STUDIO JOURNAL

SUSTAINABLE SYSTEMS

DESIGNING MIGRATORY STRUCTURES

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PARSONS SCHOOL OF DESIGN, SPRING 18
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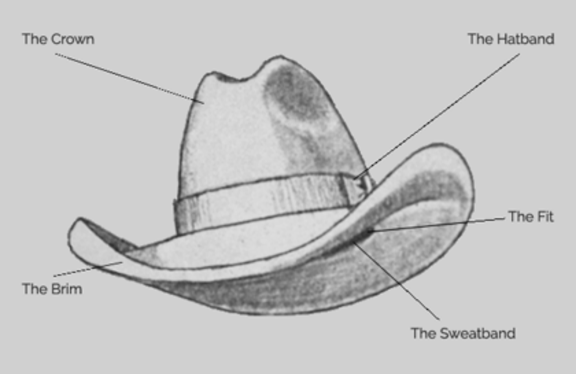
SOCIAL & SYSTEMS

Collapsable Hat

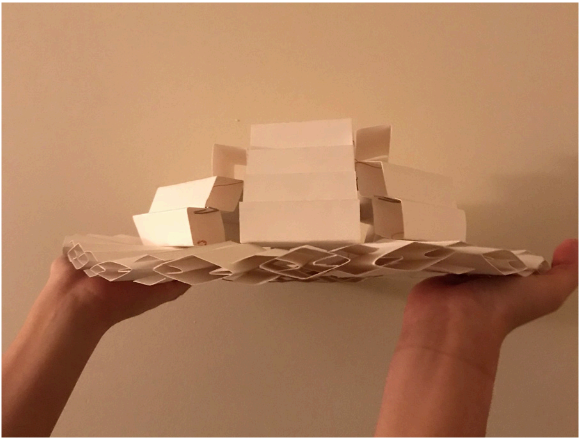
The seperate bendable cuboid modular parts for the hat.

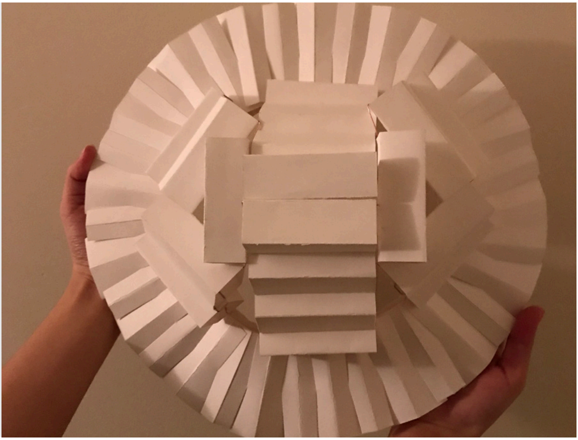
The base parts interconected with slits to form the brim of the hat.

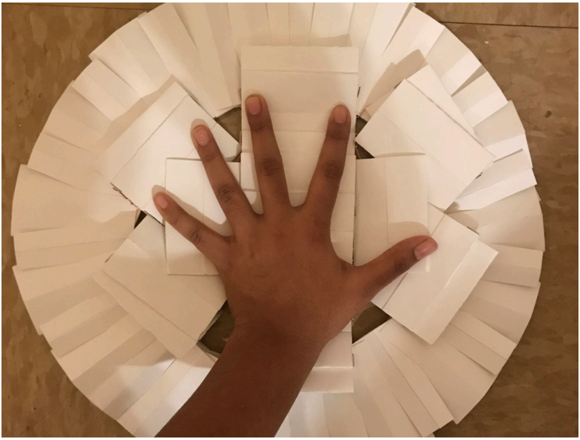


Anatomy of a hat

I wanted to create something that would collapse vertically. A structure that could go in hiding, when a city is struck by a natural disaster. This could be maybe a motivational sturcture that could show that even though our city goes through so much, it always stand back up again. I chose a simple structure for the modular part i.e. a cuboid without 2 sides. I then connected each of the pieces through the use of slits and sliding them together. This technique made the brim of the hat. And I used paper clips and wires to make the crown‘s structure. My hat collapses down completely till it is flat. And the basic rectangular sturctures have to be reworked/adjusted again to make them rise up again and thus the hat. It has a very tradional hat structure to it with a full 360 degree brim and a somewhat spherical crown.

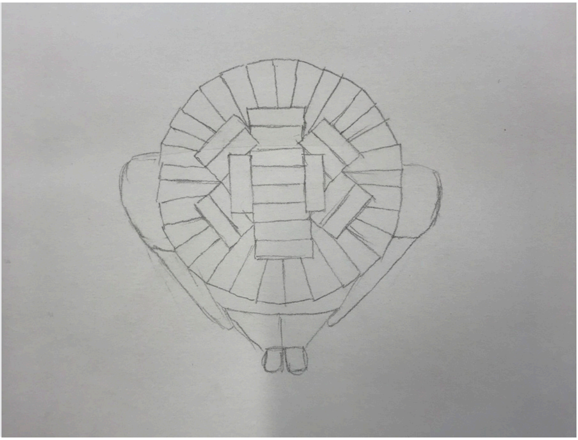

Front view of the hat

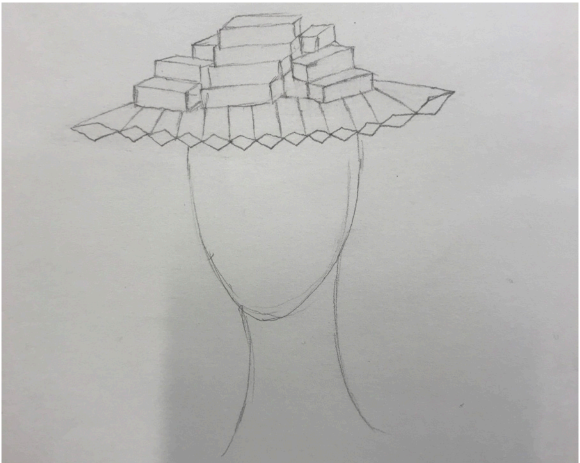

Top view of the hat



Top view of the hat while being collapsed.

Front view of the hat while being collapsed.


Top view of the hat in a sketch.


Side view of the hat in a sketch.


The collapsable hat being collapsed.

I do wish I used harder paper or lighter paper or wooden sticks so that the brim of the hat wouldn‘t need much support and would stand on its own. But overall, I was really happy about how the hat came about in the end. It collapsed but still looked beautiful when it wasn‘t collapsed. It served the purpose I was going for ie. that was to look beautiful and strong when up but adjust to the changes and still stand up straight. Just how a city could when they go through a difficult disaster.

CLIMATE CHANGE & ENERGY

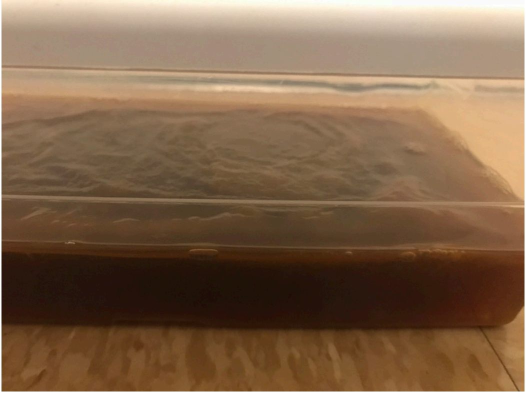
SCOBY is an acronym for Symbiotic Culture of Bacteria and Yeast. It is a living home for bacteria and yeast that ferment sweet tea into kombucha, which is a fizzy and sour drink. Along with this fermentaion, the bacteria and yeast from the SCOBY spin the cellulose nanofibrils from the sweet tea into baby SCOBY which floats on top of the tea. This material is later extracted and becomes what we call bioleather. But there are certain conditions that this bacteria and yeast colony need to be active and ferment the sweet tea into kombucha. The temperature where a SCOBY can live is between 68 degrees to 86 degrees. A temperature below this range would result in lower speed offerementation or mould formations. A temperature higher than 86 degrees results in the death of the SCOBY culture. The pH i.e. the level of acidity of the sweet tea before putting the SCOBY in it should be 2.8 to 3.2. The container with the SCOBY should have a covered surface which lets air pass through it.

