

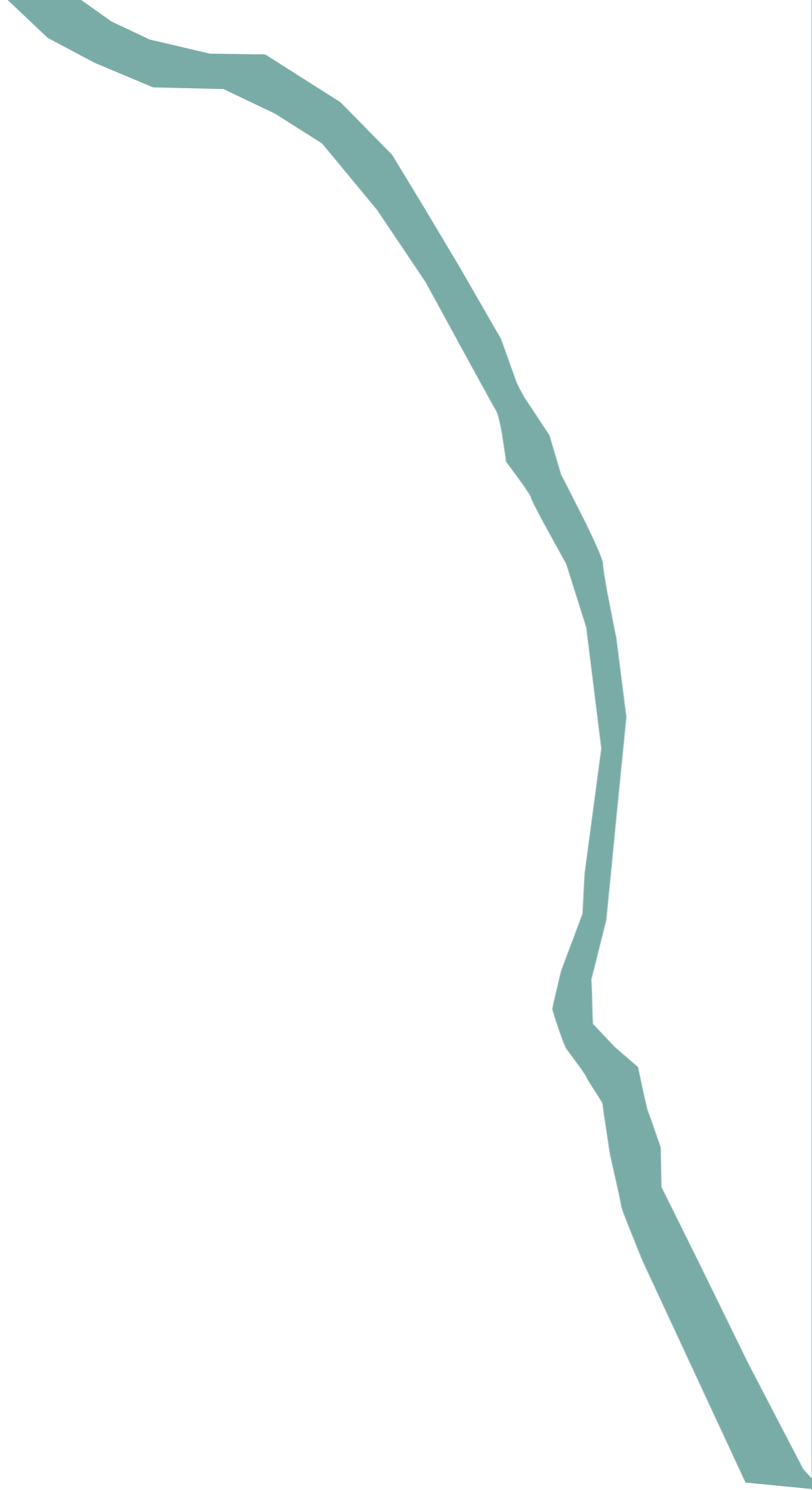
REACTIVATE THE RIVER PIURA

for a sustainable urban future

Ruth Chinchayan Barreto



SUdes 2024



—
Ruth Chinchayan
Barreto

REACTIVATE THE RIVER PIURA

for a sustainable urban future

Piura - Peru

—
LUND UNIVERSITY

Sustainable Urban Design

MArch

Thesis project

2024

Thesis project

Dedicated to:

My mom Ruth Barreto
My dad Juan Chinchayan
My fiancé Axel Sanchez
My Peruvians Arianna, Anabel & Renato
My brothers Firat, Roman & Murtaza

Thank you for the unconditional support

PROGRAMME DIRECTOR

Ida Sandström

EXAMINER

Lars-Henrik Ståhl

SUPERVISOR

Teresa Aristi



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THESIS QUESTION

How can a river reconnect a city with social problems and natural disasters through sustainable design?

INTRODUCTION

The Project is located at the north coast of Peru, in a province named Piura. This province is characterized by its hydrology because of the quantity of basins it has, and the fast increase of population over the last 60 years (2nd most populated area in Peru, after the capital, Lima).

Because of its hydrology and location in the coast this province is one of the most affected by the ENSO ("El Niño" southern oscillation), which is a superficial change of temperature in the water next to Peru.

This situation occurs every 3 to 6 years increasing the temperature around 10 °C, humidity, rainfall, diseases, river overflow, reduction of agriculture and fishes on the ocean.

But there are 3 districts of this province that has a particular situation, those has the highest density compared to other areas, lack of public spaces and have the pass of the main riverbed, with around 7.8 km that cross the urban fabric and divided the city almost exactly in two.

So, through the history, the river has been part since the first settlement and considered a natural public space, as a small beach but also to graze animals at the beginning.

Nowadays is seeing as one more item of the city that is not include in any urban plan, its used to trash rubbish and considered just to storage water (invisible for the city as a potential public space).

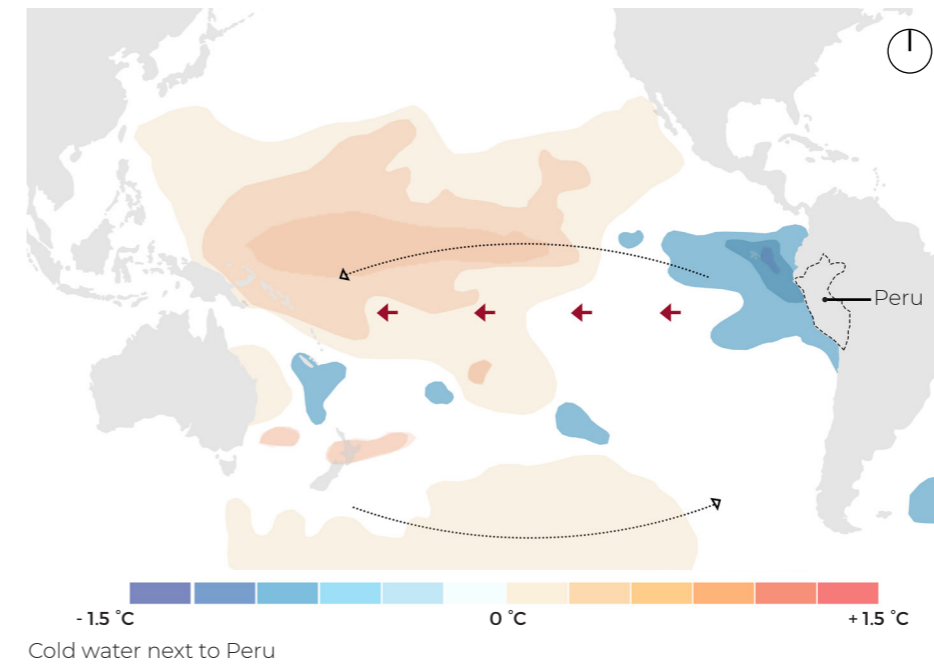
This situation is because people see the river as a potential enemy because of the river overflow trough the last 70 years, that has flooded the city, destroying buildings and roads.

For that reason, the vision of my project is to reactivate the river to reconnect the city with the history in which the river was the public heart of the city with new green areas, that will contrast the deficit of them.

To then be able to say: **WELCOME TO THE RIVER AGAIN!**

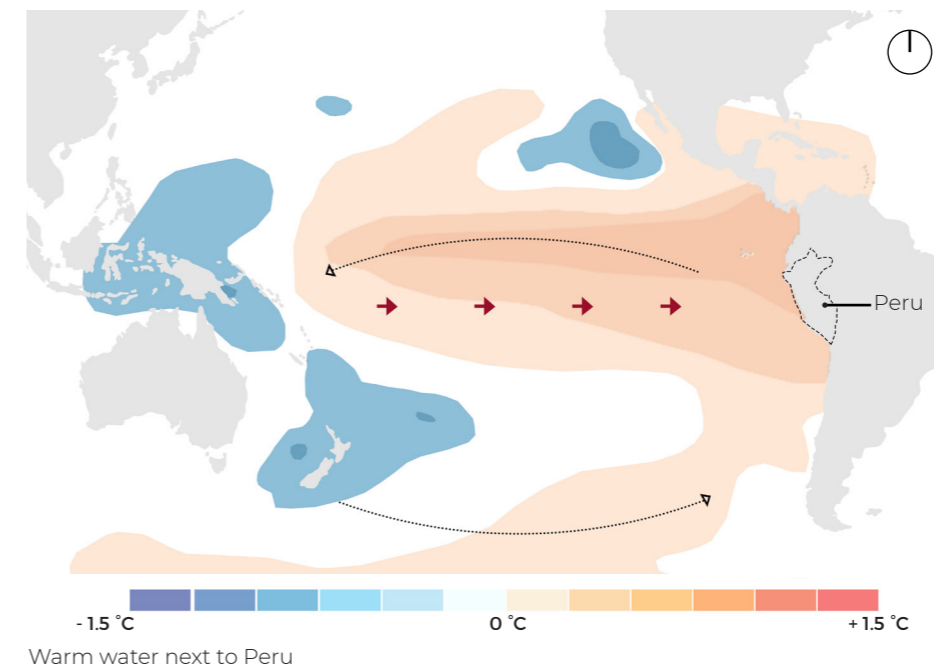
1.1 “EL NIÑO”-SOUTHERN OSCILLATION (ENSO)- WHAT IS IT?

Is a natural phenomenon that involves the temperature change of waters across the eastern and central tropical Pacific Ocean, because of the interaction between the atmosphere and the ocean. This is a cycle that occurs every 3 or 6 years.



Normal Situation

These changes in ocean temperature affected Peru, which normally has a long coast with cold waters from the Humboldt Current that flows from Antarctica.



Atypical Situation

So, during the months of November and April, warm water near Indonesia reaches the Peruvian coast, displacing the cold water next to Peru.

This causes issues in many cities in Peru, but especially in seven cities.

01

EL NIÑO - SOUTHERN OSCILLATION

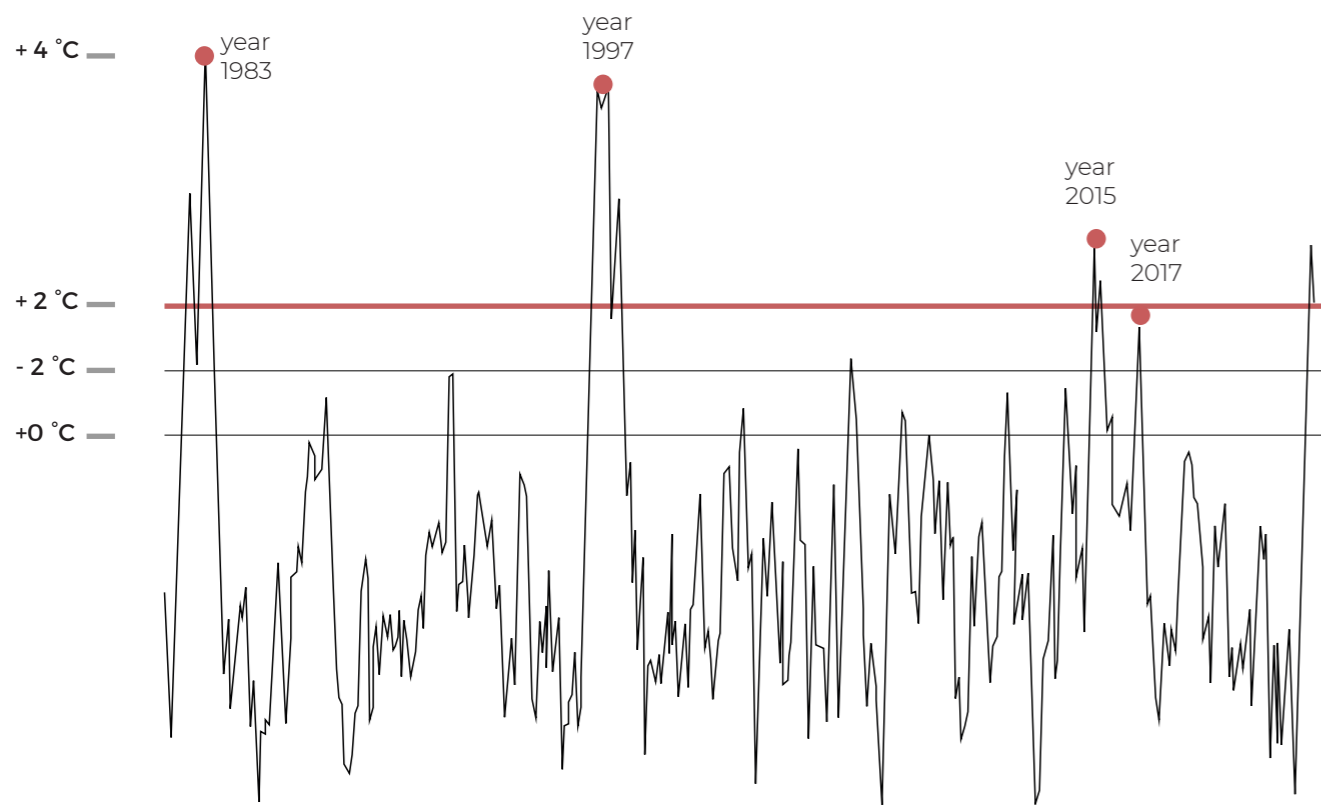
CONTEXT AND LOCATION

To understand the importance of the project in the selected area, we need to begin by understanding the extreme climate changes in the zone and why this is a crucial starting point for designing an urban project.

TEMPERATURE OSCILLATION IN THE OCEAN OVER 40 YEARS

As a result, we experienced four critical years during which this temperature change affected Peru with natural disasters.

The most significant impact on the Peruvian coast was flooding caused by river overflow and rainwater, which destroyed building foundations, roads, and parks, and blocked the main routes connecting to other cities. This situation remains unresolved, especially in the province of Piura.



When the temperature increases by around 1.5 °C, Peru experiences natural disasters in the country.

In this case there are 4 year where Peru was affected.

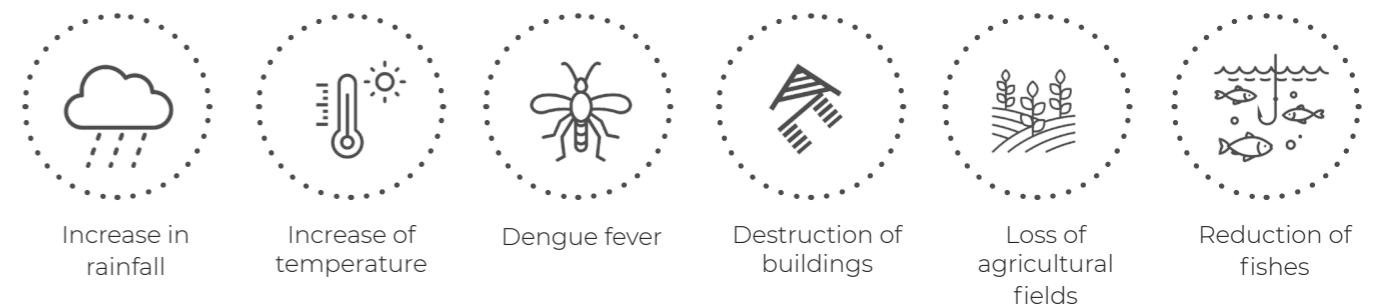
AFFECTED CITIES FOR THE ENSO - Flooding problems at the coast

Seven coastal provinces in Peru face significant challenges due to ENSO, which brings higher temperatures, more rainfall, the spread of diseases, and declines in agriculture and fishing. As a country, we're not fully equipped to deal with these issues, leading to widespread damage to our cities and buildings.

Piura is the hardest hit, largely because of its many river basins and the rapid population growth over the past 60 years. It's now the second most populated area in Peru, right after Lima.



Problems across the coast



FLOODING PROBLEMS IN PIURA - by rain water and river overflow



Loss of connections with other cities. And block of pedestrian access to the basic services.



Lack of a drain system for the rain.



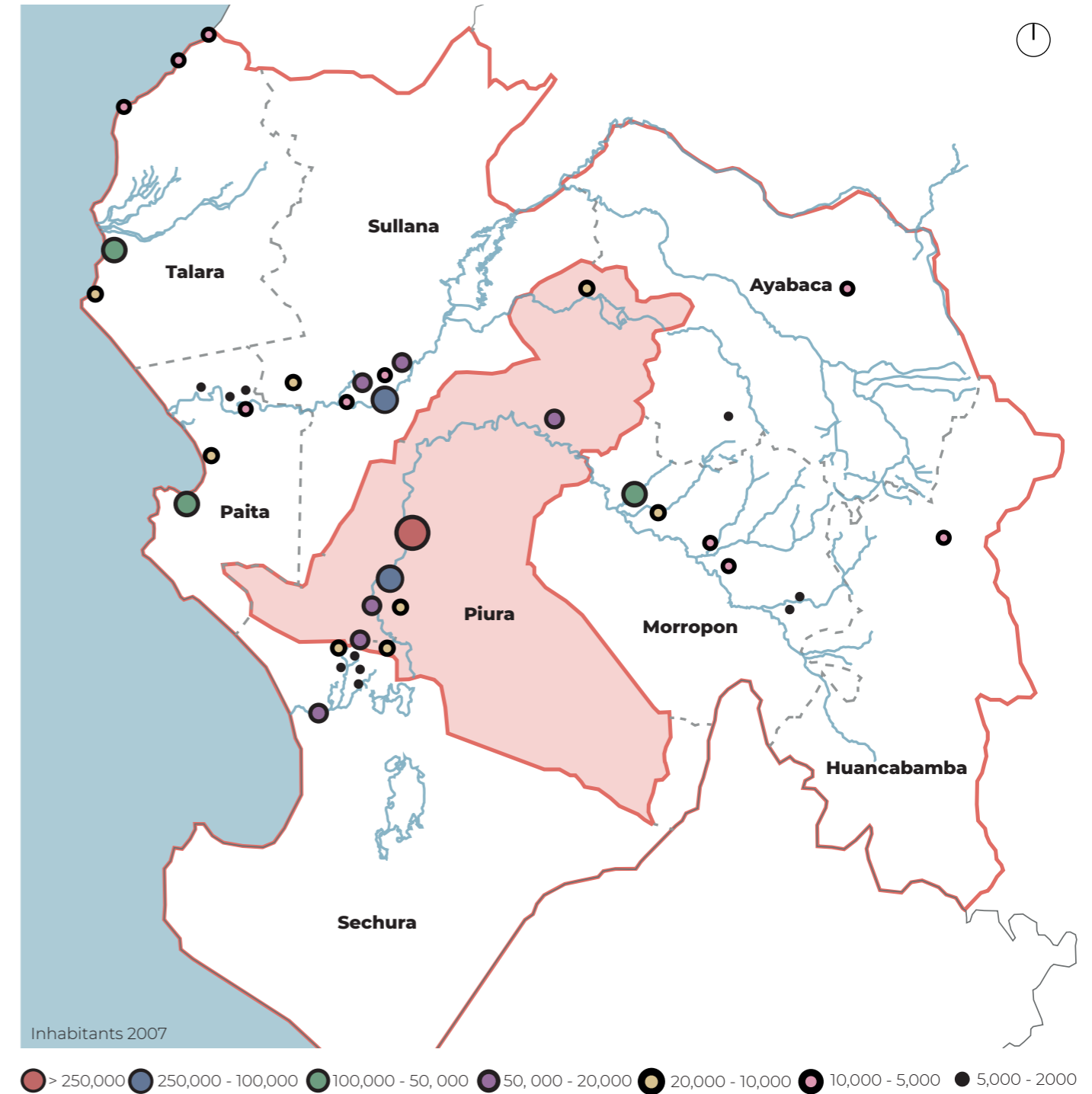
Flooding of the agricultural lands and lack of food production for other regions that depends from the coast.



Different levels of flooding in the city.

THE MOST AFFECTED DEPARTMENT OVER THE YEARS - The department of Piura

The department of Piura has 8 provinces. Piura (the one with the same name as the department) is the province with more population (799 321 inhabitants). The entire area is characterized by having two important river basins: one in the north named Chira, and in the south, Piura. These basins are affected by flooding during the El Niño Southern Oscillation (ENSO).



Temperature

This area is considered a desert with two distinct seasons, winter and summer. The temperature is influenced by the ENSO.

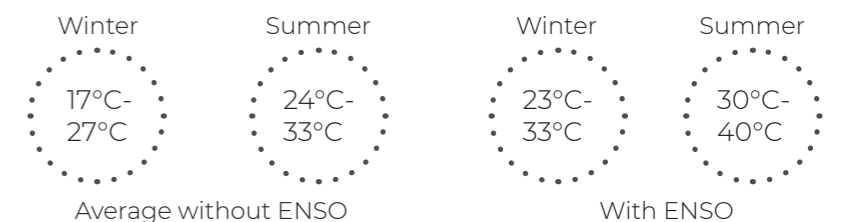


Diagram made by Ruth Chinchayan based on CENSO 2007



DISTRICTS OF PIURA, CASTILLA AND "26 DE OCTUBRE" - Between the river

Therefore, the province of Piura has 10 districts, but three of them (Piura, 26 de octubre, and Castilla) are special because they are divided by the Piura River (7.8 KM). This is a very specific situation because they are also the most populated districts of the province.



Zone characteristics

Most of the districts have the characteristic to work on agriculture and handcraft.



Desert



Agricultural lands



Handcraft markets



Considered as a Flat land

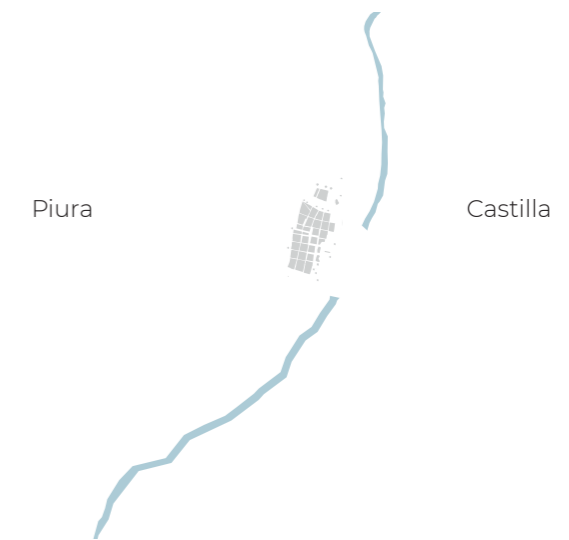
HISTORICAL URBAN DEVELOPMENT- The province of Piura

So those 3 districts have an urban development that started from the river, being this the city axis in 1535 and nowadays is a border between districts.

In the next maps it is shows the development of the city, in which I need to mention that in any stage of the urban expansion there was an urban plan. Growing based on the arrival of the new inhabitants every year.

1535

Stablished on the desert as the first spanish settlement



HISTORICAL URBAN DEVELOPMENT- The province of Piura

1940-1960
New population next to the river



HISTORICAL URBAN DEVELOPMENT- The province of Piura

1980
The river as a political boarder



HISTORICAL URBAN DEVELOPMENT- The province of Piura



Pictures: Made by Ruth Chinchayan based on PDU Metropoli al 2032

IDENTITY- Districts of Piura, 26 de octubre and Castilla

Therefore, this is what the city looks like nowadays. People are always seeking to be outside, enjoying the shade and fresh air, as air conditioning is not common in this city. Unfortunately, the streets are narrow and prioritize cars.



FEW SQUARES WITH BENCHES

Search for outdoor spaces to rest

This is the central square of the city, which has a similar design to the few other squares around. These places are always bustling with people of all ages, at any time of the day, trying to find a bench to spend time outdoors.



SQUARES WITH SHADE

Search for shade

It could be say that in this city is almost mandatory to have a pergola or atifitial shade to be able to stay long times because of the high solar radiation.



STREETS THAT PRIORITIZE CARS

"Mototaxis"

One of the most used transport in Piura is the mototaxi, which sometimes could create chaos because of the small size of them. Those park on the foothpaths, interrupting the pedestrian zones. As a result there is not any care for pedestrians.



MULTIPURPOSE AREAS

Food vendors

Because of the cheap price of the food in general. One activity that peruvians love, is eating, so vendors take advantage of the high consumption of food to create their informal stands on the roads or foothpaths (Lack of areas for fairs).

Pictures: Ruth Chinchayan

IDENTITY- Districts of Piura, 26 de octubre and Castilla

As I mention before the inhabitants are always using the streets for different activities , in the search to create new areas to enjoy outside their houses. Unhopefully because of the lack of planning, those could not have a right quality .

**THE ONLY DESIGN PEDESTRIAN STREET**

A designed place

As Piura is designed for cars and not for pedestrians, there is only one pedestrian street that try to mix the main economical activities, (food & artesanal handicraft) and shade.

**DRY PARKS**

Typical vegetation

Almost all the parks are a dry typology as in the picture. This is because Piura is located in a desartic zone.

**STREETS THAT PRIORITIZE CARS**

"car parking"

Most of the streets that connect the city with the river has not car traffic, and a result they are used as a parking.

**THE ONLY BRIDGE EXCLUSIVELY TO PEDESTRIANS**

Commerce and not use for pedestrians as a space to rest.

As there is not a urban plan for many streets around the river, people uses them as they want, without armony or relation with the sourroundings.

IDENTITY- Traditions

Despite this situation, the streets are usually alive with traditions. You'll see performances like K-pop and hip hop dancers, but most importantly, you'll witness the "Marinera," the traditional and official dance of Piura.

**PERFORMANCES AT THE MAIN SQUARE**

Around all the year

"Marinera" holds a special place as the main traditional dance in northern Peru, particularly in Piura and Trujillo, thus this tradition can be found in many of the streets.

**ALL THE AGES ARE INVOLVE**

Is a national dance pride

It is dance in every special date or celebration.

**DANCE TEACHING ON THE STREETS**

"lacking of public buildings"

As "Marinera" is learn since you are a child, people practise it on the squares or streets.

**NATIONAL DANCE COMPETITIONS**

Attracts tourists

Every year, there's this huge competition across the country that brings together people from various cities.

IDENTITY- Traditions

Artisanal Handcraft such as ceramic and straw weaving.



FAIR AND MARKETS

Made by hand

They produce products that are sold in all the cities of Peru.



CATACAOS

A distric for artisans

This is the main place where tourists use to buy souvenirs.



SPECIALIZED PRODUCTS FOR THE DANCES

Traditional hats

Those are used by the agricultures and the dancers, all of them made in Piura.



