SOCIAL SETTLEMENT IN SAN ANDRES

POLITECNICO DI MILANO
SCUOLA DI ARCHITETTURA E SOCIETA'
TESI DI LAUREA MAGISTRALE IN ARCHITETTURA

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‘Innovation is taking two things that already exist and putting them together in a new way’

tom freston

‘progress is impossible without change’

george Bernard shaw

‘we cannot change the cards we are dealt. just how we play the hand’

Randy Pausch

INDEX:

The subject of the Master Thesis is an eco-social project sets in the island of San Andres, in Colom-bia. The research started in the beginning of February in Colombia, during my International exchange program, where I could visit the intervention places, know the history and local situation. A detailed analysis of the urban fabric, understanding clearly the uses of the local native islanders, helped me to start a preliminary project. Once in Milan I developed the ideas I got, specify the reason of all the choices; this gave me the possibility to have a more complete architectural intervention.

1 DESCRIPTION OF THE SITE, GENERAL ASPECTS

1.1 LOCATION

San Andres, located in the Caribbean Sea, is the main island of the archipelago with Providenza and Santa Catherina. It measures 12 km in length with a width of 3 km and covers an area of 26 km^2. It is 191 km away from Nicaragua and 775 km from Colombia. According to the population census there are over 83.000 habitants. The closeness of the equator makes experiences a tropical wet and dry climate. Average temperatures range from 24 °C to 30 °C in two periods dominated by dry and rainy spells. The rainy season is from September to December and also from May to June, when humidity is also high (90%). The trade winds usually blow from the west to east continuously all the year.

1.2 HISTORY

The history of San Andres is complex and changeable due to its several conquerors, who, since the discovery of America, submit the islanders. San Andres together with other Caribbean islands have been alternately possessions of Spain and Britain, however they were never settled by the Spanish until 1803. This part of the history is very important for understand the identity of the island; the different communities not only the colons (British and Spanish) but also the people who passed by the archipelago (Dutch sailors, pirates, slaves Africans from Jamaica) left a part of is culture which mixed together, shape what is today the local culture called 'raizal' .

In 1822 the Archipelago became part of Republic of Grand Colombia, apparently there was an act of voluntary submission. During 90 years thereafter native islanders were 'virtually left alone'; they were self-sufficient and organized, had their own education, religious and justice systems. Then in 1912 the Colombian government made its first attempt to draw native islander 'nearer' to the mainland and instituted a policy of colonization imposing the predominant mainland Spanish language, religion and cultural expressions. In the 1953 San Andres was declared free port and thanks to this it was an increase of the constructions included airport, port, hotels and shops as well as housing for the immigrants, and brought along not only domestic and construction workers but also jobs that were against the identity, individual character and customs of native islanders.

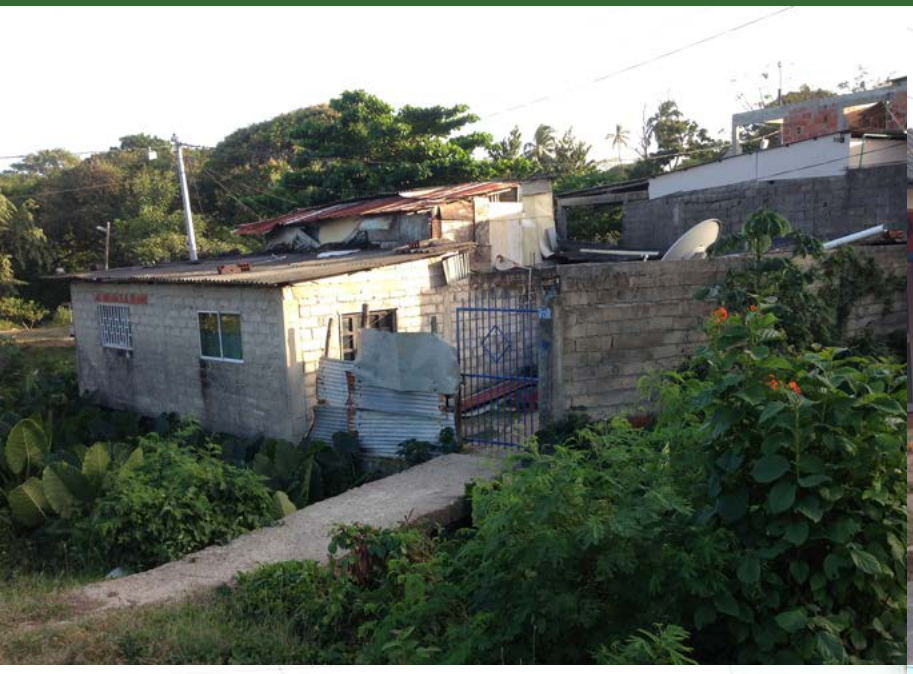
The illusion that San Andres is the free port of opportunity resulted in massive immigration of dis-advantaged individuals and entire families.

1.3 SOCIAL/ECONOMIC SITUATION

Native islanders living between two worlds: the one they built until the 1960s based on community input (without any resources of light system and an organized rainwater collection and its following distribution); and the one built with ideas imposed by the dominant one-sided continental model of development. The native islanders from San Andres however are facing serious problems to identify effective options and opportunities towards unity and organization of their people and are thus handicapped to start-up and maintain processes towards a long-term vision and community development.

2 THE AIM OF THE PROJECT

In this difficult scenario the theme of the Master Thesis is fit in a framework wider which has the objective not only as an architectural project but also a research of solid solutions to improve the today socio-economic condition of the population. A modern neighborhood organization will give better efficacy for improving the facilities distribution of water and organic waste, mapping the best position of public spaces, able not only to connect the new interventions among them but as well with the old dwellings. It has thought a modern residential system which, even maintaining the traditional style of the island, takes advantage of the bioclimatic and environmental character-istics of the area, improving the quality of life. Wind directions and solar exposition will determinate the orientation of each houses, the sloping of the roof will be studied for collecting a larger quantity of rainwater. The planning of the new dwellings will respect the local uses and traditions, therefore there will be single houses but organized as a cluster, and as well the number of the res-idents it won't modified (8 people).




