

# JAMBI WOMEN





**CHALMERS**  
UNIVERSITY OF TECHNOLOGY



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# ABSTRACT

This report is produced as a result from the course Reality Studio at Chalmers University of Technology. The project process and investigate a way of empower a group of craftswomen in the area Dunga Beach, in Kisumu, Kenya. Half of the paper concerns the outcome from a short field study performed in the concerned area, where data was collected through observations, interviews and workshops. Moreover, relationships between individuals and organizations in Dunga Beach as well as the infrastructural elements of the area was mapped out. The other part of the project was performed by the students in Sweden and Switzerland through different ideation and evaluation methods. The project resulted in a design concept consisting of three main parts: a service design, space design and product design. The products are divided into two categories: the products and dyeing processes of local material. The result of these four areas, the service, space, products and dyeing processes, have been compiled in four manuals directed to the stakeholders. This concept offers a new approach of how to empower the craftswomen in Dunga Beach with a vision that it will strengthen the women's role in society.

# ACKNOWLEDGEMENT

The project group would like to give a warm thanks for all the support and engagement provided during the course to:

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**Zingira Nyanza Community Craft,**  
with a special thanks to Evance Odhiambo, Head of Zingira

**Mentors of Reality Studio 2020,**  
Emilio Da Cruz Brandao, Examiner  
Catarina Östlund, Teacher  
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The students participating in Reality Studio 2020

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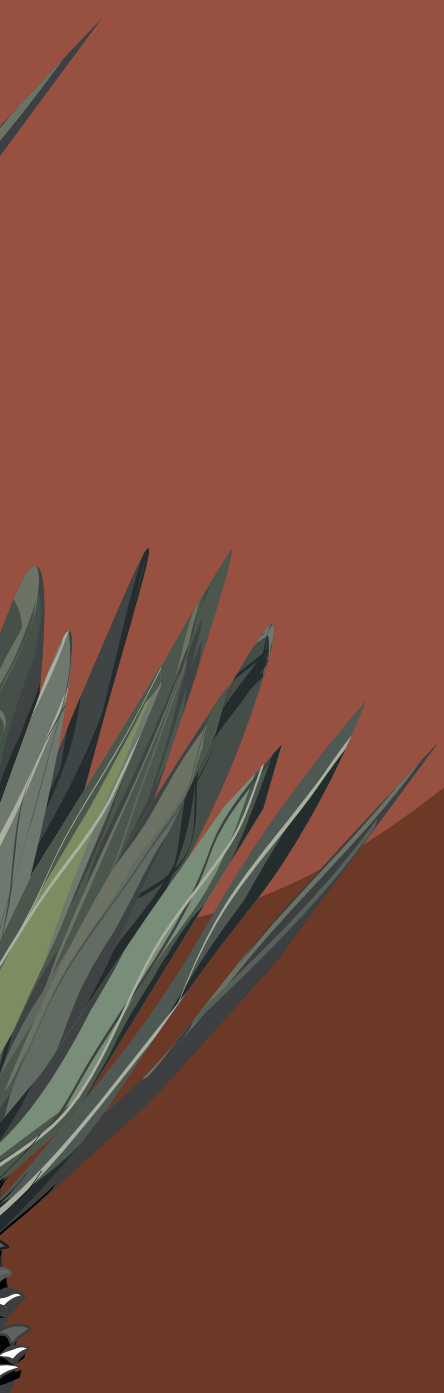
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# 1

# INTRODUCTION



# REALITY STUDIO

Reality Studio is a project course for master students within the master programme Architecture and Planning beyond Sustainability at Chalmers University of Technology. The aim of the course is for the students to experience a new context and culture. The course is conducted in collaboration with stakeholders located in Kisumu and from Kenyatta University, Nairobi. The course comprises 22,5 credits and is conducted from February until June 2020. The project research and field studies in Kenya was this year performed from the 25th of February until 18th of March, one week in Nairobi and two weeks in Kisumu. The visionary and long-term goal of the studio is to increase health and enrich quality of everyday life. The project work is performed in line with UN's 17 global goals and is linear to the climate and development restrictions, known as the Big four of Kenya.

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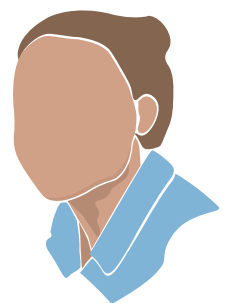
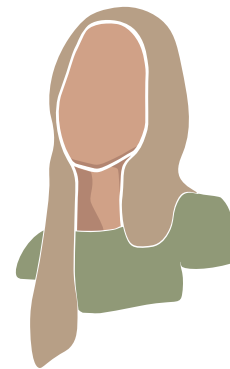
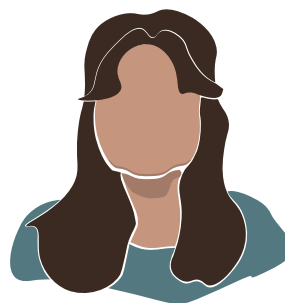
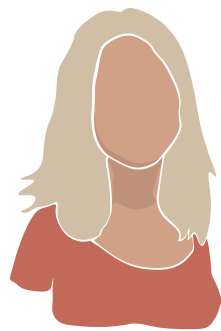
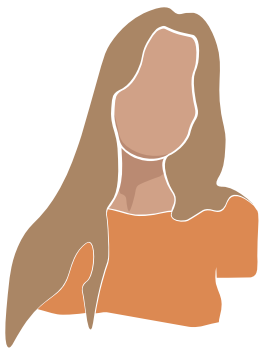
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## OUR PROJECT

This specific project mainly concerns craftswomen who weave papyrus mats in the area of Dunga Beach in Kisumu. The project was founded when the project group was guided into that area and a deeper knowledge of the women's everyday work and situation became clearer. It enlightened the low status of the craftswomen in that society. Furthermore, their current work is not profitable, it is only enough to make it through the day. The situation of the women is very separated from the male populations who own businesses and have less responsibility to take care of the household than women. Therefore, the men have a higher income and a superior status. Gender equality is a matter that is important to the members of the project group and therefore this project was considered inspiring to work with. The project started with the field study in Kisumu and data was collected to be used as foundation for the project. The project group started a collaboration with five craftswomen in Dunga Beach and conducted different activities to gain more knowledge about their current living conditions. Furthermore, relationships with organisations that are invested in women's roles in society were created in order to form a strong group of stakeholders.

The first aim of the project is to empower a group of women who weave products with local materials. The outcome would hopefully incite women to try new things. In time, the growth of businesses owned by women could make the society move into a more equal balance between the genders. A second aim is to teach tourists about crafts and the local heritage of Kisumu and Lake Victoria. Both these aims respond to certain UN sustainable goals which have served as a basis for the project.

The project has resulted in a design concept divided into three parts; the service design, space design and product design, where the service is the core of the project. Furthermore, dyeing of materials have been explored to create uniqueness in the business. In the beginning, the service will be adapted to fit school children that visit Dunga Beach from all over Kenya. It will at this stage include both the education of craftsmanship and the local heritage of Lake Victoria. Later on, the service will be open to other tourists as well and will hopefully lead to the business expanding further. The final result of the design concept is presented in this booklet together with four produced manuals: the service manual, space manual, products manual and dyeing manual.

# LIMITATIONS

The project has been restricted by several elements and adjusted accordingly. The timeframe for the project was 4 months of full time work, including the field study in Kenya. The restrictions due to Covid-19 had a large impact on the project. When leaving Sweden, there were only three confirmed cases of Covid-19 but during the trip the amount increased a lot worldwide and unfortunately, it arrived in Nairobi on the 13th of March. Covid-19 led to schools being closed in Kenya and people social distancing. Since there were no possibilities to go to schools and talk to children, it was more difficult to continue the project overall, the trip got shortened so that only a week's field study could be carried out. This unordinary situation added complexity to the communication within the project and it blocked the possibility to be at the site to do further research and to implement any physical structures. The abrupt ending affected the research and therefore some parts that could have been more detailed now had to be based on assumptions or secondary sources. Furthermore, the communication between the project group and some stakeholders has been limited by language barriers and therefore information may have been interpreted incorrectly at times.

# UN SUSTAINABLE GOALS

The UN sustainable goals that have been taken into account in this project are presented below, as well as a further explanation of their relation to this project. The UN sustainable goals are collected from United Nations (2020).

## Number 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

The project aims to teach the children about physical craftsmanship. By allowing the children to take part in the women's crafts, it could increase the children's learnings in arts and crafts. Furthermore, the project group would like to encourage the women to learn how to use their creativity to expand their craftsmanship.



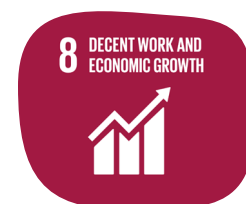
## Number 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

This is closely connected to this project, focusing on empowering the women into having a business and creating decent work, which may generate more jobs in the future.



## Number 5: Achieve gender equality and empower all women and girls.

The project group want to empower the women in Dunga Beach and give them equal opportunities as men within the area and decrease the gap between the groups.



## Number 11: Make cities and human settlements inclusive, safe, resilient and sustainable.

One of the smaller goals of number 11 is to strengthen efforts to protect and safeguard the world's cultural and natural heritage, which is a part of the project, namely, to treasure what Lake Victoria and the local materials bring the people in the area around Dunga Beach.



## Number 12: Ensure sustainable consumption and production patterns.

In the project, the project group will interact with the usage of local natural resources (i.e. water hyacinths, papyrus, sisal) and create knowledge and a way to sustain the crafts with these materials. Creating products from these materials are also a method to impact the sustainable tourism at Dunga and a way of monitoring that. If only local materials are used and the waste is optimized, it will lead to a more sustainable consumption.





# Timeline

10/2 2020

Introduction to Reality Studio in Sweden

SWEDEN

0+

25/2 2020

Went to Nairobi, Kenya

25+

NAIROBI

Field trips together with students from Kenyatta University

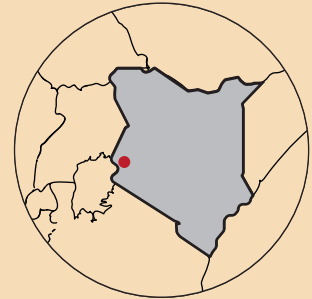


2/3 2020

Went to Kisumu, Kenya

30+

KISUMU



9/3 2020

Started the project, Jambi women

Workshop

Final meeting with the women and WISE

7+

Analysis of the collected material

18/3 2020

Went back early to Gothenburg, Sweden due to the pandemic Covid-19

SWEDEN

8/4 2020

Planned date to end the field study in Kenya

Development of the service

Ideation about the space

Final presentation

Hand-in of report

# 2 PROCESS

# METHODOLOGY

## FIELD STUDY AND RESEARCH

Research in form of different methods has been performed during the first phase of the project in order to create a solid foundation for the design process. It contained one week of field studies in Kisumu, especially in the area of Dunga Beach. Observations, interviews, mapping of stakeholders and movement in the area were made. Furthermore, a map of individuals and organisations active in Dunga Beach was made with the attempt to understand the relations between different actors. To complement the research from the field study, a survey with open questions was sent to teachers in Sweden to gain deeper insight in children's behaviours and interests.

## WORKSHOPS

Three workshops were conducted during the project. The first two were together with the group of women in Kisumu during the field study, and the last one from distance, testing our manual of the products in cooperation with a trainer from the organisation WISE (Women in Sustainable Enterprises). Workshop 1 and 2 with the objective to create relationships between the different stakeholders and the project group. To establish a common understanding of the different roles in the project. Workshop 3 was performed to enhance the collaboration and to initiate more engagement from the group of women.

## EVALUATION

With the research as a foundation, three requirements list, see Appendix 1, and three function analysis, see Appendix 2, of the three main areas, the service, the space and the products, were performed. The lists contained the important elements to consider in each area in order to fulfill the desired outcome. This material is useful both before ideation as a guideline and to evaluate solutions to see if they meet the requirements or not. Furthermore, to identify which location was most appropriate for the design concept to be implemented, a PNI was performed. A SWOT analysis was made to find the positive and negative effects a crowdfunding would have for the project. It clarifies the strengths, opportunities, weaknesses and threats of the activity.

## IDEATION

In the ideation phase several methods were used to find a variety of solutions for both the space and products as well as the relationship between the two. An internet search of already existing solutions was made for inspiration followed by brainstorming, brainwriting and 3-6-5. Since the ideation phase is iterative, this process was looped and improved until a solid result was found.

## EVALUATION AND VERIFICATION OF CONCEPTS

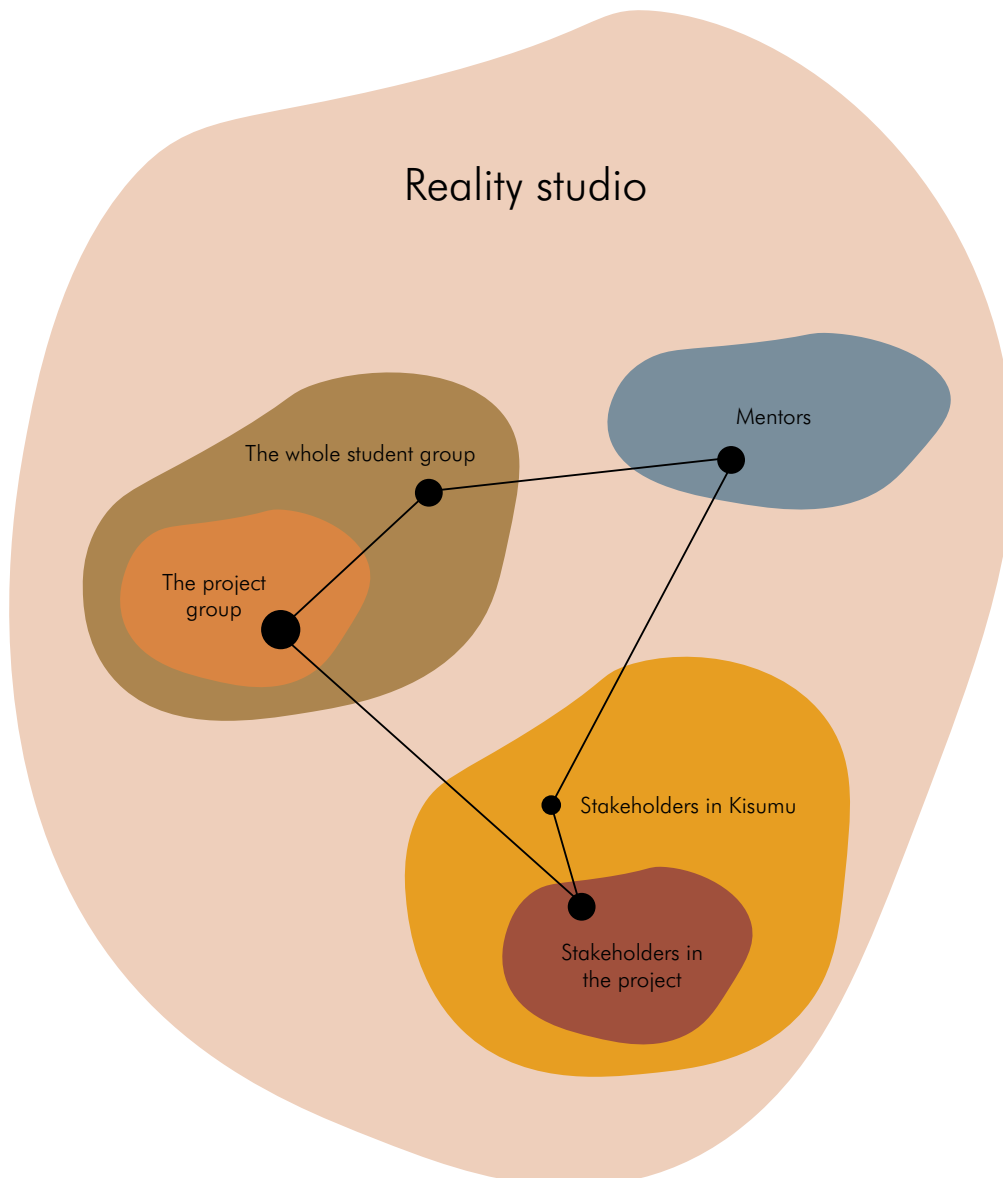
Empirical evaluation with a diagnostic purpose was made in Sweden and Switzerland to verify the usability of the manuals created. It is helpful in order to find problems and errors in the concepts. The test was made in a familiar context and without any time limit. The goal was to detect errors in the product manuals before a similar test was performed in Kenya together with the organisation WISE (Women in Sustainable Enterprises) and the group of women during workshop 3.

# COMMUNICATION

Communication is important for a project to achieve excellent results. It is the key factor for the knowledge of every stakeholder in the project to be transferred and used to create solutions for the addressed problem. Communication is always a challenge and in this project, both multi-disciplinary and multi-cultural collaboration has been performed. The diversity of everyone involved in the project is more time consuming, however, the end results more adapted to fit more complex contexts.

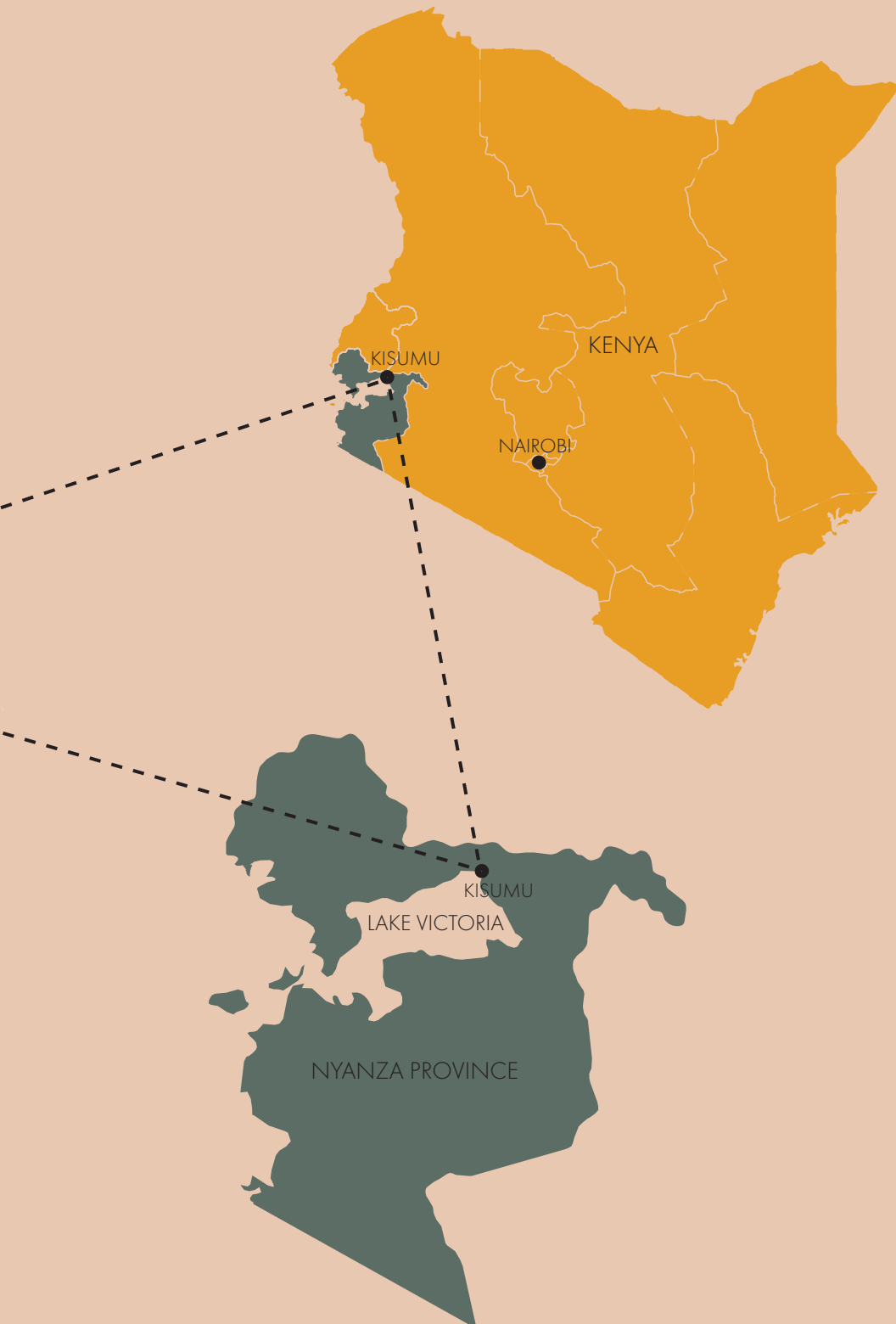
Smeds et al. (2001) explains Lewis model of communication which parts all cultures into three different ways of communicating. They compile that high power distance is related to multi-active communication and that reactive communication coincides with low power distance. Hofstede insights (2020) state that Kenya is a country with high power distance and that Sweden and Switzerland are countries with low power distance. This explains the cultural differences in how we communicate and help the project group to be cautious and aware of these differences when interacting.

Kleinsman and Valkenburg (2008) claim that the understanding in multi-disciplinary teams is challenging due to the member's separate experiences. Furthermore, they highlight the importance of creating a shared understanding and that if this is reached, a multi-disciplinary team can produce high quality solutions. With this in mind, the project group members, with background in different disciplines, shared earlier experiences and knowledge with each other in order to gain common understanding during the whole project.





# 3 CONTEXT



# KENYA

Kenya is situated in East Africa and is one of the three countries that border Lake Victoria (Lake Victoria, n.d.). Informal settlements are inhabited by about 60% of the population (Kenya, n.d.). The Kenyan economy is mainly focused on external trade and state enterprises such as agriculture, forestry, fishing, mining, manufacturing, energy, tourism (Economy of Kenya, n.d.). In 2008, the Kenya Vision 2030 was developed, a structure with an aim to improve the quality of life of Kenyan people by 2030. This goal separates into three different pillars: economic, social and political. Since 2018, some key aspects and directions that the vision encompasses are universal healthcare, manufacturing, affordable housing and food security (also known as The Big Four). As well as these conditions, there is also a demand to reform tourism, because it is the second biggest source of foreign revenue after agriculture (Kenya, n.d.).

In Kenya, the impressive wildlife and breathtaking landscapes seem to have attracted a rise in ecotourism. So much so in fact, that these attractions are now financially sustained by tourists, causing changes in the lifestyles of the locals. Following this rise in popularity are many different positive and negative impacts. On one side, the economy is boosted as a result of the new job opportunities created such as tour guiding, craft making, different food services and cultural performances. Hotels and lodges are becoming more environmentally conscious to attract ecotourist, locals are caring more about the preservation of the environment. Furthermore, the government is investing more money in the construction of hospitals, clean water sources, electricity, roads which boosts the quality of life of the local people. On another hand, there is a large amount of deforestation linked to the creation of wildlife areas and accommodation. The increased amount of traffic contributes to climate change and sometimes waste pollutes different areas. The impact of ecotourism has to stay reduced in order to be sustainable and there is still room for improvement in many different aspects (Tourism in Kenya, n.d.).

Another worrying development is that the country has suffered from unprecedented flooding due to the extended and more intense rainy season. Residents call them the worst floods ever experienced in the region in many years, and they are now afraid that things could get worse, as heavy rains continue pounding the region and the backflow in Lake Victoria increases (Raballa & Ojina, 2020)

# KISUMU

Kisumu is the third largest city in Kenya, after the capital Nairobi and the coastal city Mombasa. Kisumu has around 720'000 inhabitants and is located next to the northeastern shore of Lake Victoria. It is an important port for transportation of goods and the source of a large fishing industry. However, in recent times the levels of pollution in the lake, the invasion of water hyacinths and the tendency to overfish are reducing the capital that this activity should be bringing. More urgently, recently, an estimated 32,000 people have been displaced by flash floods in various parts of Kisumu, according to estimates by the county government (Kisumu, n.d.)

# LAKE VICTORIA

Lake Victoria is located next to the countries Kenya, Tanzania and Uganda and is the second largest freshwater lake in the world. Due to a fast increasing population, a highly expanding fish industry and many other reasons, Lake Victoria's ecological health has been influenced and changed (Global Nature Fund, n.d.). These changes have led to multiple environmental problems connected to the lake and the wildlife (Lake Victoria, 2017). To mention some of them, animal species have disappeared, there has been fish and water hyacinth invasions, overharvesting and pollution of the lake (Lake Victoria, 2017). These issues have a damaging effect on the ecology, the biodiversity of the lake and decrease the amount of available fish. Lake Victoria has great importance for a huge amount of people living in the surrounding environment (New World Encyclopedia, 2020) as it is a densely populated area, and these issues are therefore affecting a lot of people. Furthermore, the lake is used as a transport way that connects the states of East Africa. In addition to this, it supplies water to industries, balances the climate and is a basin for hydropower stations (Miriti, n.d.).



ZINGIRA

KIBUYE  
MARKET

SOOPER  
GUEST HOUSE

LAKE VICTORIA

WETLAND

DUNGA  
BEACH

SCALE 1:30 000

# DUNGA BEACH

Dunga Beach is located next to Lake Victoria, around 8 km to the south of Kisumu city centre. Most of the shoreline consists of a wetland area where papyrus reeds grow. A wetland is a place flooded by water and functioning as its own distinct ecosystem (Keddy, 2010). Dunga was first inhabited due to the business opportunities connected to the fishing from Lake Victoria. As a result of a decreasing number of fish in the lake and competitive market with imported Chinese fish (Dijkstra, 2019), there have been demands to find new livelihoods. The area with its rich biodiversity and lake view attracts tourists. There have even been efforts by the government of Kisumu to ensure the conservation of the ecosystem at Dunga Beach and Wetland. A focus on ecotourism has been initiated and attractions for tourism are increasing at the site. Services such as guided tours, boat rides, tasting fresh fish, watching hippos, birds and other wildlife are offered. The area around the beach accommodates small shops, restaurants and other businesses (Country Government of Kisumu, 2020).

In 2016, a timber boardwalk was built on top of the wetland by a team of volunteers. The boardwalk includes a viewpoint, a reception and a small museum. In the museum products and crafts made of local materials are displayed as well as information of the local history and traditions around the Lake Victoria area (I am Kisumu, 2019).

## ORGANIZATIONS

In the report Exploring Pitfalls of Participation, it is presented that a large number of organizations and community groups, both community-based and informal, are operating in the Dunga Beach area (Kraff, 2018). This is in line with what the project group experienced when conducting the field study. Following organizations were identified as relevant in this project.

### **DECCTA**

The guide organization, Dunga Environmental and Eco-Tourism Team, was established in 2003 with the focus area to create guided tours within the theme ecotourism.

### **DWIT**

In 2016 a group of women formed their own organization, called Dunga Women in Tourism. The organization had slow progress and was hard to maintain. It collapsed in 2018.

### **Kenya Lake Victoria Waterkeeper**

The organization is a part of Ecofinder Kenya and was established with the purpose to promote the conservation of Lake Victoria and its wetlands.

### **BMU**

The governmentally formed Dunga Beach Management Unit is in charge of organizing the business in the beach area.

### **Ecofinder Kenya**

The community-based organization Ecofinder Kenya was founded in 1995. Their interventions include research and monitoring to enable sustainable communities around Lake Victoria.

### **WISE**

Women in Sustainable Enterprises, is a community based organization focusing on entrepreneurship for women and girls in the area around Lake Victoria.



COMMUNITY HALL

WISE

PEDAGOGICAL CENTRE  
ECOFINDER

BMU

BOARDWALK  
DECTTA



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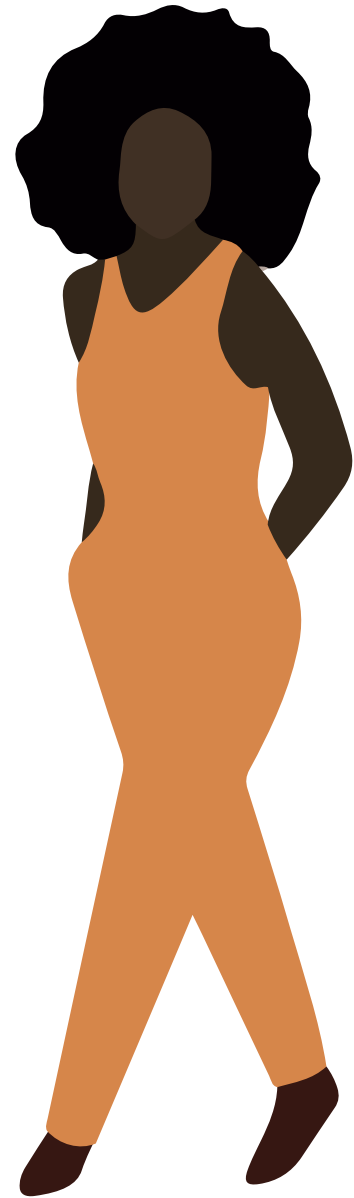


# 4 BACKGROUND



# ROLE OF WOMEN

Major actions to build institutions and policies to promote gender equality have arisen during the latest years in Kenya. A Plan of Action to implement the National Policy on Gender and Development was launched in 2008. Improvement has been noticed for instance in schooling, where gender parity is achieved in primary education enrollment and close to achieved in secondary education enrolment. The progress is not as successful for grown-up women. The impact of legal and policy frameworks on their lives has been undermined by weak implementation and lack of gender-responsive budgeting (Equal Measures 2030, 2018.). The social norm that makes the women responsible for household chores limits their work options. Women remain underrepresented in leadership positions and well-paid jobs even though they are qualified (Oxfam, 2020). Furthermore, women's empowerment is hindered by traditional discrimination and cultural norms such as early and forced marriage, polygamy, female genital mutilation and lack of access to finance. More than 80% of the women in Kenya are engaged in small-scale agriculture and farming, but only 1% own land and very few women are given the opportunity to take agricultural loans (UN Women, 2020).



# CHILDREN'S EDUCATION

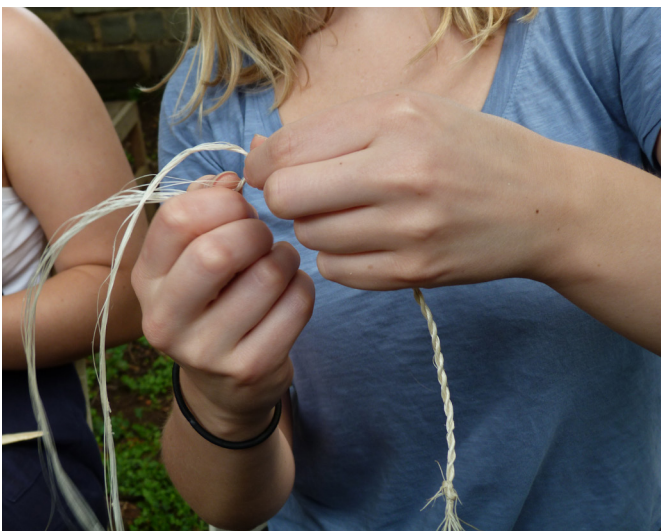
In the year 2003, the curriculum in the Kenyan education system was revised with the aim to decrease the workload of the pupils and teachers. The actions that were taken included, among others, that art and craft subjects were taken away from the curriculum (UNESCO-IBE, 2010). While being in Kisumu, many teachers and locals empathized that due to the revised curriculum, the children today do not learn much practical or creative skills. The education is more focused on learning theoretical skills such as literacy and numeracy. After years of academic studies, the children and their families have the belief that the children will end up working as e.g. a doctor, architect or engineer, namely working with white or blue collar jobs (Wagner, 2018). Yet, due to the lack of job force within the country, many children end up working with a practical occupation after they have graduated instead. This, without any knowledge or previous educational experience within the area.



# CRAFTSMANSHIP IN KENYA & KISUMU

In Kenya, the group witnessed many ways of craftsmanship. At the Bone Market in Nairobi, some men made pieces of jewellery and decorations, while others made bowls and cutlery out of wood with details made out of animal bones. At Kitengela glass in Nairobi, they use old glass bottles to make new beautiful artefacts. Further, at Kazuri, women make pearls out of clay which they hand paint and make jewellery of.

Kibuye is the biggest market in the area of Kisumu. Here the Jua Kali, which in Swahili means “fierce sun” and refers to getting things done regardless of constraints, such as working under the hot sun (Wiens, 2018), make crafts with limited resources, material and money. In the Dunga Beach area, crafts are made out of water hyacinths, papyrus and the sisal fibre.



# LOCAL MATERIALS

The local materials that the project group has explored are water hyacinths, papyrus and sisal. These are the most commonly used local materials to make crafts out of in Kisumu. The three materials are very different in texture which is advantageous for making many different kinds of crafts. Moreover, papyrus and sisal are a good complement to work with water hyacinths, that are time dependent for harvesting. Papyrus and sisal are available for harvesting all year around, while water hyacinth only grows seasonally. By working with all three materials, there will always be resources to work with.



## WATER HYACINTHS

One of the fastest growing plants in Lake Victoria are the water hyacinths. Water hyacinths live in freshwater and grow and spread rapidly (Lake Victoria, 2017). Water hyacinths bloom all year round in warm climates (Sharpe, 2017). Since the water hyacinths in Lake Victoria float around in the lake tides, harvesting can only take place in late March to late August before it moves to the south. It is an invasive plant to Lake Victoria that threatens its ecology as it has an ability to create mats on top of the water that block out the sunlight (New World Encyclopedia, 2020). The plant has caused a decreasing amount of fish in the lake, since it has deoxygenated the water and interrupted the flow of water. In the 1990s, it also made it difficult for the fishermen and other transportation to go through the lake as it covered extensive parts (Global Nature Fund, n.d.). However, the water hyacinths has interesting prerequisites and can be used for many different purposes. For example, it is used as biogas (Nakweya, 2020), rope, baskets and mats (Otieno, 2019).

## PAPYRUS

Another plant growing in Lake Victoria and many other wetlands in tropical Africa is papyrus. Papyrus looks like grass and has stems with a triangular shape that are similar to wood. The stem can become 6 centimetres wide and the plant can be as high as 4.5 metres, see the picture on the side. The plant can be harvested all year around in Kisumu and are usually dried before usage. Common usage for papyrus is as decoration in warm countries (The Editors of Encyclopaedia Britannica, 2020). In the ancient days, it was used as paper for writing. Moreover, it can be used for mats, baskets, sandals and ropes (Papyrus, 2020).



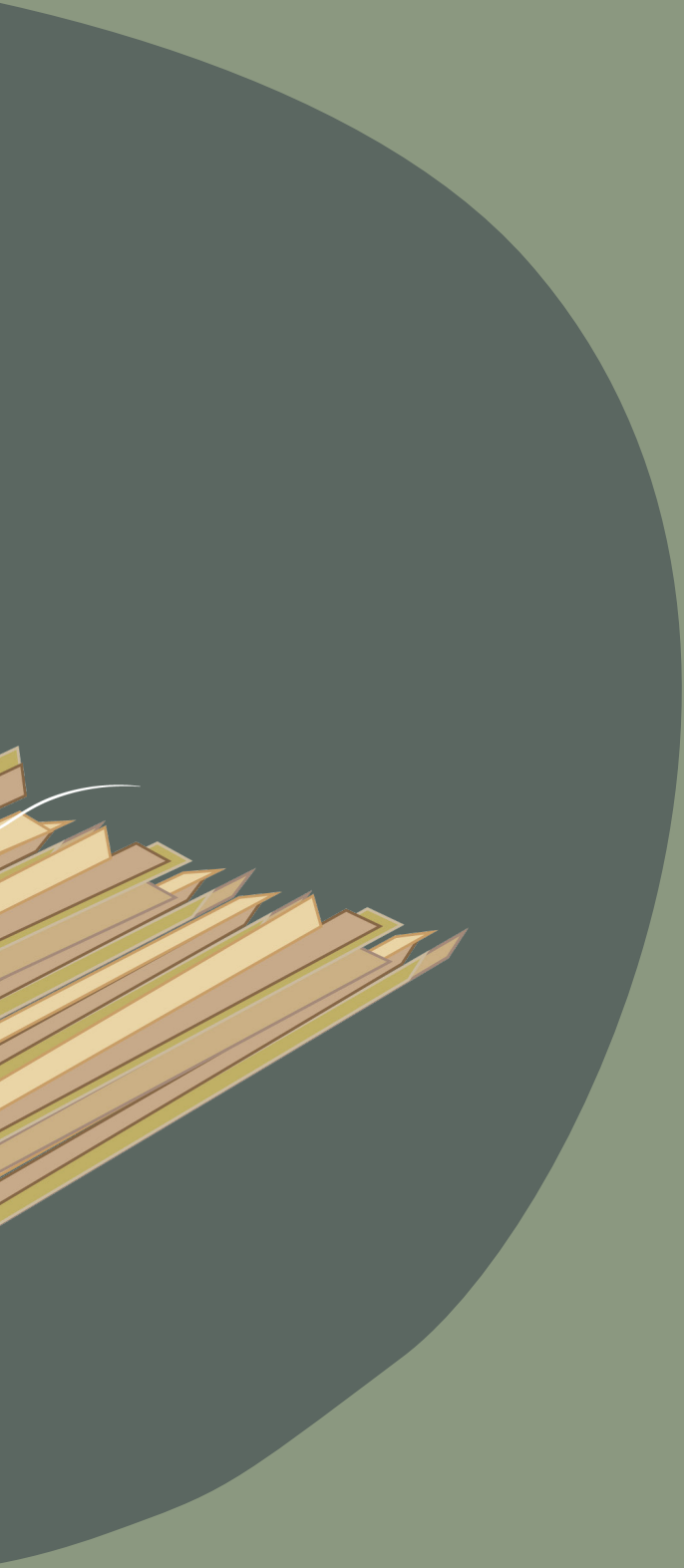
## SISAL

Sisal is a plant with lance-shaped leaves growing in soil and warm humid weather. The plant usually becomes 90 centimetres high and has a diameter of around 38 centimetres. When the plant is fully grown, the leaves are cut off and at first harvest, approximately 70 leaves can be cut off. The following year there are around 25 leaves for harvesting. Harvesting can be executed all year around in Kisumu. The sisal fibre is created from the leaves, usually, by using a machine with rollers to crush the leaves. The next step is to clean and dry the sisal fibre, naturally or with a machine. The produced fibre is around 100-125 centimetres long. Sisal fibre is well known for being strong, durable, saltwater resistant and stretchy (The Editors of Encyclopaedia Britannica, 2020). The plant is used for ropes, baskets, firewood, mats, furniture, paper, car bodies and clothes (Sawa, 2014).





# 5 NETWORK



# STAKEHOLDERS

When visiting Dunga Beach, observations and interactions with the locals enlightened the project group that many of the organizations in the area are governed by males. In several interviews, it was expressed that many organizations around the area have tried to include women in their work, but it has never been successful. There have been female tour guides working at the boardwalk but there are none nowadays. When talking to Caroline Odera, head of WISE (Women in Sustainable Enterprises) located in Dunga, she pointed towards that the reason for this was because the women never feel fully part of the business. Furthermore, Caroline stated that in order to succeed with the inclusion of women, they needed to be in charge of their own business. However, it is often hard for women to manage a business since the social norm in Kenya is that women are responsible for the household chores, which in turn limits their options to work on their own (Oxfam, 2020).

With the help of one of the mentors in the course, Evance Odhiambo, the group came in contact with five women who weave papyrus mats for a living in Dunga Beach. The collaboration began during a workshop at one of the women's land in Dunga Beach. The purpose of workshop 1 was to create relationships between the women and the project group. It was also, for the project group to understand the current work and crafts that the women practice. The women who participated was Rebecca, Mary, Margaret, Ann and Dianah. Some of the women have previously been involved in tourism in Dunga but have stopped due to the reasons provided above. Further, Margret and Rebecca have participated in a training held at Zingira Community Craft lead by Evance, on how to make products out of water hyacinths. They were trained on how to use this material to create a business, on entrepreneurship and how they could display products efficiently. Yet, today both Margret and Rebecca still makes mostly papyrus mats since that assures a better living.

At the moment, the women all work independently at their homes. They sell their mats to a distributor for a very low price, who in turn sells them at a higher price at Kibuye Market inside of Kisumu city centre. This means that the profit for the women after having made and sold the mats is incredibly low. The women lack possibilities to display and sell their work on their own, as well as knowledge on how to create an efficient business where they can collaborate and exchange knowledge with each other. This made the project group positive towards involving these women in the project, mainly to empower them within a business, but also to due to them being positive towards working with new materials and techniques. Moreover, the women were open to teach children about crafts and their local heritage.

To form a collaboration, the project group arranged a second workshop before leaving Kisumu. The intent was to find strong stakeholders and to decide each individual's role in the project. Caroline offered to help through WISE with education for the women in business, entrepreneurship and economic development, and Evance offered to take on a role as a facilitator. The group of the five women is the one that will perform and own the service. Therefore, the five women, Evance and Caroline formed the group of stakeholders for this project. In the following paragraphs, each stakeholder is described more thoroughly.





### REBECCA ACHIENG

Rebecca is one of the women making papyrus mats for a living. She deposits her papyrus against a large tree next to her house once it has been collected and dried. Rebecca owns her own land. She used to own a larger one, but when her husband died, her male relatives sold a large part of it, leaving her only with a modest area, just enough for her house and a small-scale backyard. Her property is located next to the main road to Dunga, only about 200 meters from the beach. The land lies close to Lake Victoria and when there is heavy rain, it is at high risk of flooding.



### MARY ADHIAMBO

Mary lives with her husband and her children near Rebecca's house. She mostly makes papyrus mats and her husband makes the spears they use to weave the sisal rope between the papyrus. They rent their place and are in good contact with their landlord. In the backyard of their home, there is a significant open space.



### MARGARET ANYORTGO

Margaret has been making the papyrus mats for a living for a long time. She lives on the opposite side of the road next to Rebecca's house. Close to her house, there is an open field where she commonly dries the papyrus. During the night, she stores the large bundles of papyrus inside her home. For a while, Margaret was also the treasurer of DWIT when it was still up and running.



### ANN ACHIENG

Ann also makes papyrus mats for a living and her household is close to Rebecca's, but further away from the main road.



### DIANAH AKINY

Dianah is Rebecca's neighbour. She has recently graduated from high school and speaks English well, unlike the other women. Dianah also has knowledge in making the papyrus mats since she was raised observing it.



### CAROLINE ODERA

Caroline, or Carol, is the head of WISE. The organization educates and provides tools within sustainable enterprises and leadership to strengthen women's role in society. The mission is to empower women and girls to engage in sustainable business, entrepreneurship and economic development. Earlier, WISE had its office in the Pedagogical Center in Dunga, they recently moved to a building close by. Apart from Carol, there are a few trainees working alongside her, in charge of different areas within WISE's activity.



### EVANCE ODHIAMBO

Evance is the founder of Zingira Community Craft. The organization has its base in Kisumu city centre. The ambition is for Zingira to work as a centre of innovations; creating crafts, supplying training and developing new business ideas. Evance has been involved in the Reality Studio for many years as a supervisor who supports the connection and communication between students and local actors in Kenya.



# INFRASTRUCTURE

In order to understand the context which affects all the stakeholders and the project in a whole, the infrastructure of Dunga Beach is important to understand and map out. The infrastructural basic elements were analysed and created a frame for how the project has developed. Furthermore, the construction of the infrastructure is the main component that governs all movement and flow of the area. The components are roads, buildings, distances, already existing businesses and access to necessary resources. Further, relationships between both organizations and individuals has been mapped out, see Appendix 3, and considered to understand the social dynamics in the area.

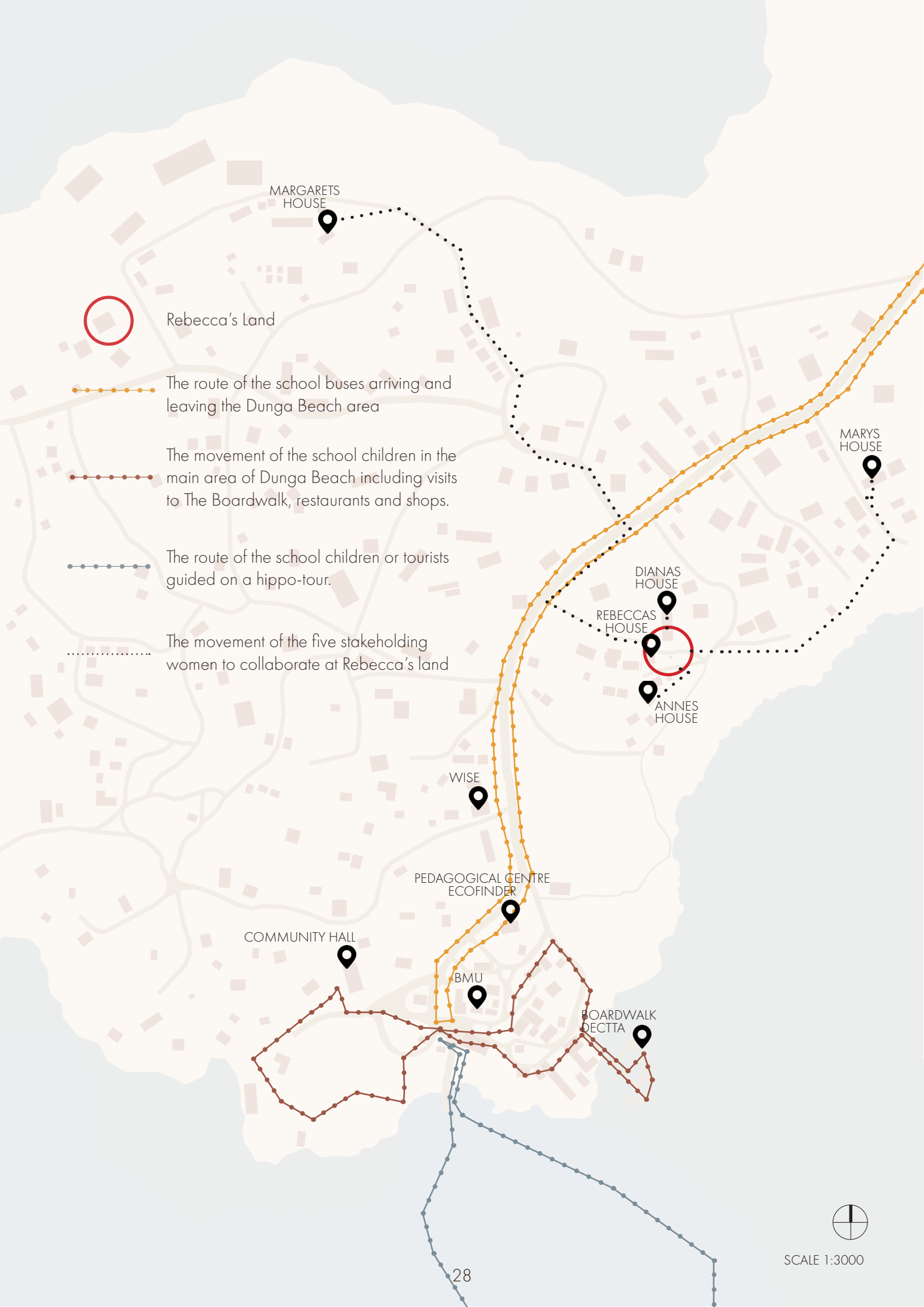
## THE SITE

Research, observations and basic exploration of the infrastructure provided us with a few options of where to locate the site of the design concept. Appropriate places was in the center of Dunga Beach, at the stakeholder Rebecca's own land or at a land next to the stakeholder Mary's house. A PNI, see table below, was conducted in order to understand the positive, negative and interesting aspects of the three options. This resulted in the choice of site to be Rebecca's land since it can be used without any payments for rent. Further, it is reasonable distance for all the women in the group to travel and not located far from the center of Dunga Beach. Furthermore, this distance from the centre makes the site serene and more relaxed for the visitors to take part of workshops.

PNI	Positive	Negative	Interesting
Center of Dunga Beach	<ul style="list-style-type: none"> <li>- central</li> <li>- a lot of people in movement</li> <li>- close to everything</li> </ul>	<ul style="list-style-type: none"> <li>- needs to rent land = costs</li> <li>- a lot of noise and distractions</li> </ul>	<ul style="list-style-type: none"> <li>- If a cooperation with already existing business could be possible</li> </ul>
Rebecca's land	<ul style="list-style-type: none"> <li>- stakeholder owns the land = free</li> <li>- quiet and calm</li> <li>- close for all women to travel</li> </ul>	<ul style="list-style-type: none"> <li>- small land</li> <li>- risk for flooding</li> <li>- located away from the center</li> </ul>	<ul style="list-style-type: none"> <li>- how current land can be transformed and useful in new ways</li> <li>- freedom of owning the land</li> </ul>
Next to Mary's land	<ul style="list-style-type: none"> <li>- nice spot with lots of greenery and shade</li> <li>- lots of space</li> </ul>	<ul style="list-style-type: none"> <li>- needs to rent land = costs</li> <li>- risk for flooding</li> <li>- located away from the center</li> </ul>	<ul style="list-style-type: none"> <li>- how the already nice surroundings can be used in the design concept</li> </ul>

## MOVEMENT AND TARGET GROUP

To understand the movement and flow of the area in relation to Rebecca's land, a map over the area was conducted and the most interesting locations pointed out. It provides an overview of the movement of the main focus groups: the school buses with children and the group of women. The project groups observations and interviews showed that Dunga Beach is a common place for schools to visit from all over Kenya and that they are the main tourist group. Especially on Fridays and weekends, the area is crowded with school buses and students of all ages, from primary school to university. Therefore, school children are the choice of main target group in this project, due to their regular movement and visits. A continuous movement of the target group is crucial in order to create a stable business. Furthermore, they visit with a predetermined amount of time and move in large groups which is suitable when conducting an activity. This makes it easy to organize group activities for the children. Learning elements at school trips are appreciated by the teachers and might attract more schools. The survey indicates that children enjoy interactive and practical learning, which also eases their concentration and learning process. A service offering practical education about the local context and materials could strengthen the ecotourism focus at Dunga Beach which also could attract more school classes to visit the site. Also, worth mentioning is that the area is visited by an increasing number of researchers, families and international tourists which are possible future target groups.



MARGARETS HOUSE

Rebecca's Land



The route of the school buses arriving and leaving the Dunga Beach area



The movement of the school children in the main area of Dunga Beach including visits to The Boardwalk, restaurants and shops.



The route of the school children or tourists guided on a hippo-tour.



The movement of the five stakeholding women to collaborate at Rebecca's land

MARYS HOUSE

DIANAS HOUSE

REBECCAS HOUSE

ANNES HOUSE

WISE

PEDAGOGICAL CENTRE ECOFINDER

COMMUNITY HALL

BMU

BOARDWALK DECTTA



SCALE 1:3000

# EXTERNAL AND INTERNAL COMMUNICATION

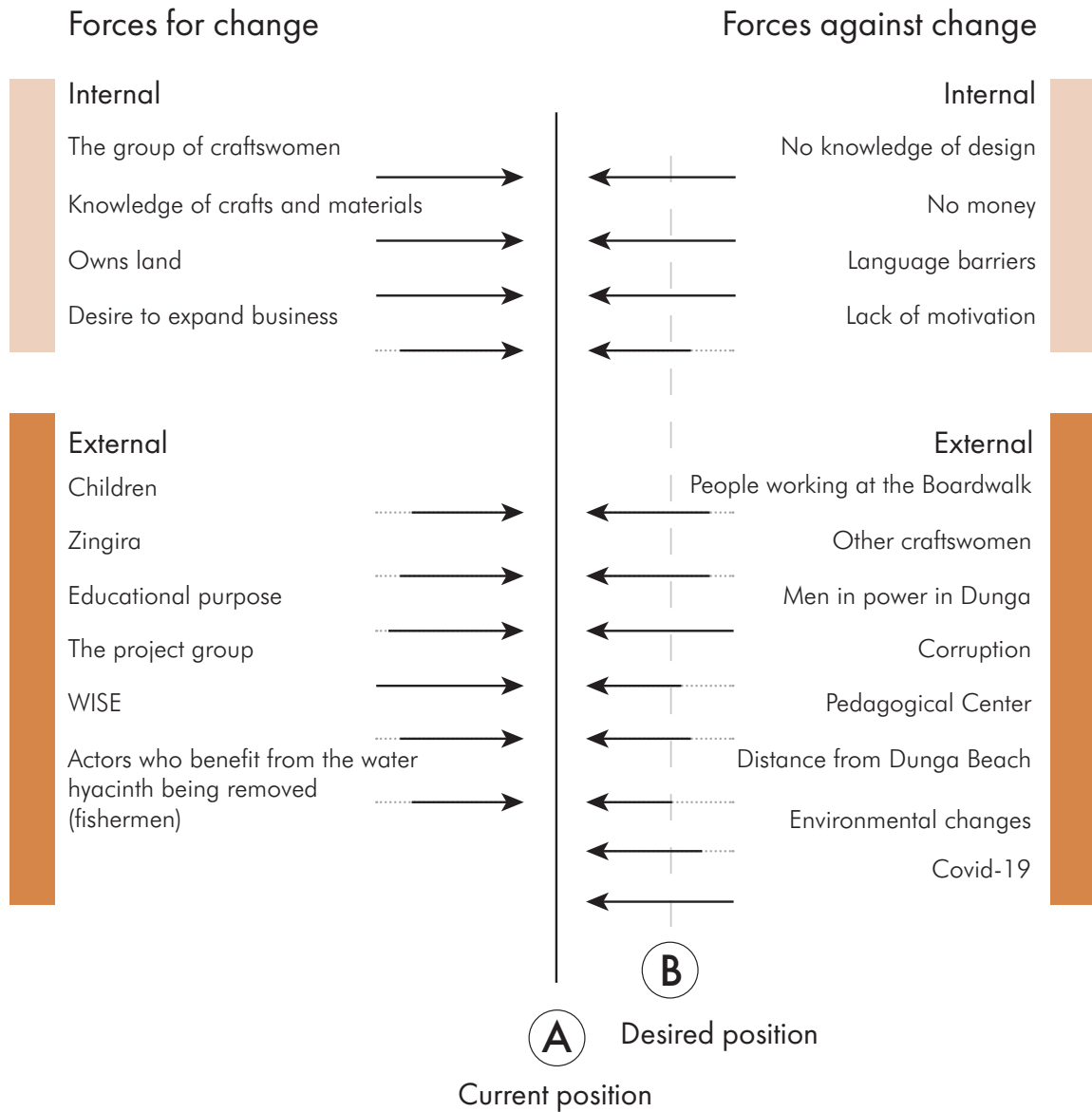
In this project both direct and indirect communication within the project group and with the stakeholders have been performed. Direct communication is good because it is very straightforward and open, however, indirect communication is as important in order to understand the body language and actions of one another. In the first part of the project, the communication between the project group and the group of women was easier since everyone could meet and interact. However, the restrictions made due to Covid-19 affected the later parts of the communication and the project mostly relied on the direct communication via online media such as Zoom, WhatsApp and Messenger. This distance in combination with language barriers created misunderstandings. So, the external environmental changes had a lot of impact on the communication between all actors of the project.