MAIN ECONOMIC ACTIVITY

Commerce

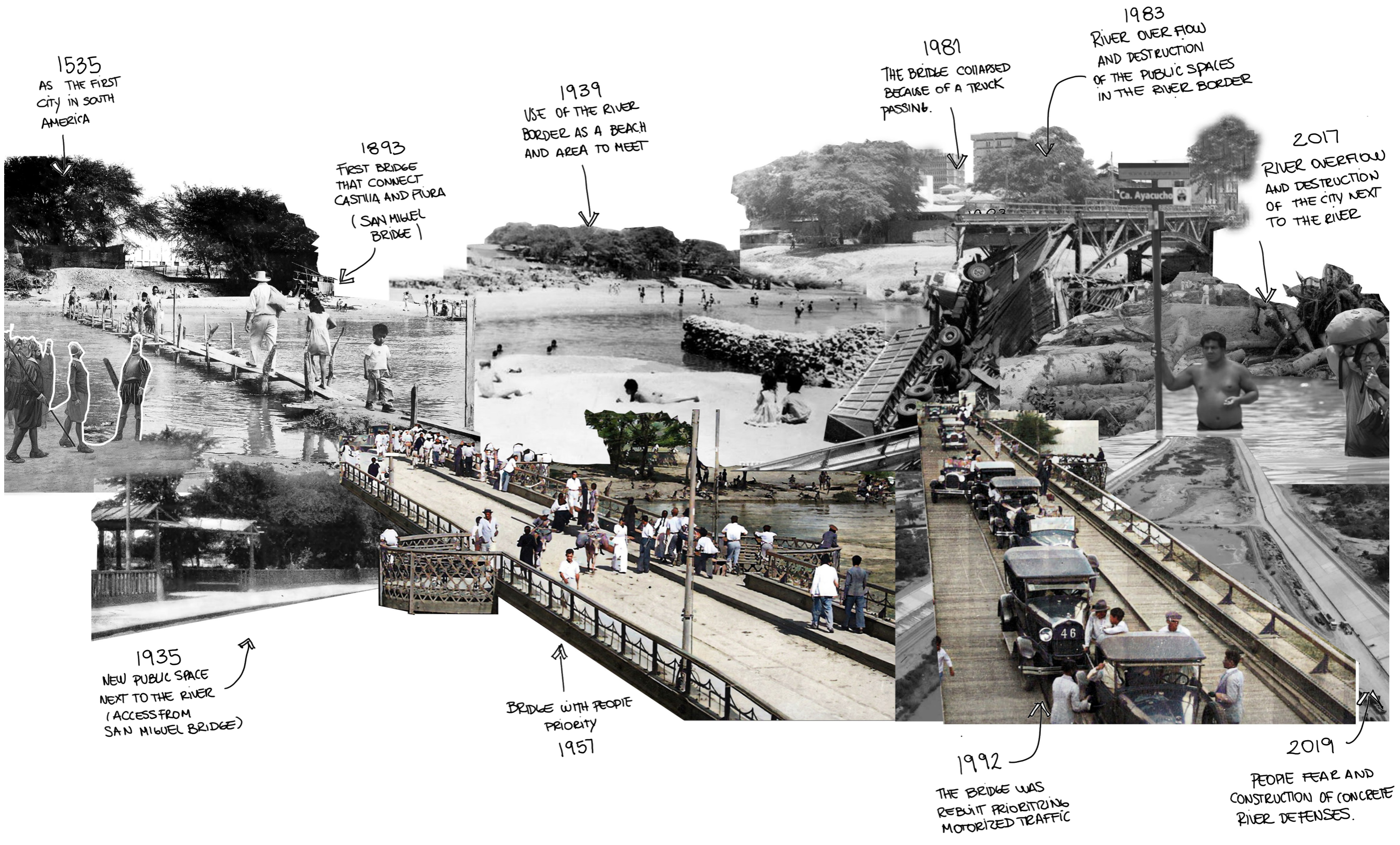
People pass down this tradition to their kids since it's the main economic activity.

02

FROM A NATURAL RIVER TO AN ARTIFICIAL

THE RIVER IN THE URBAN CONTEXT

The river used to be included in the city plans and used by the inhabitants as a public space until 1957, after that "El Niño" started to affect the increase of water in the river and the rain, which cause river overflow. So, the river was considered dangerous.



1535
AS THE FIRST
CITY IN SOUTH
AMERICA

1893
FIRST BRIDGE
THAT CONNECT
CASTIJA AND PIURA
(SAN MIGUEL
BRIDGE)

1939
USE OF THE RIVER
BORDER AS A BEACH
AND AREA TO MEET

1981
THE BRIDGE COLLAPSED
BECAUSE OF A TRUCK
PASSING.

1983
RIVER OVER FLOW
AND DESTRUCTION
OF THE PUBLIC SPACES
IN THE RIVER BORDER

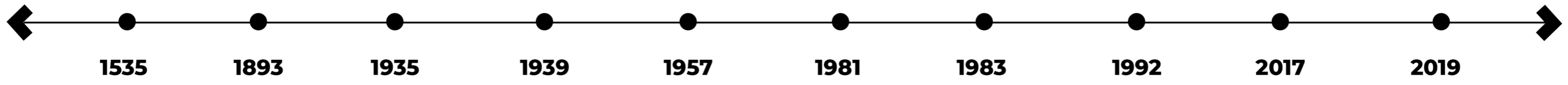
2017
RIVER OVERFLOW
AND DESTRUCTION
OF THE CITY NEXT
TO THE RIVER

1935
NEW PUBLIC SPACE
NEXT TO THE RIVER
(ACCESS FROM
SAN MIGUEL BRIDGE)

BRIDGE WITH PEOPLE
PRIORITY
1957

1992
THE BRIDGE WAS
REBUILT PRIORITIZING
MOTORIZED TRAFFIC

2019
PEOPLE FEAR AND
CONSTRUCTION OF CONCRETE
RIVER DEFENSES.



FROM A NATURAL RIVER

The river has changed with the development of the city. Initially, it was considered a recreational area where people could rest next to the river or agriculturists could take their animals to drink water



USED AS A BEACH

The quality of the water use to be good for swimming



ACCESSIBLE

A clean river to everyone



BRIDGES

Prioritize the human interaction



THE HEART OF THE CITY

People wanted to go and spend the day at the river

TO AN ARTIFICIAL RIVER

That is how after many destructions in the city because of the river overflow and rain, in 2019 the river become an artificial one with the idea to create a concrete defence to protect the city and avoid the river.



DANGEROUS ACCESS

People use to take advantage of the dam to use those spaces to drink alcohol.



CONCRETE AROUND

Concrete walls that almost work as a division between the street and the river.



NATURE INSIDE

Based on the increase or decrease of the water, there are some wide areas that work as flora and fauna container



ADANDONED BORDER

There is not a designed connection between the river and the streets. Those are used by the homeless or to trash rubbish.

CURRENT SITUATION- The concrete river

Nowadays it has become a "concrete river" that nobody visits, and people prefer to avoid it because of its frequent floodings and danger because of the delinquency in the abandoned and unused areas next to the river.



BRIDGES

5 bridges that cross the river



FAUNA & FLORA

Natural vegetation and trees



RIVER BOARDERS

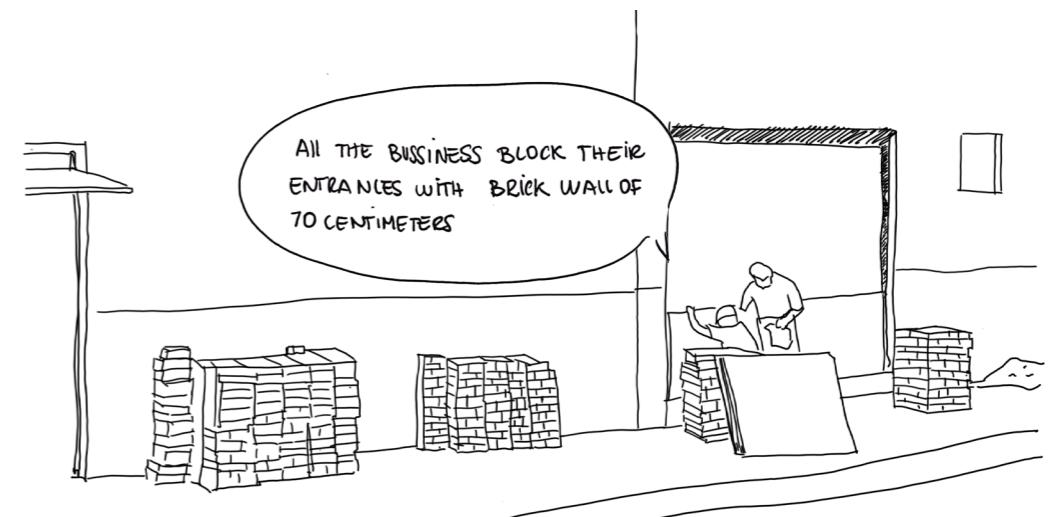
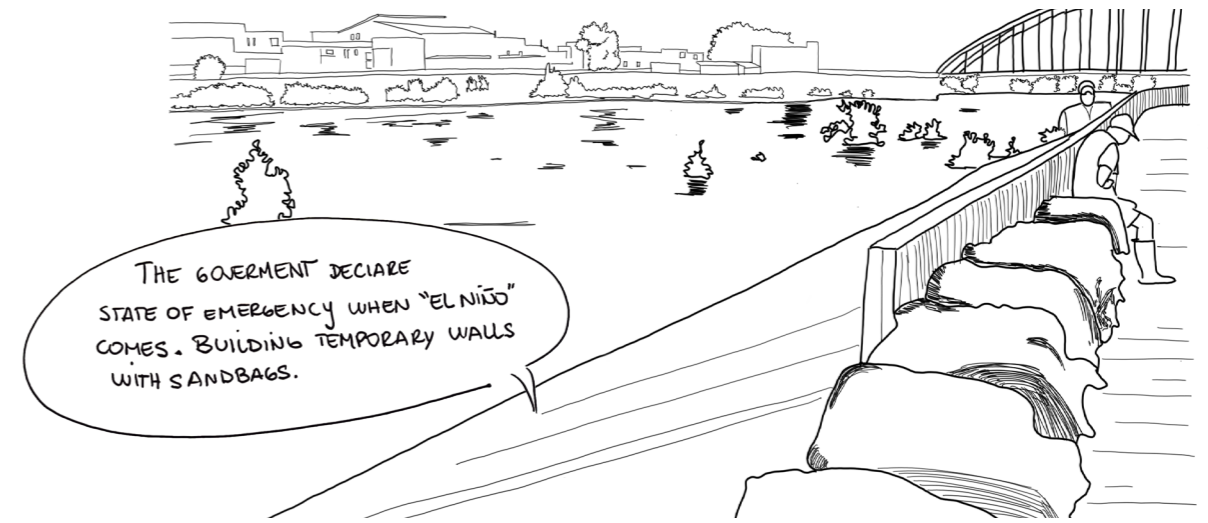
Roads and houses next to the river



RIVER BOARDERS

Trash and a waterfront design(412 m)

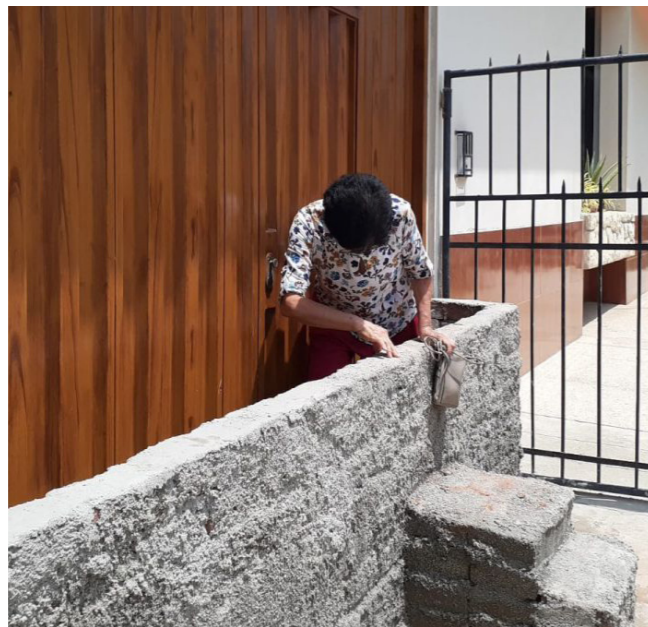
THE RIVER AS A ENEMY - People protect their houses to avoid flooding by the river overflow



THE RIVER AS A ENEMY - People protect their houses to avoid flooding by the river overflow



Inaccessible



Expensive every year

THE RIVER AS A ENEMY - People protect their houses to avoid flooding by the river overflow



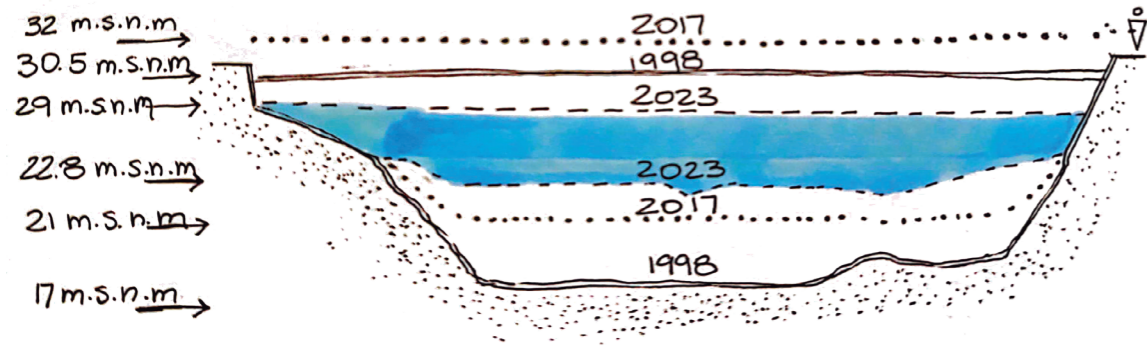
Instant solution



Property damage

CAUSE OF THE RIVER OVERFLOW- Uncontrol increase of sediments

This constant overflow is not because the river can't keep the water during "El Niño". It is because of the sediments and trash it has at the base have been growing and reducing the space to contain the water.



The diagram is illustrating how the layers of sediment have accumulated over time since 1998. It's possible that there were already existing sediments before that year, and the diagram may be representing a specific area or location where sedimentation has been studied.

A PROJECT TO CLEAN THE RIVER - from the Peruvian government

With the idea to reduce the river overflow, the Peruvian government has a project to clean the sediments and change the path of the river to the ocean, with the idea to make it shorter, as illustrated with a yellow line (next page) and avoid collecting sediments from other places.

Nowadays the path is as shown in the light blue line (next page), which is a long distance that reduces the speed of the river water to the ocean.



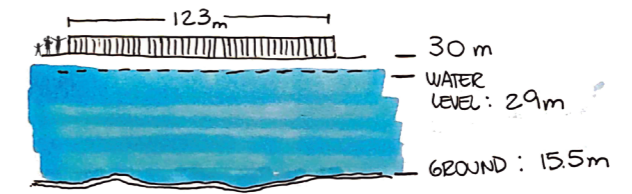
This process started in 2017, planned in phases, but it has been paralysed on different occasions. And restarted in November 2023.



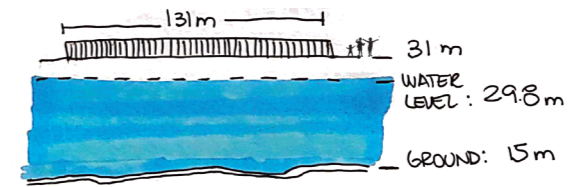
HEIGHT OF THE SEDIMENTS UNDER THE BRIDGES- after the cleaning project



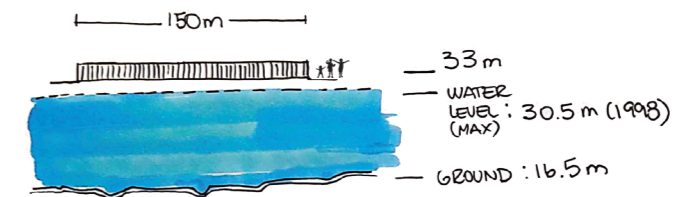
SANCHEZ CERRO BRIDGE



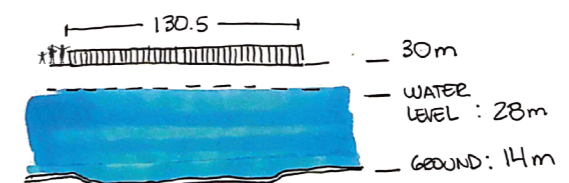
SUSPENSION BRIDGE



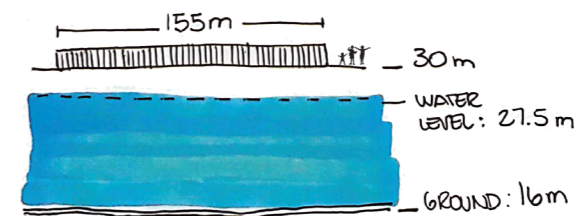
CACERES BRIDGE



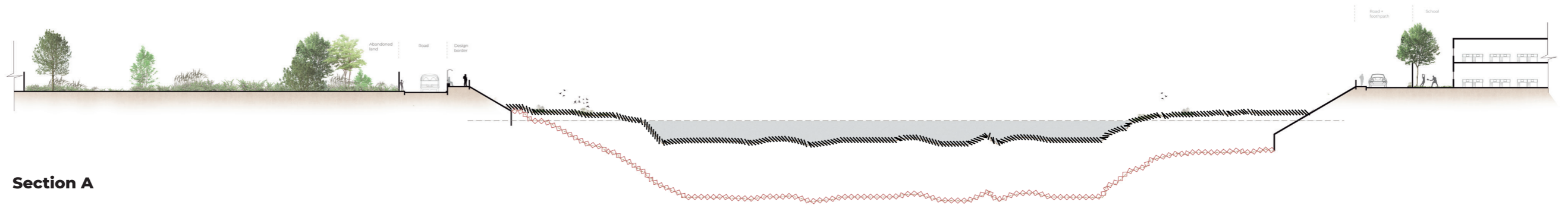
SAN MIGUEL BRIDGE = FIRST ONE



BOLOGNESI BRIDGE

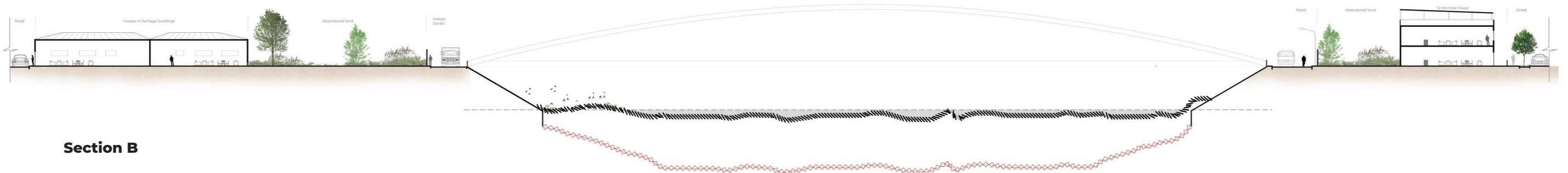


SECTION OF THE CURRENT HEIGHT OF THE SEDIMENTS AND AFTER CLEANING THEM



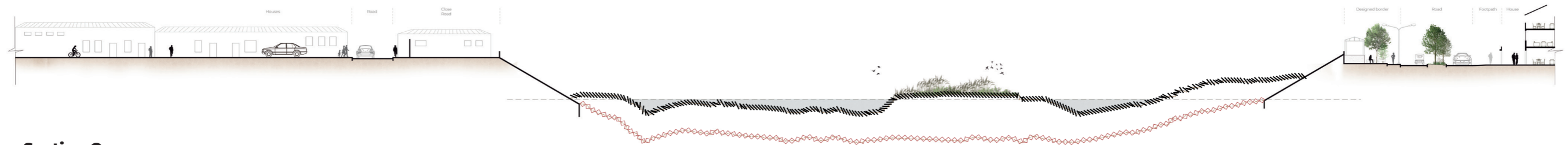
Section A

- ▨▨▨▨▨ Current base with sediments
- ◇◇◇◇◇ New base after the cleaning



Section B

- ▨▨▨▨▨ Current base with sediments
- ◇◇◇◇◇ New base after the cleaning



Section C

- ▨▨▨▨▨ Current base with sediments
- ◇◇◇◇◇ New base after the cleaning



03

CURRENT SITUATION

URBAN ANALYSIS

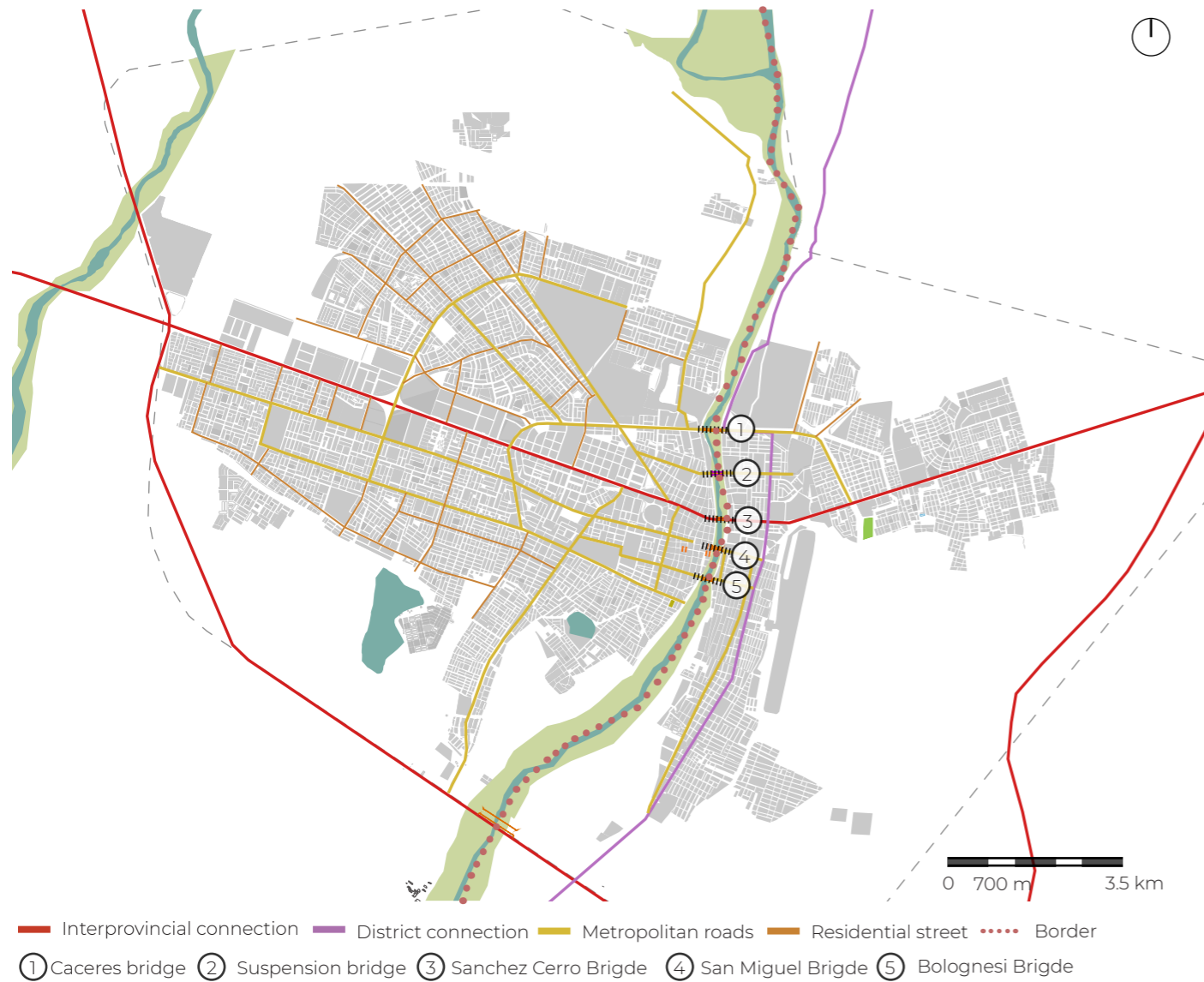
I will analyze the current situation to understand later how the river can be a potential connector of both areas and how this could be influenced by the current activities of the city.



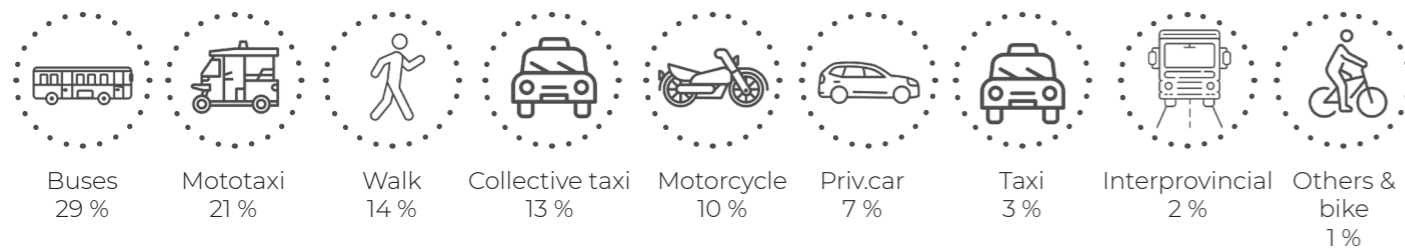
URBAN MORPHOLOGY AND MOBILITY

This area is known for being well connected with the surroundings through the interprovincial road that crosses the city (red line).

Additionally, these three districts are characterized by prioritizing car mobility, with the main mode of transport being informal buses (not regulated by the government). Conversely, the use of bicycles is not common due to the lack of cycling paths.



Daily use of transport



CACERES BRIDGE
Car priority



SUSPENSION BRIDGE
Car priority



SANCHEZ CERRO BRIDGE
Car priority



SAN MIGUEL
Exclusively pedestrian



BOLOGNESI BRIDGE
Car priority

DENSITY

The meaning of growth for this area is to build more roads, and as a result, this zone has only 1.75 m² of green area per inhabitant, which also evidences the lack of an urban plan.



482 769 inhabitants

--- Distrital borders

N° inhabitant (urban area)



26 de oct. 165 712	Piura 152 832	Castilla 158 985
-----------------------	------------------	---------------------

Density



26 de oct. 9 751.3 inh/km ²	Piura 7 891.75 inh/km ²	Castilla 7,792.65 inh/km ²
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AERIAL VIEW OF THE CITY BY DISTRICT



"26 DE OCTUBRE"
"new urban development"



PIURA
The first settlement



CASTILLA
Developed after Piura

GREEN AND BLUE RESOURCES

This area lacks green parks with grass due to its deserts character. However, what naturally thrives are trees, which don't require a high maintenance budget. Additionally, the city has a river that, compared to other arid zones, can provide water to create a green heart for the city



GREEN AREAS



WILD VEGETATION
River border



DRY PARKS
80% of the parks



RIVER BORDER
588 m of 7.8 km (Castilla)



NO PUBLIC EQUIPMENT
70% of the parks

VEGETATION TYPOLOGY

As I mentioned, part of the natural flora comprises trees, which can reach a height of up to 7 meters. This is advantageous for the zone due to the shade they offer. Additionally, their colorful leaves can create a varied atmosphere on the streets. Finally, there is the typology that produces fruit seasonally, providing another opportunity to create orchard gardens.