SHIPPING AGEN

3 ACTUAL SITUATION

3.1 TERRITORIAL PLANNING

The location of the planning is localized specifically in 'Orange Hill Street' which connect the top of the hill to the eastern coast.

From the POT 2012 , the most recent urban planning document of the island, it has verified the different uses of the case study land: agricultural treatment, natural reserve, renovation of public spaces and residential area. Due to not have to change this document, the project has been thought with these restrictions which made the intervention already possible. Moreover were given a list of local index as the distance between the street and the front of the house, the number of floor maximum and the index of occupation. Those were important for having a suitable program as well legally.

ZONA RURAL.

Incumben al suelo rural los terrenos destinados a los usos no indicados para el suelo urbano, tales como: rutinas agropecuarias, agrestes, de aprovechamiento de recursos y actividades similares. Dentro de la clasificación del suelo rural se encuentra el suelo suburbano y Los asentamientos dispersos.

UNIDADES DE PLANIFICACION INSULAR RURALES (UPI-R).

- **Asociadas a la Protección de medio Ambiente**

North Cliff	**UPI-R1**
Residencial de Renovación **Jardín de borde urbano Jones Road**	**UPI-R2**
Residencial Especial, **Jardín de borde - transición urbano - rural**	**UPI-R3**
Reserva Forestal	**UPI-R4**
Reserva de Biosfera Parque regional Bahía Hooker	**UPI-R5**
Reserva mundial de biosfera cuenca del Cove corredor Suburbano Cove y la Loma	**UPI-R6**
Sub Urbana de grandes equipamientos	**UPI-R7**

- **Asociadas al manejo de agua lluvia y suelos productivos (Distritos).**

Distrito de Riego	**UPI-R8**
Vivienda Nativa Asociada a actividad agrícola sostenible – corredor suburbano de San Luis.	**UPI-R9**
Agropecuaria Primaria 1 Corredor sub urbano Pepper Hill – Four Corner – Tom Hooker.	**UPI-R10**
Agropecuaria primaria 2 Corredor suburbano Elsy Bar.	**UPI-R11**
Agropecuaria secundaria Corredor Suburbana del Cove.	**UPI-R12**

UNIDADES DE PLANIFICACION INSULAR RURAL ASOCIADAS A EL MANEJO DE AGUAS LLUVIAS Y AL SUELO PRODUCTIVO. (DISTRITOS).

UPI-R 8 DISTRITO DE RIEGO

Los usos de avicultura, porcicultura y ganadería deben acordarse con la secretaría de agricultura y la corporación dentro del sistema de sostenibilidad alimentaria.

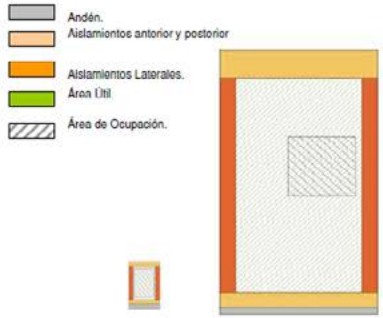
Los Usos secundarios permitidos se desarrollaran sobre la franja de 50 metros a partir del borde de la vía circunvalar contraria al mar y en la vía principal de la Loma será, Little Hill y Court House en ambos sentidos.

Para los predios ubicados en el área de litoral se deberá dar aplicación al lo establecido en el articulo No. 63 del presente decreto.

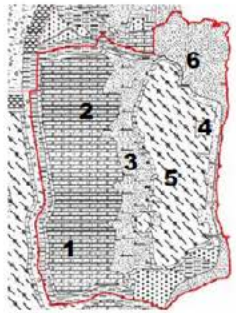
Uso principal:	Protección Manglar cuerpos de agua.
Usos secundarios:	Vivienda (corredor suburbano), comercio-vivienda, porcicultura, avicultura, agropecuarios.
Usos prohibidos:	todos los no especificados en los usos principales y secundarios.
Áreas de Cesión:	
Andenes:	2.0 Metros
Área mínima de lote corredores loma, Little Hill,	
Court House:	300M²
Frente mínimo de lote:	15m
Índice de ocupación máximo:	0.5 del área del lote
Índice de construcción máximo:	1.00
Aislamientos:	frente: 2 m
	Lateral: 1.50 a cada lado
	Posterior: 2 m
Voladizos:	1.5 m sobre el retiro frontal.
Altura máxima:	2 pisos
PARA TRATAMIENTO. 2-3	
Área mínima de lote:	3000 M²
Frente mínimo de lote:	40.00 m
Índice de ocupación máximo:	0.10
Índice de construcción máximo:	0.10
Aislamientos:	frente: 4.00 m
	Lateral: 4.00m a cada lado
	Posterior: 8.00 m
Altura máxima:	1 pisos

LOCALIZACION

OCUPACION

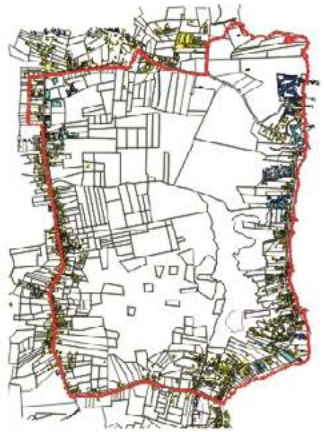


TRATAMIENTOS



Protección	1
Forestal Productor	2
Agrícola	3
Manejo Especial	4
Mejoramiento integral	5
Recuperación Espacio Público	6

USOS



UPI- R8

3.2 TODAY HOUSES ANALYSIS

Even if the POT allows to build in this area, the choice or the inadequate possibility to not have a massive constructions is quite strong; in fact, reading the urban planning pop up a clear distribution of the dwelling: each of those are separated to the others, creating a huge number of detached houses. The combination between constructions and nature is deep everywhere, in this sense the users have been always in touch with the vegetation, characteristic that has a strong identification of being 'raizal'.

