cooking. The use of LPG have increased in the mid and high income urban households.

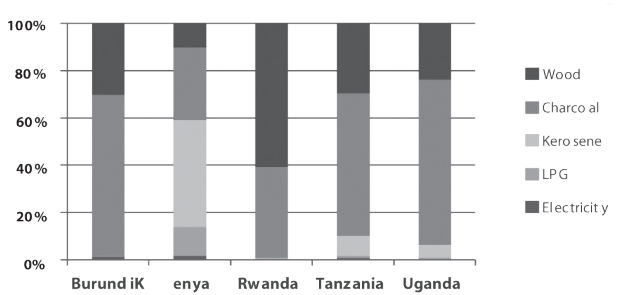
It is considered a clean fuel, that is more efficient than charcoal and easy to use. Though it is a fossil fuel, expensive and has an high initial cost for equipment and container.

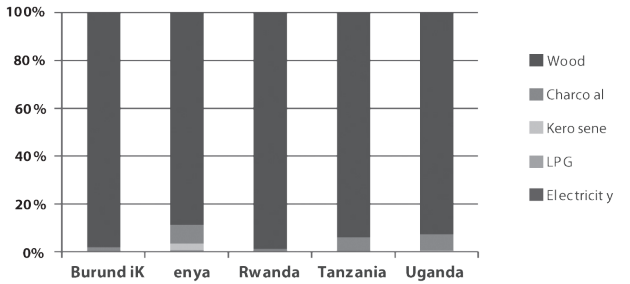
Electricity

Only 1,8% of the households in urban areas and 0,2% in rural areas use electricity for cooking. It is considered an advance and modern fuel. About 20% of the households in Kenya are connected to the electrical grid. Electricity is clean and convenient for the user, but it is expensive and requires a subscription and the means to pay the high initial cost for equipment.

Market

Biomass energy sources contribute more than 75% of the total primary energy supply in each of the five East Africa Community states of Burundi, Kenya, Rwanda, Tanzania and Uganda. With current socioeconomic and demographic trends, it seems likely that the use of biomass energy in Sub-Saharan Africa till remain high, or increase over the next 20 years. (EEP, 2013)

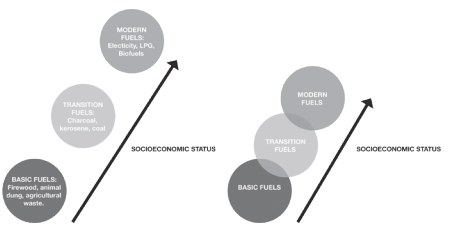




The two graphs above shows the primary source of cooking energy in an urban (previous page) and rural (above) context in the East African Community states.

Within urban areas, dependence on charcoal for cooking is high and charcoal vendors are a common sight within the residential areas. Much of this charcoal is produced through unregulated and inefficient methods, with production efficiency as low as 8-15%. In addition around 10 to 15% of charcoal is wasted as dust which is often discarded. (GVEP, 2013) Access to modern fuels as kerosene and LPG is relatively high in urban areas, but high initial cost or high up-front costs hinders the switch to these "cleaner" technologies.

Energy ladder versus the energy matrix model.



It is often believed that if the household's income level increases they take a step on the energy ladder, but empirical evidence shows that even if a household's income level increases, there is no direct switch to a more modern fuel. Instead different fuels are used for different types of cooking, there is a mixed use of energy sources. The choice of fuel for cooking is not solely dependent on the price. At household level, energy content, ash content, smoke and fumes, the available cooking appliance, availability of the fuel, type of food to be prepared and preparation time influence energy consumption and has to be considered when choosing fuel.

Policy and legislation plays a highly influential role when developing new alternatives, or when trying to affect the market to shift to a new fuel. This includes:

- availability and supply of raw material, eg. for producing briquettes from municipal waste, charcoal dust or argicultural residue;
- access to technologies and subsidies on "cleaner" fuel alternatives;
- the state of production and distrubution, such as the state of physical transportation infrastructure, energy production, energy laws;
- and access to markets, such as standards, taxation and export duties.

The Kenyan government has set renewable energy development, including biomass energy sources, as a high priority. Kenya's Vision 2030 has highlighted

energy as a core theme upon which the economic, social and political pillar will be established. (EEP, 2013)

Project

The aim with this project was to make a small scale intervention, a hands-on project to learn more about alternate fuels that could replace charcoal and firewood as fuel for cooking and heating.

In Kisumu I partnered with an organisation called Friends Pioneer. Two of their employees, John Okech and Barack Ojiem had an interest in alternate fuels and ways to empower people in the informal settlements of Kisumu. We looked in to the process of producing biomass-briquettes out of waste material and decided to give it a try. We carried out this project together and we learned a lot about the process of briquetting.

Briquettes

Fuel briquette are blocks of compressed biomass material such as farming waste, charcoal ust or waste paper. Briquettes can be divided into two different categories:

1. Non-carbonised fuel briquettes.

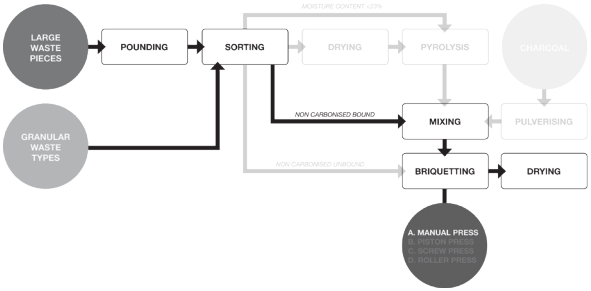
   Produced form waste material that are not carbonised, such as sawdust, waste paper and agricultural residue.

2. Carbonised fuel briquettes.

   Made from wate materials that have undergone carbonisation sutch as charcoal dust or, produced by carbonising briquettes from the first category.

Low density, inconvenient shape, high moisture content, low calorific value, etc. are some of the factors affecting burning characteristics and attractiveness of fuel. Further processing such as shredding, densification (compaction) and shaping (briquetting), and carbonisation (pyrolysis) are needed to transform the various types of organic waste into an acceptable form of domestic fuel.

Below is a flow diagram showing the flow of material and steps in the process of producing different kinds of briquettes. Our process is highlighted.



Due to time constraint we had to use material easily acquired in the urban setting of Kisumu, and material that did not need a lot of preparation.

Possibilities of production:

- could create income for many people in the value chain;
- reduce the use of firewood and charcoal;
- bring a cheaper fuel to the market and save money because the raw material is virtually free;
- empower women who already work with production of charcoal dust briquettes for domestic use.

Limitations:

- could be hard to secure the flow of raw material;
- difficulties to present a new product to the market;
- limited economic resources for start-up;
- time limit of field study.