A baby SCOBY formation, which is supposed to happen but is often confused with molds, which are fuzzy and present only on the top surface. Photographer: Ben; kombuchahome.com

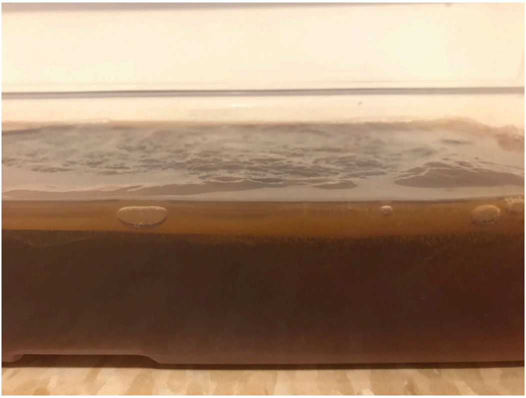
Bubble formation is normal due to the carbonation during the fermentation process. Photographers: Mike Langone; Bobby Gaglini; boxbrewkits.com

Yeast String formations are also a normal sign of fermentation. Photographers: Mike Langone; Bobby Gaglini; boxbrewkits.com

SCOBY project after 2 weeks; a wrinkly layer and some white dots started appearing on the top of the tea.



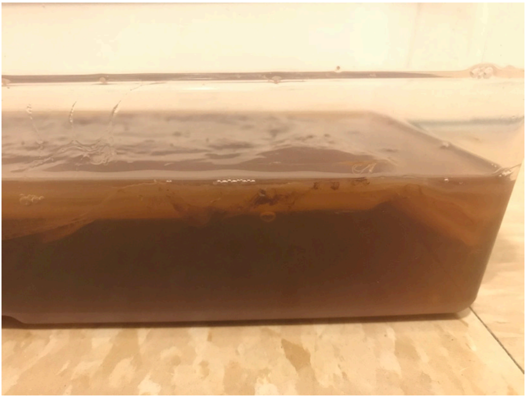
SCOBY project after 3 weeks; the wrinkly layer become thicker, more white dots appear, and more bubbles.



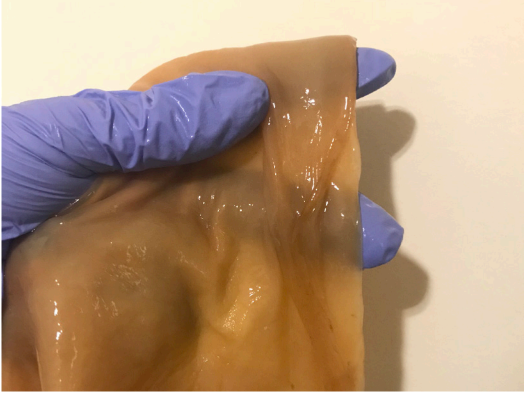
The thickness of the baby SCOBY has increased from a few millimeters to about 1 centimeter.

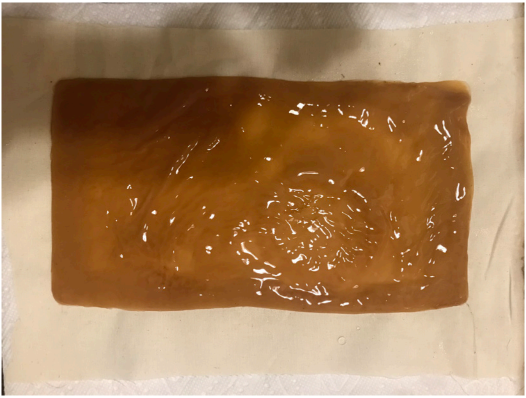
There were also layers and some wavy structure to the baby SCOBY.


The day of extraction of the leather, there were even more layers and increase in thickness.


There were also some black thread like structures, which show the normal sign of the fermentation process.


Clean bioleather and mother SCOBY in a tub.

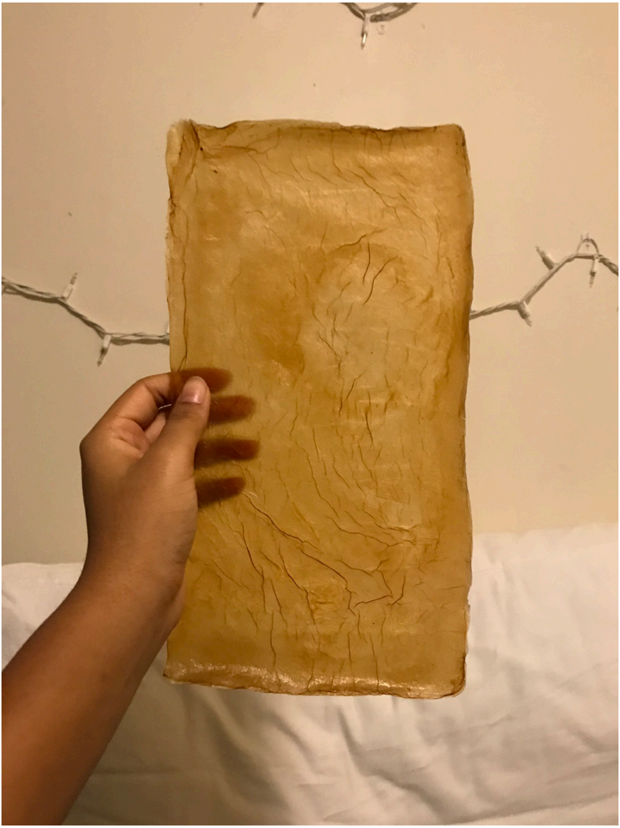

After extraction, the thin layers of the leather could be felt and seen.


The bioleather kept on a piece of muslin, which is porous, and would help dry the leather faster.


The texture of the bioleather upclose.


One of the upper layers of the bioleather being folded to show the bottom layer of the bioleather.


The thick edges of the leather kept on the muslin to dry.



The bioleather dried in two and a half days and the result was a dry organish-browinsh thicker than paper material.

Grow-Your-Own-Food Experiment

Ariel view of Wheatgrass after 2 weeks.

Front view of Wheatgrass after 2 weeks.

The seeds did not growat all for the first 2 days. But after 2 weeks the result was the 2 pictures on the previous page. I wrapped the seed in a paper towel and soaked them in water for 8 hours. The seeds became bigger after this step. After that, I took half of them and put them in the soil. I pressed them in and then took soil from the sides of the cup to cover the seeds. I then watered the cup every day once and left them near the window. The results were only apparent after the 3 day. The seeds started to germinate. But the shoots were not as dense and were sparingly scattered. I think I should have used all the seeds that were given, so that the experiment would have yielded more shoots.

Joe Coffee near 5th avenue 13th street provided the recyclable cup for this experiment.

Ariel view of Wheatgrass after 3 weeks.

Front view of Wheatgrass after 3 weeks.

I think a better design of the container for the wheatgrass to grow in would have been if it were thicker and less absorbant in its material. The cup is water/liquid leak proof. But rewatering the wheatgrass made the container's material absorbant, which made it weaker and soggier through time.

The cup could have also been made out of decomposible material so that if we wanted to plant the wheatgrass into the ground, it would have been convenient and efficient to just put the whole cup into the ground. This would have produced no waste, and would have been good for the soil over time.

