

# **MADE IN OLD PROVIDENCE**

**SECURING AGRICULTURE AND FOOD SOVEREIGNTY IN THE ISLANDS OF  
PROVIDENCIA AND SANTA CATALINA AFTER HURRICANE IOTA**

**PROJECT BOOKLET**

EXPERIMENTAL LANDSCAPE FURNITURE  
SUMMER SCHOOL 2021

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## **FREE DIPLOMA TOPIC**

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FS HS 2021

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MADE IN OLD PROVIDENCE



IMPROVISED FOOD SHELTER AFTER THE HURRICANE - PROVIDENCIA



# ABSTRACT

Global warming is arguably the greatest challenge that our societies will have to face in the immediate future, posing the threat of great social and economic disruption around the globe. The consensus of the scientific community is that the increasing temperatures and the rise of sea levels will influence climatic disturbances that in turn will provoke extreme weather events. If this is the case and the projections are accurate, we will have to prepare ourselves to cope with severe damages to the world's built environment. Given the contribution of construction to the carbon footprint, the role of architecture is a topic of significant relevance and for this reason it is crucial for architects to focus on new ways to secure a more sustainable future. On the other hand, it is important for architects to learn how to deal and react to the increment in number and intensity of natural disasters. We will have to accept that during the process of transformation towards a carbon neutral society we will most likely continue to warm up the planet and in case of failing to reach the goal of net Zero, weather instability will become a reality. Certain areas will be more affected than others and it should be our responsibility to respond with strategies for a proper recovery, focusing not only on the physical infrastructure but also on the social and economic tissue of those areas. In other words, we should set our aims to propose creative solutions for better, more sustainable, and efficient reconstructions. Crisis often act as accelerators for the use and implementation of new strategies, however there is barely enough time to develop something from scratch. For this reason, the development of smart solutions in response to catastrophes must look beyond the immediate necessities and investigate the future of the affected communities.

In November of 2020, a major Hurricane of category 5 hit the Colombian islands of San Andres and Providencia. These two islands, located on the Caribbean Sea were severely damaged by the winds of Hurricane IOTA. Providencia was the most affected, with almost 98% of the whole infrastructure either destroyed or severely damaged. With the urgency and the pressures of a fast reconstruction, architects were put to the side and the Colombian Government set a very fast plan. The priority, of course was the construction of more than 1000 houses to help recover the island from the disaster. A problem with this approach is the lack of concern of what would happen after the reconstruction and with the problems that were already there before the hurricane. Food production being one of them.

**Made in Old Providence** focuses mainly on the challenge of reaching food sovereignty and proposing a sustainable model of life for the Island of Providence after the Hurricane IOTA. The objective is to generate pride and value to the local production of food, securing the means of production for the local communities and with this, reaching a certain level of independence and autonomy as a way out of the difficult times that came and ways to endure the ones to come.

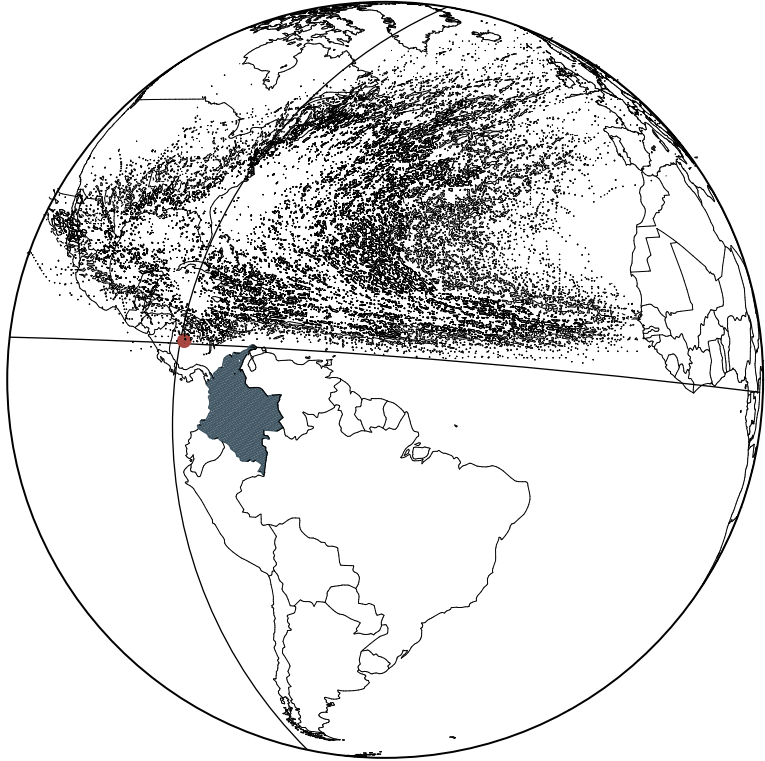
MADE IN OLD PROVIDENCE



# ***I.***

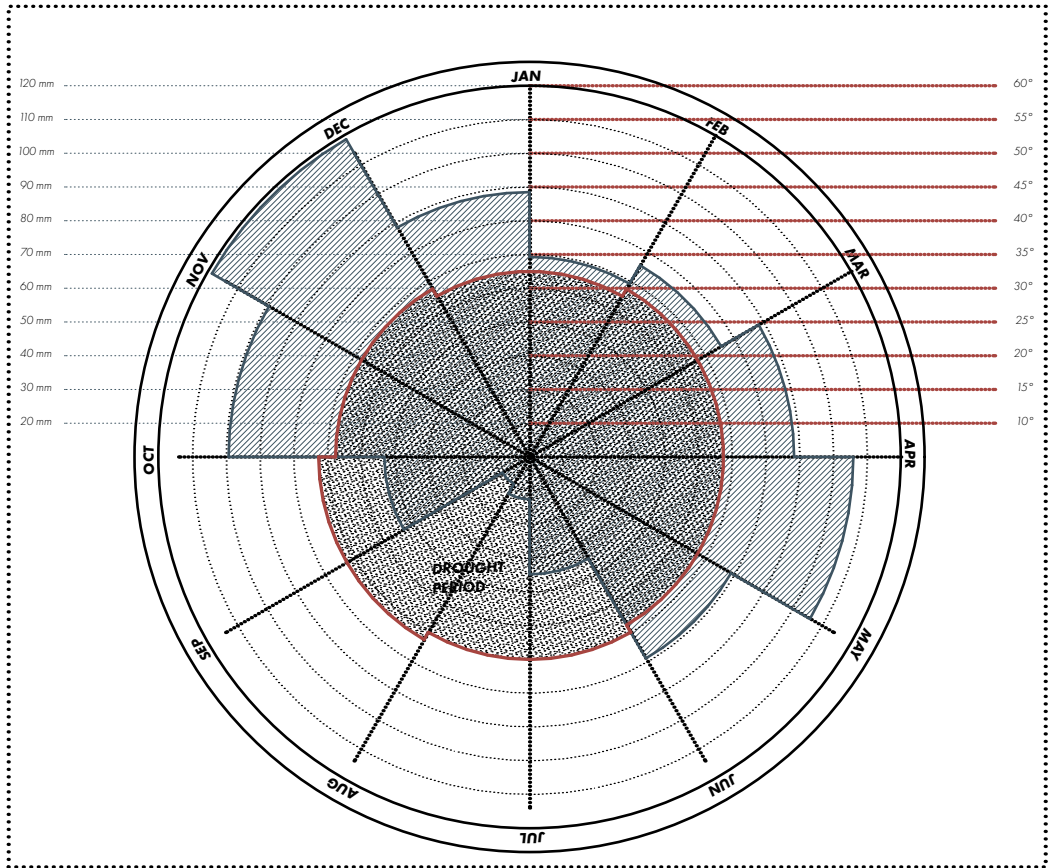
## ***SITE***

## Hurricane Alley



The Island of Providence is located at the borders of the so-called Hurricane Alley. This part of the Atlantic Ocean is under the constant threat of major tropical storms. These conditions generate the challenge to think of ways to respond and build in these types of areas.



**DROUGHT SEASON**

The drought season in the island of Providence can last up to for months and can very intence. There is a great dependence on rainwater reservoirs for fresh drinking water. It is common for islanders to collect the rain water and it is one of the most important feature of the islanders settlements. The lack of fresh water and the necessity to store it trough the dry season both for drinking porpuses and agriculture is a key feature of the project.



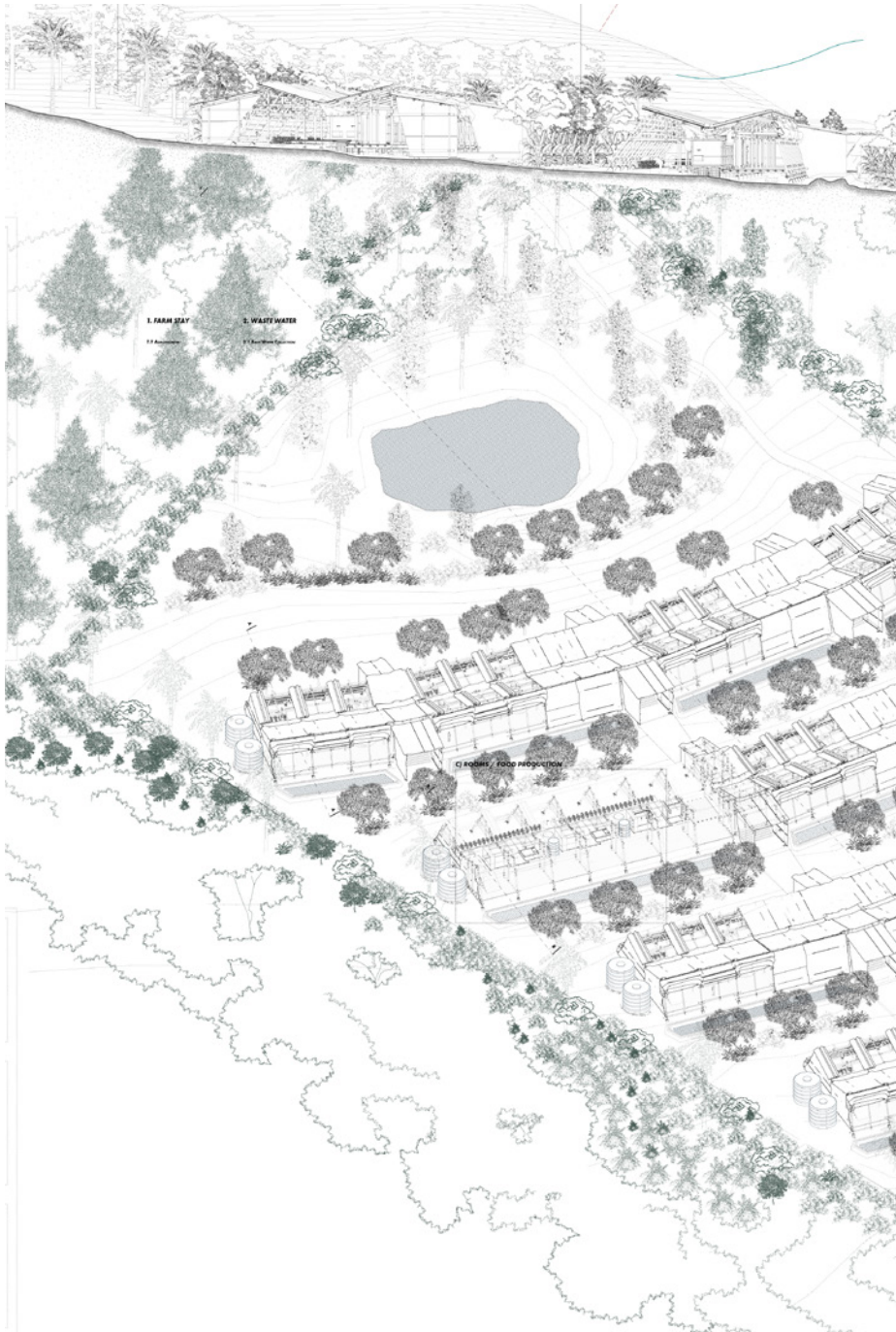
| **OLD MUNICIPAL FARM OF PROVIDENCE**



| **OLD MUNICIPAL FARM OF PROVIDENCE**



# PROJECT AXONOMETRIC



# I. SITE





MADE IN OLD PROVIDENCE



| STRAWBERRIES IN A CHINESE SOLAR GREENHOUSE  
UNKNOWN

## ***II.***

# ***PROGRAMME***

**HISTORICAL DEVELOPMENT OF THE ECONOMIC ACTIVITIES ON THE ISLAND**

**Formal forms of Work**

Dayly work / Scheduled  
Constant / Semi Constant  
Fix income  
Recent phenomenon