The project group noticed that the communication was interrupted by the external changes and took action to prevent confusion. Clarification of our objectives and limits for this project was communicated carefully to the stakeholders in the project. Furthermore, the external factors divided the project group into different locations and measurements had to be taken. The interaction became harder but to keep the internal communication clear, Zoom was used as well as a common platform to share the work of each individual.



# FORCE FIELD DIAGRAM

To identify elements affecting the project before entering the ideation phase, a force field diagram was conducted. The force field diagram shows what actors or other forces influence the project and if it is for or against change, which in this case is to start a business. The diagram is also divided into internal and external forces.



The forces for change are strong as the group of craftswomen themselves have a strong connection and a lot of knowledge about the local material and crafts. They also have a landmark that can be used for a common business. Externally, there are many forces for change and some of them are WISE, this project group and an educational purpose. Besides these positive forces, there are forces against change. The goal is to reach the desired position B, by reducing the affection of the forces against change. Internally, there are some forces against change that needs to be reduced; no knowledge of design, no money and language barriers.

The external force against change that is most critical and can be changed is "men in power in Dunga Beach". To reduce the power of men in Dunga Beach, the project is directed to empower women and create a business that increases their income. By doing so, women will get a more equal role in the society and the amount of males with high influence will be reduced towards the desired position. Moreover, by collaborating with WISE, women can inspire each other to be confident and use the collective power to create a change.



# 6 DESIGN CONCEPT



# THE CONCEPT

This chapter presents the result of the project in form of a design concept. Ideation in different forms, evaluation and iteration was performed to reach the final design concept. The concept is divided into three parts: the service design, space design and product design, which also include the process of dyeing materials. The service design is the core of the project and consists of the service itself, the space and the products. As a result of the project, four manuals have been produced to guide the women step by step to reach different levels of the design concept. The manuals contain steps about the service design, space design, the product design and dyeing processes, which will be explained later in this chapter. For the women to deeply understand the service manual, support from WISE will be needed. This due to the large amount of english text necessary to explain the service properly. The space manual can be understood with assistance from a constructor, who can describe the process from the illustrations given. The product and dyeing manual are adapted to a large variety of readers and are not only dependent on knowledge of the language since a lot of illustrations are being used.

## INTERCONNECTIONS BETWEEN THE PROJECT PARTS

All parts in the project are interconnected and affects one another. The infrastructure is the foundation and includes the prerequisites necessary to consider in the other parts. The illustration above, shows how the parts are associated to each other. The service is constructed after the requirements from the infrastructure and withholds new restrictions for the parts within it: the space, the products and the dyeing. The space and the products are closely related and are designed to work both in the context of the service and infrastructure. The dyeing is part of both the products and the space. All the parts are interactive and a change in one will affect the other parts in some way since the parts are dynamic and consists of a complex constellation.

INFRASTRUCTURE

SERVICE

PRODUCTS

SPACE

DYEING

MANUALS

• SERVICE MANUAL

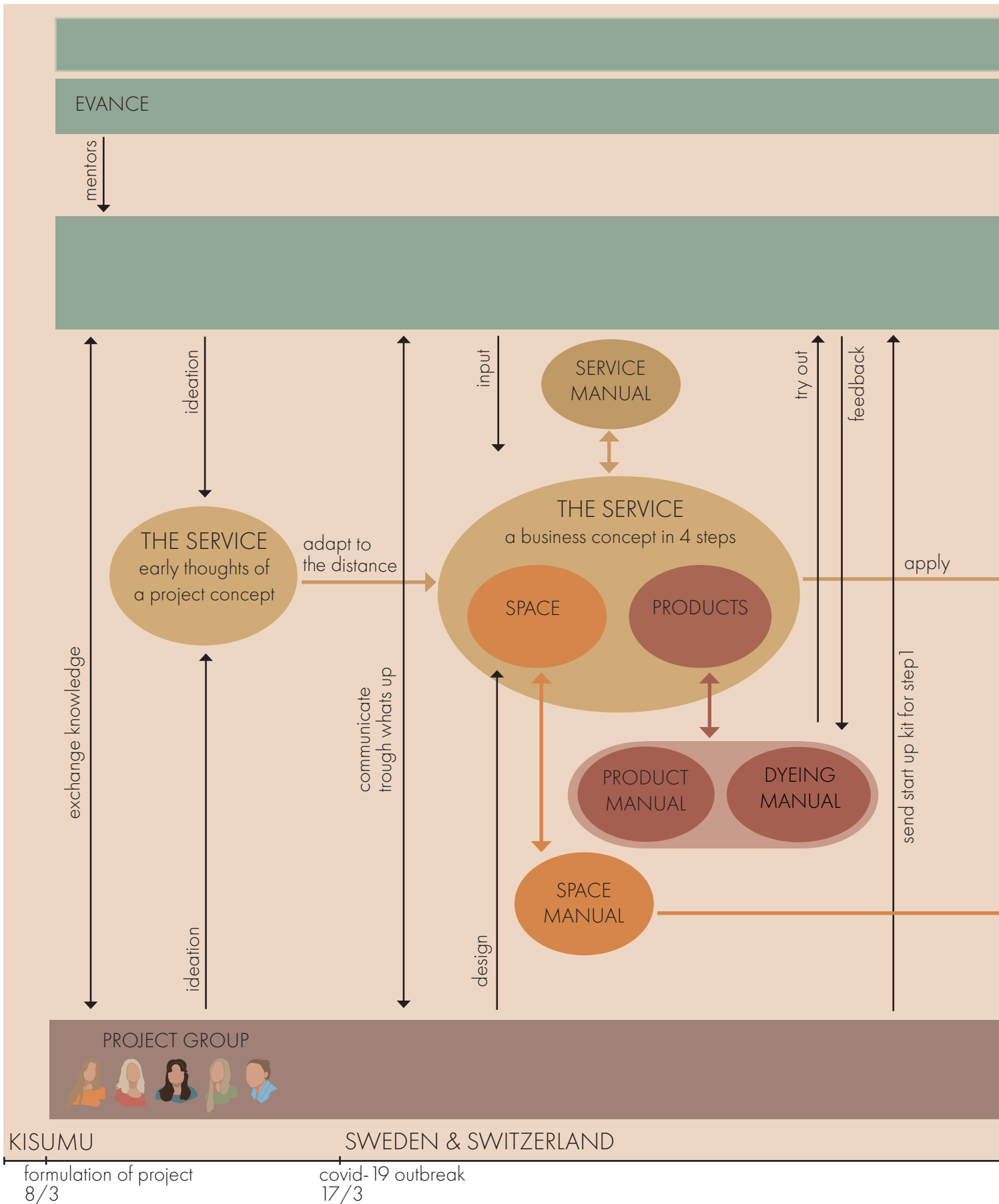
• SPACE MANUAL

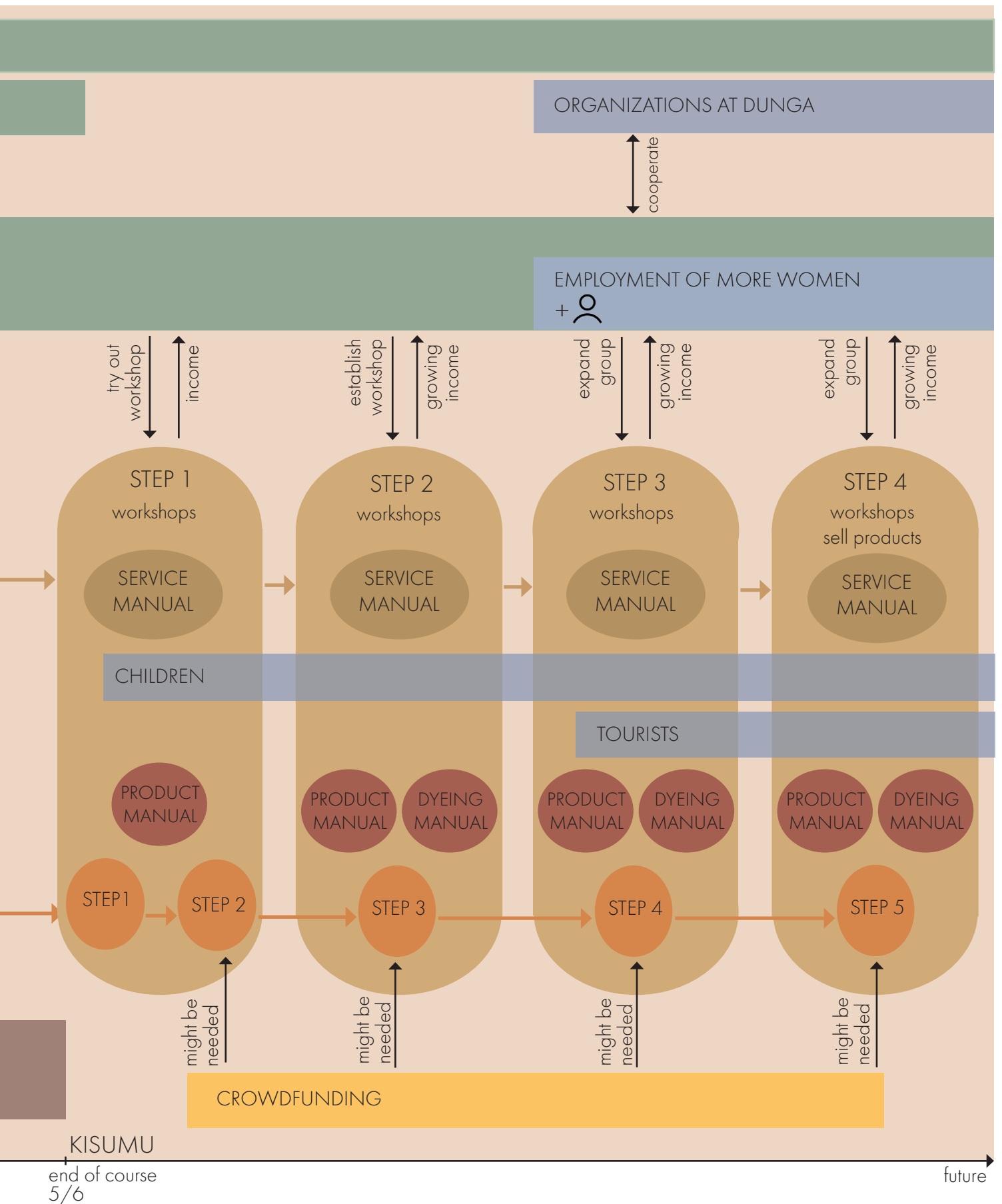
• DYEING MANUAL

• PRODUCT MANUAL

# OVERVIEW

In the diagram below, the process of the project is described based on a timeline. The relationship between the service design, space design and product design is presented with the connection to stakeholders and future stakeholders. Moreover, the diagram explains what has been executed during the project and what is recommended to be performed in the future.





## FLOWS AND SIGNS

The map shows an overview of the flow in Dunga Beach and the desired flow of the service. Some of the organizations in Dunga Beach are pointed out and above this, the desired movement of the service will take place. The school buses travels along the yellow dotted lines and stops by the Pedagogical Center. Since there are many school children and tourists coming to Dunga Beach, moving around in the center for activities, and since the service is not located in the middle of Dunga Beach, there is a need of marketing the service well. Thereby, signs pointing towards the workshop space have been placed at three different spots. At the bus stop, the first sign is recommended to be placed, see sign 1, to promote the service and lead the way for the visitors. Also, to increase the interest at the beginning of the service a craftswoman will meet the children and walk together with them to the space along the main road. By the space, there are two more signs, see sign 2 and sign 3, one by the road to market the business for bypassing, and one at the space, welcoming the visitors to the workshop.



Sign's marketing the Jambi women workshop and directs the visitors to the correct location



Rebecca's Land



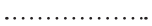
The route of the school buses arriving and leaving the Dunga Beach area



The movement of the school children in the main area of Dunga Beach including visits to The Boardwalk, restaurants and shops.



The route of the school children or tourists guided on a hippo-tour.



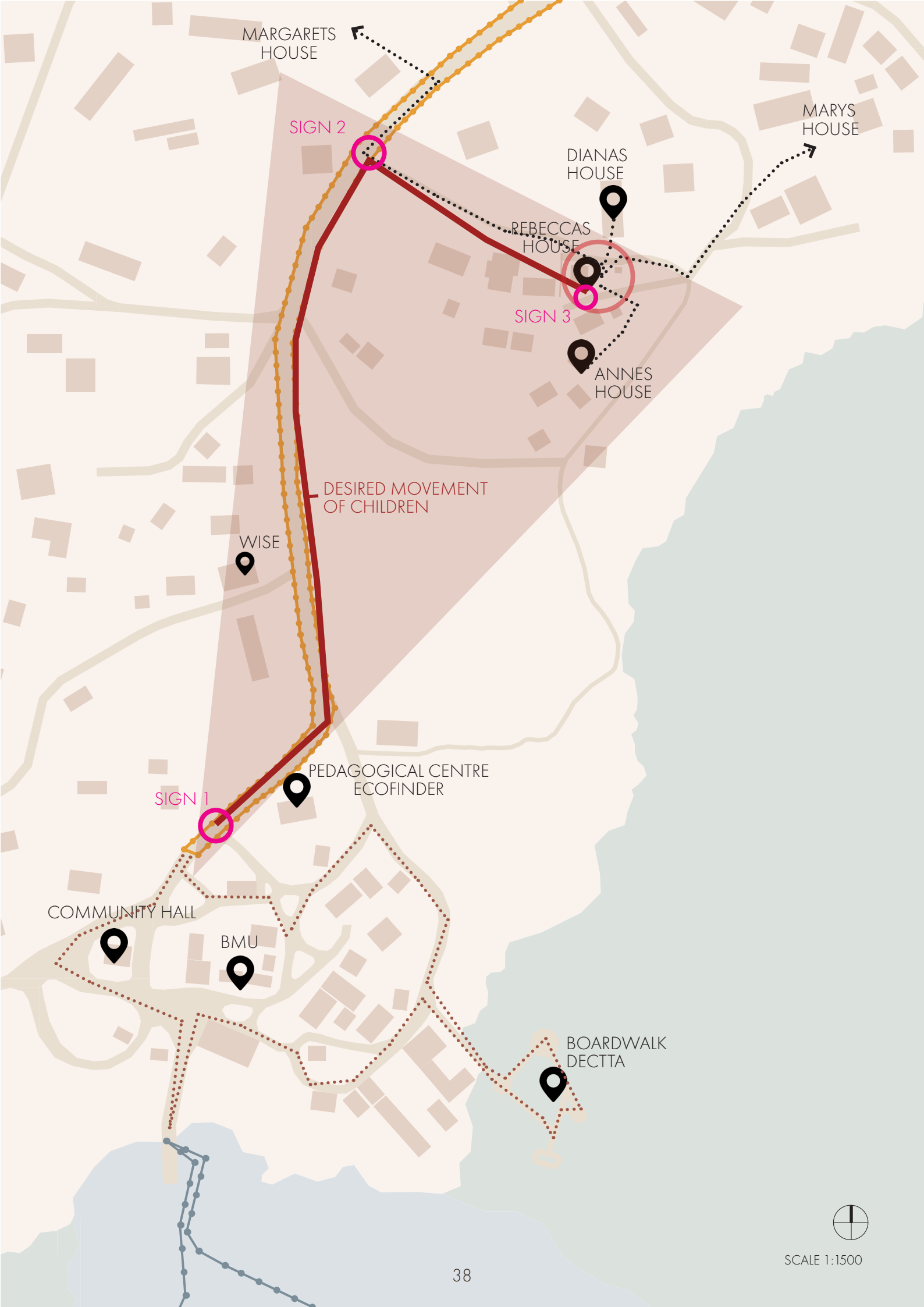
The movement of the five stakeholding women to collaborate at Rebecca's land



The route from the bus stop to Rebecca's land



The area of desired movement from the women and school children/tourists when the service of Jambiwomen is working.



MARGARETS HOUSE

MARYS HOUSE

SIGN 2

DIANAS HOUSE

REBECCAS HOUSE

SIGN 3

ANNES HOUSE

DESIRED MOVEMENT OF CHILDREN

WISE

PEDAGOGICAL CENTRE ECOFINDER

SIGN 1

COMMUNITY HALL

BMU

BOARDWALK DECTTA

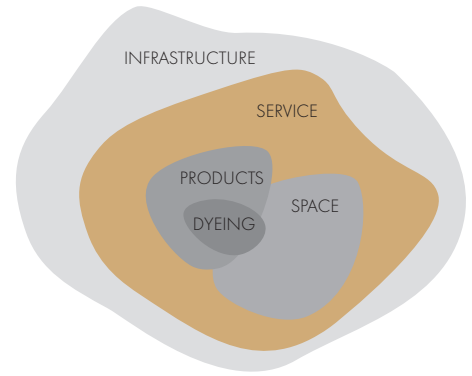


SCALE 1:1500

# SERVICE DESIGN

The service was developed with the purpose of empowering the craftswomen by providing them with a higher income but also to educate children about crafts. During the first workshop with the craftswomen, the project group interpreted that they wanted to collaborate and have a common business compared to today's situation where they work on their own at their homes. In order to create this kind of business, a common space where the craftswomen can meet and work is crucial. Nevertheless, only weaving papyrus mats in a common space would not increase the women's income. Therefore, the idea of having workshops together with school children and educate them about crafts was constructed. The development of the service is divided into four phases and is a recommendation built upon the women's current work situation. As stated in Hamdi (2004), to make change it is suggested to start with simple elements suitable for the current situation and at the same time being tactical and strategic about later stages. This induce a durable development practice.





At the workshops, the children are supposed to learn about the local material and the crafts through making small, simple products. These products are developed with children as the target group and are a part of the service.



## STEP 1 - Testing & Experimenting

---



2 hour workshop  
once a week



50 KSh



5 women



10 children

The first step in the development of the service is to try out the workshops once a week. In that way, the women can experiment with how to arrange the workshops, when to take breaks and who is doing what, in order to see how it develops. Since school children usually visit Dunga Beach on Fridays and the weekend, an idea is to start with having it on Fridays. Further, by having workshops only once a week, the craftswomen can still work with weaving papyrus mats and have a stable income. The project group has investigated, among other things, for how long children can stay concentrated and when breaks are needed, through a questionnaire directed to teachers in Sweden, see Appendix 4. From the result, a recommendation is to have workshops for two hours, in order to have time for both educating about the materials and crafts but also to let the children try out the crafts themselves and at the same time keeping their focus. The two hour workshop is divided into two 45 minutes sessions with a break for 15 minutes in between. The workshops will be open for a maximum of 10 school children and cost 50 Kenyan shilling for each child. All five women are recommended to take place during the workshop and divide roles between each other. As a final addition to this stage, the women can test experimenting with dyeing the material, which will be presented in the chapter "Dyeing of local materials", to hopefully implement it in the workshops at the next step.

## STEP 2 - Establishing workshop structure

---



2 hour workshop  
3-4 times a week



50 KSh



5 women



10 children

In the second phase, workshops are recommended to take place three to four times a week for children and cost 50 Kenyan shilling. The maximum amount of children are still 10 and all five women are holding the workshop if it has worked out properly in step one. Since the first step was about trying out the workshops, a workshop structure can now be established. Roles between the women can be given and a schedule for the workshops can be decided.

### STEP 3 - Initiating collaborations

---



2 hour workshop  
every day



50 KSh  
150 Ksh



6 women



10 children or  
10 other tourists

In step three of the service, workshops are recommended to be held every day. The workshops are now open for both school children and other tourists and there will be three to four workshops with children and three to four with other tourists each week. The cost is still 50 kenyan shilling for school children and 150 for other tourists. At this stage, a recommendation is that the craftswomen cooperates with other organizations in Dunga by having package deals where visitors for example can go on a boat ride, a boardwalk tour and make crafts on the same day. By doing this, more visitors will be attracted and the service will be exposed. It also enhance the equality by initiating a collaboration with the male owned businesses which makes them more equal in line with UN SDG number 5. Further, it moves the forces against change towards the desired position in the force field diagram. Additionally, there will be more work to do at this stage with arranging collaboration with organizations in Dunga, an idea is to employ one more woman to the team.

### STEP 4 - Selling products at the space

---



2 times 2 hour  
workshop every day



50 KSh  
150 KSh



7 women



10-15 children or  
10-15 other tourists

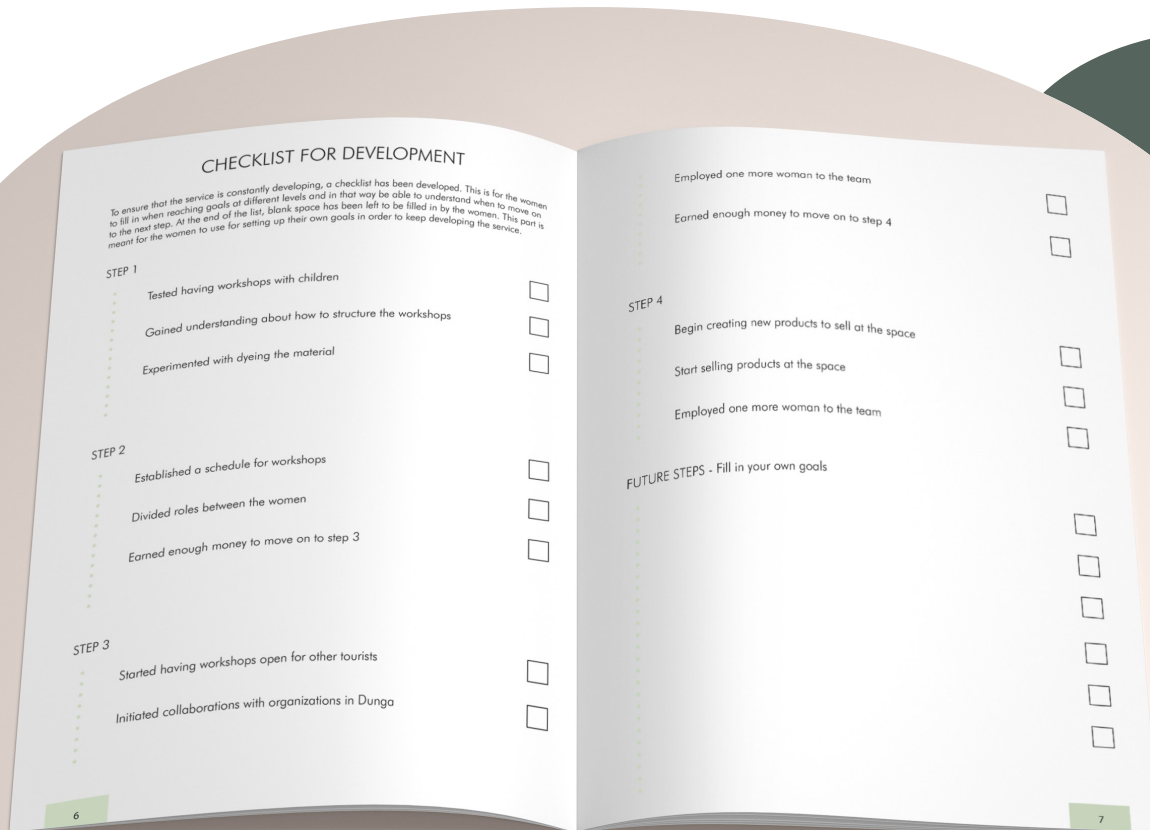
As a final step in the business, workshops will be held twice a day, one with children and one with other tourists. There will now be room for 10-15 people to visit. In addition to this, the service could be expanded to sell products at the space to further increase the income. At this point the vision is that the group of women creates new products on their own that can be suitable for sales to other tourists. The products are displayed and sold at the space and can be bought by visitors or by people walking by. For this increased amount of work, additionally, one more woman can be employed to relieve the others in the team.

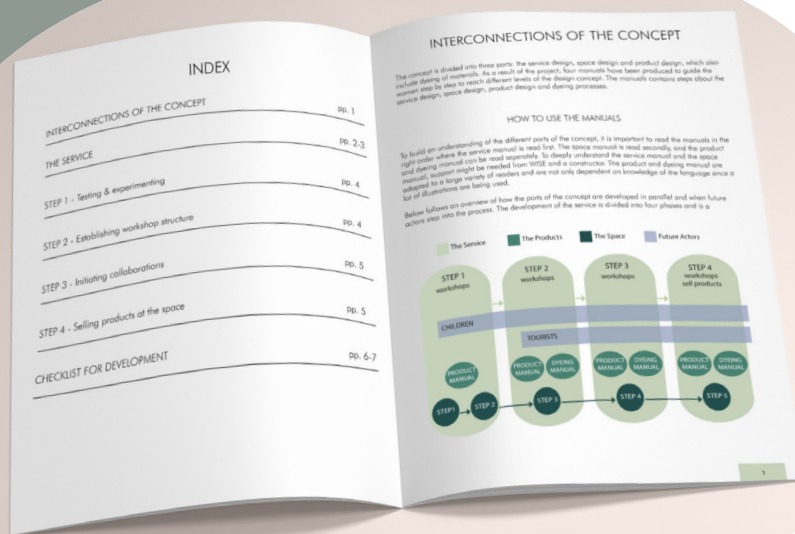
## USAGE OF MATERIAL

As the service develops, the usage of material for weaving papyrus mats will decrease while the material for the workshops increase. Since there is less material used during workshops than when weaving papyrus mats, the total amount of material will decrease drastically. Moreover, leftover material can be used from the papyrus mats for making the papyrus products. Seen from a sustainability perspective connecting back to UN SDG goal number 12, Ensure sustainable consumption and production patterns, this is a step in the right direction.

## EVALUATION OF THE SERVICE

As an evaluation for the service, the requirements list, see Appendix 1, created in the research phase was used. The requirements were used as a checklist to see if any parts were missing. To summarize the result, all requirements were fulfilled, even the lowest ranked ones. Though, it can be difficult to evaluate a service without testing it practically because external unexpected conditions can affect the result. Since the project group had to leave Kisumu earlier than expected, this could unfortunately not be executed. Therefore, the service manual will remain with the same recommendations, to be tested by the women when developing the service in practice.



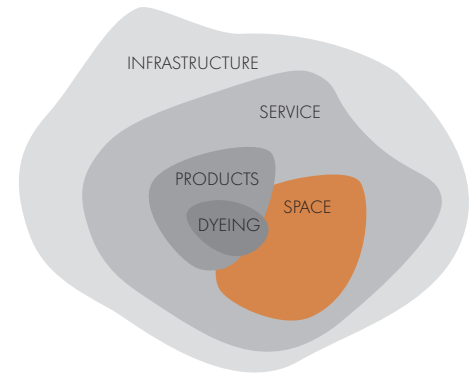


## SERVICE MANUAL

Instructions for how to develop the service step by step are given in the service manual, see Manual 1. The manual also describes how to use all of the different manuals, more specific in which order to read them. Moreover, the manual includes a description of the flow of the service and a checklist to make sure that the service will keep developing. In addition to this, the checklist provides room for the women to write their own future goals.

# SPACE DESIGN

A space design was conducted to meet the demands of the infrastructure as well as suit the requirements of the service. It provides a good place for conducting workshops with school children and other tourists. The space is in line with the service and built in different steps. Furthermore, it offers the opportunity to be developed and expanded with time as more earnings are made from the workshops. A how-to-build manual was elaborated, see Manual 2, which carefully depicts the different steps of the structure.



## LOCATION

A further discussion was where to locate the space and as mentioned before, Rebecca's land was considered the most appropriate. The land is quite narrow and small but since there is no rent, it was found suitable to start the business. As Hamdi (2004) mentioned, a small structure placed in the right spot is enough to activate a community if it is done right.

## REQUIREMENTS

Discussing the different needs for the women weaving mats in Dunga, a few specific requirements and functions arose regarding a structure, see Appendix 1 and 2. For example, the women were in need of shading, a place to work together, a place to sell from, a place to store their material and to resist the periodical flooding, all of this for a small budget. The requirements were weighed and classified in order of importance regarding the time available for the project. The most important requirements were considered to be shading, storage, safety and plans for easy future development.

## THE STRUCTURE AND MATERIALS

The dimensions of the space were decided upon observations made during the different workshops held with the women which showcased the space needed to make a papyrus mat and to hold a workshop. Furthermore, the space has been developed so that in the first steps, around ten school children can participate in the workshop meanwhile in the last step around ten to fifteen can be a part of it. Furthermore, the structure was to be made as simple and cheap as possible so that it could be afforded with small means. Research showed that reasonably cheap and durable materials were metal and timber. An approximated calculation of the budget of the space was conducted and is available in the manual, see Manual 2, here the costs of different materials are presented.

The structure is flexible through its simple metallic frame and complemented with hooks which serves to showcase the products that the women make and enable more shading. It also serves as a working space for Rebecca when the workshops are not being held. In the future it should provide display of sales, opportunities to hang up dyed materials, a place for children to play, greenery and provide a feeling of calmness at the same time as be inspirational and creative. How this may be accomplished is discussed in the chapter Future vision. Additionally, the structure is designed to be generic due to the fact that Rebecca's land is easily flooded, which is quite problematic. This way it can be easily repeated or set on another plot of land if needed or considered more suitable.



PATH FROM  
MAIN ROAD

REBECCAS LAND

REBECCAS  
HOUSE

REBECCAS  
TOILET

DIANAS  
HOUSE

PATH

ROAD

46



SCALE 1:200

## THE SPACE STEP BY STEP

Below are the 5 steps of the space explained and displayed.

### STEP 1

The structure is made simple and can be achieved quite easily by the stakeholders themselves. The suggestion is that they use the existing tree and toilet, add two new poles and then attach a sheet for simple shading. This would be complemented with papyrus mats on the ground for the visitors to sit on. This first step is considered good enough to test and try the idea of workshops with school children.



### STEP 2

This step is more advanced and starts with an explanation of how to level and flatten the ground, to make a stable ground for the structure. The structure is made out of a basic metal frame, bolted onto concrete foundations. Since the structure is stronger now, the shading can be achieved through an attached papyrus mat as roofing. This enhances the use of the women's own products in the space, it is an artefact they are familiar with and at the same time showcases their work to the visitors. When the space is not used, the papyrus mat can be taken down and stored inside someone's house.



### STEP 3

The structure is doubled in the same way as from step 2 to create more space and offer more shading



### STEP 4

At this point, a corrugated iron roof is added to enable protection from the rain and to provide the structure with a more solid protection.





PATH FROM  
MAIN ROAD

REBECCAS LAND

REBECCAS  
HOUSE

ADDED  
STRUCTURE

ADDED  
SHEET

REBECCAS  
TOILET

DIANAS  
HOUSE

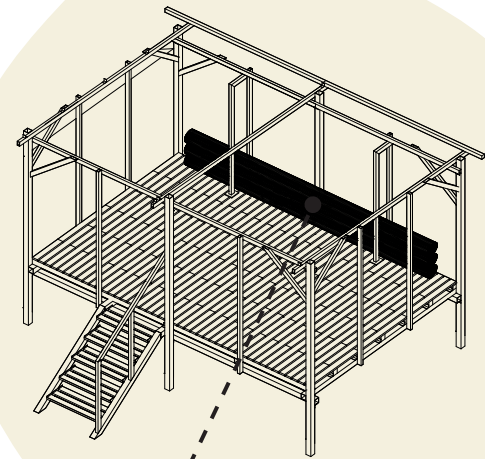
PATH

ROAD

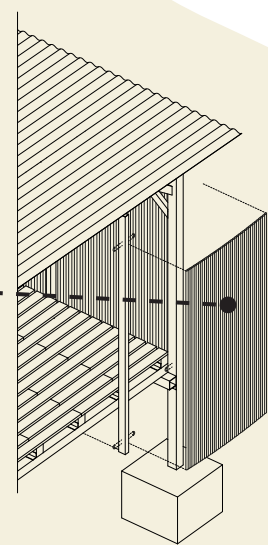


## STEP 5

In this step the structure is elevated and stairs are added for access to the platform. This in order to answer to the flooding. The elevation of the structure is good for storage of the papyrus bunches which easily can be attached on the walls and therefore protected from water. The length of the structure was decided upon this dimension, whilst the surface was adapted to the number of children it should fit. Furthermore, the part underneath the floor can be used for storage when the land is dry. Another element is metal hooks that are added to the metal structure. This is to enable to attach papyrus mats as walls to increase shading possibilities. They are also meant to be used to hang strings to display the different products developed by the women.



STORAGE FOR PAPYRUS



PAPYRUS AS WALLS

## EVALUATION OF THE SPACE

It was essential that the manual should be very clear and descriptive about each different step due to the circumstances of Covid-19 and the fact that the design could not be built in Kisumu. At times, it was complicated to be exact and precise in the dimensions and the materials because of the lack of time to analyse and measure the site properly and also to truly understand the local resources. However, in order to evaluate the space, the list of requirements and function analysis were used, see Appendix 1 and Appendix 2. In the last step of the space, all of the requirements are fulfilled. Meanwhile in the first step, only the most essential ones are considered. To achieve an even more adapted space, a continuous dialogue with the stakeholders about what the space should be, what it should look like, where exactly it should be, etc. would be preferred. However, the circumstances of the pandemic made this communication complicated and assumptions had to be made.



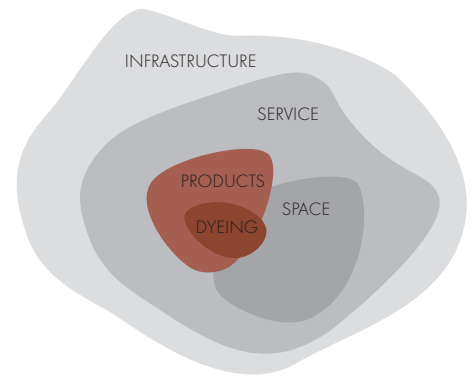
## SPACE MANUAL

Instructions for how to build the different steps of the structure. The manual also contains an estimated, approximative budget linked to each step. The first step is very simple and is more elaborately explained so that the women could try it out by themselves whereas the last step needs professional help to be realized.



# PRODUCT DESIGN

The second area of the service is the product design. The product design is about the products that will be made during the workshops. The project group decided to divide the product design into two parts to make it more structured and easy to follow. The first part refers to the actual products that the visitors at the workshop will make. The second part revolves around the process of dyeing the local material, which will also be a part of the workshops. Both parts have resulted in manuals, one product manual and one dyeing manual. This chapter will firstly present the part about products, then the process of dyeing.



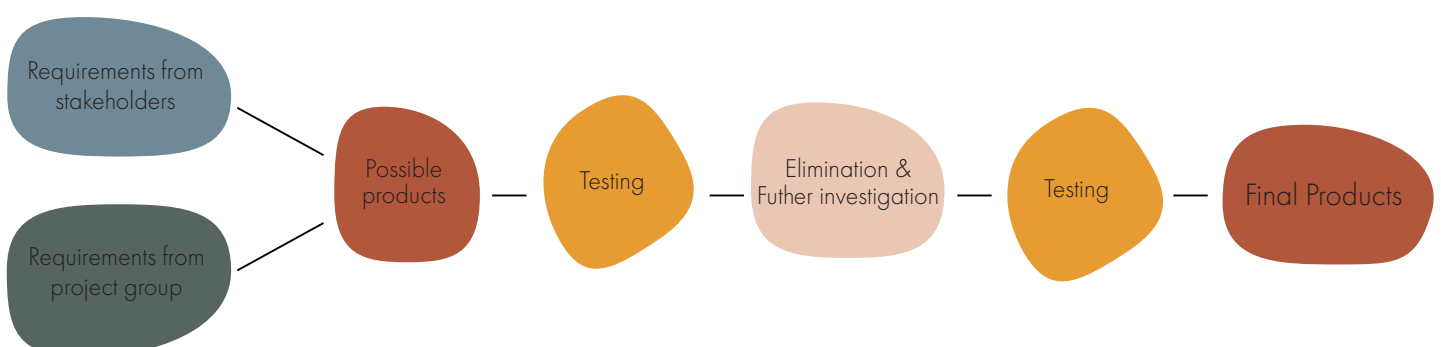
## PRODUCTS

When conducting the field study in Kenya, the project group experienced a great deal of innovation when it came to developing products and other artefacts made out of recycled or local material (see chapter Craftsmanship in Kenya and Kisumu). This knowledge was brought back to Sweden and Switzerland, where further research was performed in order to find possible products that would fit within the workshop. When conducting workshop 2 in Kisumu at the property of Zingira together with all stakeholders, a handful of requirements regarding the products that were going to be produced at the workshops were determined. The requirements being for example;

- that the products should be easy to make in order to allow school children, and other tourists in the later stages of the service, to produce them, as well as the women to teach them to the visitors.
- that the products should be able to be produced within the timeframe of the workshop.
- that the products should be rather small in size, to allow the visitors to easily bring them home in their bag, as well as not require that much material in order to decrease the cost for the women to hold the workshops.
- that the products could symbolize something in the local area to function as souvenirs.

At home, the project group decided upon further requirements for the products. For instance that the products should be made by using several different techniques to give the women the opportunity to develop their skill set within more areas than weaving. This since the project group believes that it is a great way of making the women feel comfortable working around new aspects that could, in turn, generate creativity amongst them. The requirements from the stakeholders together with the ones from the project group, formed a list of requirements for the workshop products, see Appendix 1. With these requirements, the group's research resulted in a number of products that would possibly fit within these limitations.

By conducting an ideation session at one of the project members home, with papyrus, water hyacinth and sisal that were brought back from Kisumu, the project group tested if these products were possible to make with the material. The result of the testing showed that some products were too hard to make with these types of material, which ended up in eliminating those products. The testing provided the project group with further learnings about the material characteristics, which created a base for further research of products to produce at the workshops. With that in mind, more development of some products was made, as well as ideation around additional products. By performing a second ideation session where these products were tested, nine final products could be decided upon, see Figure on next side.





## TECHNIQUES

The nine products are made with different techniques. The techniques used are weaving, twisting, origami and macramé. Weaving and twisting are techniques that the women are familiar to today. Weaving in this sense refers to the technique the women use when weaving their papyrus mats, see picture above, which is not the same technique as ordinary weaving. When making the mats, the women first twist sisal to make sisal ropes. These ropes are then used to weave the papyrus stems together by using a spear, to create the mat. The last step is to bound the ends of the mat together by using the sisal rope. Twisting water hyacinth to create water hyacinth ropes is also common for them. Origami and macramé are techniques that the women do not have knowledge in. Origami is the art of folding paper, where "ori" stands for folding and "gami" stands for paper (Origami Way, n.d). In this project, the project group refers to origami as the art of folding water hyacinth. Macramé refers to the technique of making knots in order to create an artefact, often by using textile (Macramé, 2020). The products made with the macramé technique in this project are made from knotting sisal or water hyacinth.

## CREATION OF A PRODUCT MANUAL

To be able to conduct workshops, the women need to know how to make these different products. The women shall also be able to pedagogically teach the techniques to the visitors at the workshop. As mentioned before, the project group had to leave Kisumu early and is now located on the other side of the world to the women. Thereby, the project group can not teach the women themselves on how to make the products, which is why the product group decided upon making a product manual where the development of each product is described step by step, with the aim of sending this down to the women after the end of the course. Furthermore, the manual should work as complementary learning material at the workshops, i.e. that the visitors could themselves look in the manual if needed.

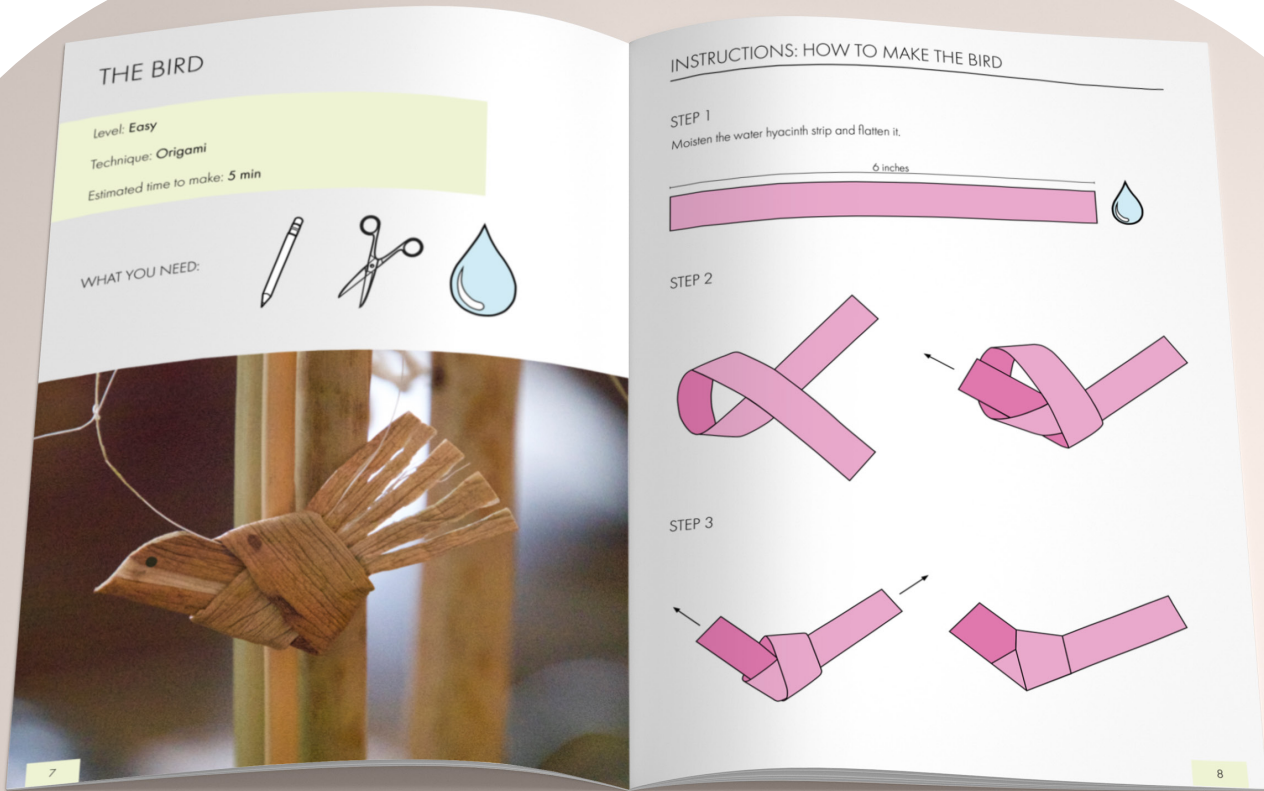
Hence, the next step in the process became to create illustrative images of how to make the products step by step. The project group focused on making simple line illustrations that were easily understood. Due to the language barrier with the women, the group aimed towards making the illustrations talk on their own, without any need for additional explanatory text. For each product, it was also essential to present what tools and supplementary necessities that were needed to create it, e.g. scissor, water or pencil. This formed the first draft of the product manual.

## EVALUATION OF THE PRODUCTS

It felt essential to evaluate the first draft of the product manual with the women since they are the ones that should use the manual and it is therefore necessary that it is comprehensible for them. If the project group had had the possibility to stay in Kisumu, it would have been easier to communicate directly with stakeholders for feedback about the product manual in order to create a participatory process. However, as stated previously, the outbreak of Covid-19 made communication more challenging and the project group was forced to be creative in order to have varied input on the project. Therefore, a third workshop was organised in collaboration with WISE in Kisumu, so that the women could test the different products in the manual. The project group compiled instructions for the workshop, which were sent to Caroline Odera via mail. The workshop was slightly challenging because WISE hired people to teach the women about the products but the teachers themselves had not been trained in making the products either, hence, ended in a learning process for them all. Even though every step were graphically explained in the manual, a few products were misunderstood and the wrong material was used. Therefore, the result of workshop 3 was satisfying only for certain products and it was clear that using only lined drawings was sometimes confusing for the women.

Furthermore, a few step by step guides of the products were tested with our friends in Sweden and Switzerland in order to get immediate feedback about the comprehensibility of it and how it could be improved. The project group noted when the tester faced any problems or did not understand the instructions given, in order to be able to alter and clarify it in the manual. Also, the project group compared both the products and the product manual against the list of requirements to be sure of that they met the listed requirements and if not, how these could be met. However, the result indicated that all requirements were fulfilled.





## FINAL PRODUCT MANUAL

Based on the evaluation of the product manual, some alterations were made. For instance, the project group decided to add colour swatches to symbolize each material being used, add short explanatory text for some of the products in order to clear any misunderstandings, as well as make small adjustments to the illustrations of the steps to make them more understandable. This generated the final product manual, see Manual 3.

The beginning of the manual includes an index, short facts about Reality Studio, the project, the manual, presentation of techniques used for the products, as well as materials used. Following are step by step guides of the nine products. For each product, difficulty level, used technique and estimated time to make are stated. Further, what essentials that are needed to produce the product. In the end of the manual, there is a chapter, where the women are encouraged to experiment on their own around new products to make. Tips are given that can be helpful, e.g. try to use new materials, techniques and tools. The women can then fill in their own step by step guides for each new product they create, that can then be part of the workshop in the future.



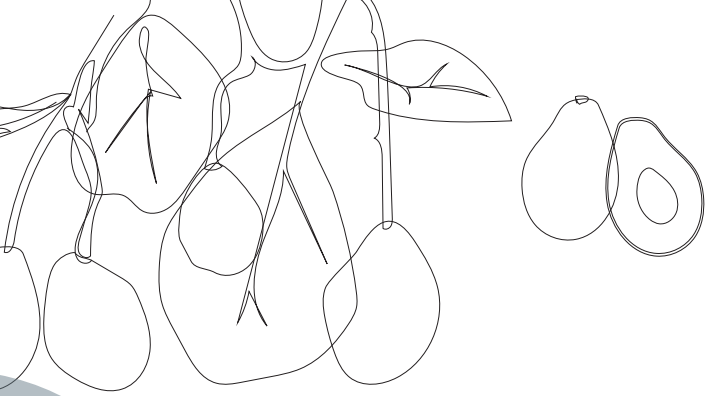
## DYEING OF THE MATERIALS

Since both products and the space would be more appealing and fun to work with and in, if it contains colours, the opportunities to dye the local materials have been investigated and tested. Further, it is seen as an opportunity for the women to create a uniqueness in their service and products. Therefore, it is considered an important track in this project to explore and introduce to the stakeholders in Kenya.

The first experiments were held in Sweden with vegetables that also can be found in Kisumu, Kenya. Avocado, carrots, red onion, red beetroot, coriander, turmeric, tomatoes, pomegranate, coffee and tea was tested. The first attempt was performed in a kitchen and the vegetables was mixed with both cold and warm water and soaked for 24 hours. The results were inadequate and only the turmeric, tea and pomegranate dyed the materials in some manner. The second experiment was with red onion, red beetroot and turmeric in the same environment. This time it was boiled and mixed with salt and white vinegar as stabilizers. End results was improved, however, not perfect but all materials had obtained some colour. Especially, the turmeric and red beetroot. Since it was considered important to use as little ingredients as possible, a third experiment was completed. The process to boil the substances, to extract the colour and then add the sisal was tried and had pleasing results. The tested substances were avocado, turmeric and red beetroot. It resulted in the sisal coloured yellow or pink. The third experiment was considered successful and suitable for the context of Kisumu in Kenya since no extra substance is needed and the vegetables are commonly found there.

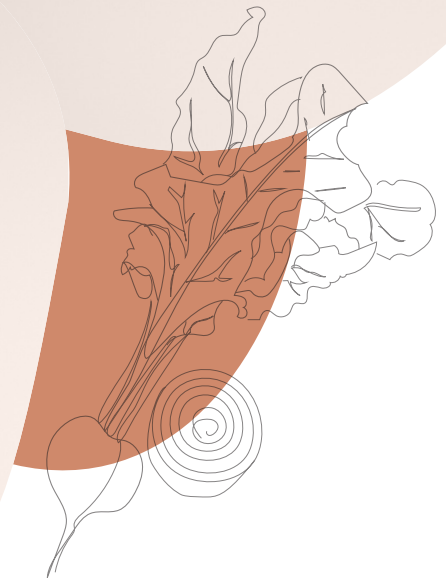
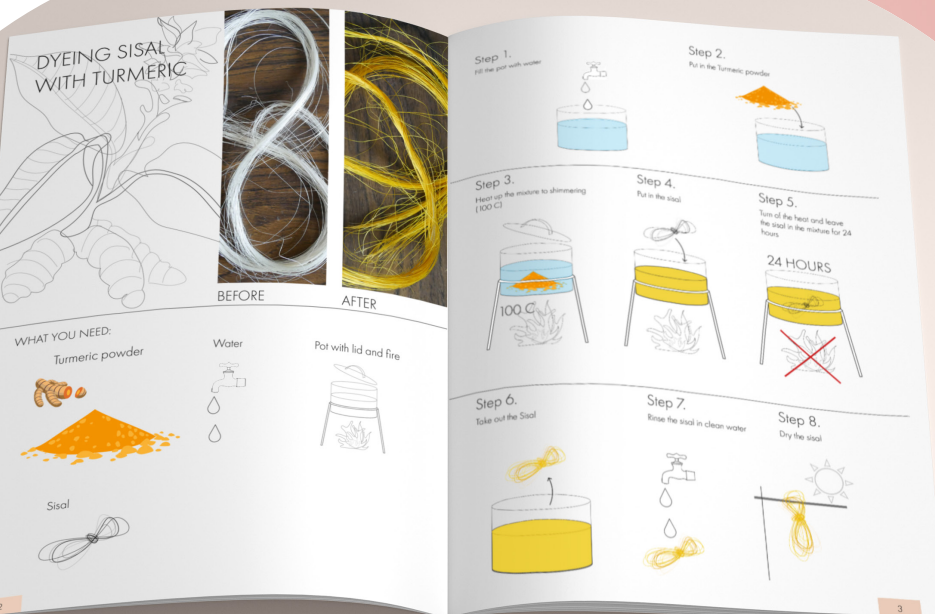


To dye with indigo is a bit more complex, however, there are currently experiments of dyeing water hyacinth, papyrus and sisal in Sweden with indigo blue. It is a cooperation between the organisation Zingira in Kenya, Helena Hansson (expert of crafts of Kenyan materials) and John Åberg (expert in indigo dyeing). So, to continue the colouring experiment, the project group contacted them. The specialist retrieved some examples of our raw materials and dyed them in an indigo bath. The results were separated, the sisal absorbed the colour very good and retrieved a nice blue shade. However, the papyrus and the water hyacinth did not contain as much colour when untreated. Nevertheless, it seems as crafted materials, such as rope, absorbs the indigo colour in a more adequate way. Considering the results, to dye the products with indigo seems as a nice activity and a way to make the products more exclusive. Furthermore, the usage of the indigo plant has a long history in East - and West Africa and they have established different traditional ways of extracting the colour from the plant and use different ways of colouring materials. According to USDA (2020) the indigo species *Indigofera Tinctoria* grow naturally in East Africa and the plant is present in Kenya. However, there do not seem to be any established farming or extraction of indigo. To have a small indigo farm is seen as an extended business opportunity to include in a future, more developed service.



## DYEING MANUAL

The target for the dyeing of the local materials is to have a natural process that is sustainable, in line with UN goal number 12, and to not use synthetic colouring. With these limitations, the subjects found pleasing to use was turmeric, red beetroot, avocado and indigo. The process of the dyeing with these is presented in a manual, see Manual 4.



# FUTURE VISION

The project is very complex and there are many dynamic and complex elements to consider in order to shape and build a flourishing business. However, if successful, there are many possibilities for the project to grow and expand. The beauty of the project is that there are no limitations of what it could be but that is also the hard part, what to focus on and how to make the most out of it. This chapter present some reflections of how the project could be developed to give some inspiration. The imagination is a crucial part of problem solving, to create new things we need to dream (Hamdi, 2004).

## SERVICE

The development of the service is dependent on the flow of visitors, marketing opportunities and sales of the service to find a name that is known and desirable for tourists to visit. In line with more visitors taking part of the service, it may evolve and more activities can be offered.

## PRODUCTS

The hope is that the presented products will help the women to feel inspired to try new things and explore with the materials they use everyday. The project group wish for the women to start thinking more creatively. As presented, in a future vision, products adapted for tourism can be sold at the site. This would probably be more profitable than just conducting the workshops. Even more visionary would be to create an online sales of products and sell to a wider audience. Another interesting angle could be to cooperate with companies that sell or would like to sell products made out of water hyacinth, papyrus and sisal. For example, the Swedish company IKEA cooperate with asian manufacturers of water hyacinth and sell the products all over the world (IKEA, 2020).

## DYEING

In a more developed stage of the service and space, it would be favourable to have a land with plants used for dyeing materials: indigo plants, avocado trees, turmeric, red beetroot or other plants. This would be more beneficial for the women than to buy the supplies as well as more sustainable to grow the plants at the location. This could also offer a side-business of sales of pigment or dying of other materials such as yarn or clothes.

## SPACE

The development of the space in the manual is adapted in relationship to the restrictions of Rebecca's land. It considers the size of the land and the occasional floodings. In the future, the space might be moved to another location and some of the features against flooding may be ignored. In a future space there may be opportunity to expand even more and include elements of play for the children. There can be more and bigger exhibitions of crafts. The dyeing process can be a central part and equipment needed for it may be implemented in the space design. The possibilities for expansion and new features are endless.



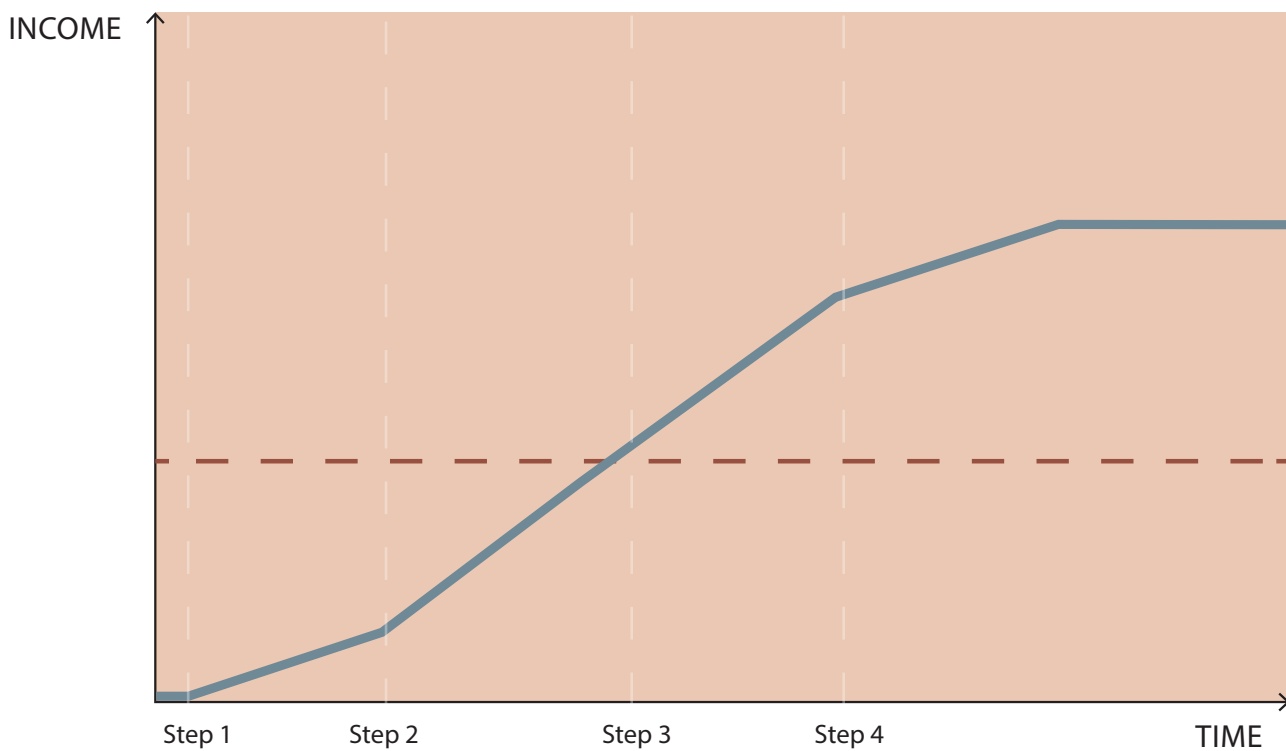
At the future workshops, the space can be divided into multiple sections specified for different activities. One part outside can be made for dyeing and drying the material, one section in the space will be used as a shop, and other sections will be used for workshops, play and socializing.