A pigment is extracted from a plant, by boiling the plant or the natural dye material in water. Scouring and using a mordant in the dye are very important before dyeing a cellulose fabric. Scouring is washing a fabric till it has no wax and dirt, which comes naturally from plants, on it. Through this the dye adheres to the material uniformly and gives a richer colour. Soda ash is used when scouring a cellulose fiber because washing soda is not harsh enough. A mordant is a substance that is mixed with a dye, so that it fixes itself into the material that is being dyed. It is a water soluble metallic salt that comes naturally and acts as a binder. Mordant makes many dyes colourfast. It is applied to the fabric after the scouring process. For cellulose fabrics, aluminium acetate and then a wheat bran bath should be used for mordanting. Both these steps require soaking the fabric in the solutions.

A natural dye offers earthy colours on any fabric at any concentration; an onion and its dye on different fabrics. Photographer: Maura Grace Ambrose; folkfibers.com

This picture taken on December 13, 2011 shows the red polluted Jian River in Luoyang, north China‘s Henan province. The cause of the river becoming apocalyptic in character was red dye being dumped into the city‘s storm water pipe network, by two illegal dye workshops. Photo: pri.org

For linen , the fabric should be wet from the scouring before it is placed in the dye. Chemical dyes provide a wide range of colors for different fibers. They use a larger amount of water and also pollute the water bodies or soil they are disposed in. This can cause the fish culture in the water bodies or the bacteria and fauna of the soil to get disturbed and also die. Natural dyes are much more organic and easier to handle. However, the use of mordants which are chemicals and inorganic can make the sustaina bility of natural dyes go in the opposite direction. Tannins are organic substances that can be used as mordant but they can also affect the color of the dye. The water can be recycled and filtered before being dumped in water bodies as waste. It may take time for researchers to develop a method that creates less waste or pollution.

Some different fabrics dyed by some of the natural dyes that are available in New York in winter. Photographer: Kristine Vjear; annabrones.com

Some of the many natural dyes are logwood, walnut shell, eucalyptus, pomegranate, cochineal, indigo, hibiscus, beetroot, lac, madder, avocado, cherries, roses, brown onion, tea leaves, Basil leaves, tumeric, saffron, blueberries, blackbeans, red onion, chamomile, and Spinach. Many of these are available in normal supermarkets like Wholefoods and Trader Joe‘s. Many sole trader fruit and vegetable vendors also are a source to these natural dyes. Onions, madder, Spinach, avocados, beetroot, tea leaves, Basil leaves, blueberries, and blackbeans are some materials that are grown during this winter time in New York and can be used as natural dyes.

Basil; Photographer: lena_volo; iStock

Spinach; Photo: almanac.com

Basil is believed to be originated in India but its reach has been all over the globe. Basil is grown in tropical to warm temperatures. Spinach is thought to have originated in ancient Persia, which is now Iran and some neighbouring countries. It is grown in winters. I personally was very interested in the creating dyes from very similar coloured plants but then may give off different tones or shades to the fabrics. I wanted to do Spinach and Basil leaves because they look very similar in their colors but dying white fabric in their extract may give off interesting differences.

Waterproofing wool and bioleather

Wool can be naturally waterproof and absorb a lot of water and still keep warmth. However, through the use of products from scotchguard, a fabric such as wool can be made waterproof or water repellant. Bioleather when exposed to excess amount of water, due to its water absorbency, it becomes soggy. Bioleather can be made waterproof, through the use of a similar product. Even a thin layer of wax will create the bioleather waterproof without causing the leather any harm or shrinking. Nikwax is specially made for waterproofing leather and can be tested on bioleather. The different properties of leather and bioleather can cause differences and it can take a longer time to figure out which method works the best.

Natural Dye Project with Basil

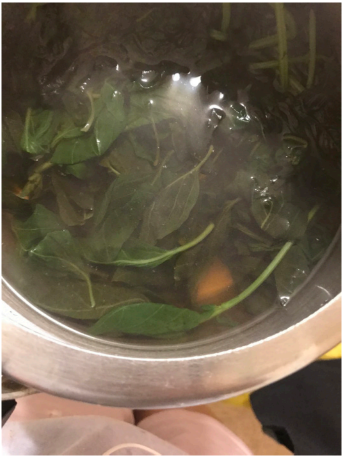
Basil in a pot with hot water.

Wool before a wash with detergent.

Wool after a wash with detergent.

Adding soda ash to wool in hot water.

Wool after soaking it in soda ash water.



The orange-ish colour of the water indicated a formation of the dye; the Basil was boiled for around 30 minutes.

Straining the Basil and obtaining its dye.

The Basil dye with a white background to look at the actual colour of the dye; the colour was a light brown camel.

The dye was divided into five parts and the wool was also divided into five parts. Four different mordants were added to the four bowls to see which would make the strongest colour. The fifth was kept with only the natural dye for comparision.


The addition of Iron as mordant created the strongest difference in the colour of the dye; it became a dark olive green colour.

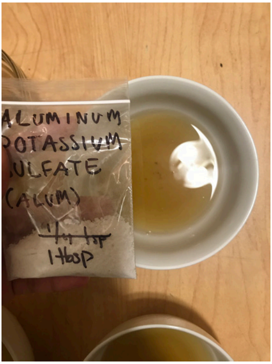

A piece of wool immersed in the Basil dye with Iron as a mordant.


The Basil dye in its natural form before the addition of soda ash.


Wool immersed in the Basil dye with soda ash as a mordant; this mordant gave the second most colour chaning difference: from a light brown to a dark orange.

The Basil dye before the additon of Tartaric acid.

Tartaric acid as a mordant gave the Basil dye a lighter and a peach-ish colour.



Alum is used as the most common mordant for natural dyes.t

The additon of Alum as a mordant didn‘t bring much of a colour difference, which is good to get the actual colour of the Basil dye.

A lineup of all the dyes with all the different mordants.

The lightest dye was obtained from Tartaric acid being used as a mordant. The second lightest was the dye without any mordant. Alum changed the colour very slightly from the actual dye. The fourth darkest dye was obtained from the Iron being used as a mordant. The darkest shade of dye was created from the soda ash. The dye got darker when it was left for a few minutes.

Wool in the fifth bowl of natural dye without an addition of any mordant.

Natural Dye Project with Spinach

A pot with boiling water and Spinach.

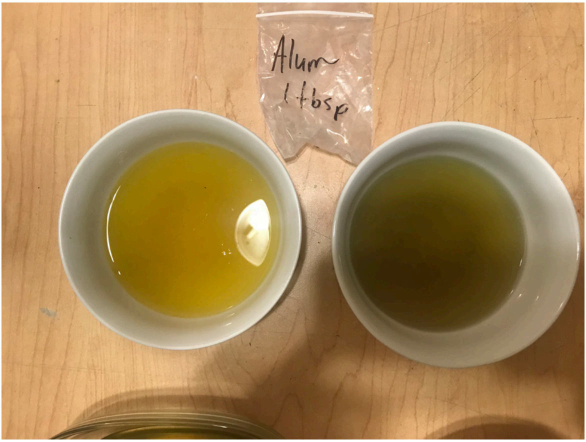
The water from the pot is strained and the Spinach dye is obtained.

The colour of the Spinach dye is greener in comparision to the Basil dye.

The Basil dye was also divided into five parts so that each mordant could be tested seperately; the fifth bowl has the natural dye wihtout any mordant for comparision.

The green colour of the Spinach dye before the addition of soda ash.

The dye turned an orang-ish brown-ish colour after the additon of soda ash: a very different result from the basil dye.



The left bowl indicates the change the Alum created to the natural dye; the right bowl indiacted the actual colour of the dye.


Before the addition of Tartaric acid in the Spinach.


After the addition of Tartaric acid; the colour was lighter and also changed into a more yellow colour.