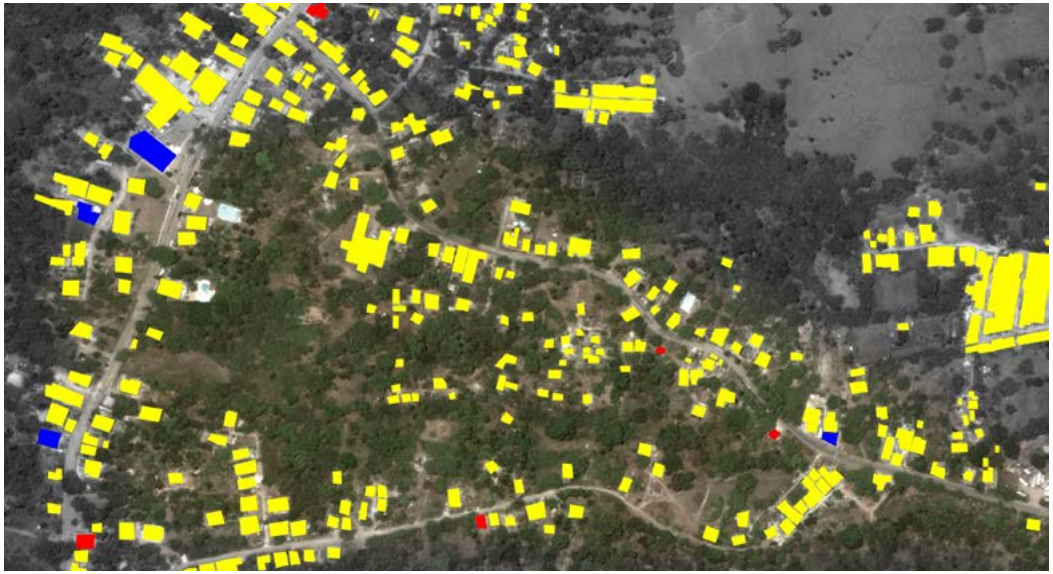
The conformation without an historical master plan and without a straight lines like the European cities, give to this settlement a scattered disposition, with no clear street except the two main road on the sides.

Besides it's present a 'line-configuration' where given a road or path, in most of the cases unsurfaced, the houses are located nearby it.