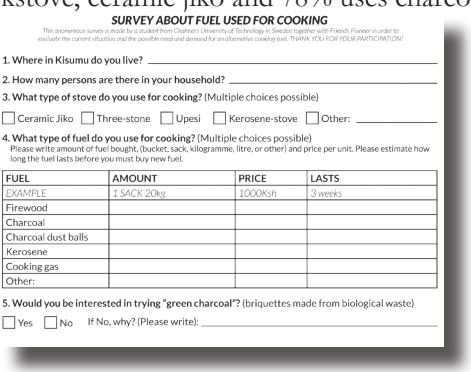
Survey

In order to understand the context we made a questionnaire that we handed out to 50 students at St Joseph Secondary School. The reason for choosing

students for the survey had several benefits. Firstly, the students were told to bring the questionnaires home over the weekend and fill them out together with their parents or guardians. The students and their families live mainly in the informal settlements in the peri-urban areas, representing the major target group for the finished product. And this was a way to involve potential future customers. Secondly the school could act as a future catalyst for marketing and producing briquettes.

In general I would say that our findings did match what I have read about the charcoal market in Kenya, but one could point out that the answers from the survey reflects the situation in the urban and peri-urban settings of Kisumu county. The rural community to a higher extent use firewood instead of charcoal.
Some findings from the survey:

- The average number of people in the households are 6, but range from 2 to 12;
- 76% of the respondents have the improved cookstove, ceramic jiko and 78% uses charcoal for



SURVEY ABOUT FUEL USED FOR COOKING

This anonymous survey is made by a student from Chalmers University of Technology in Sweden together with Friends Pioneer in order to evaluate the current situation and the possible need and demand for an alternative cooking fuel. THANK YOU FOR YOUR PARTICIPATION!

1. Where in Kisumu do you live? _____

2. How many persons are there in your household? _____

3. What type of stove do you use for cooking? (Multiple choices possible)

☐ Ceramic Jiko ☐ Three-stone ☐ Upesi ☐ Kerosene-stove ☐ Other: _____

4. What type of fuel do you use for cooking? (Multiple choices possible)
Please write amount of fuel bought, (bucket, sack, kilogramme, litre, or other) and price per unit. Please estimate how long the fuel lasts before you must buy new fuel.

FUEL	AMOUNT	PRICE	LASTS
EXAMPLE	*1 SACK 20kg*	*1000Ksh*	*3 weeks*
Firewood			
Charcoal			
Charcoal dust balls			
Kerosene			
Cooking gas			
Other:			

5. Would you be interested in trying "green charcoal"? (briquettes made from biological waste)

☐ Yes ☐ No If No, why? (Please write): _____

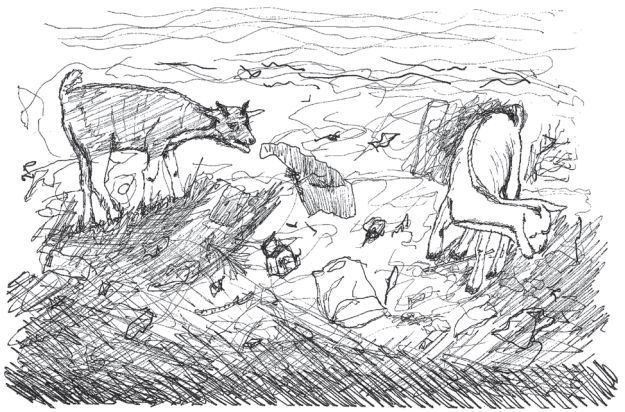
cooking;
- 43% have a kerosene stove but 38% uses kerosene for cooking;
- 19% have a three-stone stove and 22% uses firewood for cooking.

On average, the households spent about 9 KES per person per day on fuel for cooking. Most households use different fuels for different types of cooking. The survey also showed that most households buy fuel that lasts about 1-2 days.

Materials

Depending on what raw material is available and how much funding you have for machinery and equipment, that will determine what type of briquette is most viable for your project or situation.

Goats eating from the roadside waste piles.



The materials that can be used for making non-carbonised biomass briquettes can be divided into four main categories:

1. Heat fuel or main feedstock

   Highest energy content and makes up most of the briquette. This includes; sawdust, charcoal dust, rice husks, leaves, etc.

2. Accelerants

   Material that makes the briquette burn better/faster. Examples of accelerants are sawdust or pulped waste paper.

3. Binders

   These are materials added to heat fuel and accelerants to draw them together and bind them to make a solid briquette. Binders could be: starch, puled waste paper, molasses and decomposed pounded fibres from agricultural residue.

4. Fillers

   Fillers like clay, ash and soil are used to increase the weight, density or volume of the briquettes. They do not add energy value to the briquette.

In our situation, with limited funding and not very much time, we decided to produce briquettes using a manual lever-press and easily available materials.

These were the ingredients we used:

- Sawdust - bags bought from sawmills in Nyalenda near our production site;

- Charcoal dust - bought from charcoal vendors in Nyalenda;
- Paper/Cardboard - collected as waste by the roadsides in close connection to our production site;
- Leaves - collected from garden waste piles outside houses in the residential area of Milimani;
- Banana leaves - brought for free from vendors at Kibuye wholesale market.

The sawdust and charcoal dust did not need further processing before being used in briquettes. The paper and cardboard was soaked in bins of water for a couple of days and pounded to paper pulp in order to work as binder in the finished mixes. The mixed leaves and banana leaves where spread out on a black plastic tarpaulin to dry in the sun and later pounded to pieces of about 2-5cm length using a pestle and mortar.

Production

When having prepared all materials needed, we started making the blends. By volume we mixed the paper pulp (binder) with the different feedstock: sawdust, charcoal dust and leaves. We checked the readiness of the blends by taking some mixture in our hands, squeezing it together to form a small briquette. If the briquette held together and did not break when holding it in one end and shaking it 4-5 times it was a good blend. One actually only need a pair of hands to make a briquette, but in order to reduce drying time, improve the quality and burning characteristics as well as ensuring a briquette of consistent shape, there is a need for higher pressure and a mold.

From open-source drawings provided by Engineers Without Borders USA (EWB, 2011), we had a small lever press manufactured by a local carpenter

Pressing a briquette

The press is an all wood construction except from a plastic drainage tube. It was built using only hand tools. It is to small to use in "full-scale" production in a sufficient way, but it is big enough to use when trying a process or presenting the methods of pressing biomass briquettes. The lever and base of the press can be used.

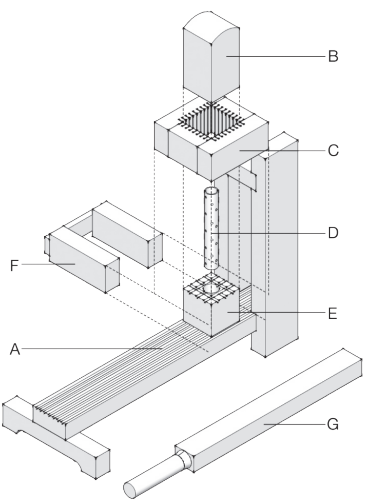
Edwin Achola and his co-worker George building the press.

The press in use at the office of Friends Pioneer.

The exploded view below shows the movable part of a press with a square mold like the one we used. And the following nine steps will describe the process of pressing a briquette.