**First half 20th. Centu**

Tourism      Service      Institutional

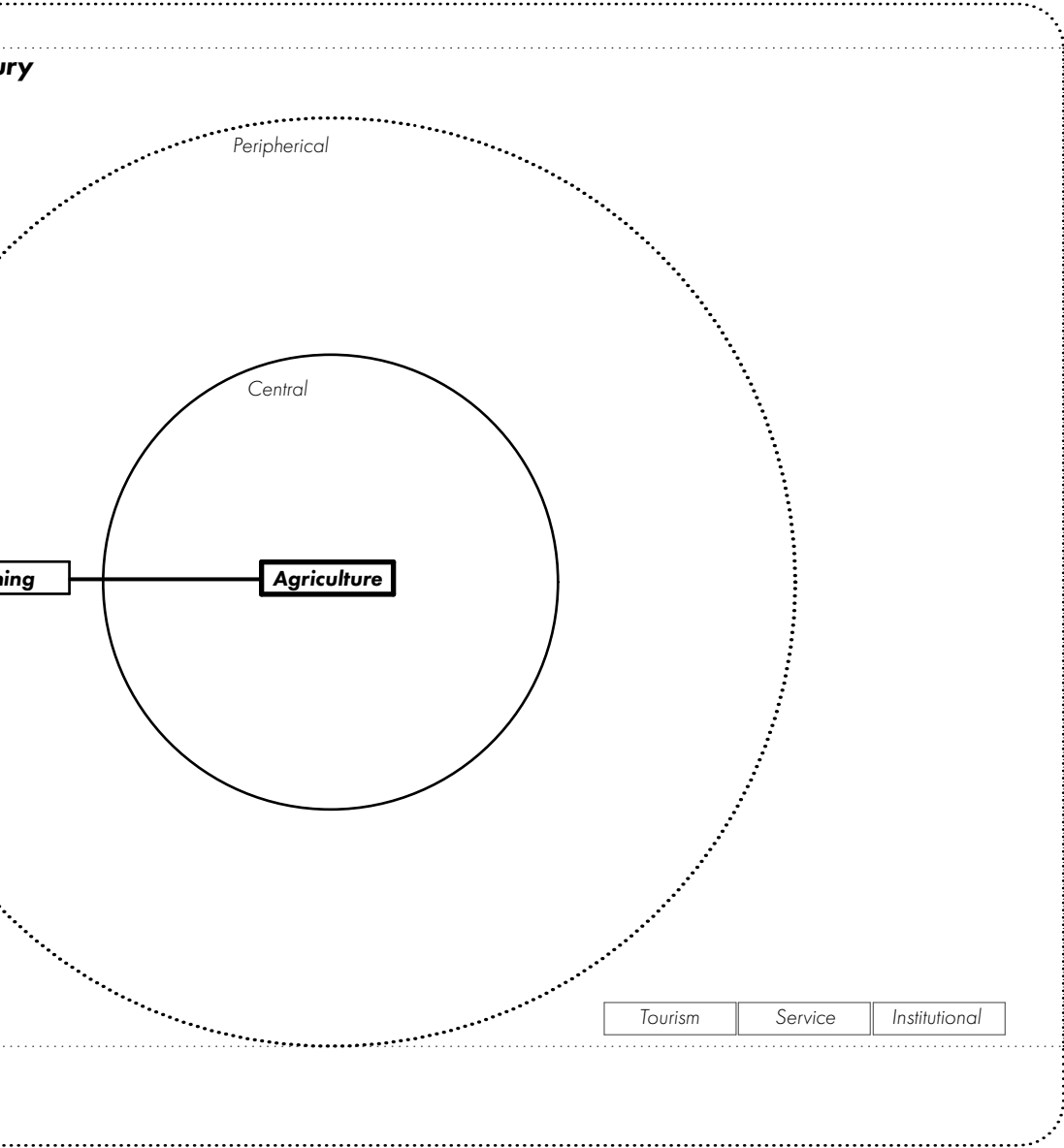
Fishing      Agriculture

**Fish**

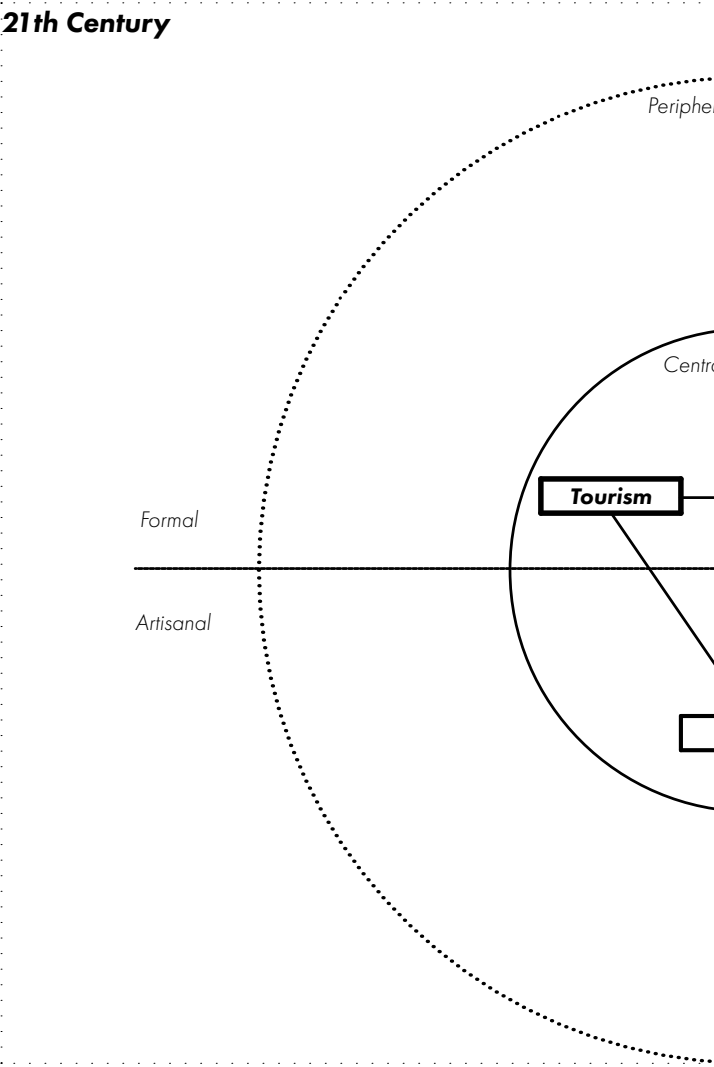
**Artisanal activities**

Spontaneous  
Self consumption  
Fluctuating income  
Traditional

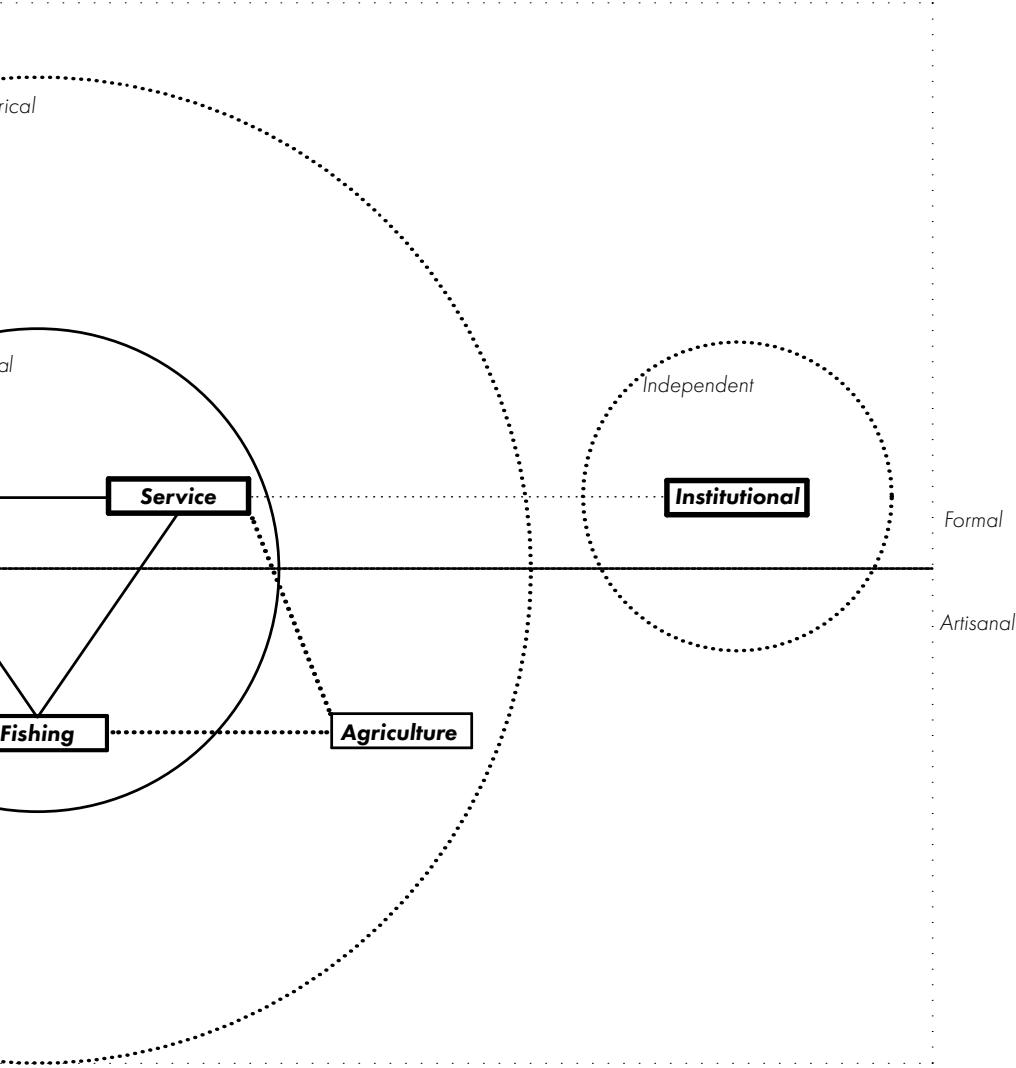
Old providence is historically a agricultural community. During the last century and because of different historical events the role of agriculture has been displaced to a peripheral activity in the food production cycle.