# ECONOMICS

The economics of the project is hard to calculate, however, a rough estimation has been performed. The calculation was based on collected information through interviews with the group of women, Caroline Odera and Evance Odhiambo. Further, the amount of visitors of the service is founded on assumptions of a growing ecotourism in the area of Dunga Beach, following the recent years trends (Kraff, 2018). However, the limitations in relation with Covid-19 may have a high impact of this movement but that is not considered in the calculations. For a full overview of the summation, see Appendix 5.

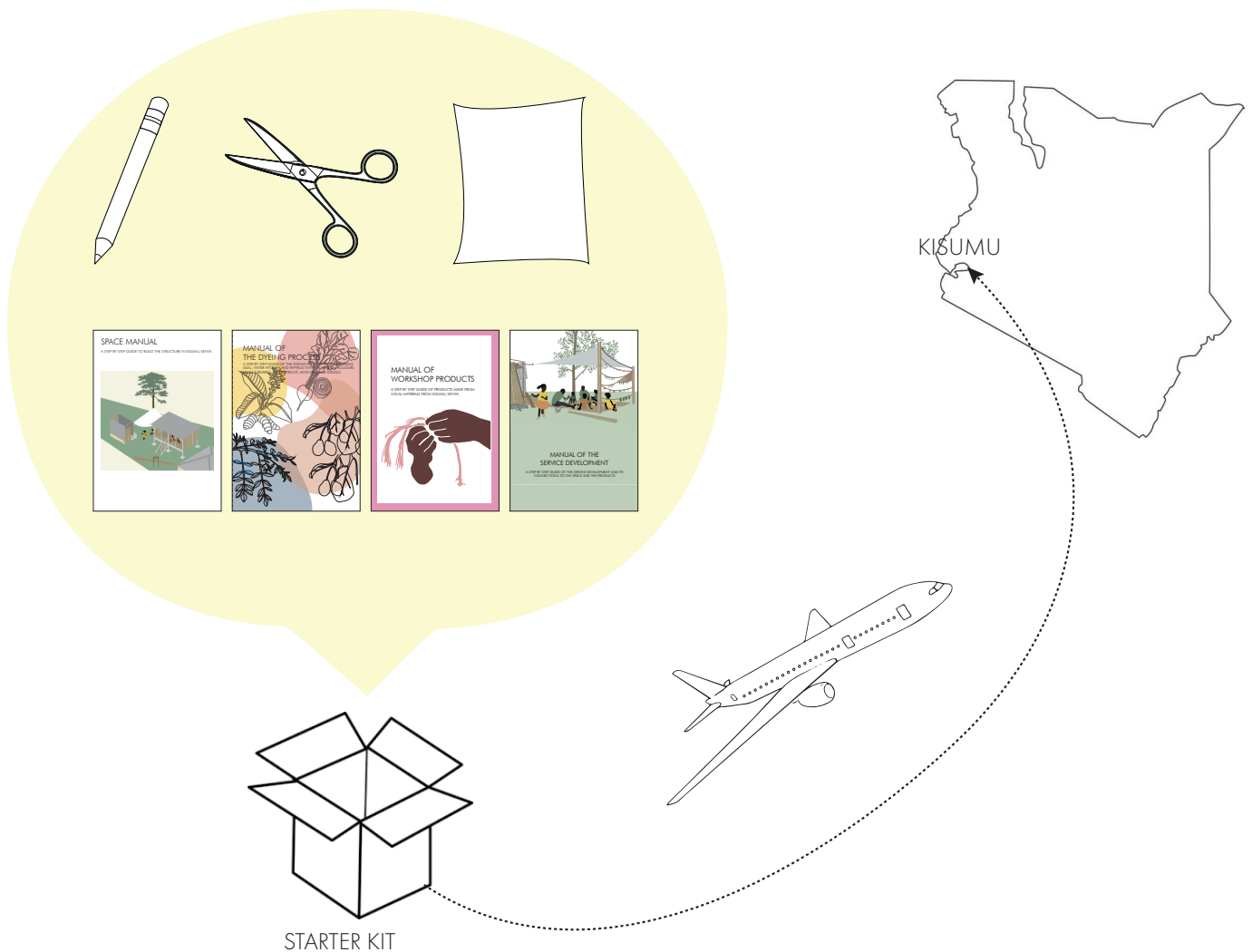
— — — — — Income from selling mats  
————— Income from design concept



The diagram above is a simplified illustration of the advancement for the women to transfer their work from weaving only mats into creating a developed business with the presented design concept. At start, the new service will not be as profitable as the current mat weaving, however, it is a higher hourly pay and with time the potential for more earnings is much higher. The idea is that until the service is more profitable than the mat weaving, the women will perform both activities at the same time. The current income of the women, by making and selling papyrus mats, is shown by the red dotted line, it is considered constant and quite stable. Meanwhile, the blue line is the expected growth of income with time if the women instead follow the steps of the service. As mentioned above, approximated calculations with assumed numbers was made but it indicates that when the service reaches step 3, the income will be more profitable than the weaving of only papyrus mats. At this stage, the weaving of mats is otiose and the women can put all effort into the development of the service. Additional earnings are expected from sales of products in the later steps.

## FUNDING OF THE PROJECT

To start the project correlates to some expenses, at the beginning the project needs funding in order to create a business that can work and be independent. The project group has individually funded workshops and materials for the women to take part of and learn from but cannot fund it a lot. However, a small starter kit for the women to test the workshops and first steps will be sent down by the project group. It will consist of multiple printed manuals of all areas, to make sure that the women understands the whole concept and know what to do. There will be some extra product manuals sent down that can be used by visitors of the workshops when creating products. It will be complemented with scissors, pencils and a large sheet to create the first shading in space step 1. To initiate a strong foundation, crowd-funding would be an appropriate option. However, the current situation with Covid-19 is not optimal to start a collection of money, if crowdfunding is to be used, there needs to be certain results which are hard to guarantee for the moment. A SWOT-analysis, see Appendix 6, for crowdfunding was made and it displayed strengths, weaknesses, opportunities and treats. The result from the SWOT was that if to use crowdfunding, it should be in a later stage due to the current pandemic. Therefore, the project group has decided to recommend to try out the project very small and see if there is a interest in this kind of service and from there take action toward a suitable way to fund a more developed stage of the service.





# 7 EPILOGUE



# DISCUSSION

The amount of parts included in this project makes it very complex and the interaction of multi-disciplinary and multi-cultural collaboration extends it even further. However, the dynamic approach and action towards challenges in the project has created solutions designed for flexibility and the different steps enable the concept to be used in different ways considering the current possibilities for the stakeholders. This also allows the concept to be suitable for more regions to adopt and implement. Furthermore, the constantly changing external conditions such as flooding and the pandemic Covid-19 has added even more complexity to the project. It made the communication, that already was restricted by language barriers, even more complicated. It created misunderstandings of the intended outcome of the project from the project group and the group of women expected help in form of funding which was never an intention. To solve this issue, clarification of our objectives and limits for this project was communicated carefully to the E Vance Odhiambo and Caroline Odera to explain for the group of women. It cannot be made clear enough that the project is non-funded and that the support are limited, which is a factor to consider in future projects.

The event of the pandemic Covid-19 was very unexpected and had a large impact on the project and the end result. A recommendation would be to make a risk analysis in the beginning of the project and consider risks that may occur, estimate their impact and consider possible adjustments if it would happen. This way the project would probably have had a smoother transition. This may also be related to the whole course, if the course was more prepared to unlikely events, the re-construction of it would have been faster and easier to follow. However, at the same time it is good to have in mind, in line with Hamdi's (2004) statement, that the acceptance of ignorance is important and it does not matter how much we predict, things will still turn out differently. Nevertheless, an important learning would be to try to limit the project more to make it less complex and focus more on specific parts. That would probably increase the quality of some parts of the project. For example, there was not enough time to test and evaluate the space, dyeing and service manuals.

The outcome of the design concept is mainly based on the research and experiences collected during the field studies in Kisumu. The research could definitely have benefited from more time for investigation, however, the data collected was enough to build a strong concept. The concept consider aspects of how the infrastructure relates to the service, space, products and dyeing. Interconnections and how changes in an area, directly or indirectly, affects the other areas have been considered.

To connect back to the force field diagram, where forces for and against change were listed and weighed, some of them have changed during the project. Internally, there were some forces against change that needed to be reduced; no knowledge of design and no money. The idea with the products manual and the dyeing processes is that the craftswomen will get inspired and learn about these to develop knowledge of how to design their own products and processes. Since they already have a lot of knowledge of making crafts and using the materials, the only missing part for fulfilling this is to be inspired and start to experiment. In the products manual, there has been left space for the women to fill in their own products, which is a way of nudging the process of designing their own products. When it comes to the economic situation, where the women do not have enough money to start a business, steps throughout the project have been made to be as simple as possible using a small amount of resources to reduce the need of having money in the beginning. By developing the service step by step, instead of only having one big concept right away, profit from the workshops can be used to expand the service continuously.

Another thing worth mentioning is the importance of investigating an area and its needs without being impacted by mentors. The time for choosing a project in Kisumu went fast and the project group felt stressed about the situation. It felt like some projects had already been pointed out from previous years and were already formed in detail. The project group chose to go for a project that was presented with an idea of a solution, namely the service, which in retrospect feels like something worth thinking about in the future. Since mentors that have been working in the course for a long time are so involved in the projects, lack of space for the students have been given to independently investigate the area.

Ultimately, reflecting over the UN Sustainable Goals for the project, it is clear that the five goals have been applied to different parts of the design concept, where some apply to multiple parts, while others to only one. Seeing to USDG number 4, this goal is mainly related to the product design part of the design concept. This, since the children, as well as other visitors at the workshop will learn about the craftsmanship that occurs around Dunga Beach. The fact that the children themselves can try out some craft techniques at the workshop are of importance within the project since the curriculum for the Kenyan education was changed to not include any subjects within art and craft. This also applies to the dyeing of the materials. By implementing the crafts into the space, the USDG number 4 is also occurring in the space design. By providing the women with manuals, the women will also gain knowledge within several areas that will be beneficial for them to manage to expand the business in the future. For instance, encouraging them to learn how to make more dyeing processes or products with other techniques and tools. USDG number 5 and 8 are closely connected, and are the two goals that permeate the service design, due to them being related to the aspect of empowering the women in Dunga. USDG number 5 connects to empowering the women by reducing the inequality within the community of Dunga Beach and making them have equal opportunities as men. While USDG number 8 relates to empower the women into sustainable economic growth, where they can rely on having decent work and an efficient business. In the future this can generate a more sustainable tourism within Dunga, which can create more income, as well as jobs if becoming successful. Further, USDG number 11 gets picked up in the aspect of safeguarding the world's cultural and natural heritage, and in this project it refers to safeguarding Lake Victoria by using local materials within the products, process of dyeing and parts of the space. Seeing to USDG number 12, if managing to monitor the amount of local materials used, as well as optimizing the waste, this will create a sustainable consumption which applies mostly to the product design with the making of products and the process of dyeing.



# CONCLUSION

To start a whole new project is complex and time consuming

TIME

Communication between multidisciplinary and multicultural members are challenging but can enhance the result if there is common understanding

COMMUNICATION

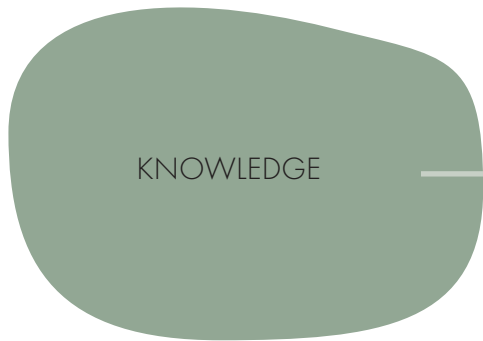
Everything needs to be communicated very thoroughly and preferably more than once

RELATIONS

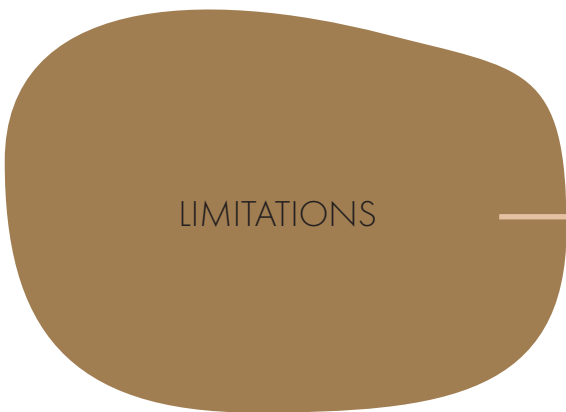
It is important to create strong relations with the stakeholders and build trust

PREPARATIONS

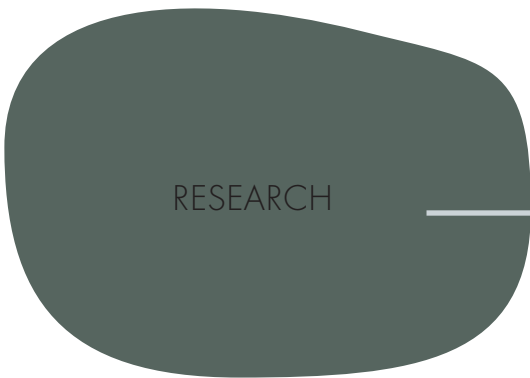
Prepare more for unexpected events, but remember that you cannot plan for everything



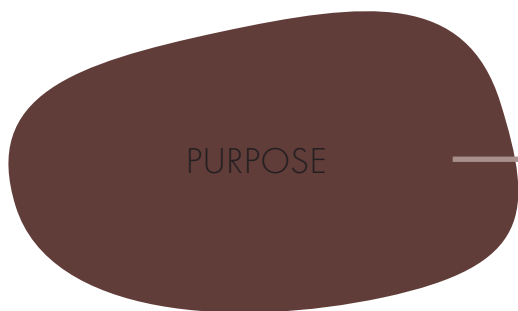
Take advantage of the different experiences and knowledge that exist in the whole studio group



Make more limitations to achieve higher quality of work and have time to evaluate more



Perform research on your own before being influenced by external parts



The most important part is to learn and have fun



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# LIST OF THE DIFFERENT MANUALS

MANUAL 1 - SERVICE

MANUAL 2 - SPACE

MANUAL 3 - PRODUCTS

MANUAL 4 - DYEING



# MANUAL OF THE SERVICE DEVELOPMENT

A STEP BY STEP GUIDE OF THE SERVICE DEVELOPMENT AND ITS  
CONNECTIONS TO THE SPACE AND THE PRODUCTS

Authors and illustrators:

Rebecka Geber, Moa Hansson, Ellen Karnblad, Miranda Reynolds, Emma Wallin,  
Jambi Women group, Reality Studio 2020.

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STEP 2 - Establishing workshop structure	pp. 4
STEP 3 - Initiating collaborations	pp. 5
STEP 4 - Selling products at the space	pp. 5
CHECKLIST FOR DEVELOPMENT	pp. 6-7

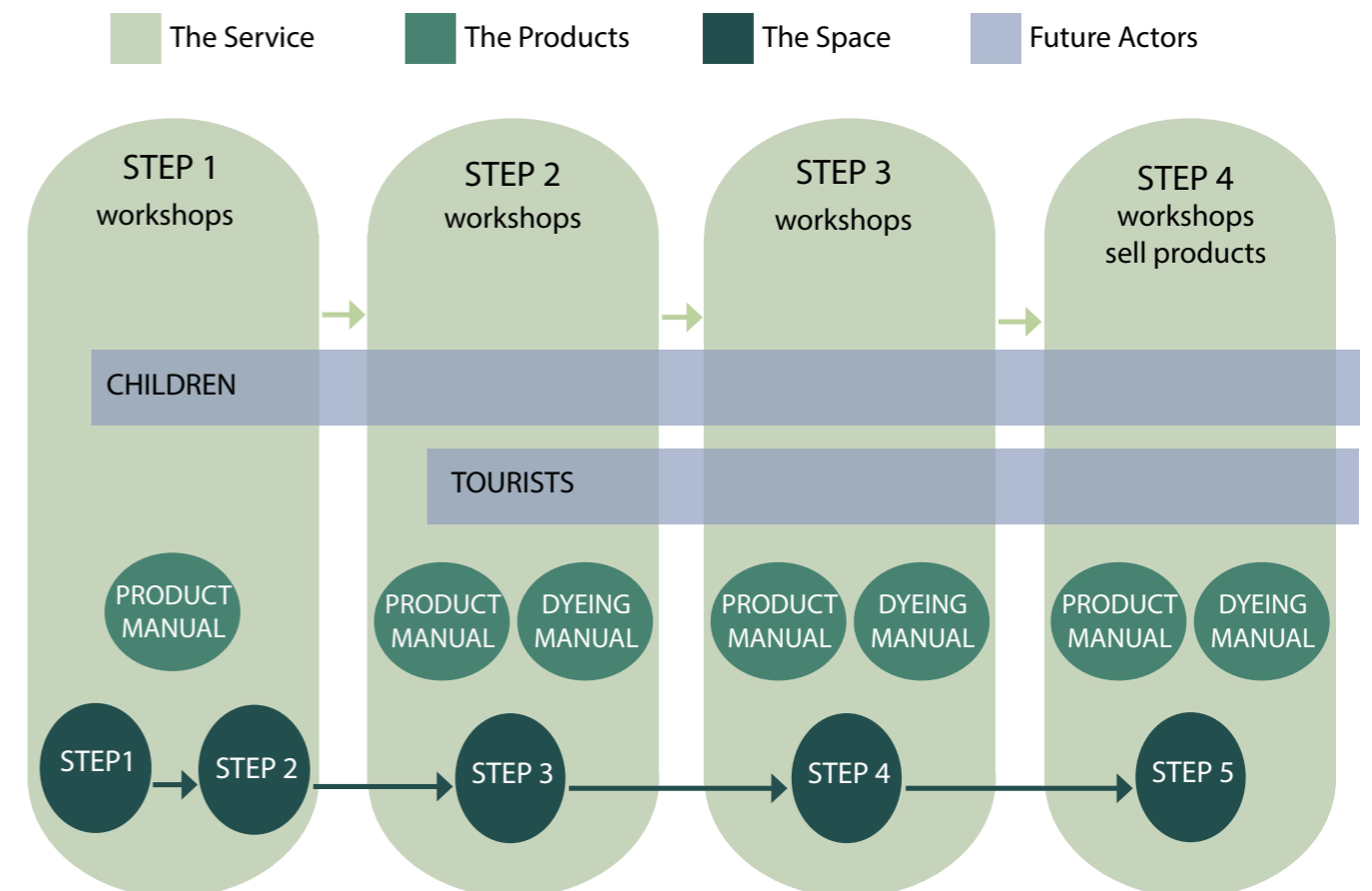
# INTERCONNECTIONS OF THE CONCEPT

The concept is divided into three parts: the service design, space design and product design, which also include dyeing of materials. As a result of the project, four manuals have been produced to guide the women step by step to reach different levels of the design concept. The manuals contains steps about the service design, space design, product design and dyeing processes.

## HOW TO USE THE MANUALS

To build an understanding of the different parts of the concept, it is important to read the manuals in the right order where the service manual is read first. The space manual is read secondly, and the product and dyeing manual can be read seperately. To deeply understand the service manual and the space manual, support might be needed from WISE and a constructor. The product and dyeing manual are adapted to a large variety of readers and are not only dependent on knowledge of the language since a lot of illustrations are being used.

Below follows an overview of how the parts of the concept are developed in parallel and when future actors step into the process. The development of the service is divided into four phases and is a

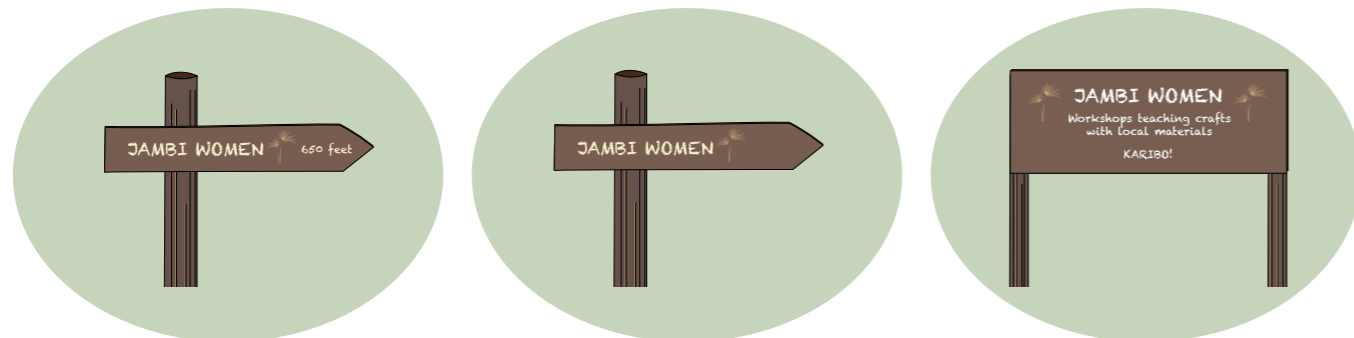


# THE SERVICE

In a short summary, the concept consists of workshops held by the craftswomen at a space that is developed at Rebecca's land. At the workshops, school children, arriving with school buses to Dunga Beach, and eventually other tourists as well, are welcome to take part. The first workshops are built upon the craftswomen teaching crafts through making products developed especially for children. The visitors gets to try out making the products on their own, and the craftswomen can help and educate at the same time. The concept is a way for the women to earn more money beside their mat weaving but also to educate and spread the knowledge of crafts and local materials to school children since they are lacking of possibilities to learn this in school.

## FLOW OF MOVEMENT

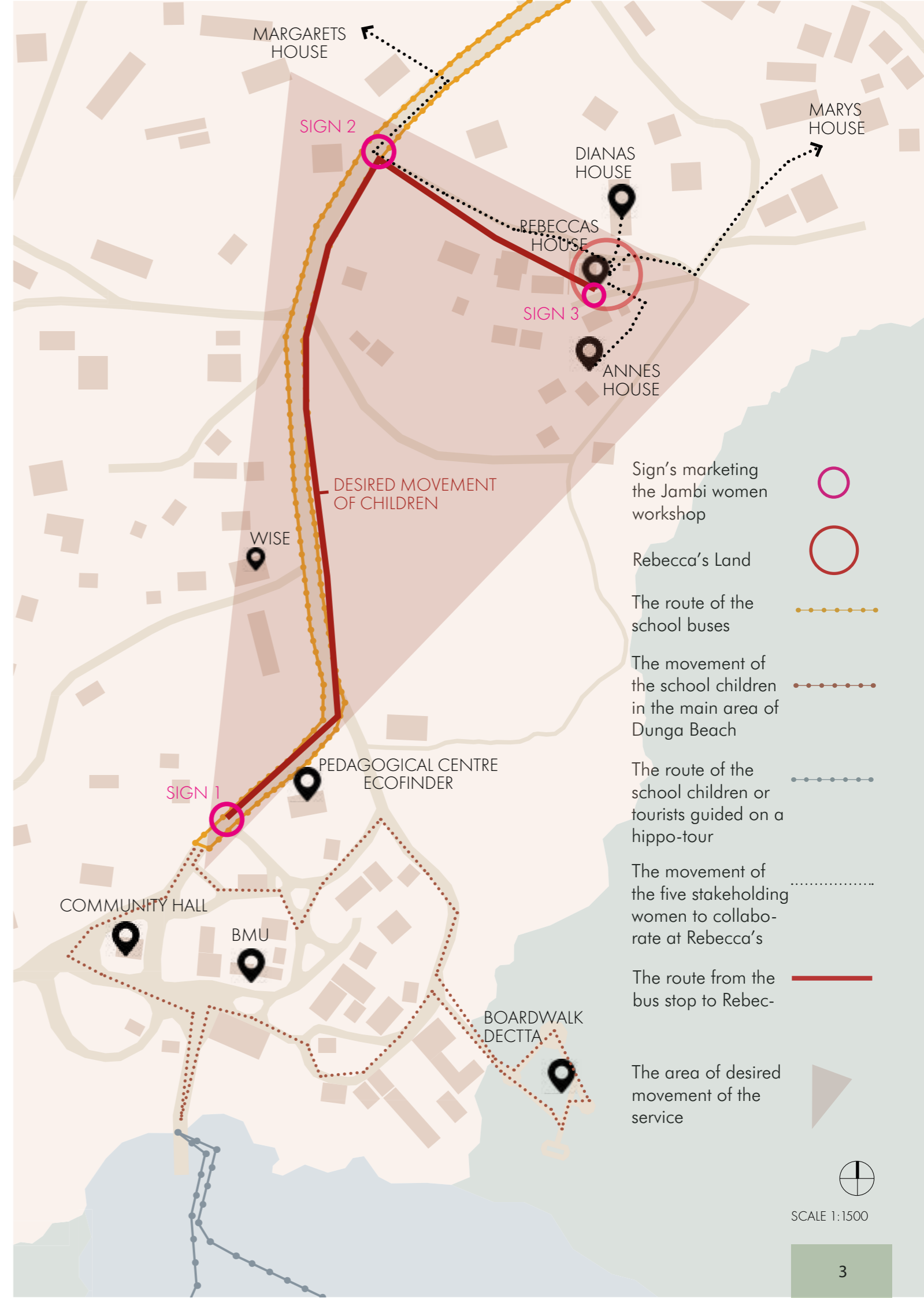
The illustration to the right shows an overview of the flow in Dunga Beach and the desired flow of the service. Some of the organizations in Dunga Beach are pointed out and above this, the desired movement of the service will take place. The school buses travels along the yellow dotted lines and stops by the Pedagogical Center. Since there are many school children and tourists coming to Dunga Beach, moving around in the center for activities, and since the service is not located in the middle of Dunga Beach, there is a need of marketing the service well. Thereby, signs pointing towards the workshop space has been placed out at three different spots. At the bus stop, sign 1 is recommended to be placed to promote the service and lead the way for the visitors. Also, to increase the interest at the beginning of the service a craftswoman will meet the children and walk together with them to the space along the main road. By the space, there are two more signs, sign 2 by the road to market the business for bypassing, and sign 3 at the space, welcoming the visitors to the workshops.



SIGN 1

SIGN 2

SIGN 3



SCALE 1:1500

## STEP 1 - Testing & experimenting



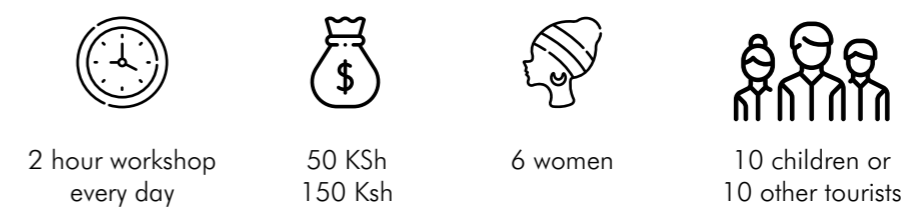
The first step in the development of the service is to try out the workshops once a week. In that way, the women can experiment with how to arrange the workshops, when to take breaks and who is doing what, to see how it develops. Since school children usually comes to Dunga Beach on Fridays and the weekend, an idea is to start with having it on Fridays. Further, by having workshops only once a week, the craftswomen can still work with weaving papyrus mats and have a stable income. A recommendation is to have workshops for two hours with a 15 minutes break after 45 minutes. In that way, there will be time for educating about the materials and crafts, letting the children try out the crafts themselves and at the same time keeping their focus. The workshops will be open for a maximum of 10 school children and cost 50 Kenyan shilling for each child. All five women are recommended to take place during the workshop and divide roles between each other. As a final addition to this stage, the women can test experimenting with dyeing the material, which is presented in the Dyeing Manual, to hopefully implement it in the workshops at the next step.

## STEP 2 - Establishing workshop structure



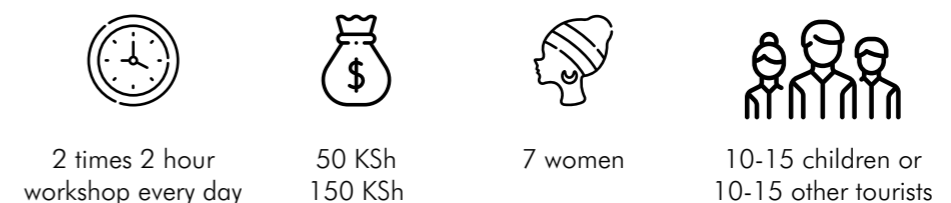
In the second phase, workshops are recommended to take place three to four times a week for children and cost 50 Kenyan shilling. The maximum amount of children are still 10 and all five women are holding the workshop if it has worked out properly in step one. Since the first step was about trying out the workshops, a workshop structure can now be established. Roles between the women can be given and a schedule for the workshops can be decided.

## STEP 3 - Initiating collaborations



In step three of the service, workshops are recommended to be held every day. The workshops are now open for both school children and other tourists and there will be three to four workshops with children and three to four with other tourists each week. The cost is still 50 Kenyan shilling for children and 150 for other tourists. At this stage, a recommendation is that the craftswomen cooperates with other organizations in Dunga by having package deals where visitors for example can go on a boat ride, a boardwalk tour and make crafts on the same day. By doing this, more visitors will be attracted and the service will be exposed. Since there will be more work to do at this stage with arranging collaboration with organizations in Dunga, an idea is to employ one more woman to the team.

## STEP 4 - Selling products at the space



As a final step in the business, workshops will be held twice a day, one with children and one with other tourists. In addition to this, the service could be expanded to sell products at the space to further increase the income. At this point the vision is that the group of women creates new products on their own that can be suitable for sales to other tourists. The products can be bought by visitors to the workshops or people walking by. For this increased amount of work, one more woman can be employed to relieve the others in the team.

# CHECKLIST FOR DEVELOPMENT

To ensure that the service is constantly developing, a checklist has been developed. This is for the women to fill in when reaching goals at different levels and in that way be able to understand when to move on to the next step. At the end of the list, blank space has been left to be filled in by the women. This part is meant for the women to use for setting up their own goals in order to keep developing the service.

## STEP 1

- Tested having workshops with children
- Gained understanding about how to structure the workshops
- Experimented with dyeing the material

## STEP 2

- Established a schedule for workshops
- Divided roles between the women
- Earned enough money to move on to step 3

## STEP 3

- Started having workshops open for other tourists
- Initiated collaborations with organizations in Dunga

• Employed one more woman to the team

• Earned enough money to move on to step 4

## STEP 4

• Begin creating new products to sell at the space

• Start selling products at the space

• Employed one more woman to the team

## FUTURE STEPS - Fill in your own goals

- 
- 
- 
- 
- 
- 
- 
- 
-

# SPACE MANUAL

A STEP BY STEP GUIDE TO BUILD THE STRUCTURE IN KISUMU, KENYA



# Facts

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## REALITY STUDIO PROJECT

This manual is part of a project conducted within the Reality Studio course at Chalmers University of Technology in Gothenburg, Sweden. The project aims to empower the women living in Dunga Beach, Kisumu, who are experts on crafts made by the local materials; water hyacinth, papyrus and sisal. The result of the project is a service that can create value for the craftswomen. The service should offer educational workshops for children held by the women, where the women can teach their crafts and the history of the materials and the area.

## THE SPACE MANUAL

The space manual is a part of the service. It is made for the craftswomen to make their own first step and for professionals to be able to easily understand the following ones. The manual contains step by step-guides of different spaces that can be made achieved once the validity of the project has been tested.



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Approximative budget.....4-5

## Different steps:

Step 1.....6-11

Step 2.....12-19

Step 3.....20-27

Step 4.....28-33

Step 5.....34-42

# Approximative budget

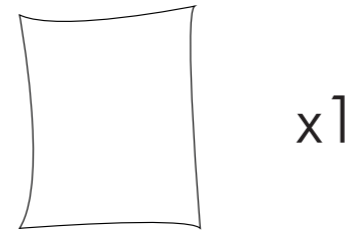
		step 2	step 4	step 5	step 5
labour per day for 1 expert and 2 assistants	2 700 ksh	10 800 ksh	5 400 ksh	8 100 ksh	10 800 ksh
concrete foundation		2 020 ksh	1 010 ksh		
cement	700 ksh/ per bag				
ballast (crushed stones)	200 ksh/ per wheelbarrow				
sand	110 ksh / per wheelbarrow				
metal plate	8900 ksh / per 8ftx4ft	1 670 ksh	835 ksh		
bolts	350 ksh/ per bolt	5 600 ksh	2 800 ksh		
toilet reinforcement	about 40 000 ksh/total				
excavation	15 000 ksh				
wall reinforcement	20 000 ksh				
wooden beam (3''x3'')	45 ksh/ft				
wooden beam (2''x2'')	35 ksh/ft		3 555 ksh	3 600 ksh	5 040 ksh
disclosure : all metals are sold in 38ft length					
metal beam (3''x3''x2.5mm)	5 300 ksh	2 650 ksh	1 325 ksh	1 325 ksh	6 974 ksh
metal beam (1.5''x2''x1.5mm)	2 800 ksh	3 611 ksh	2 873 ksh	2 873 ksh	3 758 ksh
angle line (3''x3''x3mm)	4 200 ksh				1 769 ksh
angle line (1.5''0.5''x2mm)	1 800 ksh	500 ksh	500 ksh	120 ksh	1 000ksh
corrugated iron sheets (10ftx2.5ft)	1 100 ksh			8 624 ksh	
roofing bolts (100-120 pieces)	4 800 ksh			4 800 ksh	
wood screws (180-150 pieces)	800 ksh				800 ksh
metal rods for hooks (40ft)	400 ksh				400 ksh
wooden pallets (to verify)	800 ksh/ each				5 600 ksh
<b>total</b>		<b>26 851 ksh</b>	<b>18 298 ksh</b>	<b>29 442 ksh</b>	<b>36 141 ksh</b>
<b>total + 10% margin</b>		<b>29 536 ksh</b>	<b>20 127 ksh</b>	<b>32 387 ksh</b>	<b>39 756 ksh</b>

# Step 1



Firstly, to test the validity of the workshop, you should start off with a very simple shading structure. The point of this step is to simply try out the workshop without having to invest in any structural elements.

## WHAT YOU WILL NEED:



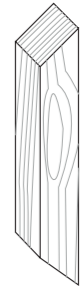
x1

a large sheet or tarpaulin



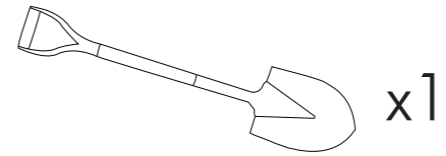
x2

a few ropes



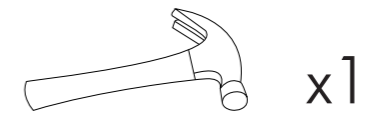
x2

2 long pieces of wood



x1

a spade



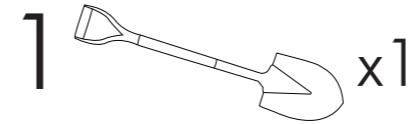
x1

a hammer



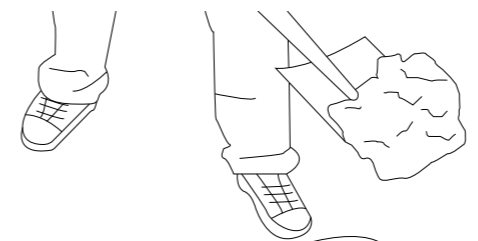
x4

nails



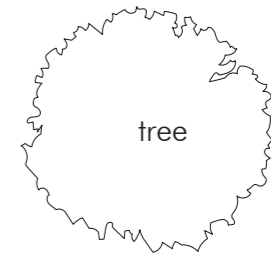
1

x1

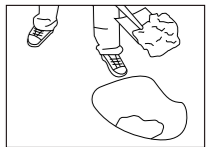


x2

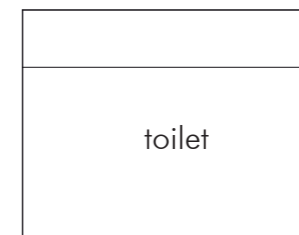
dig two holes as indicated on the plan



tree

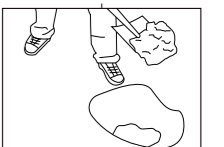


6 ft




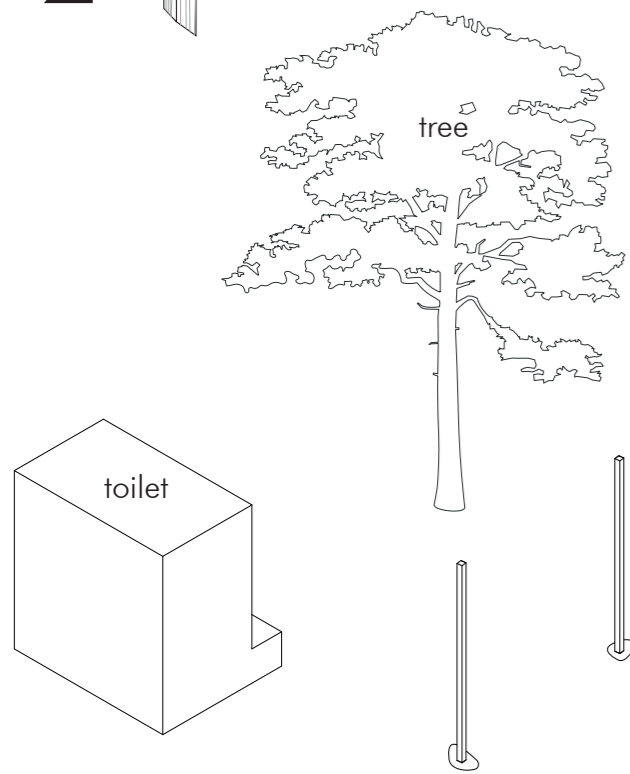
toilet

8 ft


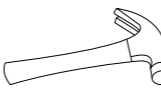


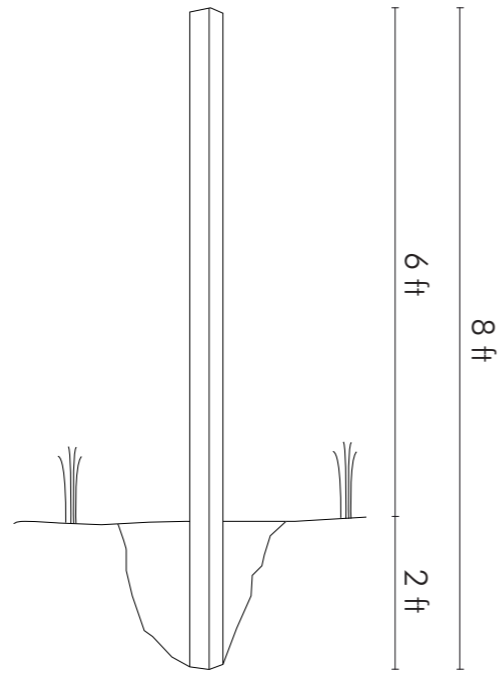
plan view

2  x2

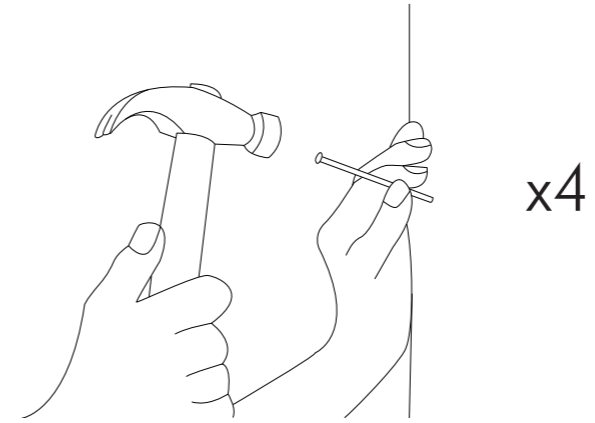


fill out the holes with 2 long poles

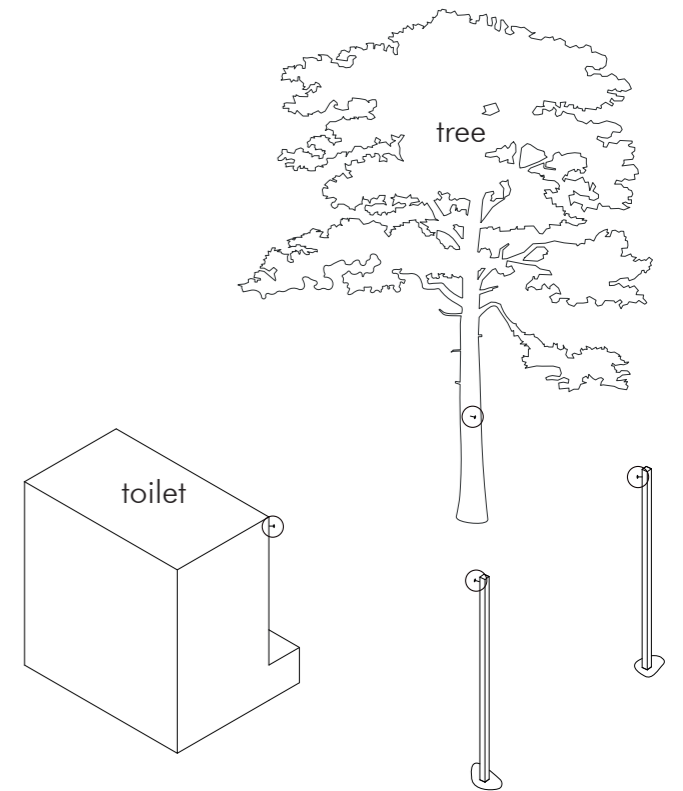
4  x4  x1

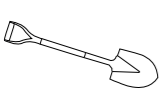


section view



hammer a nail at each indicated place around 5.5 ft above floor level

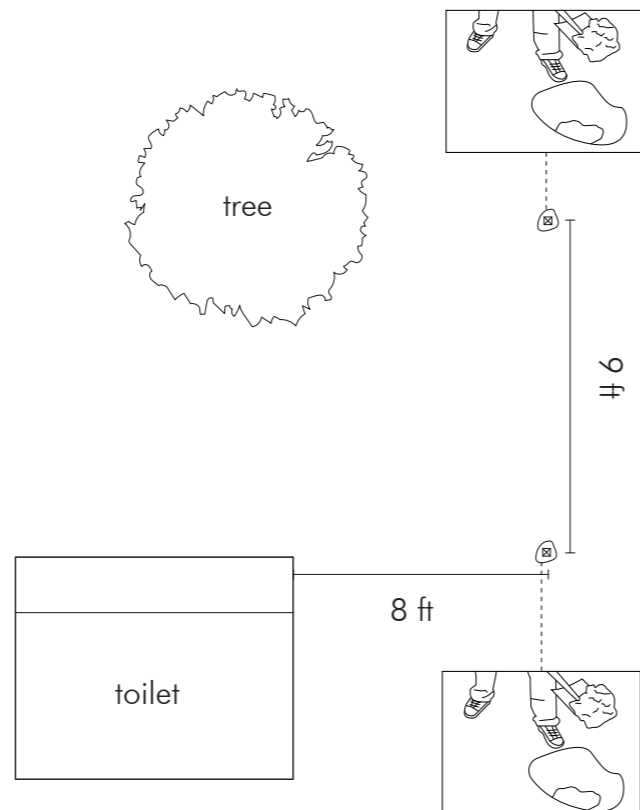


3  x1

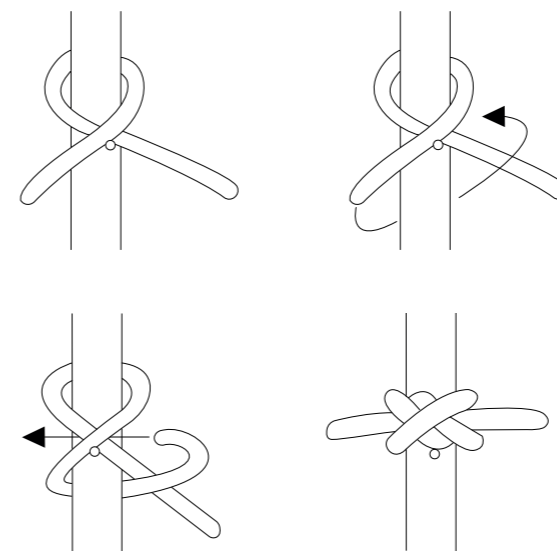


fill in the two whole holes with the poles inside

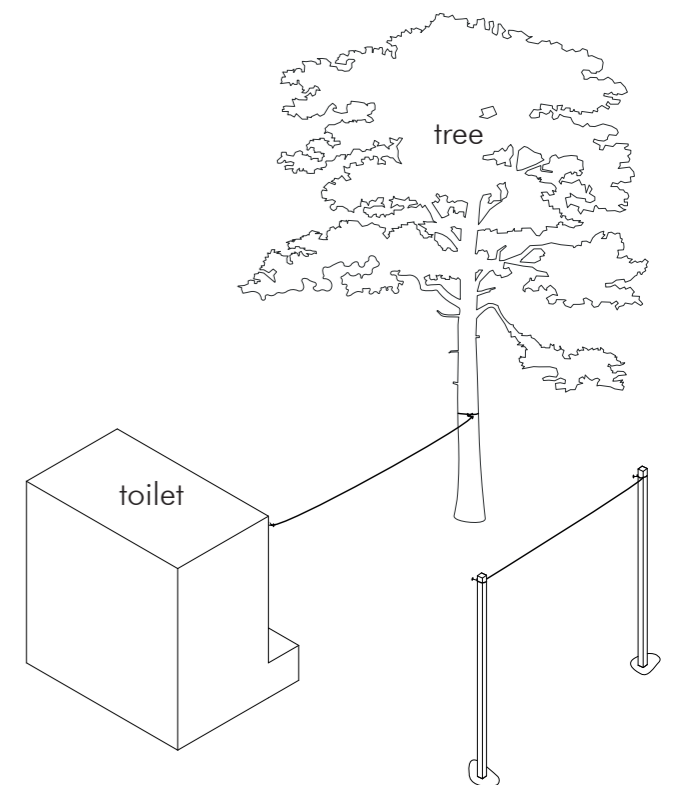
5  x2

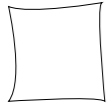


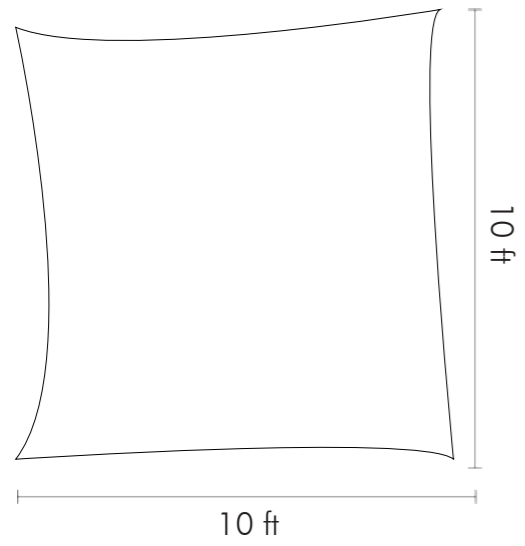
plan view



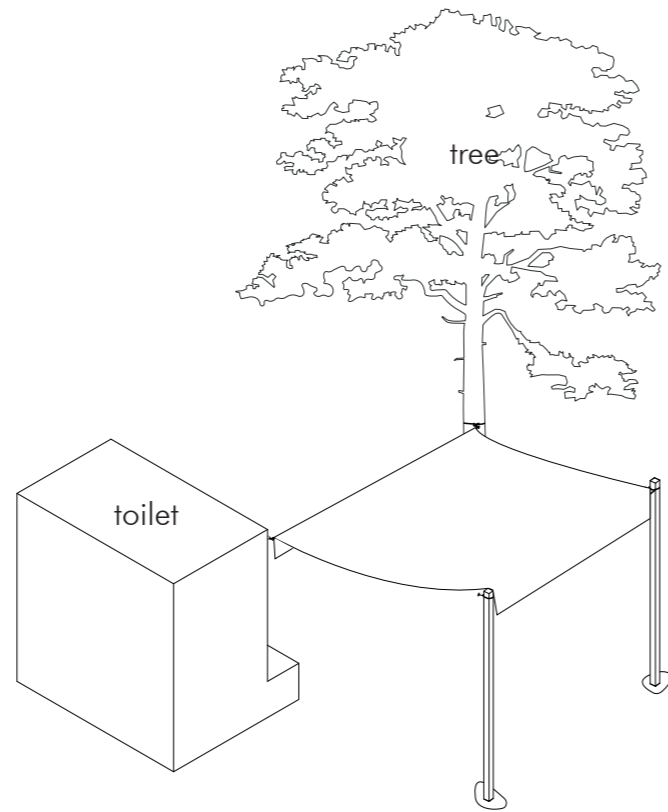
attach the rope like so around each pole simply coil it around the toilet nail



6  x1



haul the sheet/tarpaulin over the rope

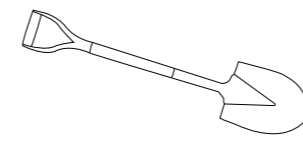


# Step 2



In this second step, we will add a metallic frame and hang a papyrus mat from it for shading.