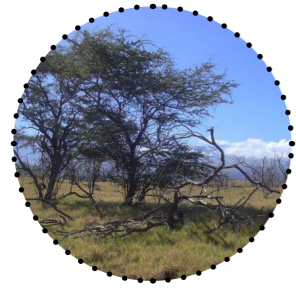
Algarrobo



Molle



Ponciana



Huarango



Zapote



Suche



Suculentas



Ceibo



Mango

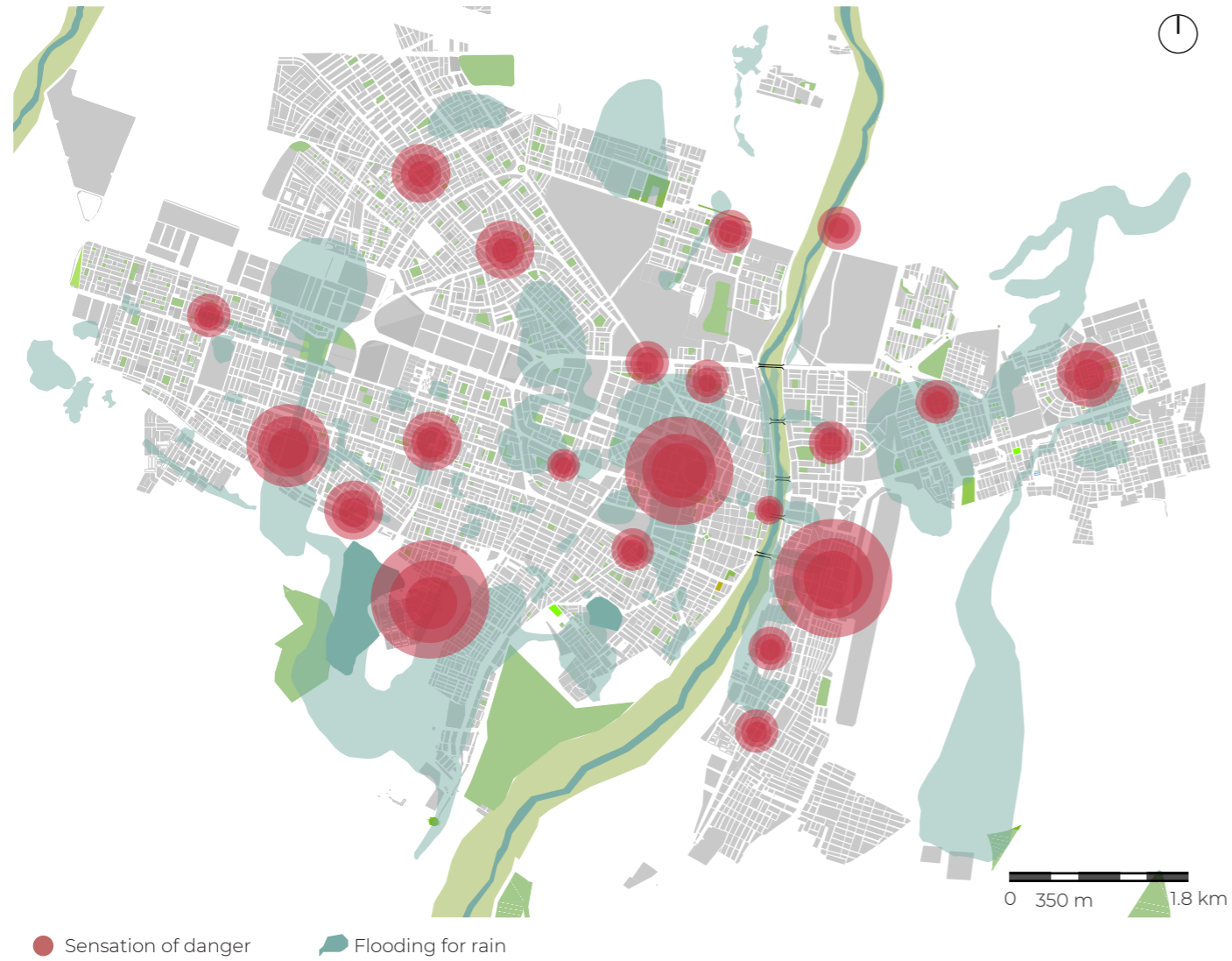
DANGEROUS AREAS - Floods

As a result of constant flooding by rainwater, these areas seem to be always under construction due to the irreparable damage to roads and houses, which reduces the quality of life for the neighbors.



DANGEROUS AREAS - Floods and delinquency

As a result of abandoned areas, unused spaces, or areas affected by street destruction due to flooding, coupled with the lack of public spaces and streets prioritizing car mobility, there are areas in the city considered dangerous or with a high probability of delinquency



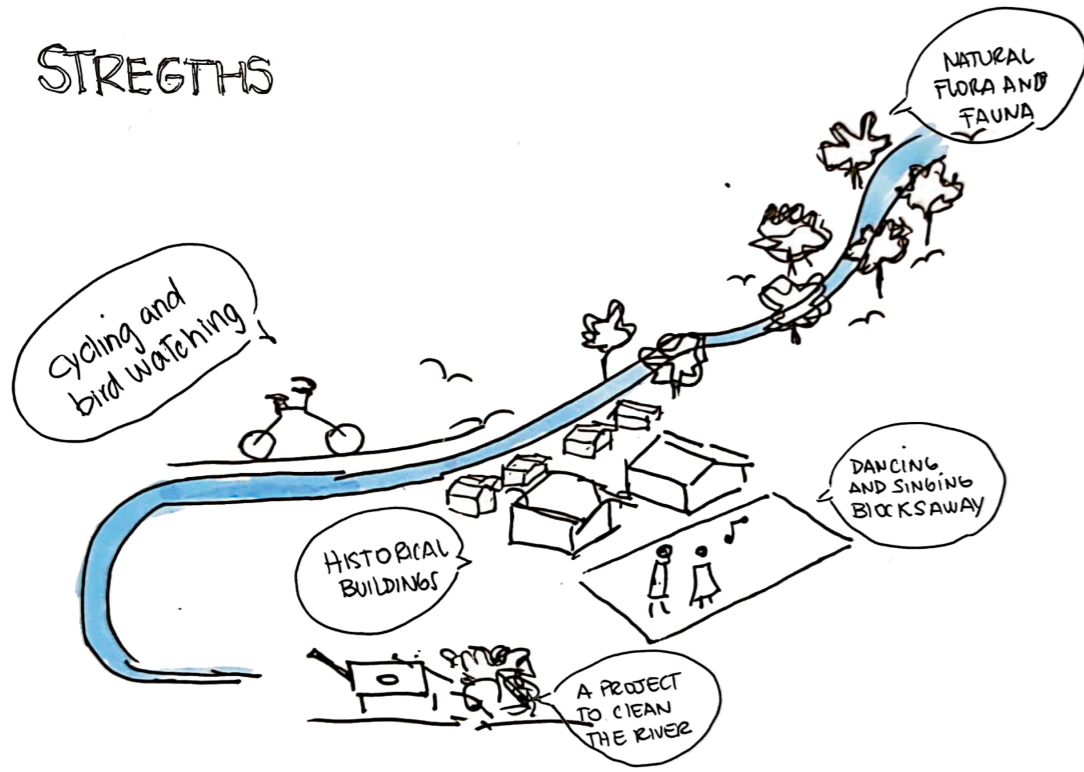
04

WELCOME TO THE RIVER AGAIN

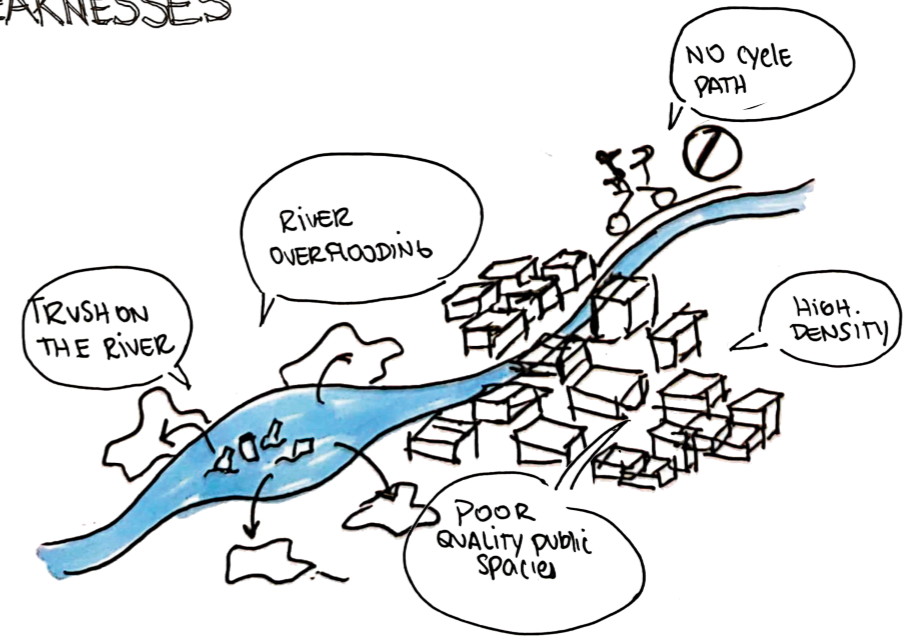
SWOT & VISION

With the idea of counteracting the deficit of green areas and public spaces, but also with the aim of REACTIVATING the heart of the city, I want to design a project that will reconnect the city with the river and, consequently, with its history, where the river served as the main public space.

STRENGTHS



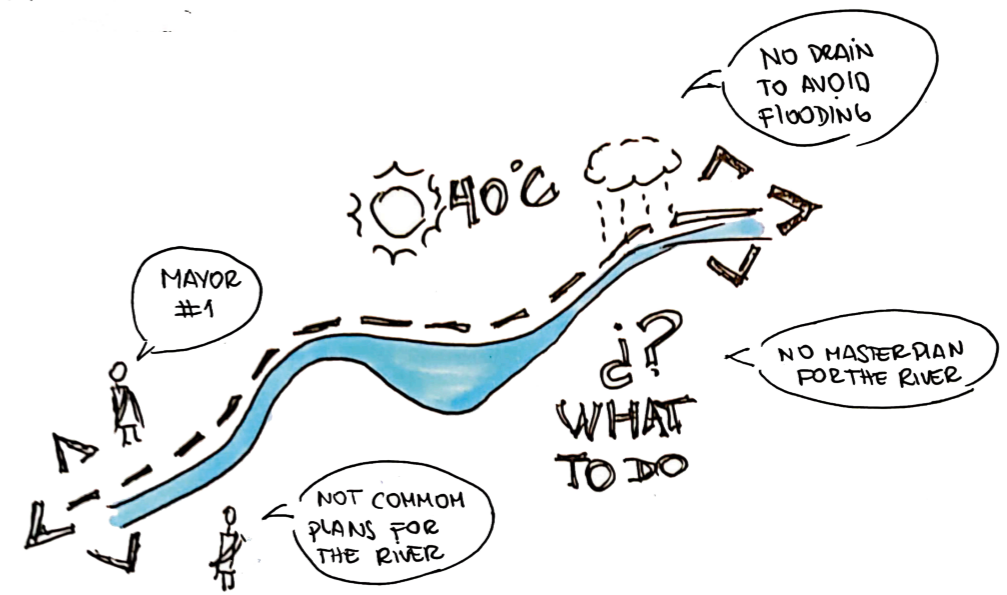
WEAKNESSES



OPPORTUNITIES



THREATS



VISION : WELCOME TO THE RIVER AGAIN

GREEN
THE GRAY RIVER



05

STRATEGIES

THE PROJECT

To understand the project, I will zoom in the area of design, which is the length of the river that is next to an urban area of the city.

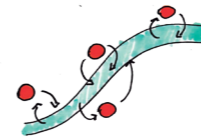
OBJECTIVES

MAIN OBJECTIVES

RECOVER THE ESSENCE OF THE RIVER AS A PUBLIC SPACE

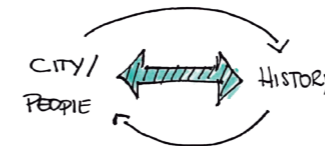
A. CREATE PUBLIC SPACES IN THE RIVER

to increase the green square meters per citizen and create new activities with spaces to meet



B. RECONNECT WITH THE HISTORY OF THE RIVER

to include the river in the urban plans of the city



C. PRIORITIZE PEDESTRIANS OVER CARS

to link both sides of the river and attract people to the new public spaces



D. THE RIVER AS A NEW SPONGE FOR THE CITY

to reduce the flooding by rain



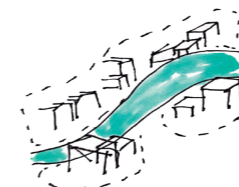
E. CLEAN THE RIVER WATER

to increase the fauna & fauna



F. PRESERVE THE BUILDINGS AROUND

to build only on the abandoned and unused areas



SECONDARY OBJECTIVES

G. USE GREENERY AROUND AS INFILTRATION GARDENS FOR THE RAIN WATER (include a wall system to contain rain water)

H. USE TRADITIONAL MATERIAL

I. INCLUDE SOLAR PANELS

J. INTEGRATE GREEN ROOFS ON THE EXISTING BUILDINGS

K. CREATE COMMUNITY AROUND THE RIVER

L. NEW AREAS TO PRESERVE AND INCREASE FAUNA

ZOOM IN AT THE WORK AREA

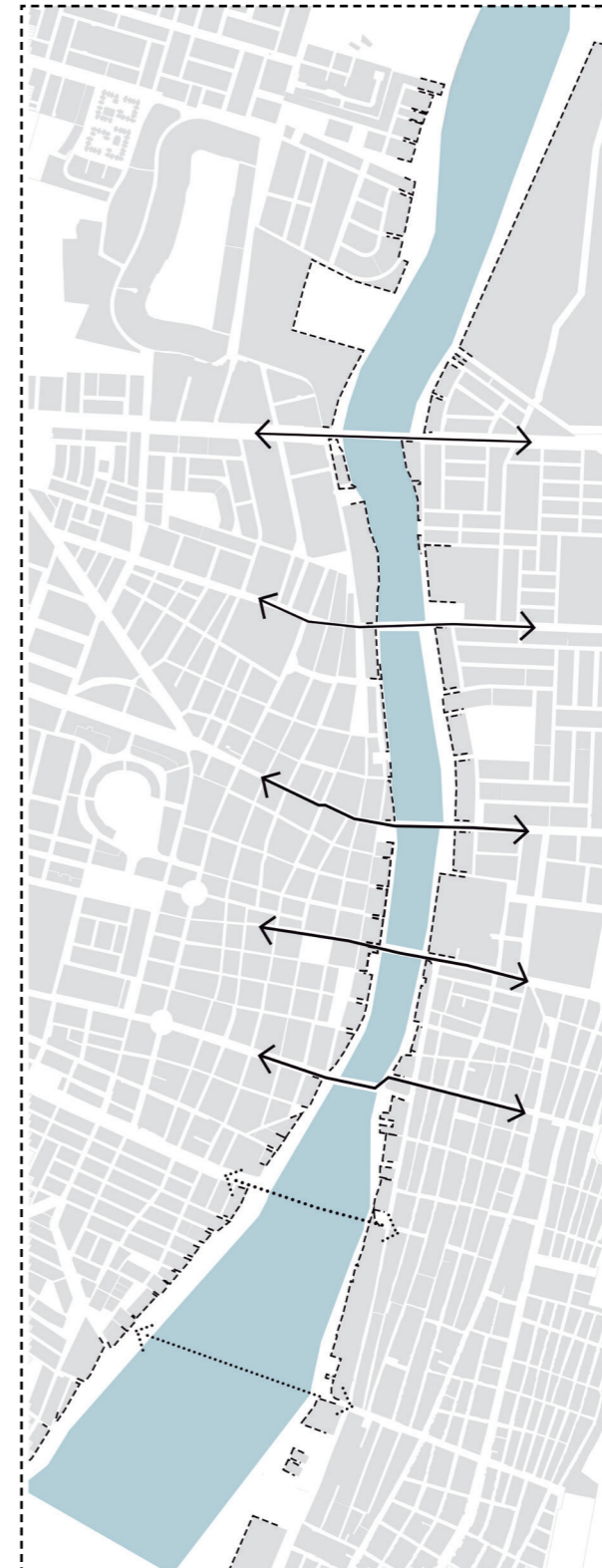
As I mentioned, my idea for the river is to reactivate its border and make the river habitable for humans and fauna again. That is why I will zoom in on the area of the river that has urban development next to it. This is to create new dynamics and link the existing ones that could influence directly the river.



BRIDGES - Strategie 01

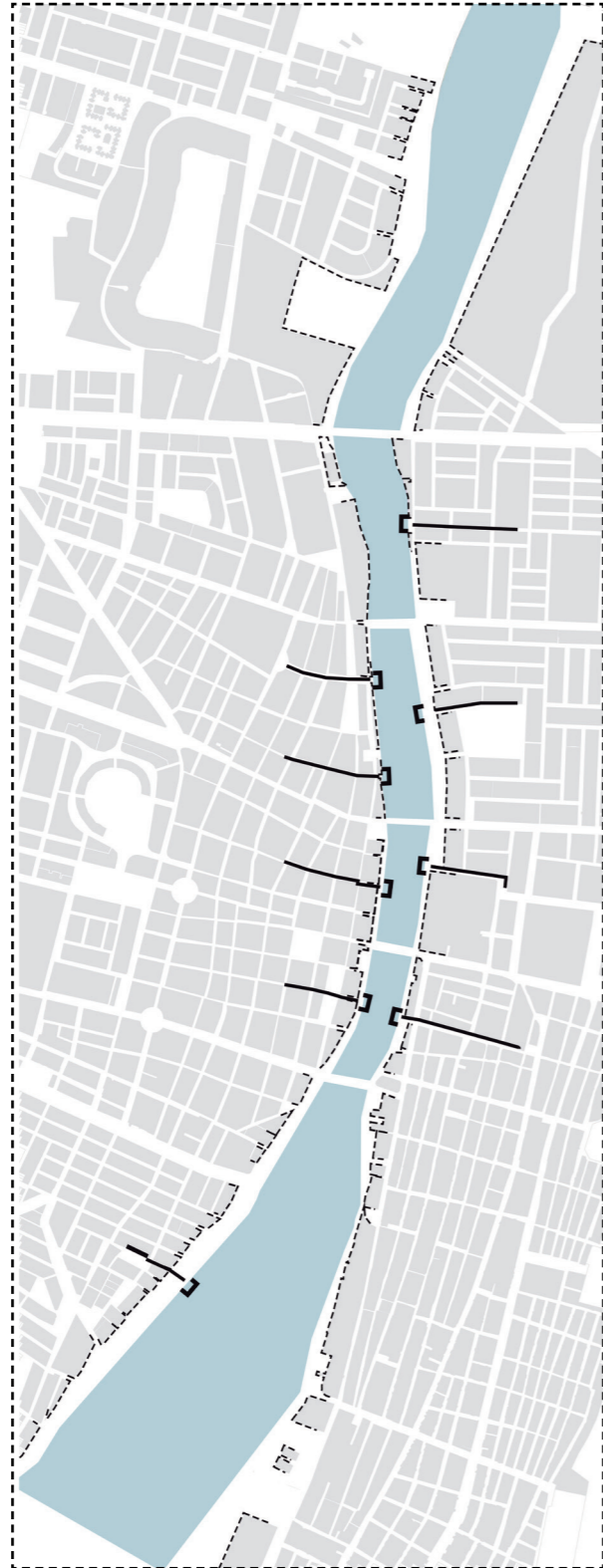
This area has 5 bridges (mentioned before) that I will keep for the project, in addition, I will add two new bridges (dots lines) that will connect the southern part of the city easily with the river and between both sides.



-  Existing bridges
-  New bridges



NEW PEDESTRIAN CONNECTIONS - Strategie 02

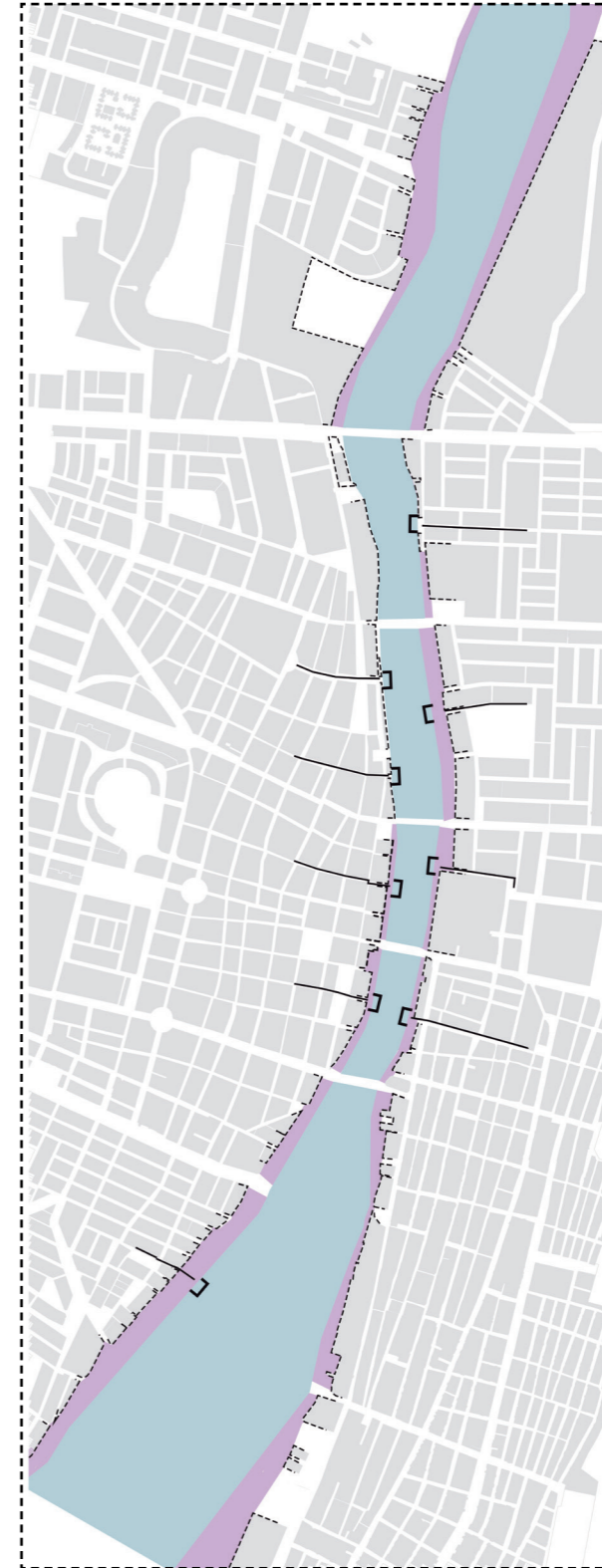
I took the roads without traffic (used as car parking) to create new pedestrian accesses to the river and make this new area reachable from different places. Those streets will be extended through platforms over the river.






-  New pedestrian streets
-  Platforms over the river

USE THE AREA NEXT TO THE RIVER - Strategie 03

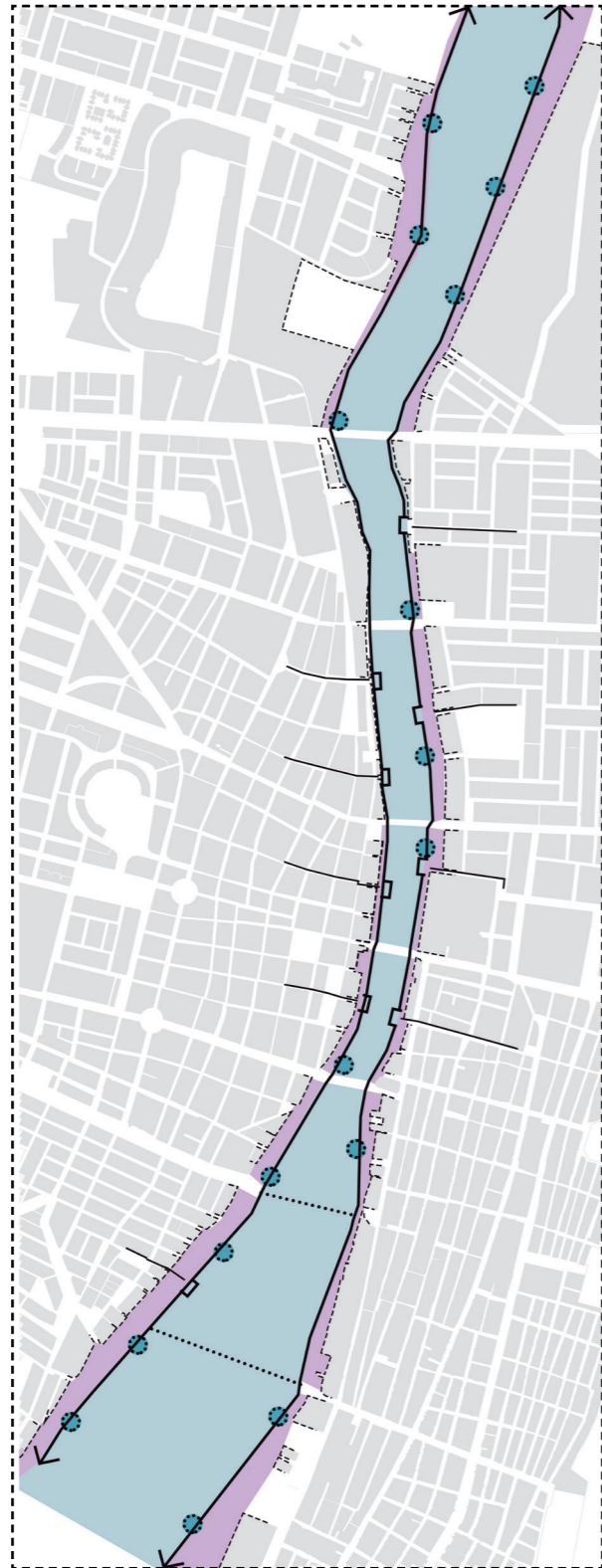
As well, I took the unused road (in light purple) between the buildings and the river to create a new path.