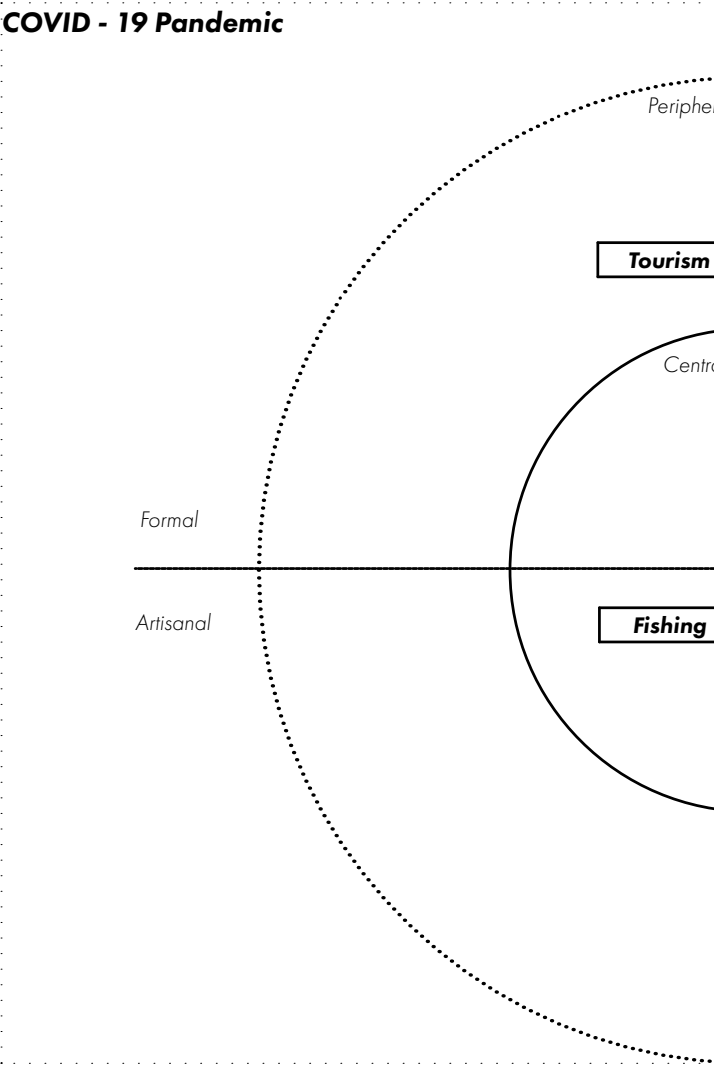
**HISTORICAL DEVELOPMENT OF THE ECONOMIC ACTIVITIES ON THE ISLAND**

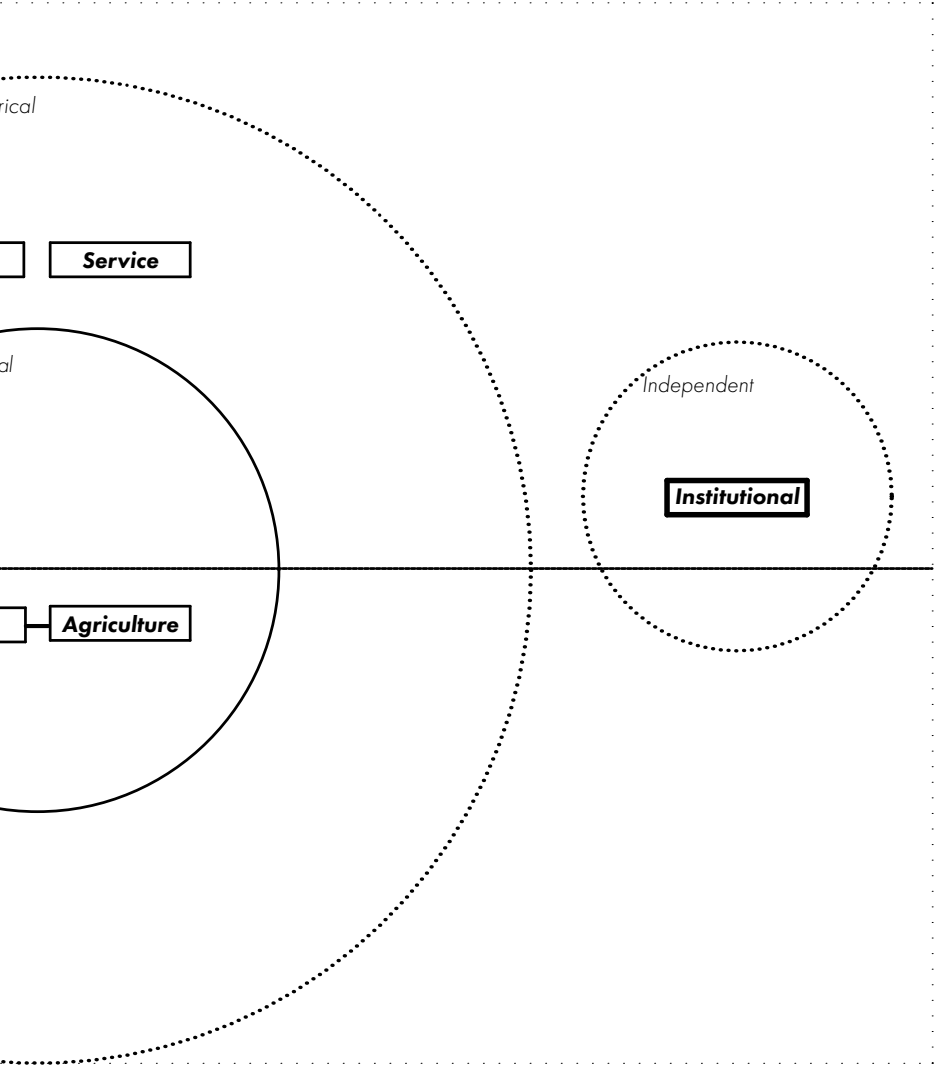




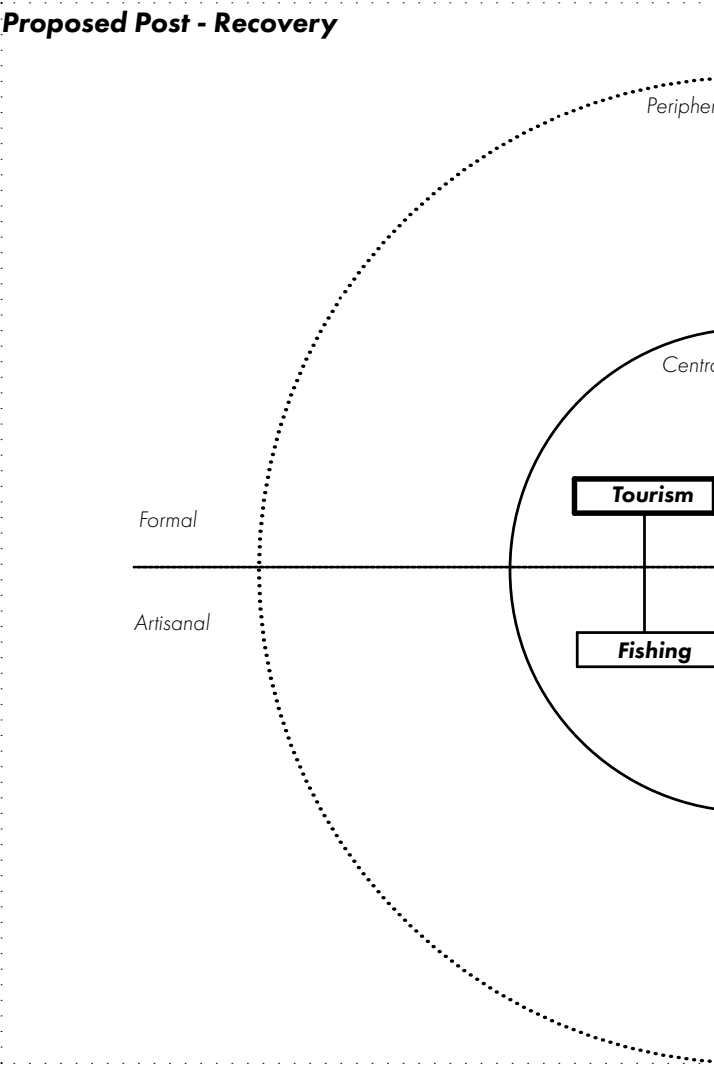


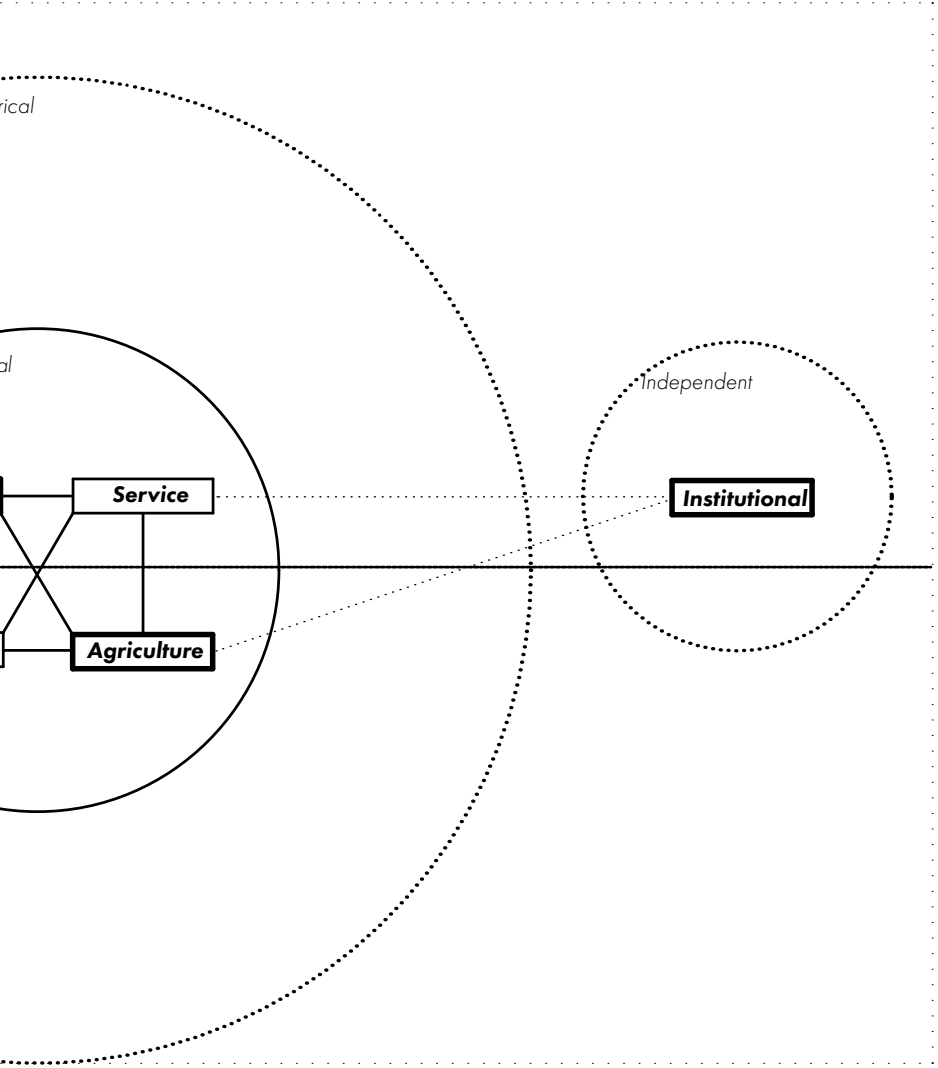
**HISTORICAL DEVELOPMENT OF THE ECONOMIC ACTIVITIES ON THE ISLAND**

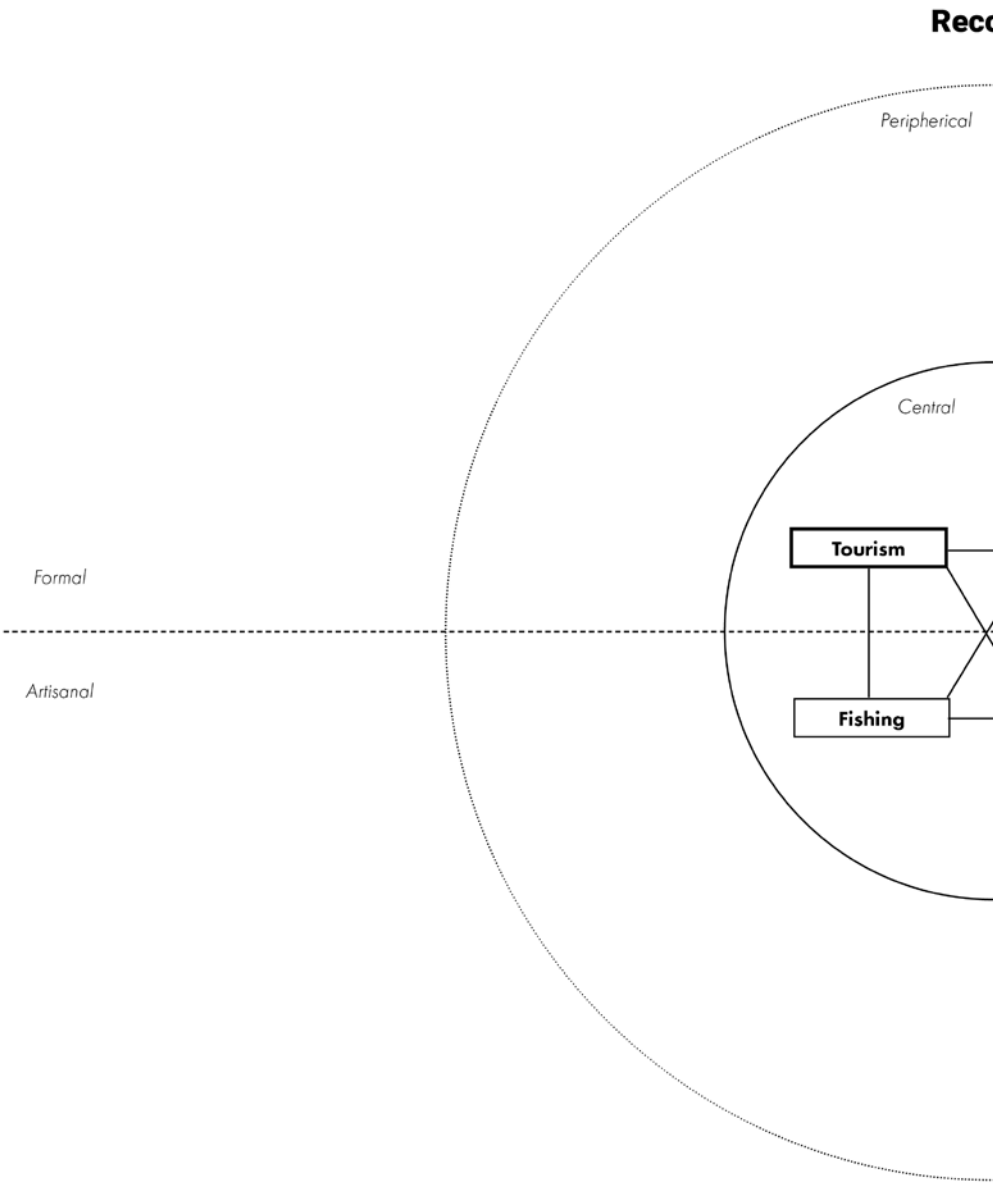




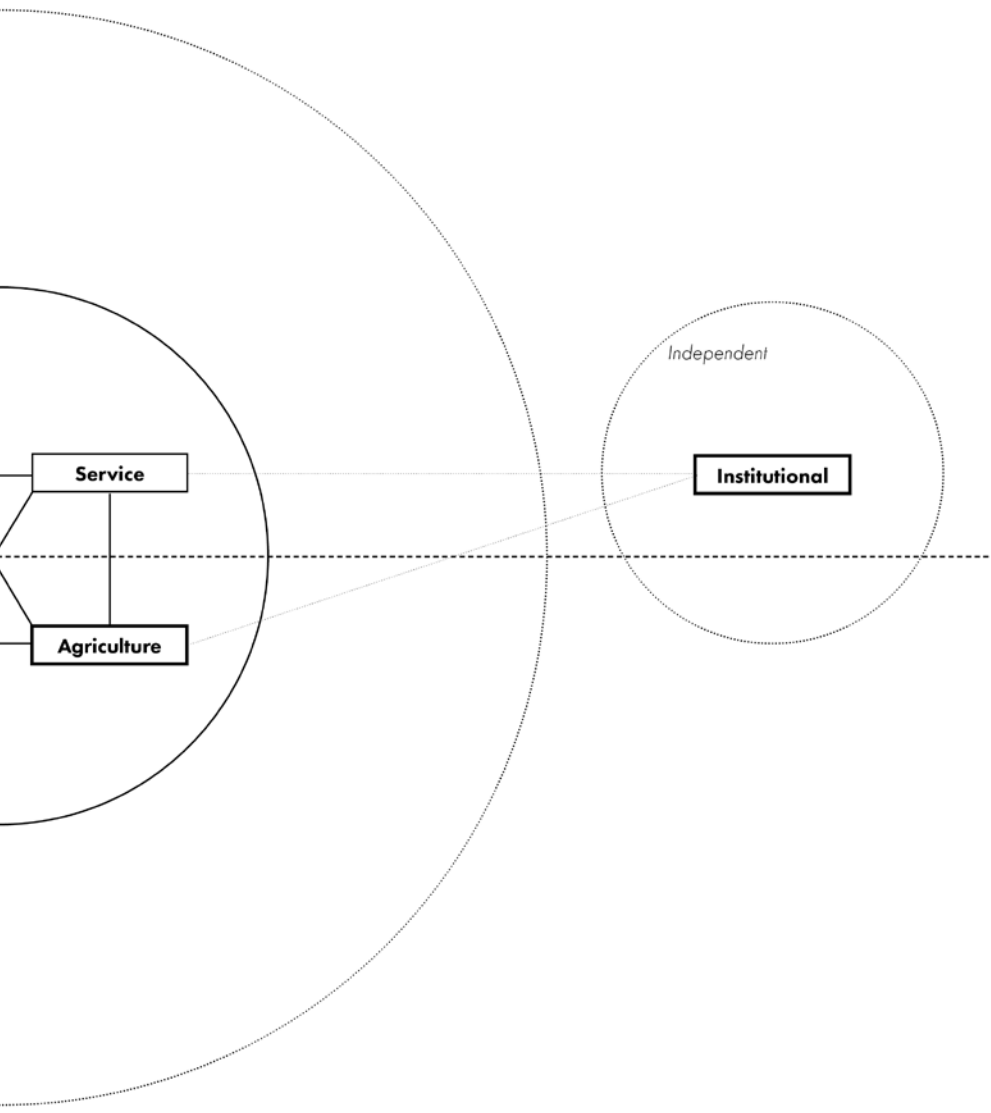
**HISTORICAL DEVELOPMENT OF THE ECONOMIC ACTIVITIES ON THE ISLAND**







covery





# Agritourism Can Drive Socio-Economic Development In The Caribbean



**Daphne Ewing-Chow** Senior Contributor   
Food & Drink  
*Food, Agriculture, Sustainability... with a passion for the Caribbean*

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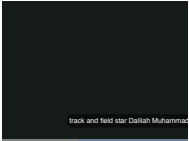
f With the global market size of agritourism expected to reach  
t \$10.16 billion by 2024 (Verified Market Reports) and with an  
in estimated Caribbean market for agribusiness products of \$4 billion per year, there is a major opportunity for the region to enhance its tourism product and improve food security, connecting visitors and locals to the people, places and processes involved in the production side of food and drink.

Regionally, operations such as Goodfellow Farms in the Bahamas, PEG farms and Coco Hill Forest in Barbados and Ridge 2 Reef Farm in St. Croix are offering farm tours, farmers markets, farm stays, farm retreats and even opportunities to take part in farm life. As an outcome of their study to map agritourism policies in the Caribbean, the Technical Centre for Agriculture and Rural Cooperation and the Inter American Institute for Cooperation on Agriculture are currently supporting agritourism development in 6 countries, including Grenada, Jamaica, Barbados, St. Lucia, Suriname and St. Vincent & the Grenadines.



Agritourism provides visitors with the opportunity to take part in farm life. DAPHNE EWING-CHOW

According to the [Culinary Tourism Alliance](#), these initiatives are particularly important to socio-economic development



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### Blue Growth blog

#### Advancing aquaponics in the Caribbean

A crisp, blue sign emblazoned with "FRESH TILAPIA" entices customers to stop in at Indies Greens in Upper Renfrew, on the Caribbean island of Antigua, to pick up these delicious fish for a pan fry or barbeque.

Bred and raised in Antigua under the supervision of Larry Francis and his team, these tilapia are grown using aquaponics.

Aquaponics is a system that combines hydroponics, soil-less agriculture and aquaculture within a closed system.

There are three biological components in the aquaponics process: fish, plants and bacteria.

With aquaponics, the farmer combines the recirculating aquaculture with hydroponic vegetables – the fish water is used as fertilizer for the plants, and the plants clean the water for the fish.

The result is value-added, local production of both fish and vegetables together, using the same water.

In this carefully balanced system in use in Antigua, the water is always filtered, oxygenated and healthy, without any chemicals at all, which means that the quality and taste of the fish and lettuce are top notch.

"Aquaponic tilapia have little in common with their wild brethren growing in stagnant ponds – tilapia from aquaponics are clean-tasting and unpolluted with chemicals, and more importantly have an appealing and delicate flavour, while the hydroponic lettuce is crisp, crunchy and extremely fresh," explains Austin Stankus, FAO consultant facilitating aquaponics projects.

FAO is supporting the development of aquaponics throughout the Caribbean region, which began with a technical training workshop hosted at Indies Greens that took place 14-18 August 2017.

Fifteen participants from five countries (Antigua and Barbuda, Bahamas, Barbados, Grenada and St. Kitts and Nevis) took part in the training activities which included lectures and theoretical discussions on the biological, chemical and physical requirements to ensure the production of the highest quality fish and vegetables.

Other topics included alternative energy and best construction practices to ensure the system is cost effective and resilient to severe weather. Lectures were reinforced with hands on practical sessions, with participants carrying out every phase of tilapia production from breeding, feeding and harvesting, and seeding, transplanting, pest management and harvesting of the lettuce and vegetables.

As a final take-home exercise, participants designed their own system, complete with financial analysis, for implementation upon their return to their home country.

Aquaponics has the potential of higher yields of nutrient-rich vegetables and protein-rich fish with less labour, less land, fewer chemicals and a fraction of the water usage. Moreover, it is a potentially useful tool to overcome some of the challenges of traditional agriculture in the face of fresh water shortages, climate change and soil degradation.

Aquaponics works well in places where the soil is poor and water is scarce, for example in urban areas, and climates and low-lying islands.



In Antigua's aquaponics project, the farmer combines the recirculating aquaculture with hydroponic vegetables – the fish water is used as fertilizer for the plants, and the plants clean the water for the fish. This produces crisp lettuce then sold on the market.

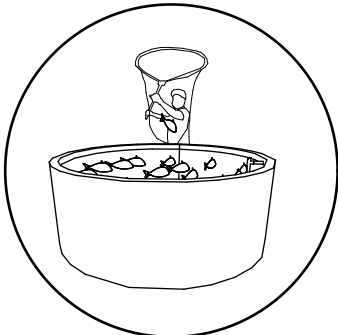


These fish ponds produce high-quality tilapia.

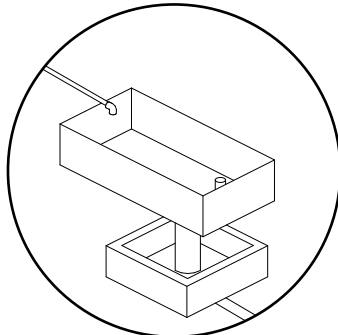
The biological components in the aquaponics process: fish, plants and bacteria



**A)- AQUAPONICS SYSTEM**

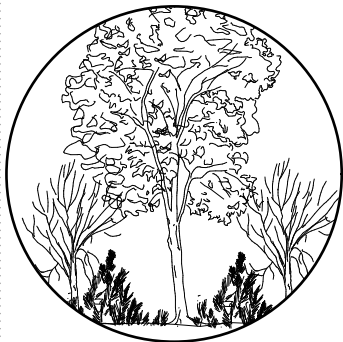


1. FISH-TANK - NUTRIENTS

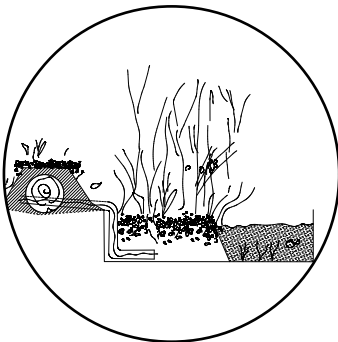


2. SOLID WASTE FILTRATION

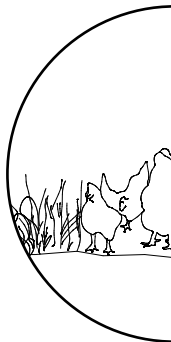
**B) - AGROFORESTRY - PERMACULTURE**



1. MULTILAYERED PLANTATION - MIXING SIZE AND TYPES OF TREES



2. NATURAL WATERPONDS FOR IRRIGATION

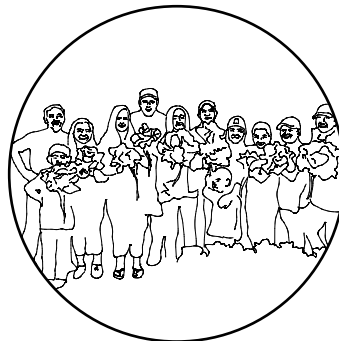


3. ANIMALS MAKE PASTURE CONTROL AND COMPOST

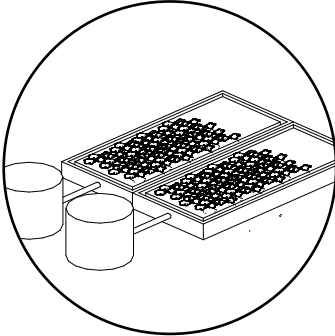
**C) AGROTOURISM**



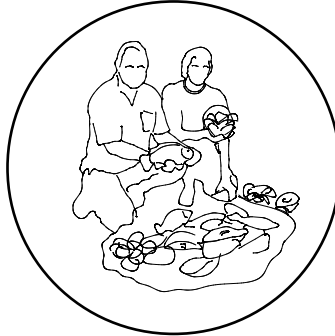
1. TOURIST CAN TAKE PART OF THE PRODUCTION



2. WORKSHOPS AND LEARNING ACTIVITIES



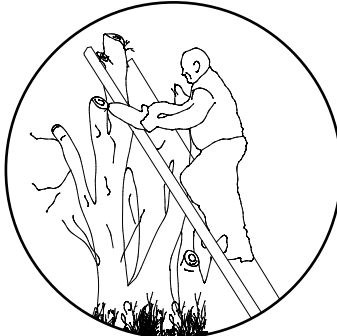
**3. Plants absorb the nutrients and clean the water.**



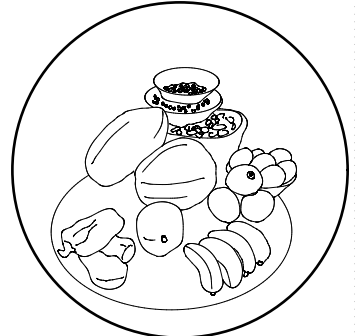
**4. END PRODUCT FISH AND VEGETABLES IN A CLOSED LOOP**



**START OF THE SYSTEM - PEST**



**4. TIMBER TREES CAN BE A SIDE PRODUCT**



**4. END PRODUCT FRUITS AND VEGETABLES**



**3. PRODUCTION OF LOCAL CONSERVES**

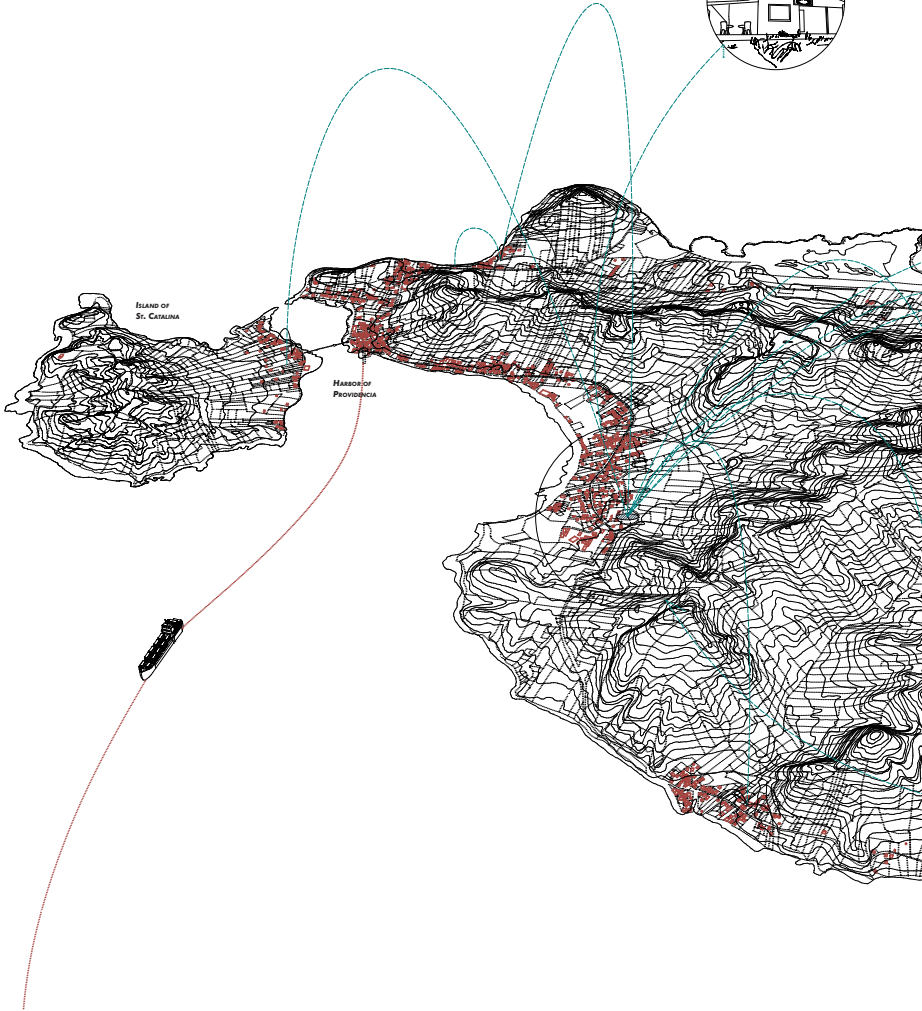


**4. PROMOTING THE CONSUMPTION AND EXCHANGE OF LOCAL PRODUCTS.**

## 1. RESTAURANTS

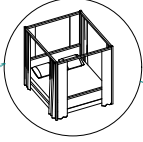
The restaurant and service industry of the island can use the brand **MADE IN OLD PROVIDENCE** to generate value to the food and local gastronomy.

1. RESTAURANTS



## 2. HOTELS

### 1. HOTELS



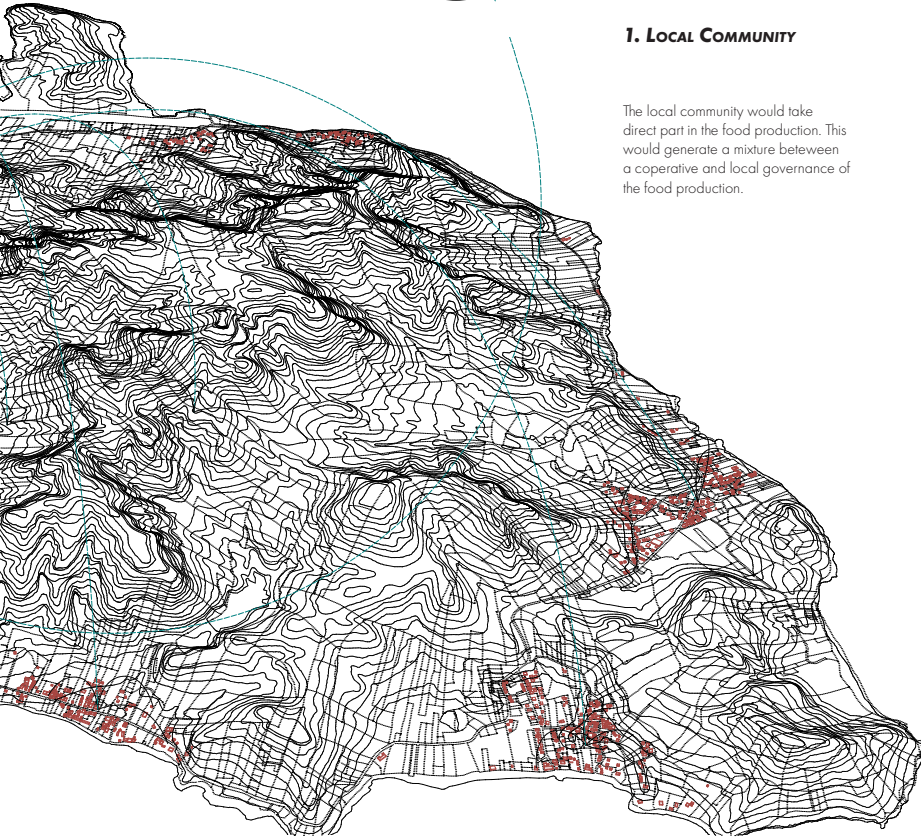
The Hotels and the small bed and breakfast would certainly benefit from more sustainable and less consumption-directed tourism.

### 1. LOCAL COMMUNITY



## 1. LOCAL COMMUNITY

The local community would take direct part in the food production. This would generate a mixture between a cooperative and local governance of the food production.