## WHAT YOU WILL NEED:



x1

a spade



x4

four ropes



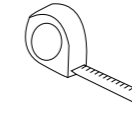
x4

four small wooden sticks



x1

a spirit level



x1

a tape measure



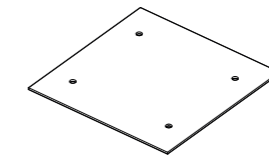
x1

a compactor



x16

threaded rods



x4

metal plate

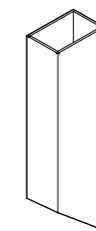
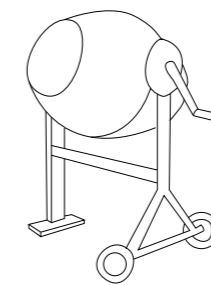


x8

metal rod

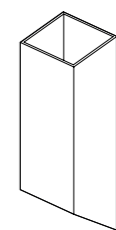
### CONCRETE MIX:

use the 1-2-3 mix ratio:  
1 part concrete  
2 parts sand  
3 parts ballast  
+ water



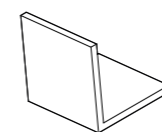
x8

metal beam  
(1.5''x2''x1.5mm)



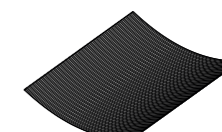
x4

metal beam  
(3''x3''x2.5mm)



x16

angle line  
(1.5''x0.5''x2mm)



x1

papyrus mat

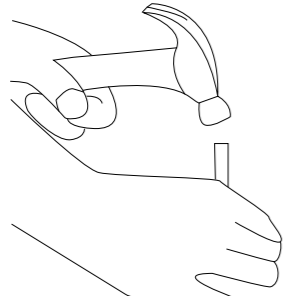


x2

a few ropes

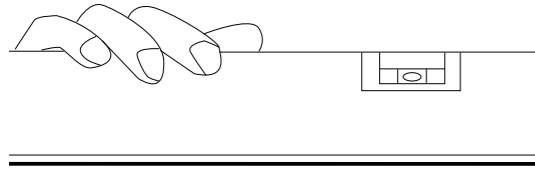
- 1
- shovel x1
  - rope x4
  - wooden stick x4
  - level x1
  - key x1
  - rod x1

a) hammer the four wooden sticks into the marked spaces

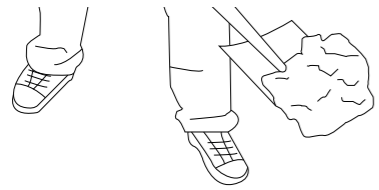


b) attach the ropes around the wooden sticks

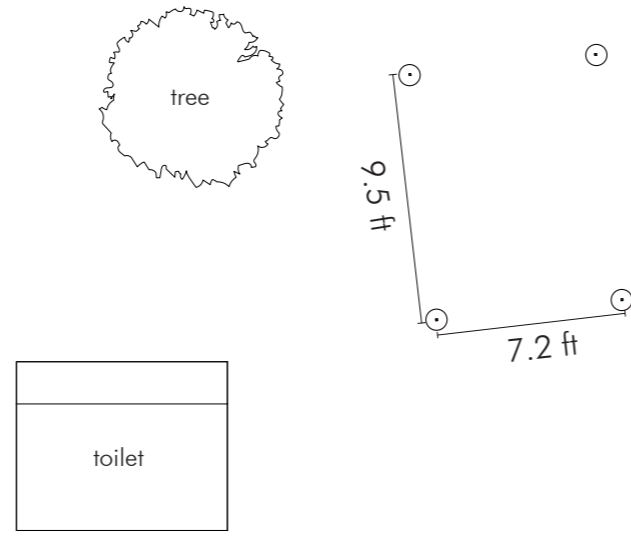
c) check if the rope is straight with the level if not - adjust it



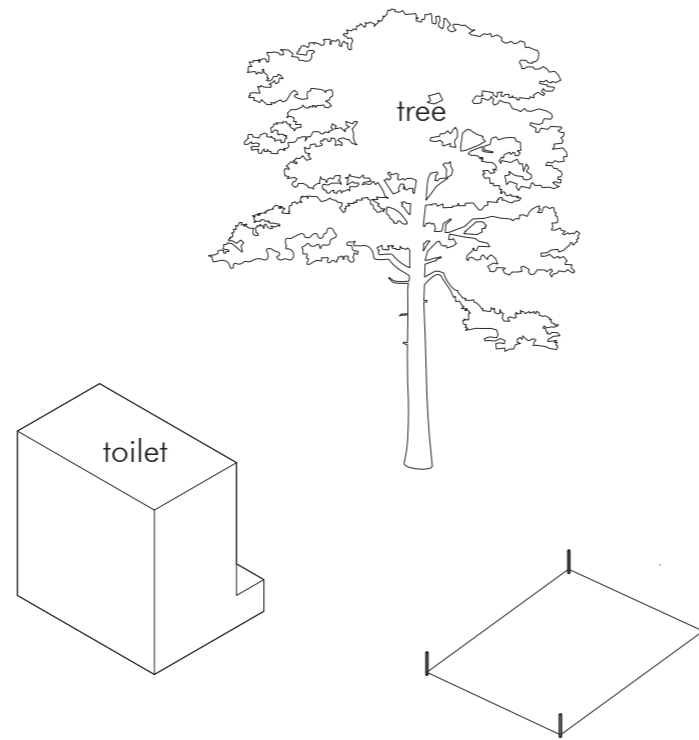
d) make the floor level flat and by using a spade to redistribute the earth



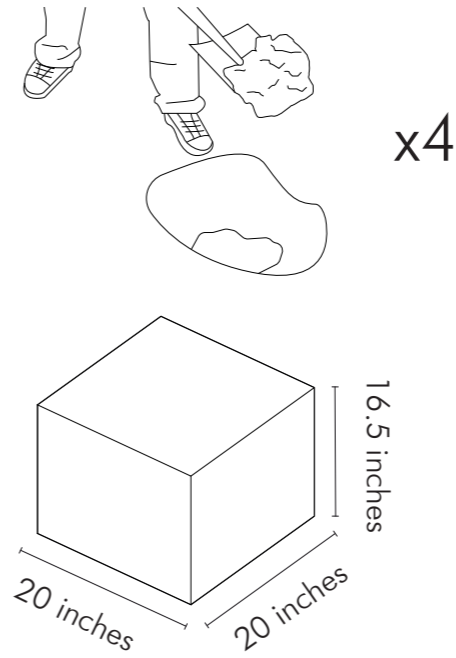
e) use the compactor to compact the regularly distributed earth



plan view

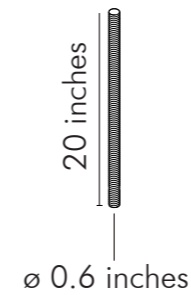
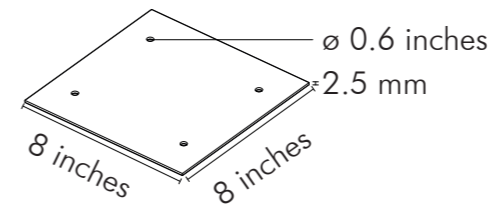


- 2
- shovel x1

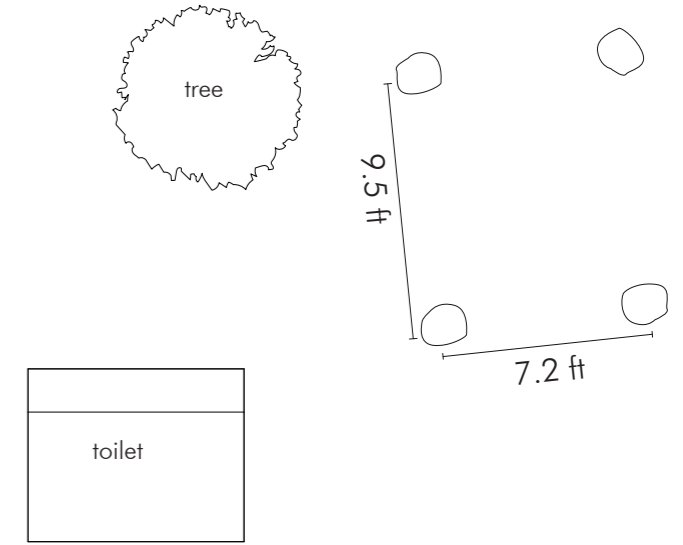


dig four holes as indicated on the plan

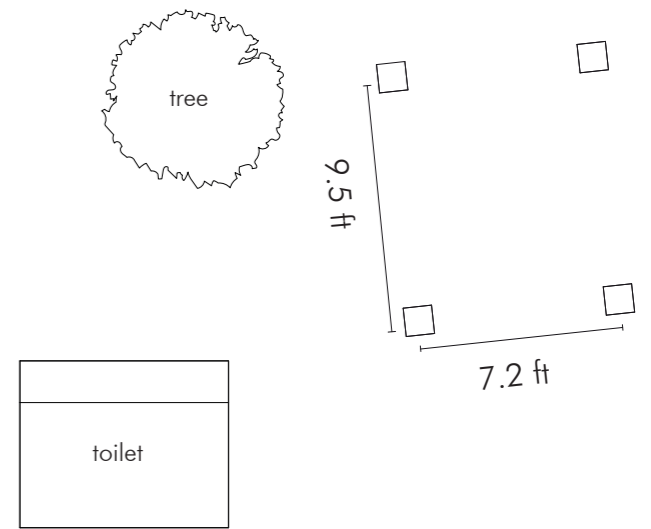
- 3
- rod x16
  - nut x4
  - rod x8



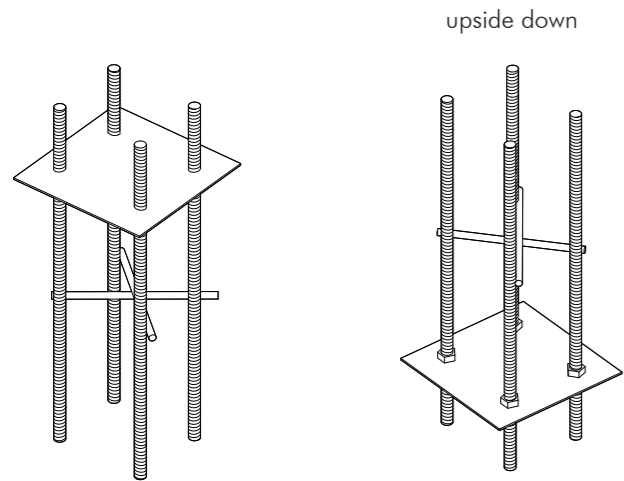
pour concrete into the hole and place the nuts inside



plan view

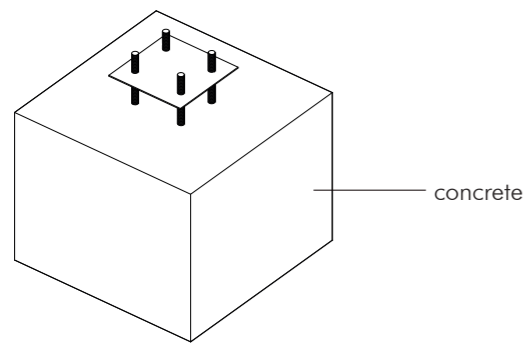


plan view



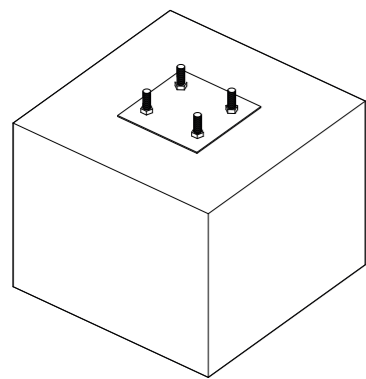
upside down

make a cross bracing to keep everything into position  
make sure to put bolts under the metal plate

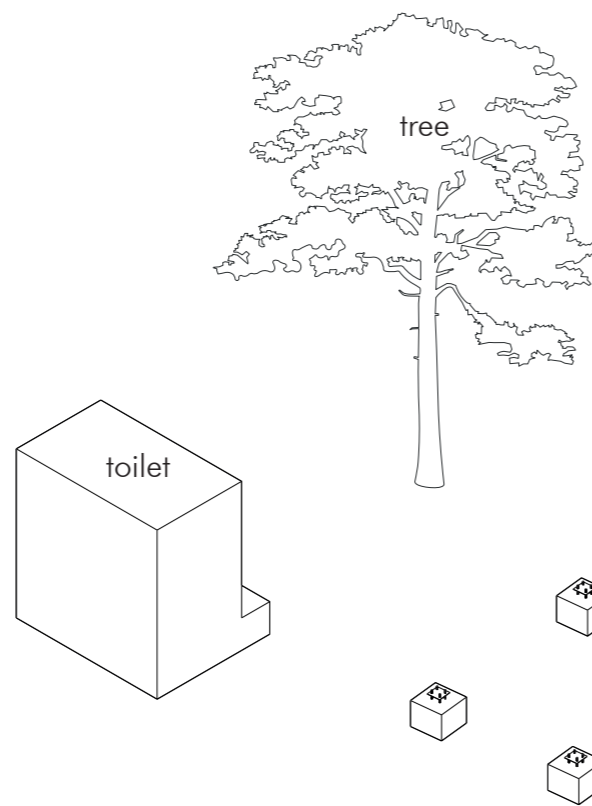


concrete

set pile cap on nuts to keep the piles from moving as the concrete cures (around 7 days)



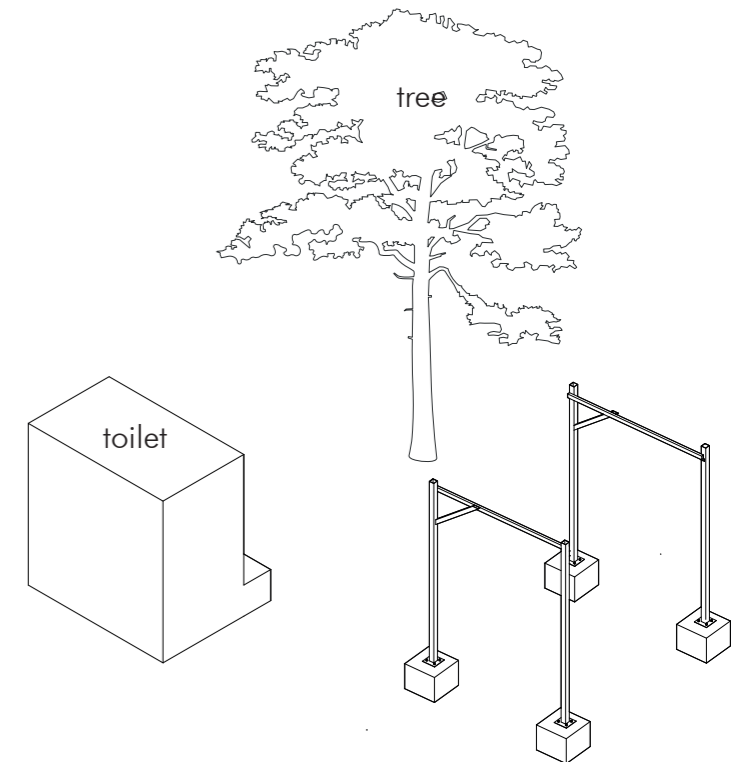
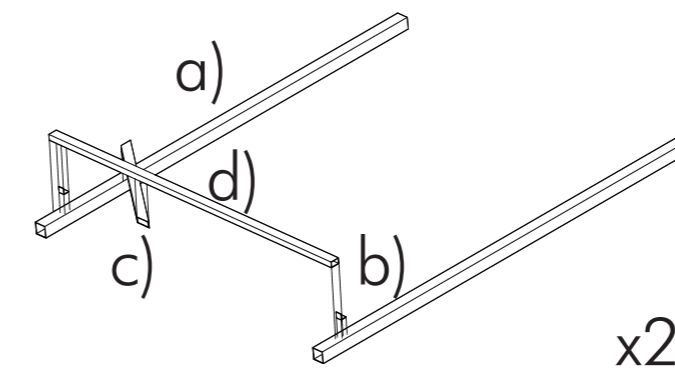
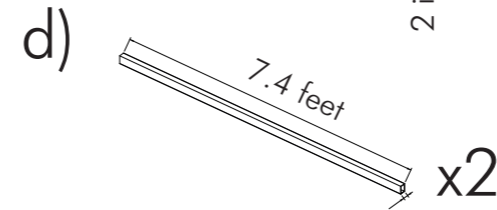
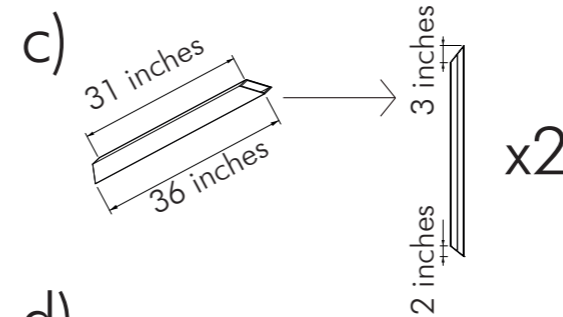
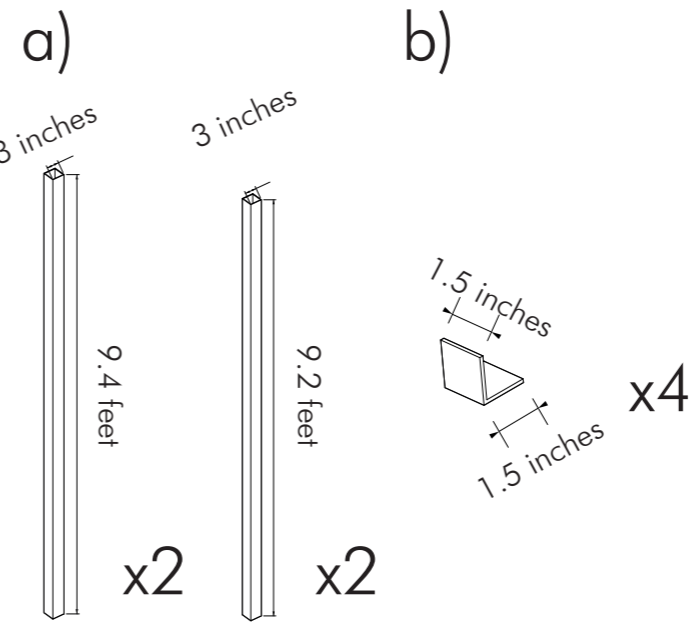
bolt the caps onto the metal plates



toilet

tree


4 x4 x4 x4

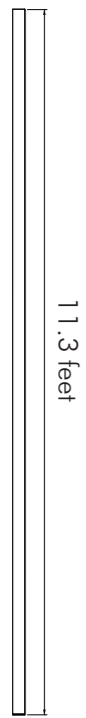


toilet

tree

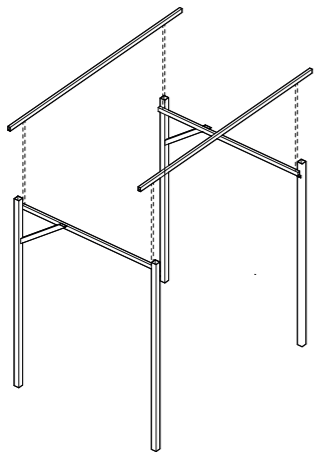
- 1) weld the different pieces together to build a frame, first with the 9.4 ft poles then another one with the 9.2 ft poles
- 2) weld the different frames onto the metal plates

5  x4

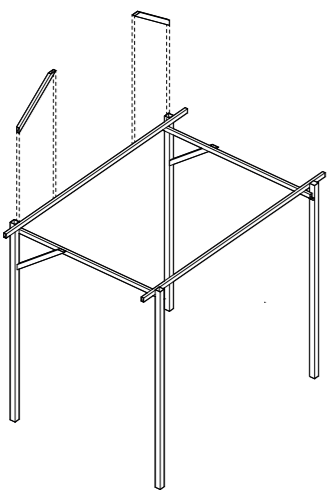


3.2 inches 27.5 inches 1.8 inches

a)



b)

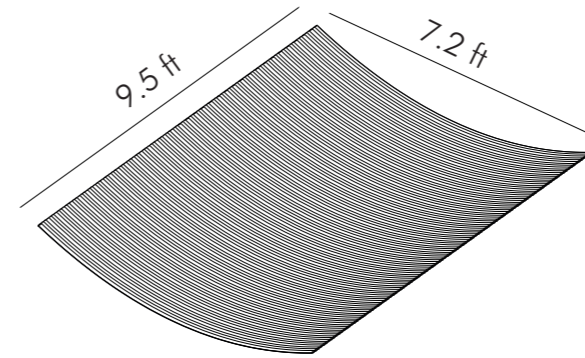


weld the pieces together in this way

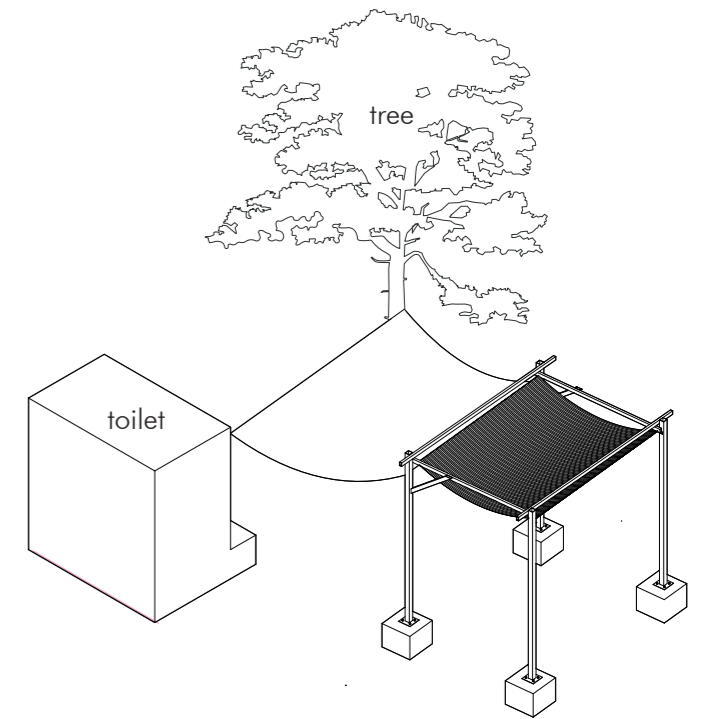
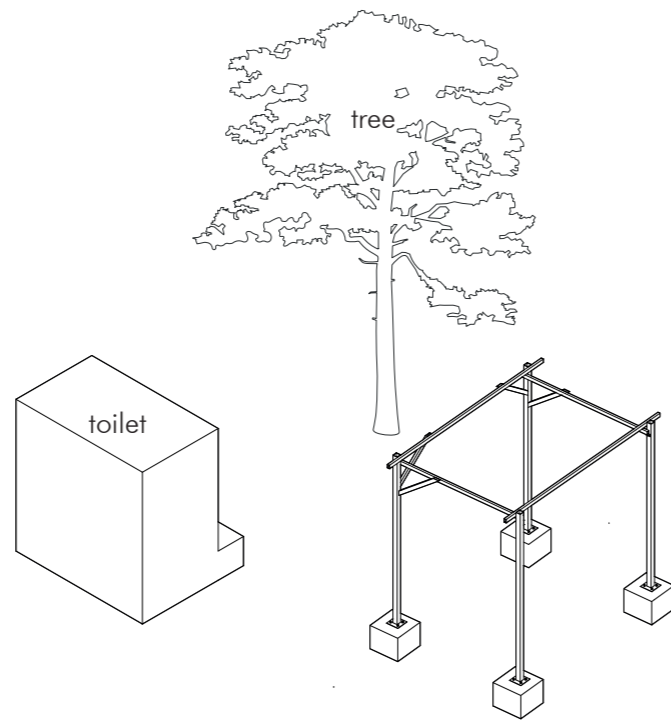
6  x2  x1

a) repeat step 1.5 to attach the sheet

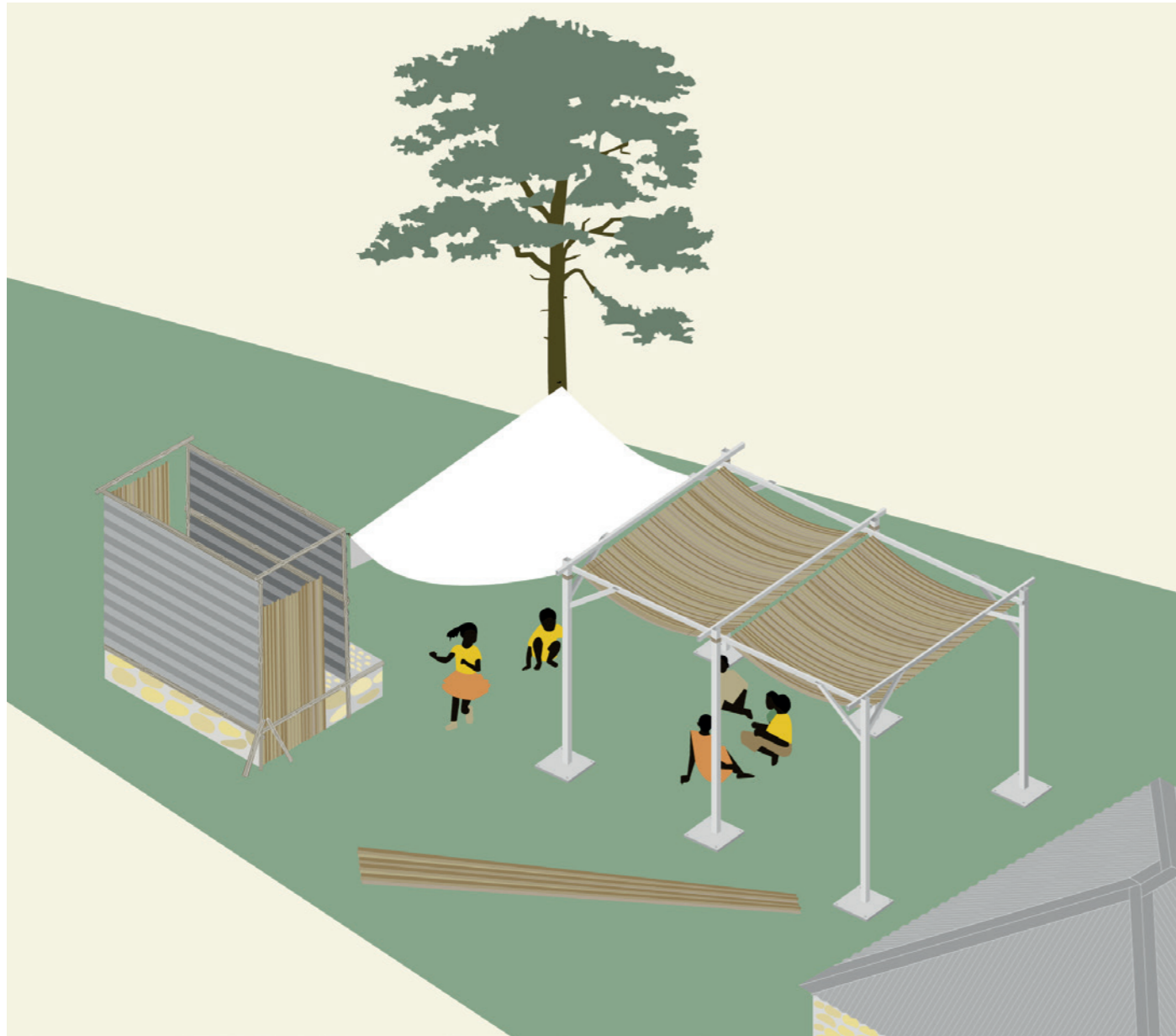
b)



make a papyrus mat in these dimensions and attach them to the structure as seen in the axonometry

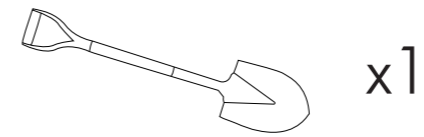


# Step 3



In this third step, we will add a module to the structure.

## WHAT YOU WILL NEED:



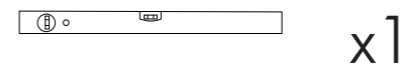
a spade



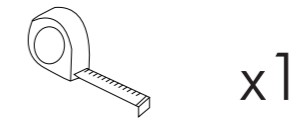
four ropes



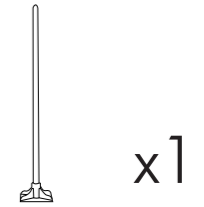
four small wooden sticks



a spirit level



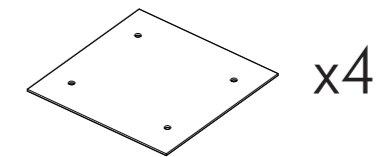
a tape measure



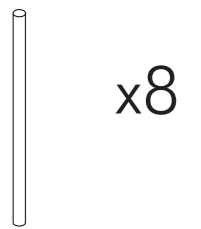
a compactor



threaded rods



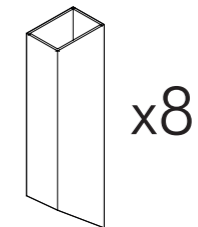
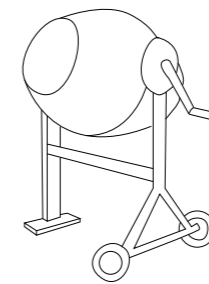
metal plate



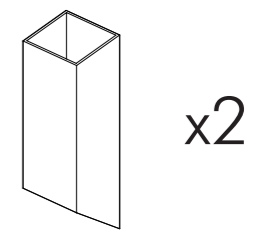
metal rod

### CONCRETE MIX:

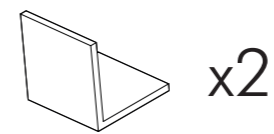
use the 1-2-3 mix ratio:  
1 part concrete  
2 parts sand  
3 parts ballast  
+ water



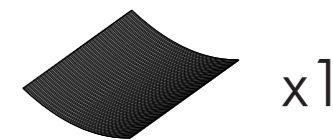
metal beam  
(1.5''x2''x1.5mm)



metal beam  
(3''x3''x2.5mm)



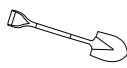





angle line  
(1.5''x0.5''x2mm)

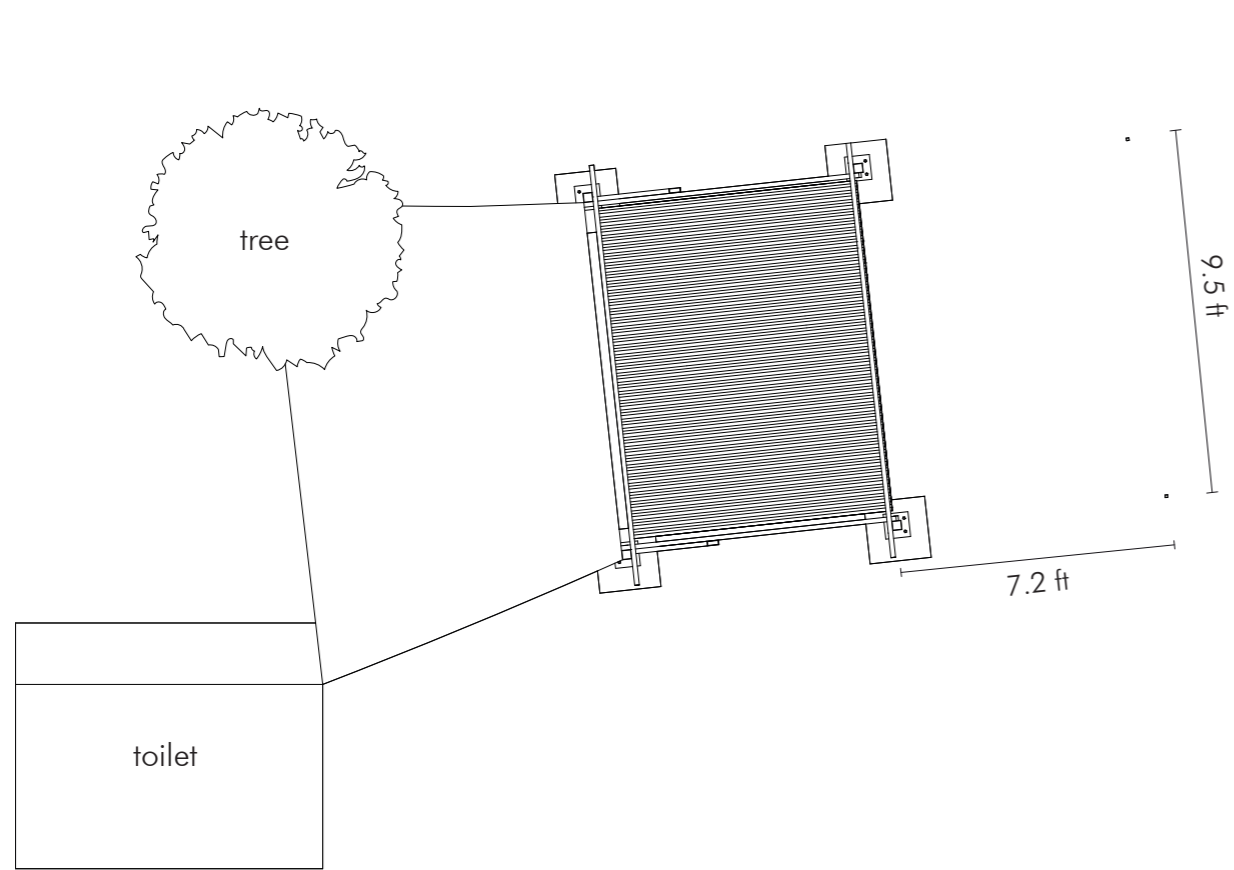


papyrus mat

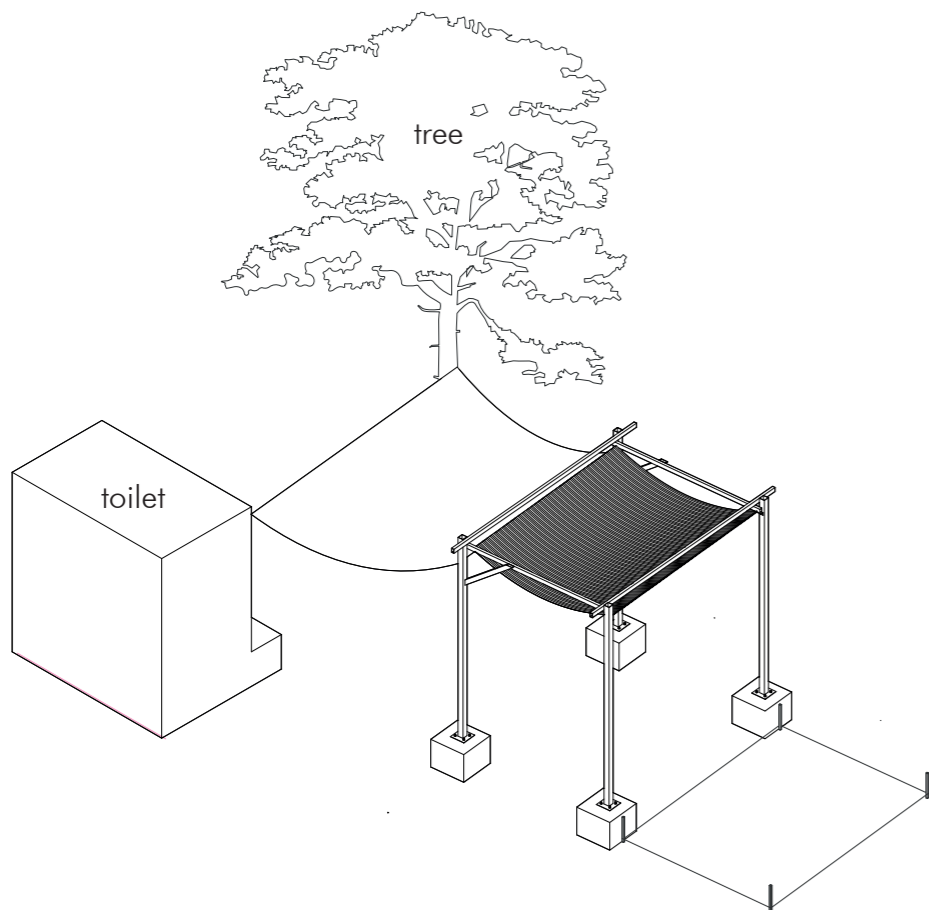


a few ropes

- 1
-  x1
  -  x4
  -  x4
  -  x1
  -  x1
  -  x1



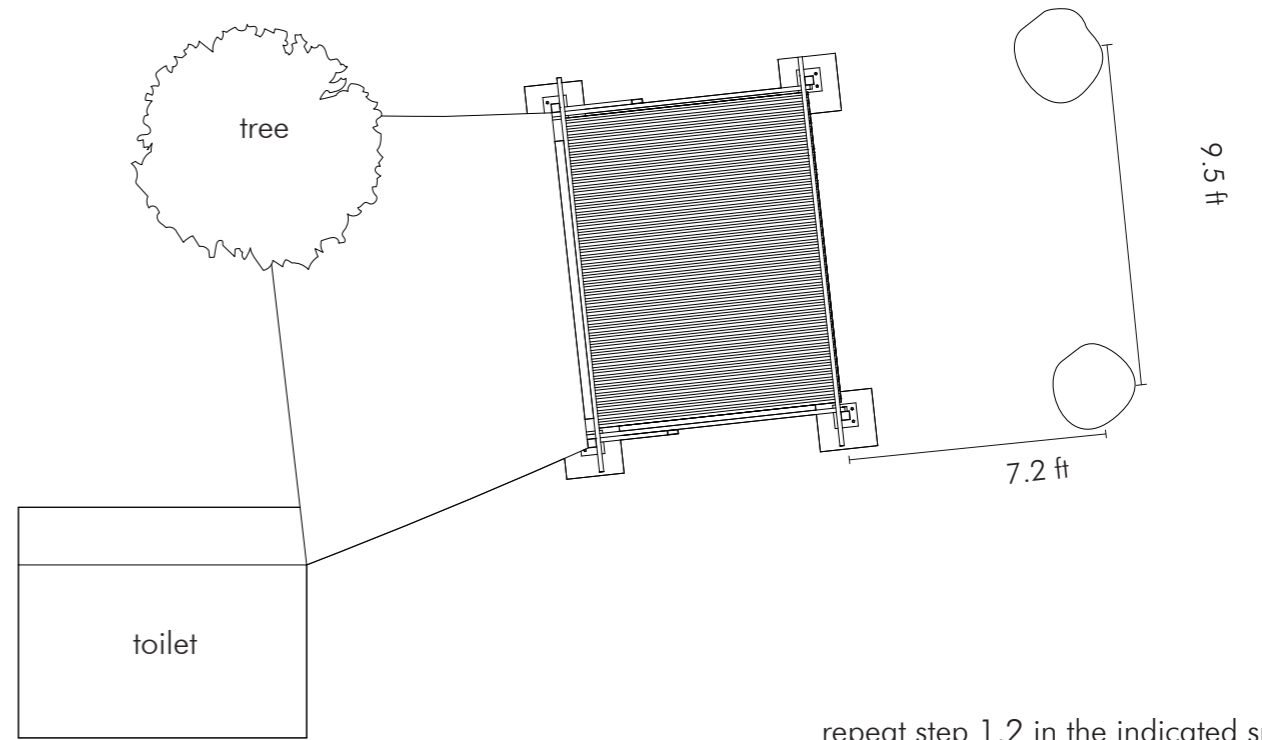
plan view




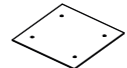

axonometric view

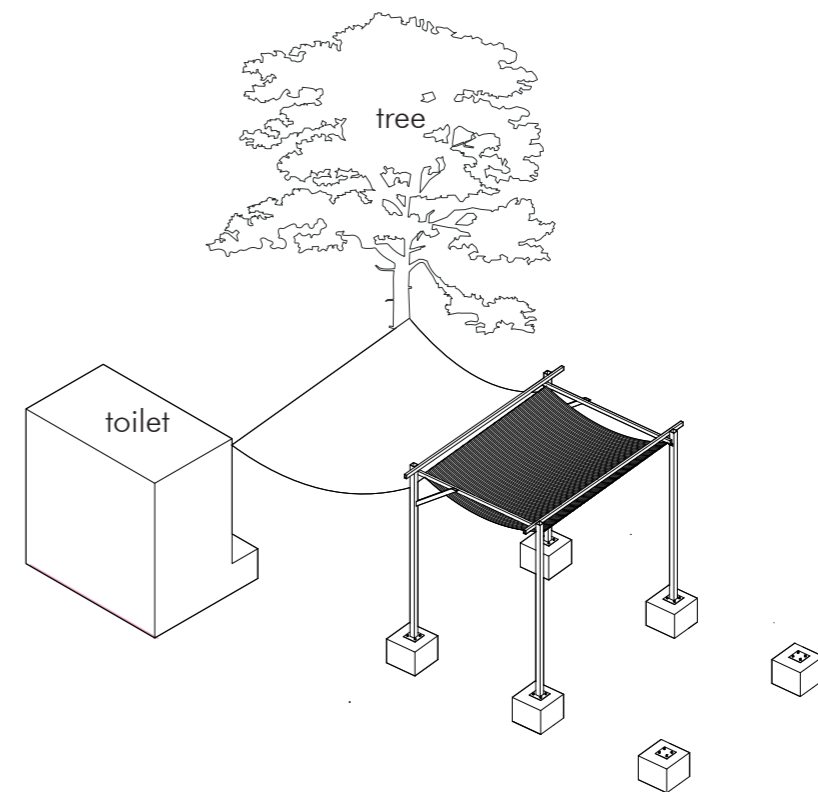
repeat step 1.1 with these distances

- 2
-  x1

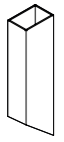

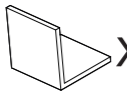


repeat step 1.2 in the indicated spots

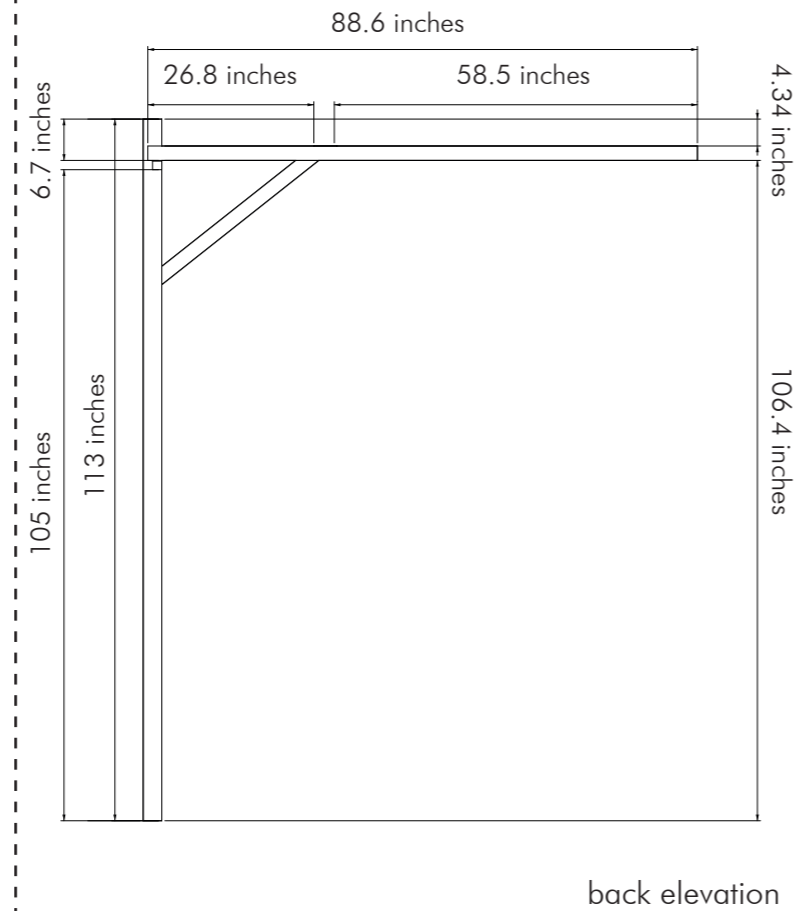
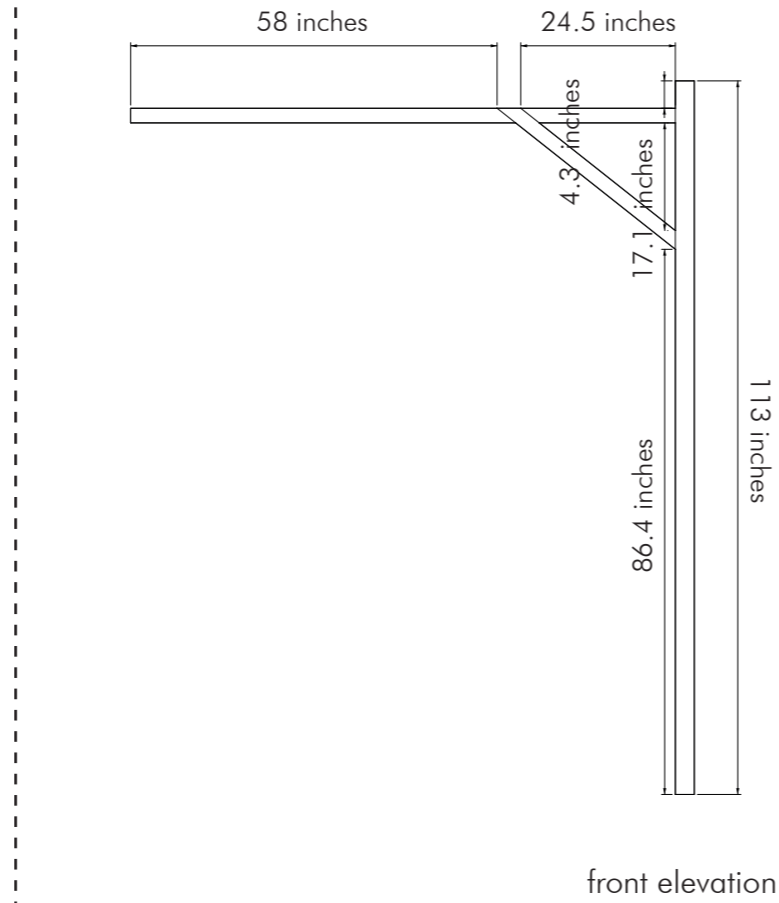
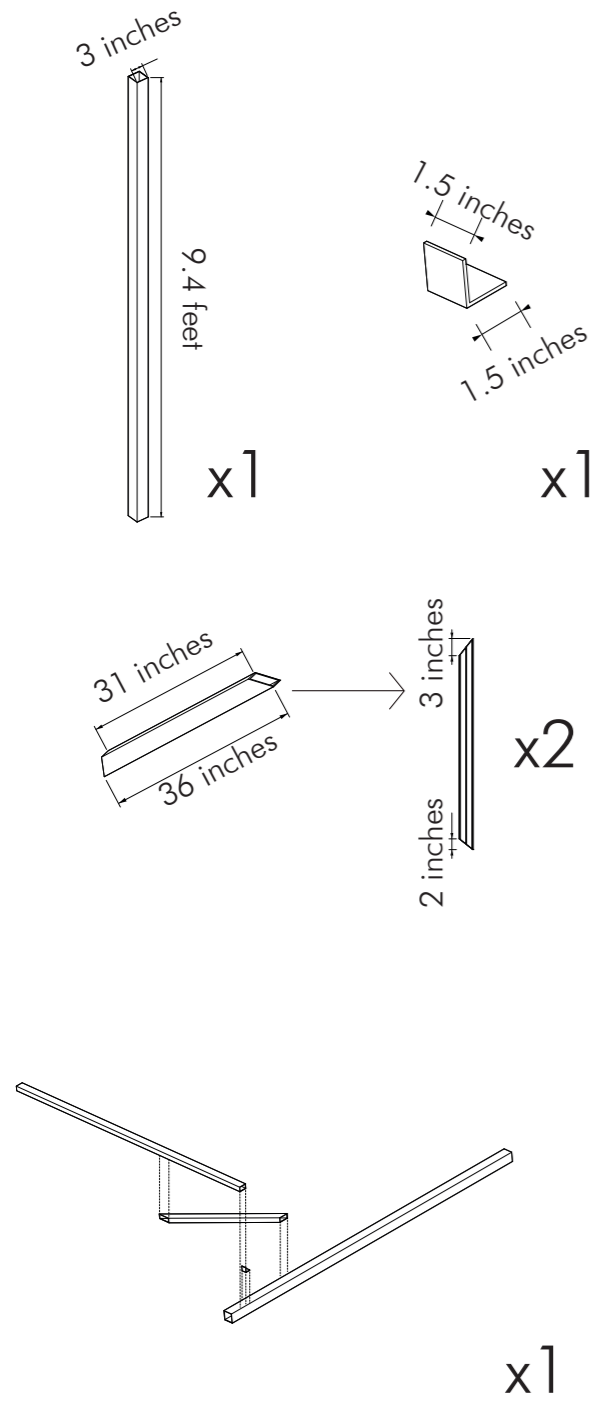
- 3
-  x8
  -  x2
  -  x8



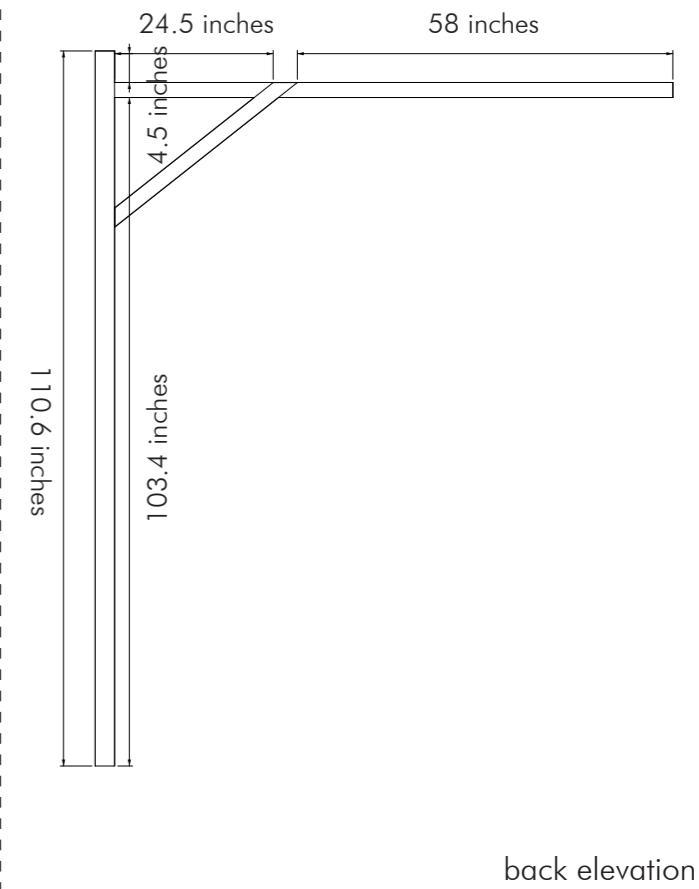
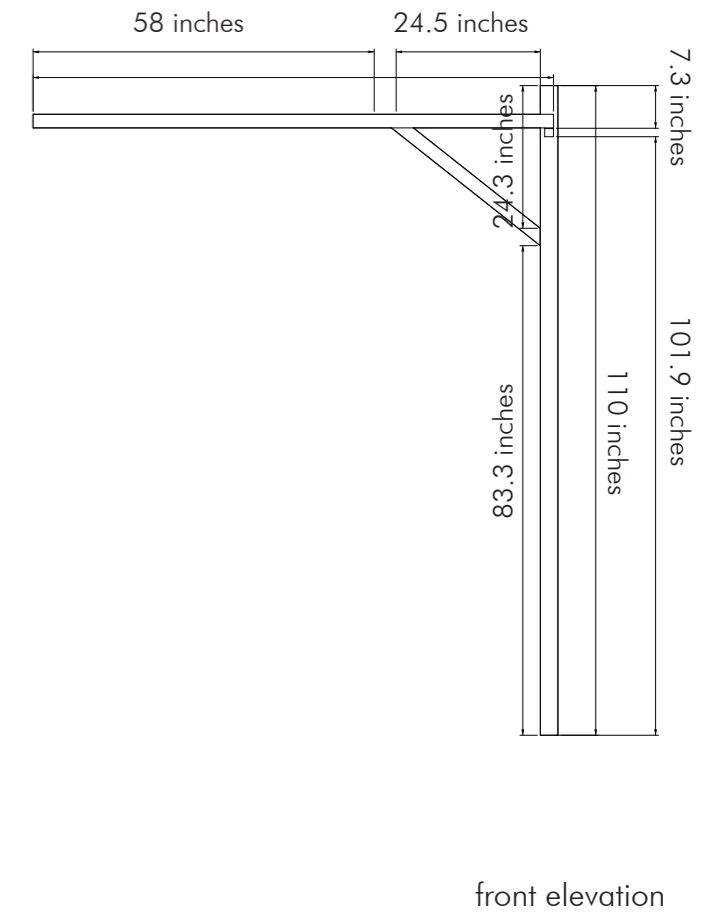
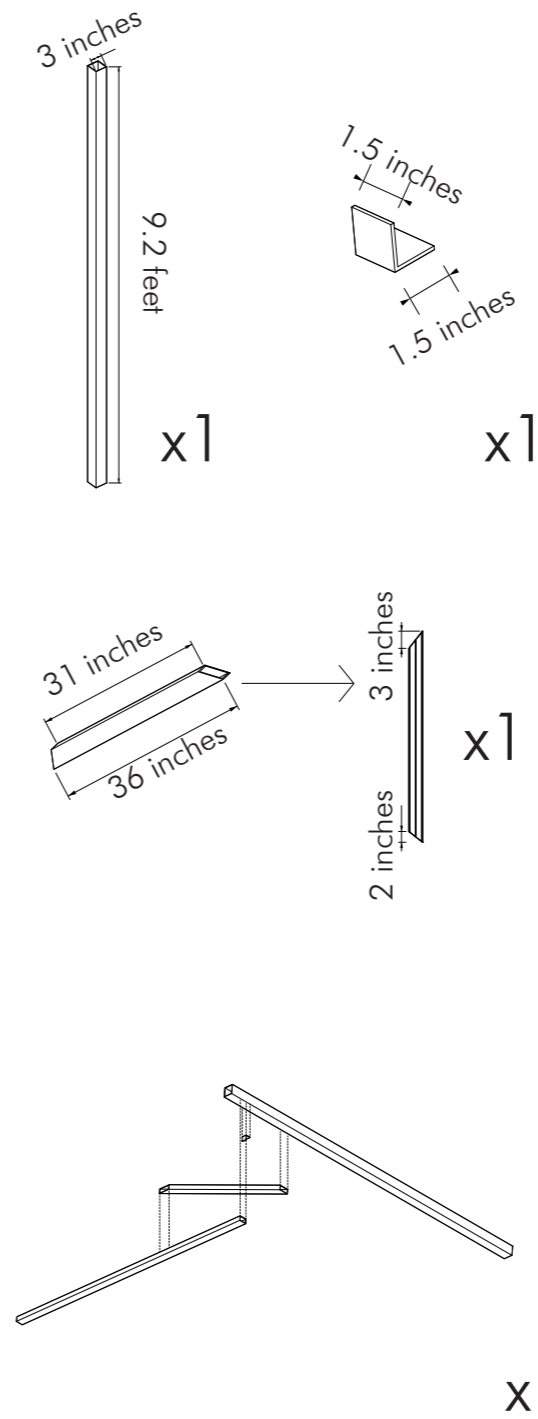
repeat step 1.3 in the indicated spots

4  x4  x2  x2

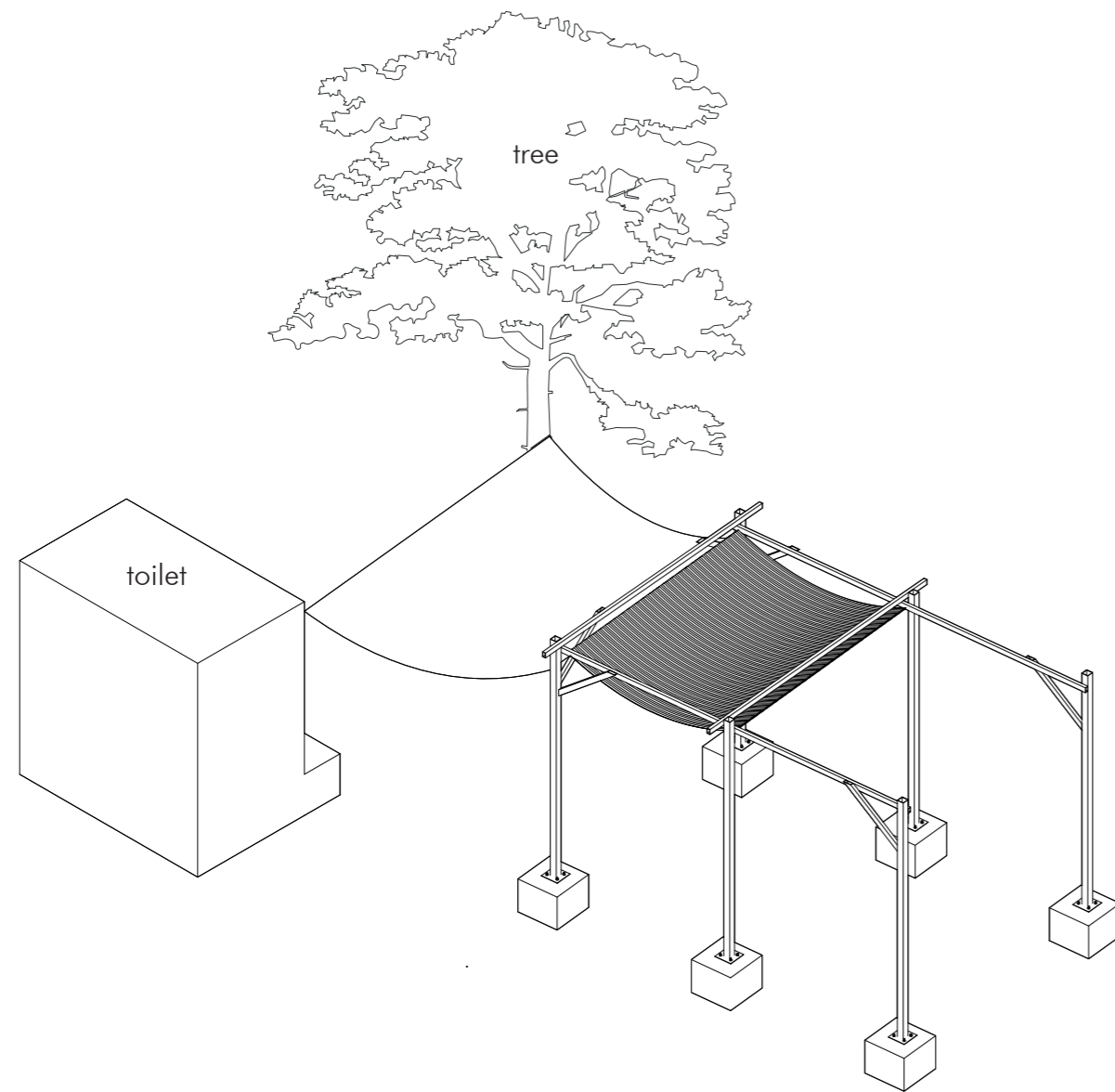
a)




b)