The process of addition of Iron as a mordant into the natural dye of Spinach.

The colour changed into a dark green and brown colour immediately. The process was fun to watch and it also made a great organic colour.

A lineup of all the dyes created from different mordants. From the lightest dye created by the Tartaric acid, again, to the darkest dye created from Iron. The second lightest was created with Alum. The fourth was from soda ash. The second darkest was made from the natural dye without any mordant.

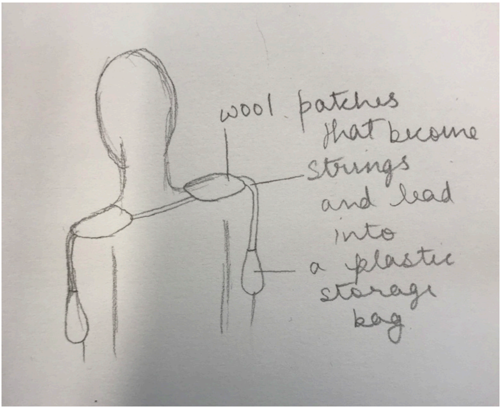
The wool in the natural dye without any mordants.

The dyed wool pieces obtained from the Basil dye; Mordants from left to right: Tartaric acid, Alum, no mordant, soda ash, Iron.

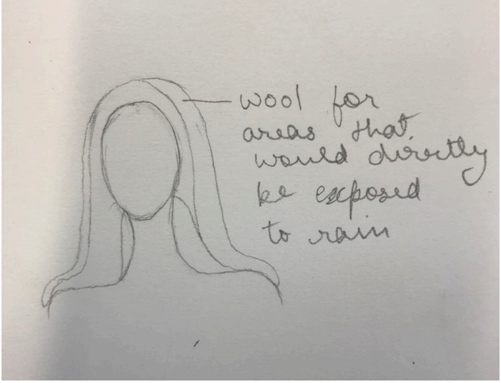
The dyed wool pieces obtained from the Spinach dye; Mordants from left to right: Tartaric acid, Alum, no mordant, soda ash, Iron.

On top: Basil dye; On bottom: Spinach dye

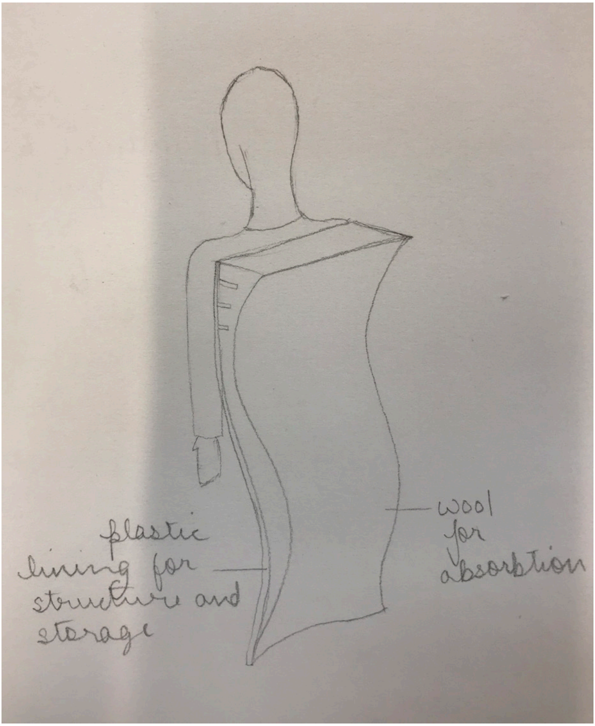
Wearable designs for water collection



First Design



Second Design

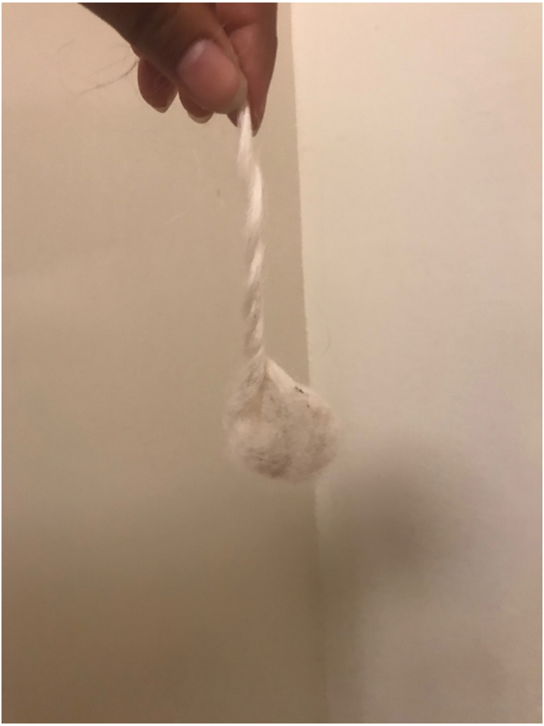


Third Design

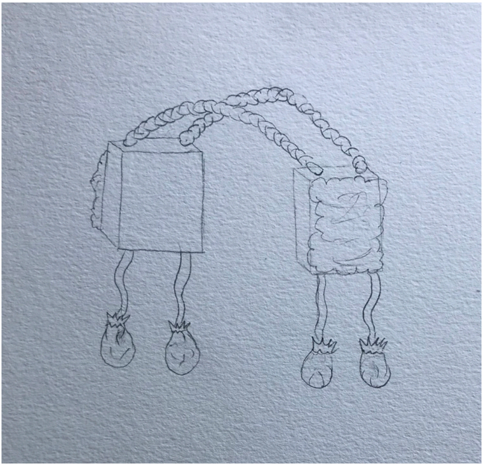
Wearable design prototype

Shoulder pads design; the connectors of the two pads are braided.

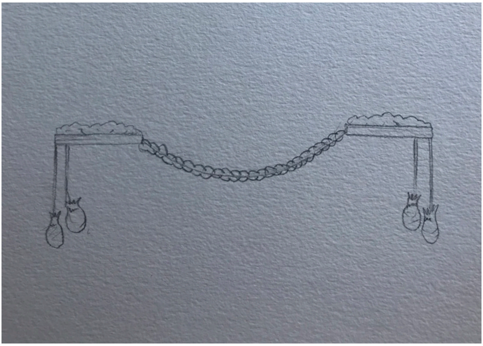
The bag like structures are made from wool, as shown in the figure on the next page, and are wrapped in plastic. This plastic could be taken off by pulling on it. The plastic bag has elastic around it making the pulling and putting bag easier.



The structure of the wool which has plastic bags wrapped around it; The structures provide an upbeat design for the wearer in terms of fashion and also are useful for rainwater harvesting.