MADE IN OLD PROVIDENCE



| ERECTION OF A CONICAL-SHAPED HOGAN DURING A YEIBICHAI CEREMONY, **St. Michaels Arizona**

SIMON SCHWEMBERGER / CORBIS, 1905

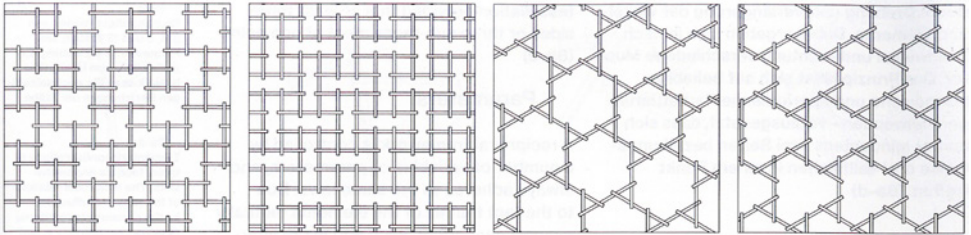
# **III.**

## **STRUCTURAL CONCEPT**

*-LOCKED TIMBER SYSTEM-*

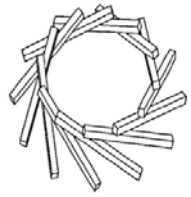
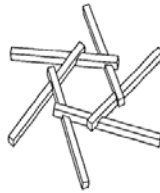
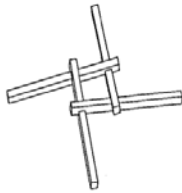
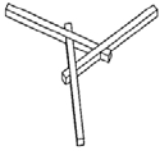


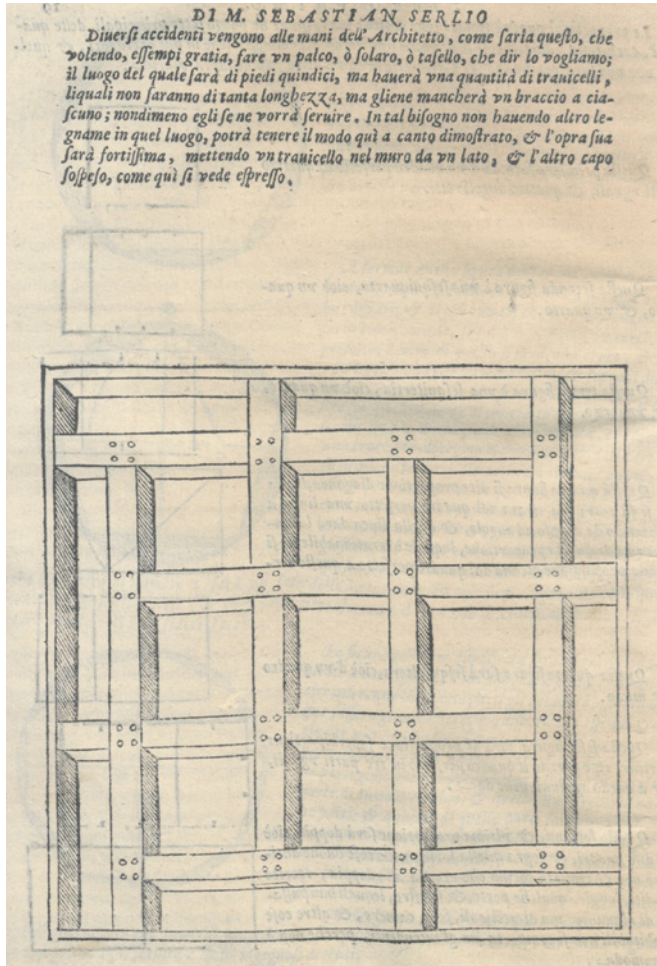
*"...Within that field (mechanics), 'resilience' was defined as the interplay between rigidity (the ability of a structure or system to resist stress) and ductility the ability of that same system to absorb stress through its own deformation".*



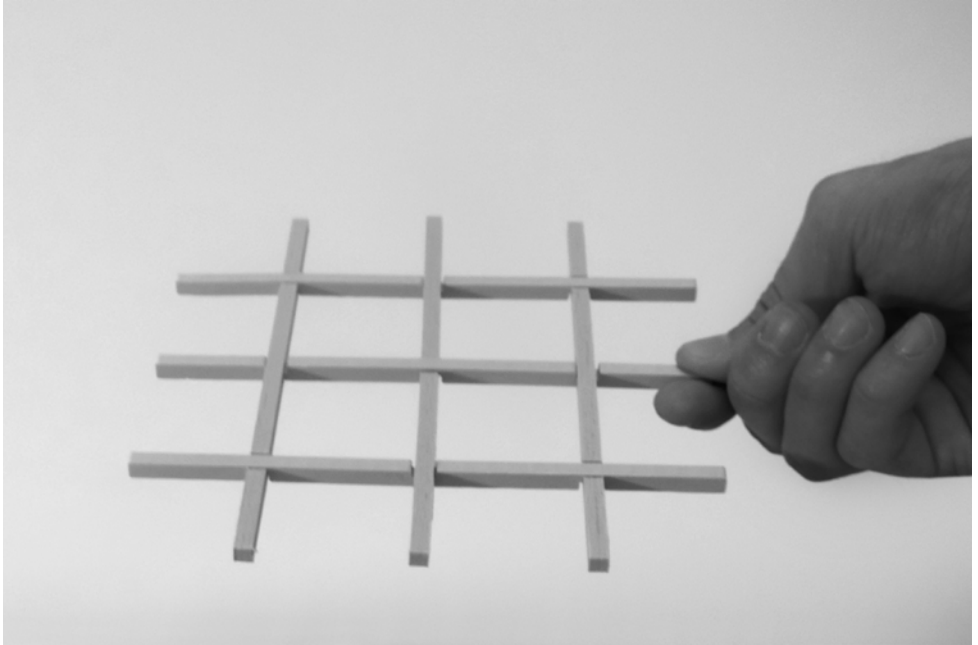
**| Reciprocal Frame Configurations**

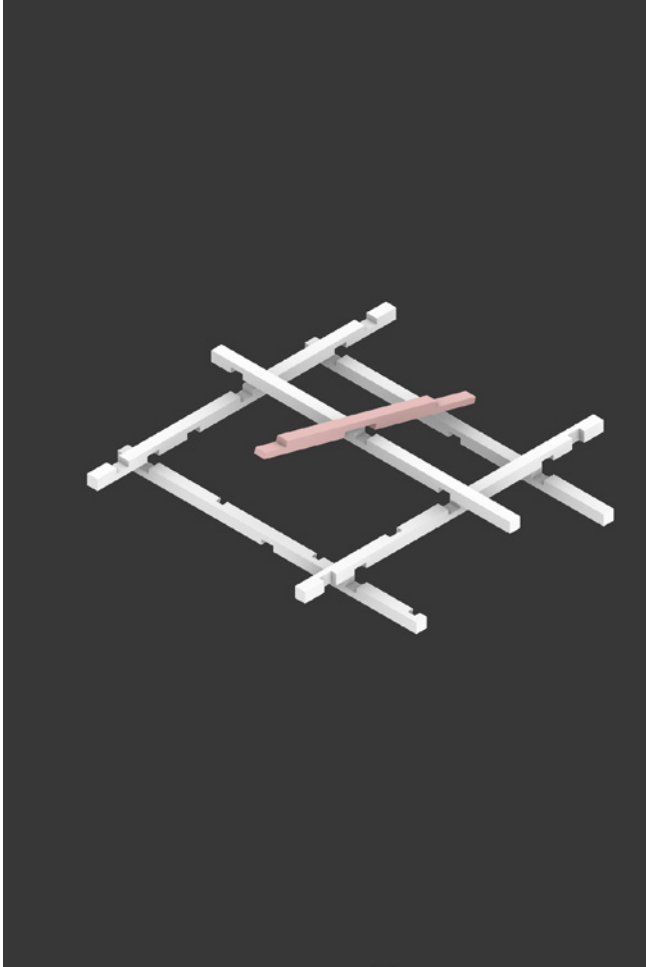
U. Thönnissen, Hebelstabwerke, gta Verlag, 2015





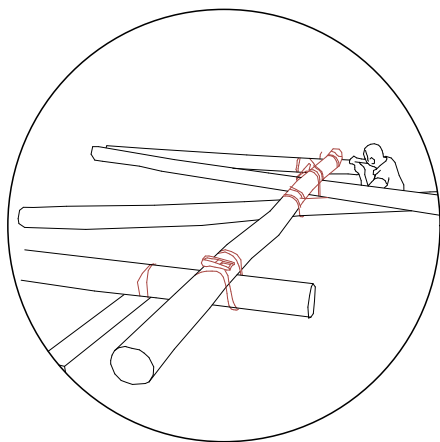
**| Ceiling Framework**  
Sebastiano Serlio, 1584



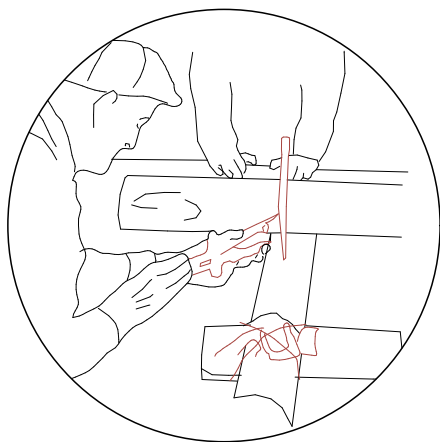


## CONSTRUCTION PROCESS - "LOCKED TIMBER SYSTEM"

### 1. PREPARATION/ ROUND ELEMENTS



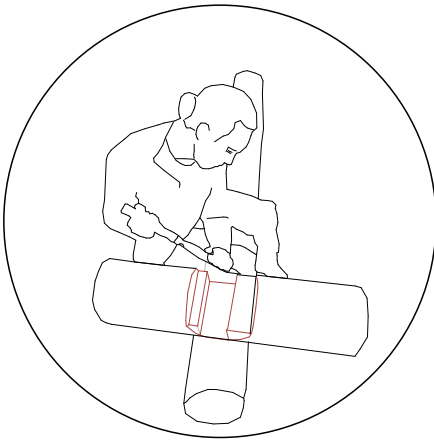
1.1 SETTING UP THE MOLD AND PLACING THE PIECES



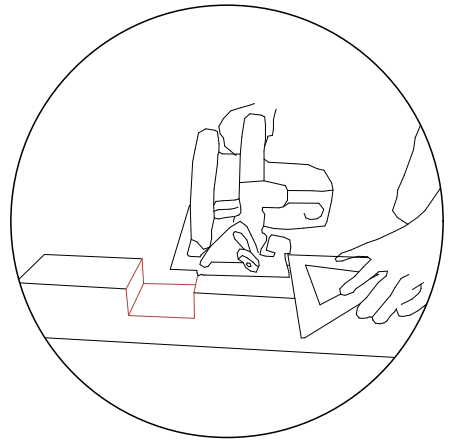
1.2 Marking the cuts



## 2. CARVING AND CUTTING

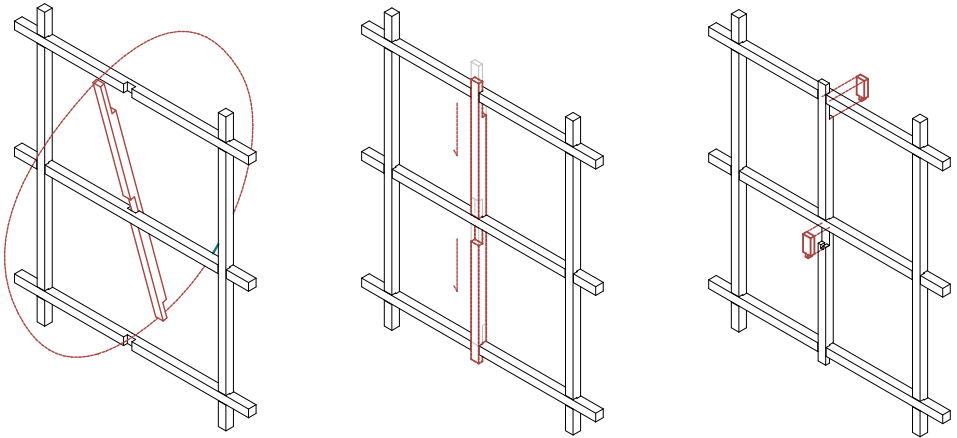


1.1 A square cut must be made in the round element



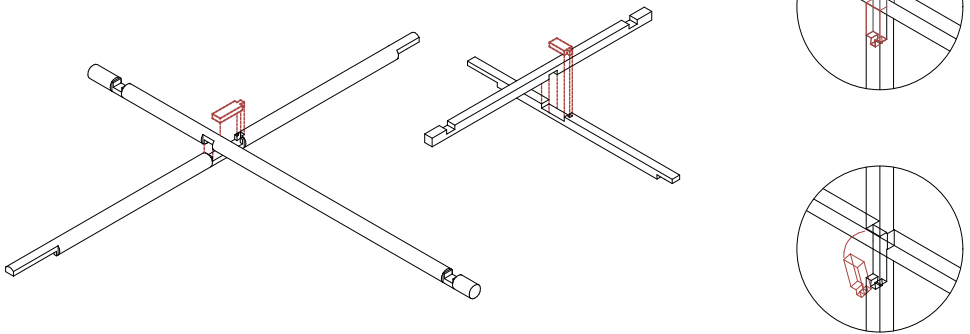
1.2 A guide mechanism can be easily implemented with a round saw and a mold.

## KEY PIECE - LOCKING MECHANISM



To succesfully "lock" the structure a spetial piece is needed. The assembly logic was resolved by creating a special piece that slides in to close the pattern.

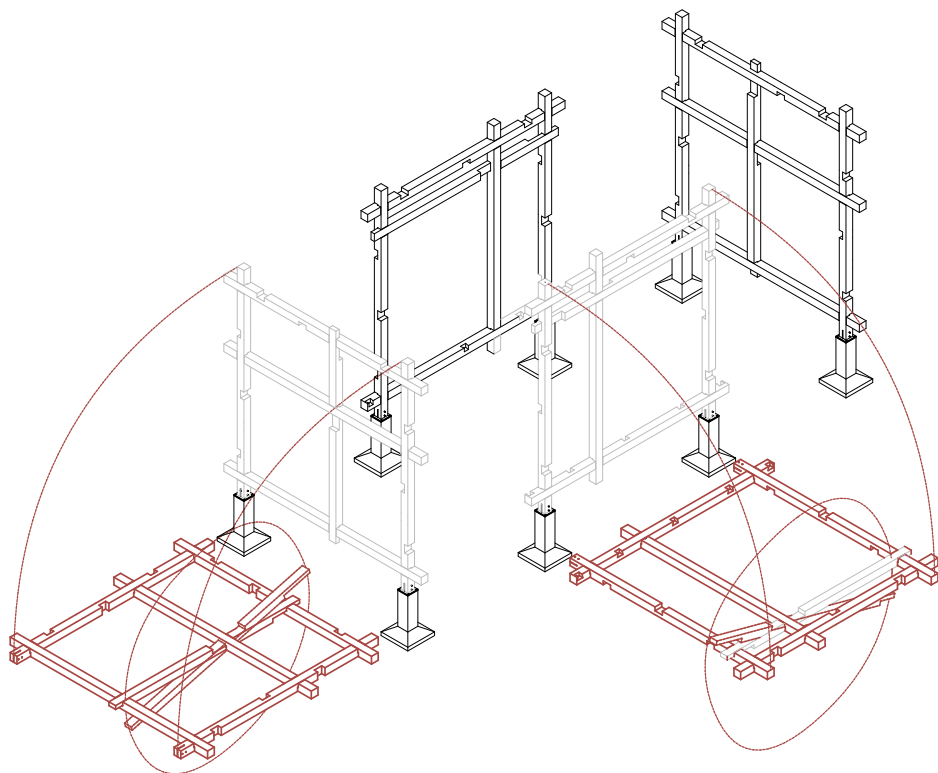
#### **WEDGE SECURE THE MOVEMENT - UNLOCKING MECHANISM**



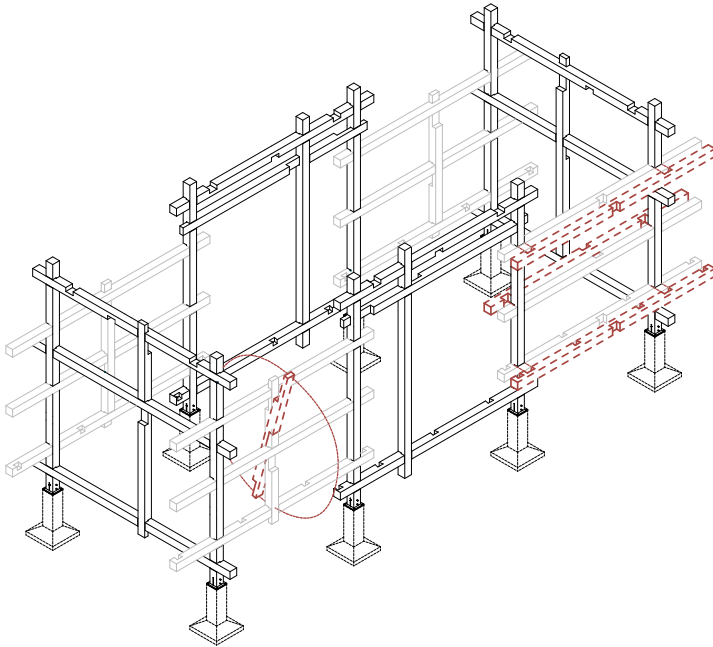
*Given the great redundancy and the reciprocal logic of the system a certain tolerance can be given in key points to facilitate assembly and also to reduce stress on the joints caused by horizontal forces. The wedge is placed to stiffen the structure but also as a safety mechanism falling when the horizontal forces are too strong.*

## ASSEMBLY - **SMALL MODULE** / *LIVING UNIT*

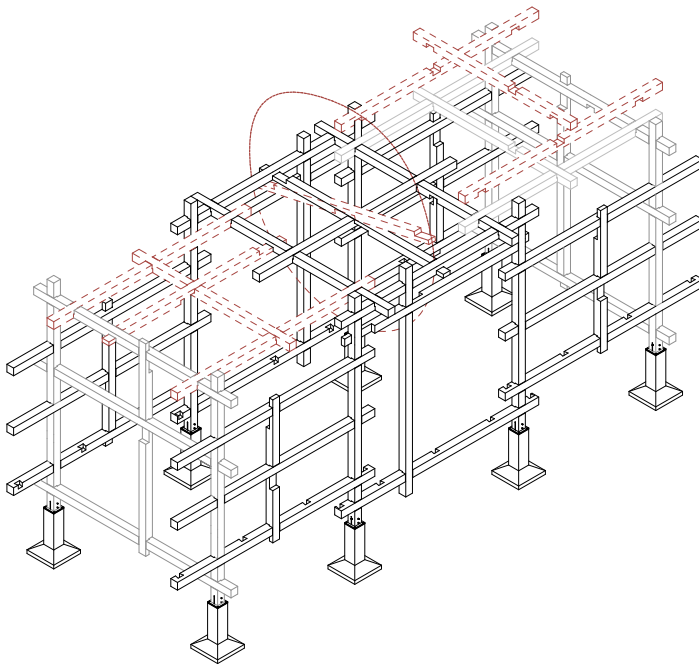
### 1. ASSEMBLY OF THE FIRST STABLE ELEMENTS