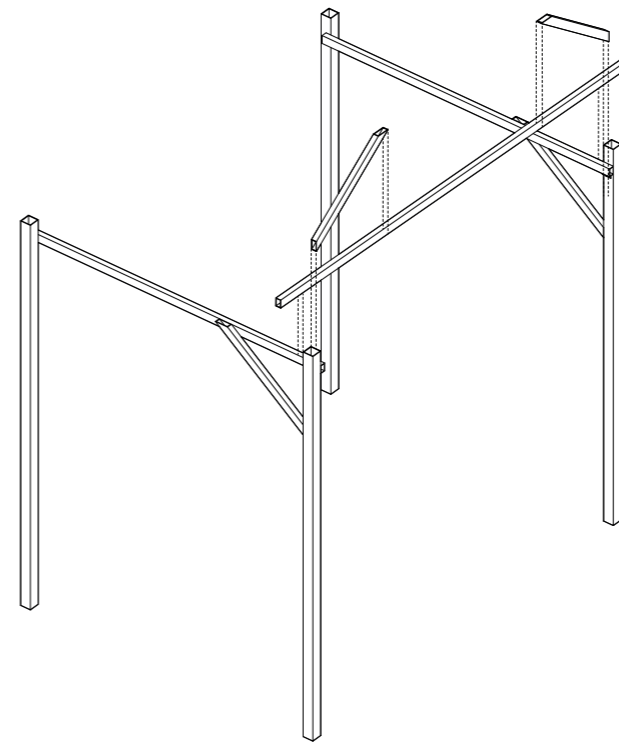


c)



weld frames onto the metal plates

5  x4

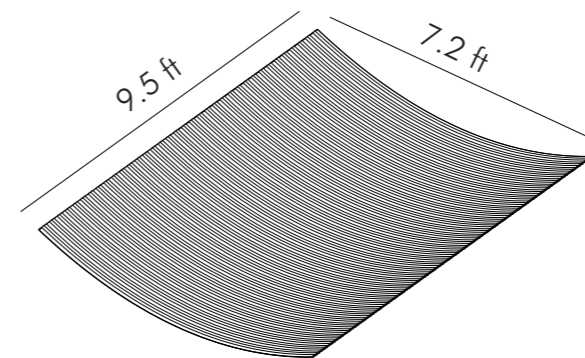


weld the pieces together in this way

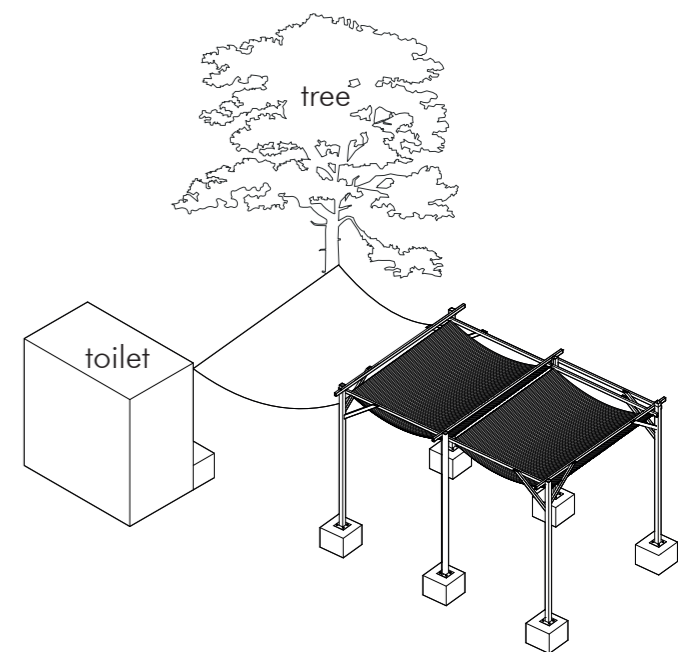
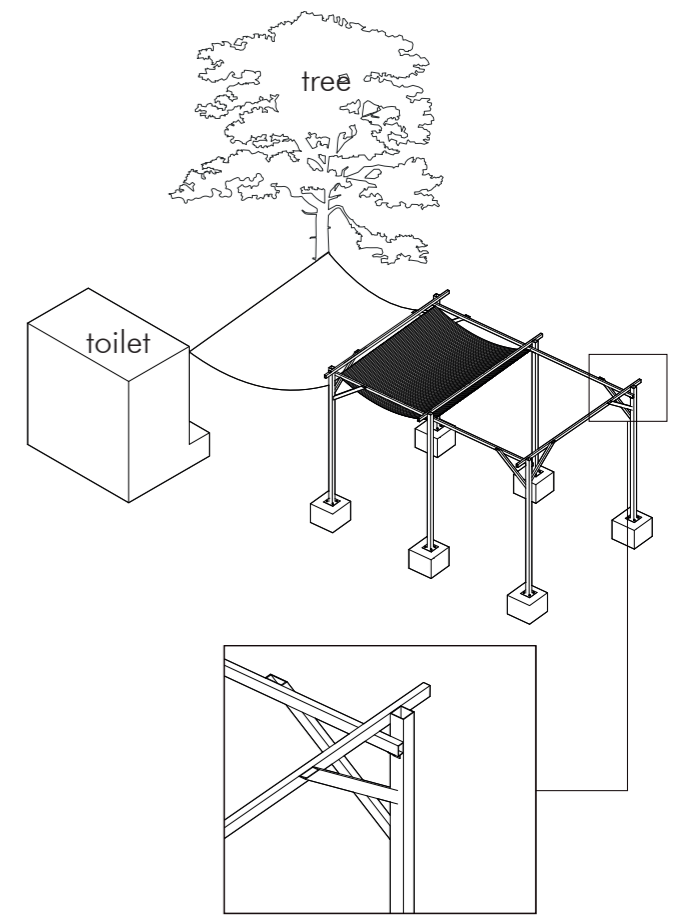
6  x2  x1

a) repeat step 1.5 to attach the sheet

b)

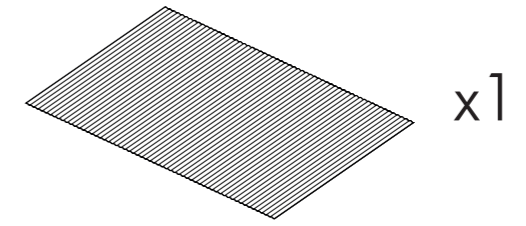


make a papyrus mat in these dimensions and attach them to the structure as seen in the axonometry



# Step 4

## WHAT YOU WILL NEED:



x1

corrugated iron



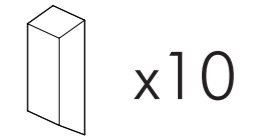
x20

angle line



x100

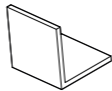
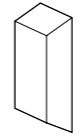

screws

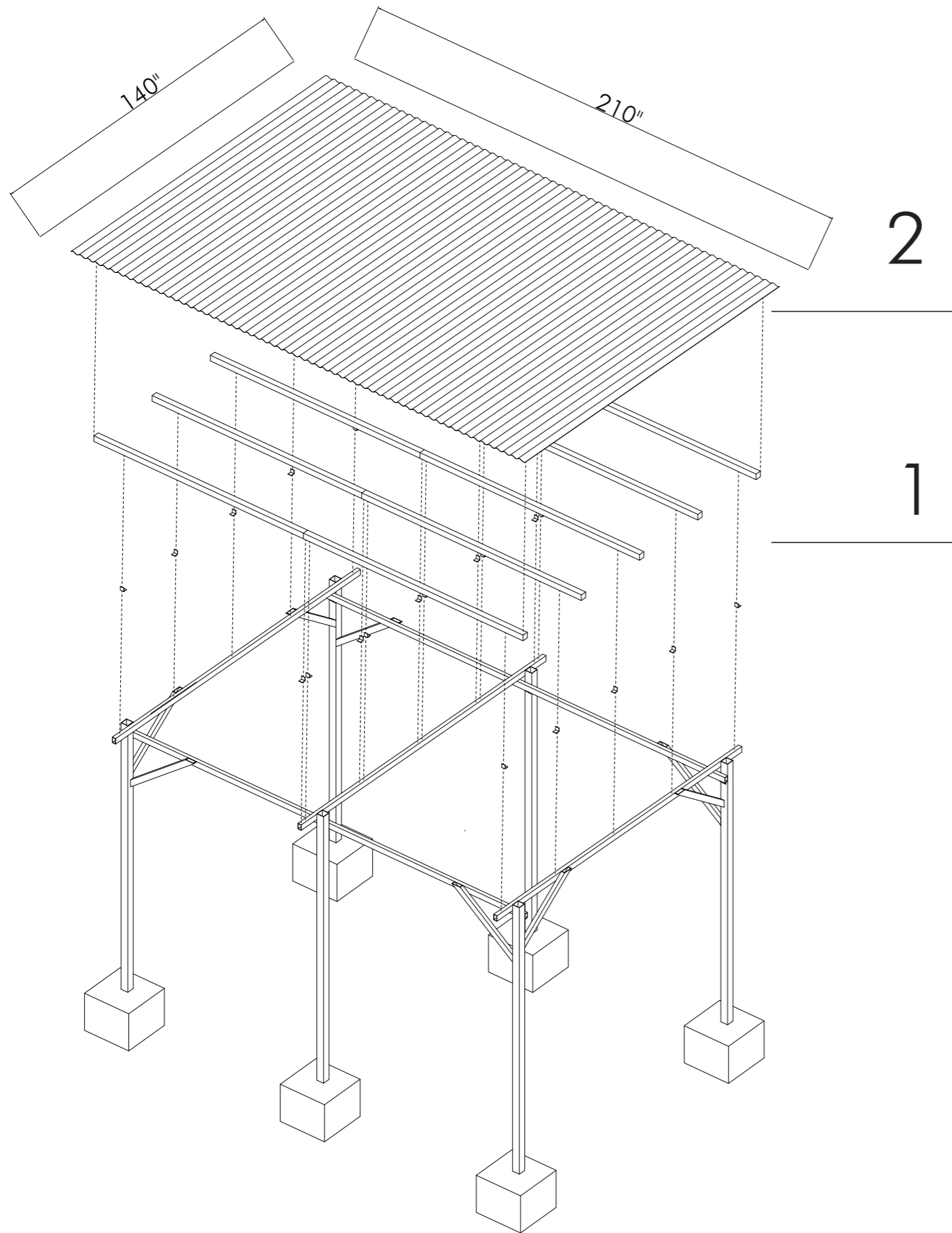


x10

timber beams

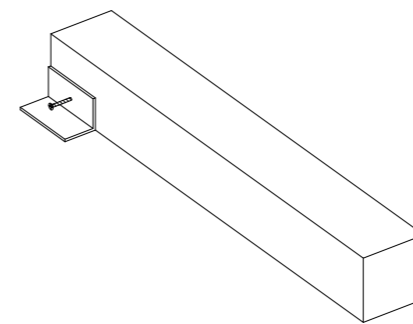
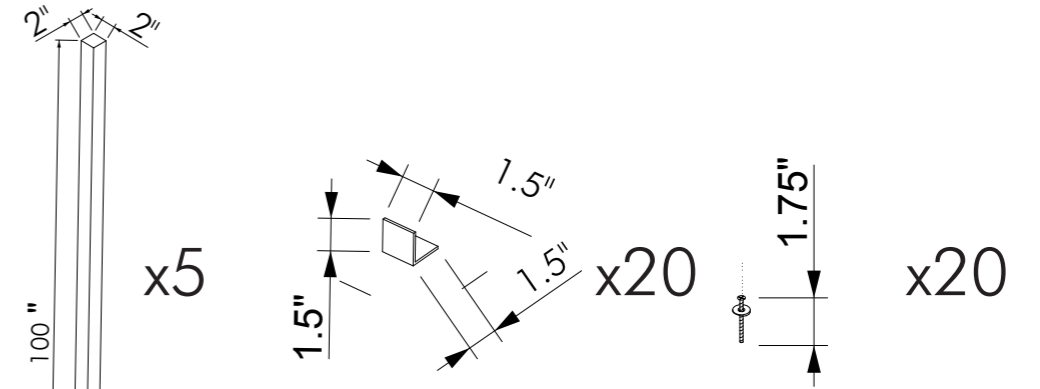
In this fourth step, we will add a corrugated iron roof.

1  x20  x10  x20

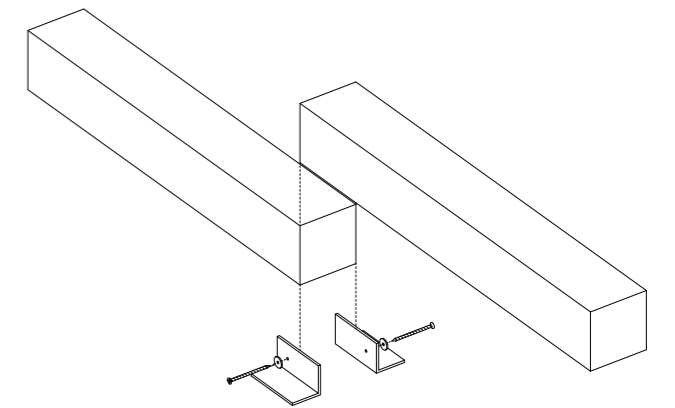


2

1




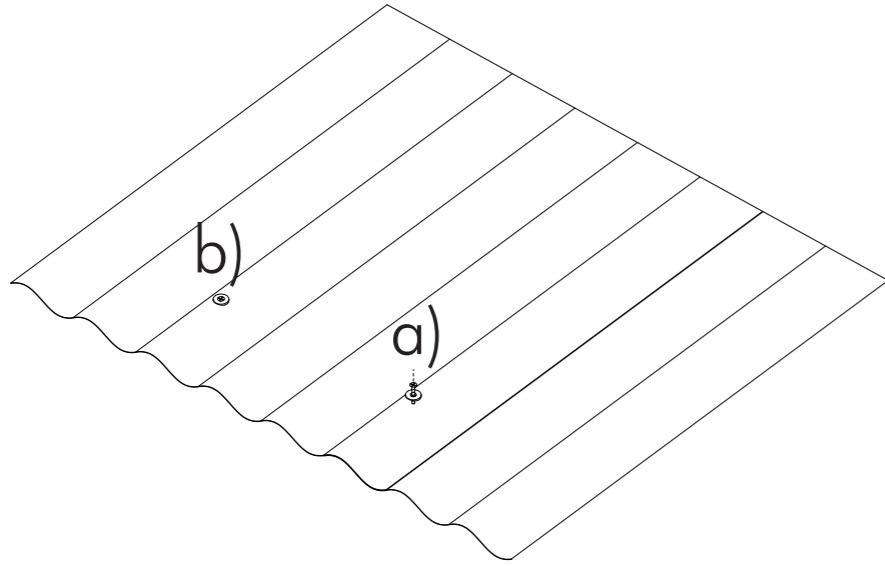
detail of the joinery for the end of the wooden beam that isn't connected to another



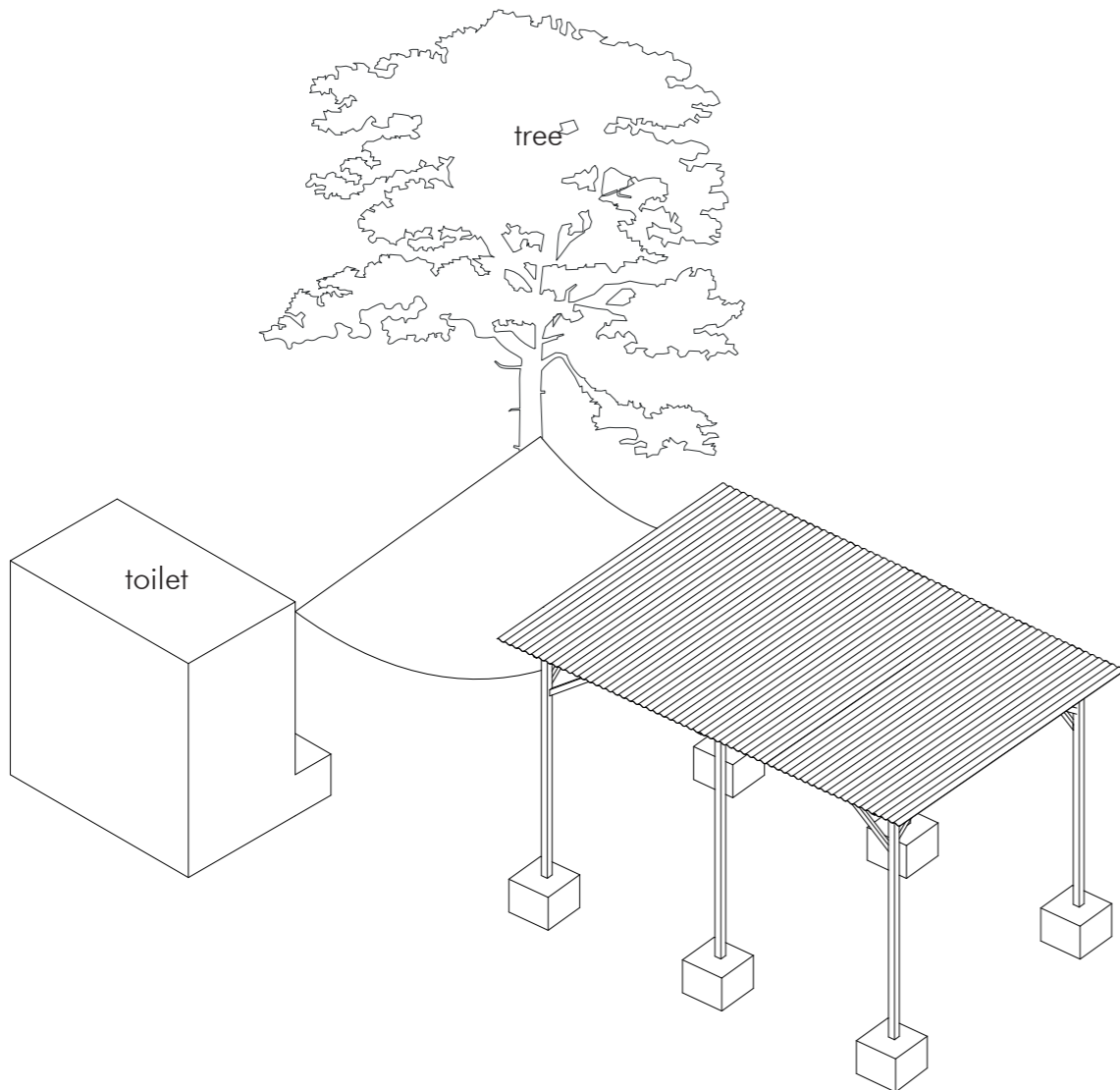
detail of the joinery between two wooden beams in the center

weld the different angle lines to the structure, then position the wood at the indicated distances to screw them in

2  x80



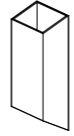
detail of how to drill the corrugated iron roof into place

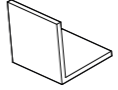


# Step 5

## WHAT YOU WILL NEED:

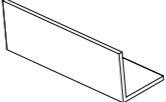


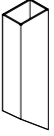
 x17  
metal beams 5"x5"

 x6  
angle lines

 x186  
wood from pallets

 x322  
screws

 x20  
long angle lines


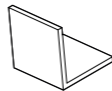
 x6  
metal beams 2"x5"

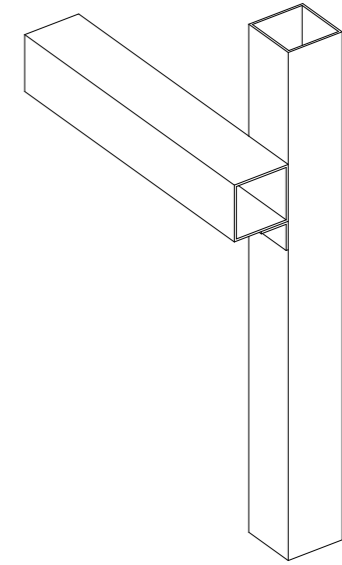
 x96  
metal hooks

 x6  
papyrus mats

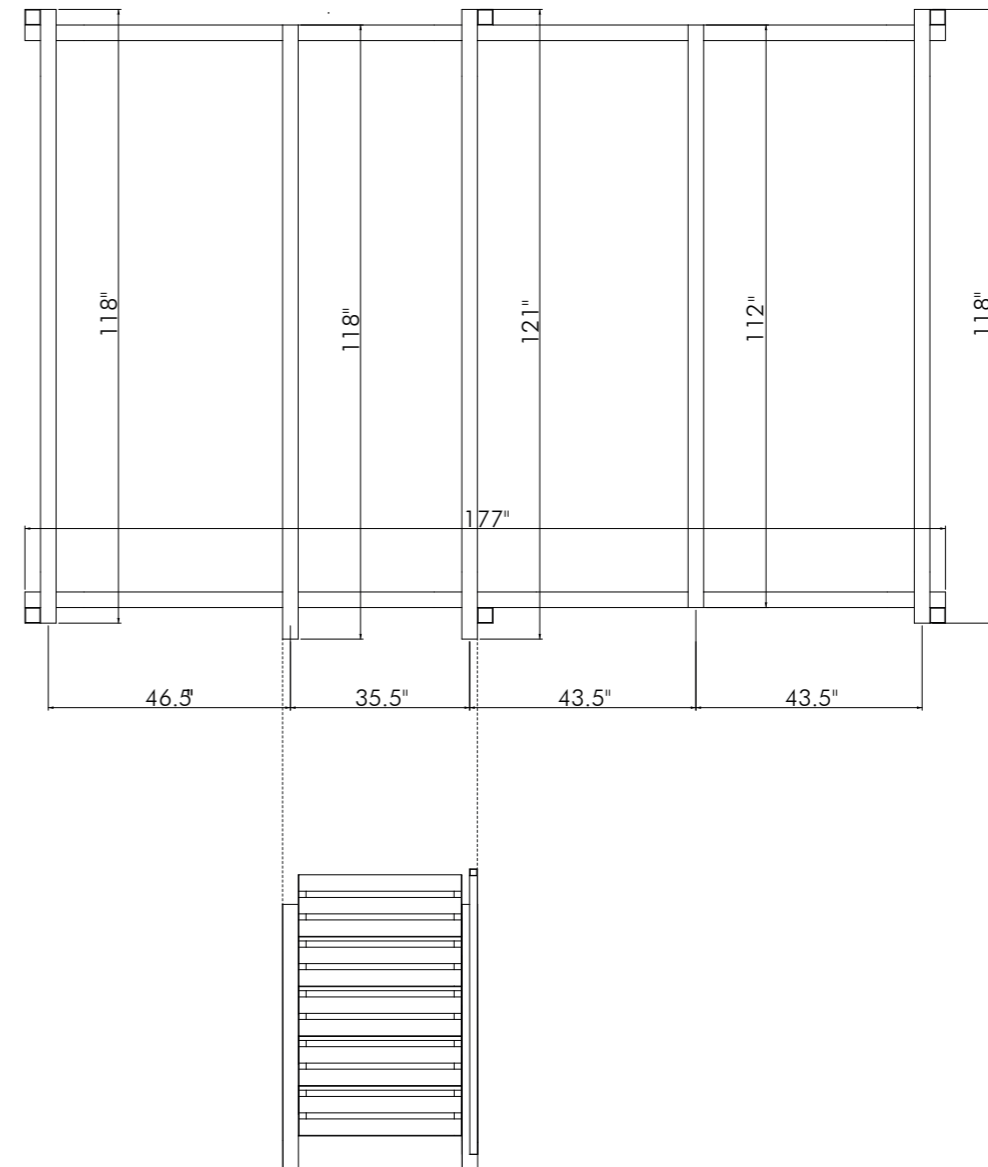
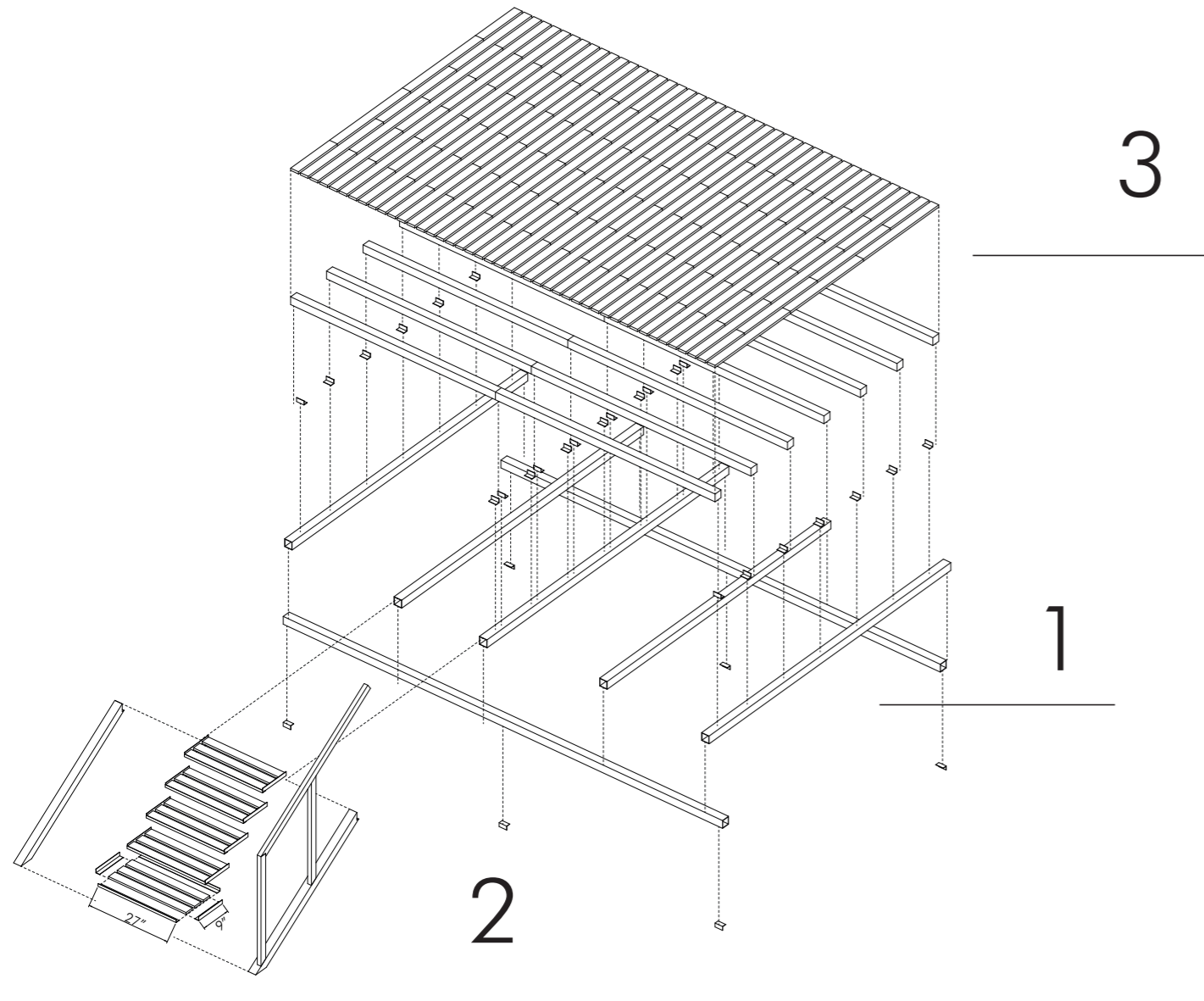
 x30  
rope

This is the final construction step.

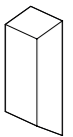
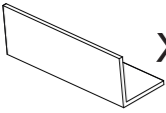


1  x8  x6



detail of the joinery between the vertical and horizontal metal beams

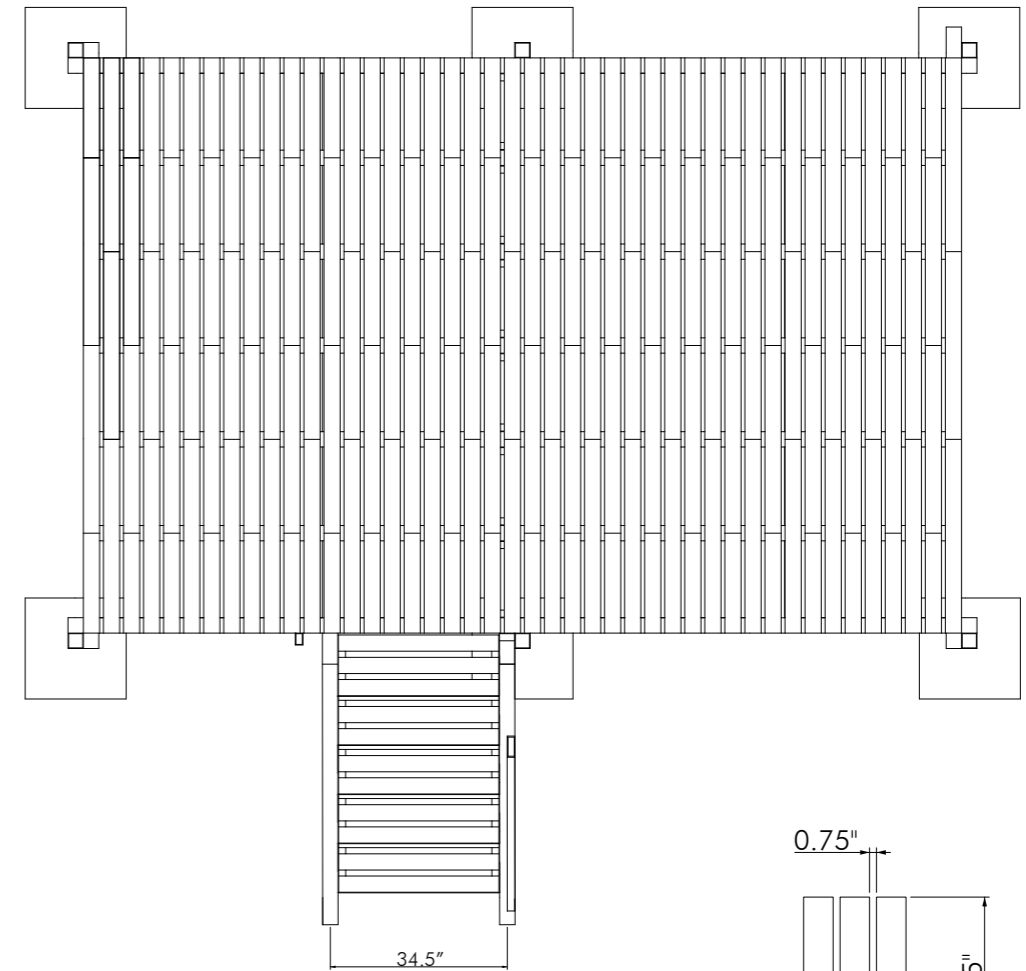
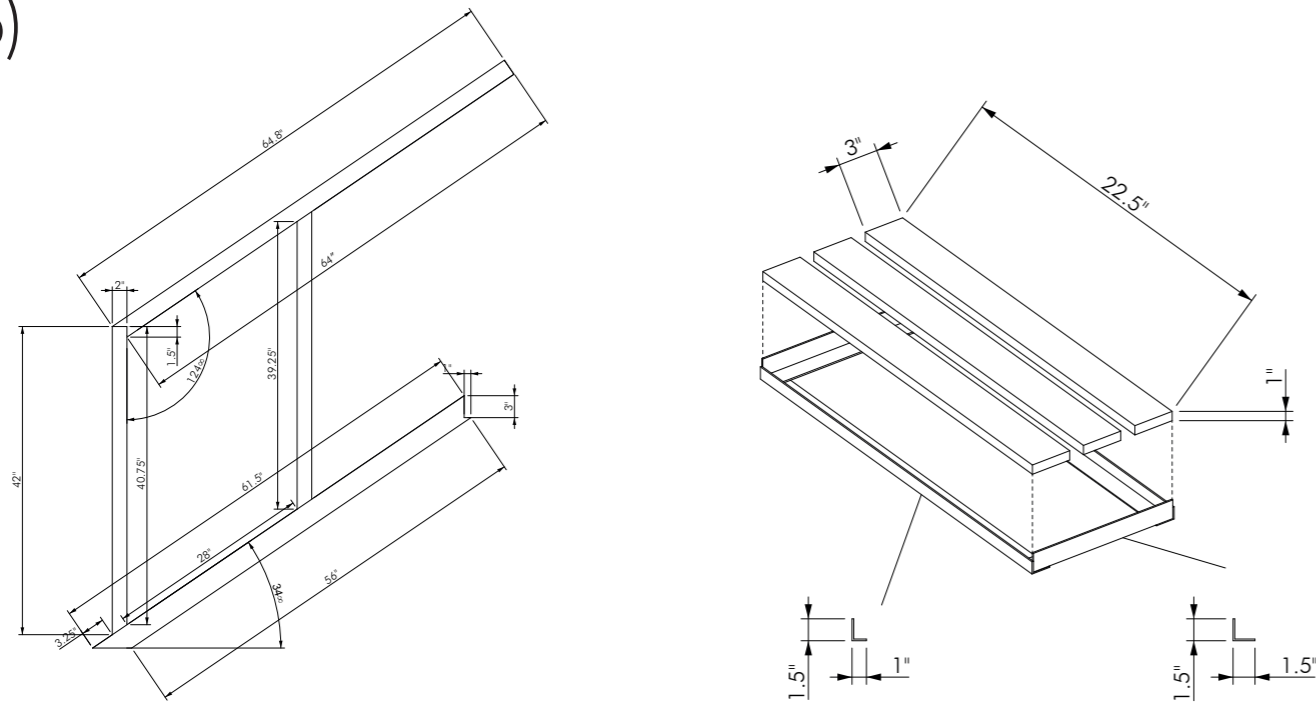


place the metal beams as indicated on the plan and weld the pieces together

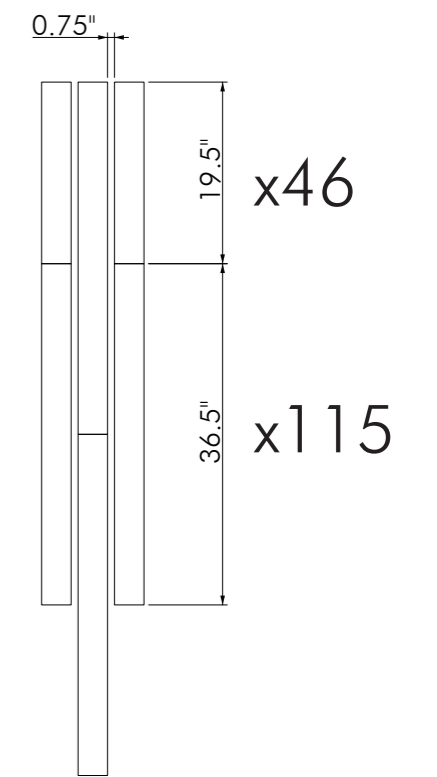
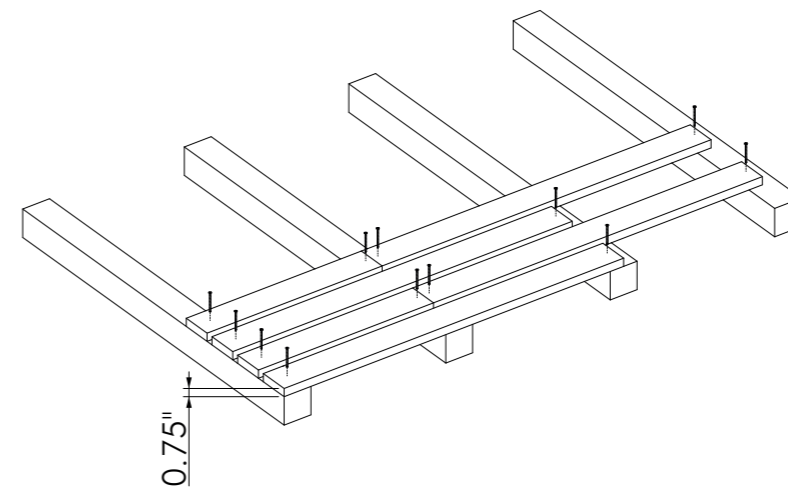
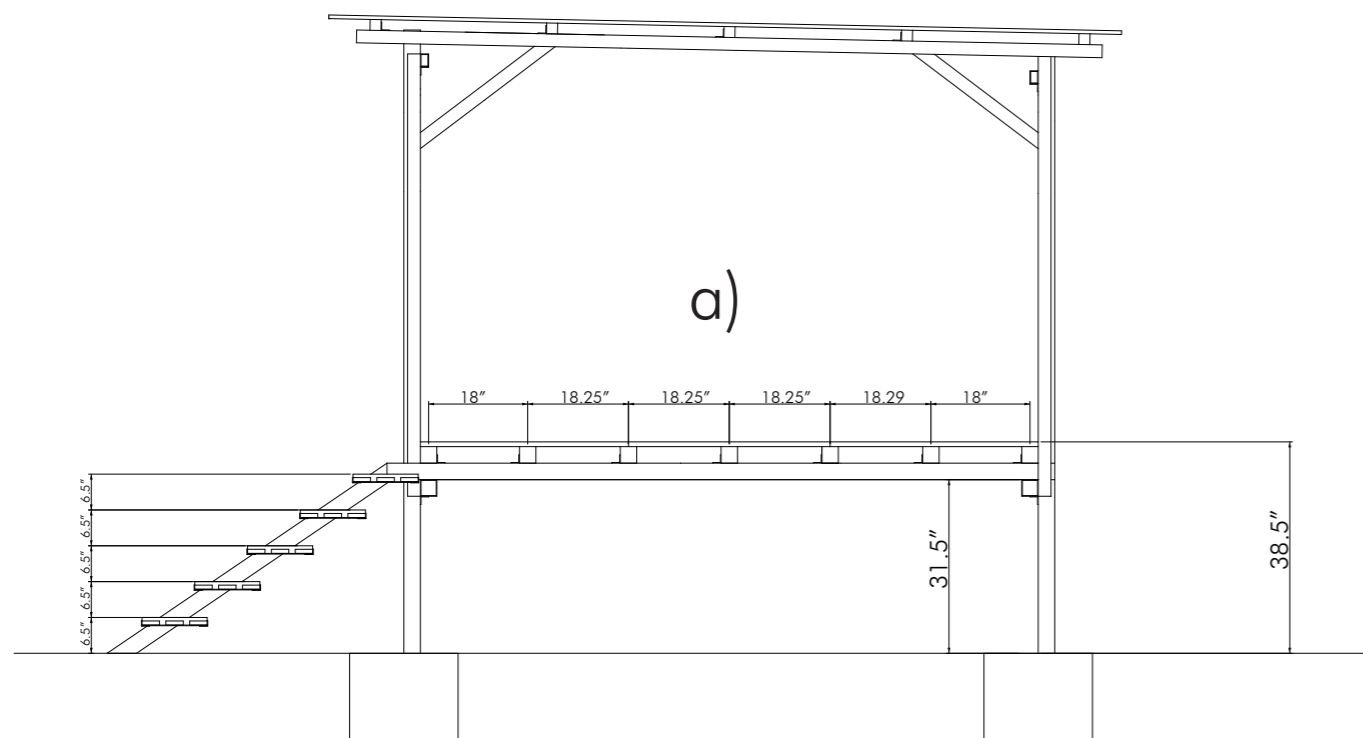
2  x9  x20  x15  x6

3  x161  x322

b)




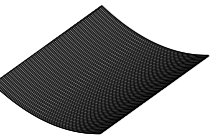

a)

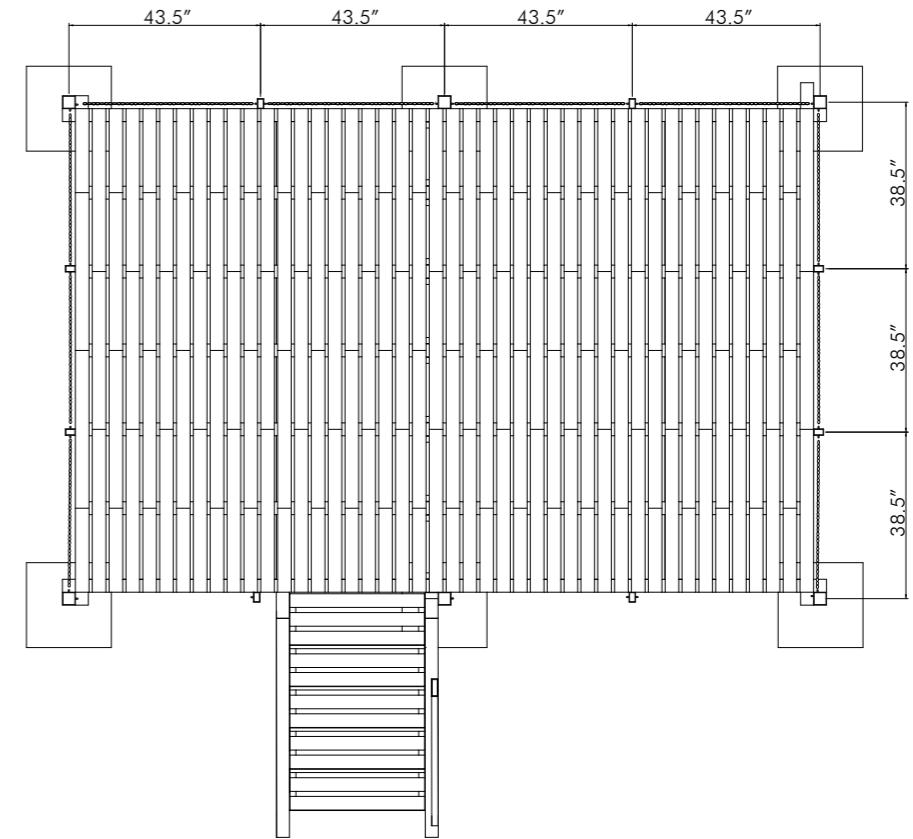
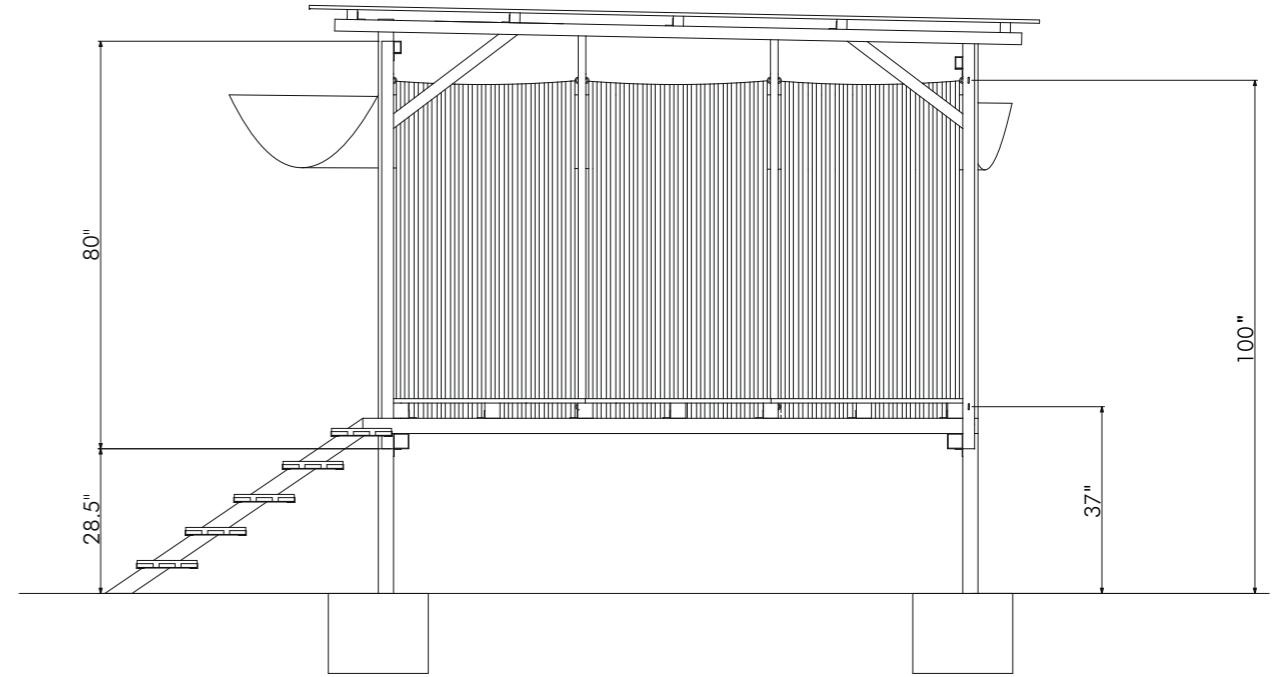
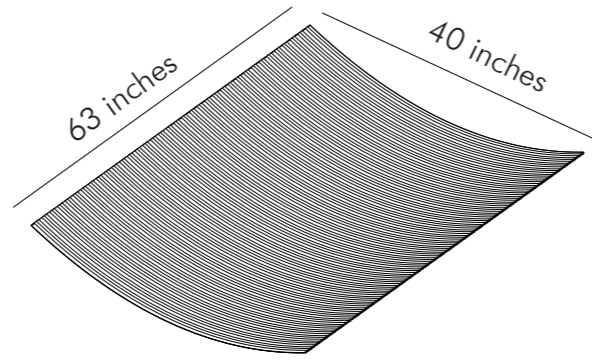
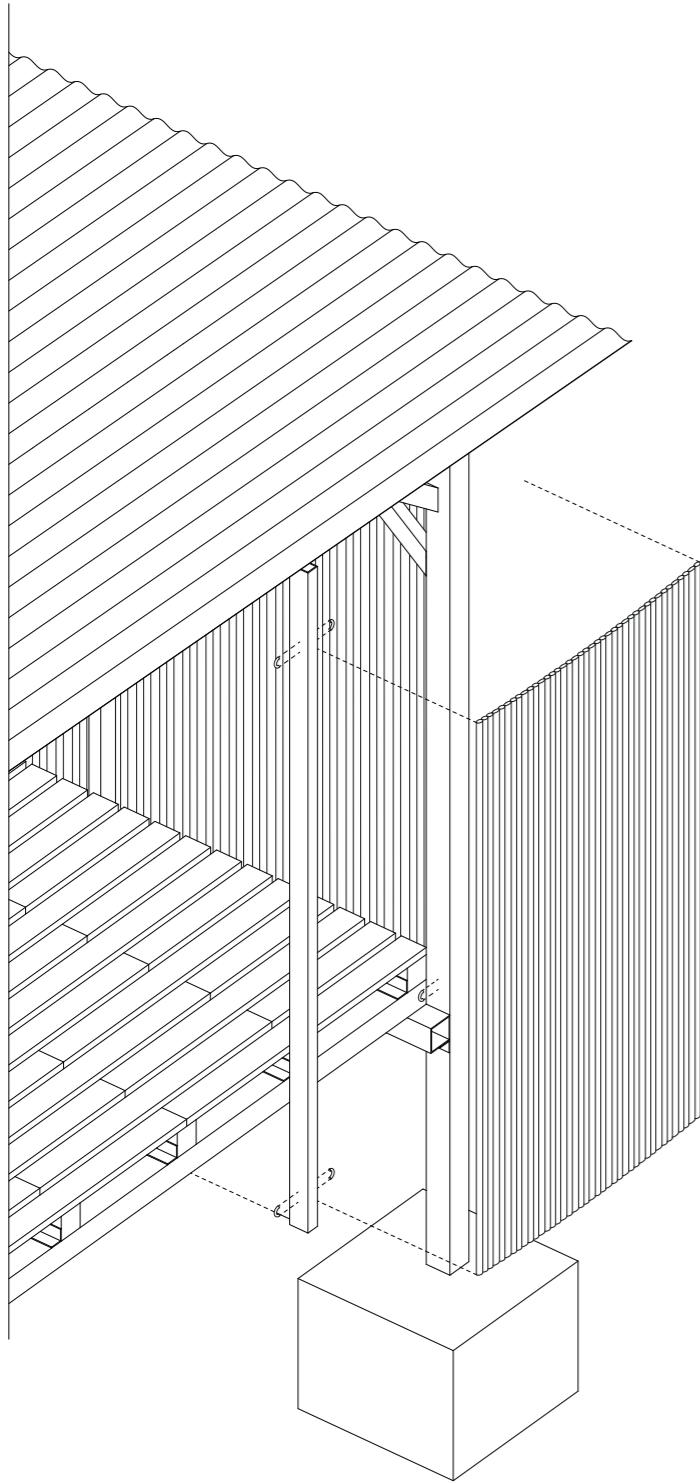


a) place the wooden beams and screw them onto the metal beams

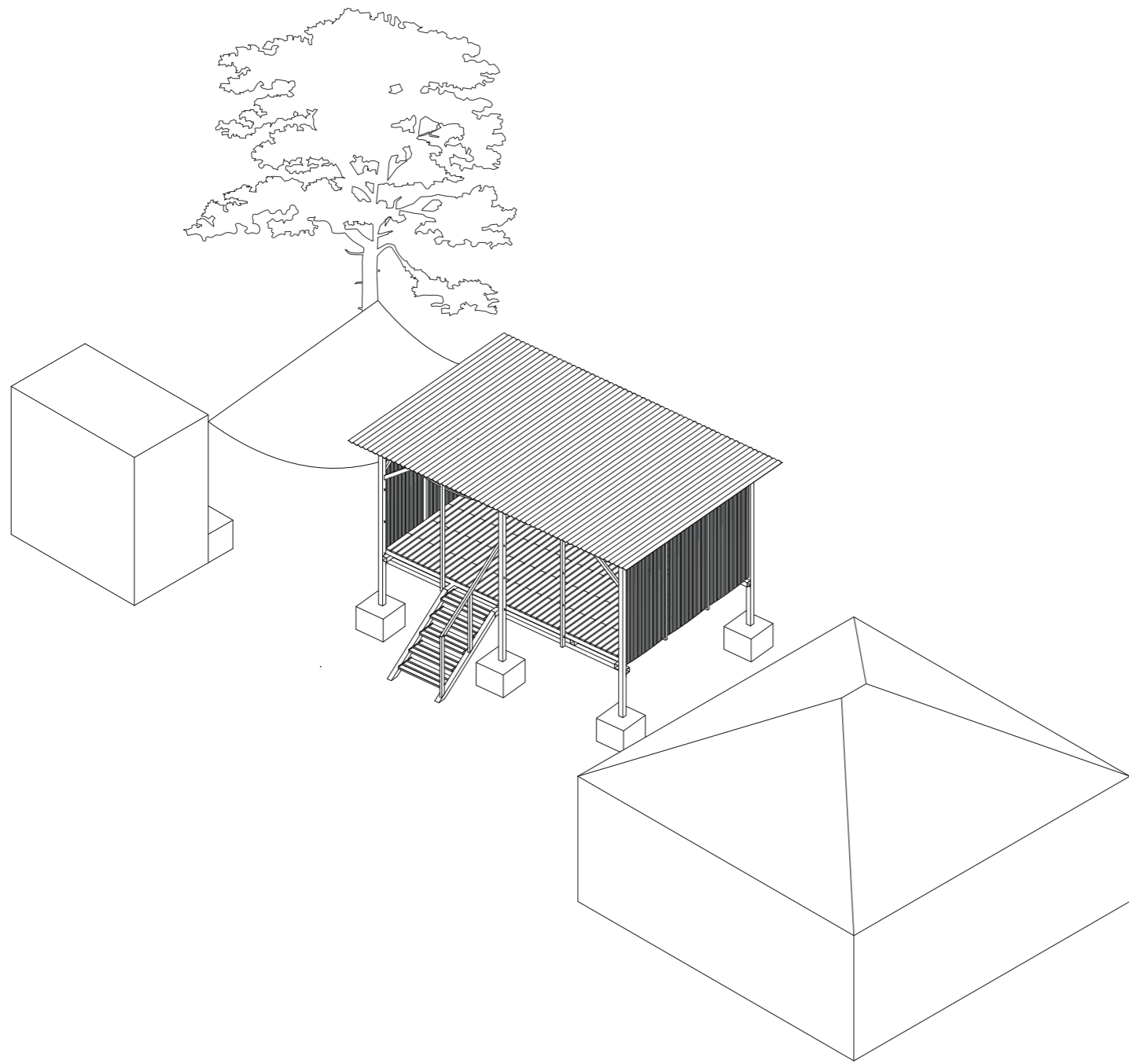
b) make the stairs as indicated

remove wood from pallets and use them to make the flooring by screwing them as shown on the plan

4  x96  x6  x30



weld small hooks onto the metal structure to attach products and mats for extra shading



# MANUAL OF WORKSHOP PRODUCTS

A STEP BY STEP GUIDE OF PRODUCTS MADE FROM  
LOCAL MATERIALS FROM KISUMU, KENYA.



# FACTS

## REALITY STUDIO PROJECT

This manual is part of a project conducted within the Reality Studio course at Chalmers University of Technology in Gothenburg, Sweden. The project aims to empower the women living in Dunga Beach, Kisumu, who are experts on crafts made by the local materials; water hyacinth, papyrus and sisal. The result of the project is a service that can create value for the craftswomen. The service should offer educational workshops for children held by the women, where the women can teach their crafts and the history of the materials and the area.

## THE MANUAL

The manual is part of the service. It is made for the craftswomen to use while holding the workshops. The manual contains step by step-guides of different products that can be made by children during the workshops. The products are classified into three levels based on how they are made. The levels are: **Easy**, **Medium** and **Hard**.

## TECHNIQUES USED

Weaving

















Macramé

Origami

Twisting

## CODING OF MATERIALS

To make it easy to understand what material is used for which product, each material has a certain colour coding.

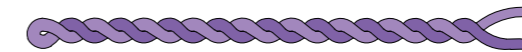
PINK					water hyacinth
PURPLE					sisal
BLUE					twisted sisal
PEACH					papyrus



Authors: Rebecka Geber, Moa Hansson, Ellen Karnblad, Miranda Reynolds & Emma Wallin

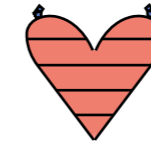
# INDEX

THE ROPE



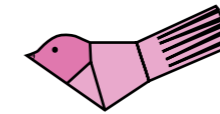
pp. 1 - 2

THE HEART



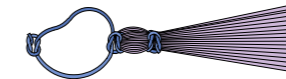
pp. 3 - 6

THE BIRD



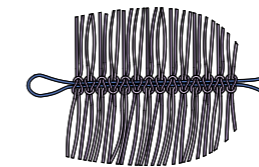
pp. 7 - 9

THE TASSEL



pp. 10 - 12

THE FEATHER



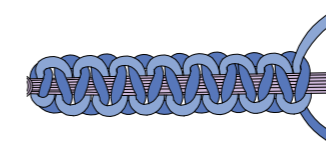
pp. 13 - 15

THE FISH



pp. 16 - 19

THE BRACELET



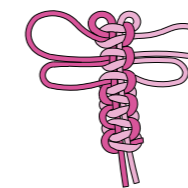
pp. 20 - 22

THE BOOK MARK



pp. 23 - 27

THE DRAGONFLY



pp. 28 - 31

EXPERIMENT WITH PRODUCTS

pp. 32 - 44

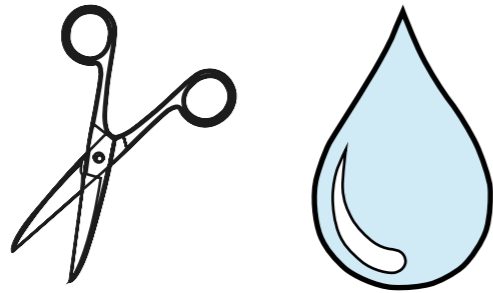
# THE ROPE

Level: **Easy**

Technique: **Twisting**

Estimated time to make: **5 min**

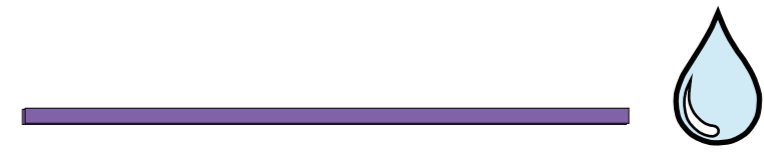
WHAT YOU NEED:



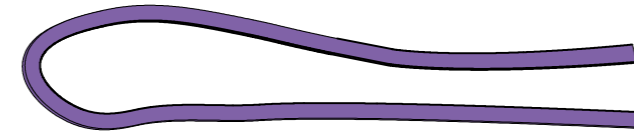
## INSTRUCTIONS: HOW TO MAKE THE ROPE

STEP 1

Moisten the sisal.