INFRASTRUCTURES

main street

path

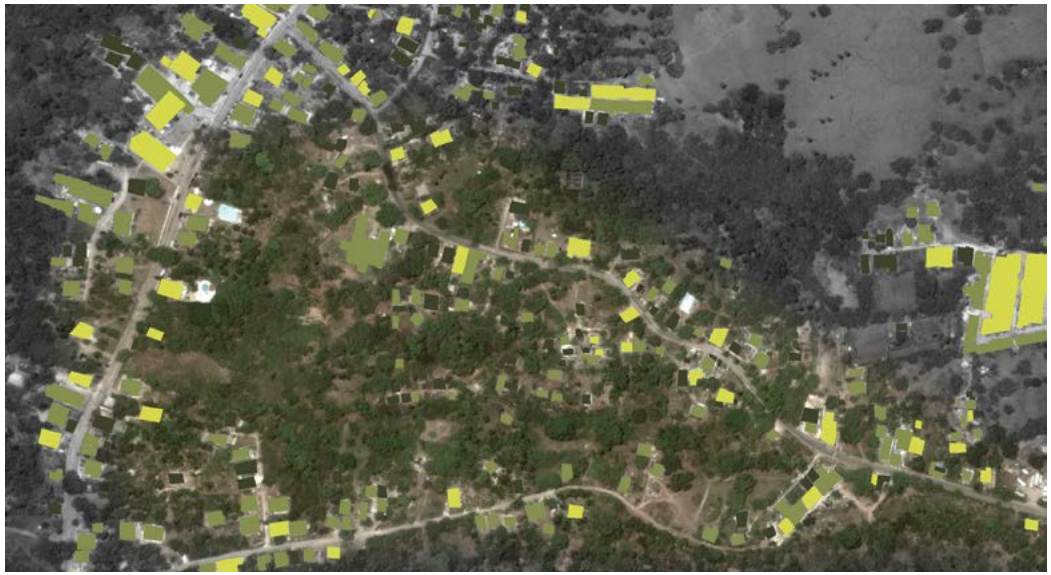


USES

residence

commercial

facility



DECAY

none

regular

high

MATERIAL

metal

mix

concrete

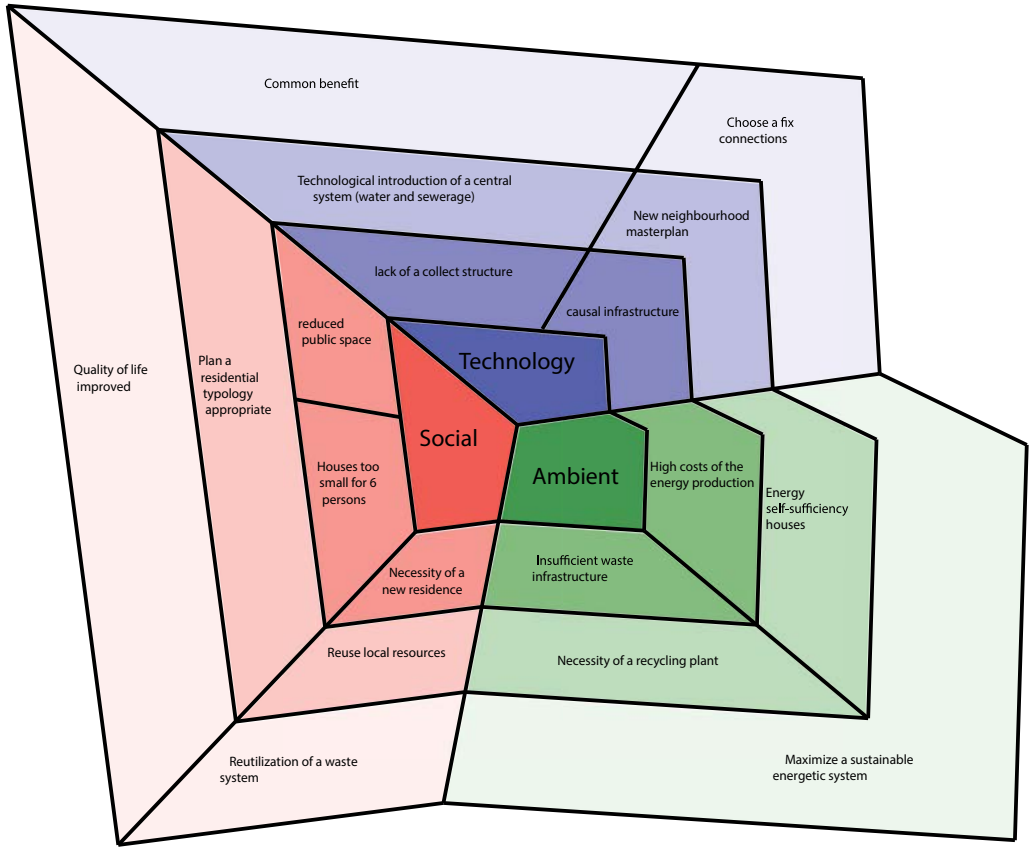
wood

3.3 DEFINE PROBLEMS

The aim of the project is define a believable strategy which could improve the local situation and suggest truthful solutions for real circumstances. The idea is not to convert this particular situation into a general answer which can be done in any places for any people. The result has to help the natives to live in a better way, but not introducing everything new. For doing that a good knowledge about the tradition and the history could be used to the architecture for reducing the gap between old and new. Identification is an important aspect which will be studied and developed to reach a only outcome.

After a visit in the area the informations collated were many; for a clear understanding the causes of those problems it has done a graphic where the analysis of the area were subdivided in tree topics: social, technologic and environment. For each of those were selected the main problems, the range of improvements and finally the consequences of these improvements will have in the area once the project is done.

This method was helpful all through of the process. Made remember in one glance the problems, the solution and the consequences of every single component and how the different topics could come up together to solution a general agreement.


Common benefit
Choose a fix connections
Technological introduction of a central system (water and sewerage)
New neighbourhood masterplan
lack of a collect structure
causal infrastructure
reduced public space
Technology
Quality of life improved
Plan a residential typology appropriate
Social
Ambient
High costs of the energy production
Energy self-sufficiency houses
Houses too small for 6 persons
Insufficient waste infrastructure
Necessity of a new residence
Reuse local resources
Necessity of a recycling plant
Reutilization of a waste system
Maximize a sustainable energetic system

4 LOCAL CULTURE

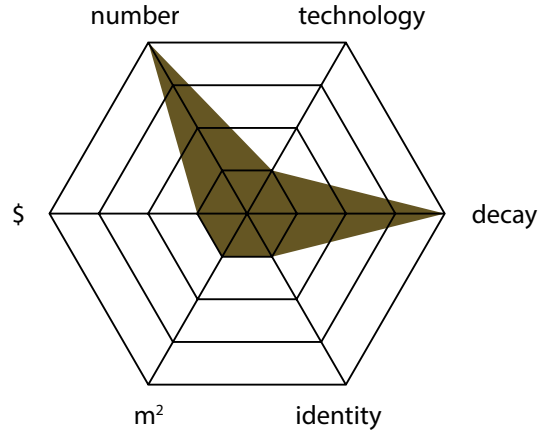
4.1 HOUSES

The study of the houses existing in the case study was extremely important for understand several points; for example the differences of materials used, which technology is the most suitable for this area, why choice one particular material and 'which' one is the raizal's favorite and 'why'.

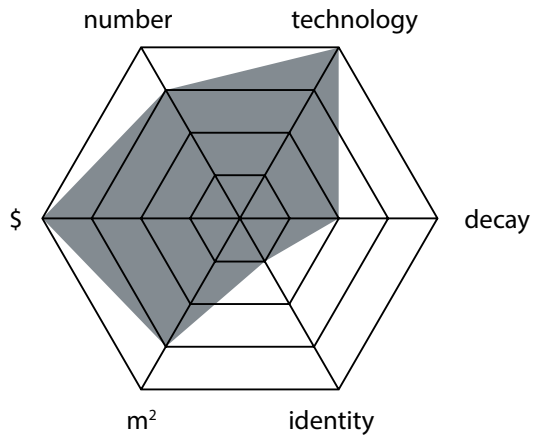
4.2 MATERIALS

In the area of Orange Hill area were four different materials, which are been separately analyzed for understanding better the uses of each one. In the analysis were been poped up six fix characteristics: number of the constructions build, technology used, seriousness of the decay, how much was conform with the local tradition, dimension and the cost.

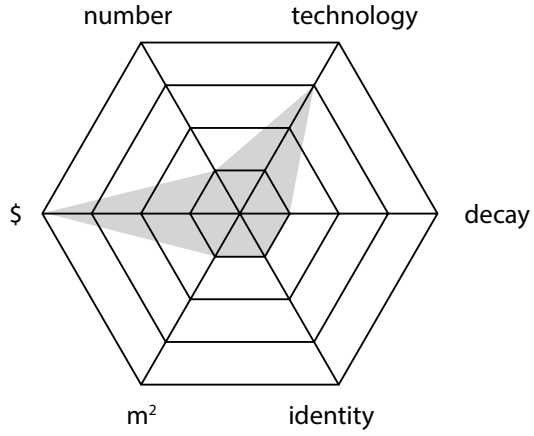
- METAL: nowadays the most common dwelling in the area due to its reusable and poor materials.
The scarse technology and the high decay don't make this type of construction suitable for a healthful permanence.