## 2. CONNECTING PIECES

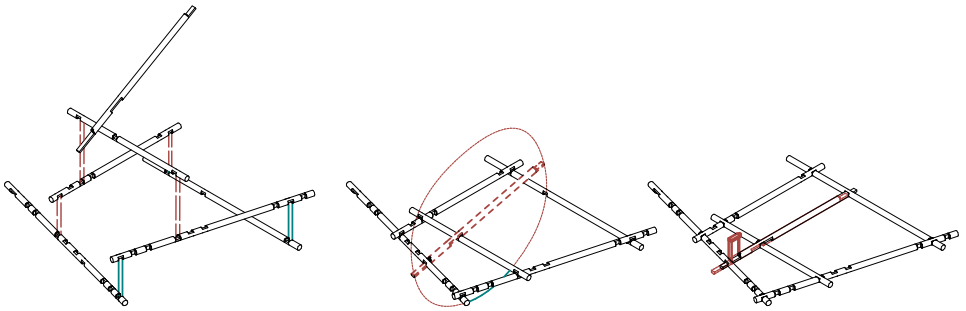


### 3. ROOFING - HORIZONTAL CONNECTION



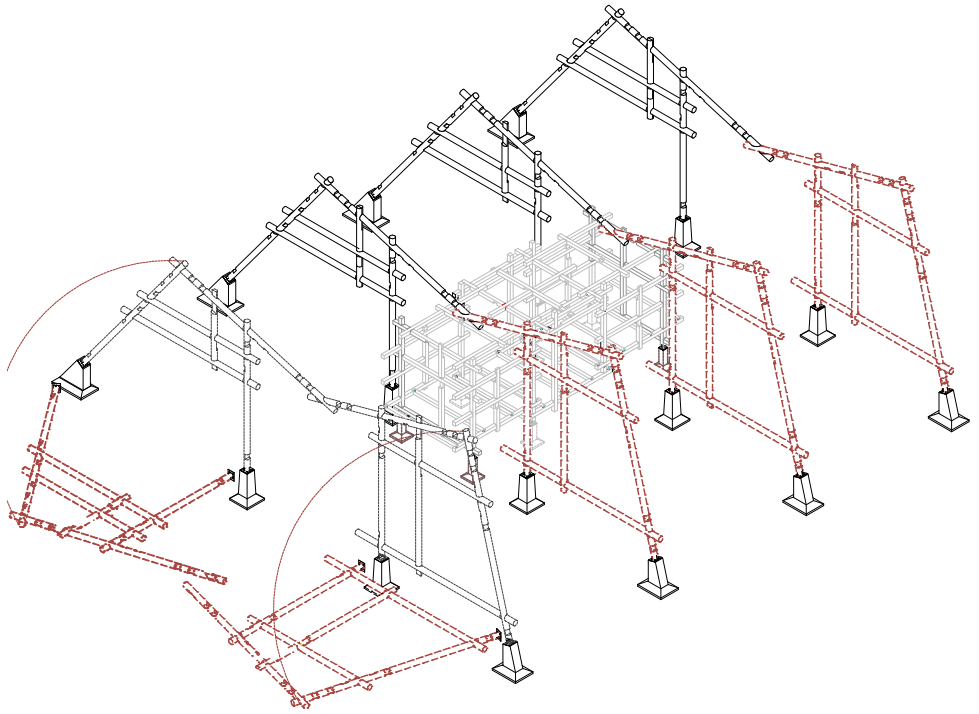
## ASSEMBLY - COVER MODULE / ENVELOP

### 1. FIRST WALLS

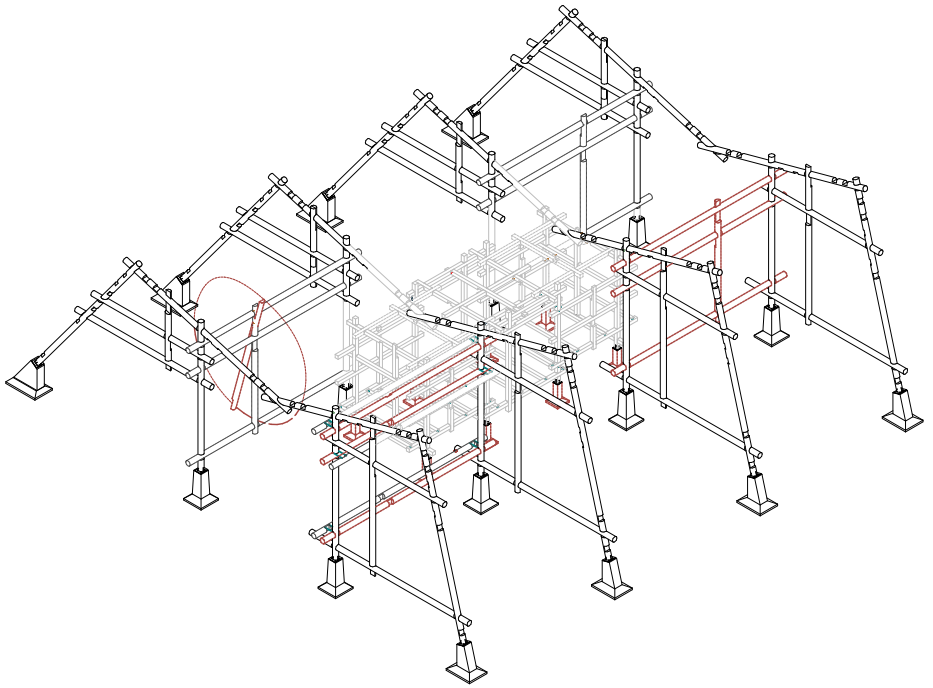


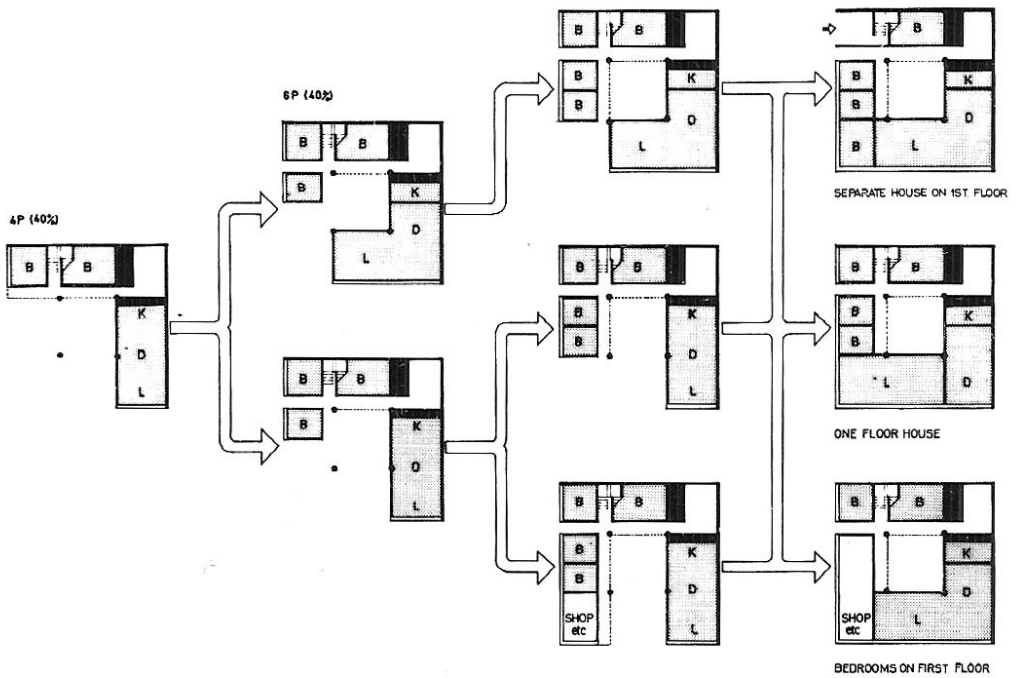


## 2. LIFTING IN PLACE

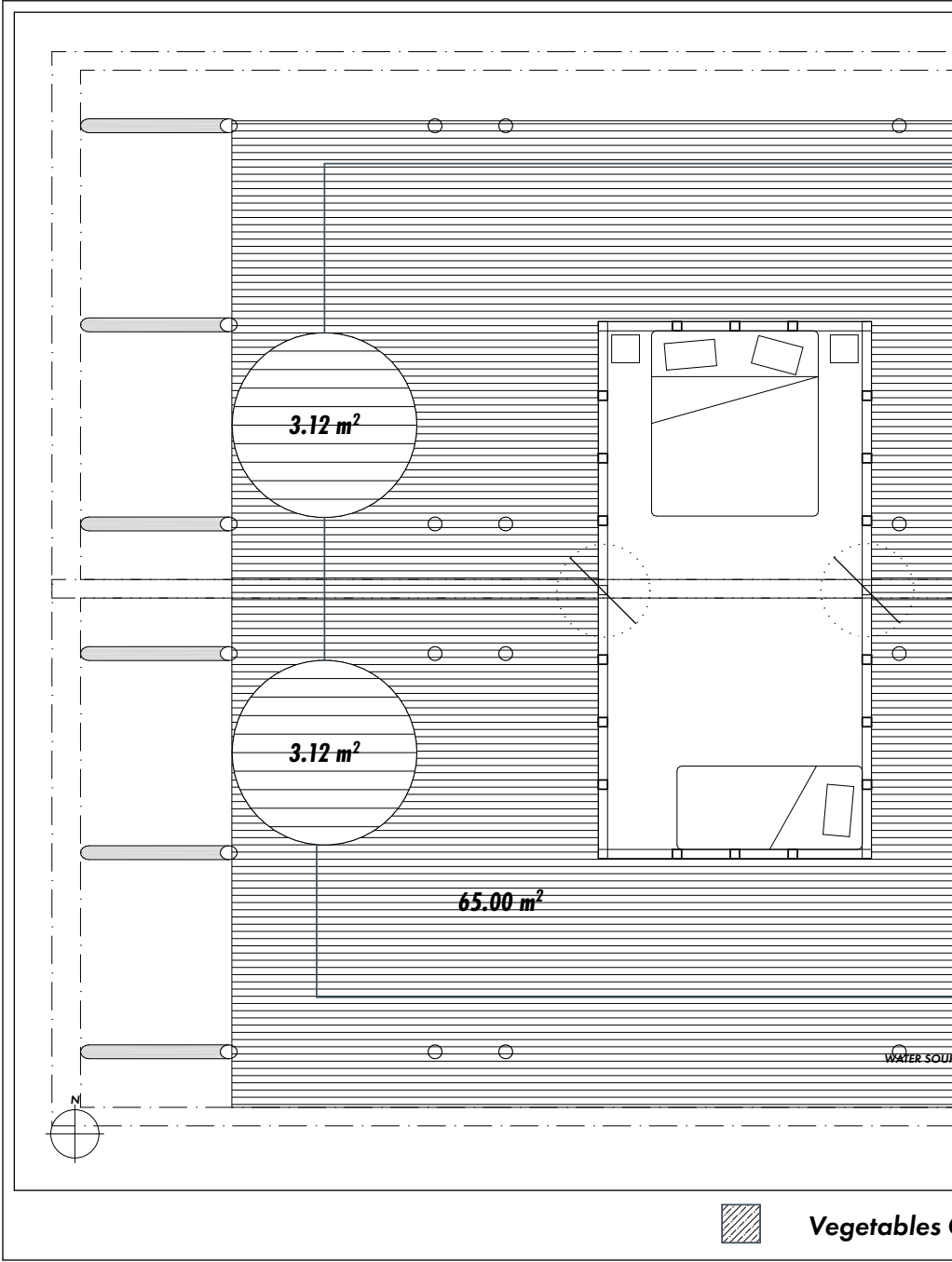


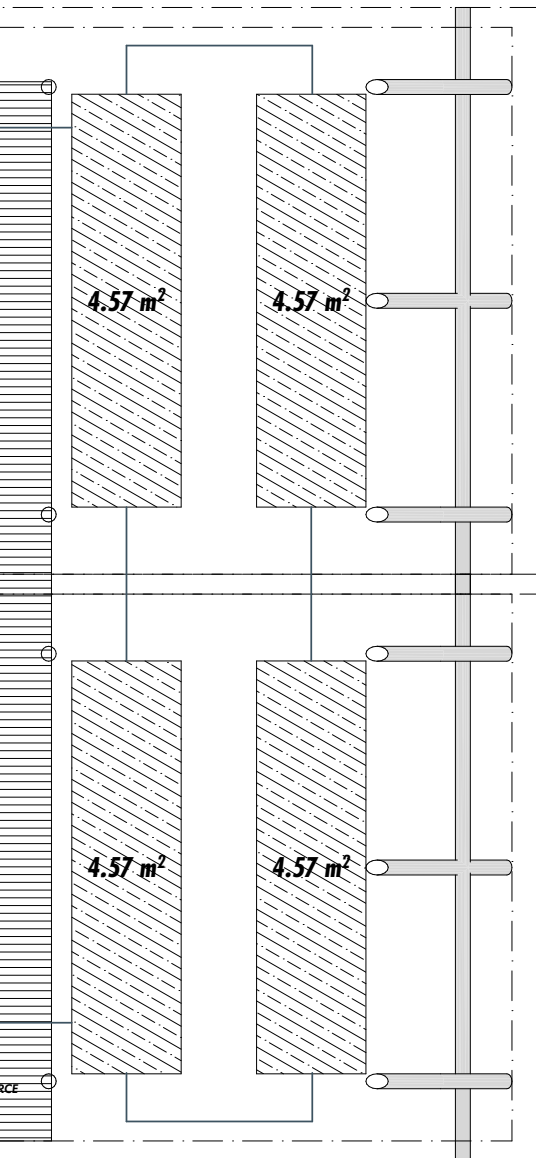
### 3. HORIZONTAL CONNECTIONS





# **IV.** **MODULE**





**$18\text{m}^2$  Grow Bed = 180kg  
Fish a Year**

**1 Fish of 500gr = 25L**

**180 kg Fish = 9000L**

**180 kg Fish =  $9\text{m}^3$**

**$18\text{m}^2$  Grow Bed = 1100  
Vegetables a Year**

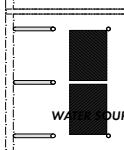
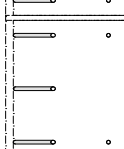
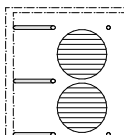
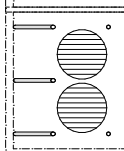
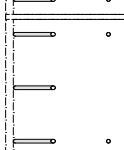
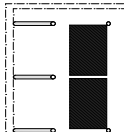
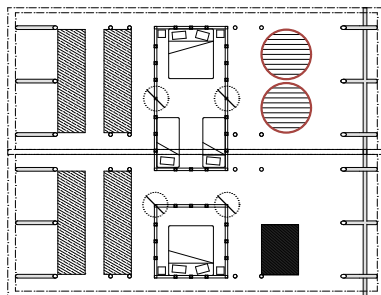
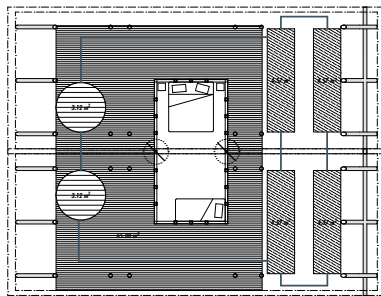
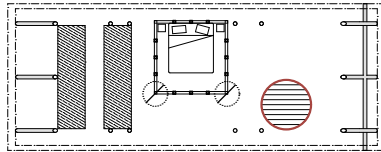
**4 Adult should consume  
around 104 kg of Protein  
a Year (WHO)**

**4 Adult consumes  
around 584kg of  
Vegetables and Fruits  
(WHO)**

**Grow Bed**

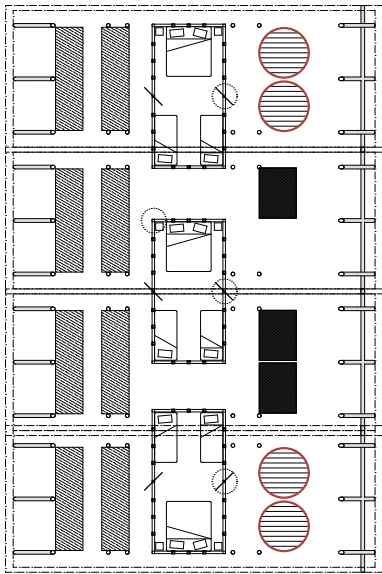
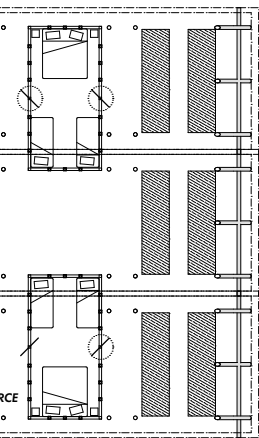
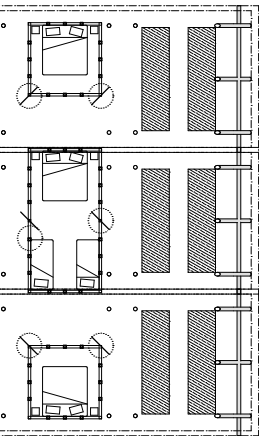


**Fish Tanks**



## Vegetables





Grow Bed



Fish Tanks

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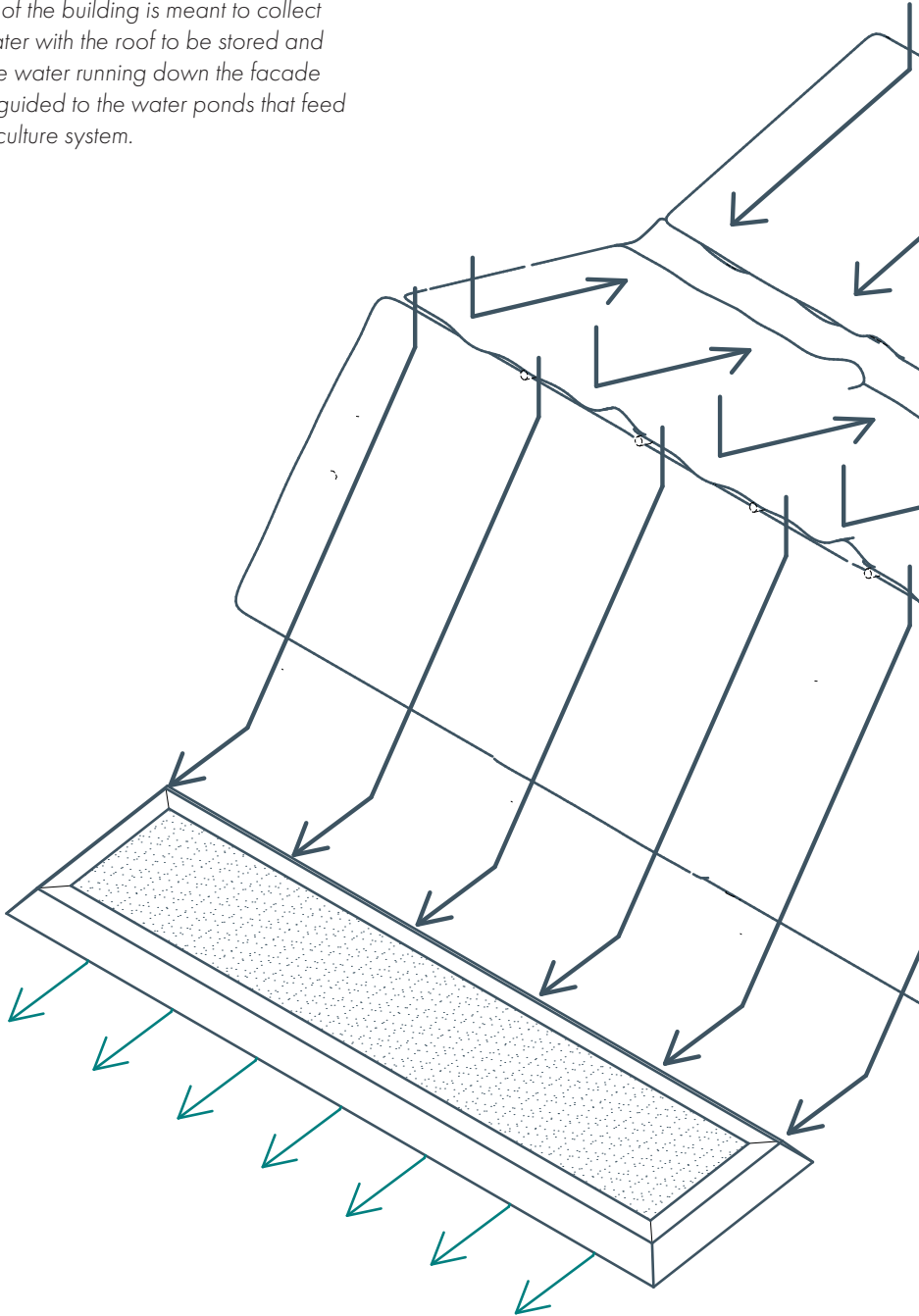