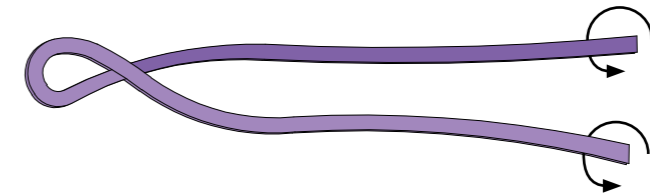


STEP 2

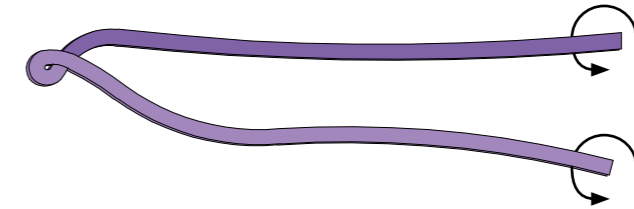


STEP 3

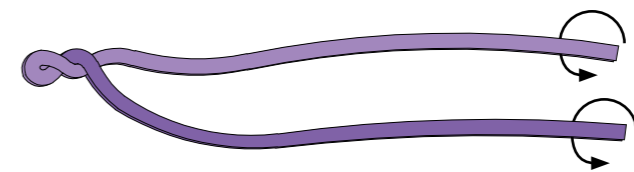
Twist the ends in the same direction.



STEP 4

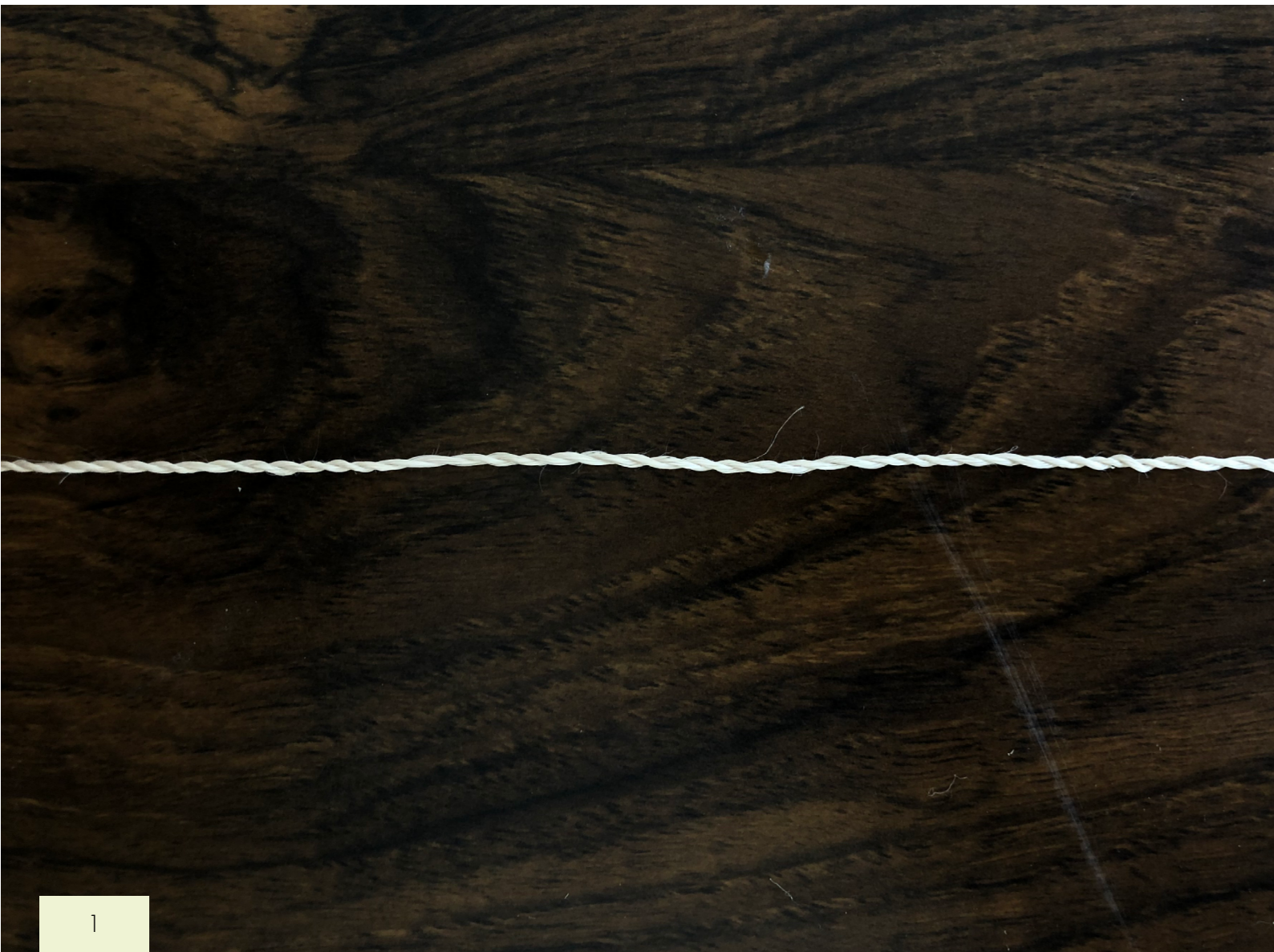


STEP 5



STEP 6

Repeat STEP 5 until desired length.



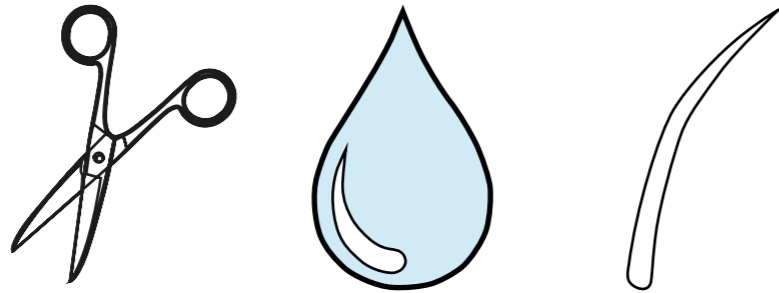
# THE HEART

Level: **Easy**

Technique: **Weaving**

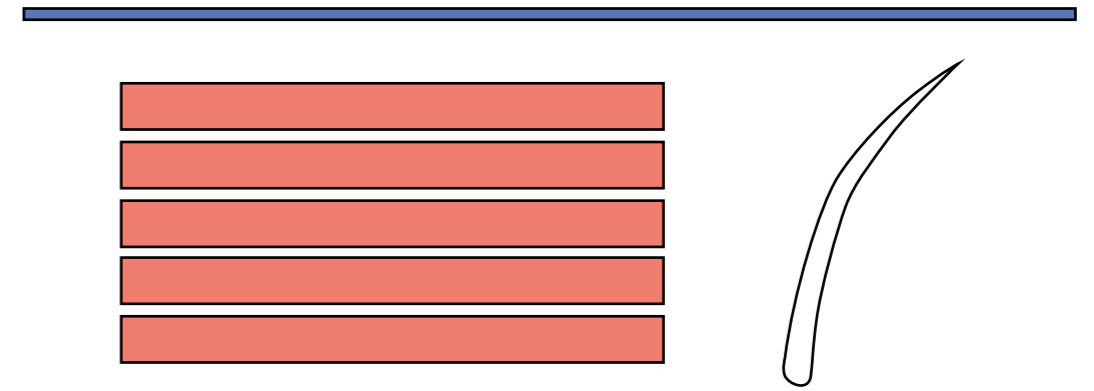
Estimated time to make: **7 min**

WHAT YOU NEED:



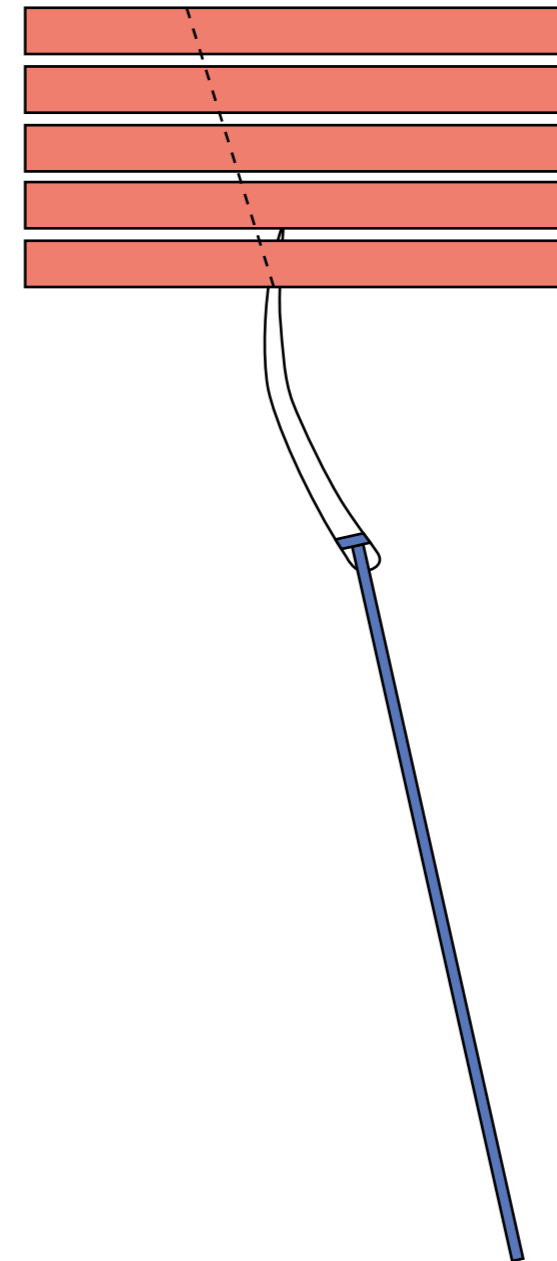
## INSTRUCTIONS: HOW TO MAKE THE HEART

STEP 1

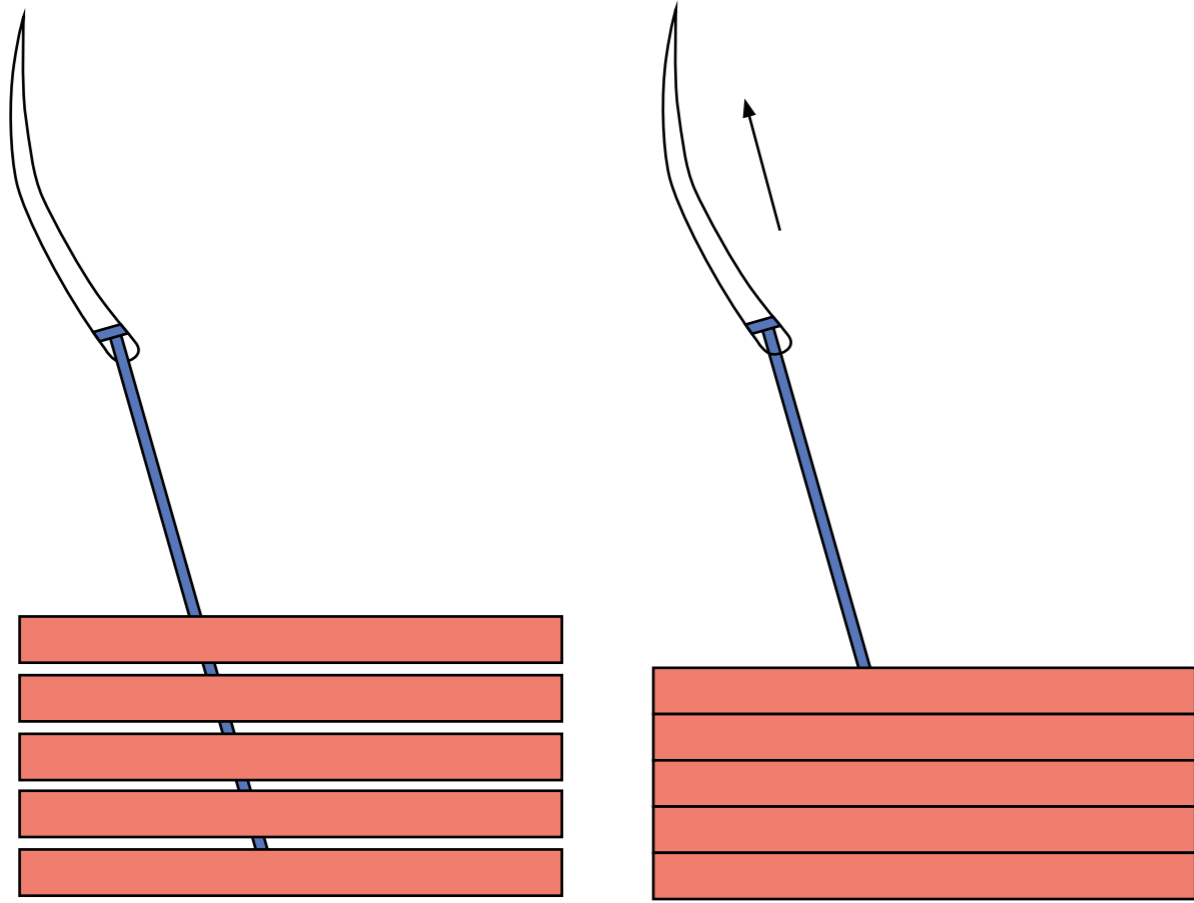


STEP 2

Attach the twisted sisal to the spear. Press it through the papyrus aiming a bit to the left.

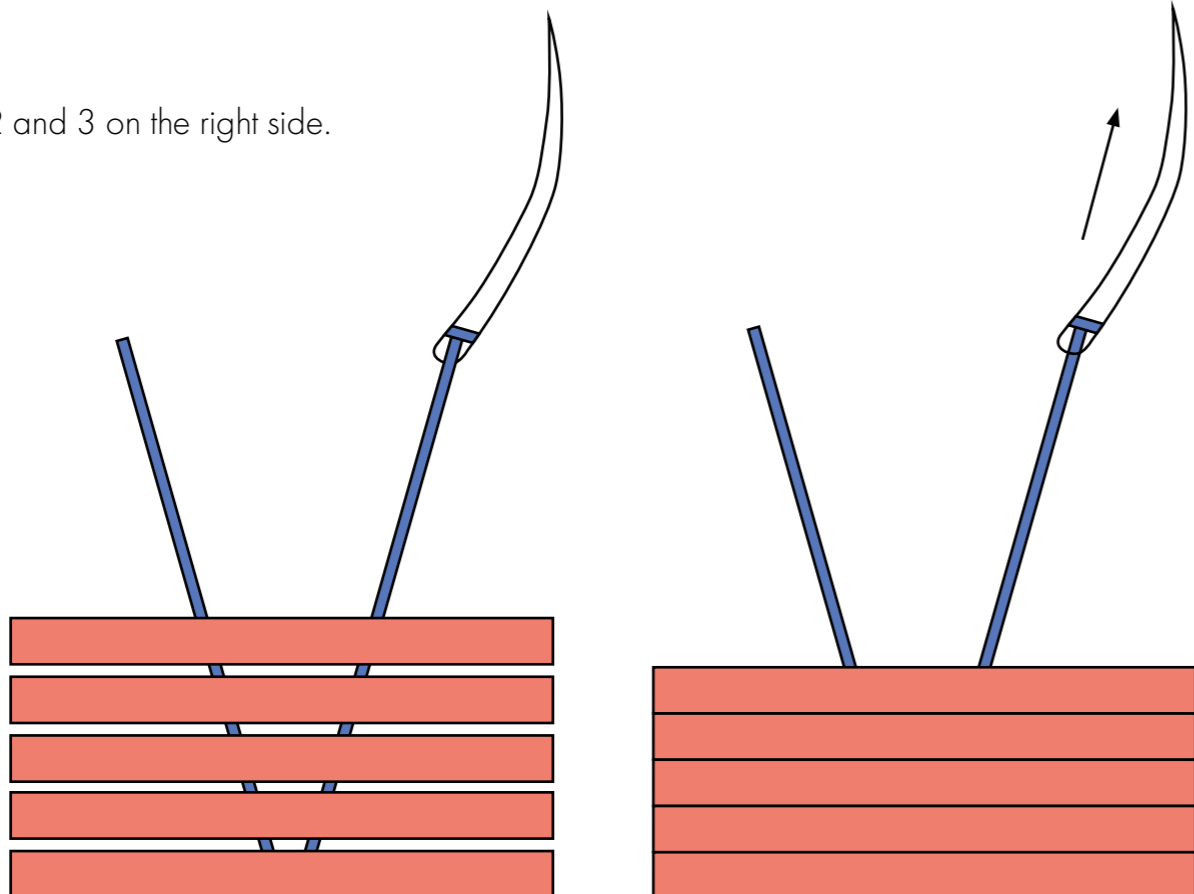


STEP 3



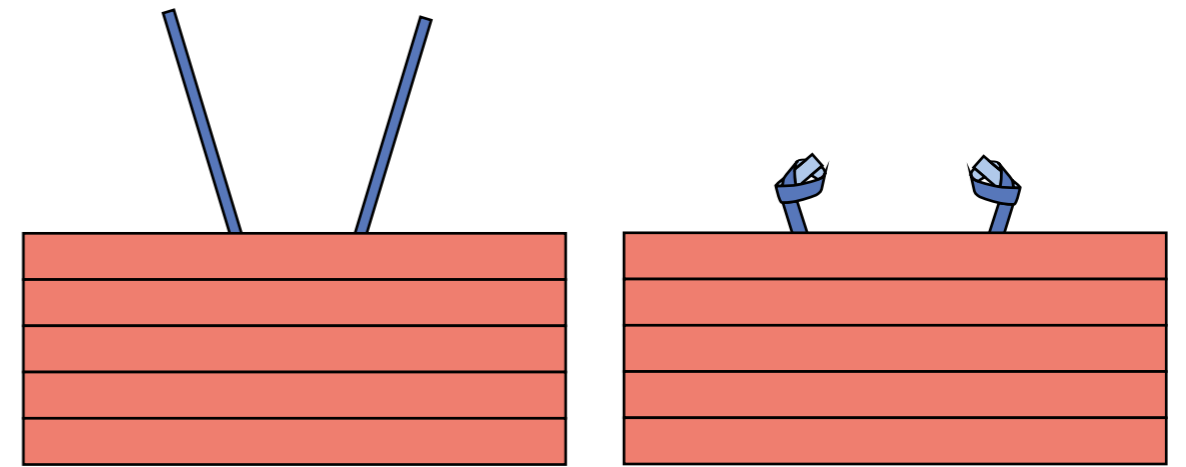
STEP 4

Repeat STEP 2 and 3 on the right side.

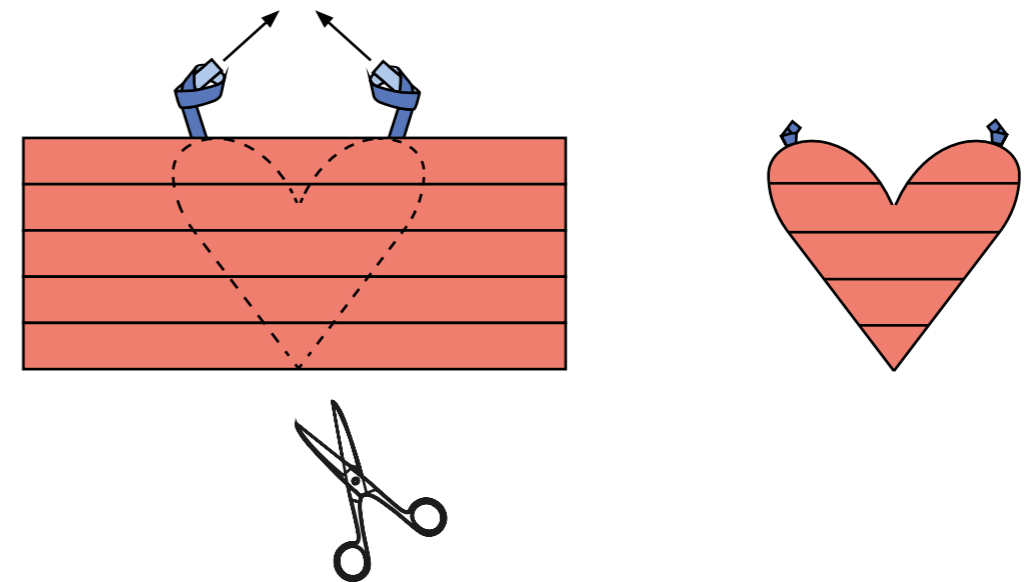


STEP 5

Take away the spears and make knots on the end of the sisal.



STEP 6



# THE BIRD

Level: **Easy**

Technique: **Origami**

Estimated time to make: **5 min**

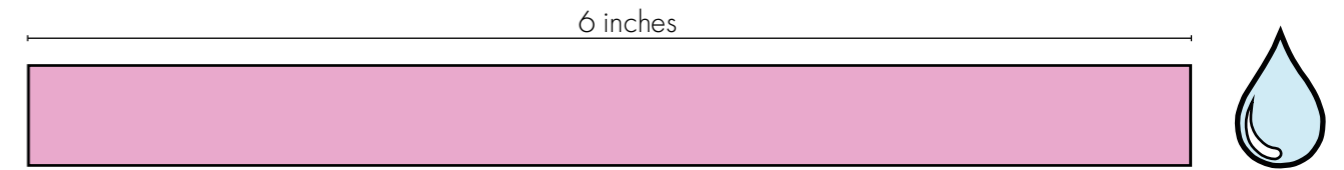
WHAT YOU NEED:



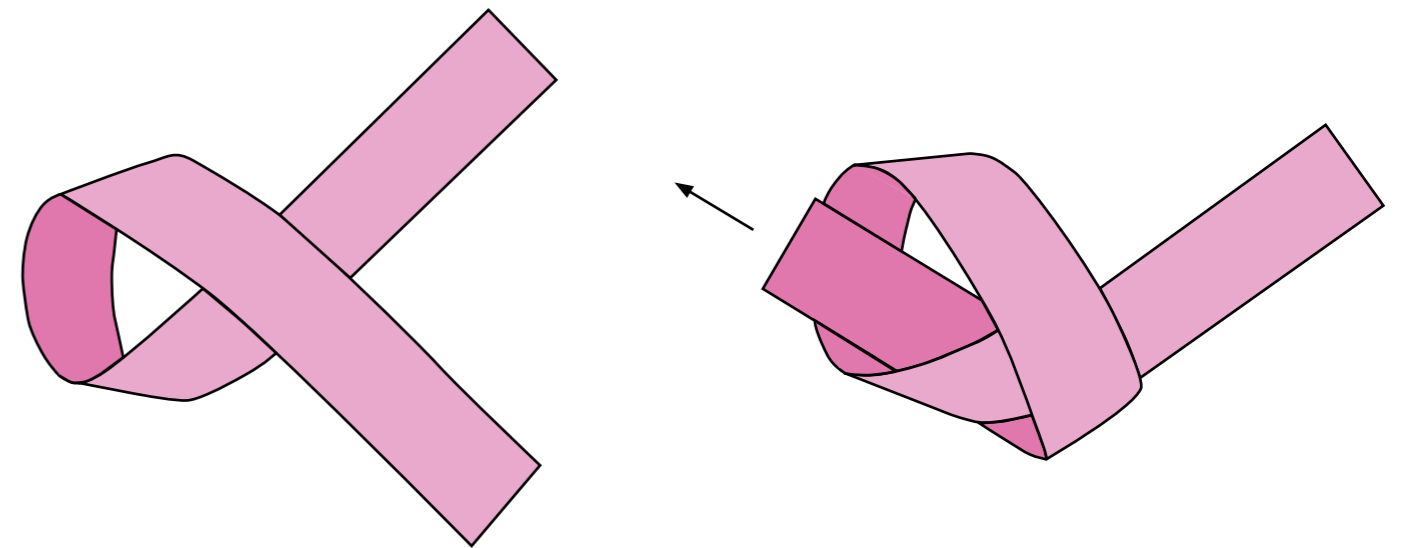
## INSTRUCTIONS: HOW TO MAKE THE BIRD

### STEP 1

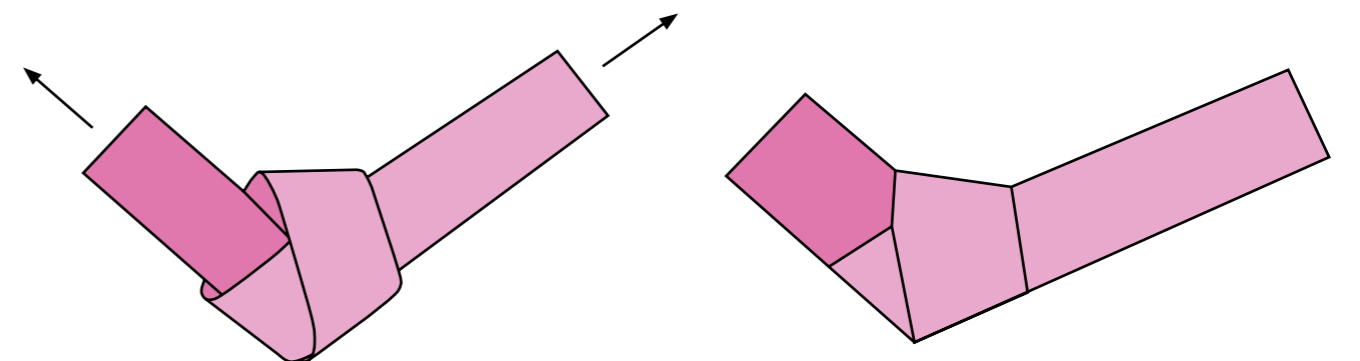
Moisten the water hyacinth strip and flatten it.



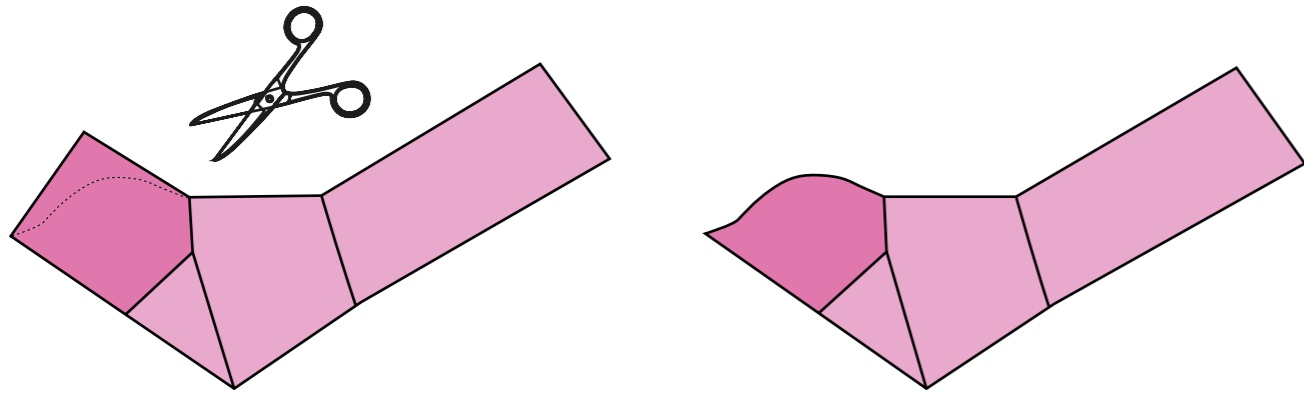
### STEP 2



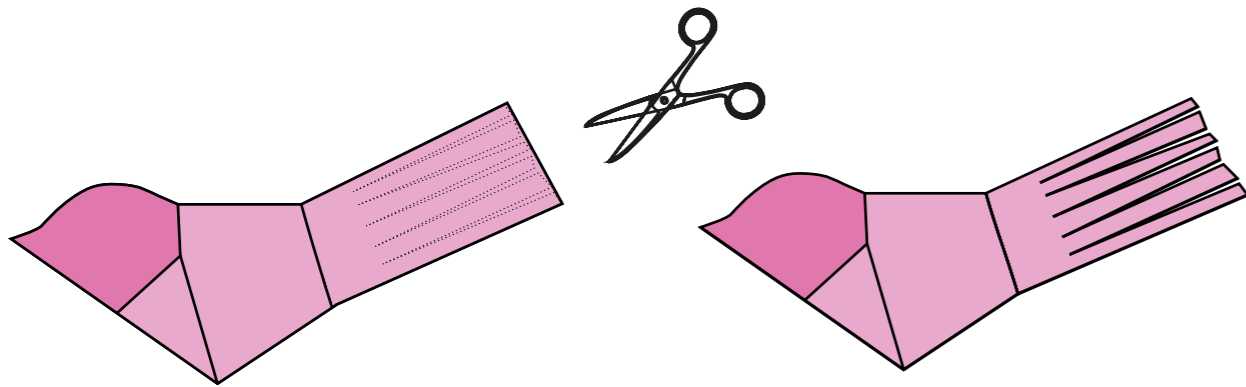
### STEP 3



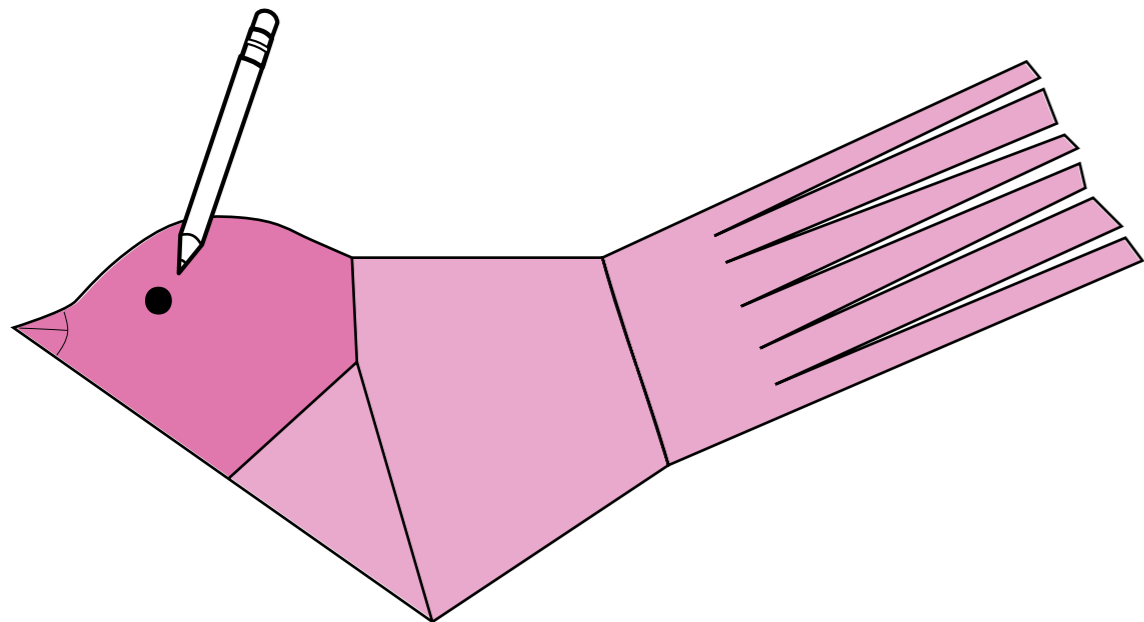
STEP 4



STEP 5



STEP 6



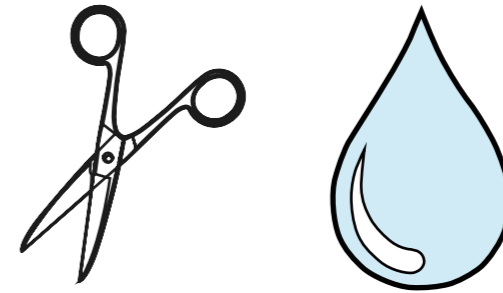
## THE TASSEL

Level: **Easy**

Technique: **Macramé**

Estimated time to make: **5 min**

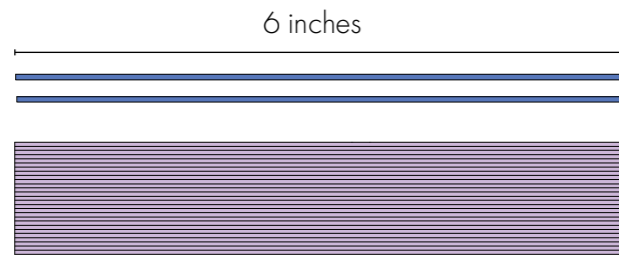
WHAT YOU NEED:



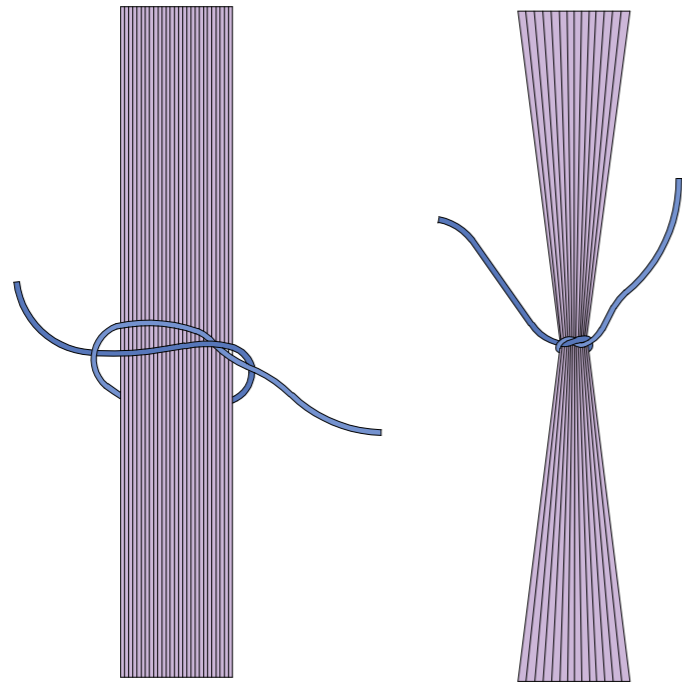
# INSTRUCTIONS: HOW TO MAKE THE TASSEL

## STEP 1

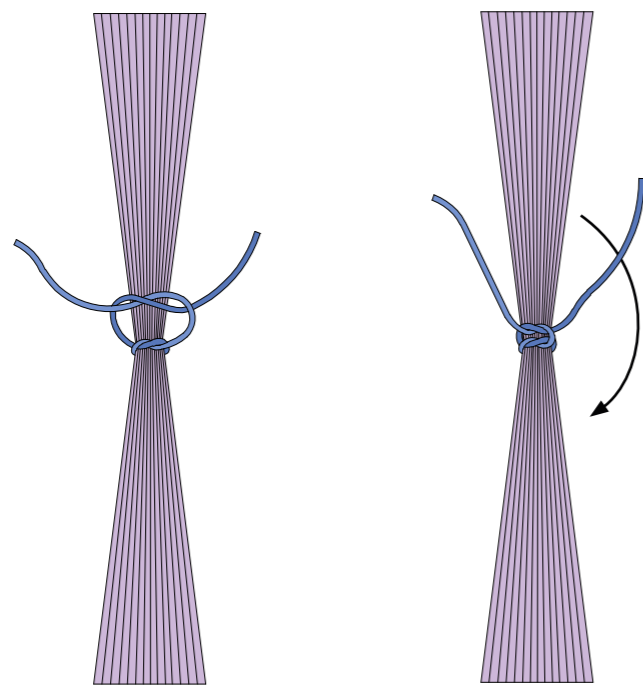
Moisten the sisal.



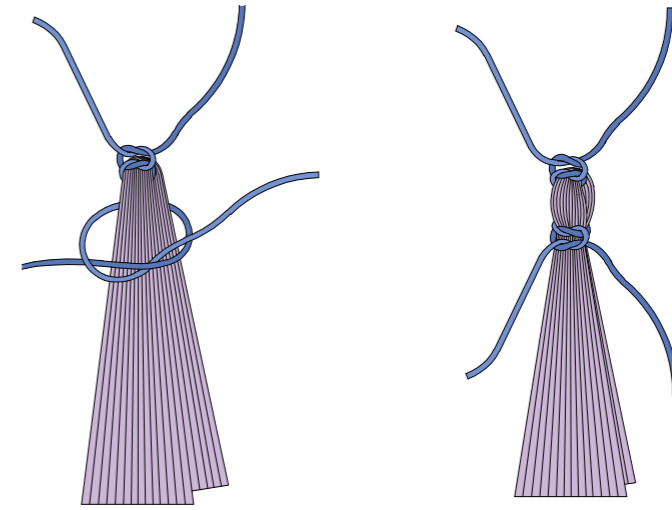
## STEP 2



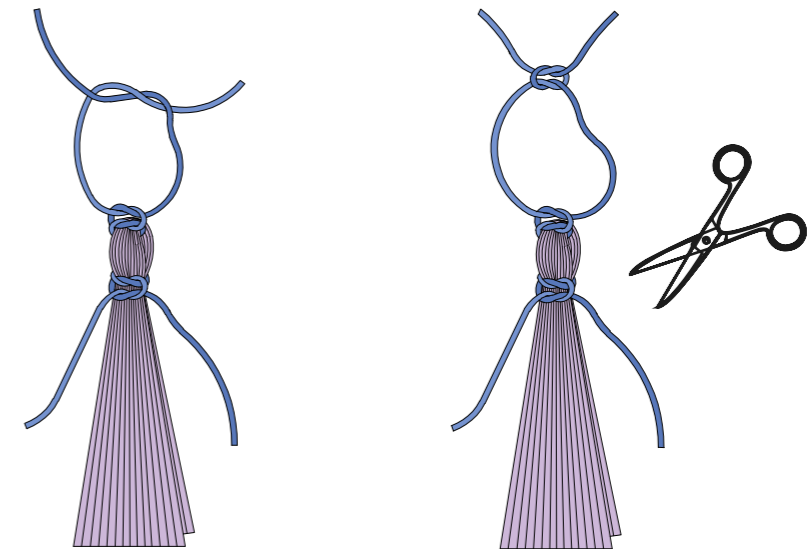
## STEP 3



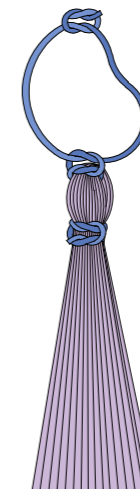
## STEP 4



## STEP 5



## STEP 6



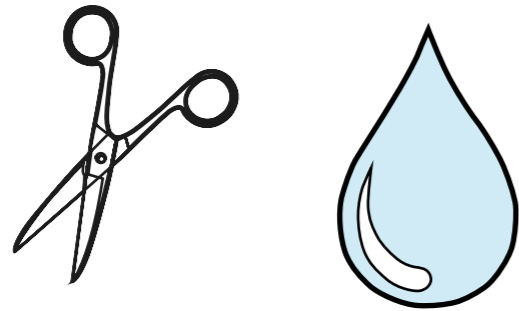
# THE FEATHER

Level: **Easy**

Technique: **Macramé**

Estimated time to make: 10 - 15 min

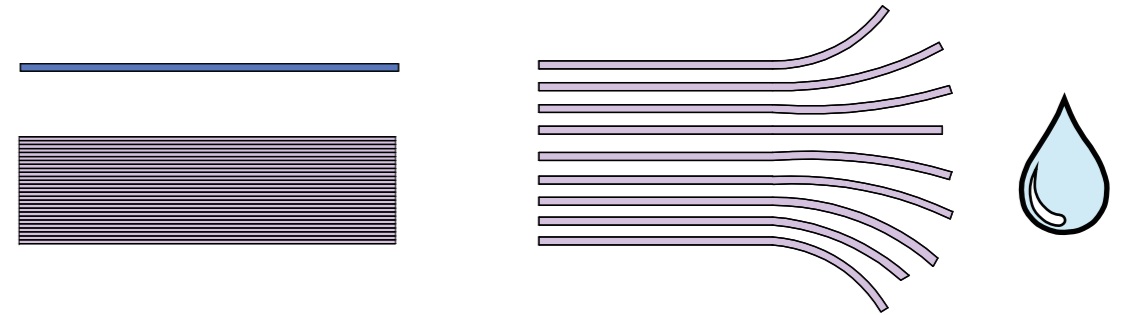
WHAT YOU NEED:



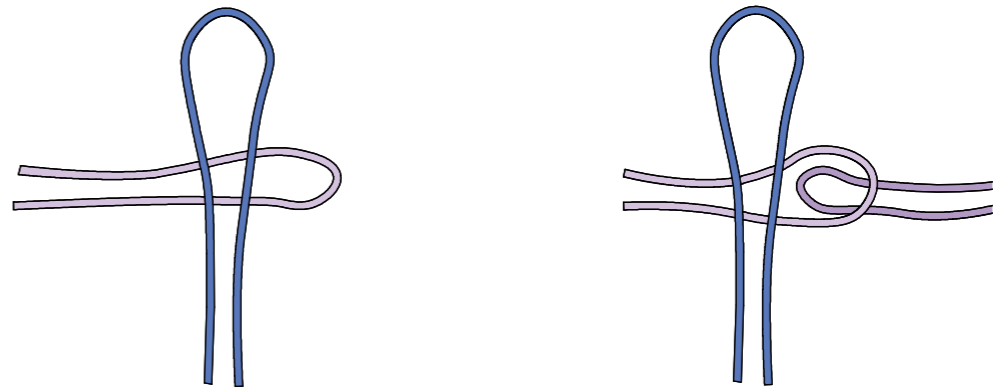
## INSTRUCTIONS: HOW TO MAKE THE FEATHER

STEP 1

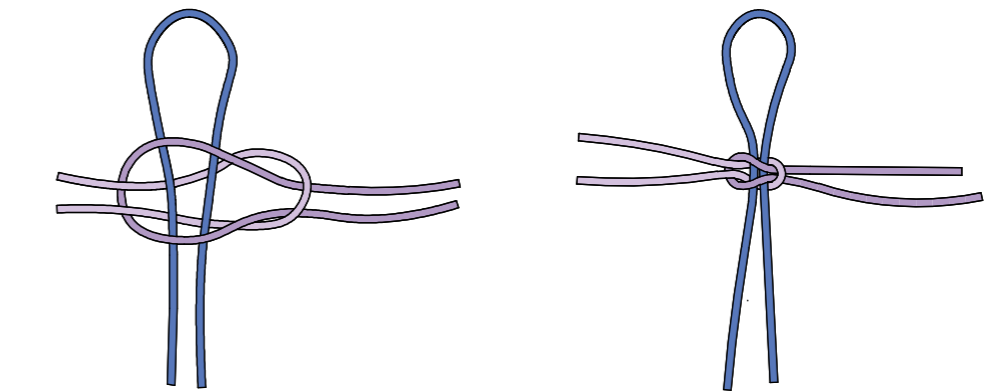
Moisten both the twisted sisal and the sisal.



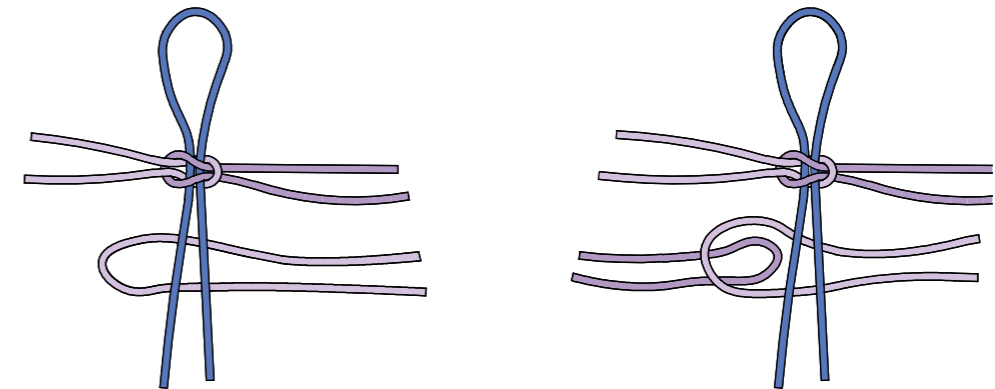
STEP 2



STEP 3



STEP 4



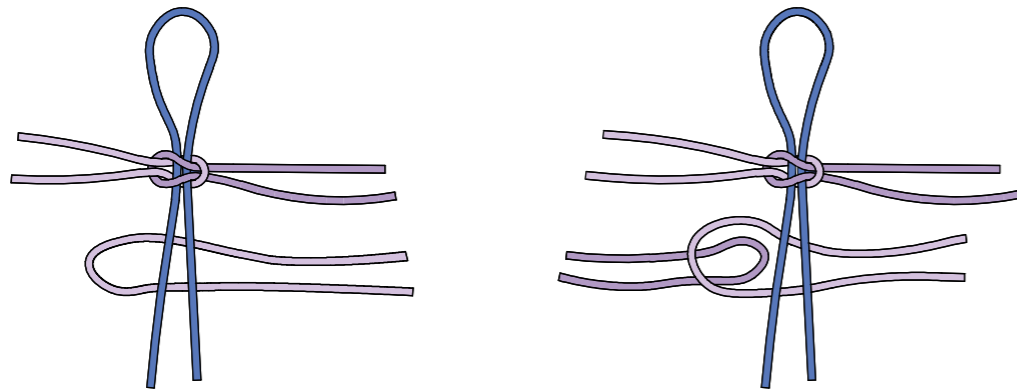
# THE FISH

Level: **Medium**

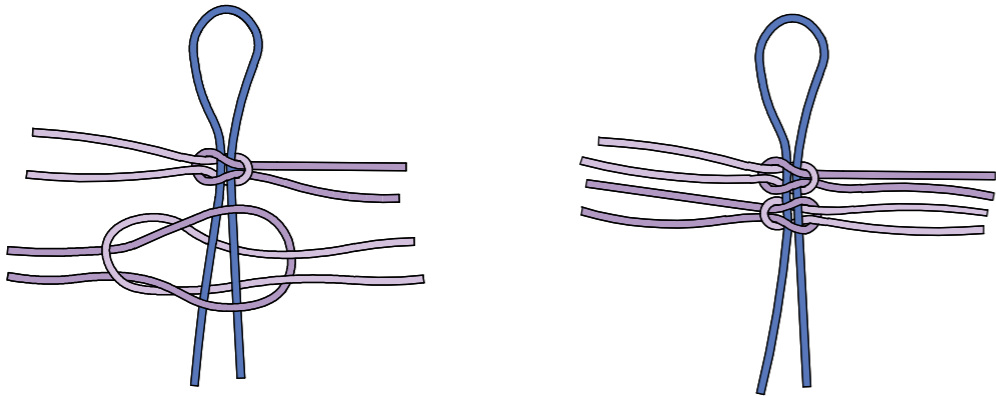
Technique: **Origami**

Estimated time to make: **5 - 10 min**

STEP 5

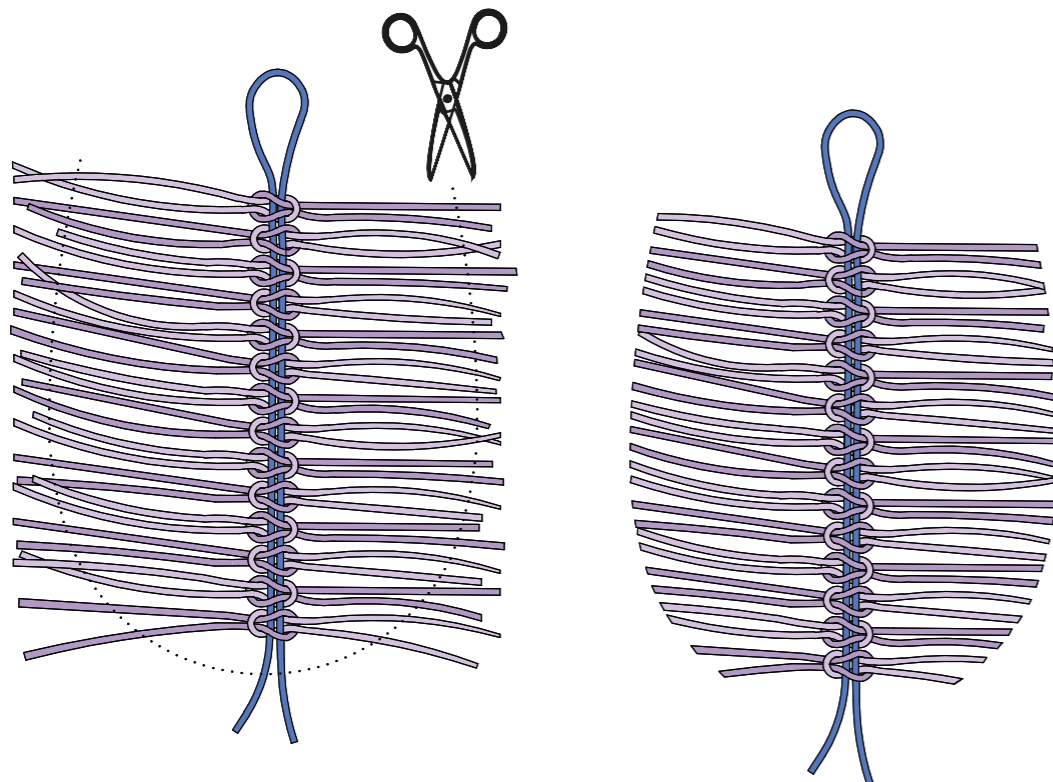


STEP 6

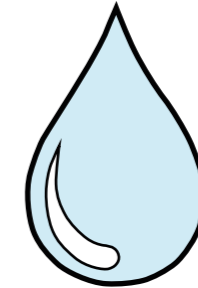
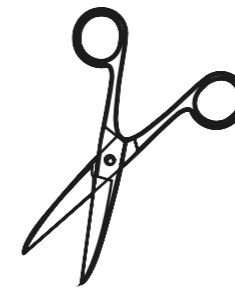


STEP 7

Repeat STEP 2, 3, 4, 5 and 6 until desired length.



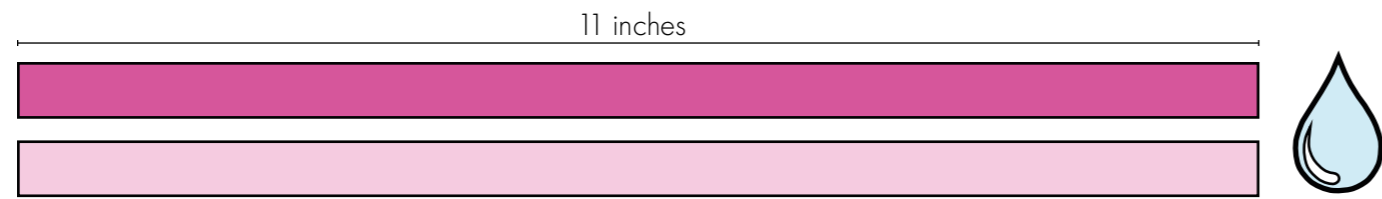
WHAT YOU NEED:



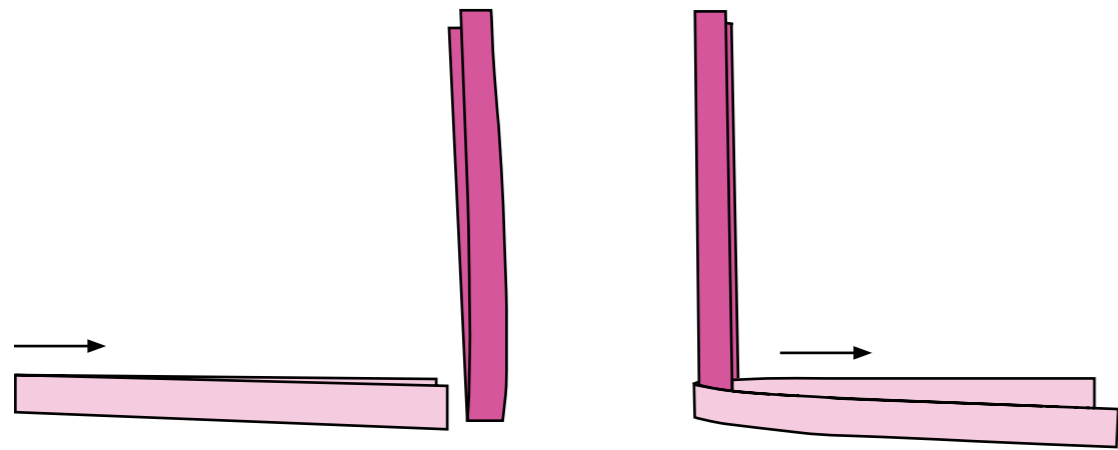
# INSTRUCTIONS: HOW TO MAKE THE FISH

## STEP 1

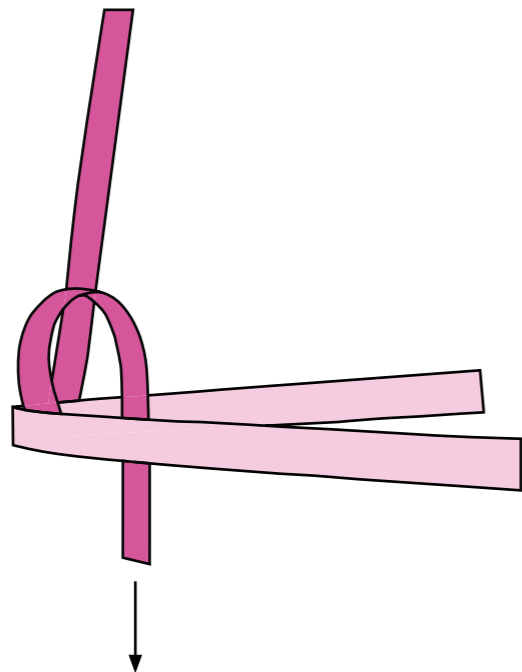
Moisten the water hyacinth strips and flatten them.