Result

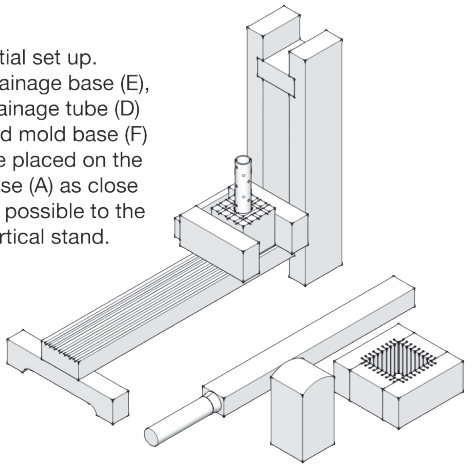
During the first day of production we produced seven types of briquettes, six briquettes of each blend. We wanted to try mixtures with different proportions of feedstock, accelerants and binder. The variation of briquette recipes could possibly target different customers and have diverse burning characteristics



A: Base - Five parts of 1½“ thickness
B: Piston - 3” x 3” x 6” with 1⅛” hole
C: Mold - 3¼” square with drainage slots
D: Drainage tube - 1” PVC tube
E: Drainage base - 3” cube with 1⅛” hole
F: Mold base - removal jig
G: Pusher lever - 2” x 1” x 24”

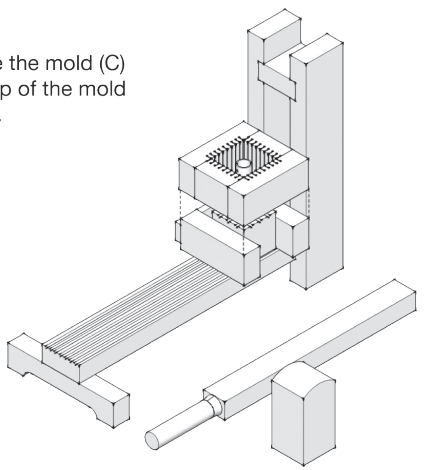
1

Initial set up. Drainage base (E), drainage tube (D) and mold base (F) are placed on the base (A) as close as possible to the vertical stand.



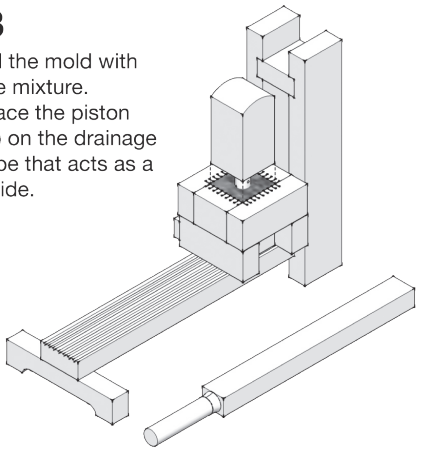
2

Place the mold (C) on top of the mold base.



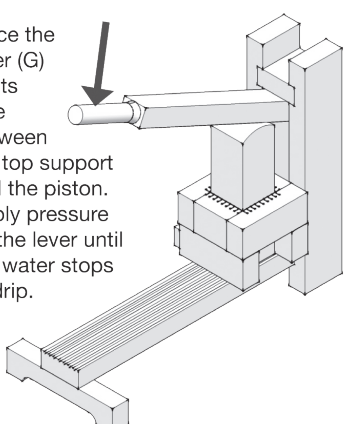
3

Fill the mold with the mixture. Place the piston (B) on the drainage tube that acts as a guide.



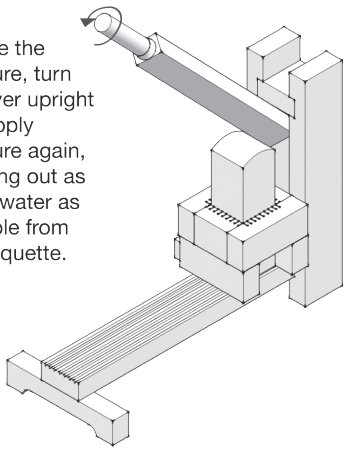
4

Place the lever (G) on its side between the top support and the piston. Apply pressure on the lever until the water stops to drip.



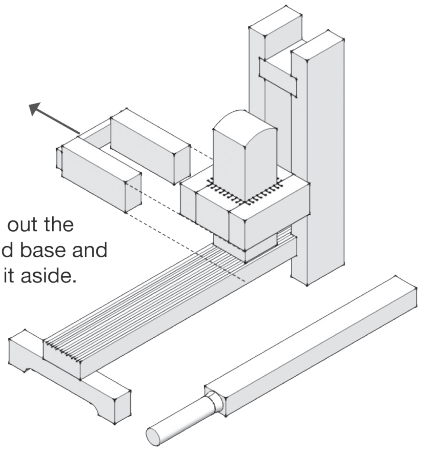
5

Relieve the pressure, turn the lever upright and apply pressure again, pressing out as much water as possible from the briquette.



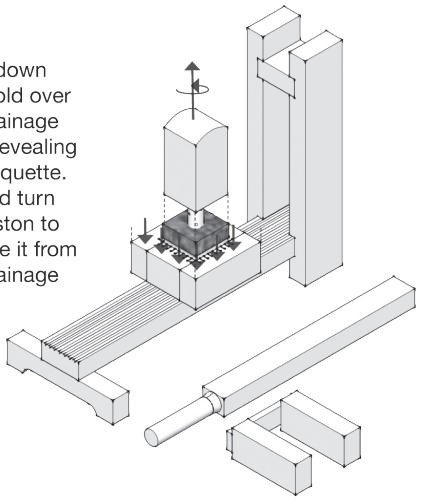
6

Pull out the mold base and put it aside.



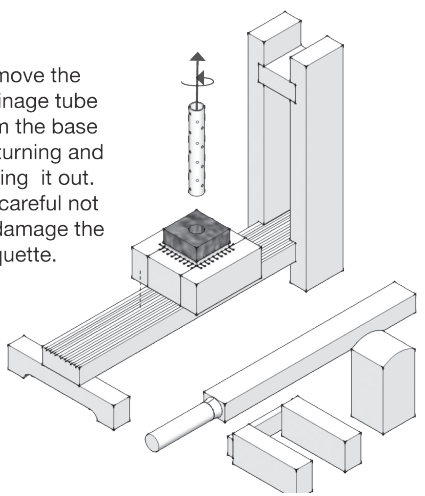
7

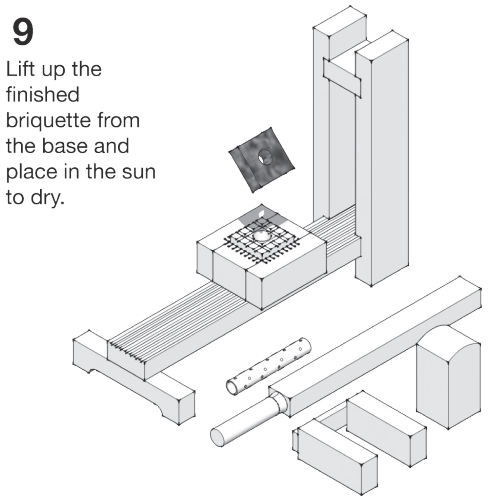
Push down the mold over the drainage base revealing the briquette. Lift and turn the piston to remove it from the drainage tube.