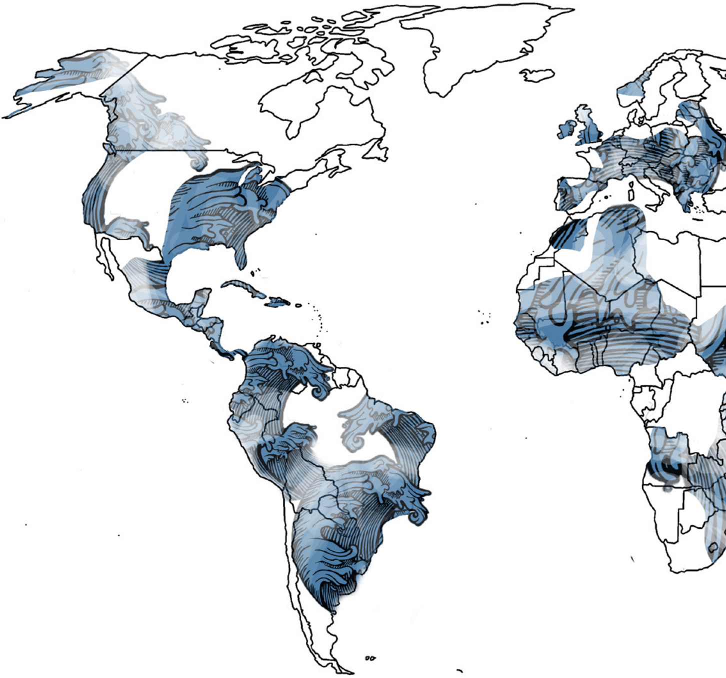


Side view of the Wearable Design

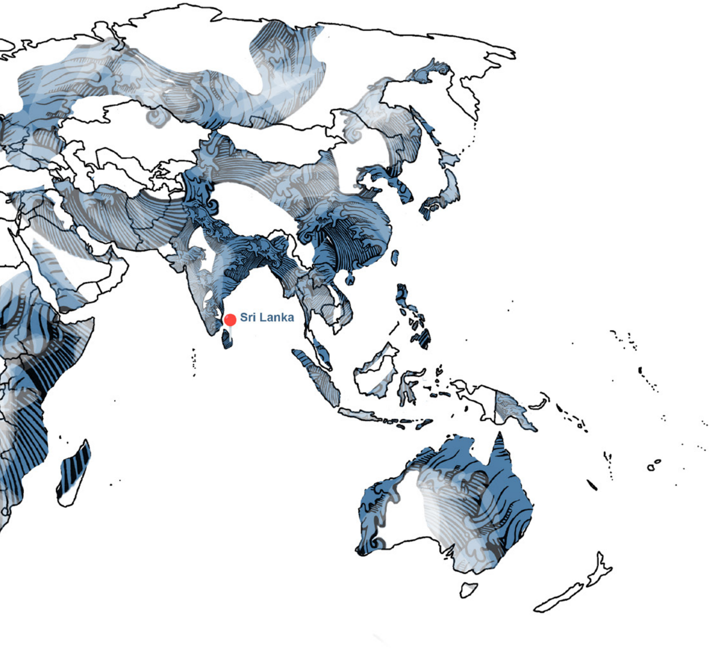


Front view of the Wearable Design

World Fl



ood Map



ood Events   Small Flood Events

to 2016

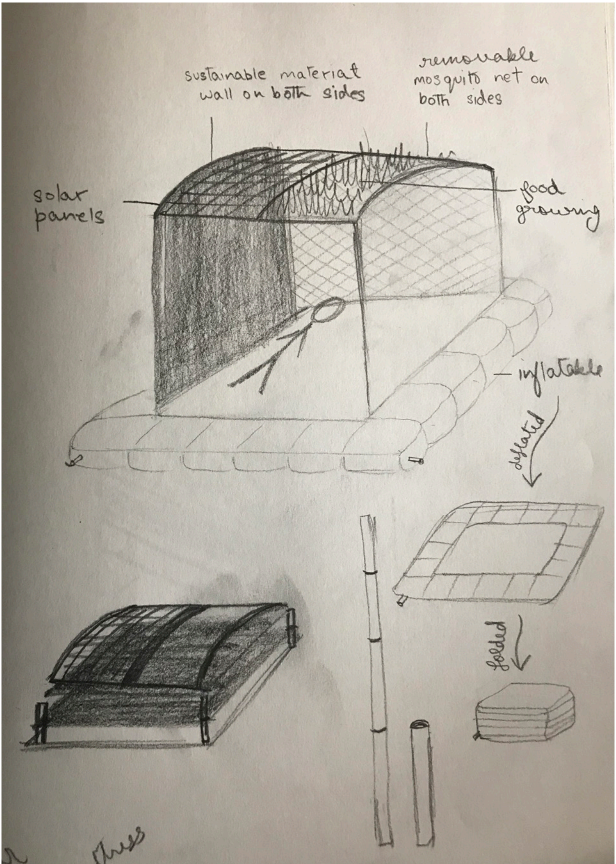
Living situations in flooded areas

Floods in Sri Lanka; www.cnn.com

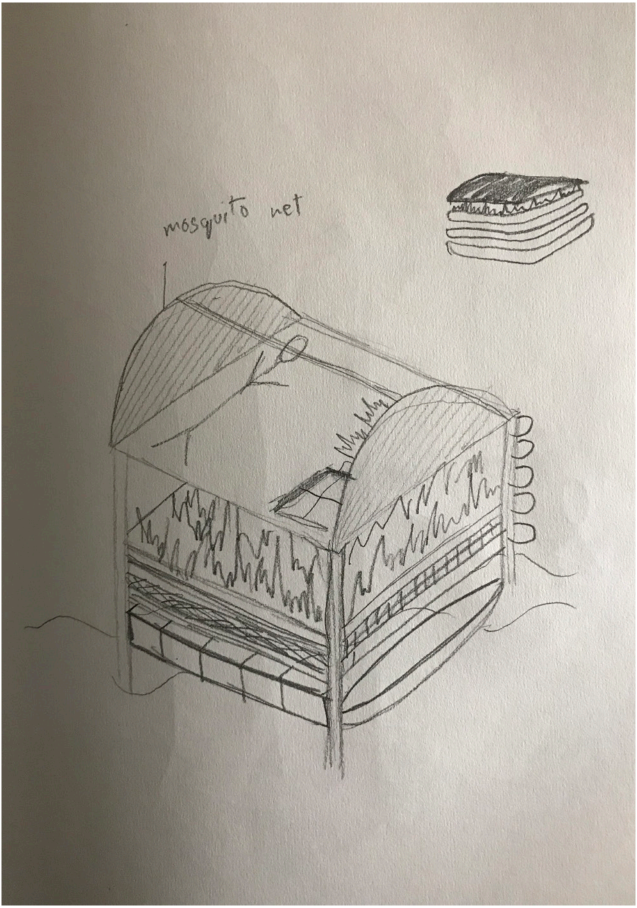
I chose extreme floods as a climate change to work on. A person living in a region which is flooded would first of all need to have a dry area where the person could sleep and eat food. Many dieseases like malaria and Dengue are very dangerous and if left untreated can be life threating. And these are water-borne diseases, and living near wet areas, can increase exposure to mosquiotos that carry these diseases. Movement of water can also cause dryer areas to become wet. So a heightned structure for living would be needed all the time. A water purifying system. And some basic cooking equipment. A small hydroelectric system or a tidal system that uses flood water can also be attached to the structure for energy purposes.