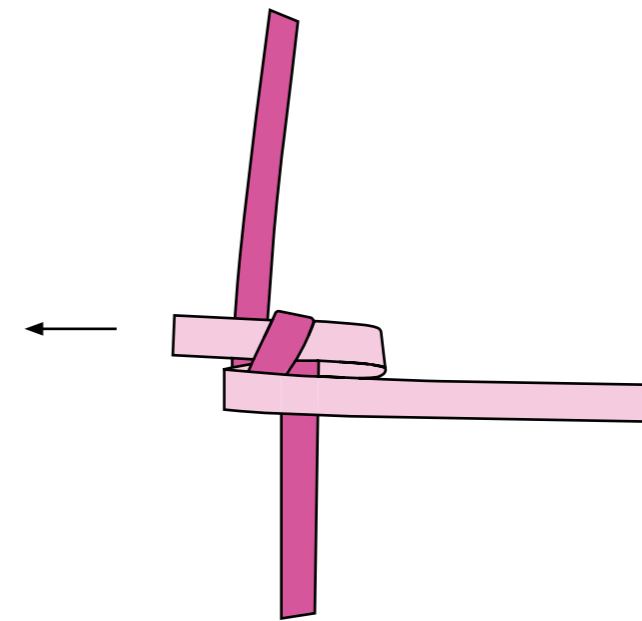
## STEP 2



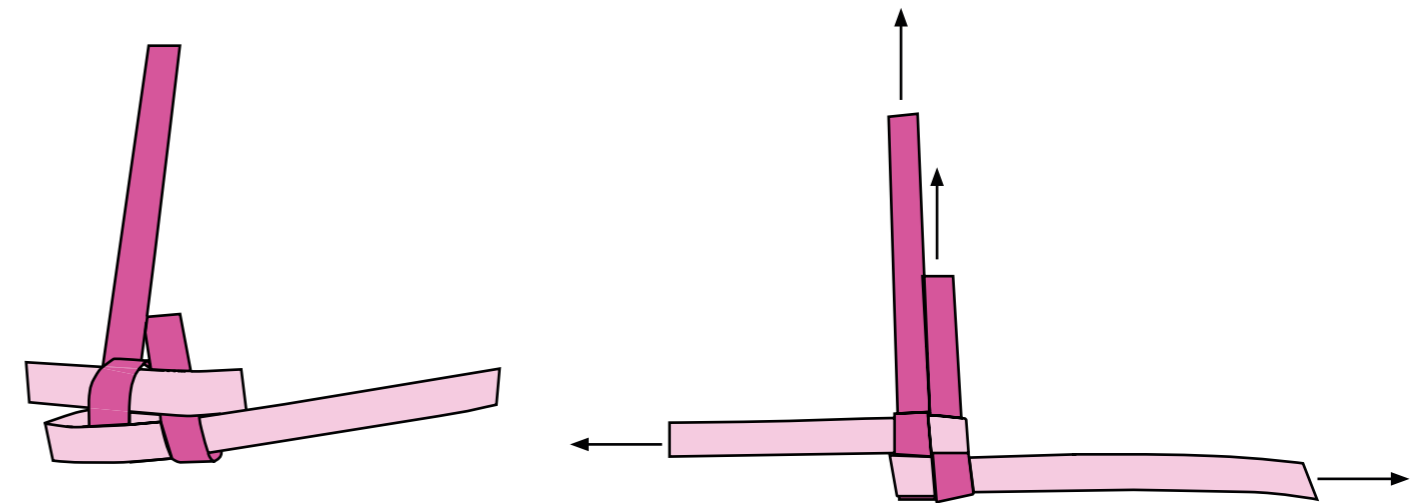
## STEP 3



## STEP 4

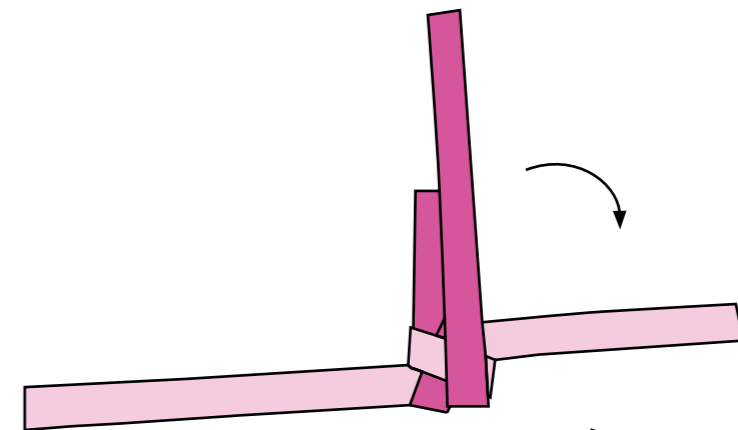


## STEP 5

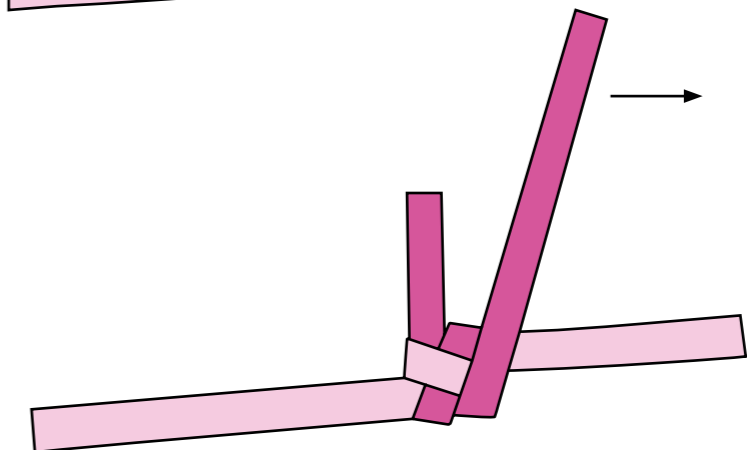


## STEP 6

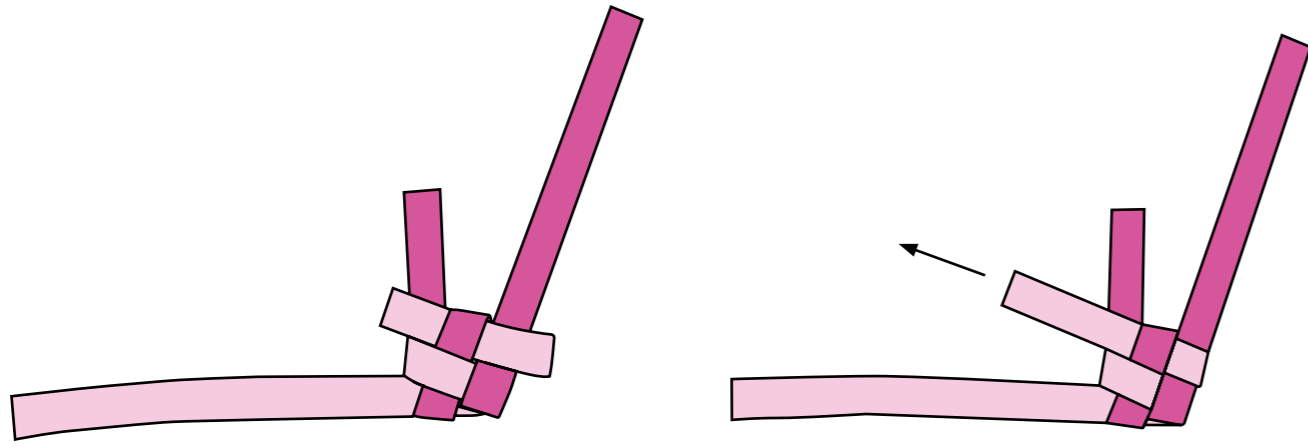
Flip the fish.



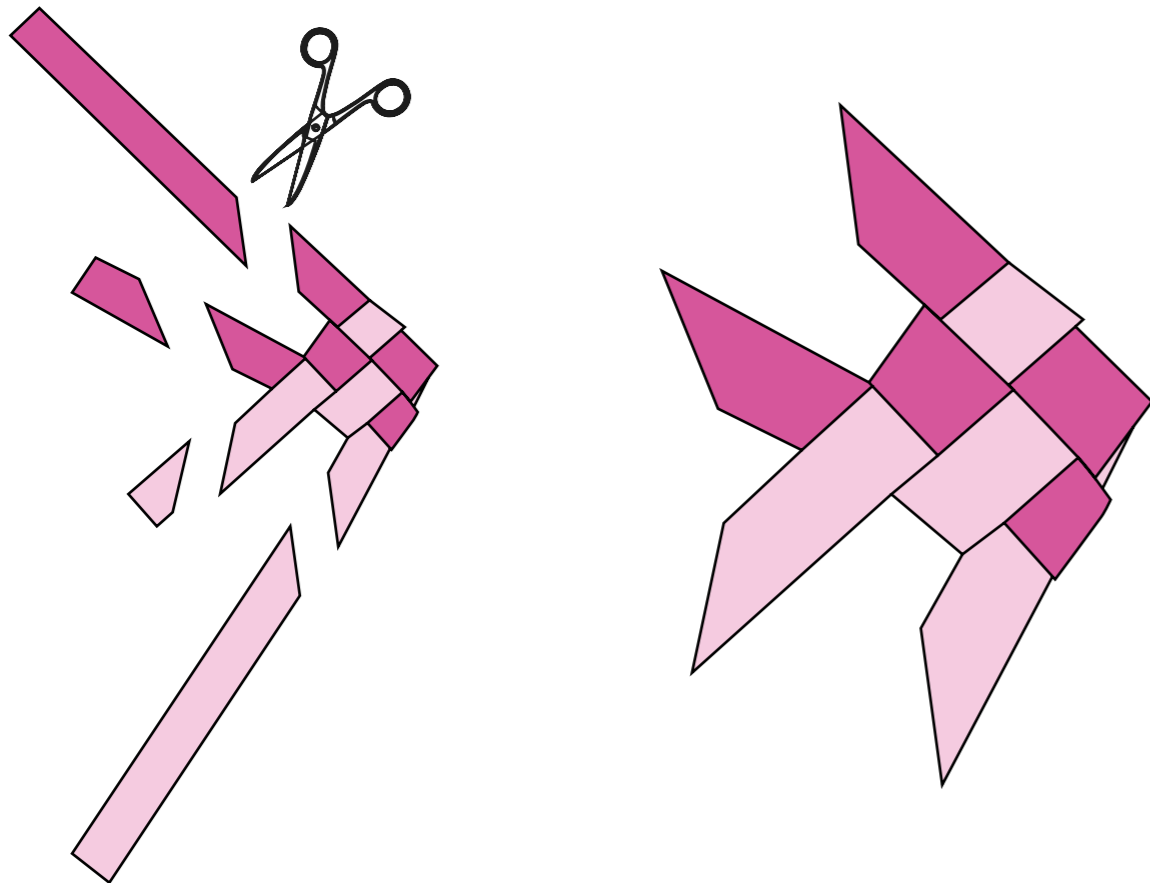
## STEP 7



STEP 8



STEP 10



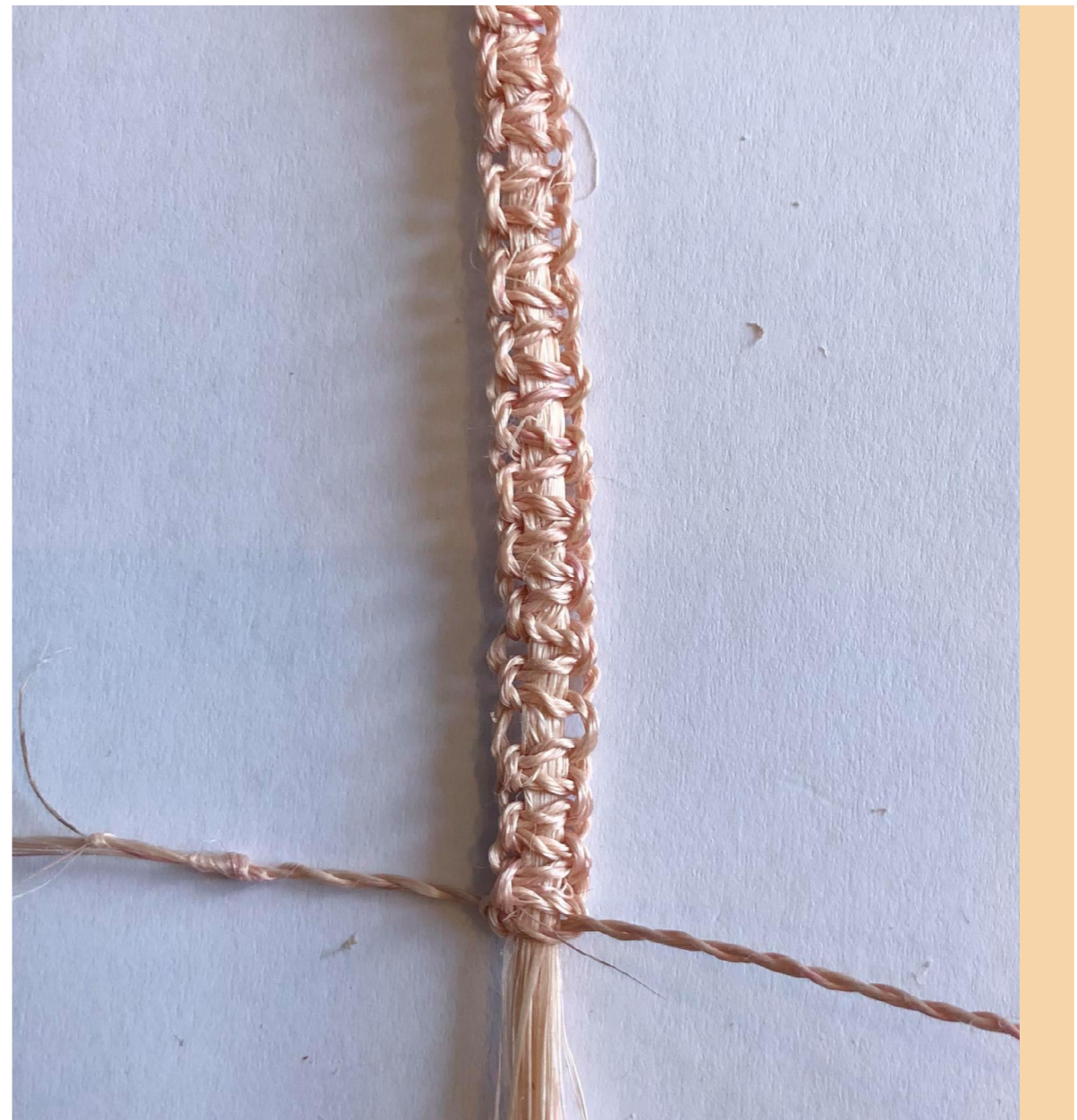
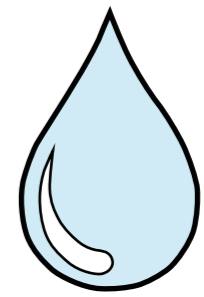
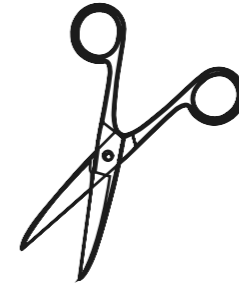
# THE BRACELET

Level: **Medium**

Technique: **Macramé**

Estimated time to make: 10 - 15 min

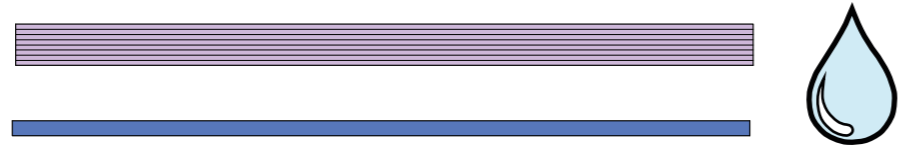
WHAT YOU NEED:



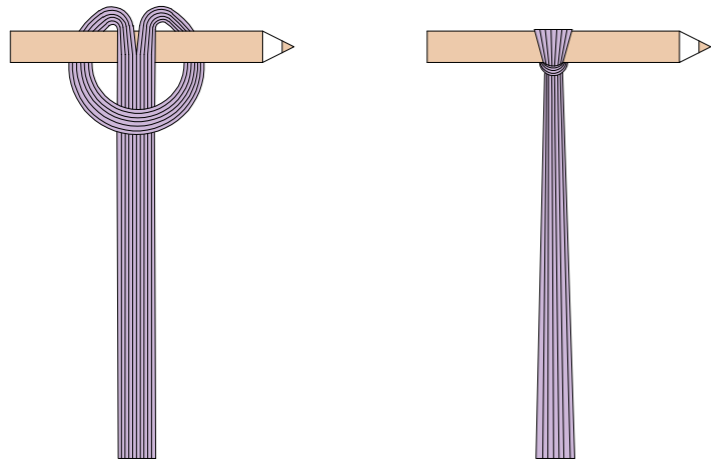
# INSTRUCTIONS: HOW TO MAKE THE BRACLET

## STEP 1

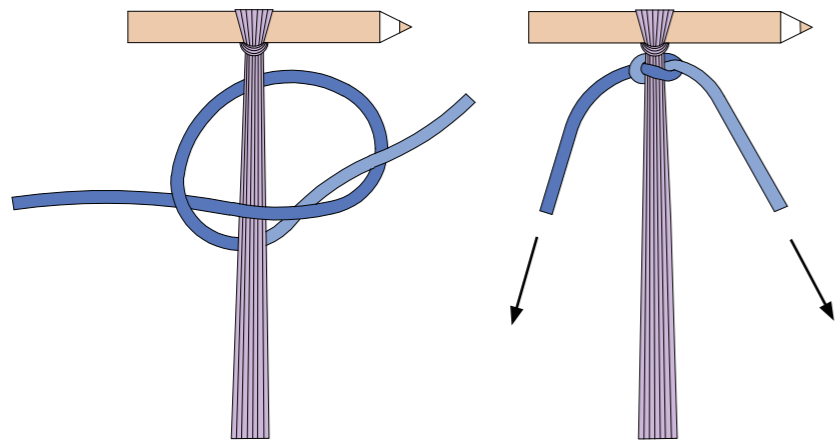
Moisten both the twisted sisal and the sisal.



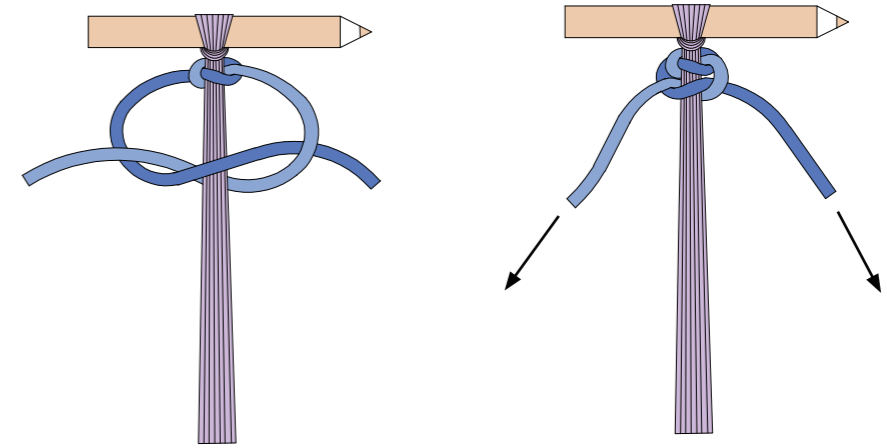
## STEP 2



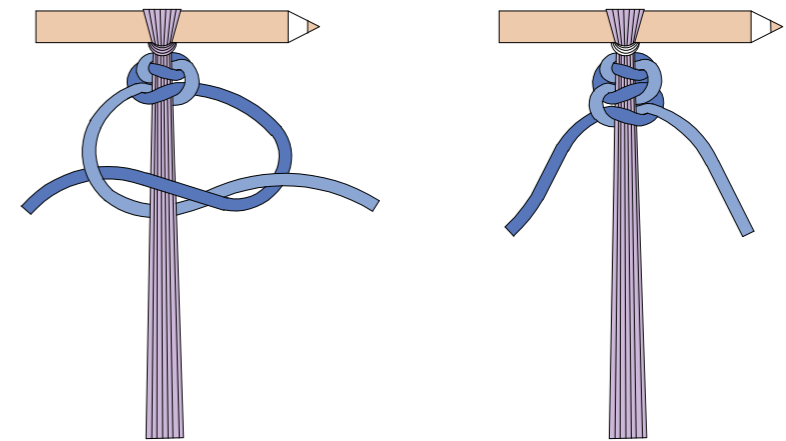
## STEP 3



## STEP 4

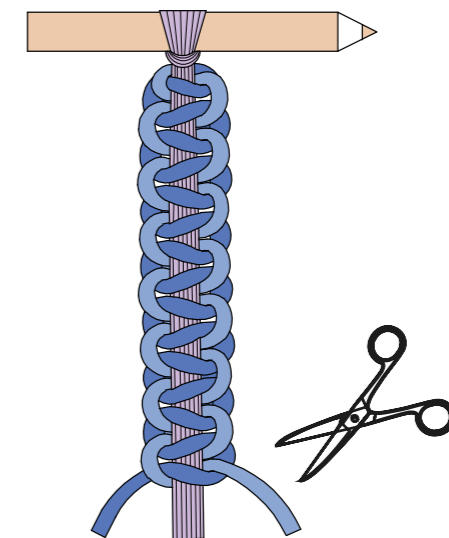


## STEP 5



## STEP 6

Repeat STEP 4 and 5 until desired length.



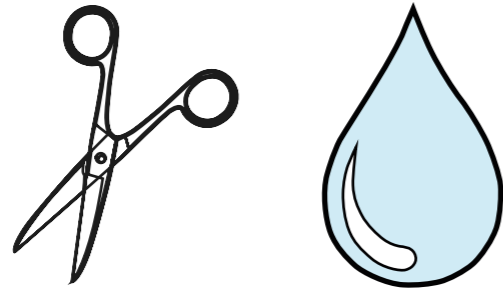
# THE BOOK MARK

Level: **Hard**

Technique: **Origami**

Estimated time to make: 10 - 15 min

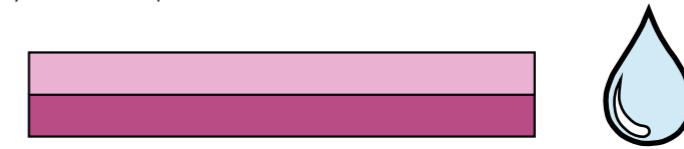
WHAT YOU NEED:



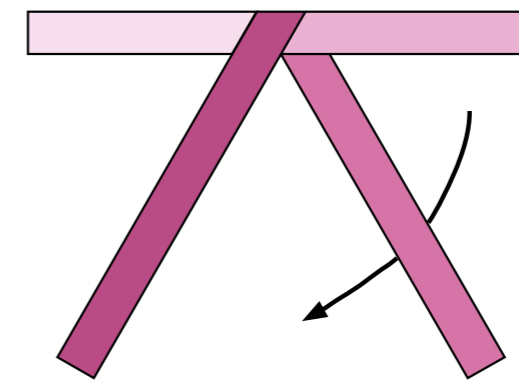
## INSTRUCTIONS: HOW TO MAKE THE BOOK MARK

STEP 1

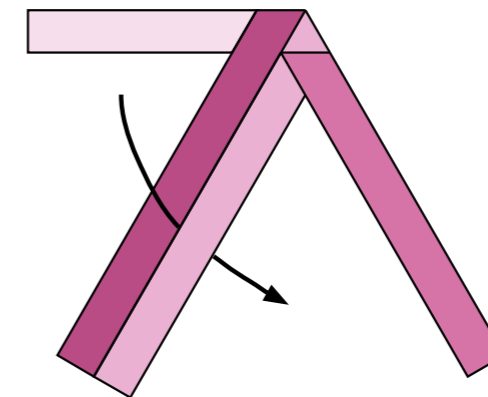
Moisten the water hyacinth strips and flatten them.



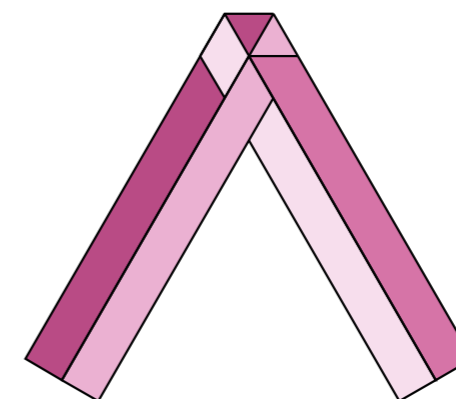
STEP 2



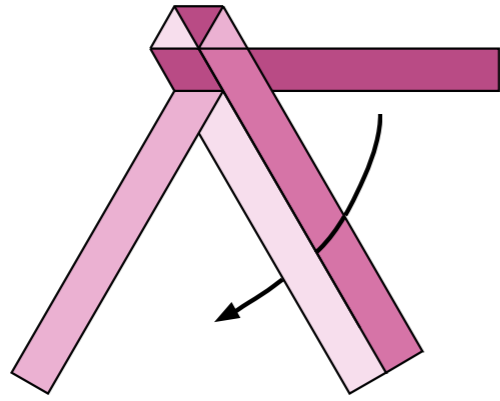
STEP 3



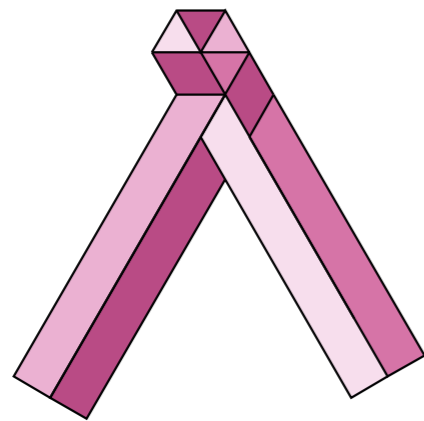
STEP 4



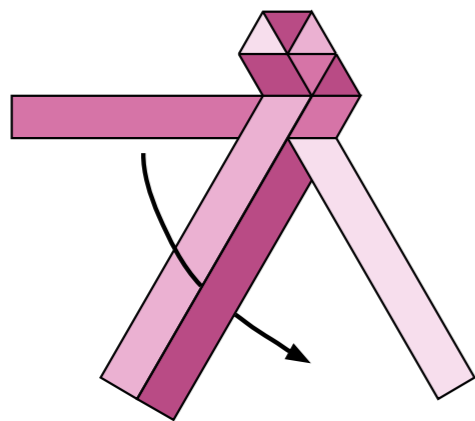
STEP 5



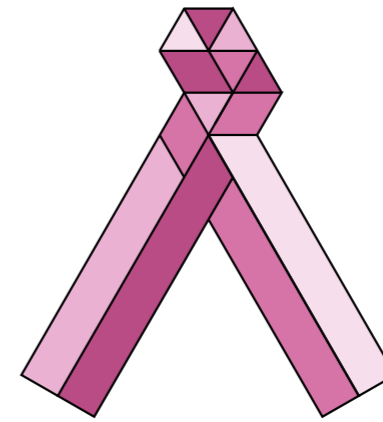
STEP 6



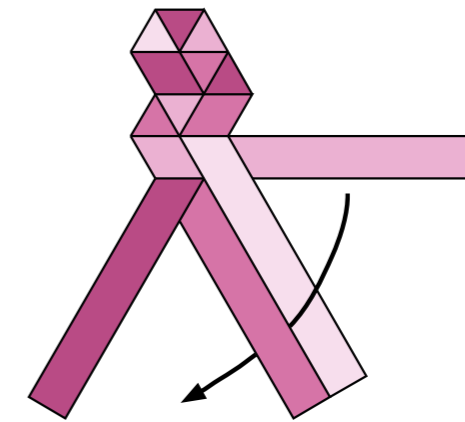
STEP 7



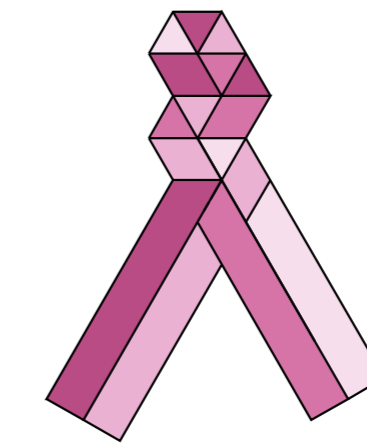
STEP 8



STEP 9

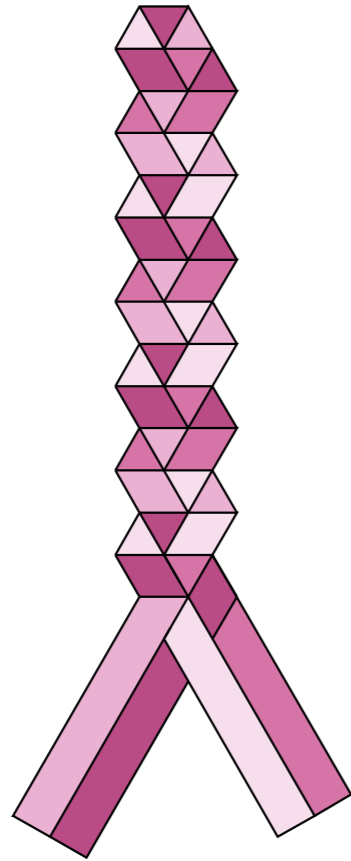


STEP 10

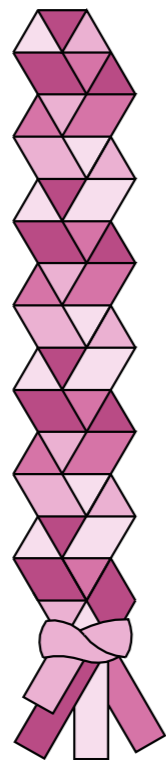


## STEP 11

Repeat STEP 7, 8, 9 and 10 until desired length.



## STEP 12



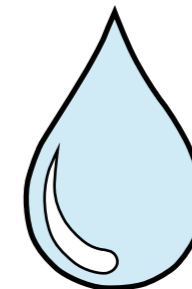
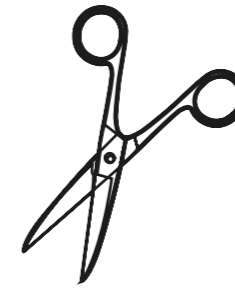
# THE DRAGONFLY

Level: **Hard**

Technique: **Macramé**

Estimated time to make: **12 - 15 min**

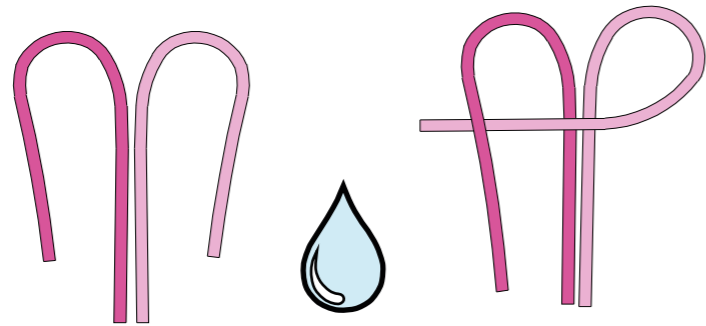
WHAT YOU NEED:



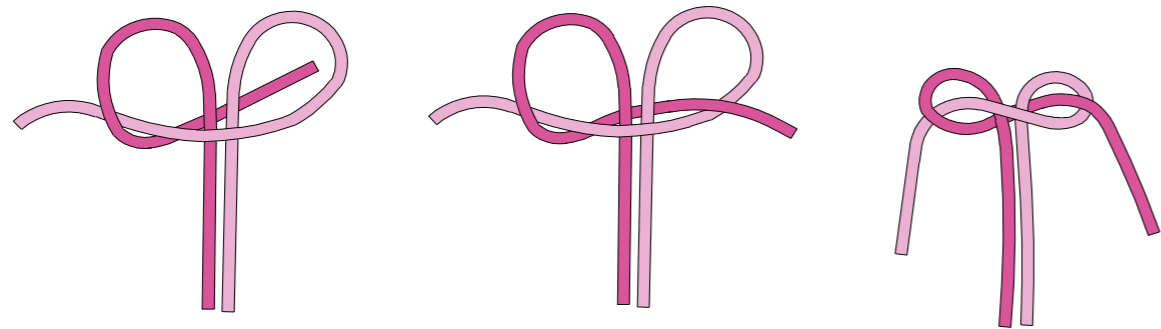
# INSTRUCTIONS: HOW TO MAKE THE DRAGONFLY

## STEP 1

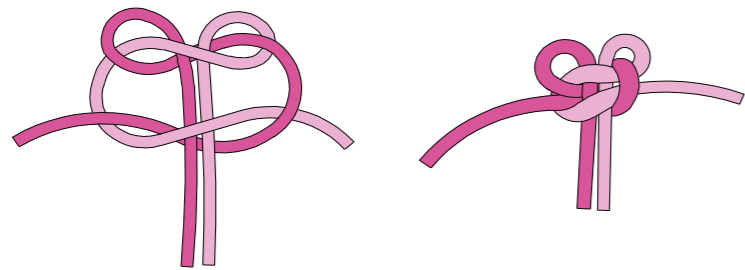
Moisten the water hyacinth strips.



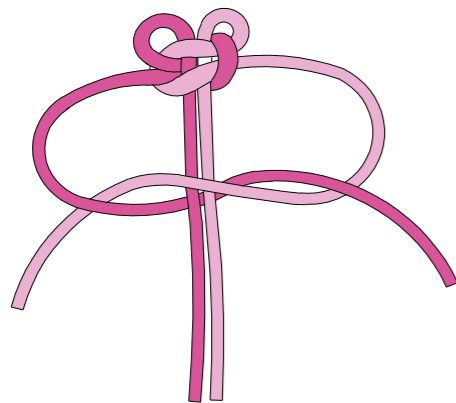
## STEP 2



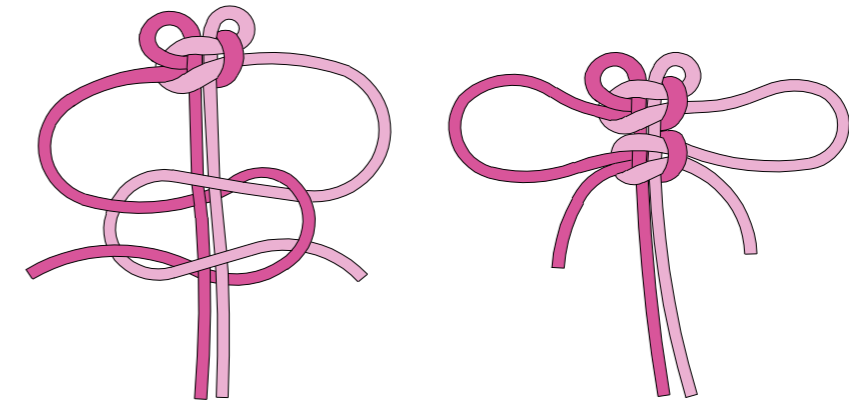
## STEP 3



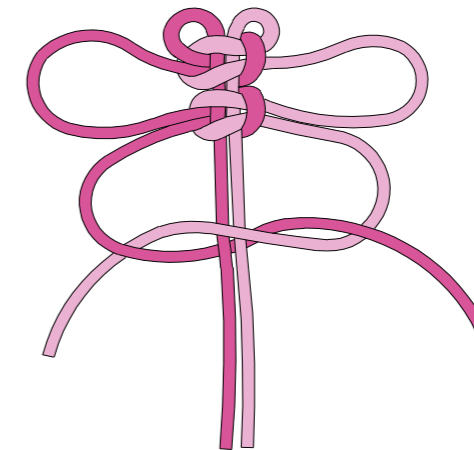
## STEP 4



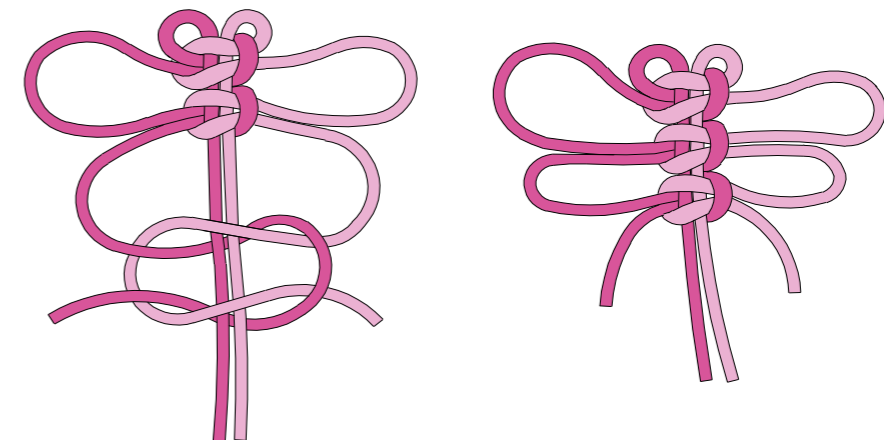
## STEP 5



## STEP 6

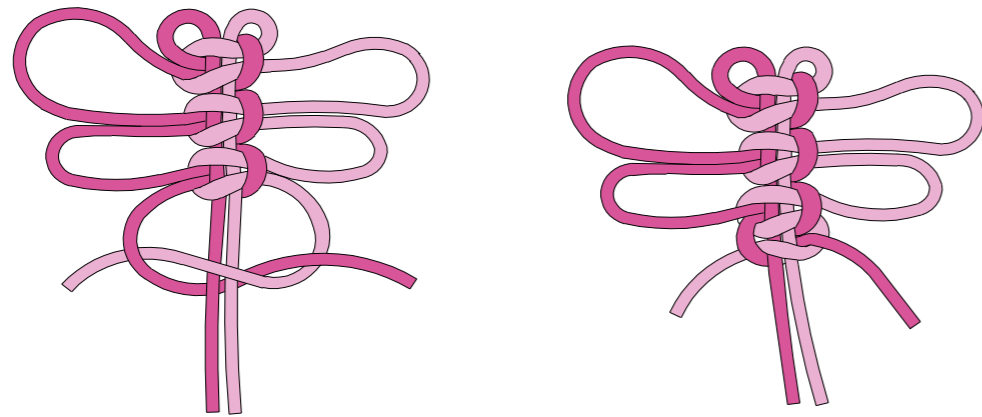


## STEP 7



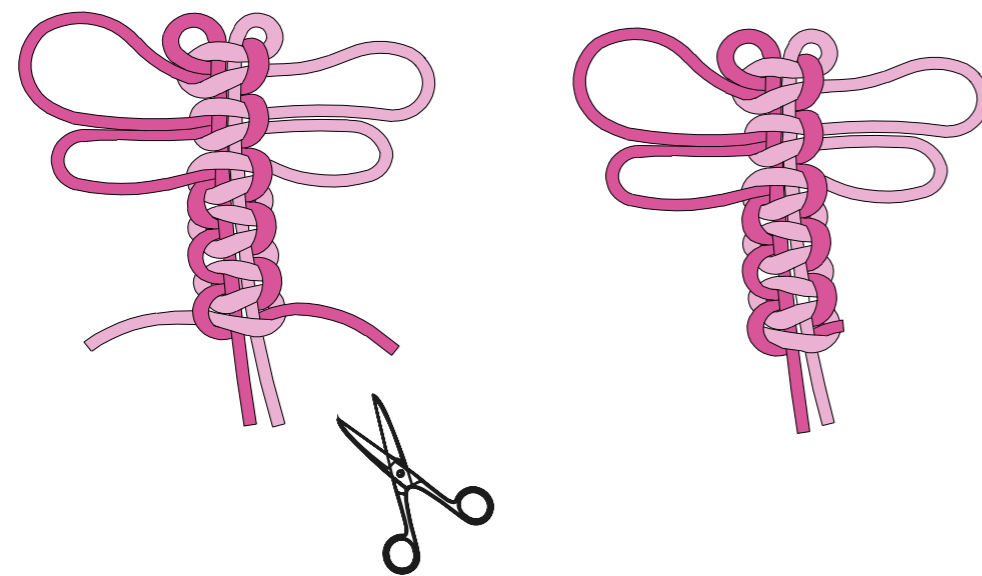
# EXPERIMENT WITH PRODUCTS

## STEP 8



## STEP 9

Repeat STEP 8 until desired length.



This chapter is made for the women to experiment on their own and creatively investigate around new products to make.

### TIPS:

1. Try to use new materials
2. Try to use new techniques
3. Try using different tools



# THE .....

Level:

Technique:

Estimated time to make:

WHAT YOU NEED:

STEP 1

STEP 2

STEP 3

STEP 4

STEP 5

STEP 6

# THE .....

Level:

Technique:

Estimated time to make:

WHAT YOU NEED:

STEP 1

STEP 2

STEP 3

STEP 4

STEP 5

STEP 6

# THE .....

Level:

Technique:

Estimated time to make:

WHAT YOU NEED:

STEP 1

STEP 2

STEP 3

STEP 4

STEP 5

STEP 6

# THE .....

Level:

Technique:

Estimated time to make:

WHAT YOU NEED:

STEP 1

STEP 2

STEP 3

STEP 4

STEP 5

STEP 6

# THE .....

Level:

Technique:

Estimated time to make:

WHAT YOU NEED:

STEP 1

STEP 2

STEP 3

STEP 4

STEP 5

STEP 6

# THE .....

Level:

Technique:

Estimated time to make:

WHAT YOU NEED:

STEP 1

STEP 2

STEP 3

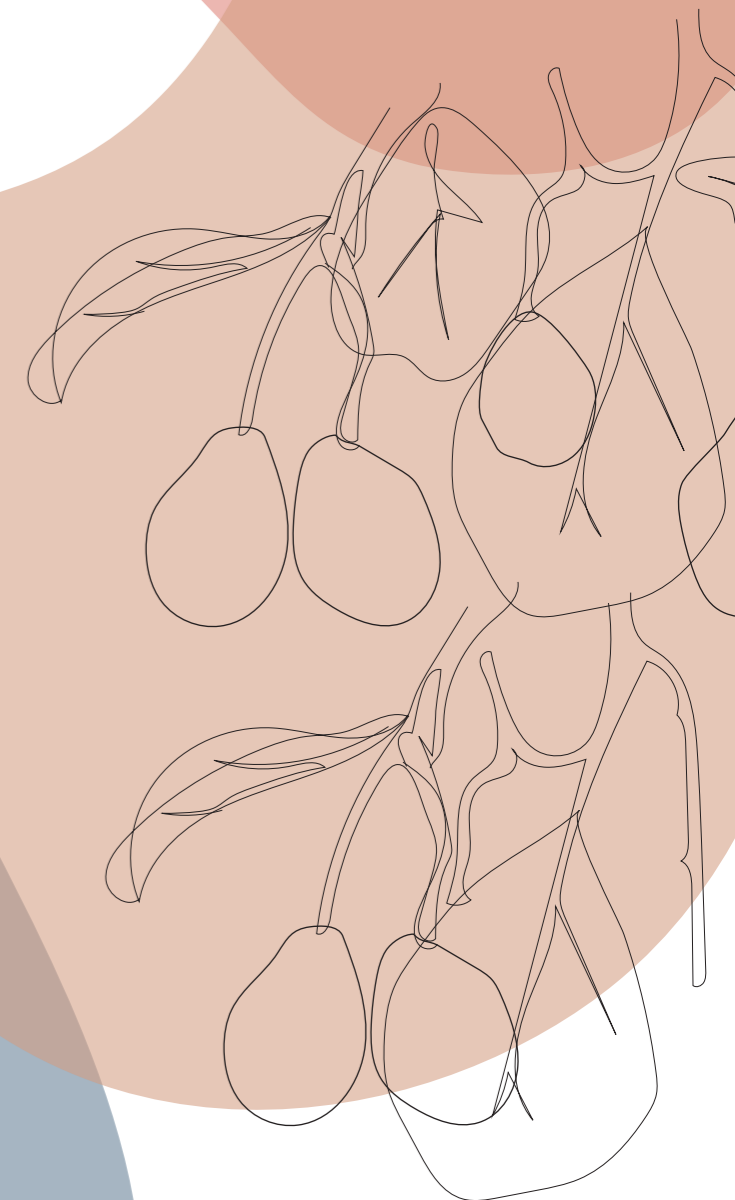
STEP 4

STEP 5

STEP 6

# MANUAL OF THE DYEING PROCESS

A STEP BY STEP GUIDE OF THE DYEING PROCESS OF THE MATERIALS  
SISAL, WATER HYCINTH AND PAPYRUS WITH THE NATURAL COLOURS  
FROM TURMERIC, RED BEETROOT, AVOCADO AND INDIGO.



# INDEX

DYEING OF THE LOCAL MATERIALS pp. 1

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DYEING SISAL WITH TURMERIC pp. 2 - 3

---

DYEING SISAL WITH RED BEETROOT pp. 4 - 5

---

DYEING SISAL WITH AVOCADO pp. 6 - 8

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DYEING SISAL WITH INDIGO pp. 10 - 17

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EXPERIMENT WITH DYEING pp. 18 - 19

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REFERENCES pp. 19

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# DYEING OF THE LOCAL MATERIALS

Since both products and the space would be more appealing and fun to work with and in, if it contains colours, the opportunities to dye the local materials have been investigated and tested. The target for the dyeing of the local materials is to have a natural process that is sustainable and to not use synthetic colouring. With these limitations, the subjects found pleasing to use was turmeric, red beetroot, avocado and indigo. The process of the dyeing with these is presented in this manual.

## EXPERIMENTING WITH DIFFERENT COLOURS AND TECHNIQUES

The first experiments were held in Sweden with vegetables that also can be found in Kisumu, Kenya. Avocado, carrots, red onion, red beetroot, coriander, turmeric, tomatoes, pomegranate, coffee and tea was tested. The first attempt was performed in a kitchen and the vegetables was mixed with both cold and warm water and soaked for 24 hours. The results were inadequate and only the turmeric, tea and pomegranate dyed the materials in some manner. The second experiment was with red onion, red beetroot and turmeric in the same environment. This time it was boiled and mixed with salt and white vinegar as stabilizers. End results was improved, however, not perfect but all materials had obtained some colour. Especially, the turmeric and red beetroot. Since it was considered important to use as little ingredients as possible, a third experiment was completed. The process to boil the substances, to extract the colour and then add the sisal was tried and had pleasing results. The tested substances were avocado, turmeric and red beetroot. It resulted in the sisal coloured yellow or pink. The third experiment was considered successful and suitable for the context of Kisumu in Kenya since no extra substance is needed and the vegetables are commonly found there.

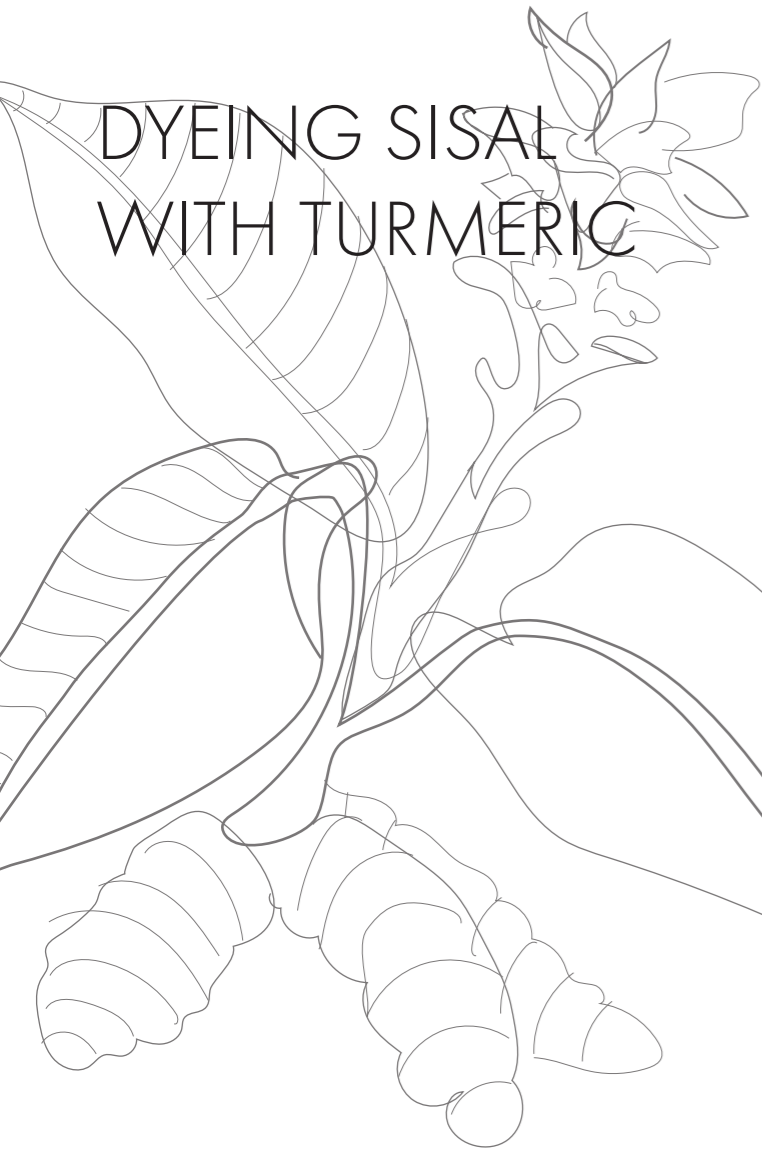
Present, there are experiments of dyeing water hyacinth, papyrus and sisal in Sweden. It is a cooperation between the organisation Zingira in Kenya, Helena Hansson (expert of crafts of Kenyan materials) and John Åberg (expert in indigo dyeing). So, to continue the colouring experiment, the project group contacted them. The specialist retrieved some examples of our raw materials and dyed them in an indigo bath. The results were separated, the sisal absorbed the colour very good and retrieved a nice blue shade. However, the papyrus and the water hyacinth did not contain as much colour when untreated. Nevertheless, it seems as crafted materials, such as rope, absorbs the indigo colour in a more adequate way. (SEE PICTURE) Considering the results, to dye the products with indigo seems as a nice activity and a way to make the products exclusive.

The usage of the indigo plant has a long history in East -and West Africa and they have established different traditional ways of extracting the colour from the plant and use different ways of colouring materials. According to USDA (2020) the indigo species *Indigofera Tinctoria* grow naturally in East Africa and the plant is present in Kenya. However, there do not seem to be any established farming or extraction of indigo. This is seen as an opportunity for the women to create a uniqueness in their service and products. Therefore, it is considered an important track in this project to explore and introduce to the stakeholders in Kenya. A future vision would be to implement the indigo plant in the space and extract the colour at the location.

## FUTURE VISION

In a more developed stage of the service and space, it would be favourably to have a land with the plants used for the dyeing of the materials: indigo plants, avocado trees, turmeric and red beetroot plants. This would be more beneficial for the women than to buy the supplies as well as more sustainable to grow the plants at the location.

# DYEING SISAL WITH TURMERIC



BEFORE



AFTER

## WHAT YOU NEED:

Turmeric powder



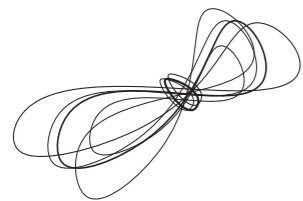
Water



Pot with lid and fire

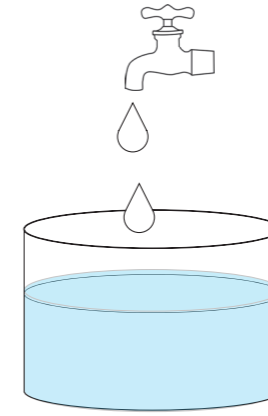


Sisal



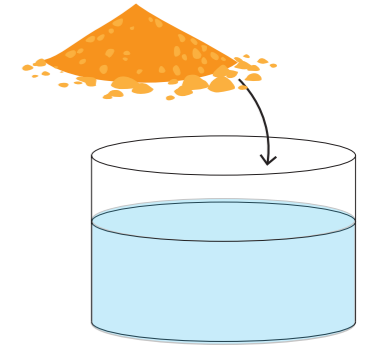
### Step 1.

Fill the pot with water



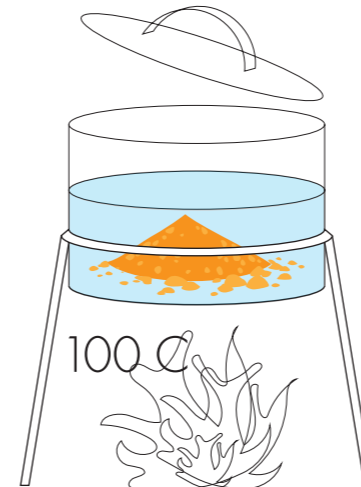
### Step 2.

Put in the Turmeric powder



### Step 3.

Heat up the mixture to shimmering (100 C)



### Step 4.

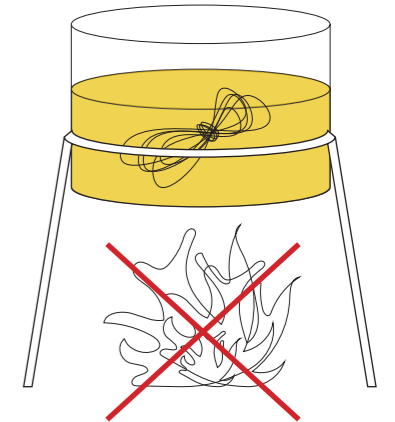
Put in the sisal



### Step 5.

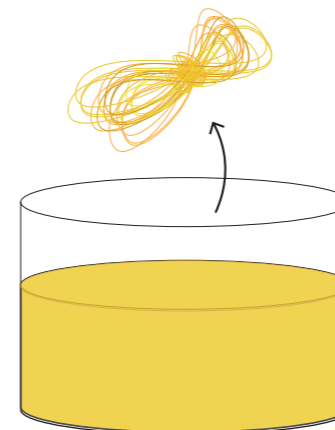
Turn of the heat and leave the sisal in the mixture for 24 hours

24 HOURS



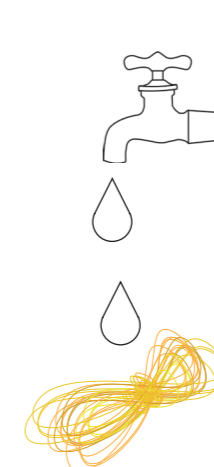
### Step 6.

Take out the Sisal



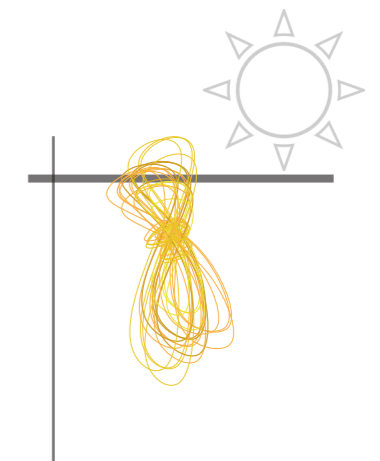
### Step 7.