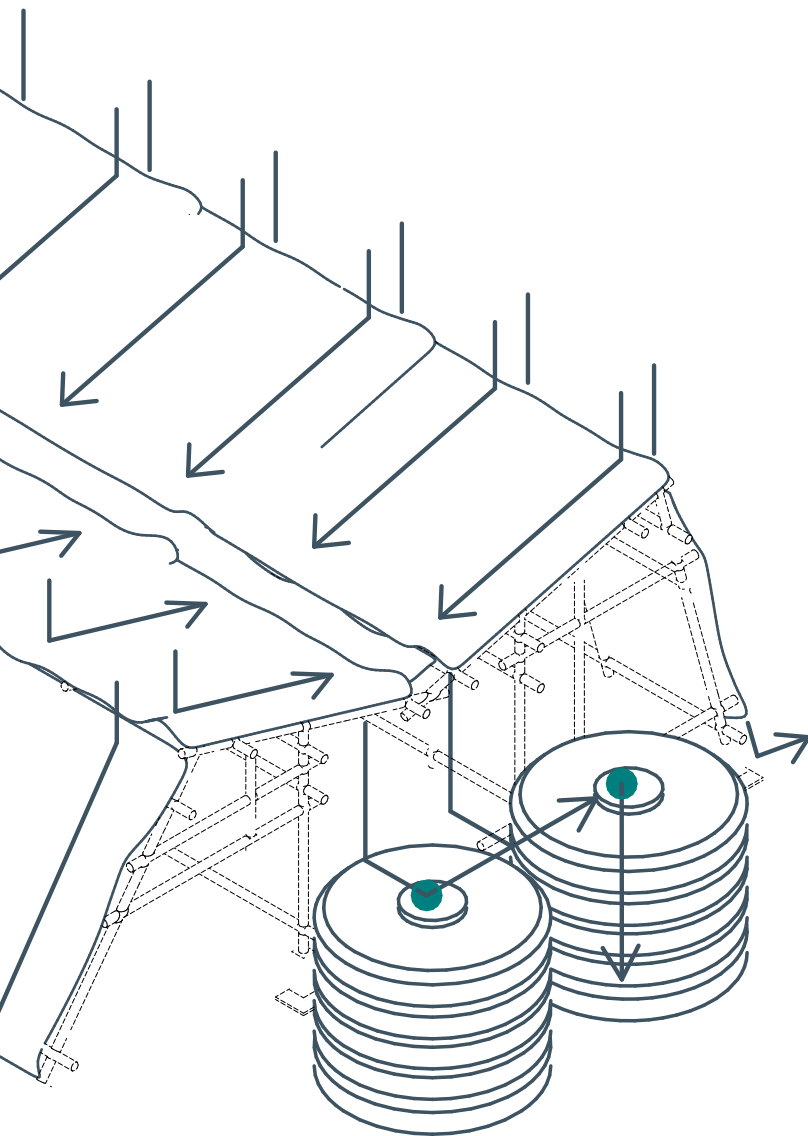
| **GLENN MURCUTT**  
MAGNEY HOUSE, 1984

# **V.** ***WATER SYSTEMS***

## 1. GEOMETRY

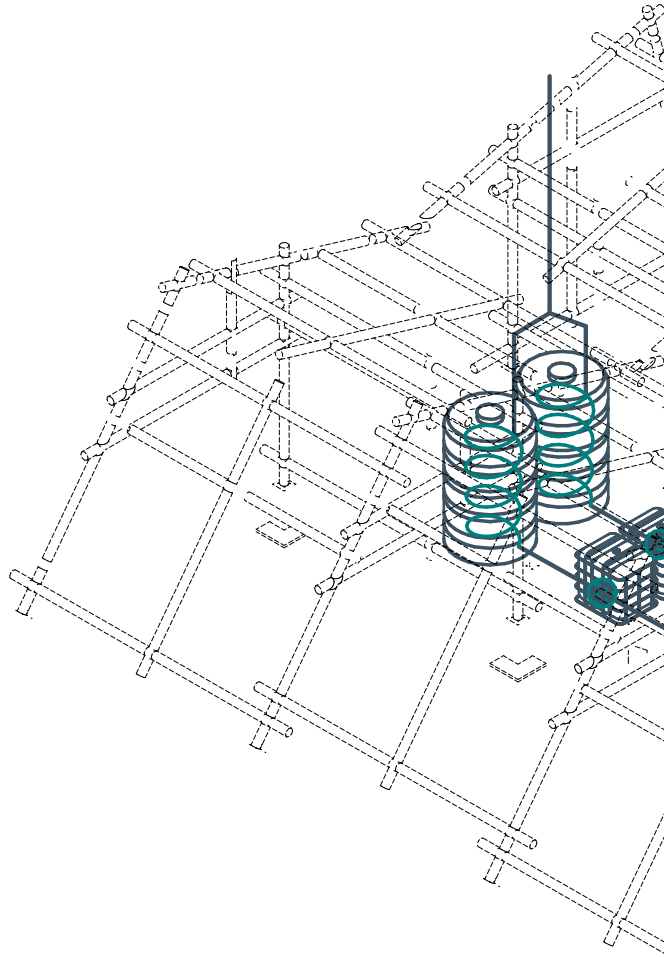
The shape of the building is meant to collect the rain water with the roof to be stored and filtered. The water running down the facade would be guided to the water ponds that feed the permaculture system.

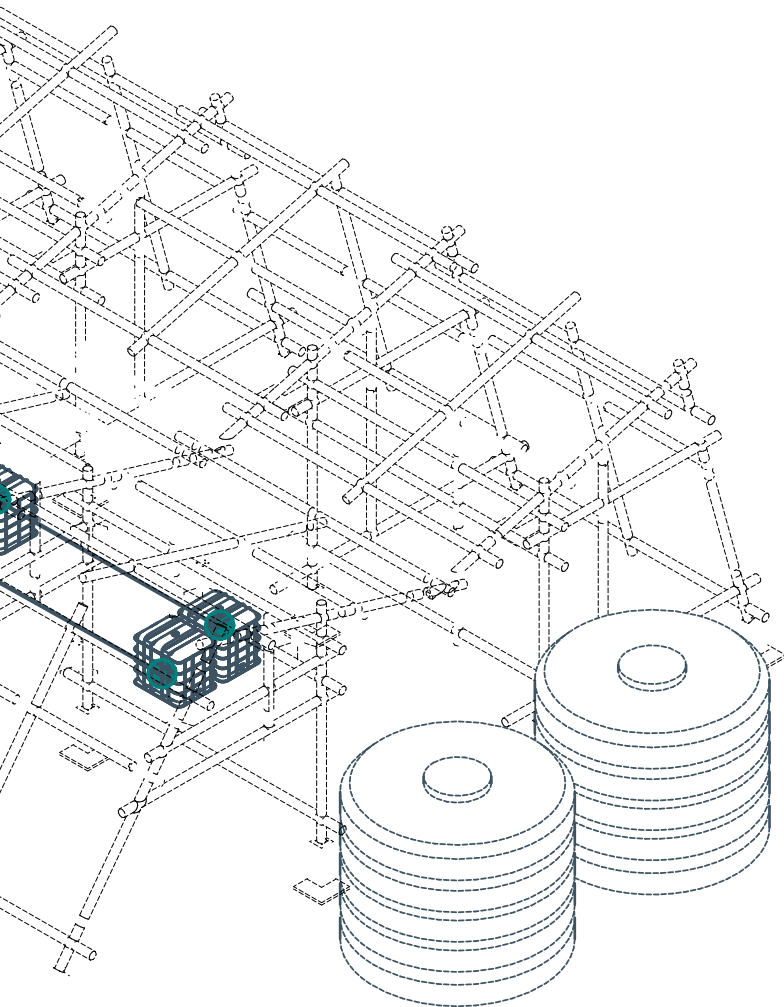




## 2. WATER FILTRATION AND STORAGE

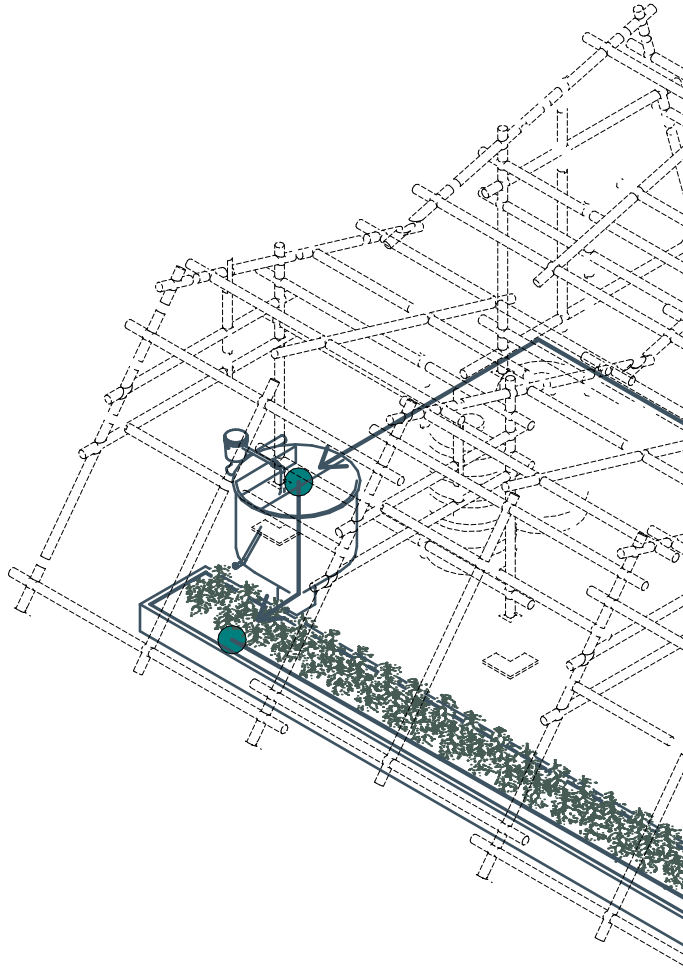
*The slow sand filtration system could be a good option for retaining big volumes of water while securing clean drinking water.*



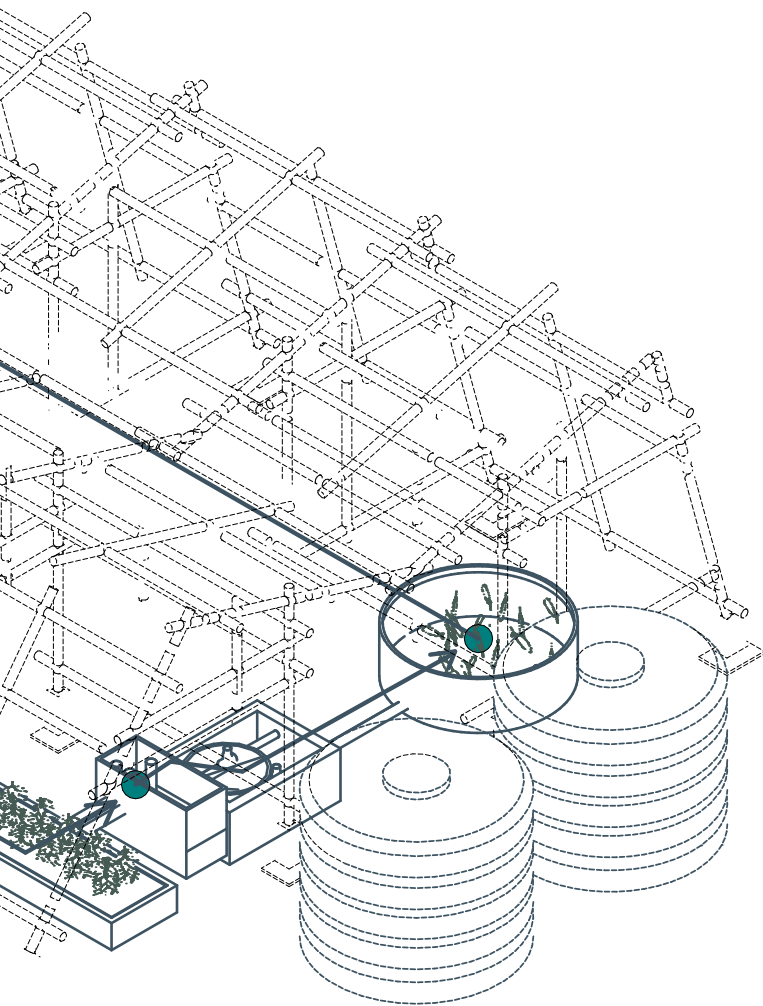


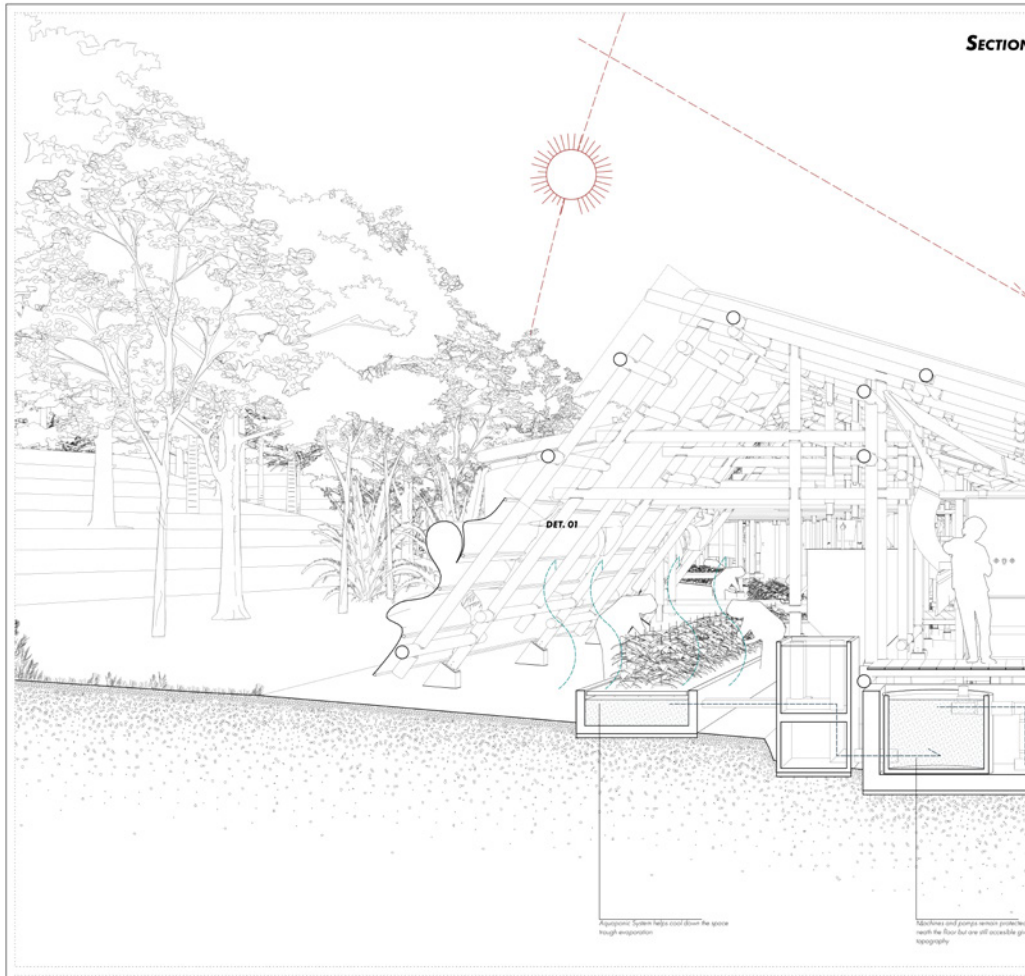
### 3. AQUAPONICS SYSTEM / WORKSHOPS

The aquaponics system needs a fraction of the water of traditional soil based agriculture. The water needed can be supplied by the big gray water tanks.