8

Remove the drainage tube from the base by turning and pulling it out. Be careful not to damage the briquette.





making them suitable for different types of cooking. After pressing the briquettes were placed upright in the sun, to provide good airflow around the surface. All briquettes were moved indoors overnight, protected from the rain. Drying of the briquettes took about 2-3 days depending on type and density.

The second day of production we continued to produce one of the briquette types from the day before. Without the time to try the different briquettes in a stove to see how they performed, we decided to produce more of the blend we thought might be the most viable in the local market for domestic use. It was the blend with the highest density and highest percentage of charcoal dust, making it a briquette that could have burning characteristics similar to charcoal.

Finished briquettes in and next to an improved cookstove normally used for cooking with charcoal.

With a team of 6 people pressing 900 briquettes, a possible price for one briquette could be 3-4 KES. With the estimation that one person needs 1-2 fuel briquettes a day, this price would be lower than what most people spend on fuel today. Production could provide for 75 average sized households. (Legacy Foundation, 2003)

SWOT-analysis

Strengths, Weaknesses, Opportunities and Threats based on the production of the briquette type mentioned above with 30% cardboard, 30% paper pulp, 30% charcoal dust and 10% sawdust.

Strenghts:

- Easily available materials;
- Waste management, paper collected from the streets;
- Short preparation time of materials;
- No need for agricultural "waste" that require longer preparation time;

- Solid briquette with relatively high density.

Weaknesses:
- Costly material
- Production dependent on charcoal and wood
- The paper could be recycled instead of used in briquettes
- The demand for sawdust might affect the prices, making it harder for poultry farmers and other people buying sawdust for other purposes
- The higher density results in longer drying times
- The briquette will produce smoke and ash

Opportunities:
- A good briquette can lead to widespread implementation
- Could create job opportunities along the value chain
- Can be used in different kind of stoves for both heating and cooking
- Expectations and demand for alternate fuels
- Good connections to the market, schools and hotels could create demand for new products making use of different types of waste
- Standardisation of briquettes

Threats:
- Increased cost of production
- Longer drying times during raining season
- Difficulty to introduce a new product to the market
- Difficulty to keep up flow of material and production rates to meet public demand

- To high expectations on burning characteristics
- Big scale briquette/pellet producers to undermine the market for small producers.

Conclusion

Though our briquette production was very small-scale and graspable, it connects to so many issues making it so much bigger when trying to understand the systems behind it, the needs, culture and traditions. Cooking is so close connected to the culture and traditions of a country. It is a part of peoples everyday life.

With the overall aim to do a small intervention, a hands-on project and to work with local organisations, I feel that the project was successful. In regards to producing a fuel for domestic use and to reduce deforestation, the project might not be as successful.

During a public exhibition at Jomo Kenyatta Sports Ground we got good response and people showed great interest in the briquettes. Most of the questions we got was about how the briquettes perform relative to charcoal; smoke produced; heat and burning time. Because we had not had time to test the briquettes ourselves, all the answers were assumptions, based on tests and research done by others.

Before continuing the project and scaling up I think it is crucial to map possible clients and get input on what is expected of the finished product. It is also important

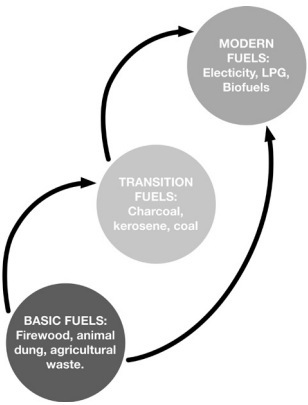
to work together with a network of producers to find ways to ensure consistent look and quality of briquettes.

Looking at the situation in the peri-urban areas of Kisumu, it is very unlikely that people would switch from charcoal to non-carbonised briquettes, because of their characteristics and the tradition of cooking with charcoal. Low energy briquettes are often regarded as a more basic fuel than charcoal, which is a transition fuel towards modern alternatives. In the urban areas, bigger clients like hotels, restaurants and schools might be interested in briquette alternatives to market themselves as environmentally conscious, while some industries that are centrally located and have a high risk of fines and penalties associated with using quasi-illegal charcoal, might look to briquettes as an alternative.

To address the energy deficiency in Sub-Saharan Africa there are mainly two complementary approaches. The first is to support more efficient use of traditional biomass sources, the second is to enabling the switch from traditional to modern cooking fuels.

Looking at the energy ladder in relation to briquette projects, the greatest benefit would be to help people in rural settings to switch from firewood to solar cooking and briquettes while peri-urban settings should aim for biogas and bio-alternatives. In the urban setting, as mentioned above, bigger clients could benefit from briquettes and pellet for space heating instead of charcoal. While the majority of the urban households should be encouraged to switch to electricity, if the electricity comes from renewable sources.

It is important to look at the infrastructure and available materials/ equipement in different settings when empowering people to take a step on the energy ladder.



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REJUVENTATION OF HIPPO POINT THROUGH CULTURAL ACUPUNCTURE by Frida Bard & Loice Loo

This project focuses on the site Hippo point which is a public space by the shores of Lake Victoria in Kisumu. The site is popular for boat rides and relaxing due to its access to water and rich vegetation. Over time its popularity has grown and with it, the emerging of informal businesses and infrastructure on site. With Kisumu needing more green public spaces, this project sees the need to create a development proposal for Hippo point to guide development in a sustainability manner. The authors Frida and Loice, have a background in Civil Engineering and Urban Planning respectively.

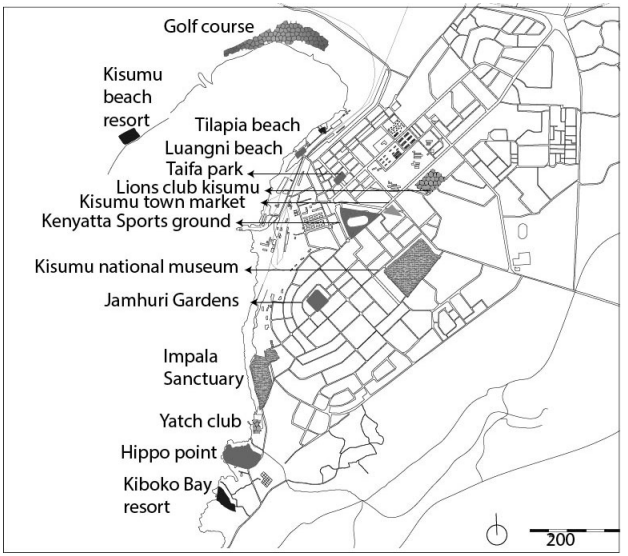
Introduction

Green spaces are increasingly being recognized as having positive benefits in regeneration by enhancing people's quality of life (DTLR, 2001). However, with the urbanization trend, green spaces are ever reducing in number (Zube, 1971). The need for green space is evident and Kisumu which the study area is obligated to join in the efforts towards greening urban areas.

Kisumu as the Millennium city of East Africa attracts a lot of people increasing the demand for existing resources including green spaces.

Kisumu city has fourteen green public spaces in total. Eight out of these are located along the water front as illustrated in the figure below. However, of the 8 public spaces located by the Lake Victoria, only two are completely accessible to the public: Luang'ni beach and Hippo point.