-  Unused road
-  New pedestrian streets
-  Platforms over the river

NEW CONNECTION ALONG THE RIVER - Strategie 04

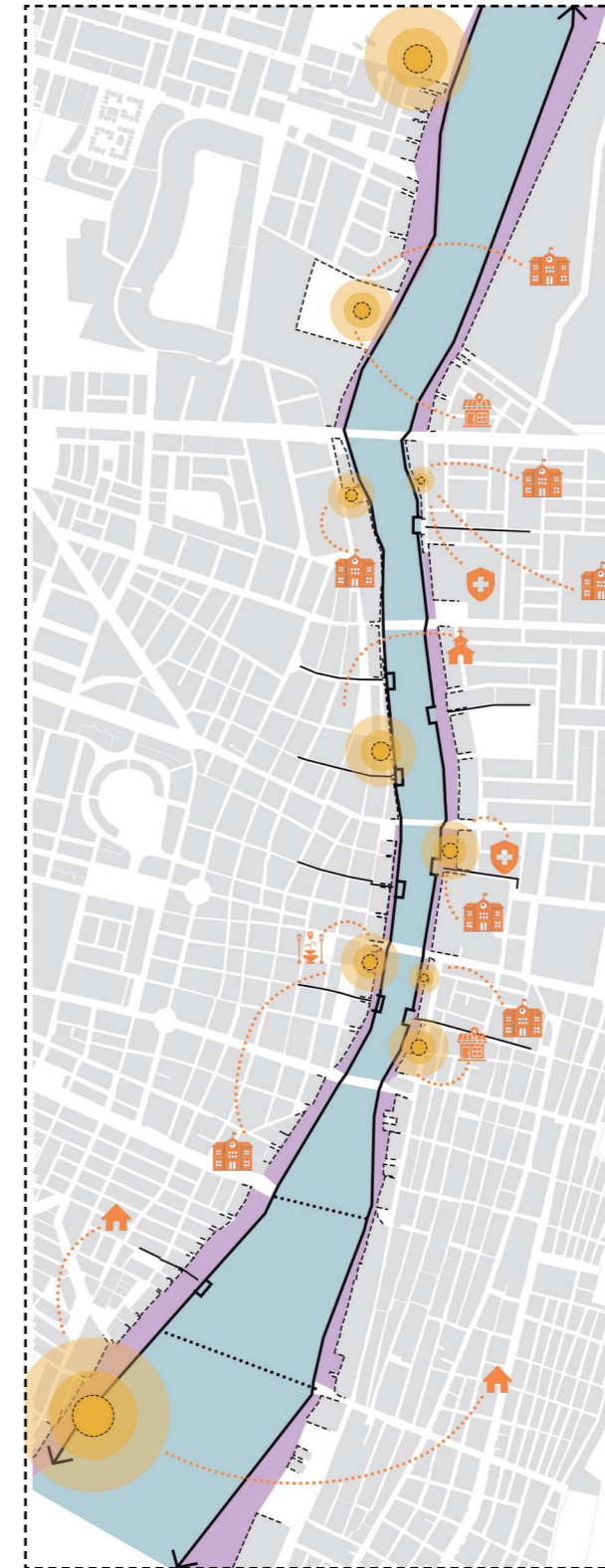
This new path would also be the first cycle path that will connect all the borders. The path will also work as a rainwater collector.










-  Water collection
-  Unused road

NEW USES AND ACTIVITIES IN THE BORDER- Strategie 05

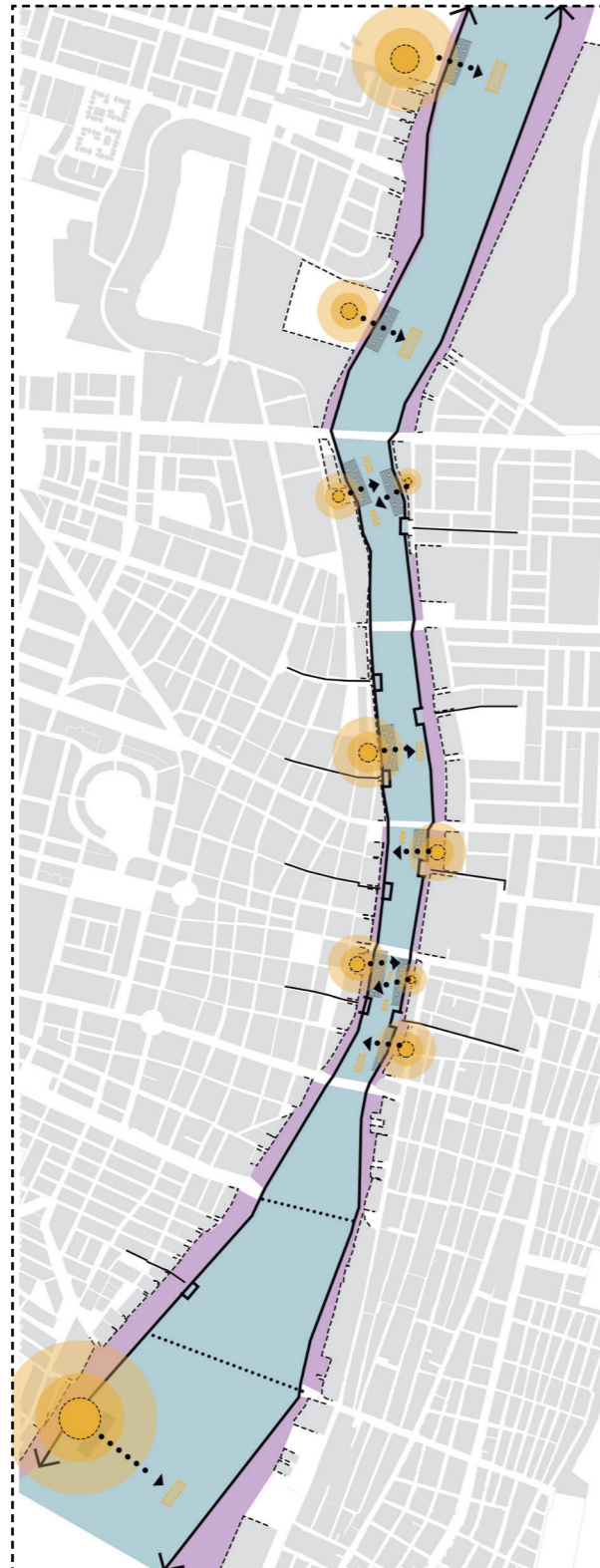
So, this new path would be activated with new buildings located in the abandoned and unused areas, creating new activities that will serve the existing ones, such as schools and universities that are around 7 in this area, but also will reactivate the historical centre and will give new activities to the housing areas.



-  New buildings
-  Unused road
-  Housing
-  School / University
-  Church
-  Historical center
-  Hospital
-  District Market

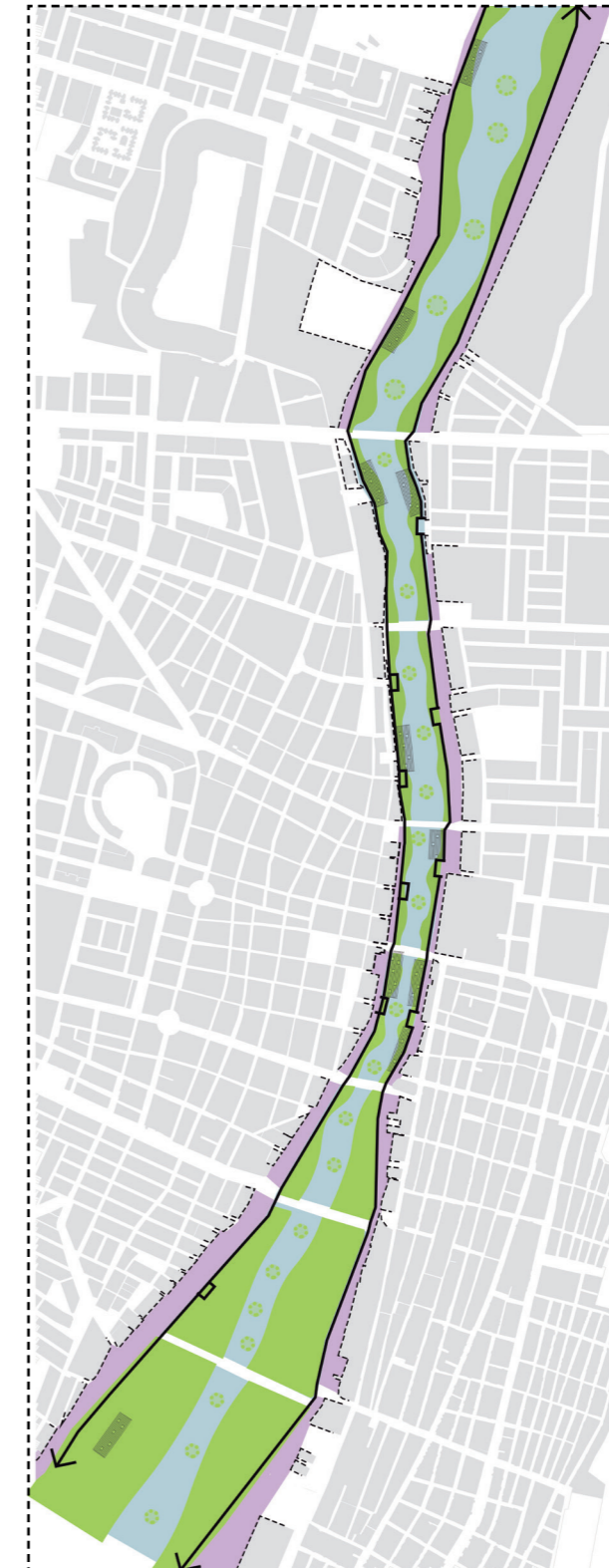
EXTENSION OF THE ACTIVITIES INSIDE THE RIVER - Strategie 06

Those new buildings have an extension inside the river through stairs and floating platforms that will be the main accesses to the river and will allow different activities based on the buildings.



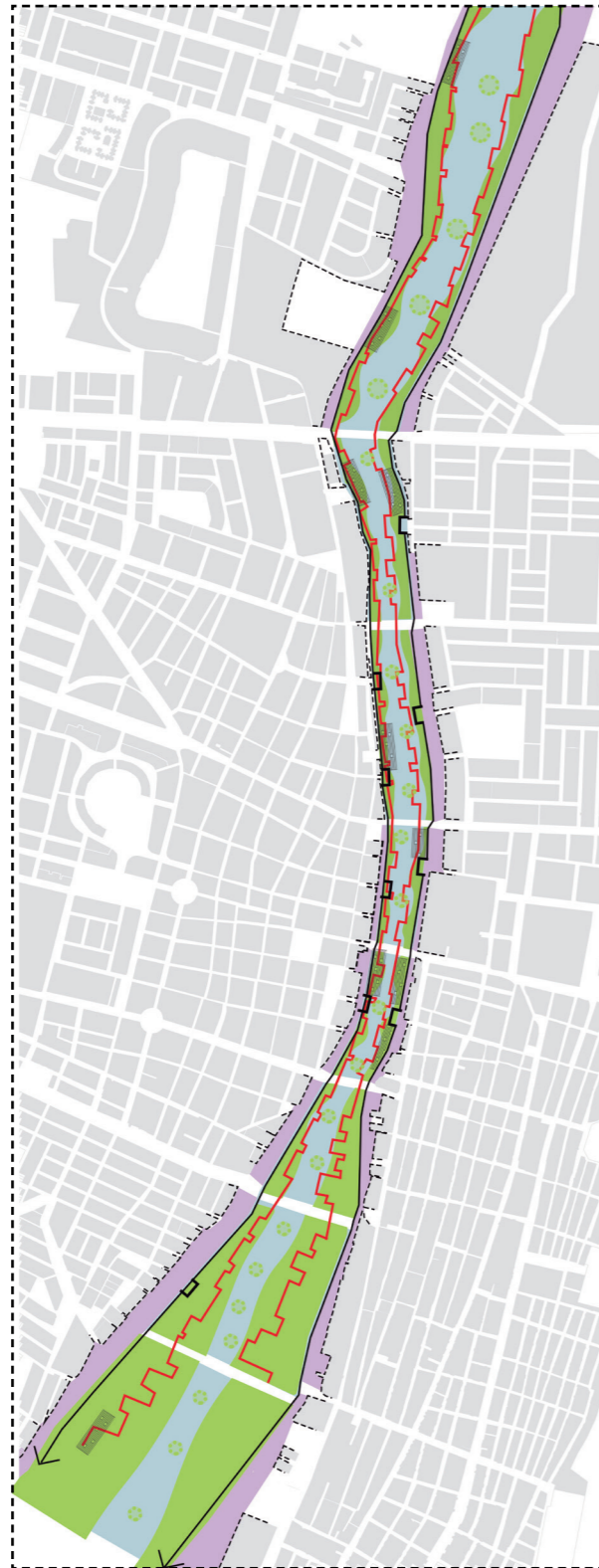
A NEW GREEN BORDER AND FLOATING GARDENS- Strategie 07

That is how now that the river would be accessible (after the strategies). I will bring the natural environment and keep the existing flora & fauna by extending a green border based on the fauna location. It will be complemented by floating gardens that will increase fauna diversity, but at the same time will create community relations through the care of the ones that are productive gardens.



ANOTHER LEVEL OF CONNECTION- Strategie 08

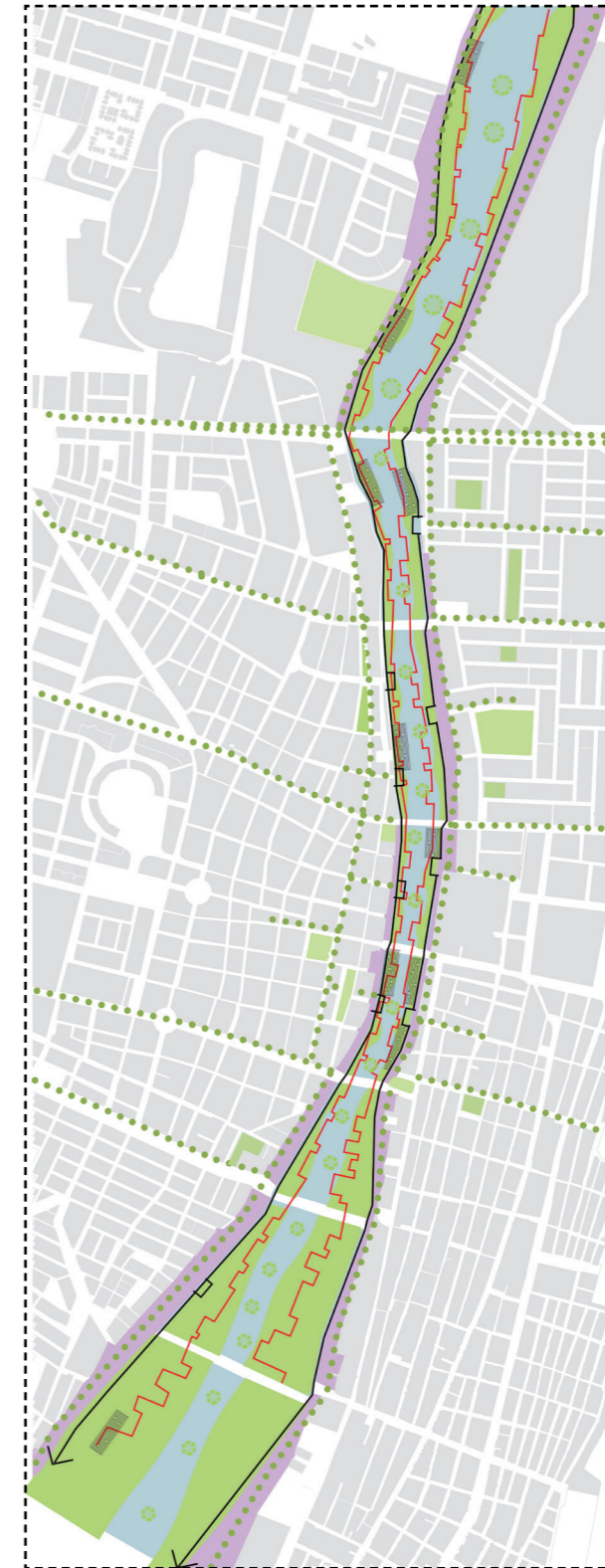
So, with the idea of having different levels of relation with the river (as the city used to have before), I designed a path (in red) that will allow pedestrians to explore the river when the water level is low (around 6 to 7 months). For that reason is also important to mention that this one could be floodable.






-  A new path to explore
-  New green border

EXTENSION OF THE CURRENT GREEN CORRIDOR- Strategie 09

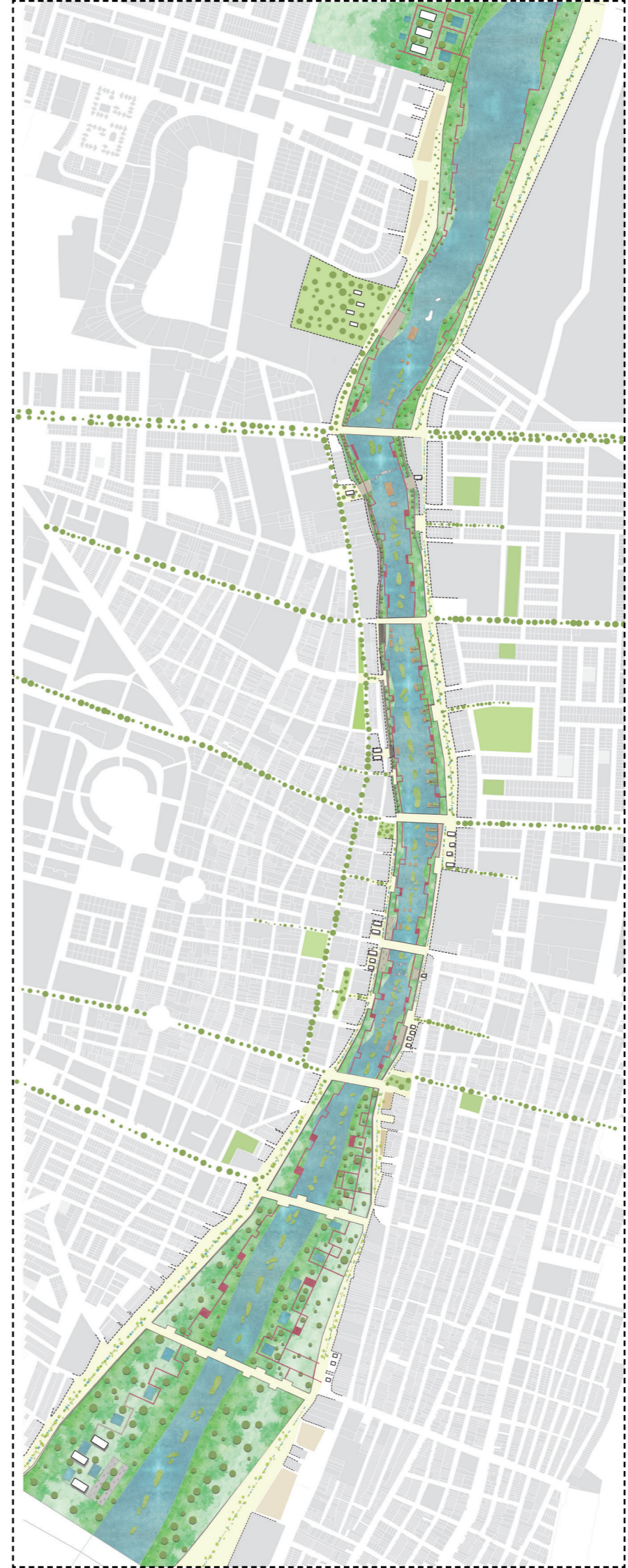
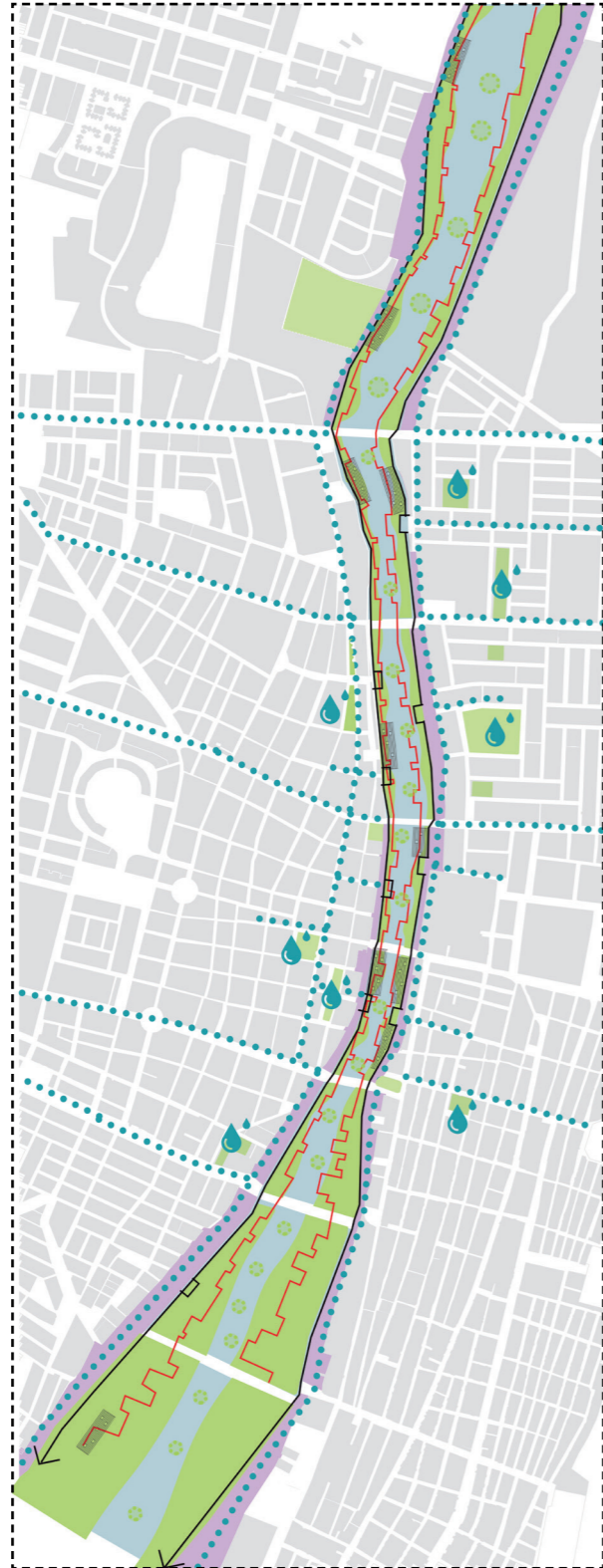
All mentioned strategies are connected with the surroundings through the extension of the existing green corridors (made by trees), linking the new river and the existing parks near the project.



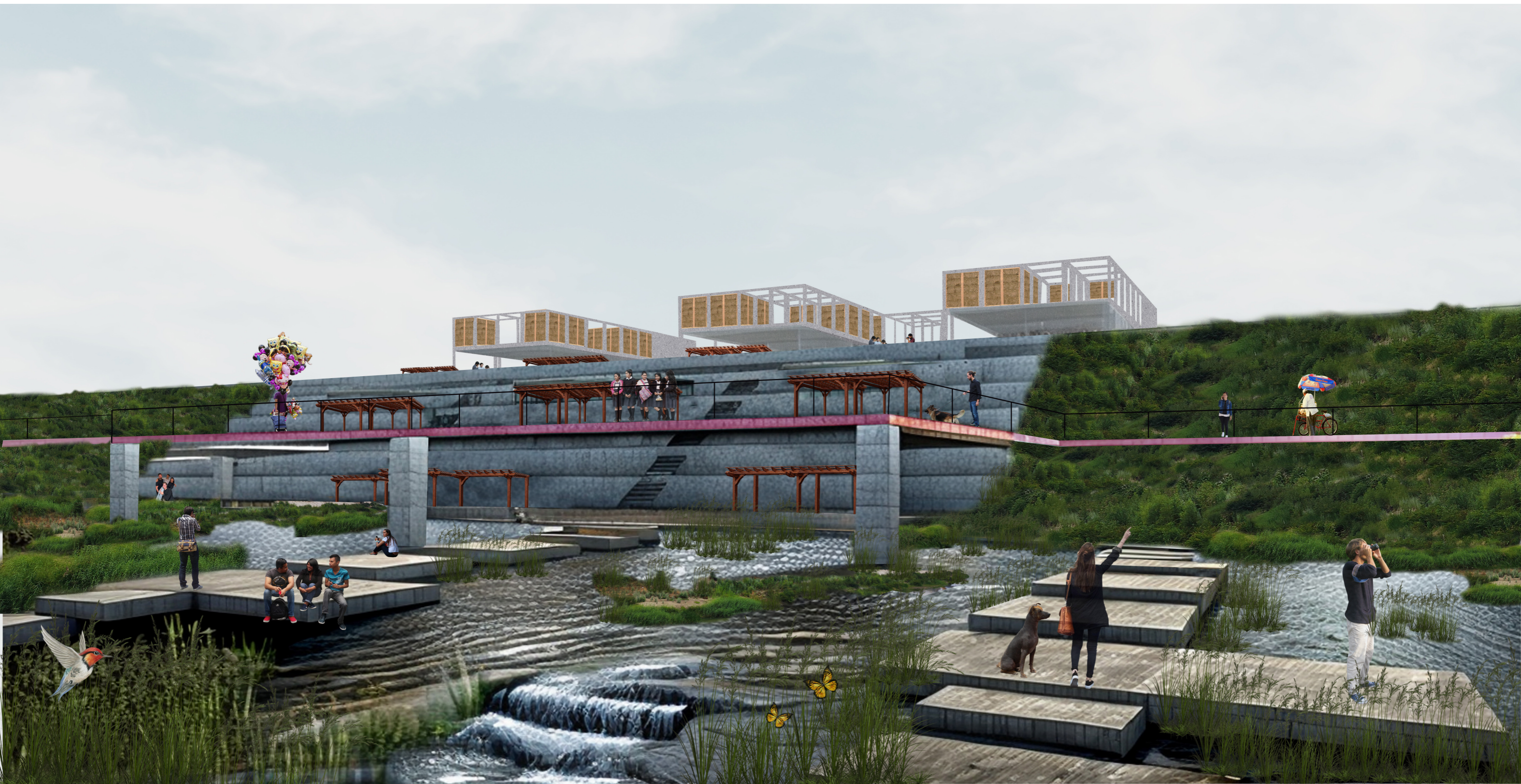
-  Green corridor
-  Infiltration parks with walls that can contain the rain water (reservoirs)
-  A new path to explore

A DRAIN SYSTEM TO AVOID FLOOD BY RAIN WATER- Strategie 10

This green corridor extension would be also the path for a new drain system to avoid flooding by rain and redirect all the water to the river. Complement with the sponge parks that also will absorb the water (infiltration parks).