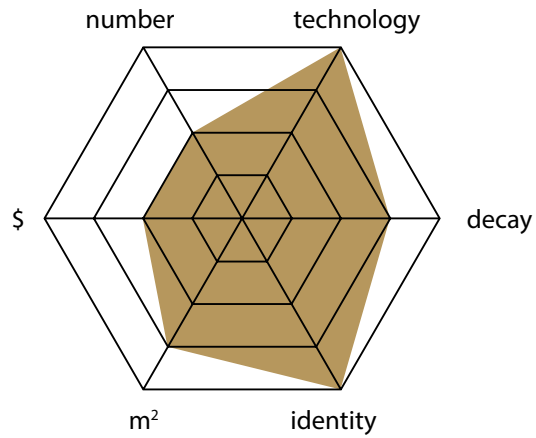
- MIX: although metal, concrete and perfored bricks aren't in the traditional materials in the island, we can find many houses built in this way. The large amount of building technologies of these materials allow them to be edited according to the traditional habit.



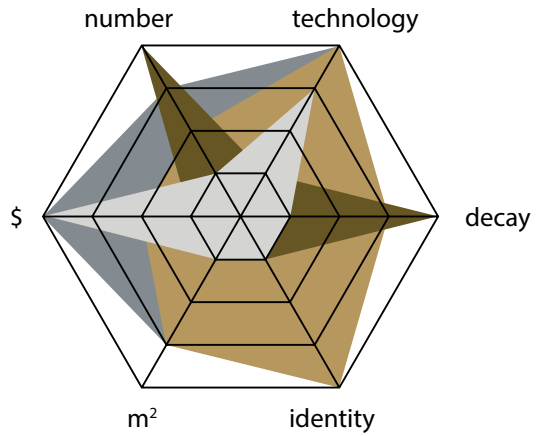
- CONCRETE: appeared in the last decade, this material don't belong to the island and affect all the neighborhood and the natural landscape. Its popular use, due to the easy execution allows to be suitable, with little architectural alterations. The introduction of an outside portico and perfored bricks make more qualified the structure with the local climate requirement.



- WOOD: unique traditional material, used for centuries to build houses, is today replaced because the number of the trees and the skilled labour are reduced. Only few constructions still in use but the lack of preservation make difficult living in them.



Overlapping the different graphics, comes up the characteristics of each material. It's easy now compare them to understand the pros and cons and select the worthy structure suitable for the island. The wooden building has more value than others; its high score of technology and identity make it be the first choice. The project will work in order to understand the reason and the possible improvement the weak points.



4.3 IDENTITY

The first constructions existing in the island were made in wood, brought from English and Netherland because they were able to build with only these materials; then the natives understood that the trees could grow as well in island and afterwards started to produce their own architecture.

Local houses have several elements which distinguish this particular construction to others.

- MATERIAL: the wood need under skilled labor and have the physic-mechanical proprieties, thanks to its resistance to salinity, humidity and premature putrefaction made this material suitable for this territory.

- STRUCTURE: the houses stand by a pilotis construction, which define the wooden skeleton of the dwelling. The space underneath the ground floor has different reason: raise to the ground humidity and generate an extra layer where store equippings.

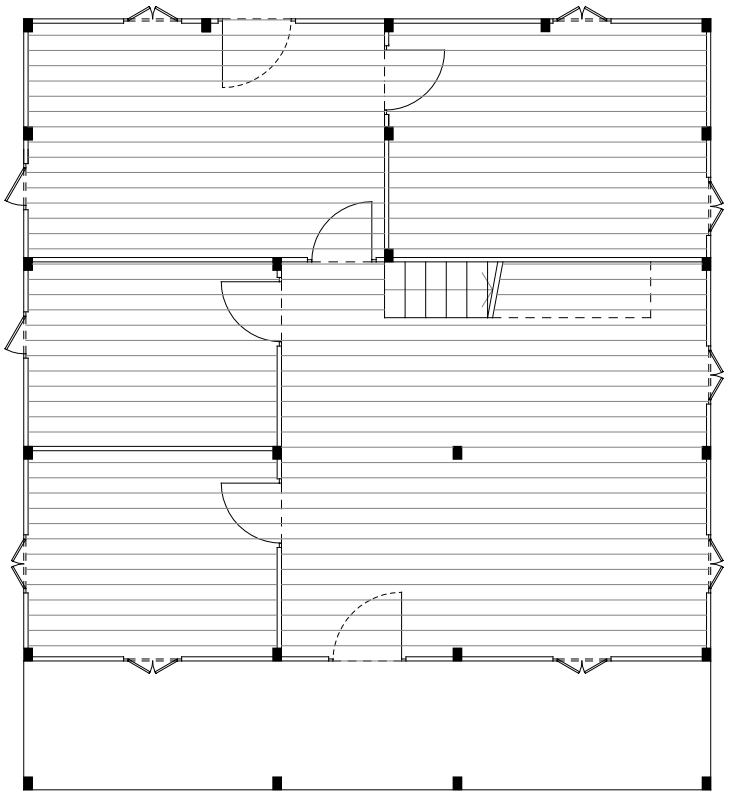
- ROOF: the roof is characterized by two slopes, which are in charge to collect rainwater. In many cases slopes are protagonists of the enlargement of the same house: are pulled down to give an extra room in the first floor.