The others have restrictions like entry fees, membership subscriptions and high cost of refreshments which discourage people from visiting them.



Access to green spaces in Kisumu

The green spaces mapped in the figure show a concentration around the town center. This follows the cities development pattern which tends to push towards the lake resulting in circular shape (UN-HABITAT, 2005). Evidently there is need for provision of more green spaces to let up the pressure on the existing ones.

While Luang'ni Beach has undergone massive changes in infrastructural development, Hippo point has yet to go through the same. Its location is away from the city and developing it could serve as strategy to reduce pressure on the public spaces at the town center.

Initially parks were created to provide relaxation for people. However, with the new global trend, they have been expected to transform into avenues for social, economic, cultural and environmental activities (Rabare, 2014-05-06).

At Luang'ni beach, the economic function has dominated resulting in environmental degradation due to unregulated economic activities like car washing right into the Lake Victoria. Ogudah (2013) refers to this type of development as guerrilla urbanism.

With the growing interest of traders and visitors in Hippo point such haphazard development is inevitable hence the inception of this project. The project considers that the functions of public spaces have changed from merely being relaxation points.

As such principles of sustainability and livelihood improvement are key pillars in the development proposal for Hippo point.

Specific Objectives of the project include :

- Evaluating the resources, assets and set backs at Hippo point
- Developing a proposal for the sustainable development of Hippo Point
- Drafting a business model for the development proposal

Work Process

The whole process begun in Sweden with preparations for the field study. This was followed by a field study in Kisumu where we spent 8 weeks. We then returned to Sweden to wrap up the project based on the site visit reflections.

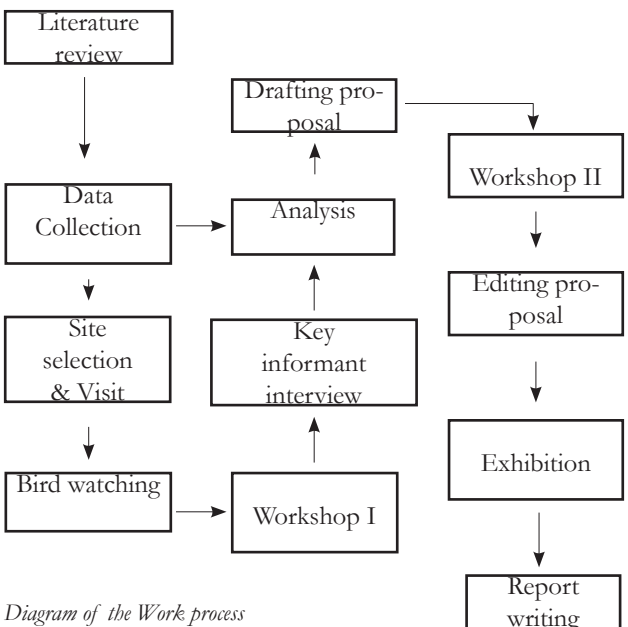
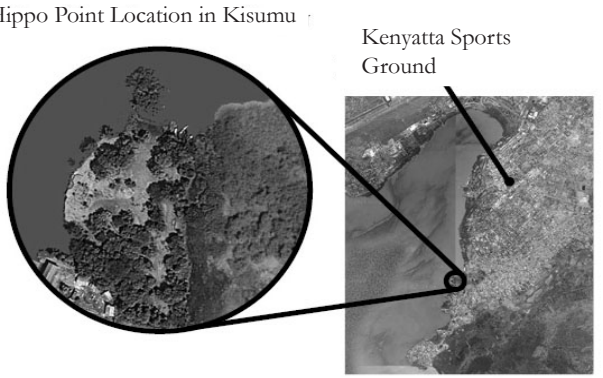


Diagram of the Work process

Site Location

Hippo point is located to the South West of Kisumu City and is 3 km from the centrally located park Kenyatta Sports ground. The plot measures approximately 5 acres. It has public access and is mostly visited by the locals.



Hippo point in relation to Kisumu City

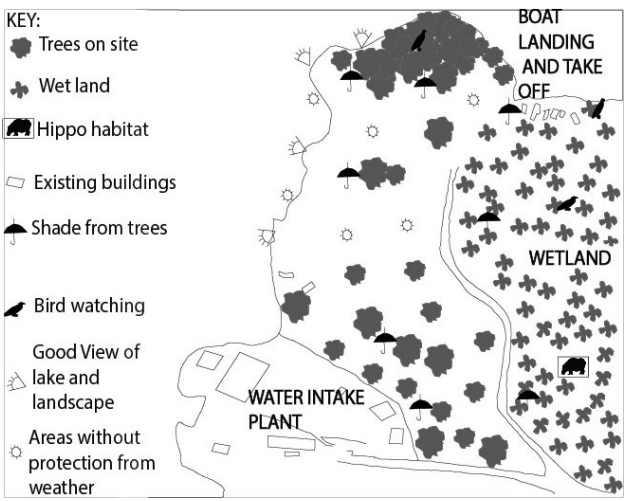
Currently, local inhabitants have organized themselves in a group called Hippo Focus to manage the site and they even charge a small fee to some tourists who visit the site. Though the group is officially registered, their management of the site is informal and not recognized by the local authority. However, the group has a constitution and vision for Hippo point with regard to development.

Site Characteristics

Hippo point has access to the water front where visitors enjoy watching the beautiful landscape.

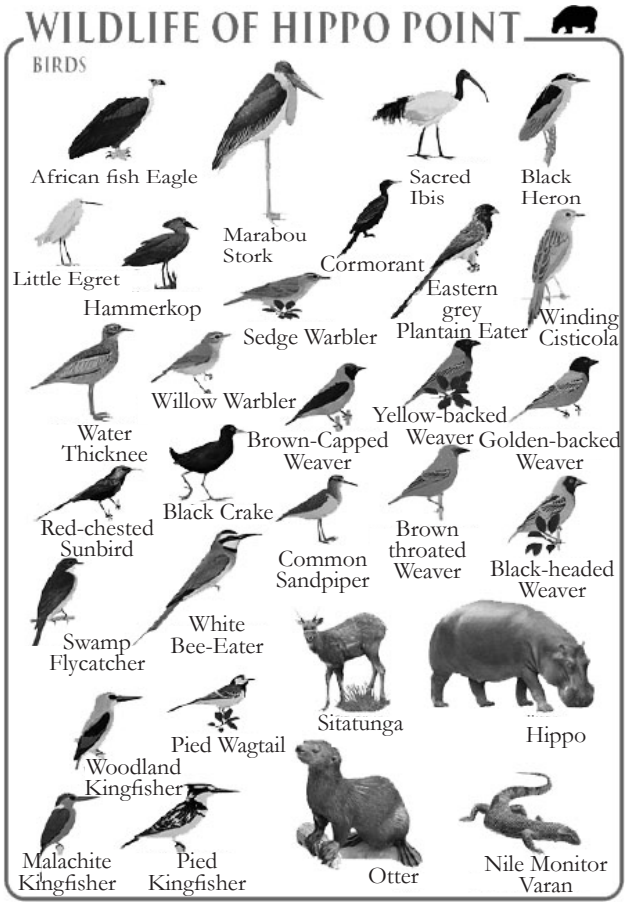
The wet land at Hippo point is home to different bird species and animals like the Hippo. It further serves as a migration corridor for animals.