WATER & MATERIALS

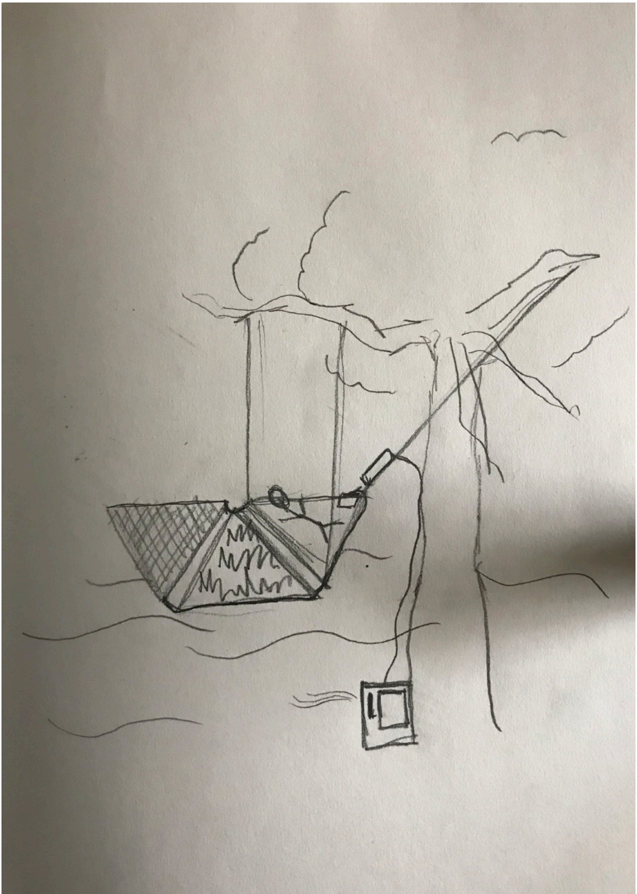
Initial Designs



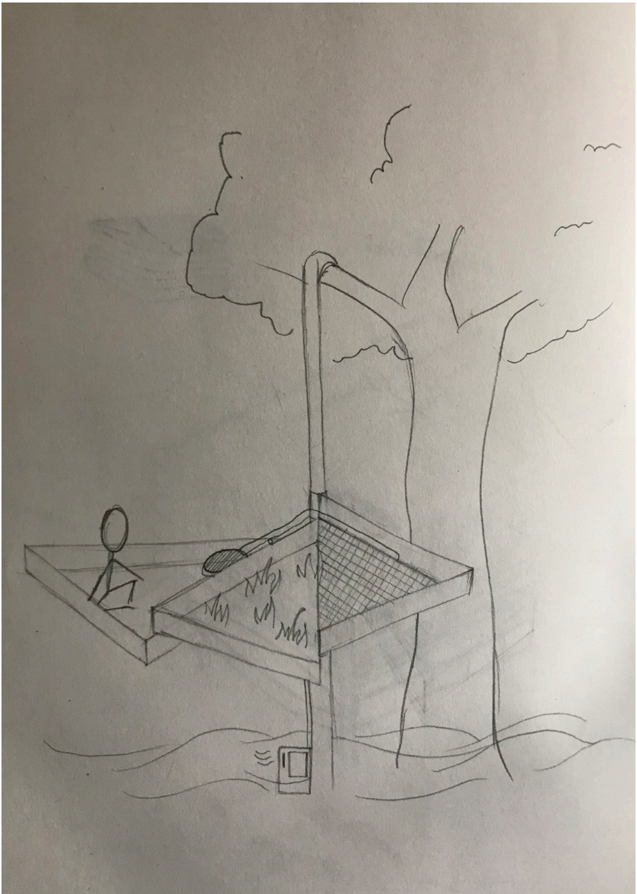
First Design



Second Design



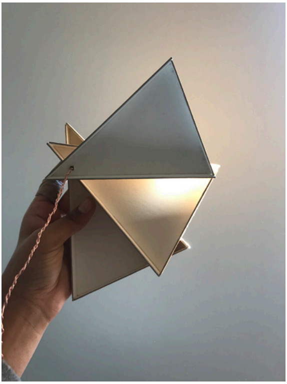
Third Design



Development of the third design

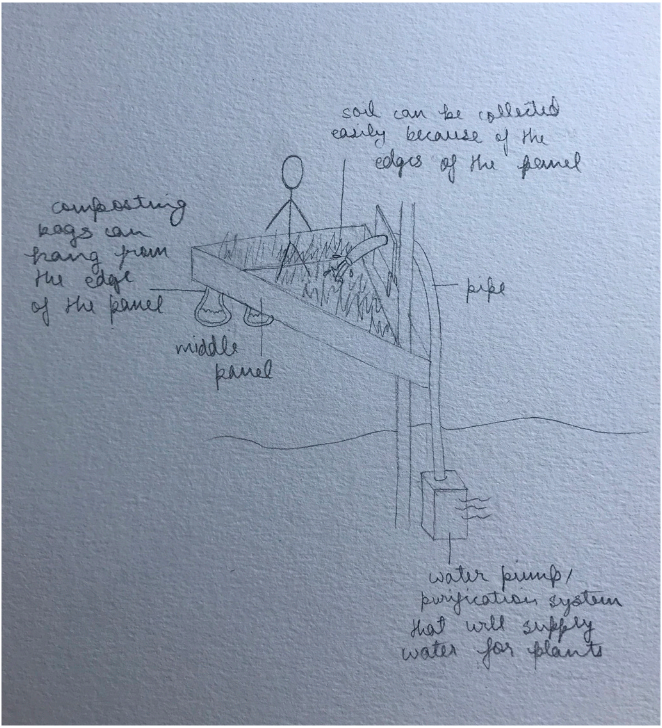
Shelter Structure completed upto 50%


Side view of shelter structre.

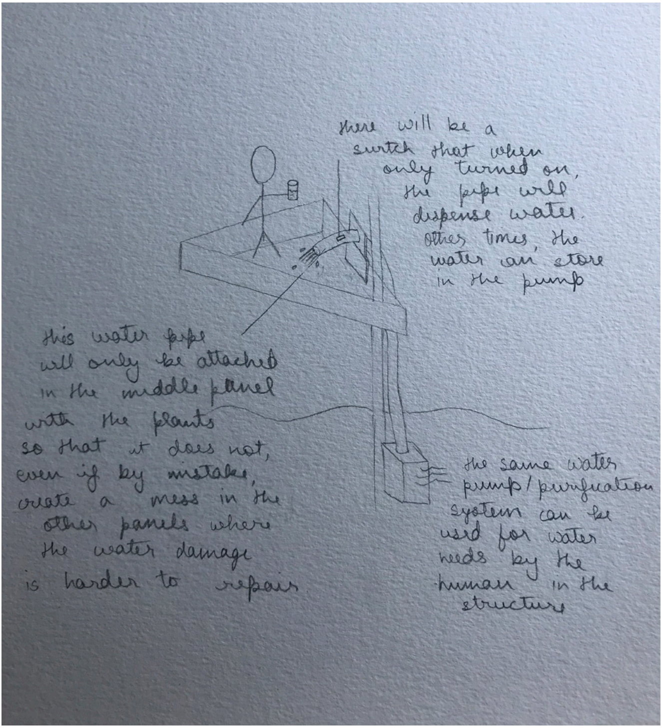

Ariel view of shelter structre.


Collapsed view of shelter structre.

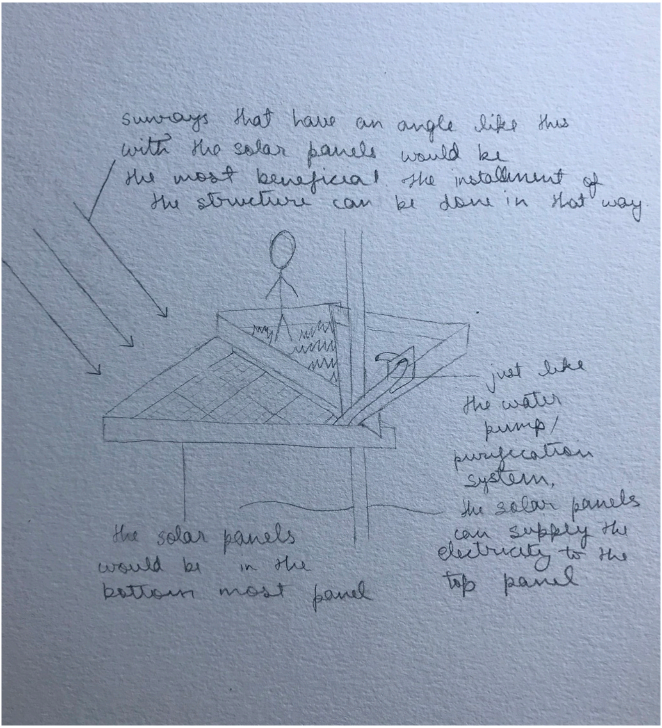
Specific Aspects and Details of the Structure



How the structure will grow plants and compost waste.