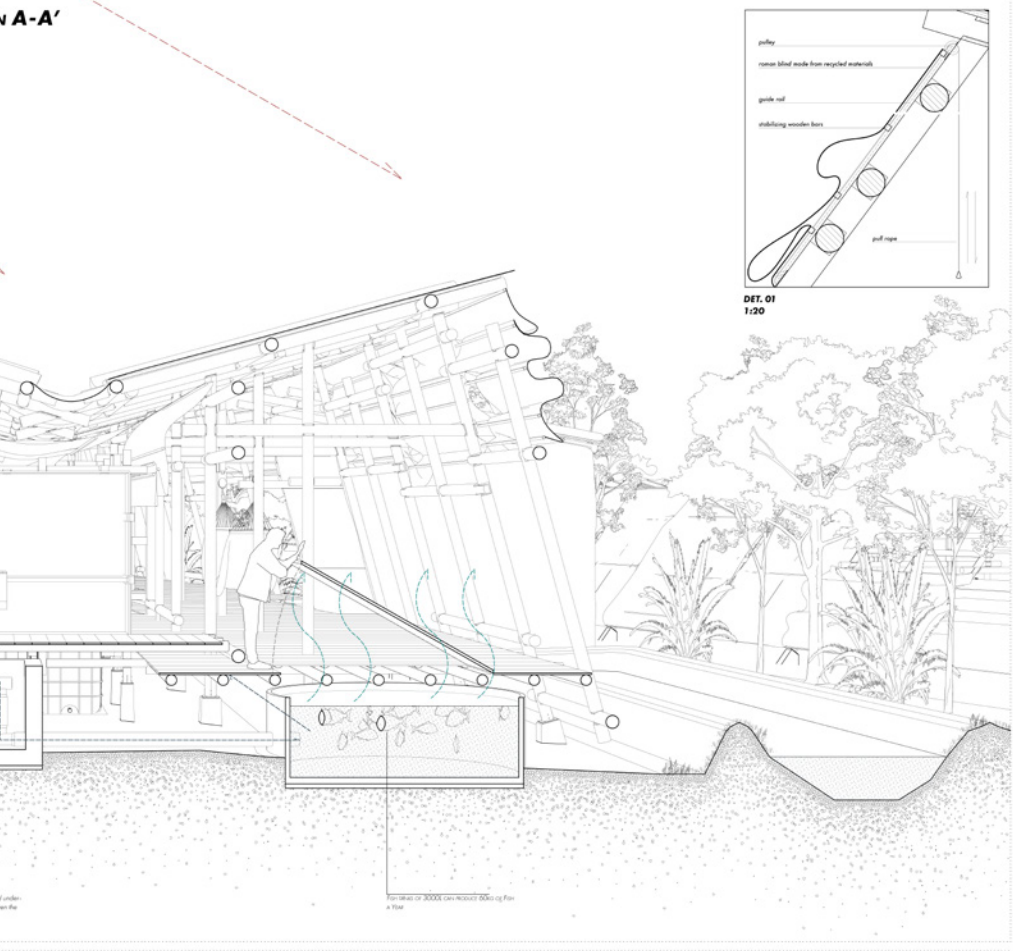




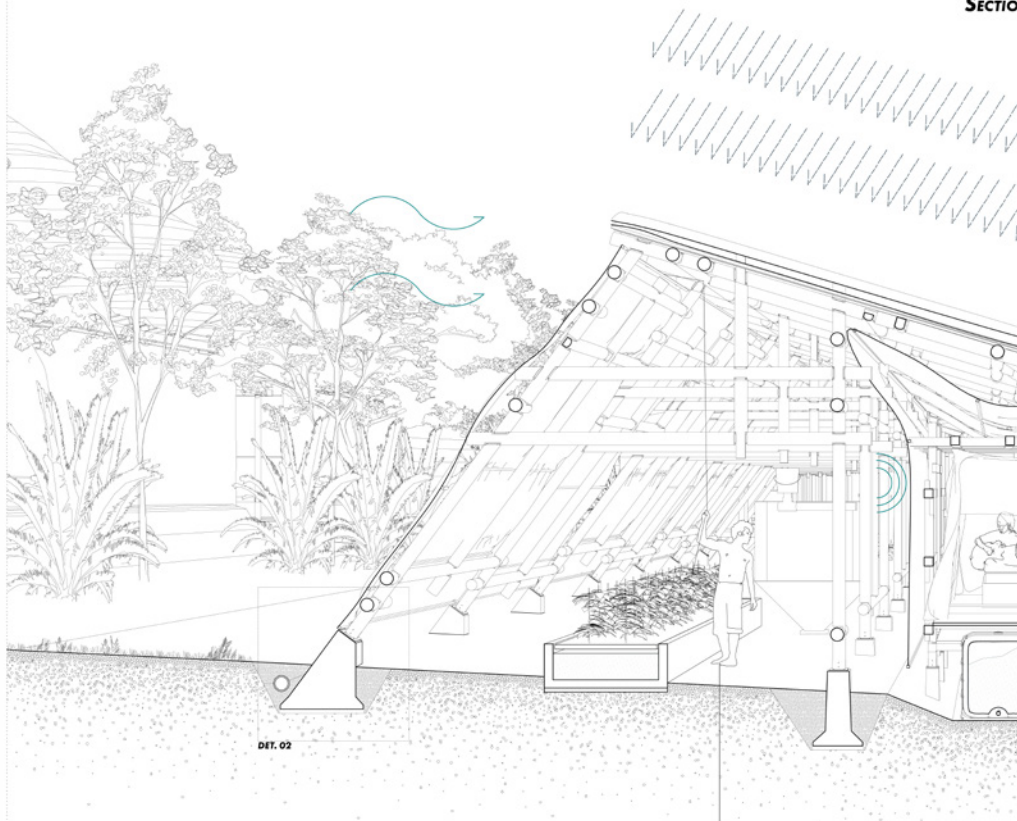




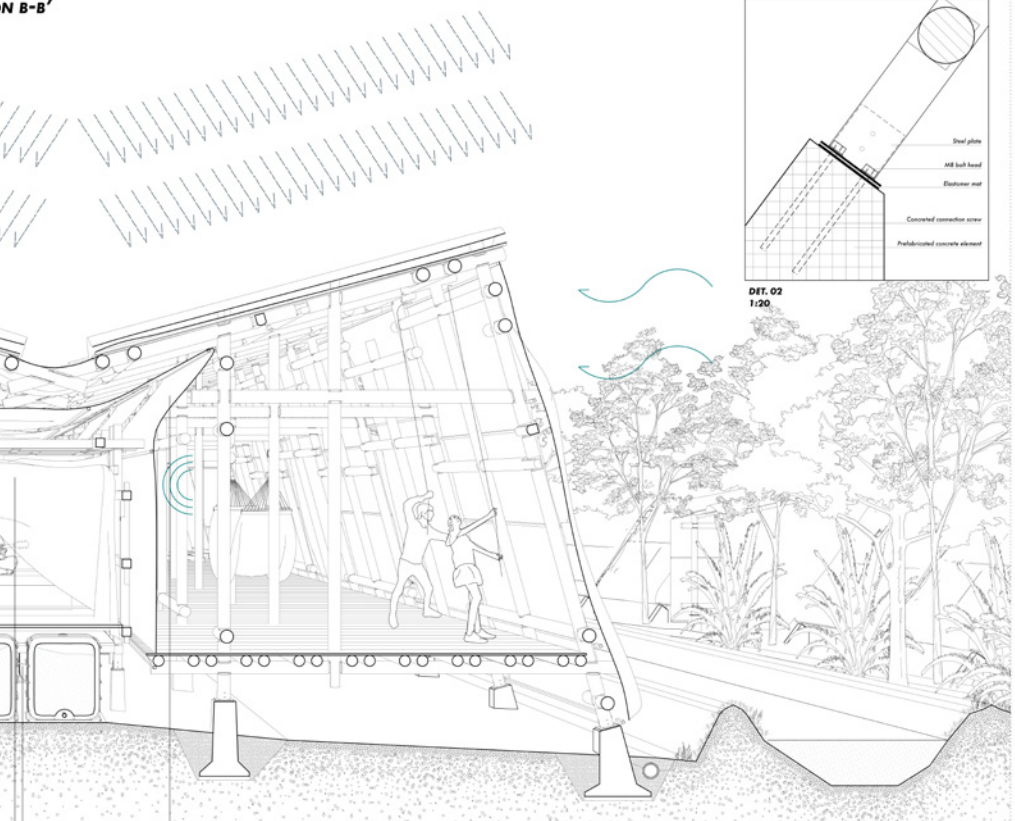
W-A-A'



SECTION



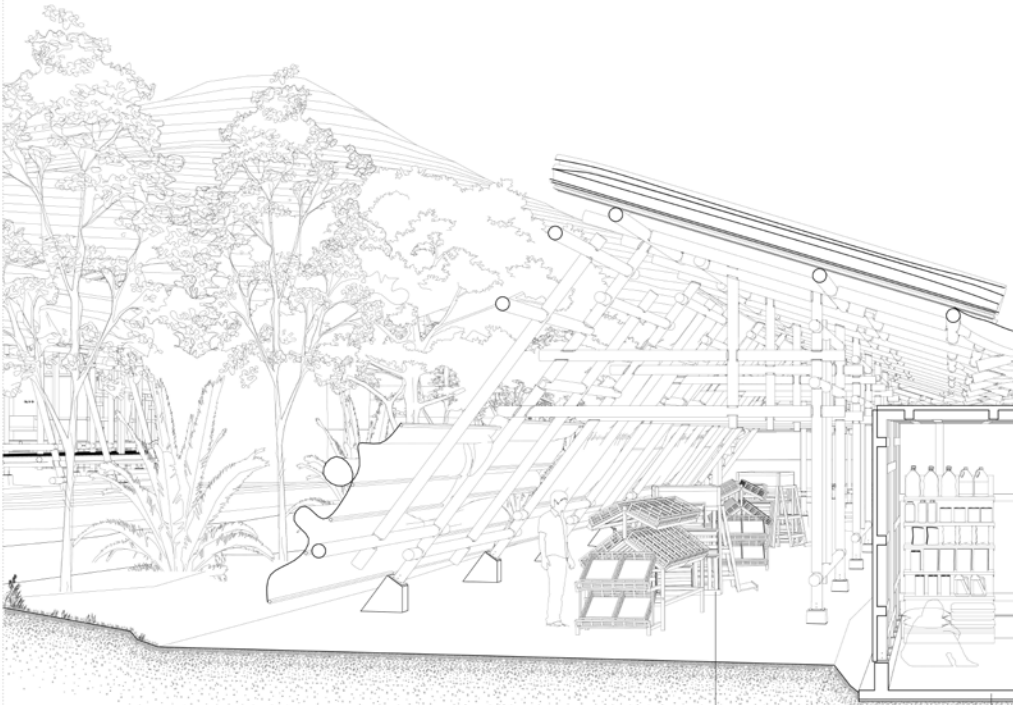
N B-B'



Urban-Curtain Facade System.

Massive Pier on the inside of the core.

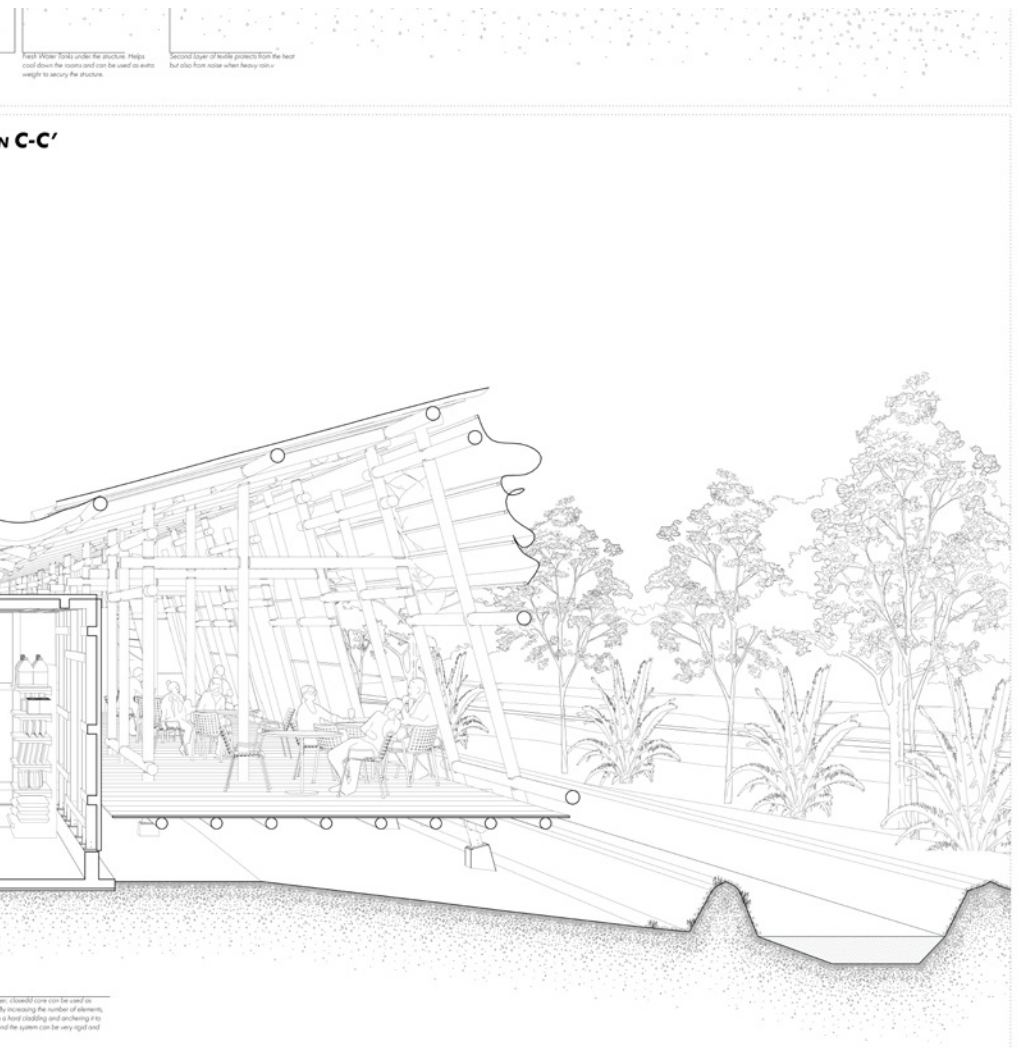
## SECTION



The open space can be also used as a Market for the public program.

A strong shelter creating the green strong.





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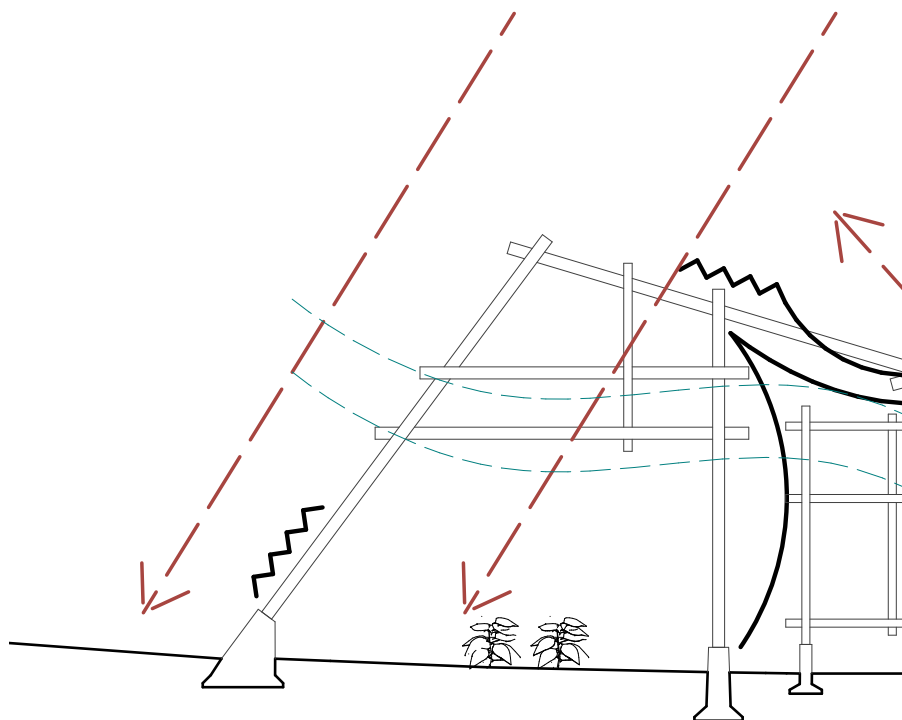
| **BIG AIR PACKAGE**  
CRISTO, 2011



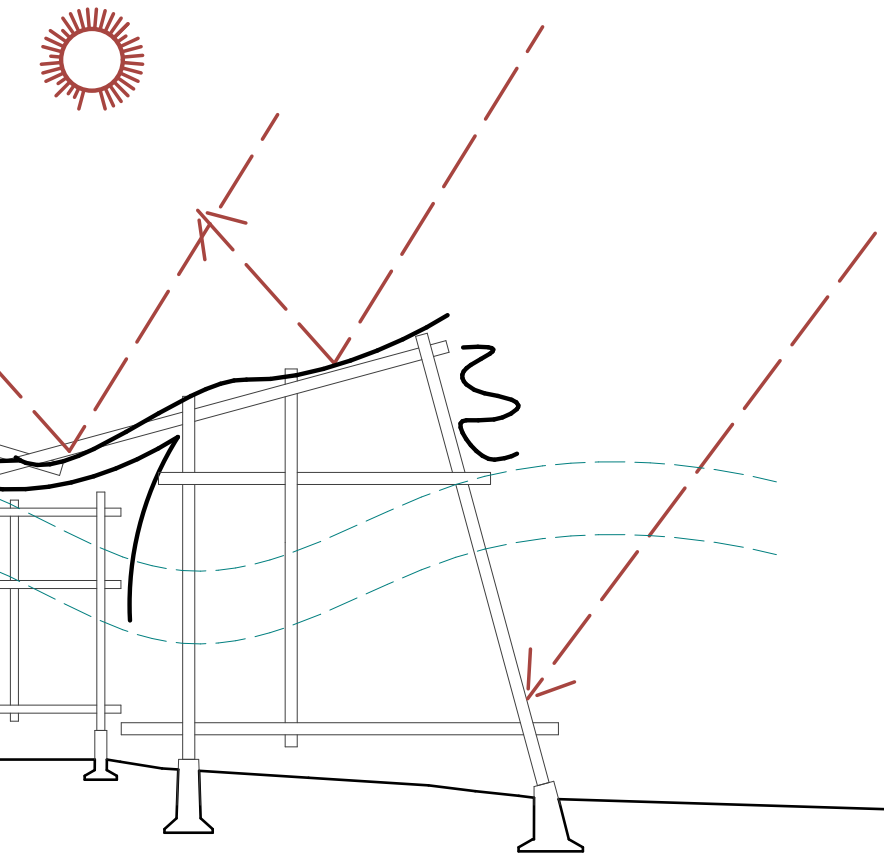
## **VI.**

# **CLADDING**

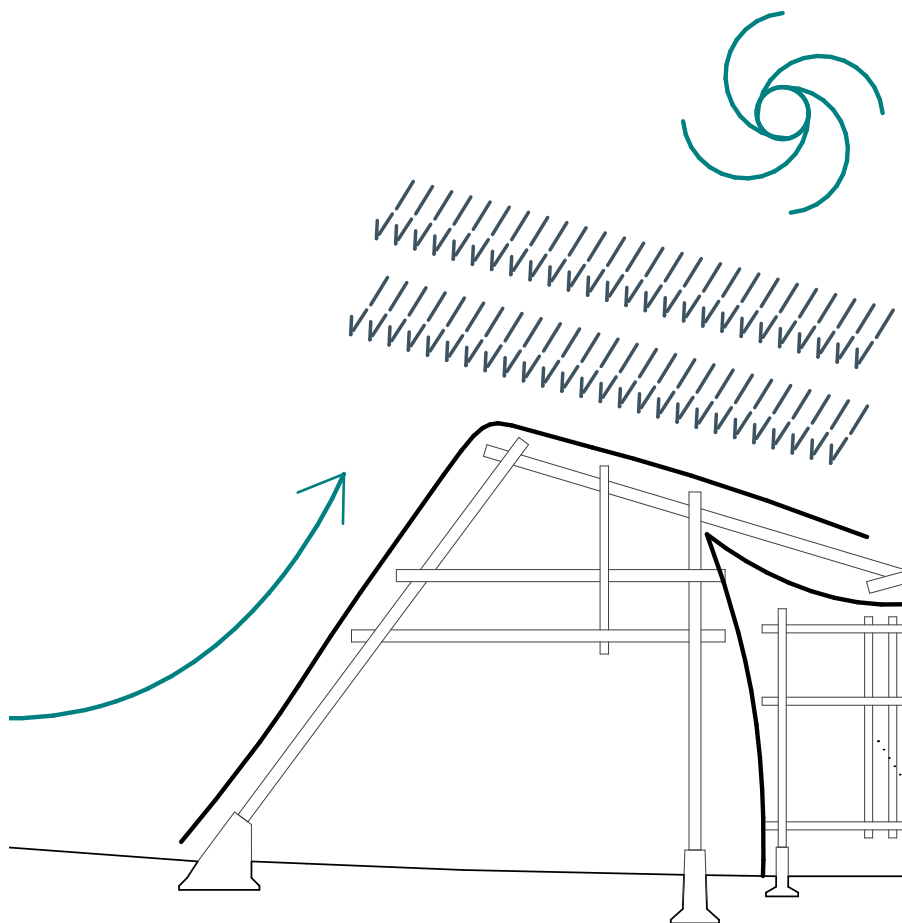
## 1. PROTECTION AGAINST THE SUN



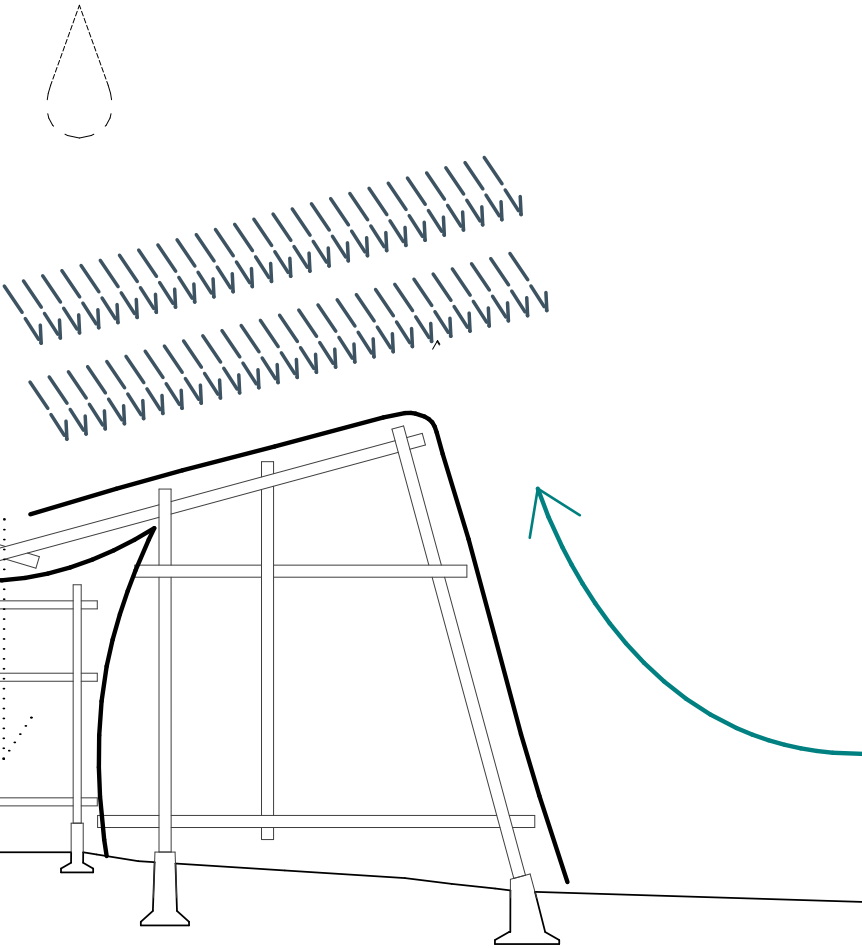
*By adding layers of different textiles a protection against the heat can be achieved. The light material also allows for a cross ventilation.*