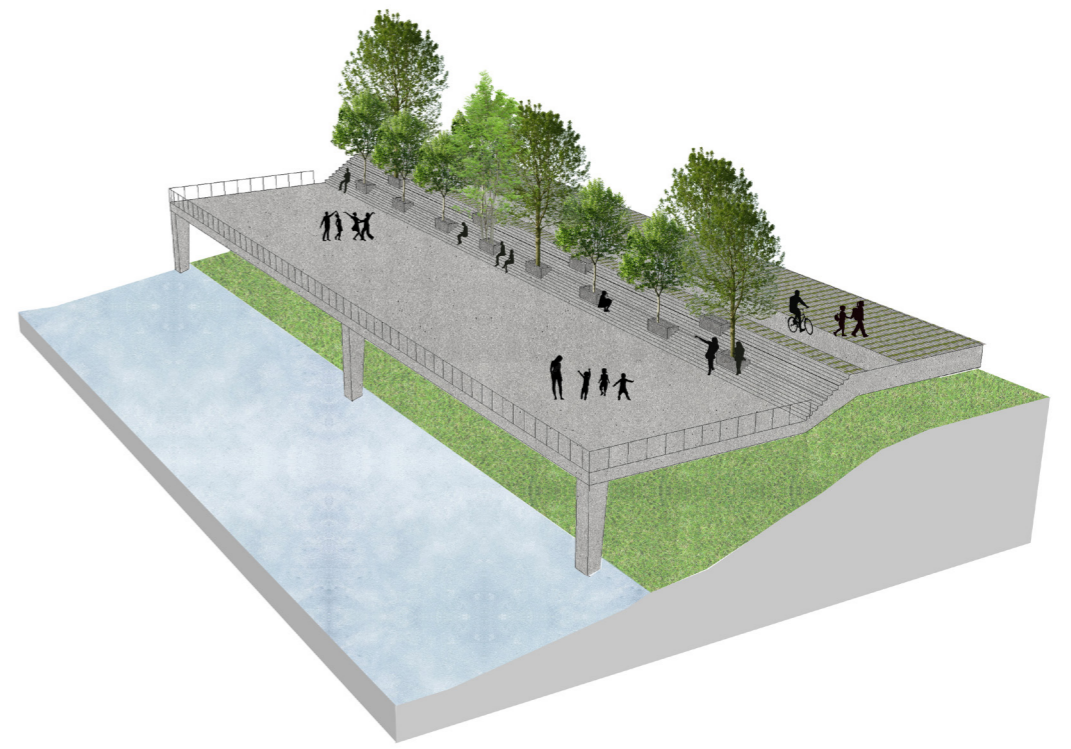
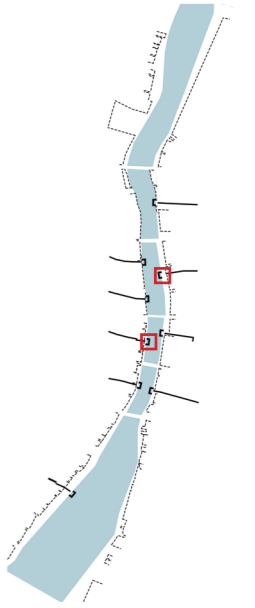


PLATFORMS OVER THE RIVER

In the case of the platforms there are three (03) typologies, and will depend on the activities around.

PLATFORMS - 01

It allows multipurpose uses, such as an area to dance or have street performances (as Piura's streets have nowadays in some squares or streets near the river).



□ P-01. Multipurpose area

HOW?

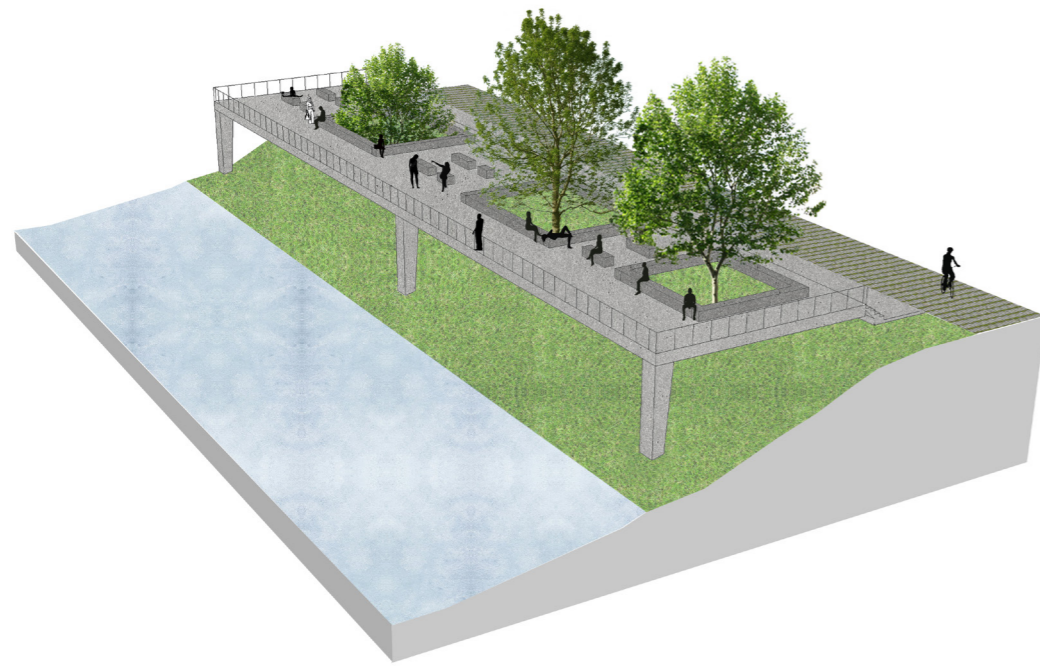
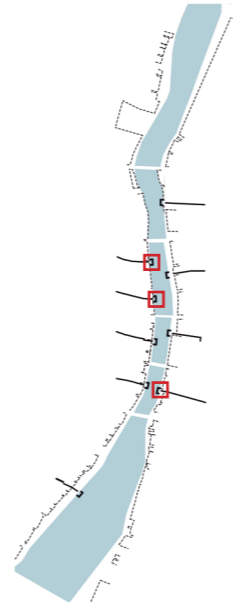
TOOLBOX

And how are those elements I mentioned in the strategies? For that I created a toolbox

- 01. Platforms over the river
- 02. Stairs
- 03. Paths
- 04. Floating platforms
- 05. Buildings

PLATFORMS - 02

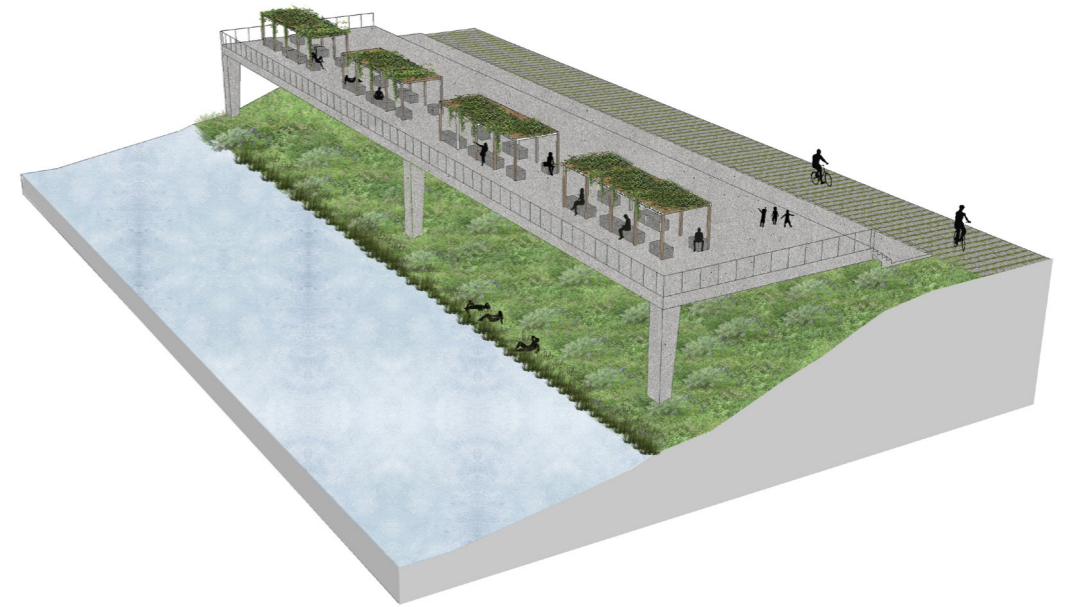
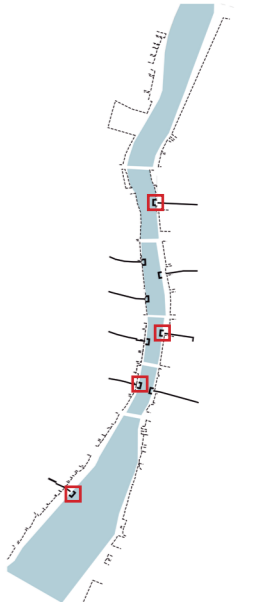
It allows the existing vegetation to grow inside the platforms, which at the same time provides new meeting points with natural shade.



□ P-02. Include the existing trees

PLATFORMS - 03

It gives the citizens wider meeting points at the end of the new pedestrian streets, which include artificial shade.



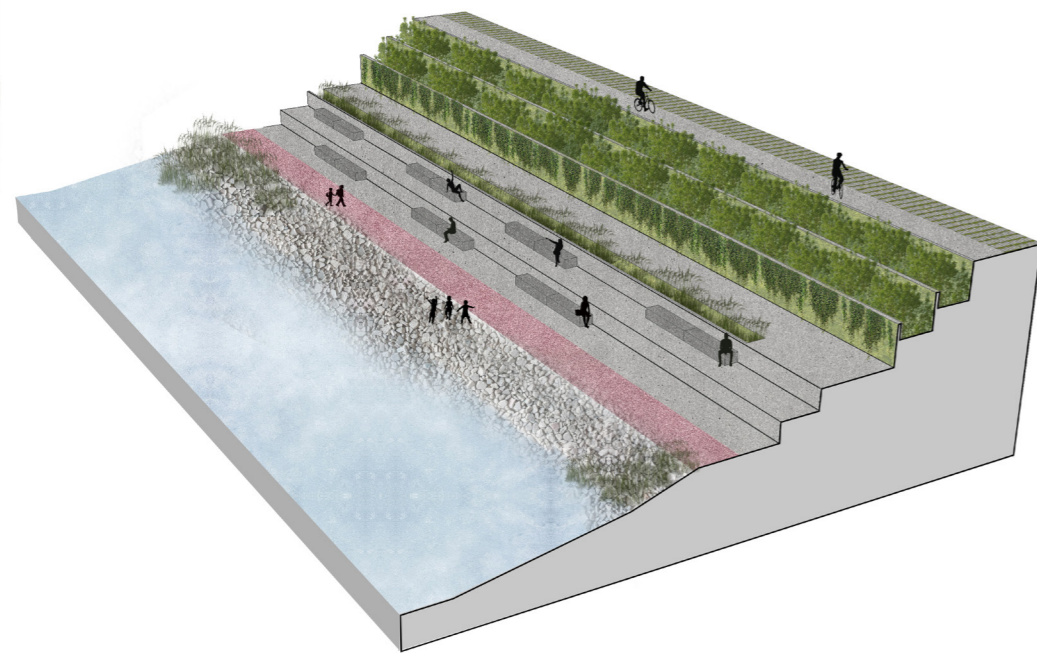
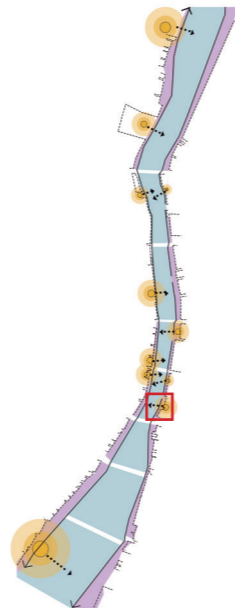
□ P-03. With artificial shade

STAIRS

In the case of the stairs, there are 07 typologies. Some of them allow the extensions of new activities from the buildings to the river while others work as agricultural stairs to preserve natural flora or create orchard gardens.

STAIRS - 01

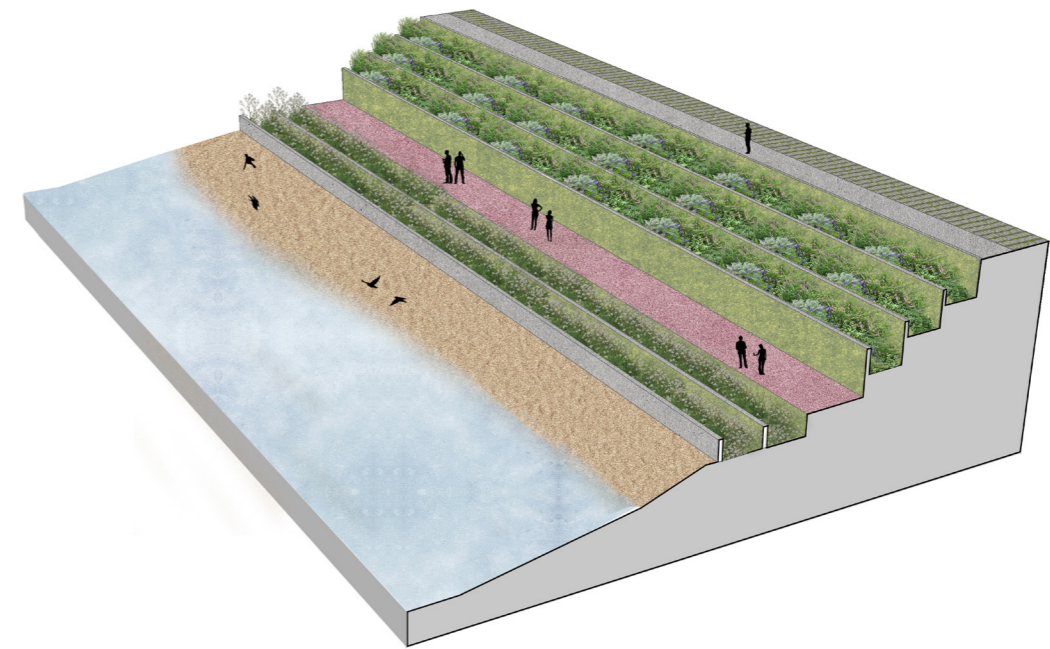
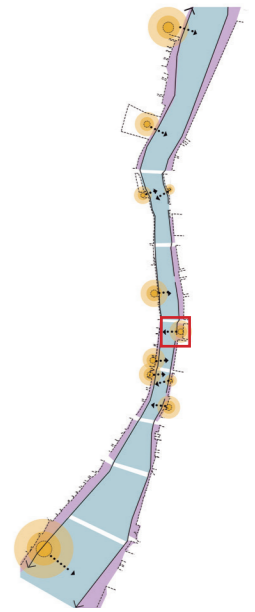
It is a mixed stair which allows the creation of new green areas with typical vegetation and at the same time creates meeting points near the base of the river to enjoy the water.



□ S-01. Mixed (vegetation + stairs)

STAIRS - 02

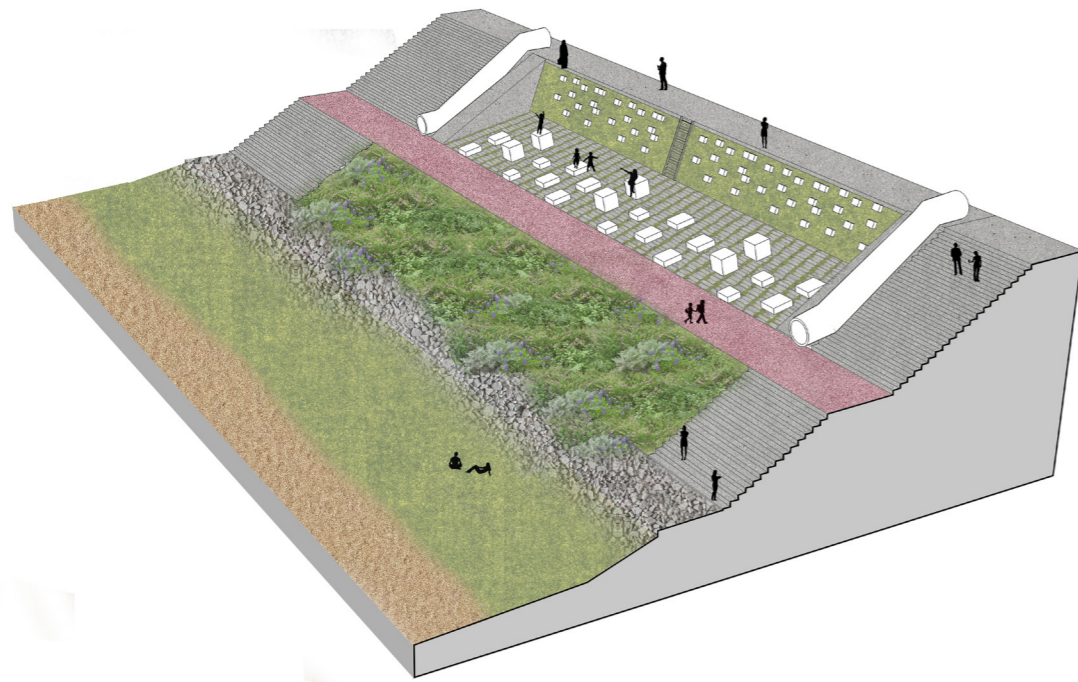
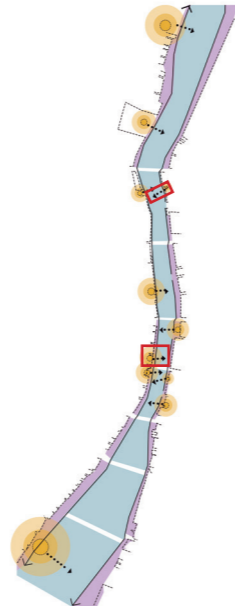
It allows the creation of orchard gardens on the slope over the existing concrete base.



□ S-02. Agricultural stairs

STAIRS - 03

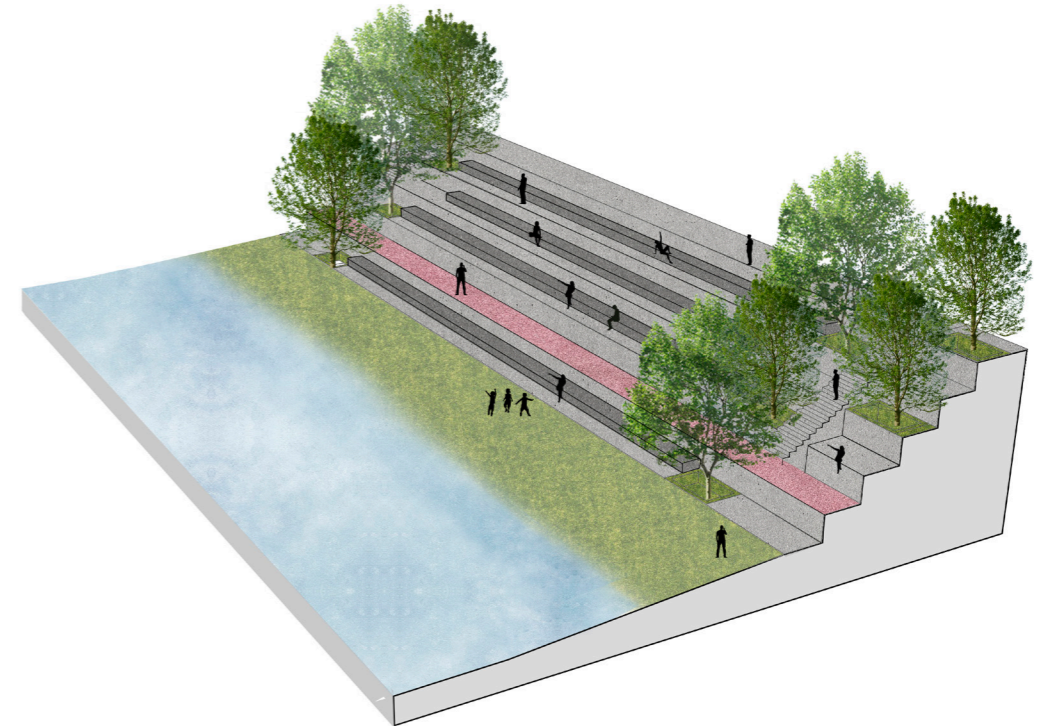
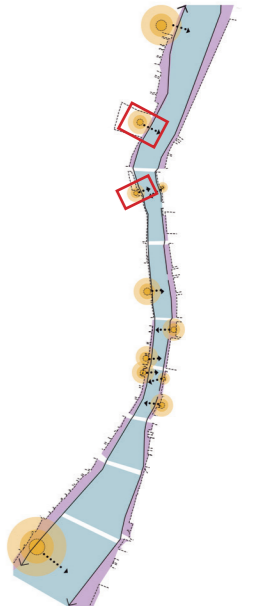
This typology allows diversity in the slope and creates playgrounds or areas with multipurpose furniture.



□ S-03. Use the slope for playgrounds

STAIRS - 04

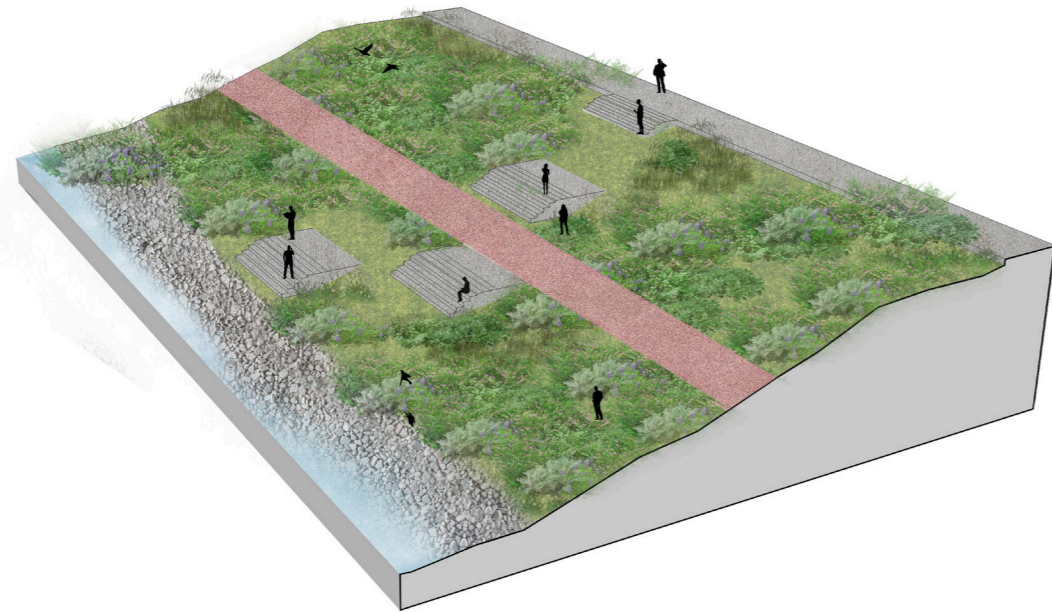
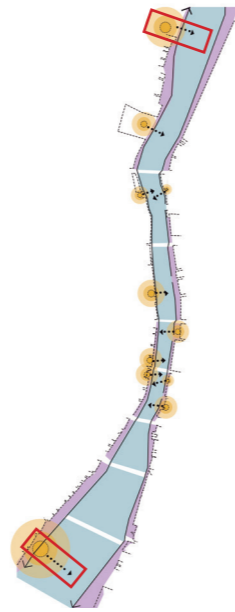
It allows meeting spaces with natural shade and looks at other activities that are happening inside the river, such as watching a football match, film or performances.



□ S-04. To watch a football match/ cine/ theater

STAIRS - 05

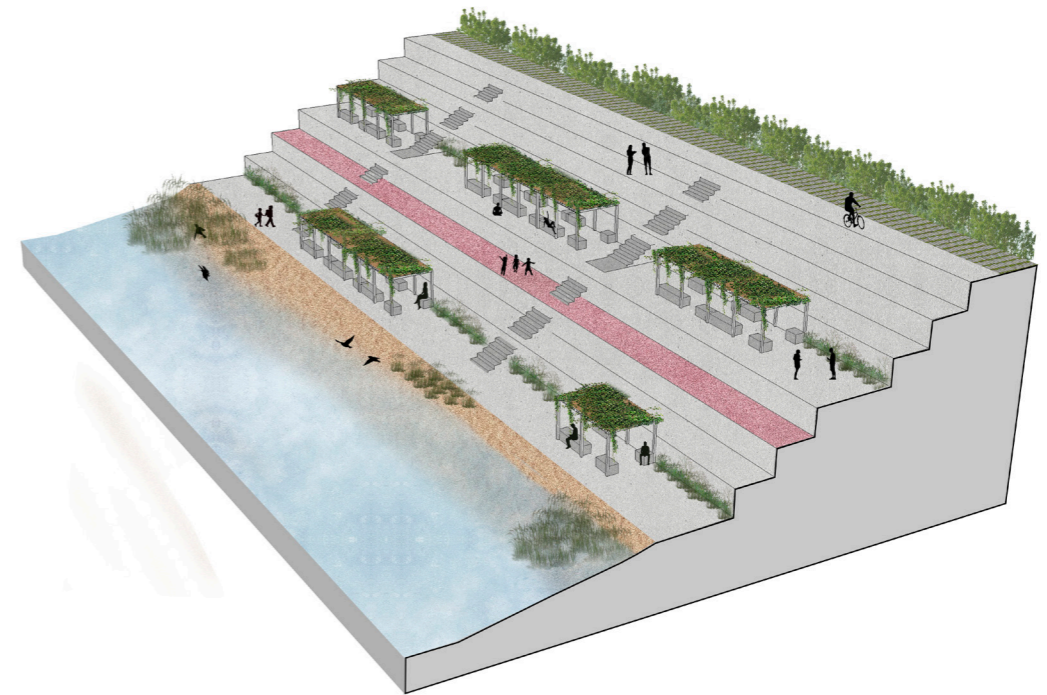
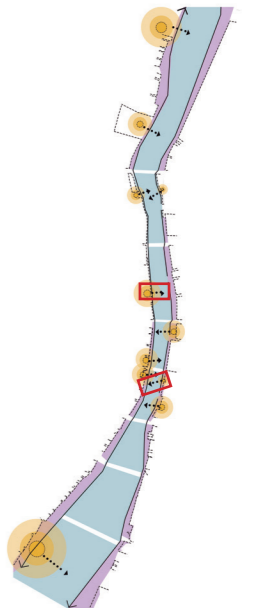
It is located where there is natural vegetation, with the idea to create a non-invasive access to the river.



□ S-05. Allows natural plants to grow

STAIRS - 06

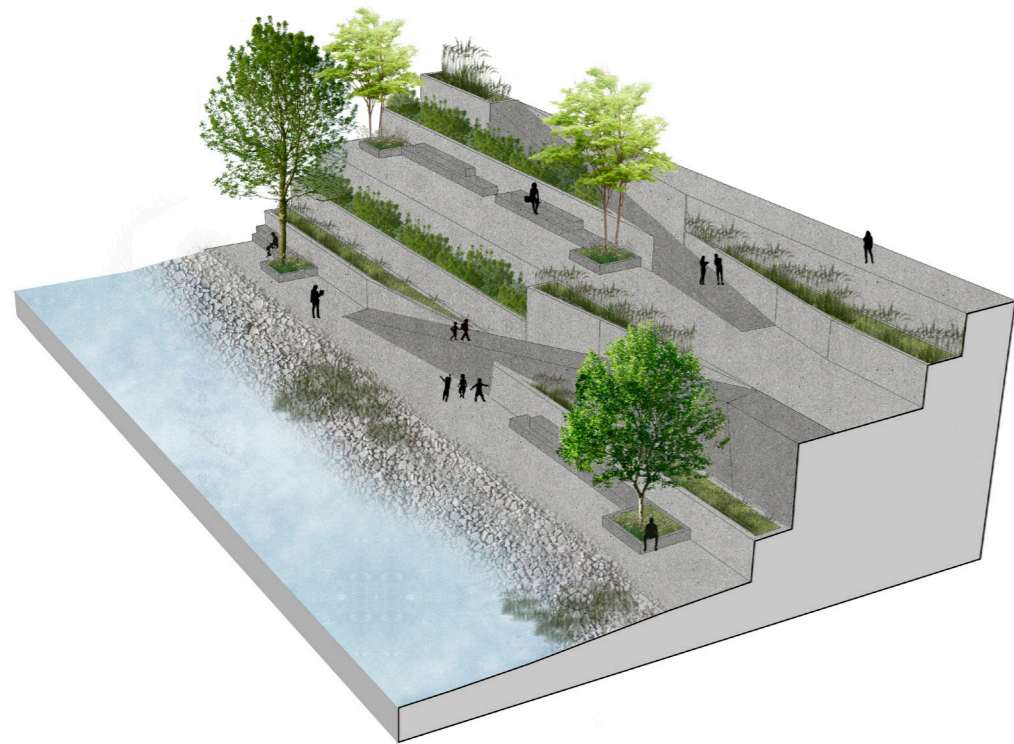
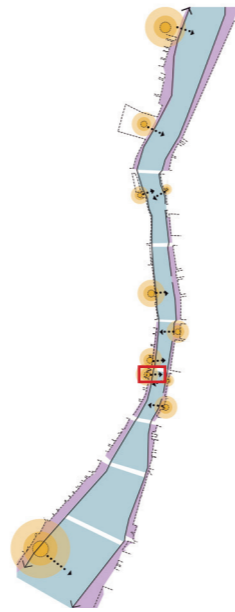
It allows diversity in the meeting spaces, which could be with artificial shade or without in case of using those areas as a "beach area".