Images of Hippo point

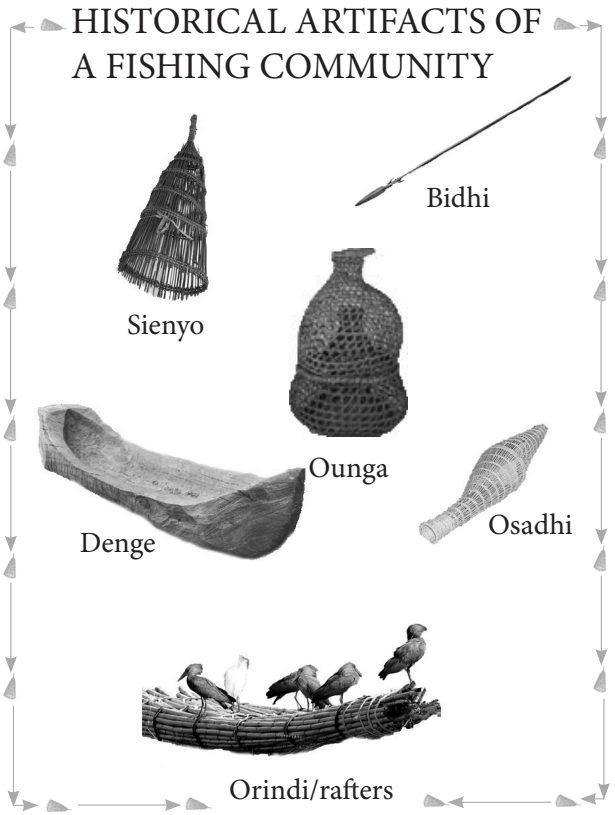


Site Analysis of Hippo point

The map shows the shaded areas and wetland of Hippo point where people like to sit under shade. The shore is mostly for viewing the landscape. Most of the activities mapped; sitting under shed, meeting and boat rides are social in nature and could symbolize the key function of the public space as a meeting point.



The various bird species at hippo point were captured and documented during field studies. These are a key attraction to bird lovers who take boat rides just to catch a glimpse of the birds.



The community also has a rich culture as a fishing community. During a workshop on site, fishing traps and canoes from the past were identified. This is a part of the fishing community that is slowly fading away. The group managing the site hopes to use this as a stepping stone for preservation of heritage.

As much as Hippo point is a social place, small businesses have emerged that come hand in hand with the visitors. They serve as critical source of livelihood for the community members working on site.

Clearly, the site has various functions both social and economic: a trend highlighted by (Rabare, 2014-05-06). The activities that people engage in are usually to the financial benefit of the small scale traders. These include: boat riding, birdwatching and taking refreshments.

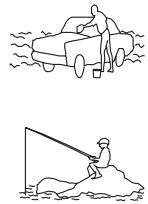
Different activities dominate different hours of the day and they begin as early as six o'clock in the morning as illustrated in the image on the following page.

Socio-economic Activities at Hippo Point

Tourists
Tour guide
Fishermen

6.00 -
9.00A.M
Bird watching
and net fishing

Young boys

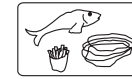


9.00 - 11.00
A.M.
Car wash and
line fishing

Food traders
Women

11.00 - 12.00
P. M
Setting up
refreshments
and cooking

Food traders
Tourists
Tour guides
Fishermen



12.00- 1.00 P. M
Eating

Tourists
Tour guide

Beyond 1.00 P.M.
Boat rides and
landscape viewing
till sunset

SWOT Analysis

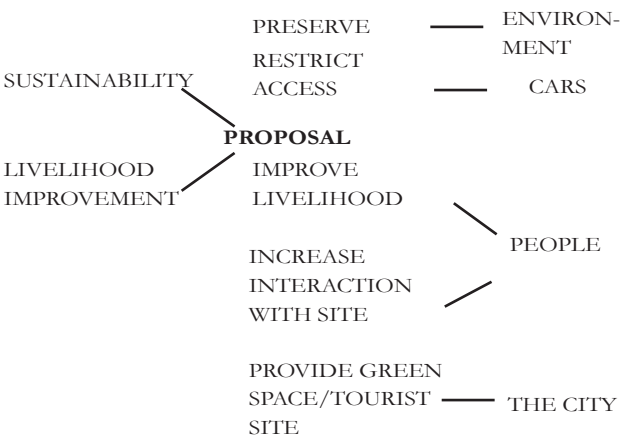
Evidently Hippo point is an active public space. In order to highlight its strong and weak points, this study has used the SWOT analysis.

S	**W**
The water	Insufficient facilities
Biodiversity	Uninviting entrance
Existing structure	Lack of infrastructure
Established community	Steep shoreline
Near city centre	Occasional commotion
O	**T**
Kisumu Water front development plan	Absence of development plan
Increasing tourism	Informal constructions
Growing interest in community management	Distribution of natural resources
	Unregulated Activities

From the SWOT analysis, the study concludes that Hippo point has great potential. Its vegetation and shores are a great asset to it. Human resource is also available at the site due the community initiatives in managing the site. These together with the goodwill of the people on site are sufficient in addressing the weaknesses highlighted. However outside threats may be beyond the control of the community members e.g. possible destruction of wetland by private investors. Fortunately, the local authority has plans to open up the water front to the city and boost tourism and can deal with major challenges. The project is therefore basing upon the above parameters as the building blocks of the development proposal.

Design Criteria

Development of the project proposal has been informed by the design criteria below.



In the spirit of sustainability, the proposal emphasizes preservation of the existing flora and fauna. This is reflected in the restrictions of motorized access to the site.

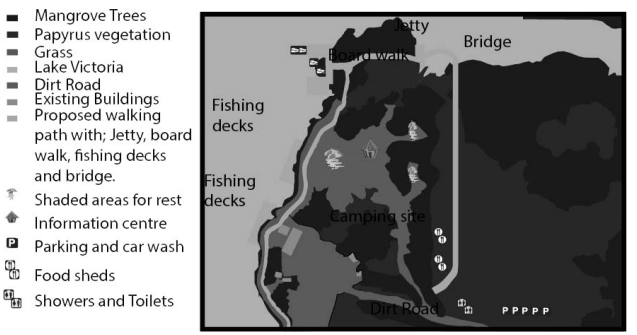
As a livelihood improvement strategy, the plan seeks to make the site more interactive for the visitor. Through the interactions, income can be generated and livelihoods improved.

Making the site more attractive will open it up to the city providing an alternative tourist destination site. As is the case, such sites are few in Kisumu city.

The project proposal will include; structural interventions presented in site plans and conceptual images. Further it is also presented a proposal for developing Hippo point as a cultural site and a few models that will increase the resilience of Hippo Point.