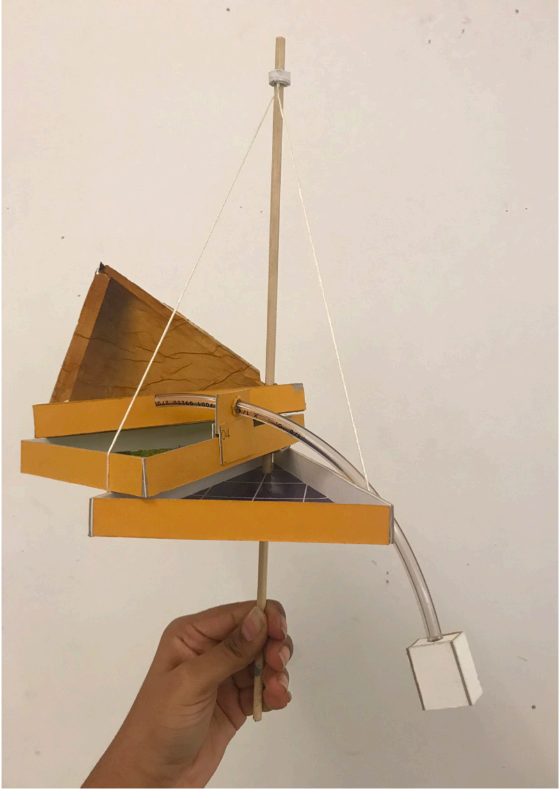


How the structure will filter water and how it would be accessible.



How the structure will collect solar energy.

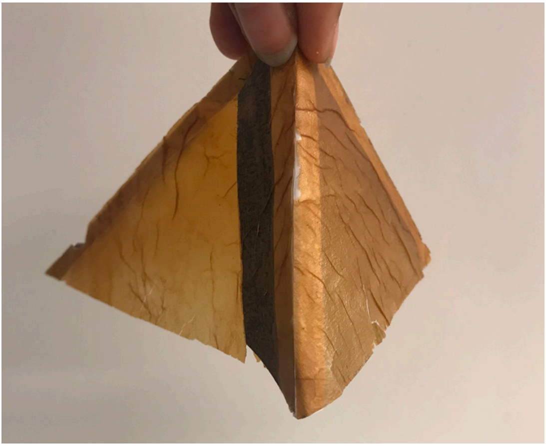
Completed Shelter Structure



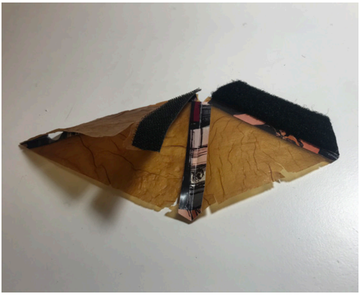
Front view of the shelter structure.


Ariel View of shelter structure.


Close up view of shelter structure.


Tent made from bioleather: standing/installed.

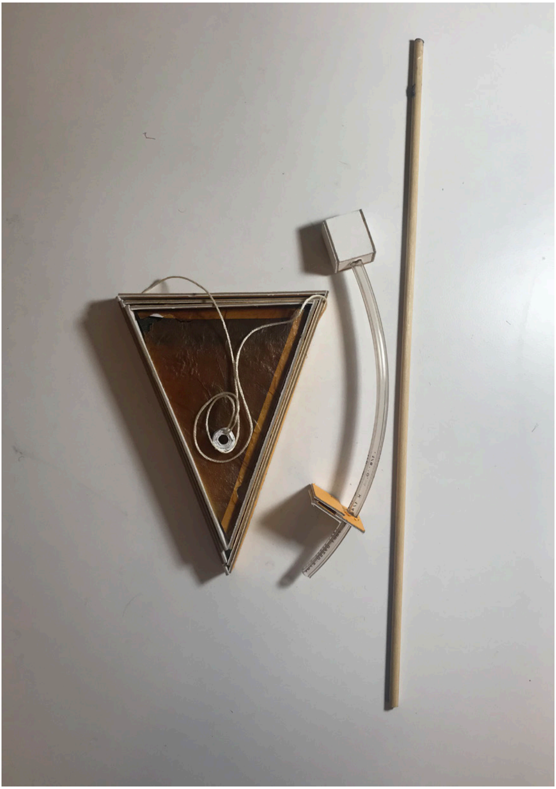

Tent made from bioleather: collapsed.



Velcro attachment to two sides of the tent creates a door.

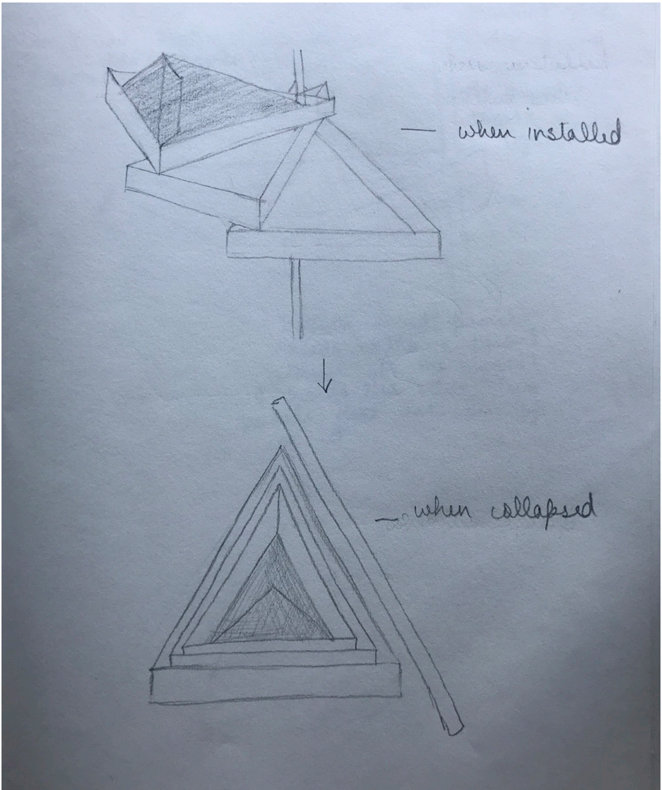
The detachable piece that holds up the water pipe to the panels.

The detachable piece that has strings provides extra support to the bottom most and largest panel, which also has to support the other two panels.



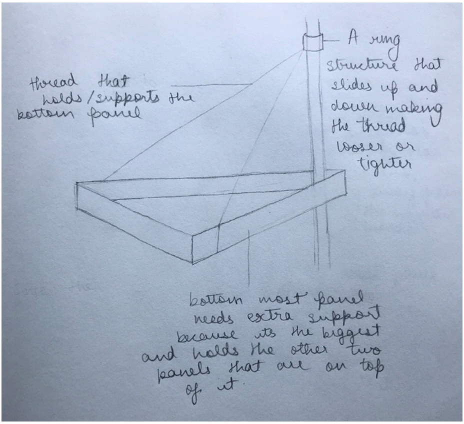
Fully collapsed shelter structure.

Structure‘s Transformation

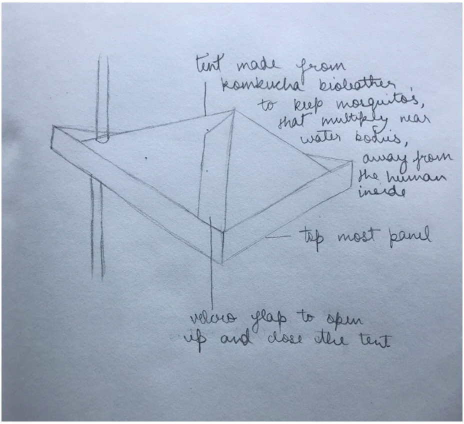


The shelter structure‘s transformation from it being fully installed to it being fully collapsed.