□ S-06. Spaces to rest with artificial shade

STAIRS - 07

It mixed vegetation, areas to rest and easy access. (Even though these is the only stairs that include access through a ramp, there are ramps in each bridge to go inside the river through the red path from the strategies).



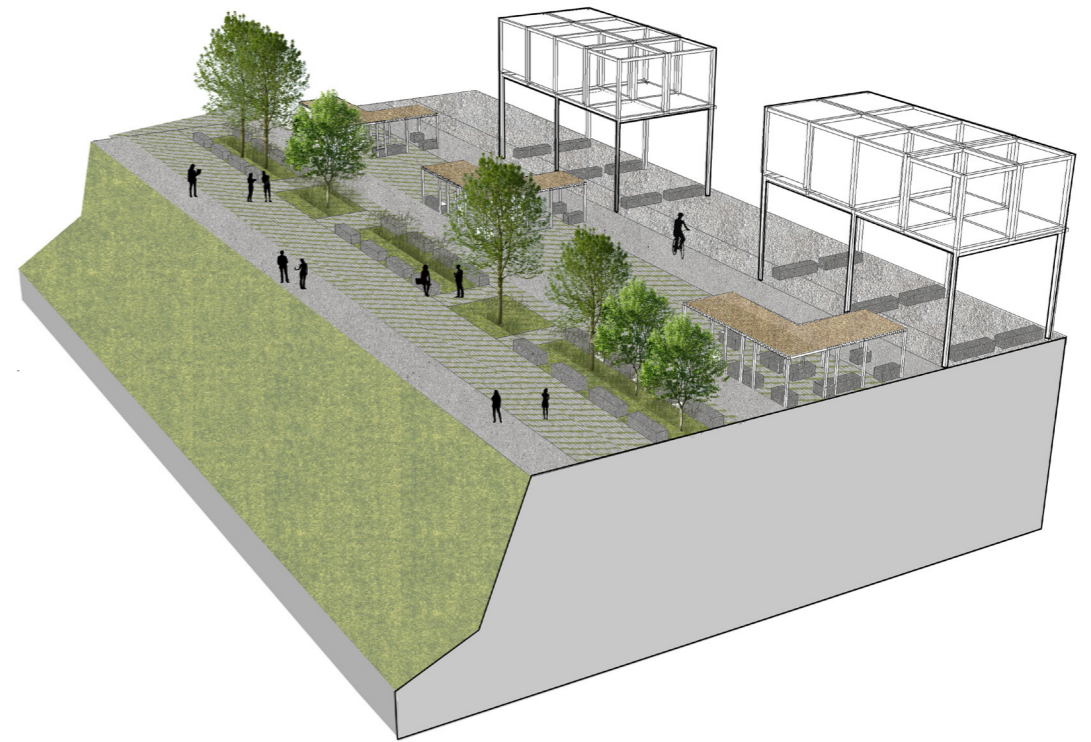
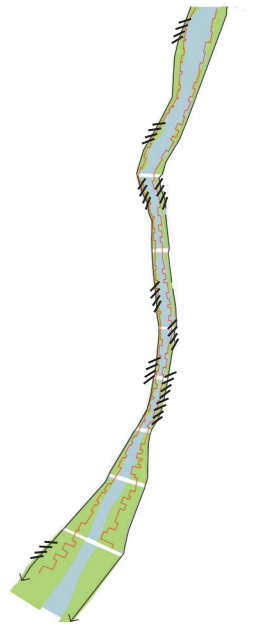
□ S-07. Spaces to rest with natural shade

PATHS

In the case of the paths, there are seven typologies. Those allow variety in the green areas and different levels of interactions with the river or buildings.

PATH - 01

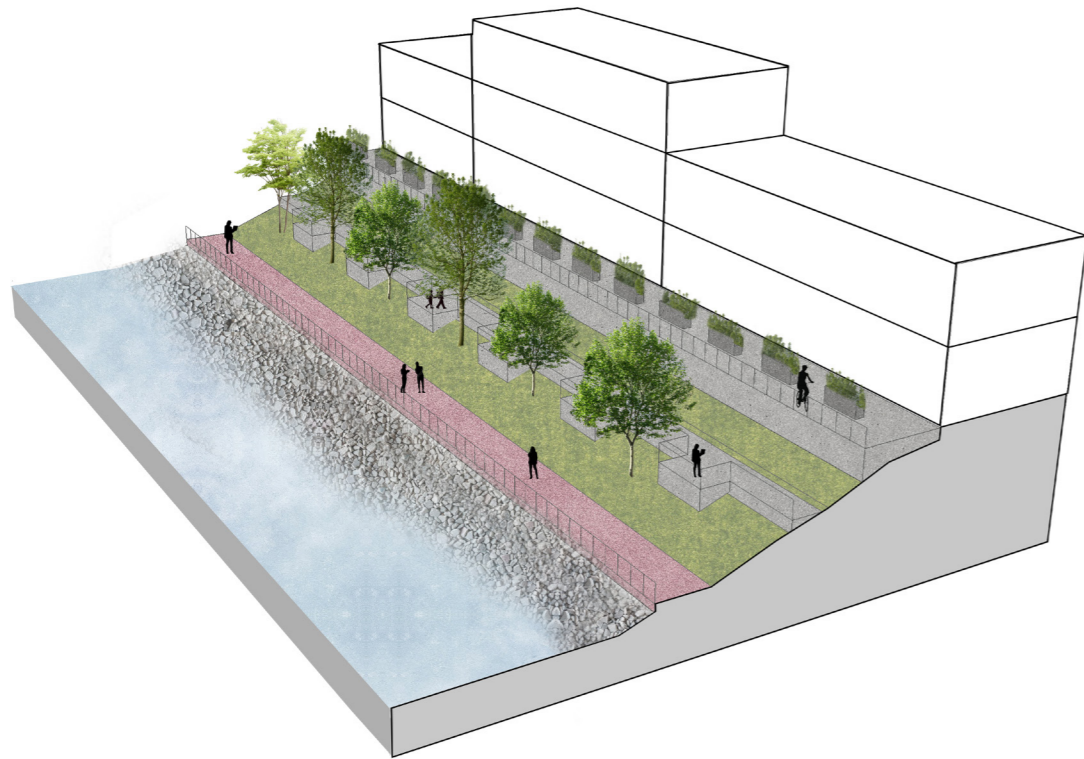
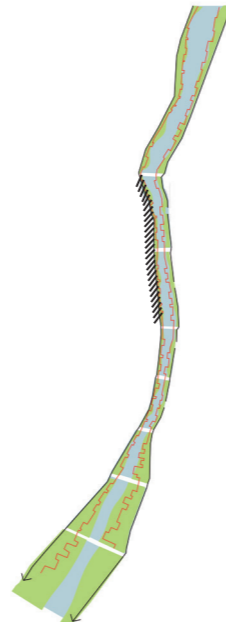
Those are located in front of new buildings to offer diversity in the meeting areas, complemented by infiltration gardens and typical vegetation.



≡ PA-01. Infiltration gardens + artificial shadow

PATHS - 02

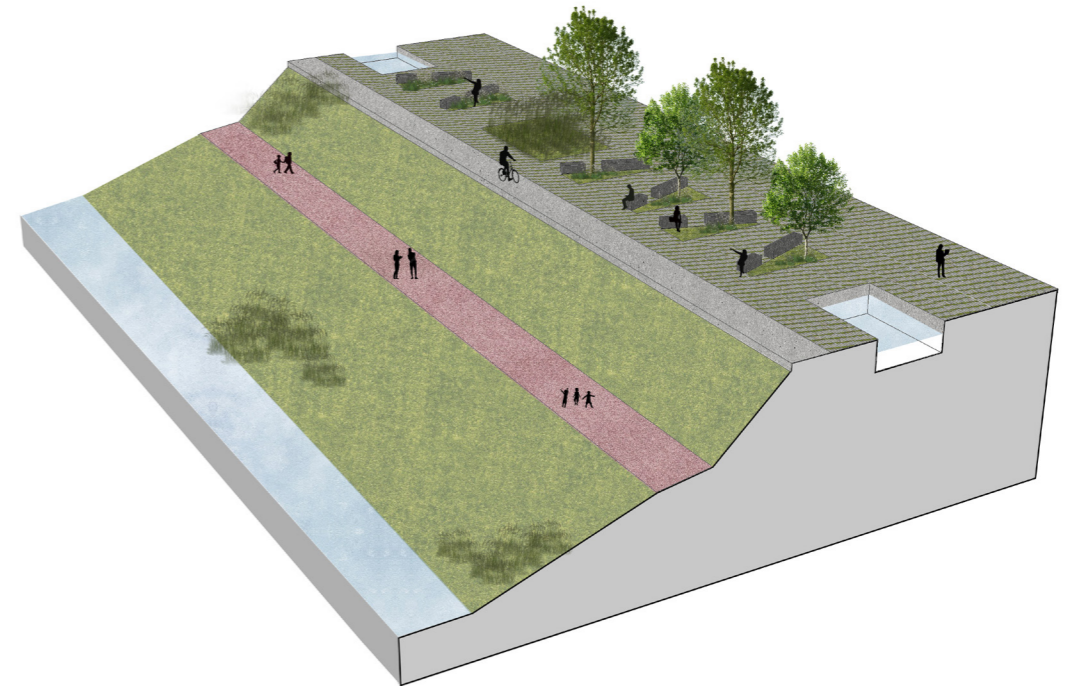
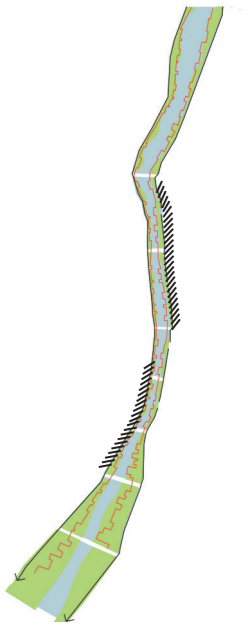
It is located in situations where there is not an existing path next to the road, with the idea to create three different levels of privacy and give the neighbours a new facade facing the river.



PA-02. Three levels (next to the houses,in the slope & at the water level)

PATHS - 03

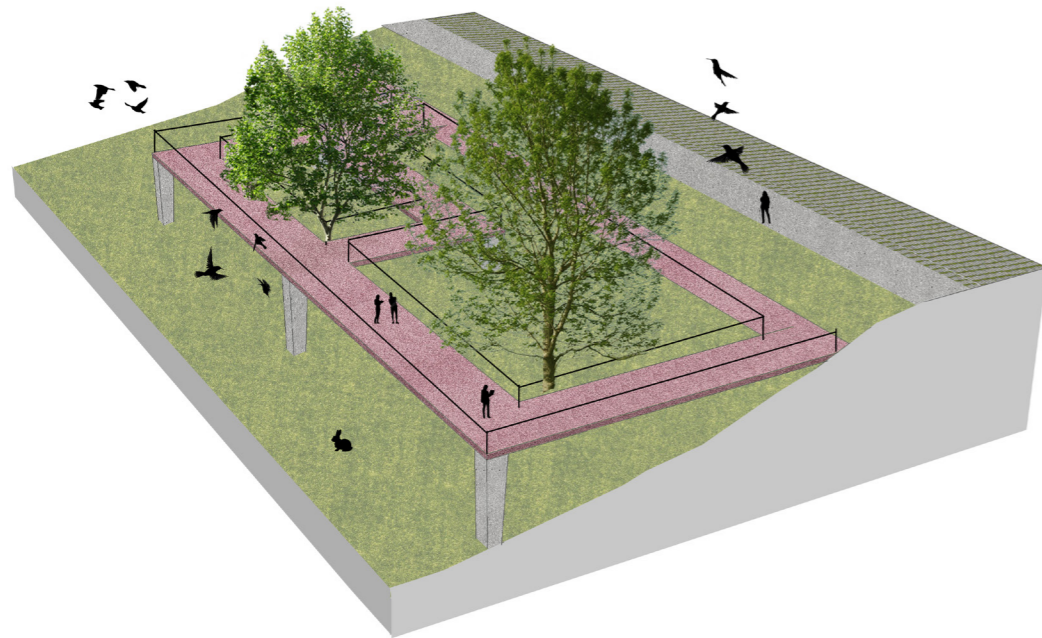
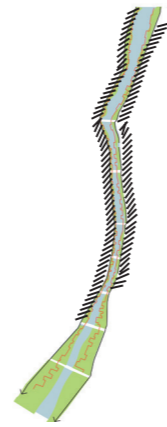
This shows a typical situation with the red path near the river to appreciate fauna & flora, and the path at the level of the street with vegetation and water storage.



PA-03. Infiltration gardens + Path to appreciate fauna

PATHS - 04

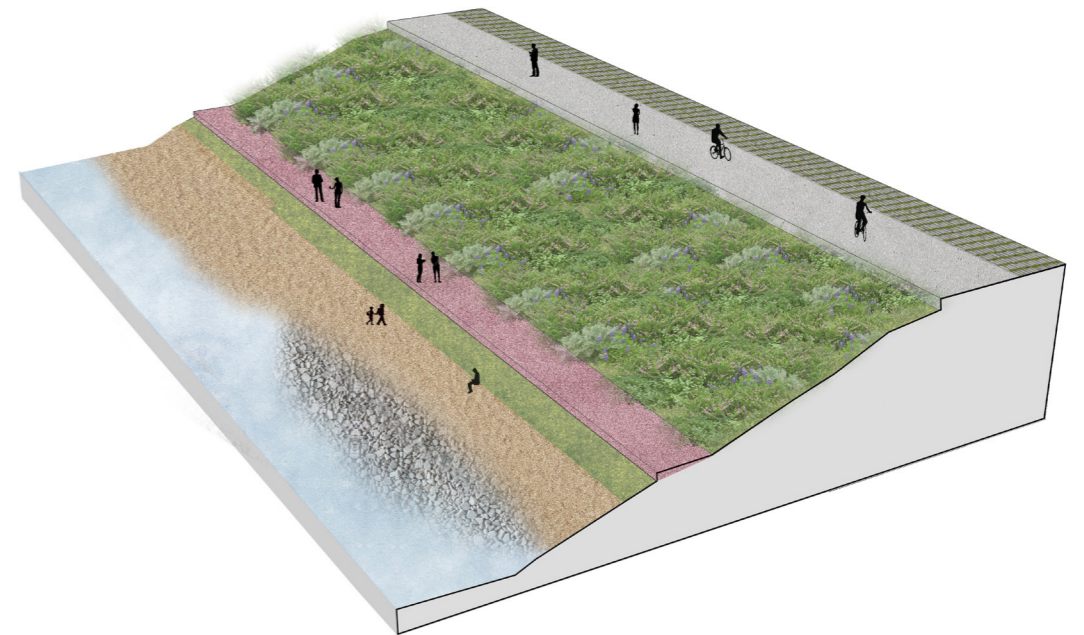
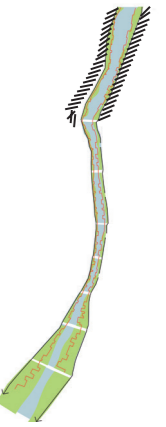
The red path could round the existing vegetation to respect the flora & fauna.



PA-04. Path to appreciate flora & fauna

PATHS - 05

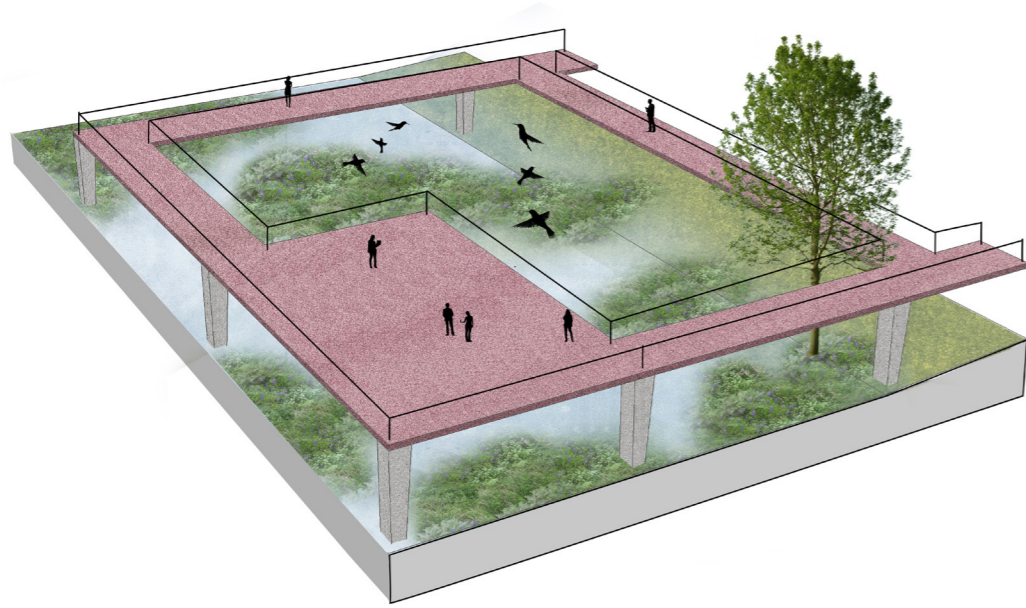
This path avoid doing big interventions in the existing vegetation.



PA-05. Paths around the natural and current vegetation

PATHS - 06

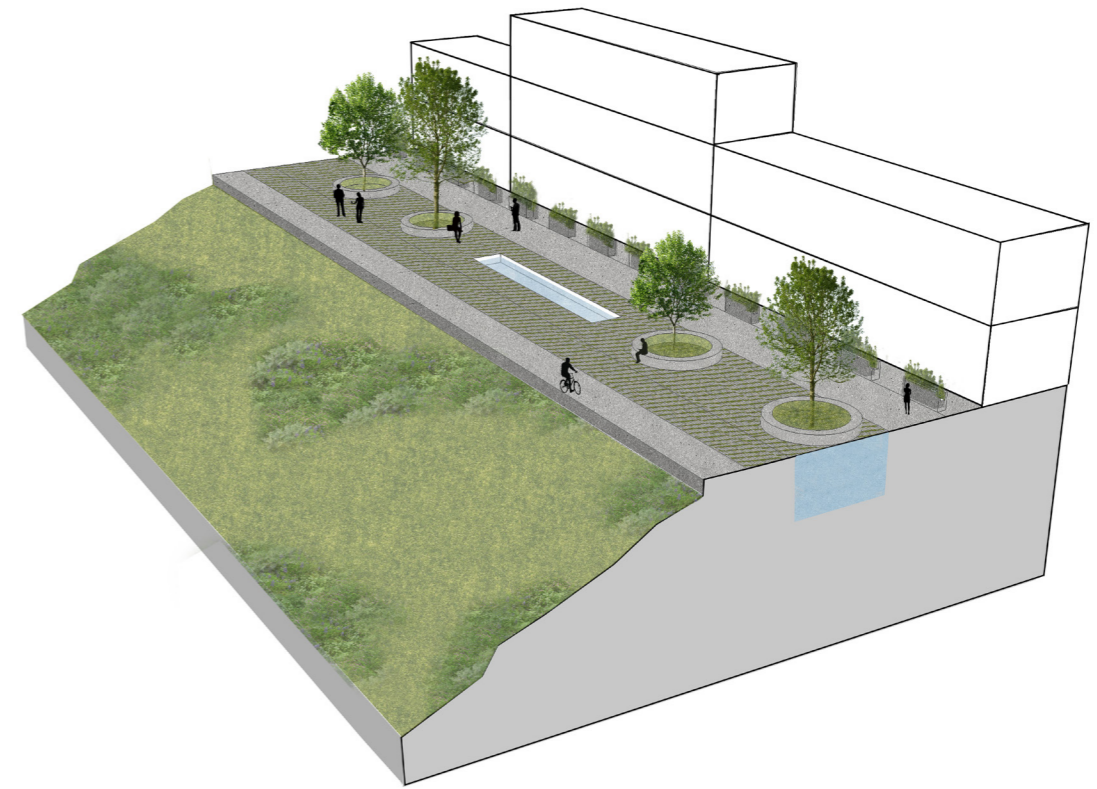
In the areas with could be considered wetlands, the red path is built over it.



PA-06. Path over rain gardens

PATHS - 07

In the situation with a narrow road without car traffic, the middle are become a tree corridor providing shade.



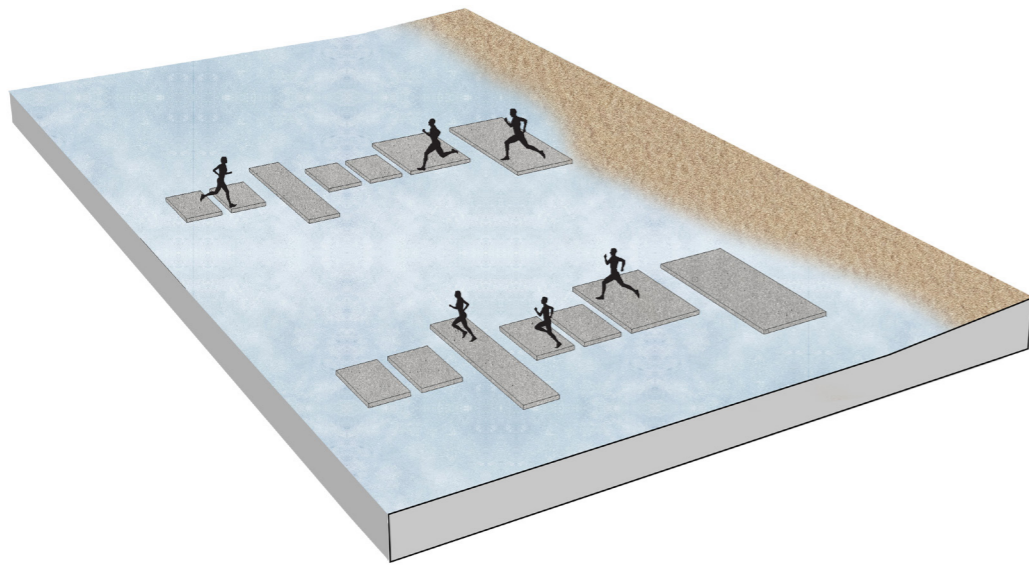
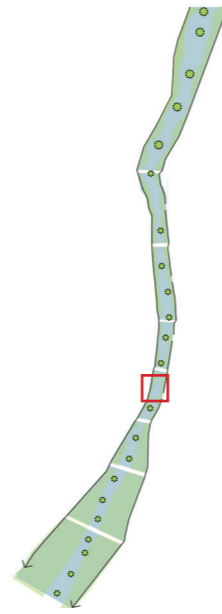
PA-07. Standar path in an narrow road

FLOATING PLATFORMS

Those allow different activities around the whole year because of their adaptability to float with the different levels in the water

FLOATING PLATFORM - 01

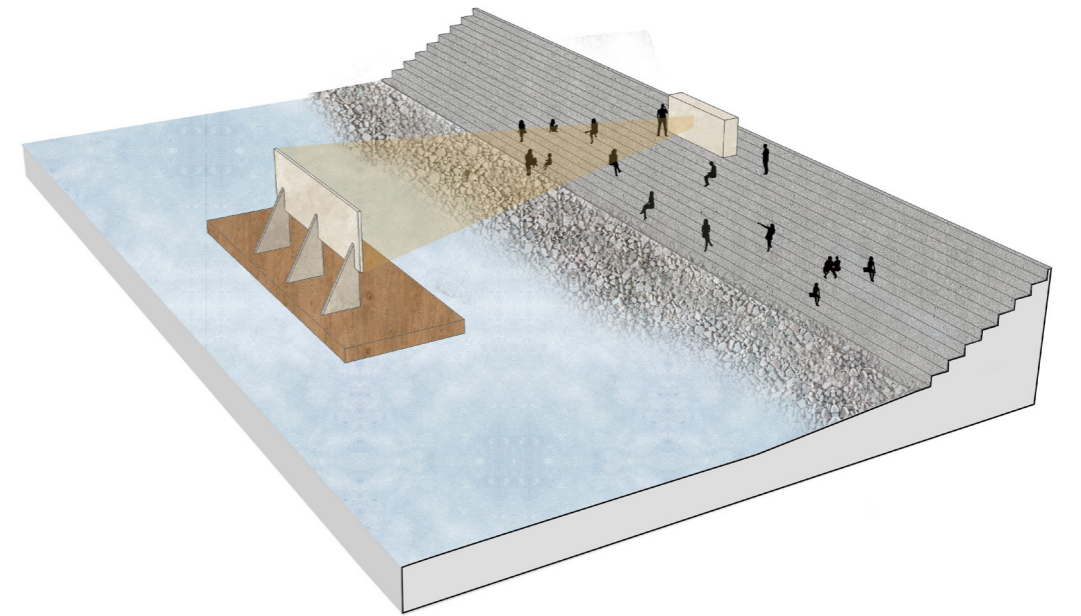
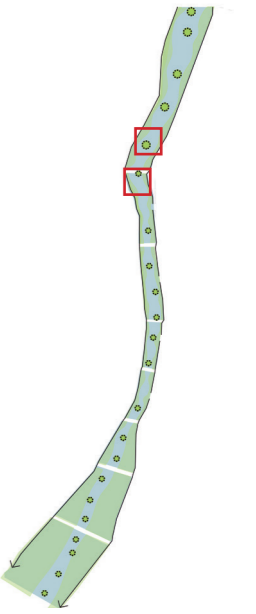
Allow to cross the river from one side to another.