Design Proposal

Site Plan



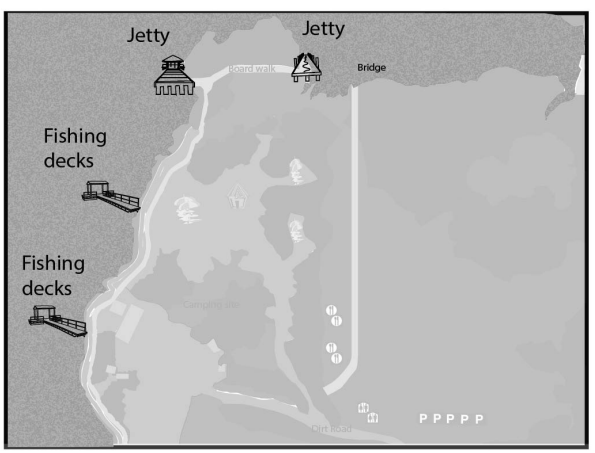
The site plan proposes increased interaction with the water by introducing fishing decks and jettys. A board walk is also proposed. It follows the shore line and delves into wetland areas bringing bird viewers close to the birds.

Shaded areas are introduced to shelter from sun and occasional rain. Food kiosks are located away from the centre to free it up for visitors. Green spaces are added to make the place cooler and less dusty.

The proposed infrastructural developments are based on the planning codes of Kenya as advised by the County planner; no hardscapes are allowed along the water front. He also noted that buildings should be located 30m away from the highest watermark.

Interaction with the Water

Fishing decks and Jettys are therefore the first Structures as you approach the site from the water. The decks are to be shaded due to the high temperatures in Kisumu.



Proposal for increased interaction with the water

The plan proposes two fishing decks in the areas where views are best. The jettys are located close to the place where boats dock.

The aim is to encourage visitors to move right into the water and not just experience it from meters away. The jetty is also to ease the process of getting into and off the boats

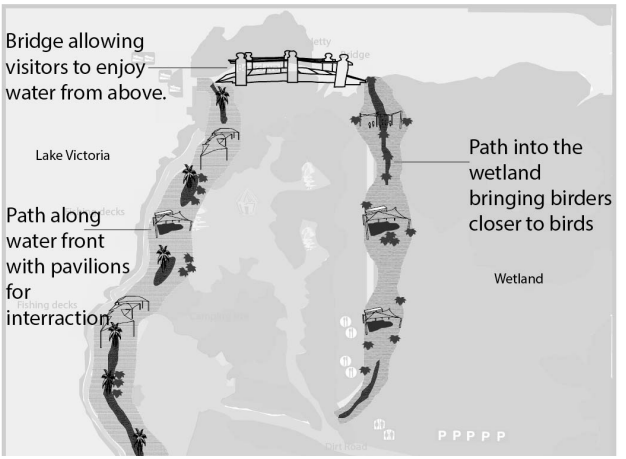
Buffer Zone

The vegetation on the shore line is to be left untouched along the shore for a distance of 1.5 meters. However, a grass lawn of 1.5 meters is proposed after the natural vegetation. This is to create a buffer zone of vegetation along the water while preserving the indigenous species and providing lawns that people can enjoy. This is to be Followed by a 2 meter wide foot path that runs along the shore line.

Proposal for creation of buffer zone

Interactive Foot Path

The foot path is to have pavilions where people can stop and socialize. The design should enable people who are not able to move to the shores an opportunity to enjoy the lake. The path is complete with a bridge which enables one to experience the water from above.

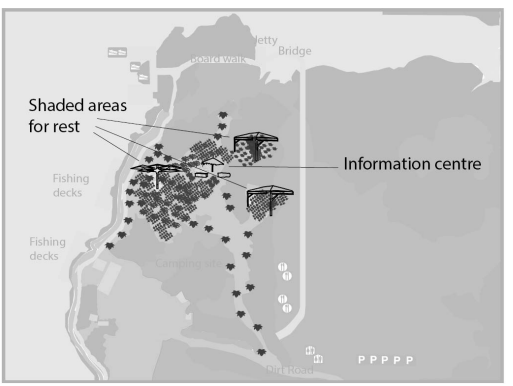


Proposal for interactive path along the water front

The path goes into the mangrove bringing birders close to the bird species that attract them to Hippo point.

Shaded Areas for Rest

In the site plan, the mangrove trees and papyrus vegetation are left untouched and remain as they are. However, the exposed patches are to be provide with shaded areas for rest. The shaded areas should also be able to shelter from rain as Kisumu is accustomed to afternoon thunderstorms.

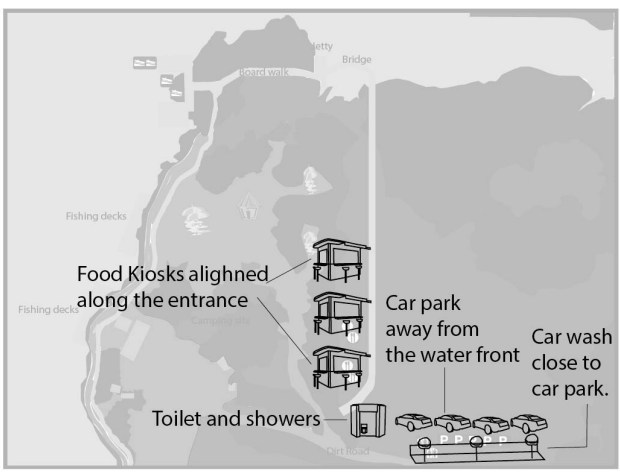


Proposed areas to be shaded for rest

Introducing sitting furniture would make the place inviting for visitors. An information point at the center could serve as a reception for visitors and facility for interactive learning activities e.g. fishing traditions

Built Area

The space along the entrance of Hippo point is proposed for construction of structures to free up the center to visitors. Food kiosks and any other structures would there be found by the entrance. This is to reduce competition for space between visitors and built area.



Proposed location for built up area

The proposal locates the car park before the entrance restricting entry to protect vegetation at the site. A car wash area is also planned for next to the car park to prevent contamination of the water.

The site should have a visible entrance that states what is offered at Hippo Point to attract more visitors. It is also proposed that something is placed in front of the entrance to prevent vehicles from entering the site but still be accessible and welcoming for pedestrians.

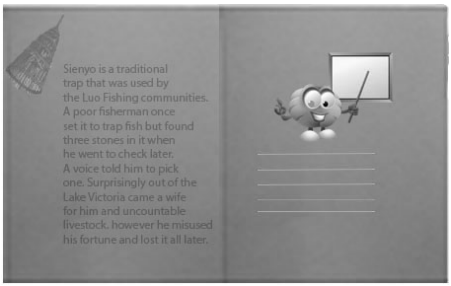
Preservation of Cultural heritage

The rich culture of the fishing community that was captured during the workshop can also be a selling point for Hippo point. Hippo focus is already working on site and can come up with a program of documenting and disseminating the history of fishing community. Some proposals on how this can be done are given in this study.

The members of Hippo focus include basket weavers who use papyrus as a raw material. They can work with the information gathered to design baskets that carry a message as illustrated in the diagram.