- TANK: the rainwater captured by the roof is stocked in tank on the ground. Here the users take it without any filtration or processing.

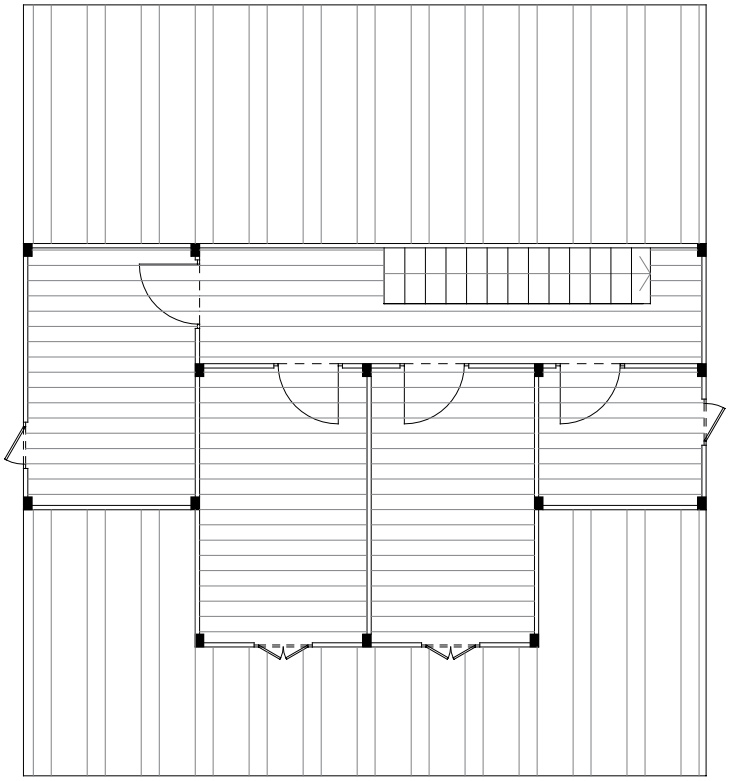
- PORTICO: 'Porce' is an important part of the raizal's house; in fact, here the people stay for most time, among the family, friends or neighbors. It has as well a filter function between the outside and the inside; each house has a portico.

- INTERNAL SUBDIVISION: the separation between social spaces and private rooms is pretty clear, most of the cases on the ground floor is assigned for social activities and the upper floor the private rooms.

GROUND FLOOR



FIRST FLOOR



ELEVATION

5 PROJECT'S CHOISES

5.1 VORONOI PLANNING /MASTERPLAN

The urban conformation of Organge Hill has been done without a master plan, able to define main and secondary streets, different uses of the territory and a clear position of the edifications. In this way during the years the native organized themselves in a logic which is not conform to the urban rules but is based on connection made in other logic. So it is not possible deal with this reality like we could do in the cities, with a rigid grid, because it has origin more instinctive and spontaneous.

So for understanding the 'no-conventional grid' one of the tool that we can use is a Voronoi's diagram.

In this way on the top of the neighborhood plan it has marked some key points corresponding either a urban settlements or natural landmark. Some urban settlements which had a high decay have been replaced and added new key-point; in this way we still got some new centers without changing radically the surrounding countryside.

The Voronoi's diagram draws a specific grid which subdivides the territory into small cells, the perimeter of those are the pedestrian paths and inside take place a group of residences. The cross-points among the paths are located the public spaces with a cone-shape structures which have function to collect rainwater give out to the residences new and already existing. The position of those points is studied for being equidistant among the different groups of houses near the public space; in this way the distances of the pipes are shorter and less expensive.