Rinse the sisal in clean water

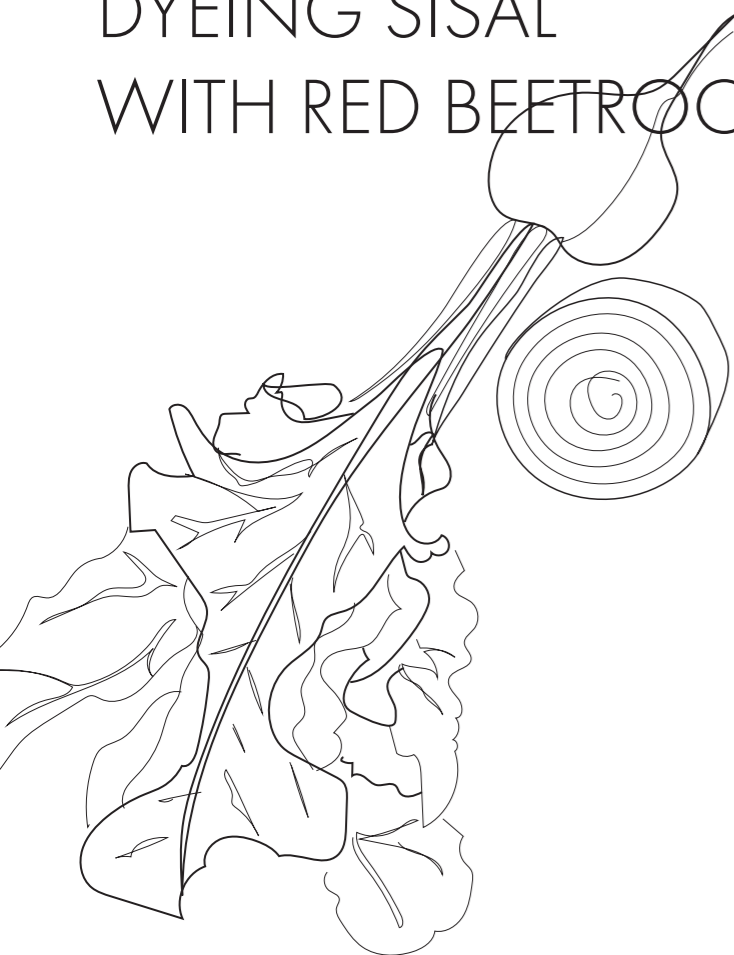


### Step 8.

Dry the sisal



# DYEING SISAL WITH RED BEETROOT

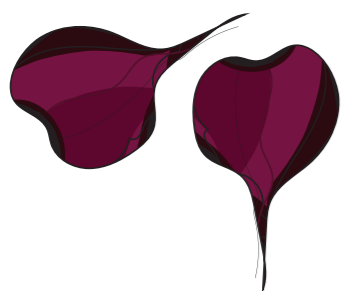


BEFORE

AFTER

## WHAT YOU NEED:

Red Beetroot



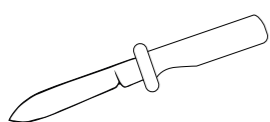
Water



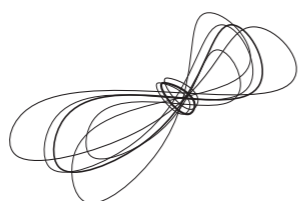
Pot with lid and fire



Knife



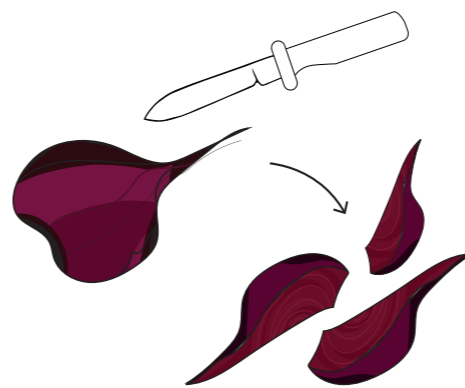
Sisal



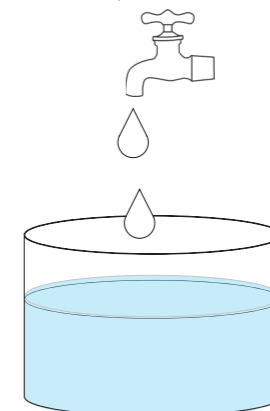
Stabilizers:  
Salt & White vinegar



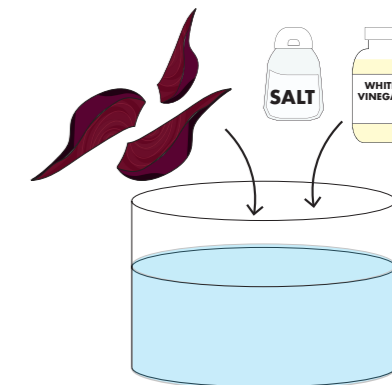
Step 1.  
Cut into pieces.



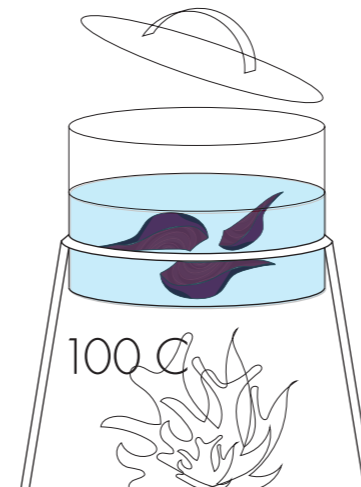
Step 2.  
Fill the pot with water.



Step 3.  
Put in the pieces of red beetroot and the stabilizers: salt and white vinegar.



Step 4.  
Heat up the mixture to shimmering (100 C) and let it be until wanted colour.

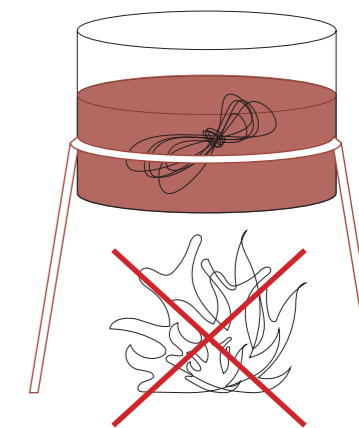


Step 5.  
Take out the red beetroot and put in the sisal.

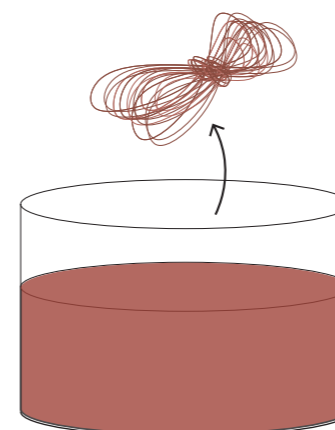


Step 6.  
Turn of the heat and leave the sisal in the mixture for 24 hours.

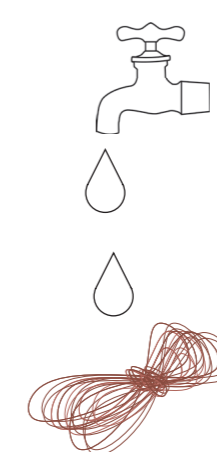
24 HOURS



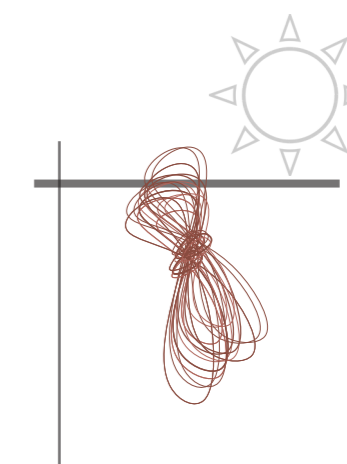
Step 7.  
Take out the sisal.



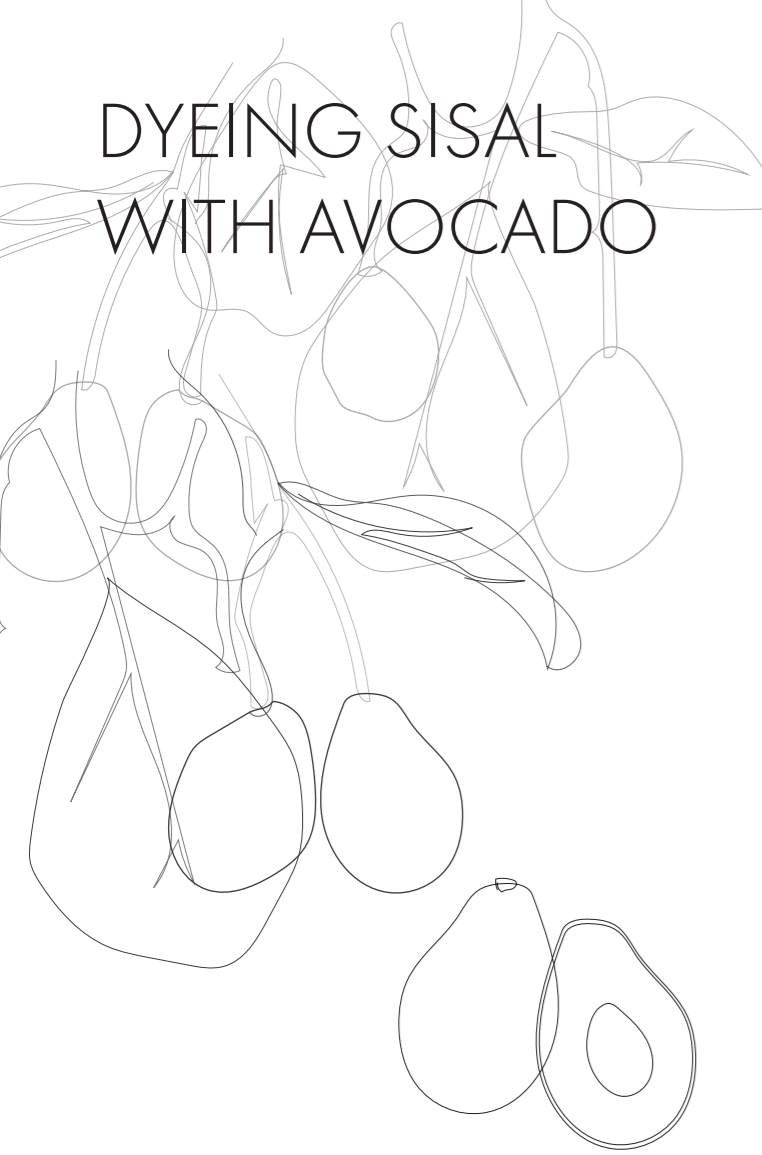
Step 8.  
Rinse the sisal in clean water.



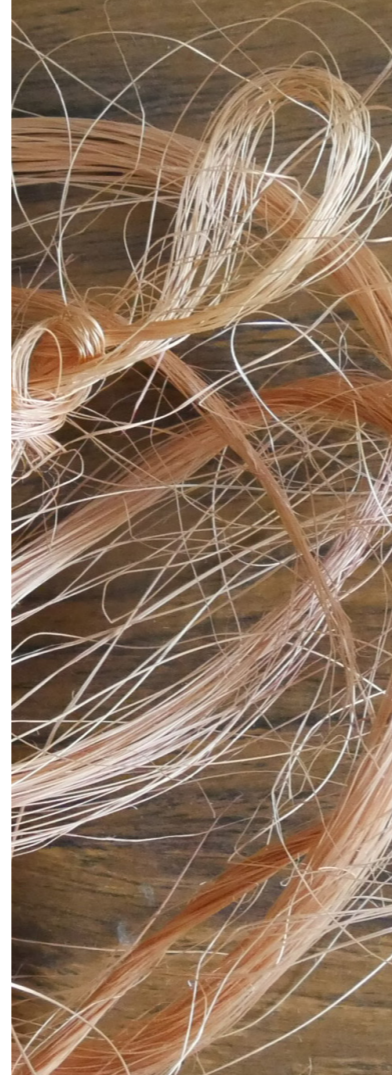
Step 9.  
Dry the sisal.



# DYEING SISAL WITH AVOCADO

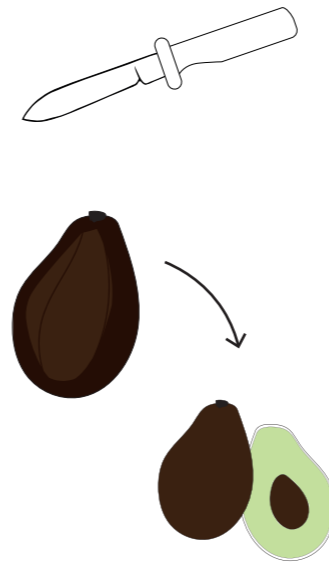


BEFORE

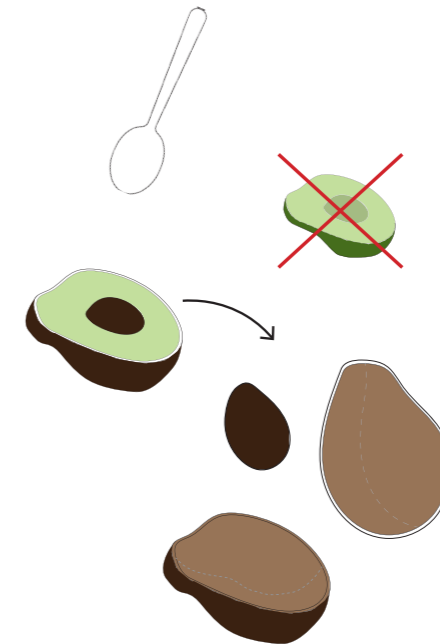


AFTER

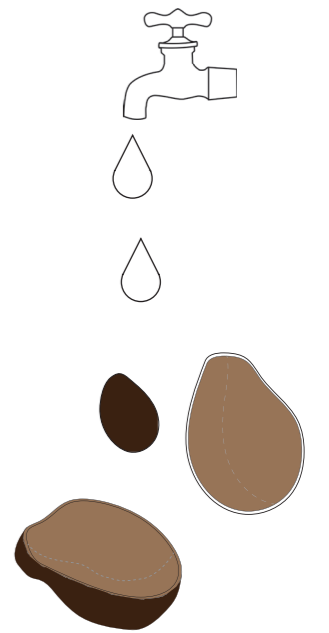
Step 1.  
Cut the avocado in half.



Step 2.  
Take away the green inside and only keep the core and peel.

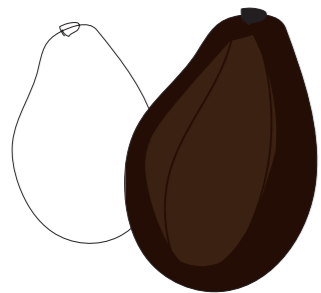


Step 3.  
Rinse the core and peel in water.



## WHAT YOU NEED:

Avocado



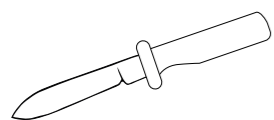
Water



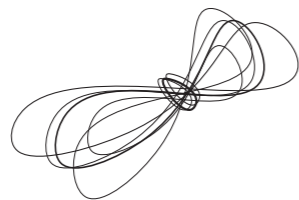
Pot with lid and fire



Knife



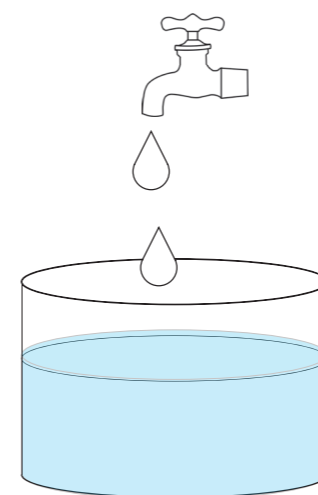
Sisal



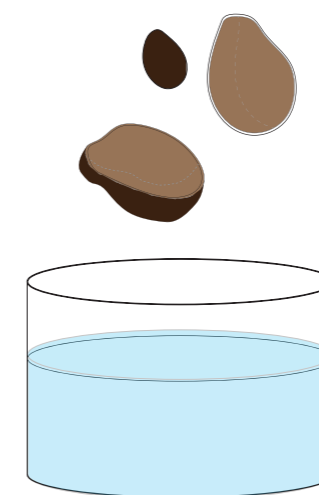
Spoon



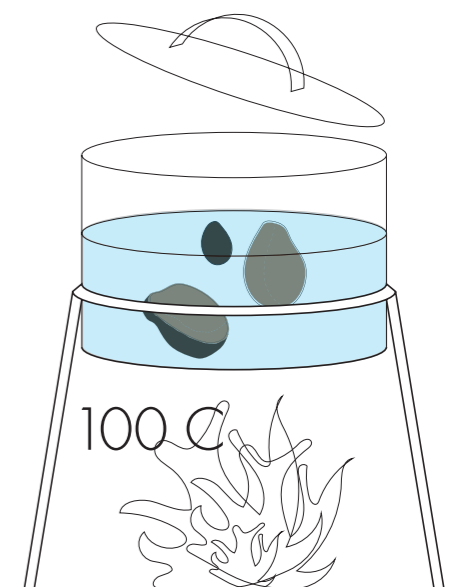
Step 4.  
Fill the pot with water.



Step 5.  
Put the core and peel in the pot.

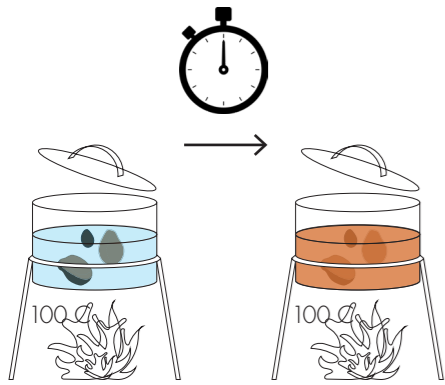


Step 6.  
Heat the pot until it starts boiling.



### Step 7.

Let it simmer on low heat until wanted colour .



### Step 8.

Put in the sisal and let it be on the heat for a while.



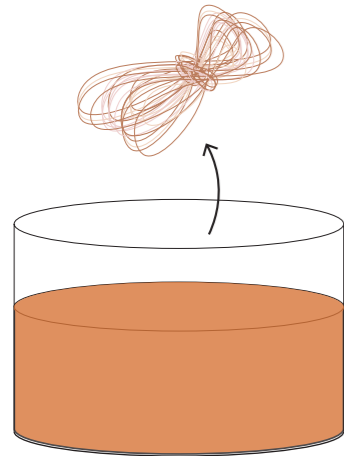
### Step 9.

Take off the heat and let the sisal sit in the pot for 24 hours.



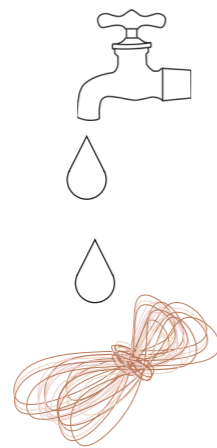
### Step 10.

Take out the Sisal.



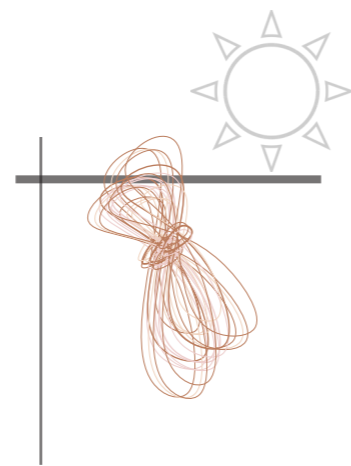
### Step 11.

Rinse the sisal in clean water.



### Step 12.

Dry the sisal .



# DYEING SISAL WITH INDIGO



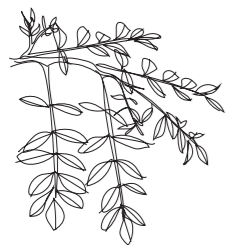
BEFORE



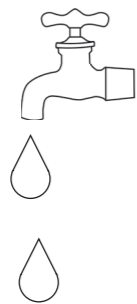
AFTER

## PART 1. WHAT YOU NEED TO MAKE INDIGO PASTE:

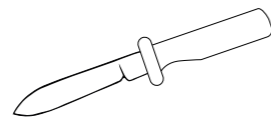
Indigo plant



Water



Knife



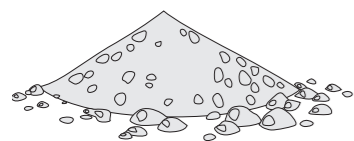
Rocks



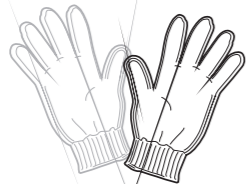
Small vat



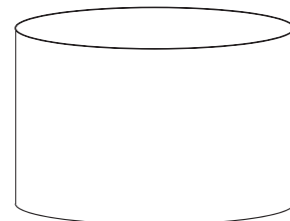
Limestone



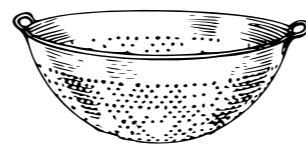
Gloves



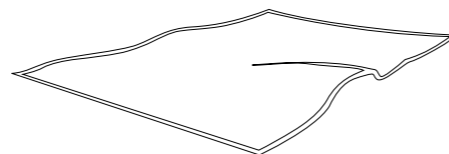
Vat



Strainer



Cotton cloth



### Step 1.

Harvest the indigo plant.



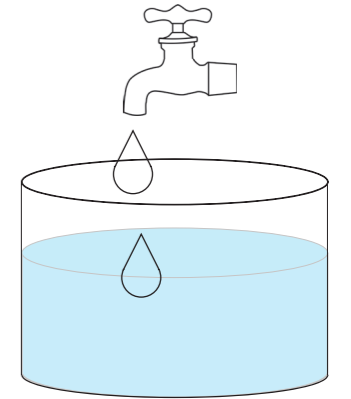
### Step 2.

Bunch the leaves together.



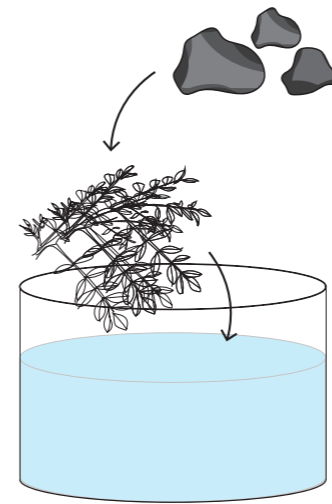
### Step 3.

Fill up the vat with clean water.



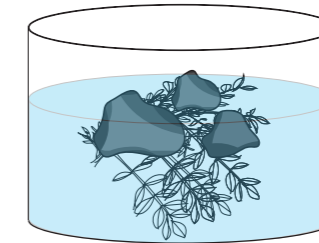
### Step 4.

Put in the indigo bunches in the water and put the rocks on top to keep the bunches under water.



### Step 5.

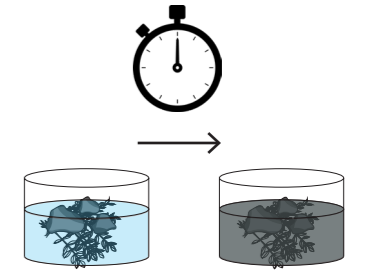
Leave in the vat to soak for 24 hours.



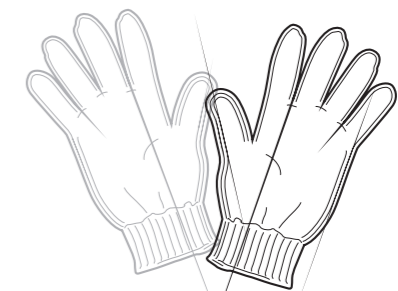
### Step 6.

Leave for 24 hours, let the water turn brown/purple.

24 HOURS

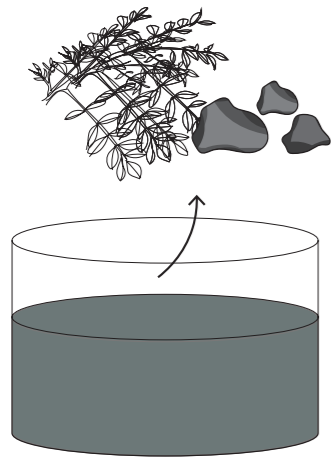


PUT ON GLOVES FOR PROTECTION



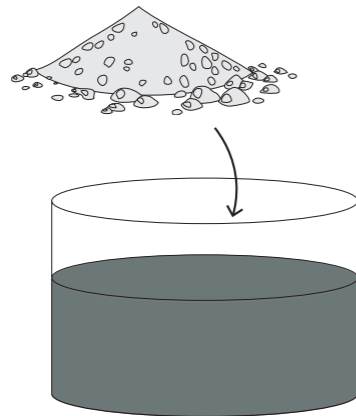
### Step 7.

Remove the rocks and bundles.



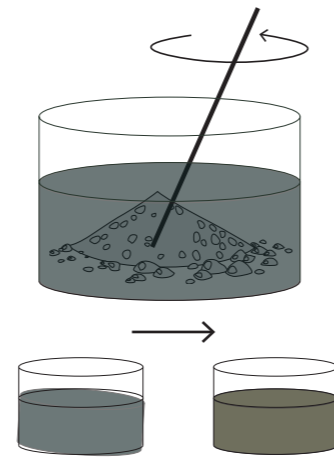
### Step 8.

Add 2% builders lime  $\text{Ca}(\text{OH})_2$ . Mix carefully into the vat.



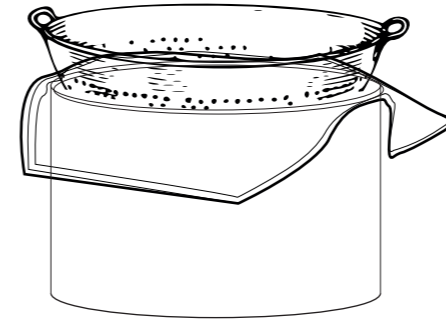
### Step 9.

Mix carefully into the vat and the colour will turn a bit more green/yellow.



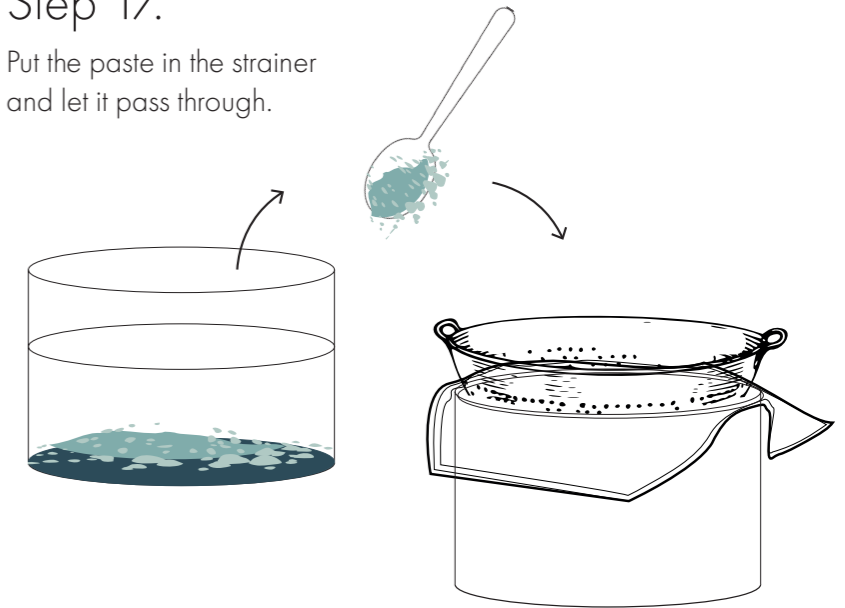
### Step 16.

Put them together.



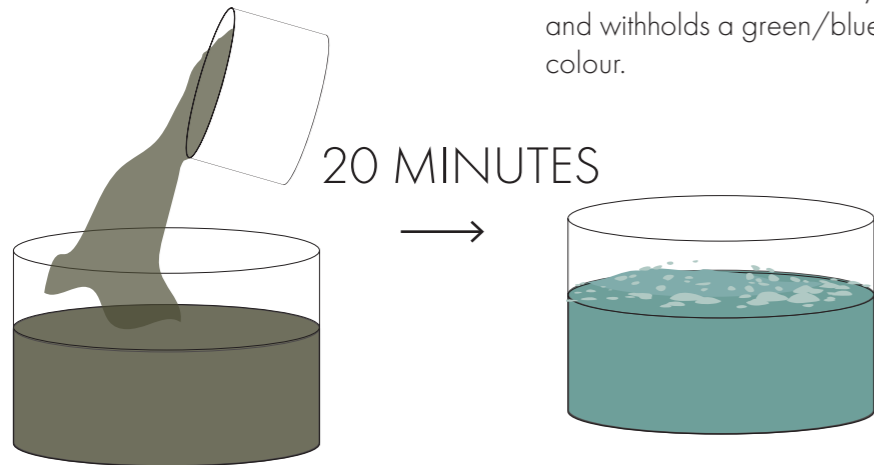
### Step 17.

Put the paste in the strainer and let it pass through.



### Step 10.

Oxidizing the mixture by beating air into the mixture for about 20 minutes.

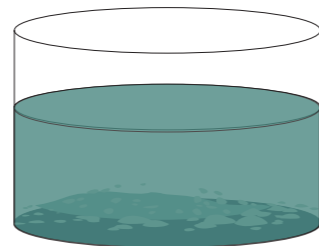


### Step 11.

The beating process is done when the mixture turns frothy and withholds a green/blue colour.

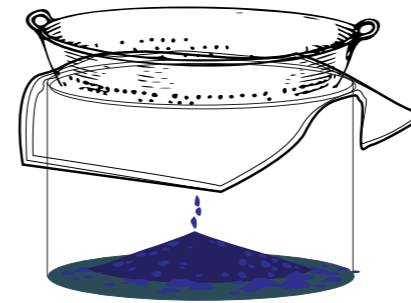
### Step 12.

Let it rest 24 hours. The indigo paste will settle at the bottom and then the brown water on top can be carefully removed.



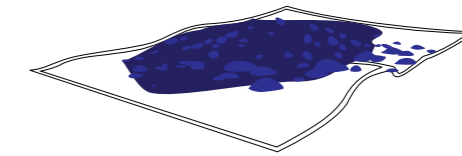
### Step 18.

Leave until it has passed through.



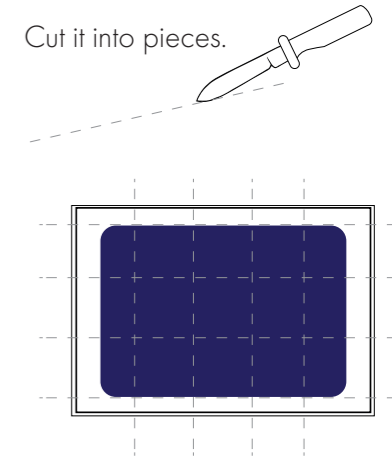
### Step 19.

Put the paste on a cloth.



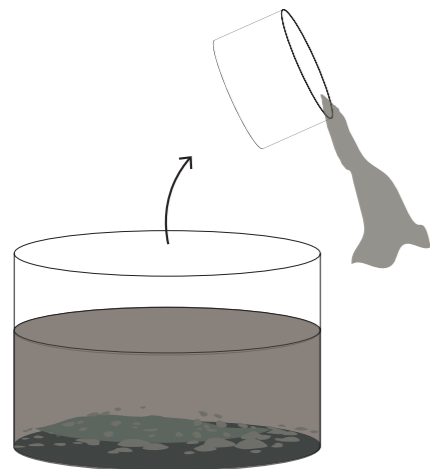
### Step 20.

Cut it into pieces.



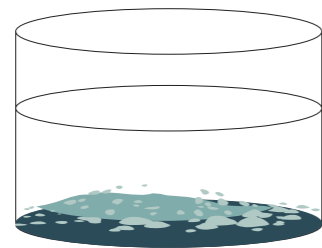
### Step 13.

Remove the brown water on top.



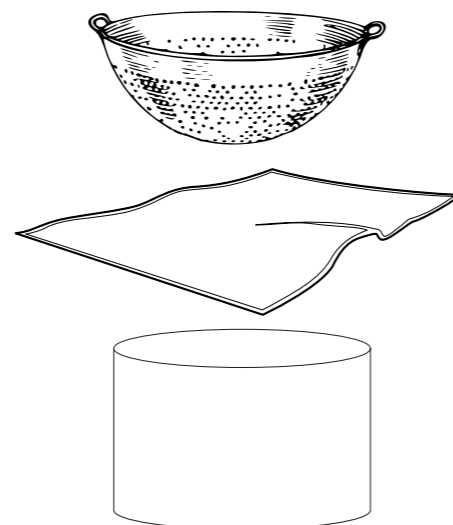
### Step 14.

Only the blue paste is left at the bottom of the vat.



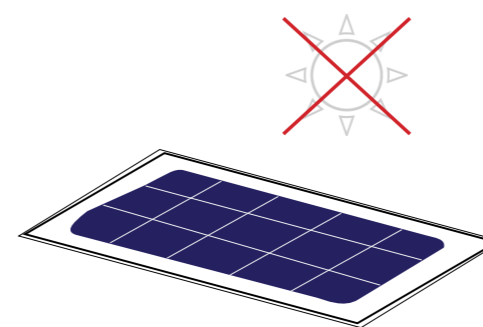
### Step 15.

Prepare a vat, a cotton cloth and strainer.



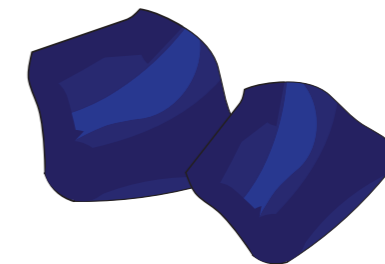
### Step 21.

Put to dry in the shadow.



### Step 22.

Indigo 'cakes' are now finished and can be stored dry for a long time.

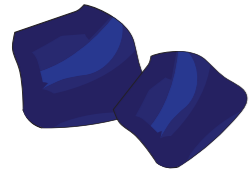


NOW YOU ARE READY TO MAKE A INDIGO VAT!

# PREPARE A INDIGO BATH OF 15-20 LITERS

## PART 2. WHAT YOU NEED TO MAKE A INDIGO BATH:

Indigo powder



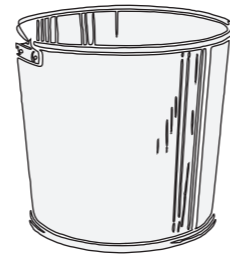
Pot with lid and fire



Water

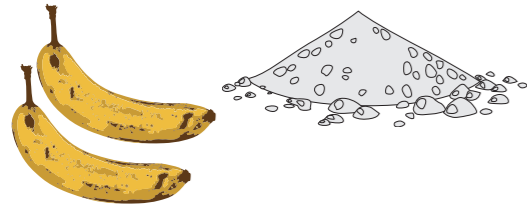


Stainless steel vat



Fermentizers:

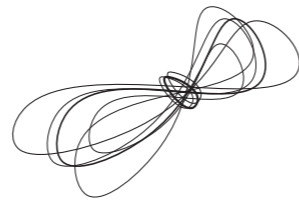
Old fruit & lime (calx)



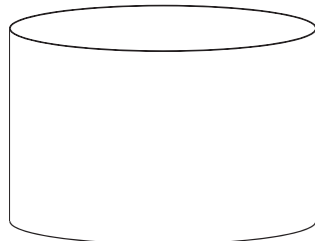
Spoon



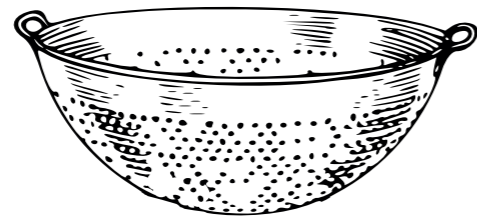
Sisal



Vat



Strainer



Gloves



Step 1.

Peel the fruit.



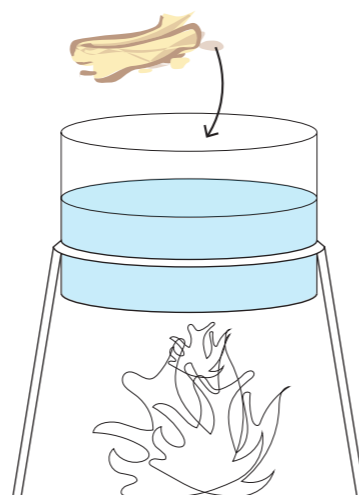
Step 2.

Mash 1 kg fruit.



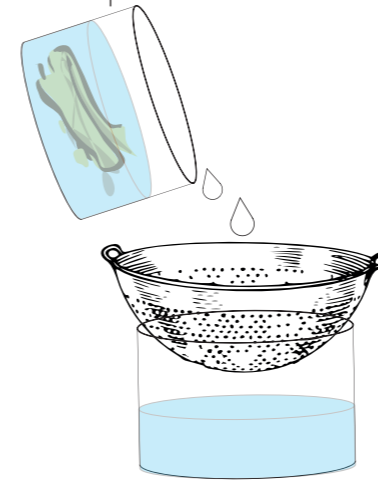
Step 3.

Put the mashed fruit in water and boil it for a few minutes.



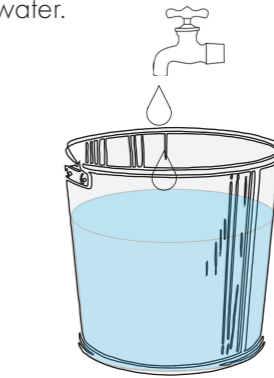
Step 4.

Filter the juice from the fruitmash.



Step 5.

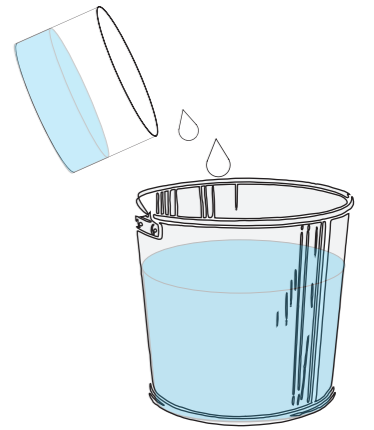
Fill the stainless steel vat with 3/4 of hot water.



HOT WATER

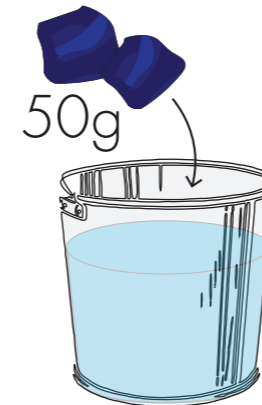
Step 6.

Add the fruitjuice to the stainless steel vat.



Step 7.

Add 50gram hydrated indigo powder.



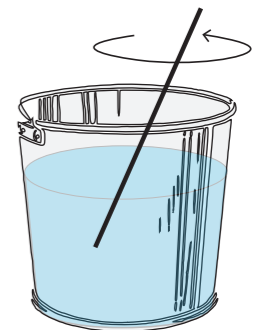
Step 8.

Add 30 gram of lime (calx).



Step 9.

Stir the vat carefully! You do not want any air in the mixture.



Step 10.

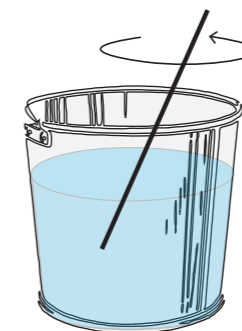
Leave the vat for a few minutes.

5 MINUTES



Step 11.

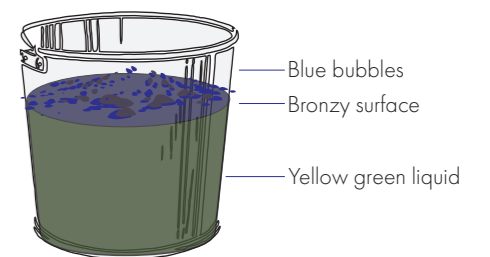
Stir carefully again. Repeat step 10 and step 11, 4 times.



Step 11.  
Step 10. x4

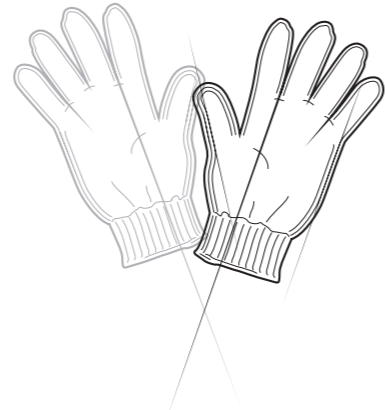
Step 12.

The bath should have a bronzy surface, blue bubbles and the liquid a yellow green.



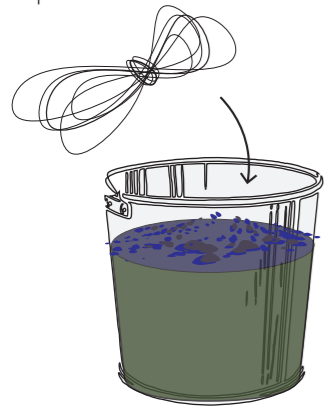
Blue bubbles  
Bronzy surface  
Yellow green liquid

PUT ON GLOVES FOR PROTECTION



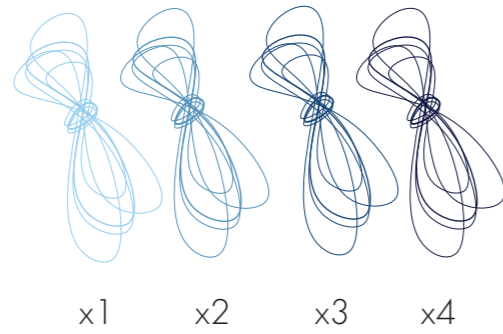
Step 13.

Dip the sisal in the vat, try to not expose the vat for unnecessary air.



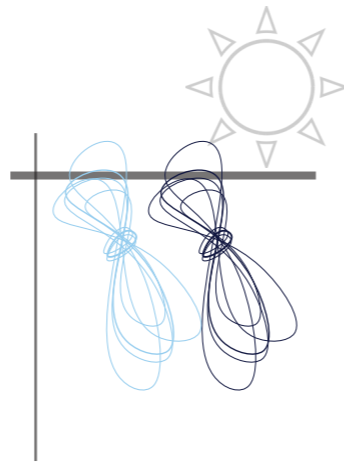
Step 14.

Dip more than once to gain a deeper shade of blue.



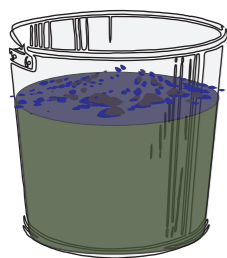
Step 15.

Let the sisal dry.



Step 16.

Take care of the vat by feeding it with the fermentizers and it can stay alive for a long time.



# EXPERIMENT WITH DYEING

This chapter is encouraging to test and experiment with dyeing. The best way to learn about dyeing and to understand the materials properties is to experiment and test different methods.

TRY ON WATER HYACINTH, PAPYRUS OR OTHER MATERIALS

Notes

TRY DIFFERENT METHODS

Notes

TRY WITH OTHER SUBSTANCES

Notes



## REFERENCES

Maiwa (2013) Natural dyes - indigo, the fruit vat. Retrieved 2020-05-19 from: <https://maiwahandprints.blogspot.com/2013/08/natural-dyes-indigo-fruit-vat.html>

The Kind Craft (N.D) The process: Indigo from plant to paste. Retrieved 2020-05-19 from: <https://thekindcraft.com/the-process-indigo-from-plant-to-paste/>

USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. Retrieved 2020-05-11 from: <https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=20064>.

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- b) The space
- c) The products

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- c) The products

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## APPENDIX 6 - SWOT ANALYSIS: CROWDFUNDING

## APPENDIX 1 - LIST OF REQUIREMENTS

### A) The service

	Requirements for the service	Specification	Weighing (1-5)	Comments
1	Offer space	For maximum 10 adults and 10 children	5	
2	Enable profit	For the craftswomen through workshops with children + selling of new smaller products	5	
3	Offer education	Offer education For the children and tourists about the materials, crafts and local area of Dunga	4	
4	Offer education about ecotourism	Education about the local area and materials - make the visitors aware of the impact	4	
5	Empower the women	The number of women working in Dunga Beach	5	Today many men are in charge of the tourism
6	Offer marketing/branding	In need for the people to access the workshop area	5	Connected to empowering women and enable profit.
7	Access to material and tools	Water hyacinth, papyrus, sisal, spears	5	
8	Access to a translator	Having a translator to translate between the women and the people coming to the workshop	3	Could be a WISE-person at the beginning teaching e.g. Dianah how to hold the workshops.
9	Offer different kinds of workshops	Adapted after group and age.	3	Dyeing and drying, different crafts and products
10	Enable movement between the service and Dunga Beach	Walking distance between the service and Dunga Beach	5	With a guide leading the group between the two points.
11	Education about sustainable usage of materials	Usage of local materials in a responsible manner	3	

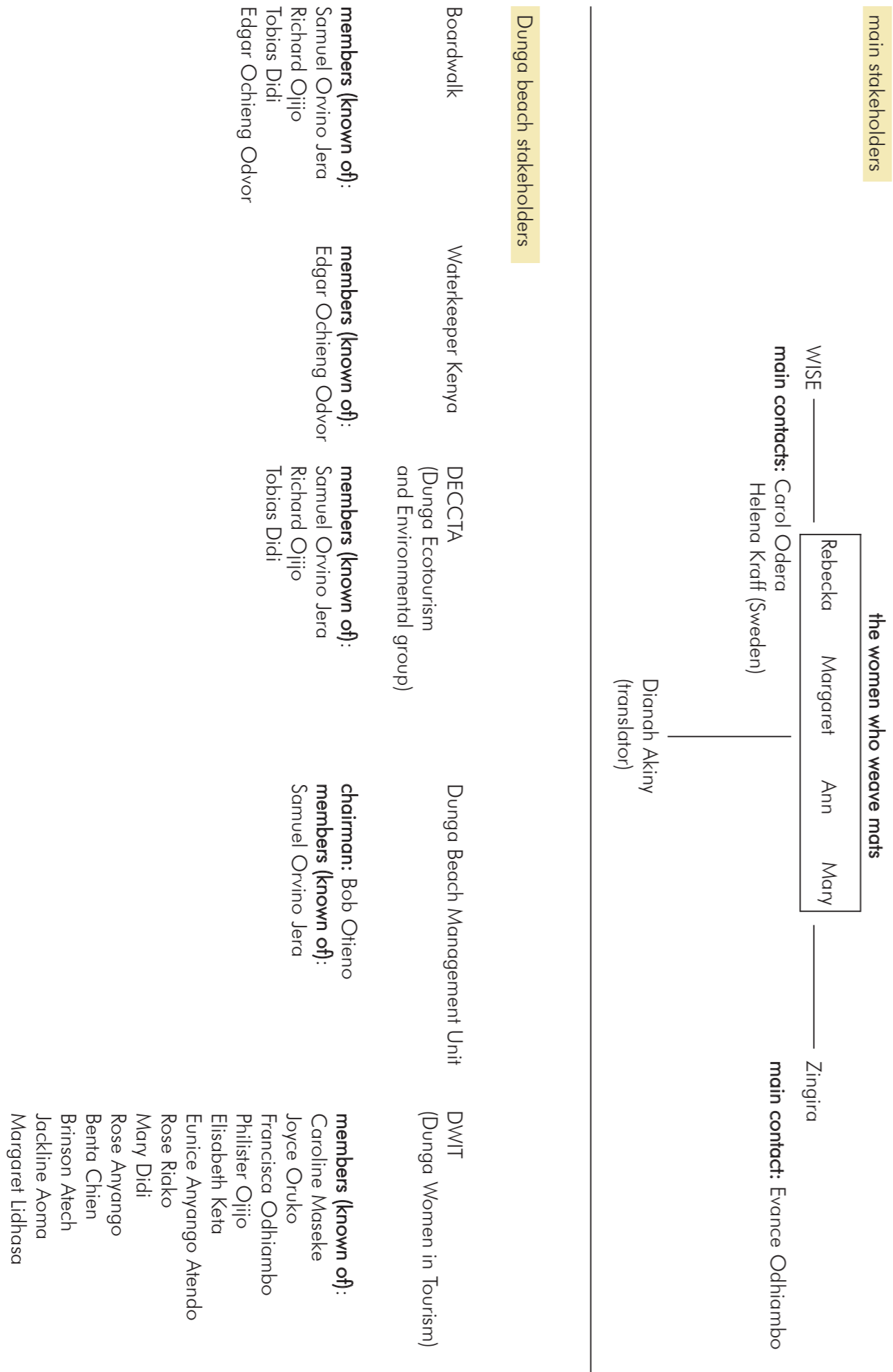
## B) The space

	Requirements for the space	Specification	Weighing (1-5)	Comments
1	Offer shading	During the hours of the workshop	5	
2	Keep the materials and products safe	Storage	5	The weighing depend on the options to store, maybe it can start inside someone's house.
3	Opportunities for seating	Chairs, benches for five adults	3	Resting area
4	Offer safety	No protruding elements within the space that can cause harm when being there	5	In terms of Kenyan safety (might differ between Sweden and Kenya).
5	Possibilities to display work	Both the work by the women and children. The work of the women can be integrated into the space	4	
6	Avoiding water damage	Elevated from the ground	4	
7	A place for dyeing and drying	Process of creating the materials	3	Needs sun and water and natural color materials
8	Adaptable to weather conditions	Flexible structure	4	
9	Offer structure that can be developed	The space can be developed and be built by local people	5	
10	The structure should be cheap	Local materials, not to complex solutions	5	

## C) The products

	Requirements for the products	Specification	Weighing (1-5)	Comments
1	For both the women, children and tourists	For both the women, children and tourists	5	
2	Doable with the materials offered	Products that do not require materials that the women do not use	5	
3	Doable with the existing tools or tools that can be locally made		5	
4	Suitable for children of different ages	Matching the children's interests	4	
5	Connected to the tourism	Products inspired by the local area	3	
6	Made out of materials available	Papyrus, water hyacinths and sisal	5	
7	Flexible products	Depending on what materials are in season the products are adapted	4	
8	Easy to learn to make	Products that the women can learn and then pass onto the children at the workshops	5	Responsibility for us to make the manual easy to understand
9	Evoke creativity	Products that the women can be inspired by, hence, lead them to develop other new products	5	

## APPENDIX 2 - STAKEHOLDER MAP



## APPENDIX 3 - FUNCTION LIST

### A) The service

	Analysis of functions	Comments	Necessary/ Desirable/ Unnecessary
1	Express safety	Solid, round shapes and semantics of safety	D
2	Express creativity	Colours, shapes, innovative ways of displaying the things made	D
3	Show information	Signs and marketing	N
4	Enable interaction	Between children and adults	N

### B) The space

	Analysis of functions	Comments	Necessary/ Desirable/ Unnecessary
1	Express calmness	Greenery, "orangery"	D
2	Offer sales	Products, materials	D
3	Offer play	Swing? Tires?	D
4	Offer wardrobe	For bags	D

## C) The products

	Analysis of functions	Comments	Necessary/ Desirable/ Unnecessary
1	Evoke happiness	Products with fun features for the users	D
2	Create attachment	Personal, belonging, by making it yourself	D
3	Evoke play	A product that the children can play with	D
4	Create demand from customers	Make products that meet the requirements of the market	D/N (if good business)
5	Create uniqueness	Dyeing	D

## APPENDIX 4 - QUESTIONNAIRE

### Do you work as a teacher or pedagogue for children/youths (5-15 years)?

Hi,

We are working on a project to strengthen women's role in an area called Dunga Beach, located in the city of Kisumu in Kenya. The women work with crafts made from local materials from Dunga Beach and our project aims to create workshops for children where they can learn about women's crafts and the culture in the area. As a result of the coronavirus, we have had to restructure our project and perform many parts digitally. Hence, we would need your help if you are a teacher, pedagogue or do similar work with children/youths and get answers to some questions about the interests of this target group.

What do you think is interesting for kids to learn when it comes to crafts? (Multiple choices possible)

- How to create products
- How to manufacture and dye the material
- History about the area and the products
- About the material and its characteristics
- Other: \_\_\_\_\_

Picture of the women we work with and us, taken in Dunga Beach.



Through what medium do you think they learn the best (and prefer)? For example, pictures, storytelling, creating, texts or combinations.

Your answer \_\_\_\_\_

What ages do you work with?

Your answer \_\_\_\_\_

What kind of crafts/stuff do kids in those ages like to create?

Your answer \_\_\_\_\_

For how long can they keep concentrated without having a break?

- 30 minutes
- 45 minutes
- 1 hour
- 1.5 hours
- 2 hours
- 3+ hours

For how long do they usually have breaks?

Your answer \_\_\_\_\_

## APPENDIX 5 - COST ANALYSIS

### WHAT THE WOMEN EARN TODAY

Bunch of papyrus costs 200 KES, lasts for 2.5 mats → material per mat costs 80 KES  
 One mat is sold for 100-150 KES → earn around 50 KES per mat  
 One woman makes 3-5 mats per day → earn around 200 KES per day  
**One woman earns around 1400 KES per week (work around 40h every week)**

### WHAT THE WOMEN WOULD EARN FROM THE SERVICE

#### STEP 1

10 children, 5 women, 2h/workshop  
 Once a week, 50 KES per child, 10 children → 500KES  
 $500/5 = 100$  KES  
**One woman earns around 100 KES per week (work 2h every week)**

#### STEP 2

10 children, 5 women, 2h/workshop  
 3-4 workshops a week, 50 KES per child, 10 children → 1750 KES  
 $1750/5 = 350$  KES  
**One woman earns around 350 KES per week (work 7h every week)**

#### STEP 3

10 children, 10 tourists, 6 women, 2h/workshop  
 3-4 workshops a week, 50 KES per child, 10 children → 1750KES  
 3-4 workshops a week, 150 KES per tourist, 10 tourists → 5250 KES  
 $7000/6 = 1167$ KES  
**One woman earns around 1167 KES per week (work 14h every week)**

#### STEP 4

10 children, 10 tourists, 7 women, 2h/workshop  
 7 workshops a week, 50 KES per child, 10 children → 3500KES  
 7 workshops a week, 150 KES per tourist, 10 tourists → 10500 KES  
 $14000/7 = 2000$ KES  
**One woman earns around 2000 KES per week (work 28 h every week)**  
 +income for selling products

## APPENDIX 6 - SWOT ANALYSIS: CROWDFUNDING

	HELPFUL	HARMFUL
INTERNAL ORIGIN	<p><b>STRENGTHS</b></p> <ul style="list-style-type: none"> <li>» Higher profit for the business</li> <li>» Empowerment of the women</li> <li>» Expertise (WISE) of business for women in Kenya</li> <li>» Many stakeholders that can support</li> <li>» Opportunity to start the business</li> </ul>	<p><b>WEAKNESSES</b></p> <ul style="list-style-type: none"> <li>» Women lack knowledge of how to crowdfund</li> <li>» Women lack tools to do the crowd funding</li> <li>» Women lack motivation?</li> <li>» Interest of the stakeholders</li> <li>» Get stuck in only crowdfunding</li> </ul>
EXTERNAL ORIGIN	<p><b>OPPORTUNITIES</b></p> <ul style="list-style-type: none"> <li>» Opportunity to expand in the future</li> <li>» Creates more work opportunities</li> <li>» More marketing for the business</li> </ul>	<p><b>THREATS</b></p> <ul style="list-style-type: none"> <li>» Other organisations take the money</li> <li>» Time-consuming</li> <li>» Hard to reach a larger crowd</li> <li>» People might be unwilling to give money if they can not see the result</li> <li>» Covid-19</li> <li>» Relies on crowdfunding</li> </ul>