Preservation of heritage through everyday functions

The infrastructure of the site can be designed to symbolize heritage e.g. Garbage collectors in the shape of fishing traps. The Collectors could have text explaining about the artifact represented. This could be an interesting way to manage waste at the site.



Disseminating and preserving heritage through book covers

Sail displaying the image of a fish trap from the past

Waste Management System

Waste coming into the site from different sources: visitors and restaurants should be collected in garbage bins. A recycling point is proposed where waste can be sorted. The sorted waste can then be used for bio-gas production or sold to traders of recycled waste. The bio-gas can be used for cooking in the restaurants and residue sold to farmers. The diagram on the next page is an illustration of the proposed waste management system.

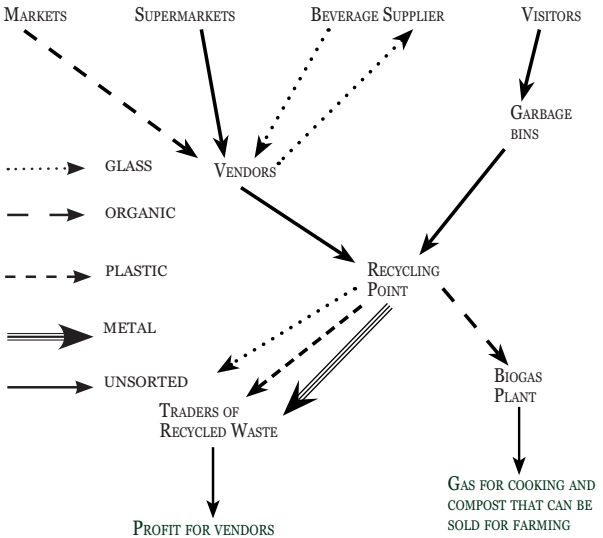


Illustration of the waste management system

Water Management Systems

The project proposes water supply to be from KIWASCO which is the provider for Kisumu's clean treated water. Rain water should also back this supply.

This will be used in the restaurant, toilets and showers. The water will then go through an infiltration bed for purification before being released back into the Lake.

Water for the car wash will be sourced directly from the lake. Once it has been used it will pass through the infiltration bed again before being released into the lake.

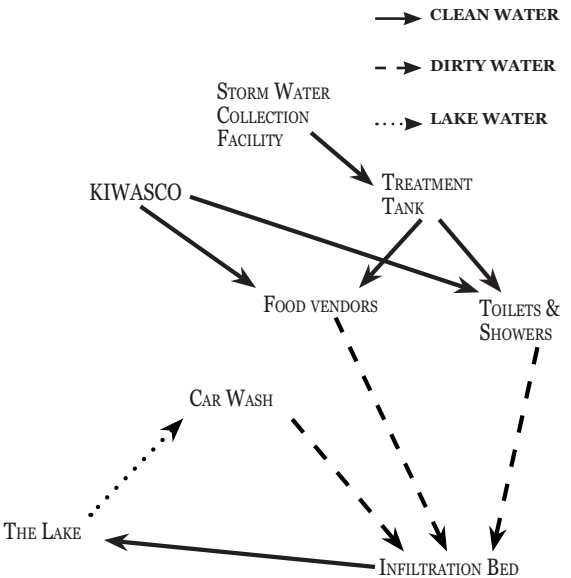
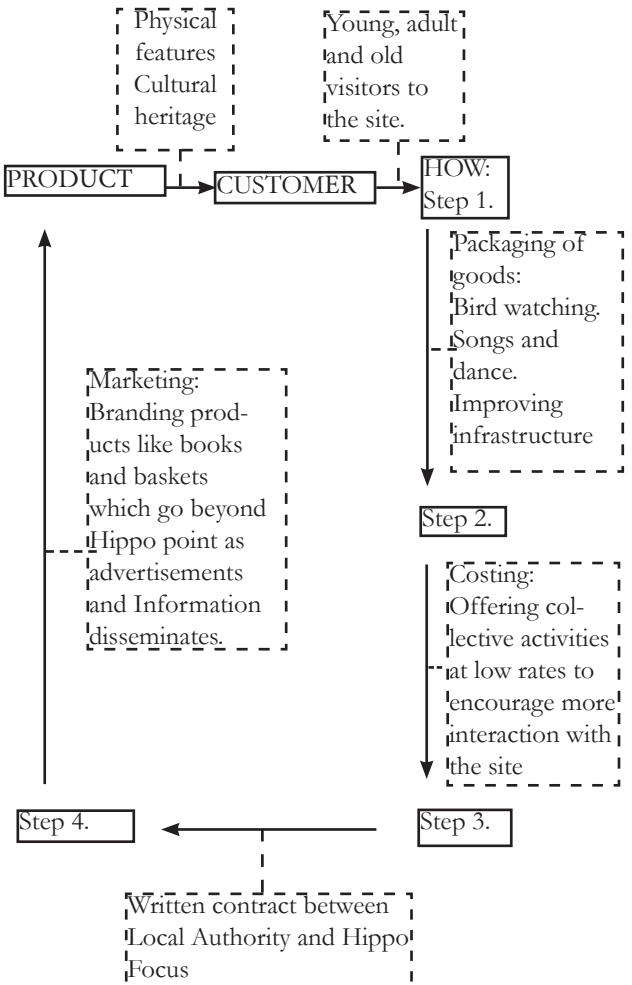


Illustration of the waste management system

Business Model

The business model is a road-map to implementation of the proposals given in the project. In order to arrive at the end results proposed, this model emphasizes three key principles. First is definition of the product, i.e. knowing exactly what out put you want. The next step is identifying the target group so that you can come up with consumable products. The third phase is the production process which deals with the production of goods. Key elements of production in the are: packaging of goods, costing technique, legitimate management and marketing.


Physical features Cultural heritage
Young, adult and old visitors to the site.
PRODUCT
CUSTOMER
HOW: Step 1.
Packaging of goods: Bird watching. Songs and dance. Improving infrastructure
Step 2.
Costing: Offering collective activities at low rates to encourage more interaction with the site
Step 3.
Written contract between Local Authority and Hippo Focus
Step 4.
Marketing: Branding products like books and baskets which go beyond Hippo point as advertisements and Information disseminates.

Conclusion

The function of Hippo Point to Kisumu's Urban fabric can not be overemphasized. The proposals in this project are therefore aimed at reinforcing the presence and importance of Hippo Point. Activities on site have been planned for to ensure optimal use of the 5 acres. Areas popular for resting have thus been reinforced with infrastructure to support this. Activities like car washing by the lake and cooking have been relocated in the proposal. Though important sources of income, they pose a threat to the water quality and aesthetics of the site respectively. Such are the elements captured in the proposed site plan.

Given that the stakeholders already have a desire to develop as a cultural site, this project uses this as a window for creating a niche for Hippo point. Suggestions have been made on how to capture, preserve and disseminate cultural information. This includes branding of goods like baskets with cultural messages that can be passed on to the general public while preserving it at the same time.

Ideas in the proposal have been simplified as much as possible as an attempt to empower key stakeholders in taking action when it comes to managing their local resources. In the case of Hippo point, such an initiative would go along way on improving the both the livelihoods of stakeholders while preserving the environment.

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