layer

masterplan

section

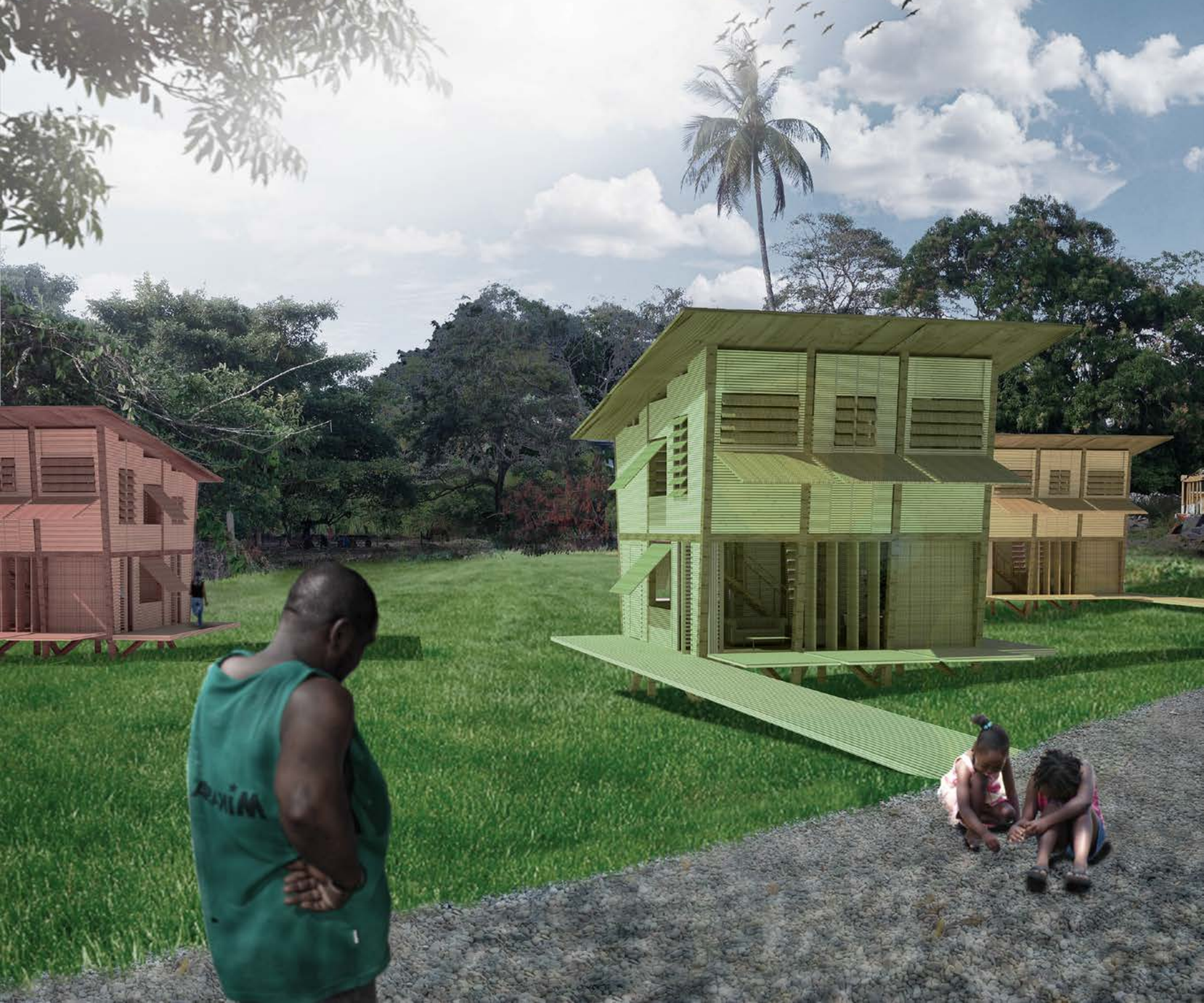
5.2 RESIDENTIAL TYPOLOGY

The typology studied are connected with the path through a bamboo walkway. The two-floor house is made in local wood for the structural skeleton, like the tradition method, but implemented with bamboo for the external walls, which is possible find directly in the island. The choice has been made based on the fact that this material allows to filter more air inside the house than other conventional material. This makes the rooms more windy, suitable for an humid climate.
The house is pilework, twelve columns don't let the floor touch the ground. The idea is to have a house-shutter for surviving to the heavy temperature, so it is important shade all the building for the straight sun rays but, in the same time, allows the ventilation. The windows proposed permit these two situations for the tree cardinal points. Instead, in the north side, the living room of the house has a full height panels let the wall slide on a side. Attached to the external wall in the north side of the house, there are three rope bridges, which come down and from vertical position ro-tate until they are horizontal. The three bridge are the 'revised portico' which is flexible and not fixed like the traditional one.
As the wind blows from west to east provided windows are positioned in this transit making the air in continuous movement. The holes on the floor, which subdivided the ground floor with the first one, allow higher vertical ventilation into the houses. These two alterations increase the airstream in all the house.
The walls aren't vertical because it would enter more ray of light, consequently we'll got rooms with high temperature, which in this environment is not a good solution. So the external walls are inclined by 5 degrees, doing this it will have

the same intensity of the light, but the fresher rooms .

The roof is composed by one slope: in this way the rainwater collected will be controlled in a better way with only one gutter. The rainwater will go under the house into tanks which have the duty to filter the water. The house is though as a cycle, where the water can be used after the first time, again for grey water, and finally black water. It is possible to inspect each filter underground due to the safety height between the ground and the floor.

orto



5.3 ECOLOGICAL ASPECTS IMPROVED

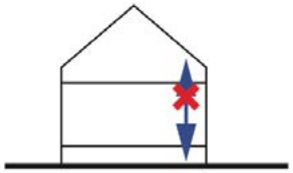
Take advantage all the year to the direction of the wind, from west to east, it is thought to help the ventilation of the house planting trees on south-west side of the residences to facilitate a natural airstream. Moreover the air passes through the trees is colder than if it wasn't vegetation. With a digital program able to read the wind direction it was possible to define a rotational range between 30 and 50 degrees, to facilitate the continuous entry and exit of the airstream. In this way all the houses will have a different rotation like the present construction.

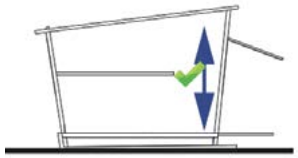
In the middle of the Voronoi's cell is placed underground a biodigester. This special machine is able to transform, in absence of oxygen, organic material in fertilizing and methane; in this way it will have less waste and energy recirculation for cooking and cultivating.

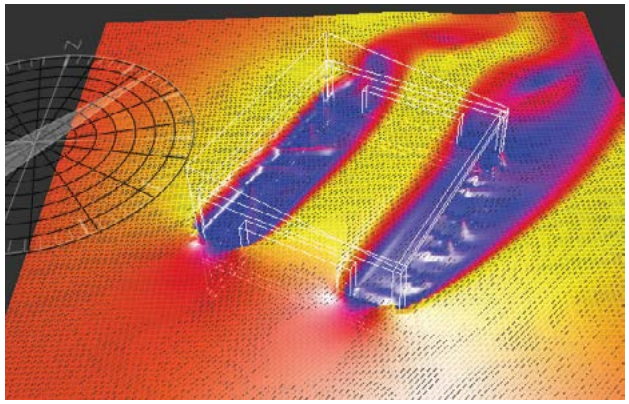
ACTUAL SITUATION

PROJECT

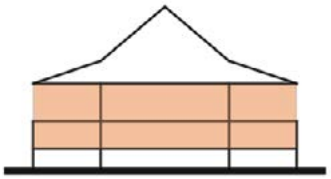
VERTICAL AIRSTREAM

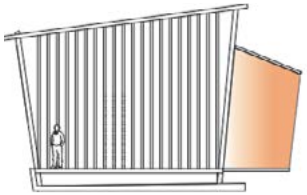


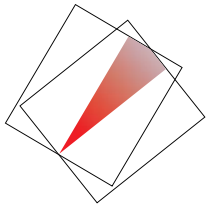




PORTICO



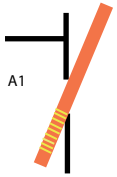




SUMMER

ORIENTATION RANGE 30° - 50°

WINTER



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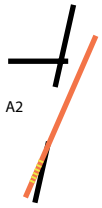