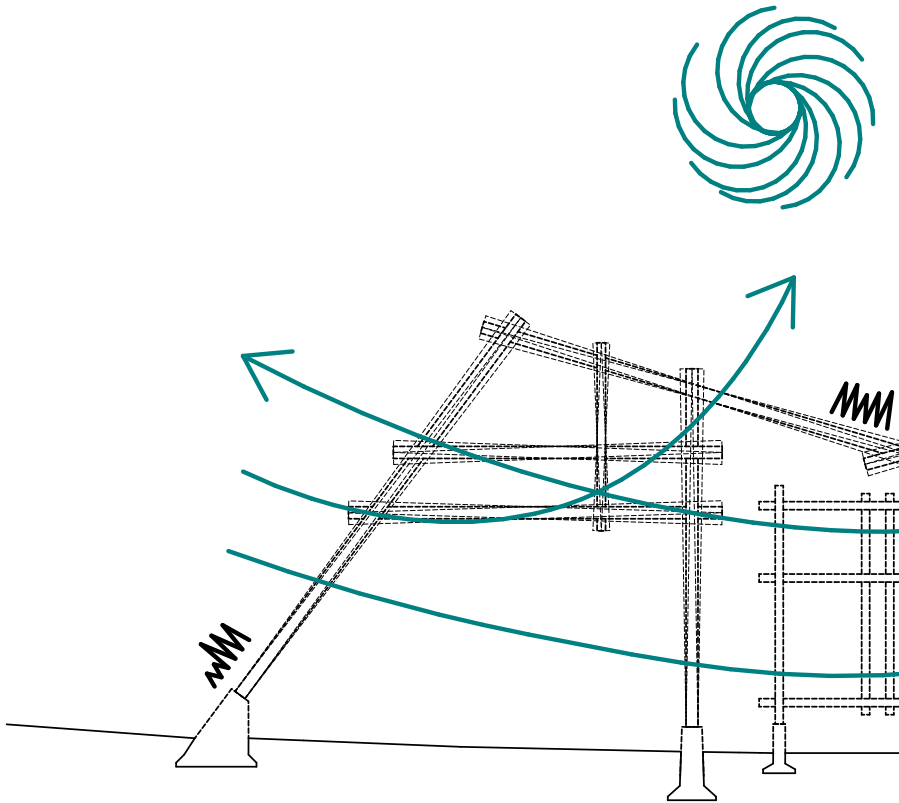
## 2. PROTECTION AGAINST THE RAIN



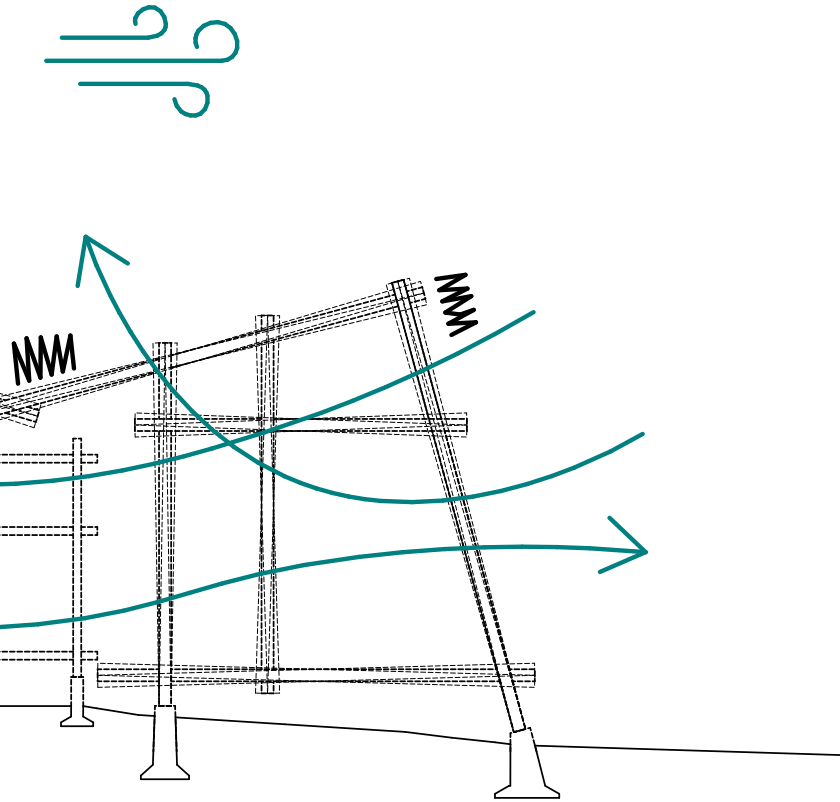
*During heavy storms the textiles can be well sealed, protecting crops and guests from the rains and heavy winds. Both layers can be closed in order to achieve comfort and protection from the elements.*



### 3. RESPONSE TO WIND LOADS



*In case of the threat of a major hurricane the textiles can be collected with ease. This would reduce the contact surface with the wind and avoiding any abrupt change of pressure or up-lifting forces. Instead of adding mass to counter the external forces the system would reduce the mass to reduce the stress received.*



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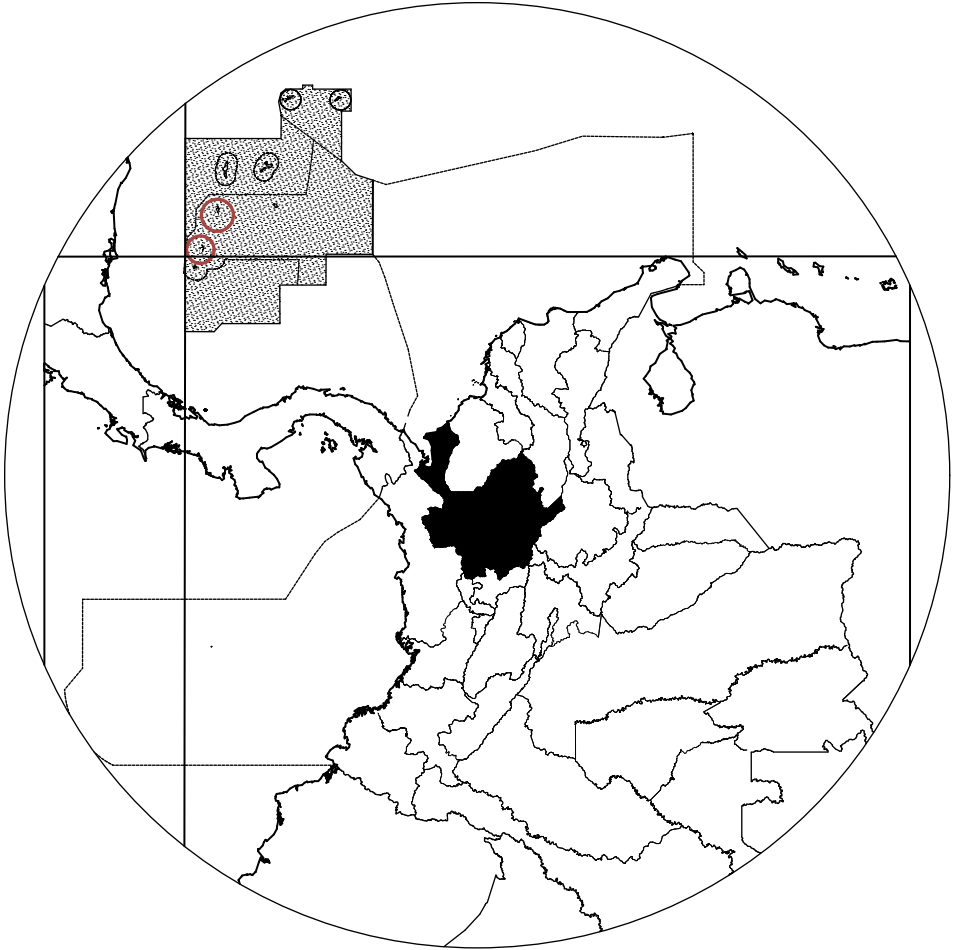
| STABBUR IN GJELLERUD / BUSKERUD

DAS HOLZ UND SEINE VERBINDUNGEN - KLAUS ZWINGER, 1997



# **VII.**

## ***MATERIALS***

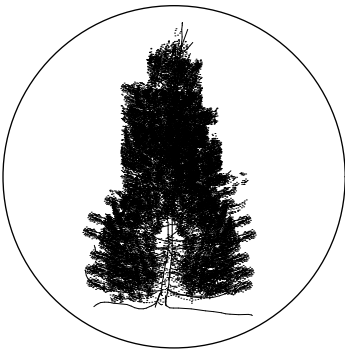


### **MATERIAL SOURCE**

One of the first questions to be asked after such a catastrophic event is how to get the materials to the affected area. Maybe as important is also the question of the origin and legality of such materials. Relating back to the climate crisis, the importance of sourcing the materials is key in the process of reconstruction.

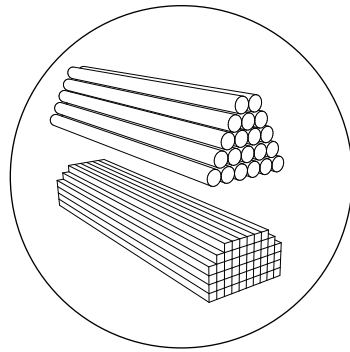
# I - MATERIAL EXTRACTION - TRANSPORTATION

## 1. PATULA PINE / WOOD EXTRACTION



The use of legal resources is crucial, even if it means assuming higher transportation efforts. The Colombian Patula Pine, for example, has a certified industry not so far from the Colombian Coast.

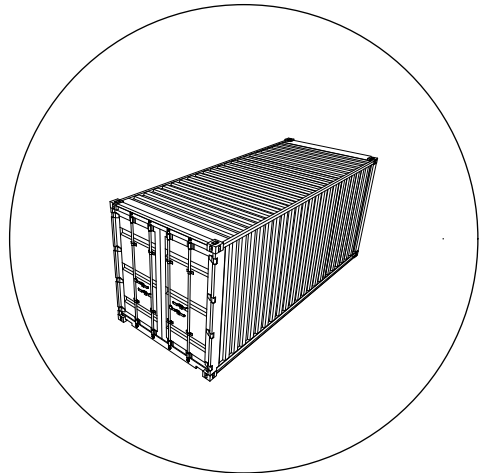
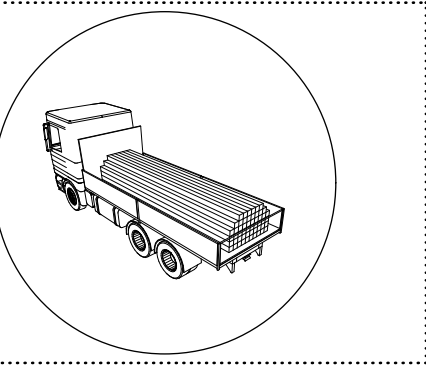
## 2. PREPARATION / IMMUNISATION



### SOLID PIECES SQUARE PROFILES / ROUND PROFILES

MAX LENGTH OF 3M FOR A SQUARE  
PROFILE OF PATULA PINE

**3. TRANSPORTATION /** By TRUCK



**SHIPPING /** STANDAR 20' CONTAINER

**INTERNAL DIMENSIONS (IN METERS): 5.898M LONG X 2.352M WIDE X 2.393M HIGH.**

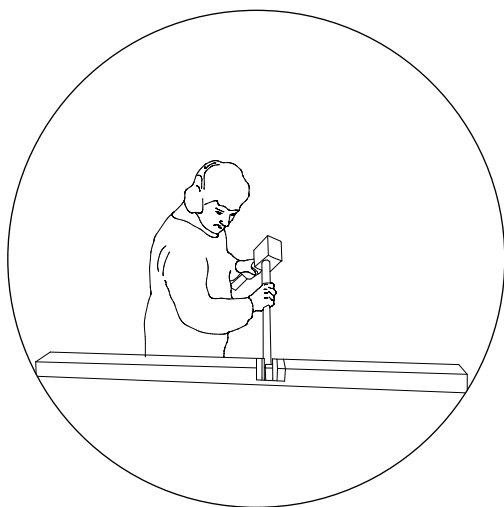
**TIMBER ELEMENTS**

ROUND =  $\varnothing$  15CM / 5.9M

SQUARE = 10CM X 10CM / 2.95 M

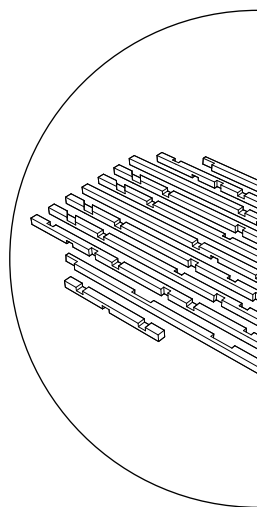
## II - ON SITE - CONSTRUCTION

### 1. FABRICATION / *TIMBER JOINERY*



The Joints will be done in an on site prefabrication.

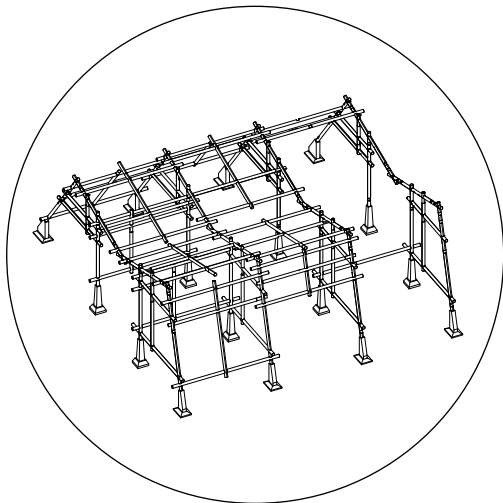
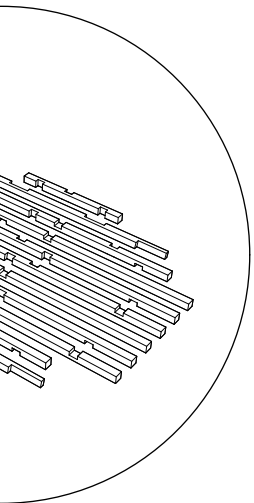
### 2. FABRICATION / *SETTING*



Once the pieces are placed and assembled.

ING UP THE PIECES

### 3. ASSEMBLY

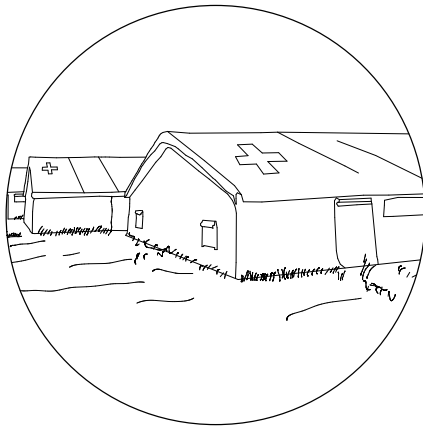


the made they can be  
led on site.

The final structure should be a simple  
assembly line.

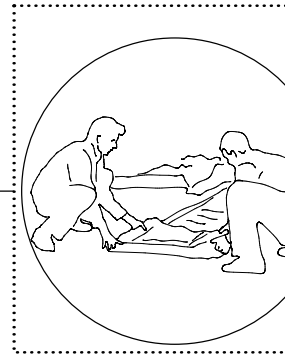
### III - Re Use

#### **HUMANITARIAN CAMPS** / MATERIAL SOURCE



The Humanitarian camps set up by the Colombian Army and the Humanitarian organization are an opportunity to extract "local" materials.

#### **1. CUTTING UP** / SECTIONING THE T TEXTILES

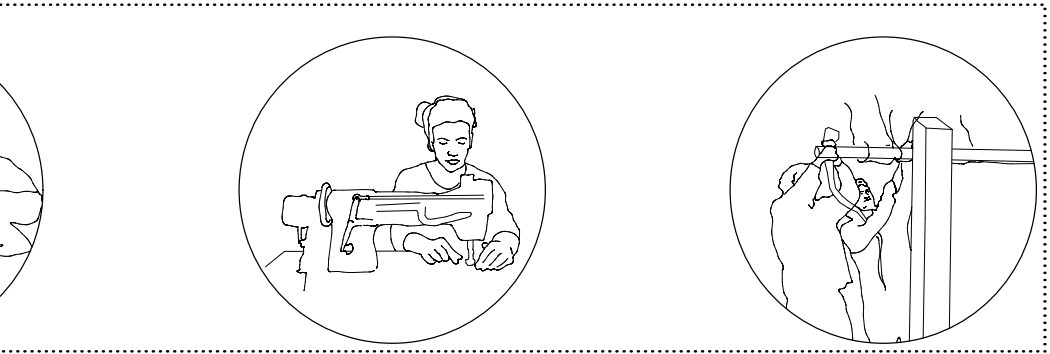




TENT

**2. CLEANING AND REPAIRING /** SEWING  
AND REPAIRING

**3. MONTAGE /** TENSING THE STRUCTURE





**VIII.**  
**MODEL**  
**&**  
**RENDERS**