□ F-01. To cross the river

FLOATING PLATFORMS - 02

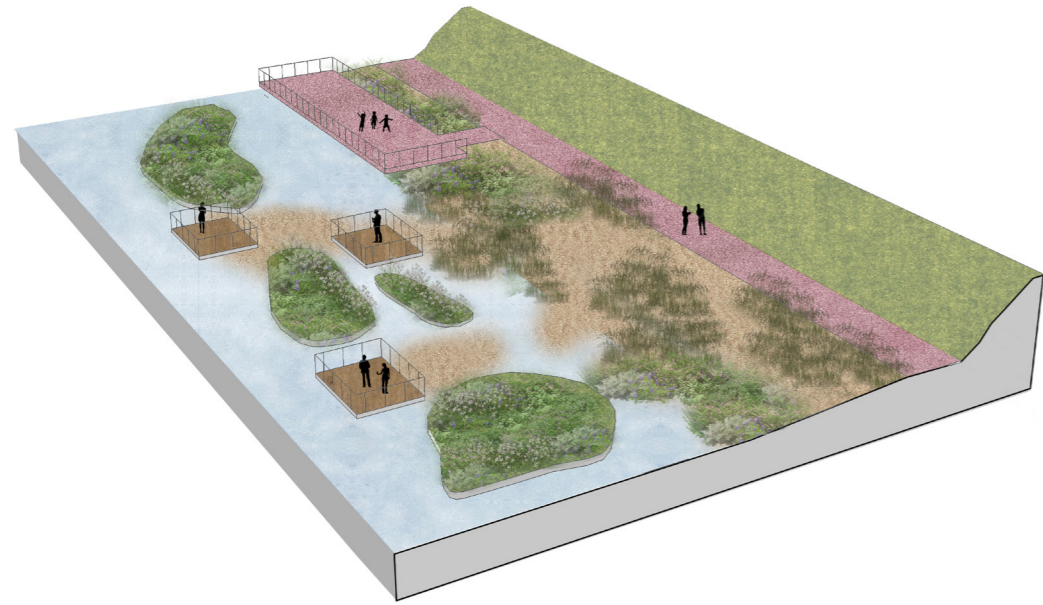
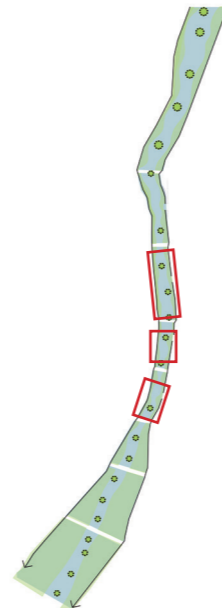
This platform works as a stage. Those are connected to the base of the river to avoid displacement of it.



F-02. To watch films or performances

FLOATING PLATFORMS - 03

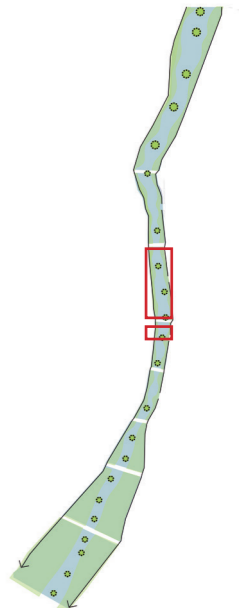
Those allow us to have another perspective of the fauna & flora by being near them. Those are reachable by walking when the river doesn't have water (5 months) and reachable by swimming when there is a high water level. As well as the previous one, those are connected to the base of the river.



F-03. To appreciate the fauna & flora

FLOATING PLATFORMS - 04

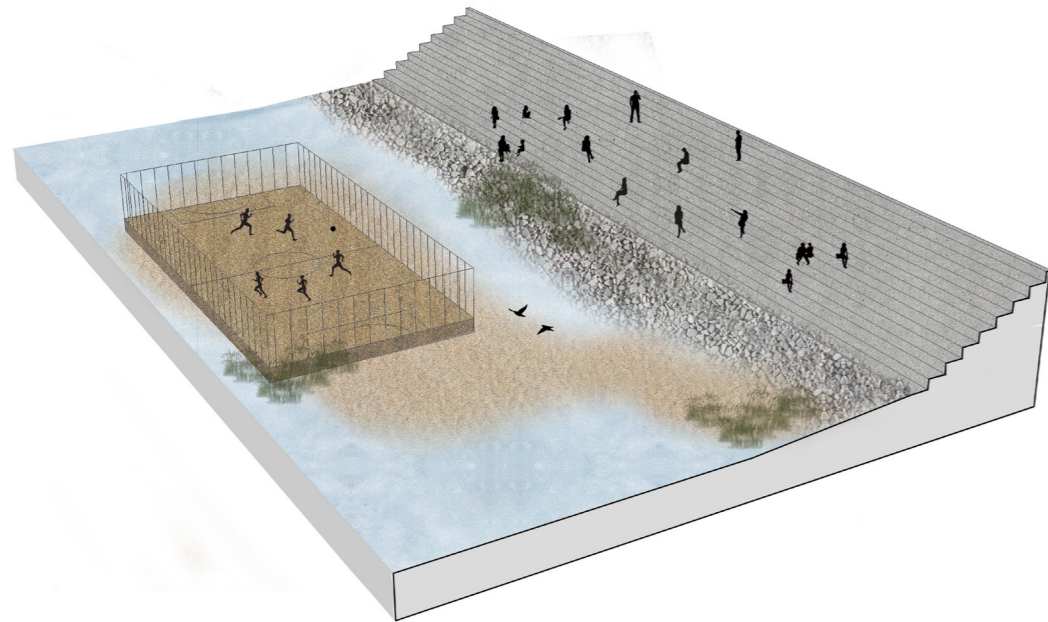
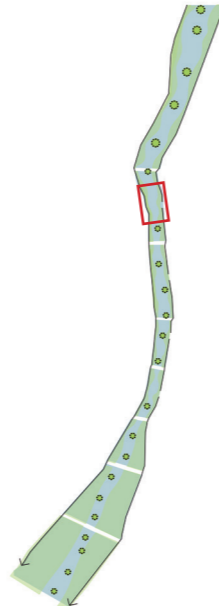
Those allow to have community gardens trough platforms of 3.5 m x 3.5 m. Those are reachable by the walking platforms (not floatable) and when water level increase are reachable by small boats.



F-04. Floating orchard gardens

FLOATING PLATFORMS - 05

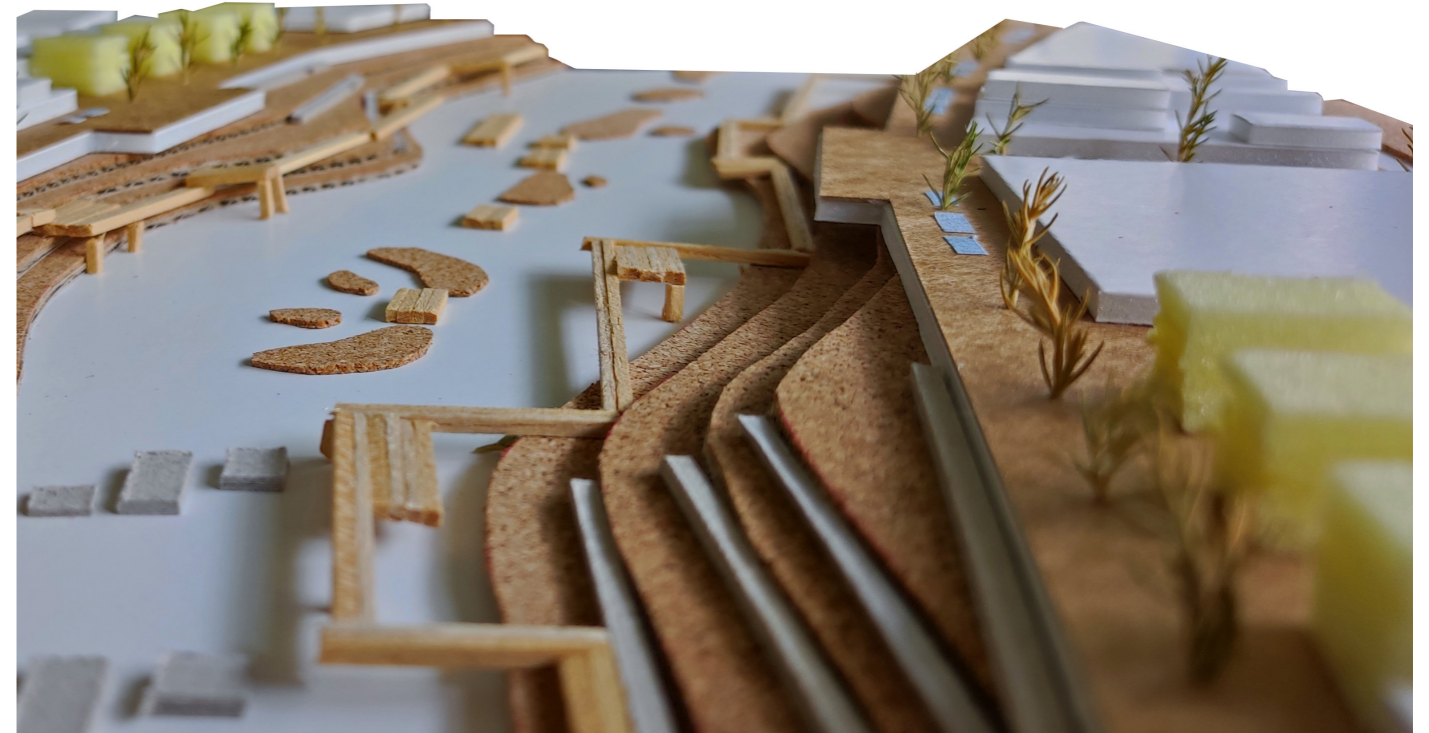
Those are the bigger ones designed to do sports (11 m x 22 m) and compensate in a percentage, the lack of public spaces in the city



F-05. To do sports

MODEL - The path inside the river

Here we have a view of how those items would look like.



MODEL - Floating platforms and gardens

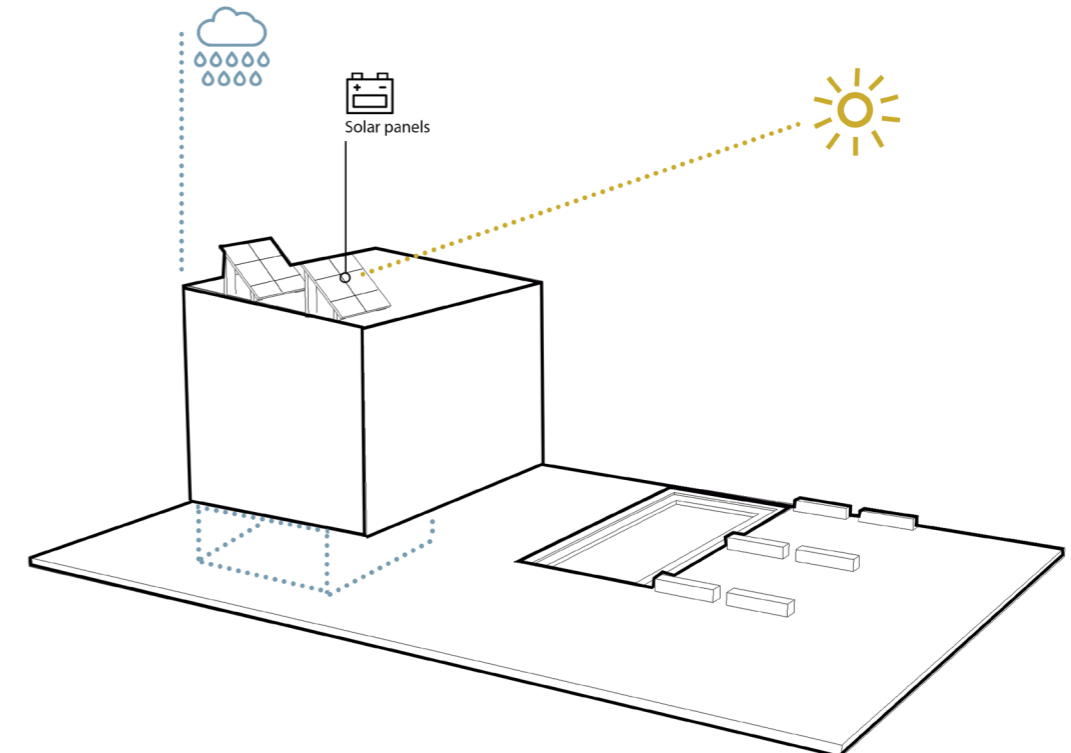
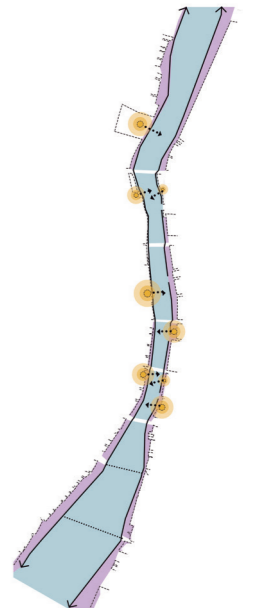


NEW BUILDINGS TYPOLOGIES

Those are two types which are gonna be explained in steps to make the design process more understandable. For that, the first building is divided into 05 steps while the second one will be into 02 steps. Located in the abandoned and unused areas next to the river.

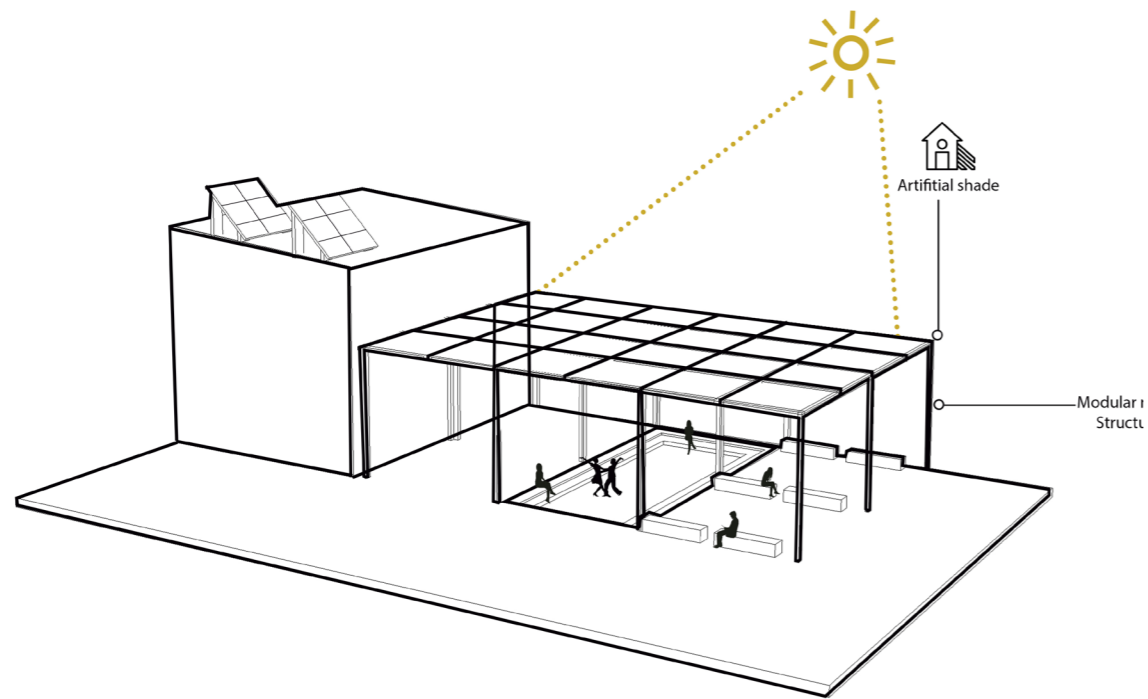
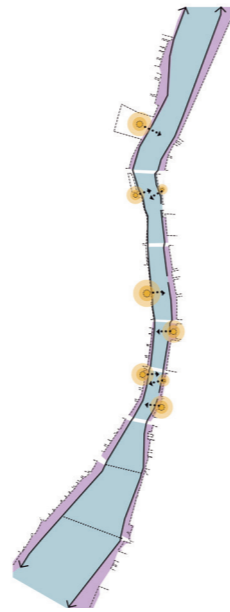
BUILDING 01 - STEP 1

The first is a modular building that will allow different shapes for the uses, as the first step, all of them will have a base "box" in the back part of the building that will work for the administrative offices and to store solar energy and rainwater.



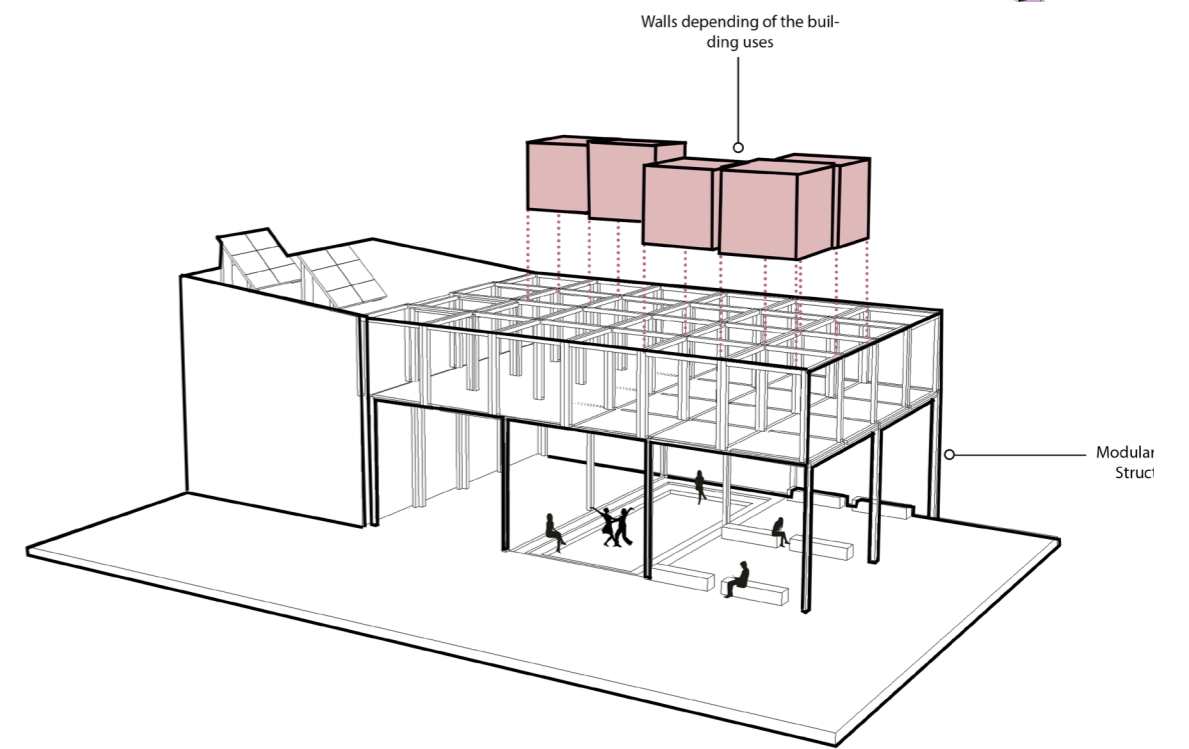
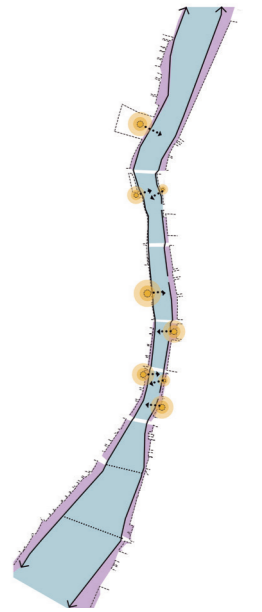
BUILDING 01- STEP 2

Then, with the idea to create artificial shade (an aspect that the inhabitants are always looking for), the MODULAR metal structure (3m x 3m) will create a roof over the ground that allows different activities.



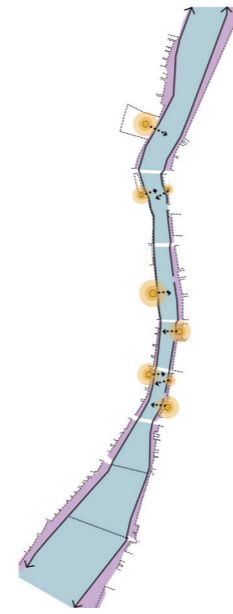
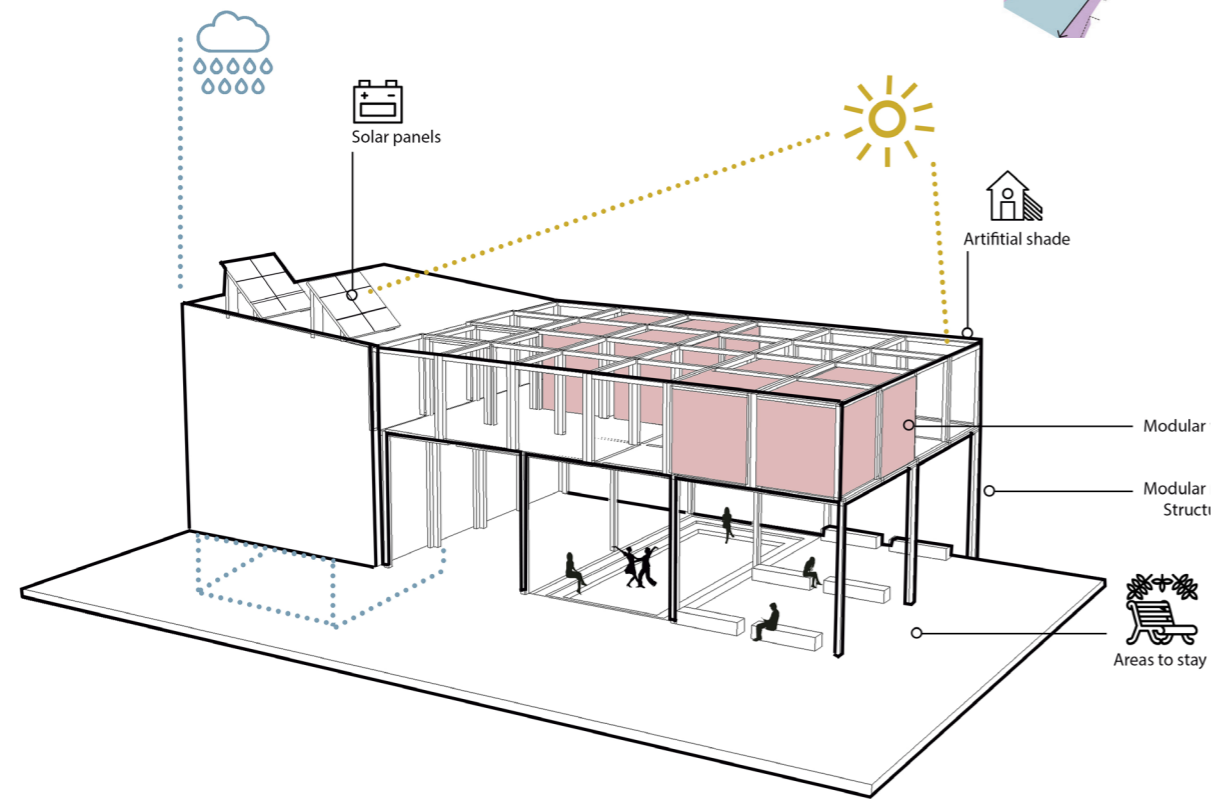
BUILDING 01- STEP 3

This metal structure could be of two floors, to create spaces through prefabricated earth walls (traditional material from the city).



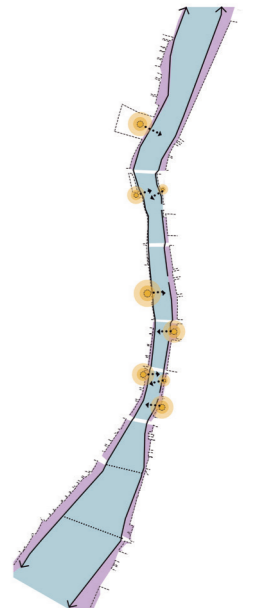
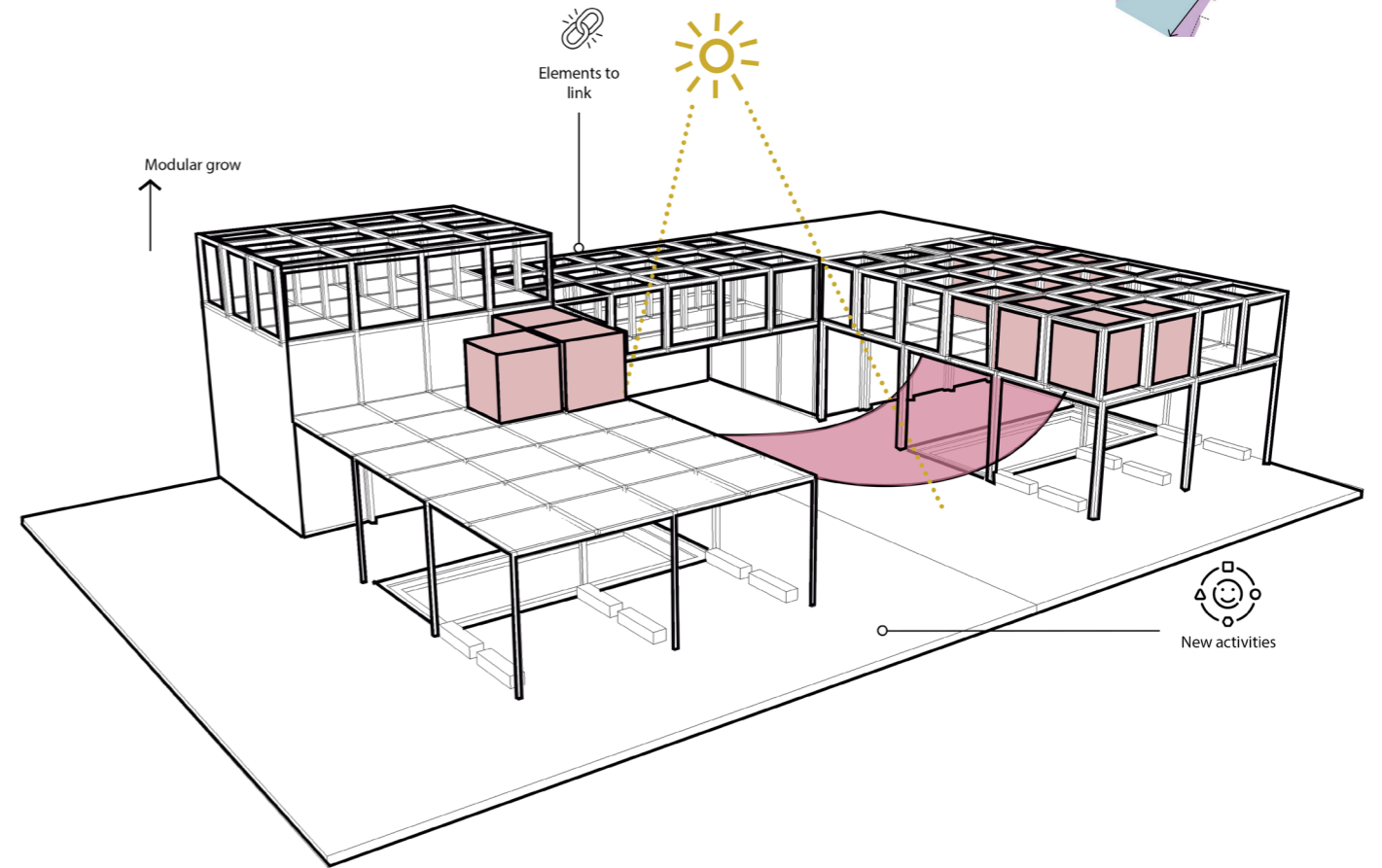
BUILDING 01- STEP 4

Providing different modular location of the walls.