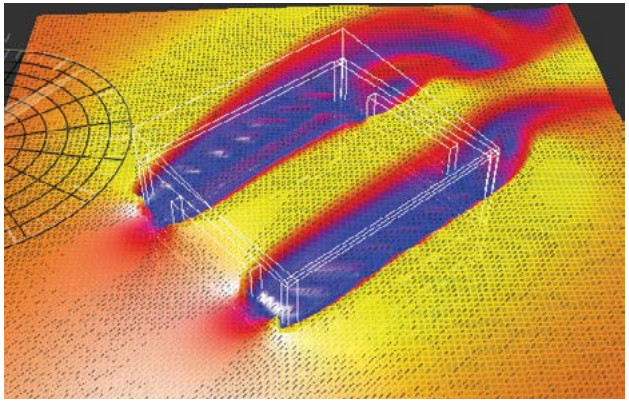

5.4 STORAGES RAINWATER AND PATHS

The paths, which are given by the Voronoi's grid, are the perimeter of the dwelling cell and where there is an intersection it has been created the public space. The footpath is made in gravel, chosen because is material which can be found in the island; its impermeable propriety will help to slide drops water, when rains, which are collected by a performed tube underground. Due to the natural sloping of the ground, the tube will reach the underground tank placed under the public space.

For the public space it was thought of elements capable to collect rainwater, successively stored and shared out to the groups of houses, but as well an opportunity to live communally this space. Nowadays doesn't exist any area considered in this way, the people meet in the sidewalk or stay where the vegetation is not so dense, in any case protected from the tree's shades. So it weren't any examples to examine and to study as a referent for the project. Thinking about capturing rainwater the upper part should designed wider possible, instead the lower part smaller for let this space easy to live. The comparison with a tree helped the idea; in this way different objects, with various heights, will thought as a public space: on the top it will collect rainwater for the community and on the bottom the same community will meet together. Taking the tree as a referent, the shape stylized chosen will be a cone. This element will have a solid structure made with bended bamboo columns kept together with different metal rings through the whole height. Inside it will be positioned an impermeable fabric for collecting the water. Outside the structure, a nylon net will be able to take the drops poped up

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during the night, due to the high humidity; this will increase even more the water collection. Afterwards collected, the rainwater and the humidity drops will be stored in the same tank of the performed

tubes of the paths, placed underground the public space.

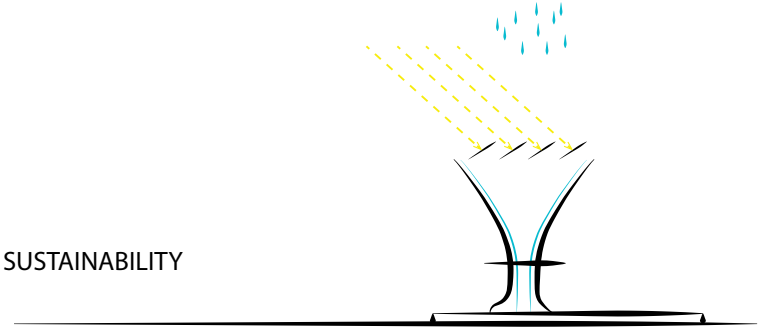
The cone-element will be completed with bamboo skin, chosen for harmonized this structure with the surrounding nature. At the bottom of the structure it will be take place the sitting around the 'trunk', to incentivize the permanence of people in this space. Starting from the bottom with the sittings, a continuous bamboo skin will be gradually disappear reaching the top of the structure; as a parasitic.

Besides, like a tree, it will be possible live in height the each cone-elements with a cycle-platform at 2.40 meter from the ground. This altitude is reached with a spiral staircase in bamboo, completely linked to structure of the cone. Also a serial of bridges, as well in bamboo, will connect the different platforms creating a unique promenade separated to the ground, place where is as well possible have a bird's-eye view of the surrounding nature. A series of solar panels, at the top, will provide solar energy to the neighborhood.

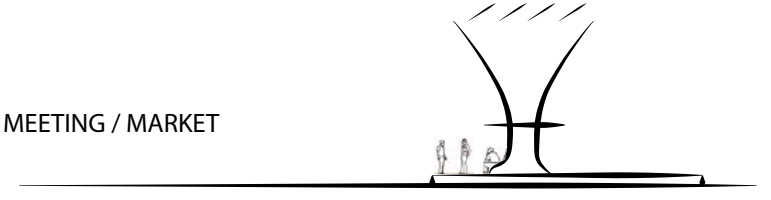
Concluding, these tree-elements are based on a stands risen from 40 to 20 cm to the ground; in this way there is a clear difference where the path is finished and where the stand starts; where there is a pedestrian crossing and where there is a permanence space. This area, which are covered by the 'tree', could be used for meeting, relaxing, playing or using for have a market or a meal; all actions that the community can share and live together.

USES

SUSTAINABILITY

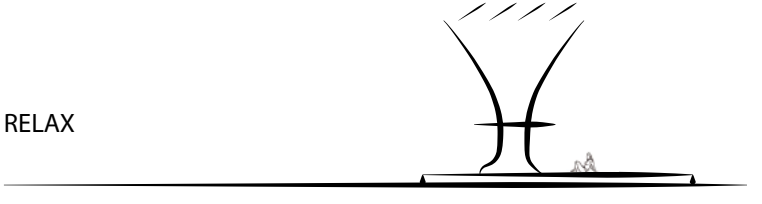


MEETING / MARKET



PLAY

RELAX



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