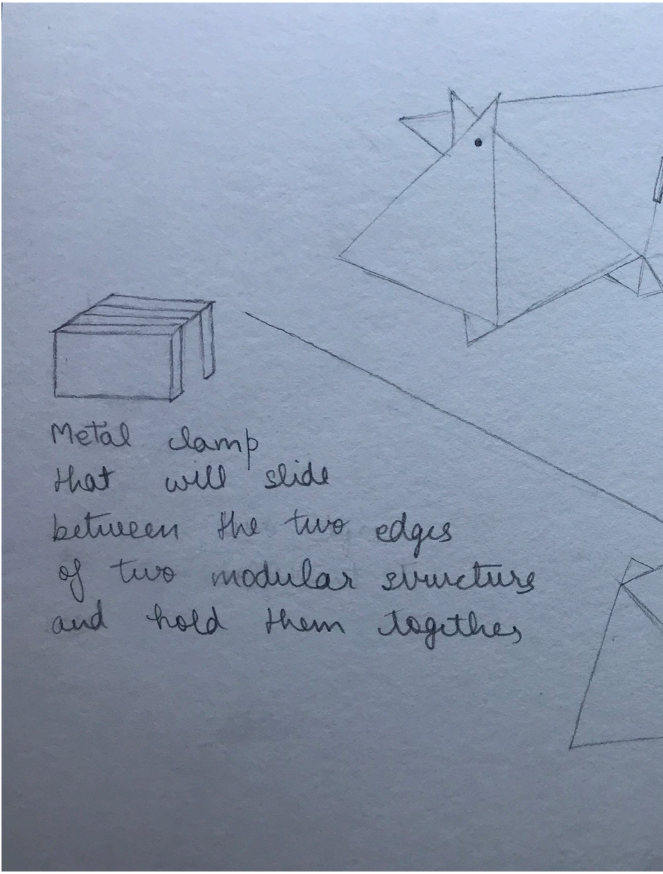
Technical Details



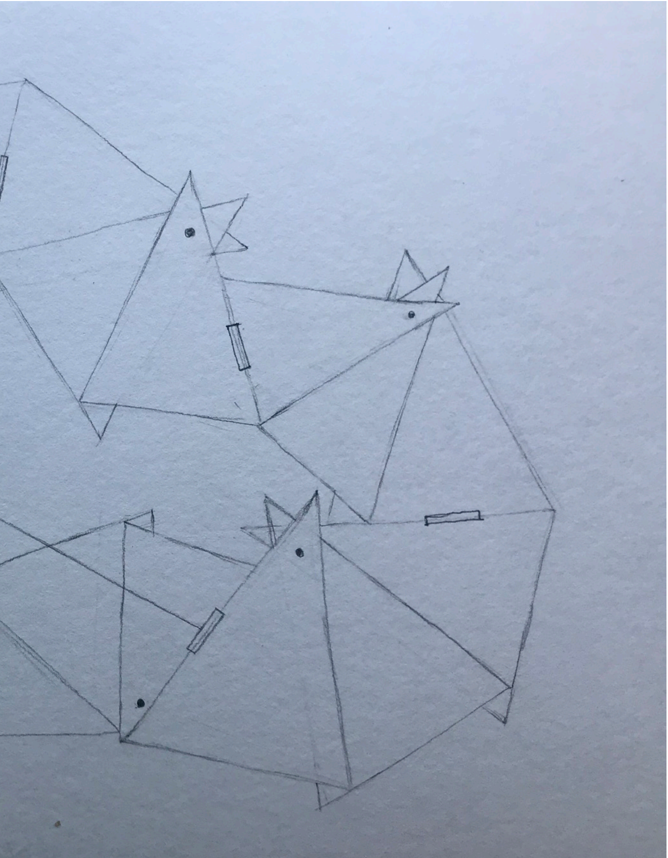
Technical Detail 1



Technical Detail 2



How the shelter structures will attach to each other and form a collective structu e Structure



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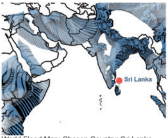
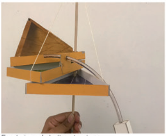
Presentation Board

BOX in a BOX in a BOX

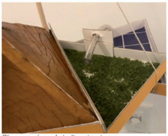


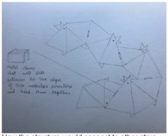
World Flood Map; Chosen Country: Sri Lanka

For my final project, I decided to create a shelter structure for the people affected by the natural disaster, extreme floods. I specifically chose Sri Lanka as the country to work on because the country is still developing and the government cannot help the people as much. So, this project provides food, water, energy and shelter for one individual person. It can be connected to other similar structures and also be collapsed for transportation.


Front view of shelter structure.


Ariel View of shelter structure.


Close up view of shelter structure.


How the structure would connect to other structures.

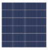
Clamps would be used to build a greater sturcure. To connect two structures, on clamp can be inserted into the edges of the two structures. The colony created would be aestheically geometric and since each piece is also indvidually attached to a tree, there would be a harmony between man-made and natural structures.


Bamboo; I chose Bamboo for the panels, pole, and some other trivia parts because it's strong and lightweight.


Bioleather; I chose Bioleather for the tent because it is flexible and can collapse easily.


How the structure would have access to food, water, and electricty.

There are three panels in the structure and each panel is categorized into 1: solar panels, 2: food growing, and 3: sleeping and sitting area. The living area also has a collapsible tent to prevent mosquitos, which usually breed near water bodies and cause health diseases, from entering the space where the person lives.


Solar Panels; I chose Solar Panels to generate Solar Power for the shelter structure.


Flexible Plastic Tubes; I chose these tubes to transport water and electricty easily.

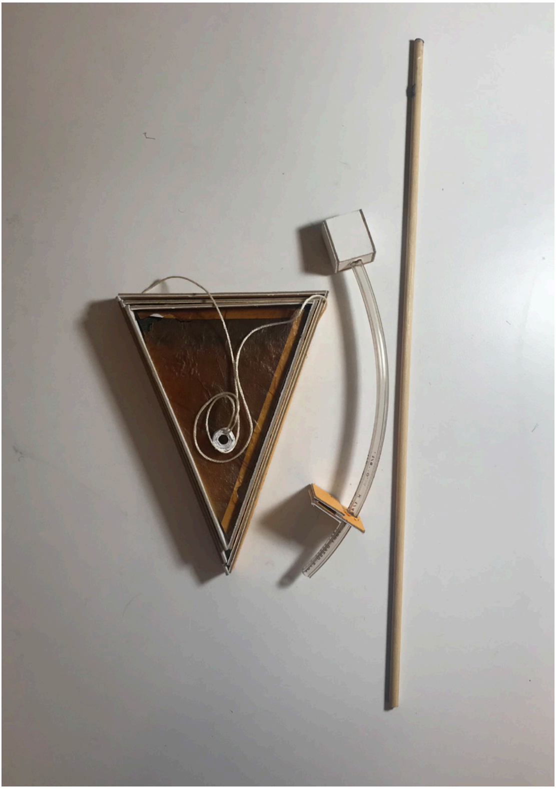
How the structure collapses.

The structure has a 3 different sizes of triangular panels/boxes. Each panel/box is slightly bigger than the other. So the smaller panels/boxes fit snugly into each the bigger ones. And so, once a structure that had a large volume, now has 3 times less it's volume. The collapsible tent fits perfectly in the smallest panel, and the water purifier with it's cord would also fit into that panel.

BOX in a BOX in a BOX

Divyashakti Gupta

SUSTAINABLE SYSTEMS, PARSONS THE NEW SCHOOL FOR DESIGN, SPRING 2018, INSTRUCTOR: CAROLIN MEES



Shelter structure ready to be transported to Sri Lanka :)