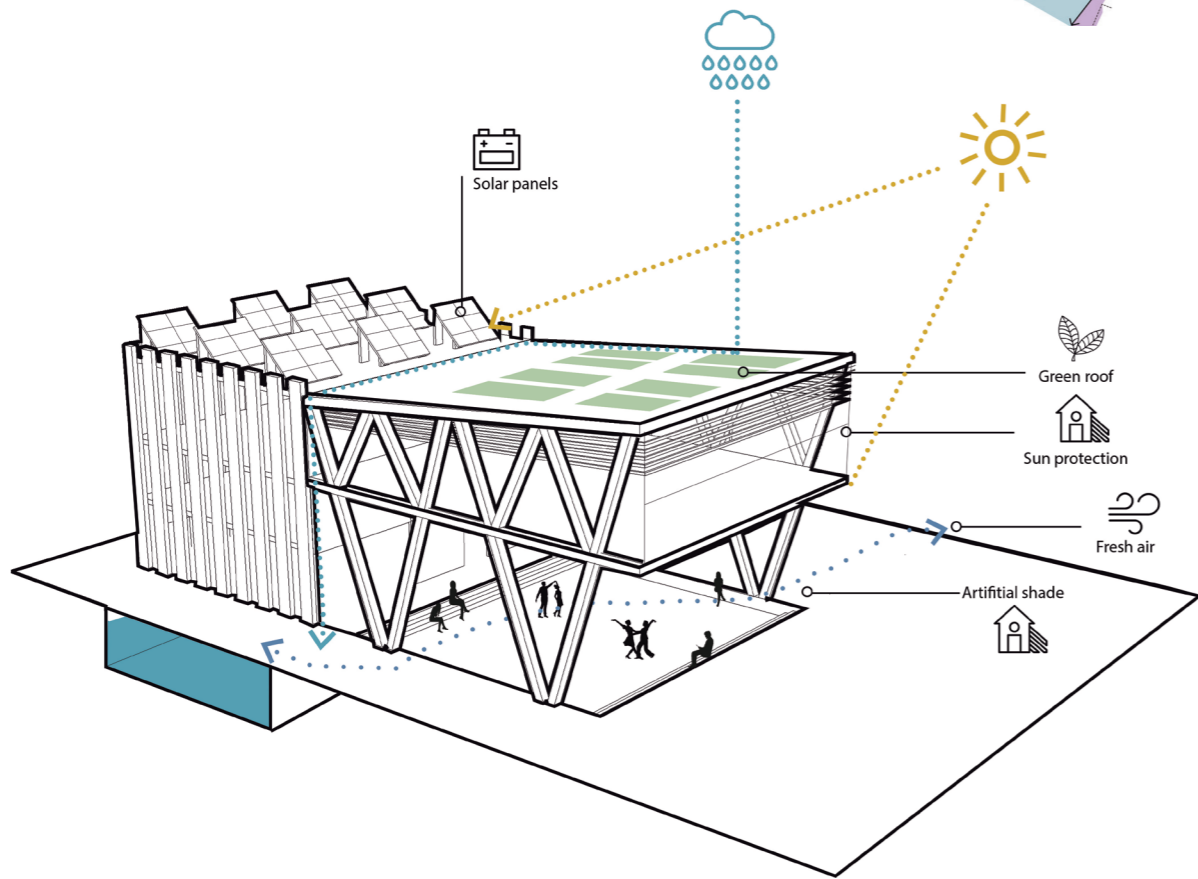
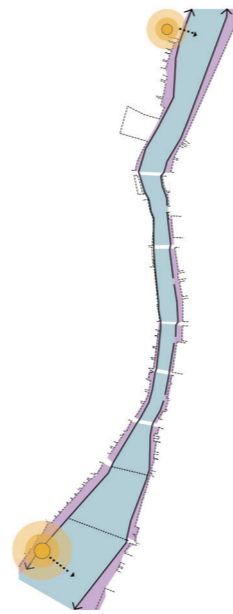
BUILDING 01- STEP 5

This main building could also work with a second one, connected through the same structure, which is an opportunity to create new intermediate spaces between them.



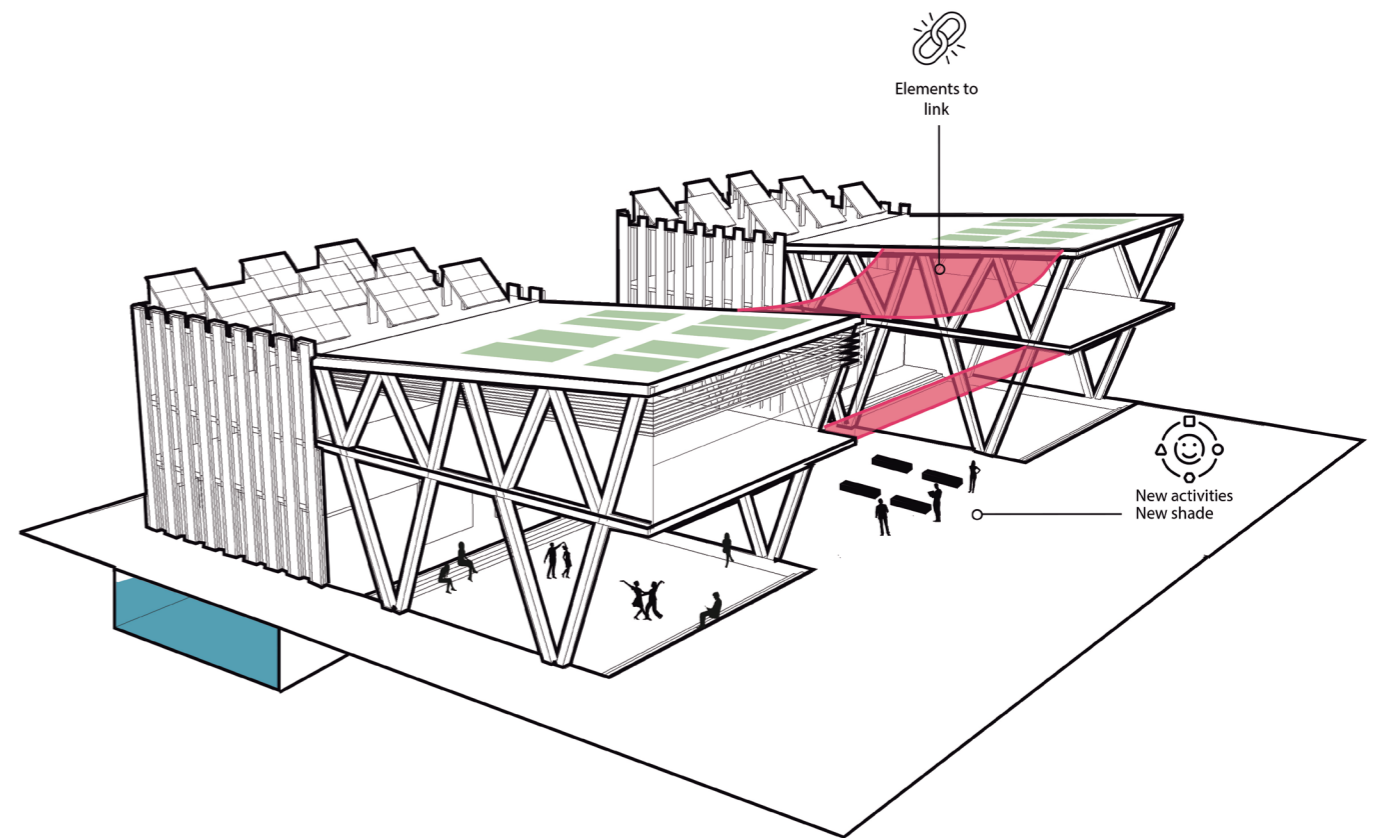
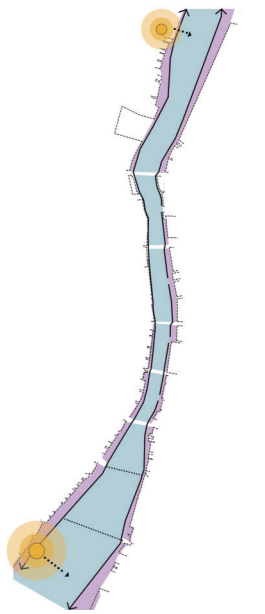
BUILDING 02- STEP 1 - LANDMARKS

In the case of the second typology, this is located at the beginning and at the end of the new border project. It will allow bigger dimensions, working as **LANDMARKS** in the city and providing artificial shade.



BUILDING 02- STEP 2

Those will work in pairs or more to create dynamics around them. Those also works as a **SPONGE** in the city, keeping the rain water.



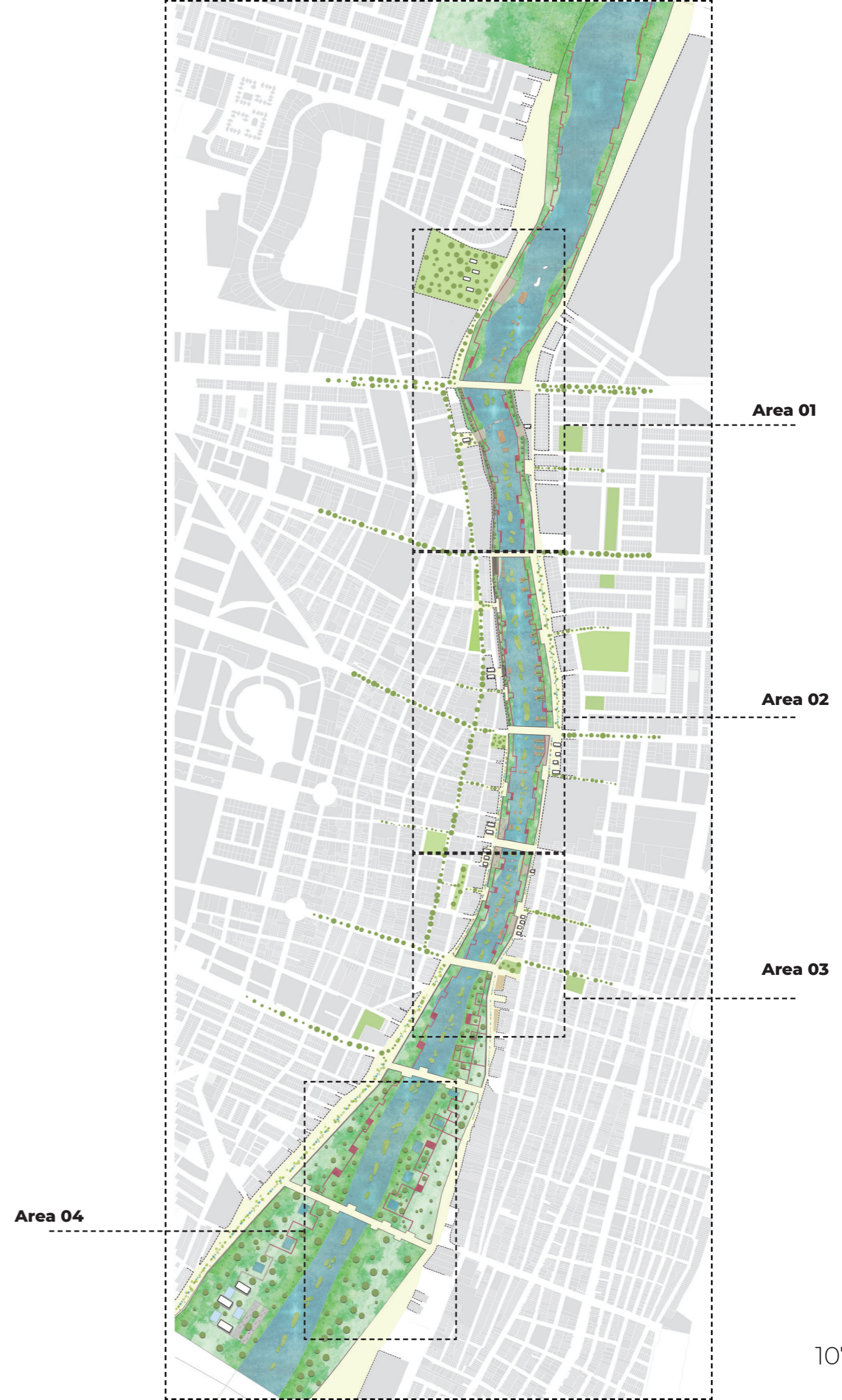
06

BEFORE AND AFTER SECTIONS

DETAIL DESIGN

For the explanation, I will divide the master plan into 4 areas, from north to south.

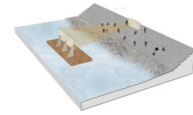
Lets see how all those items are applied in the project.



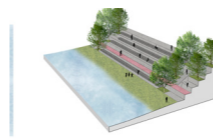
AREA 01 SECTION A

The FLORA & FAUNA center.

Used items from the toolbox:



F-02

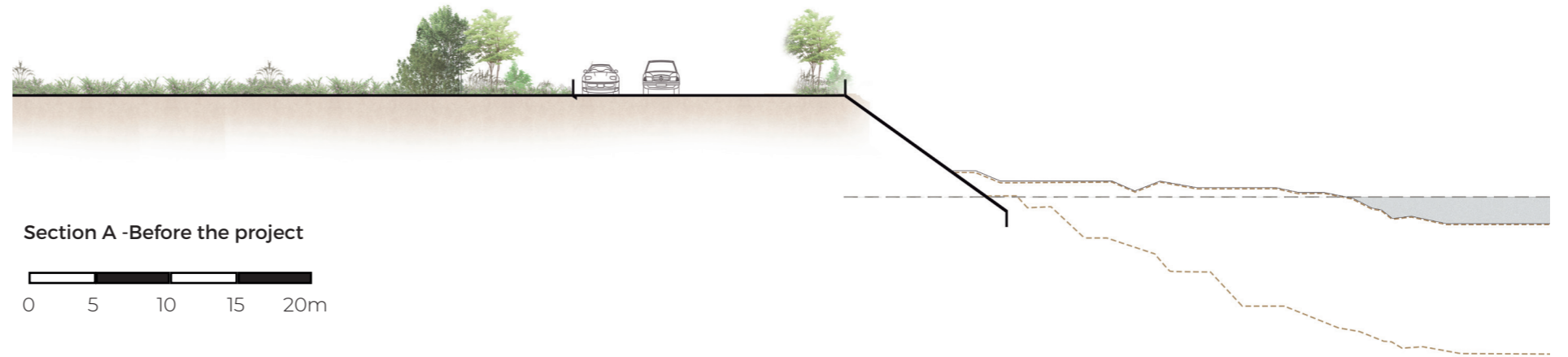


S-04

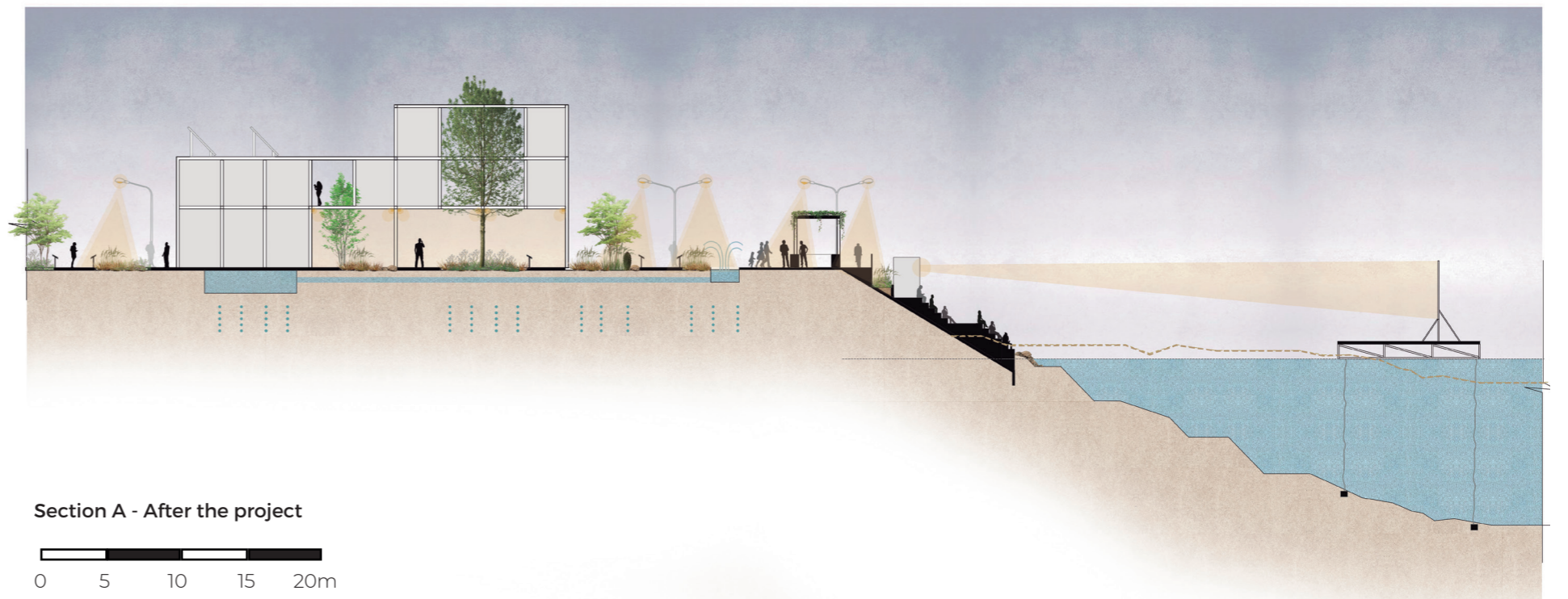


PA-01

One of the uses that will highlight the existing flora & fauna will be a research centre that will show the importance of the river to the citizens through many activities such as films or performances.



Section A -Before the project



Section A - After the project

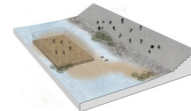


AREA 01 SECTION B

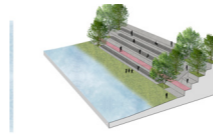
YOUTH CENTER

Based on the uses around, mainly educational centres, there would be a youth centre that will provide public areas to them, such as a library and outdoor areas to do sports or meet friends.

Used items from the toolbox:



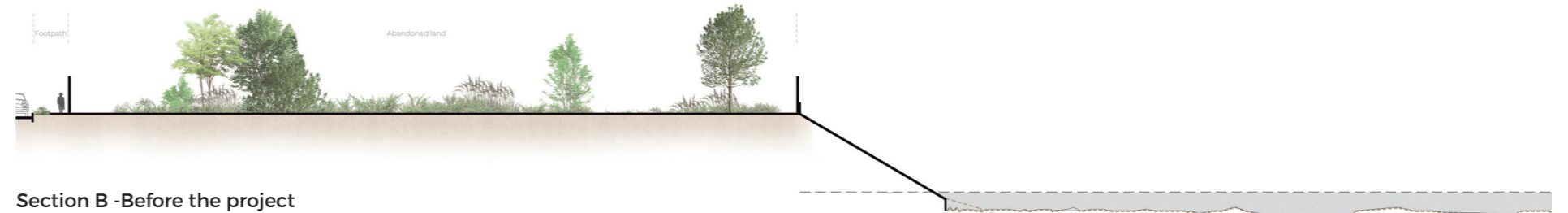
F-05



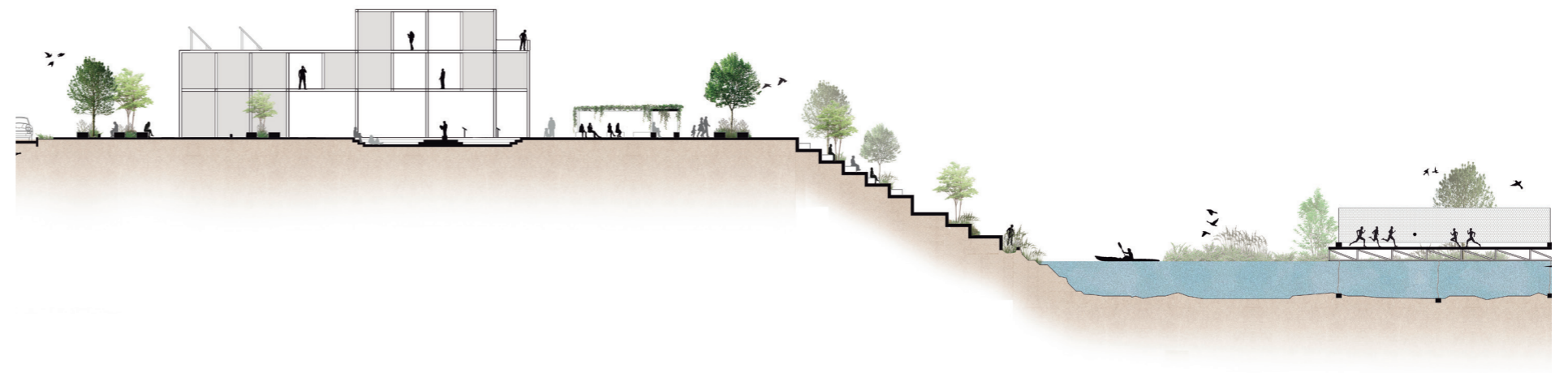
S-04



PA-01



Section B - Before the project



Section B - After the project

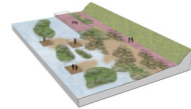




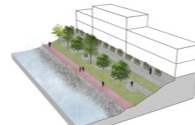
AREA 01 SECTION C

HOUSING NEXT TO THE NEW PATH

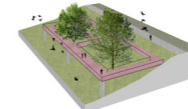
Used items from the toolbox:



F-06

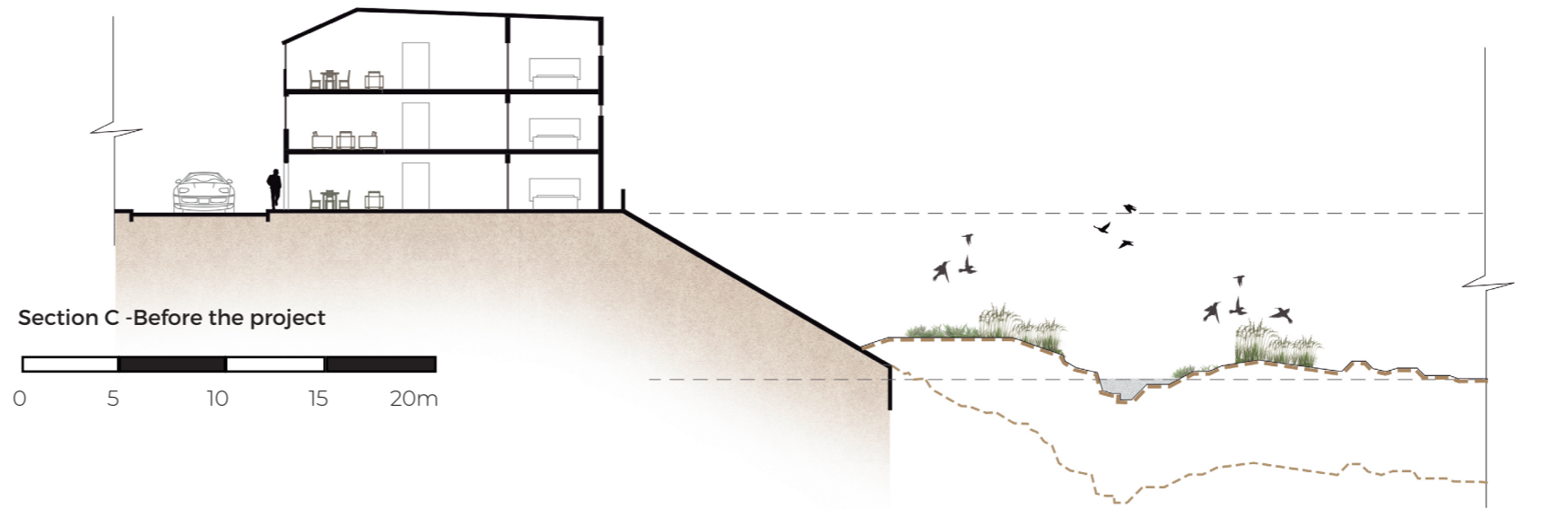


PA-02



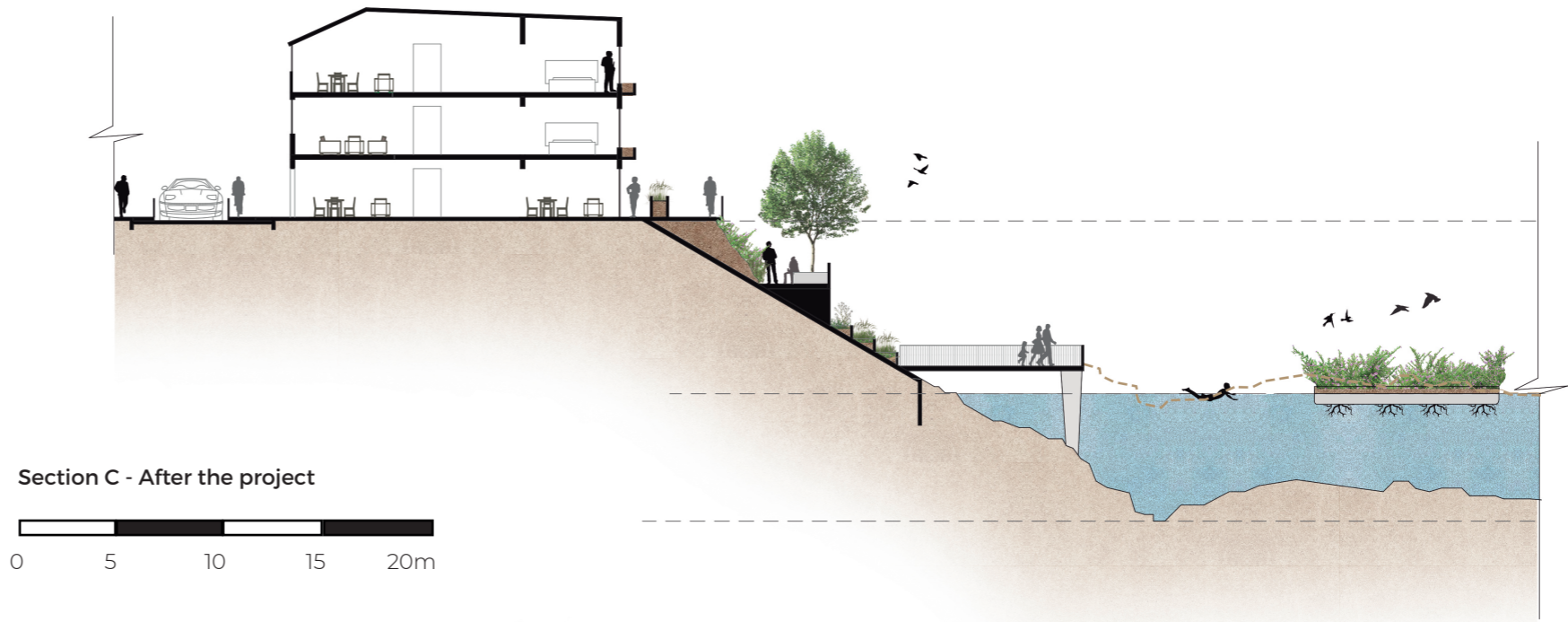
PA-04

One of the existing border typologies is the one that has a house facing directly the river without any intermediate road or area. So, for this, I designed 3 categories of paths based on privacy. The one near the house has a space for a bike path (which is the area that is not gonna be flooded) and a private garden for the ones who live there while the second and third levels allow people to stay and enjoy the river.



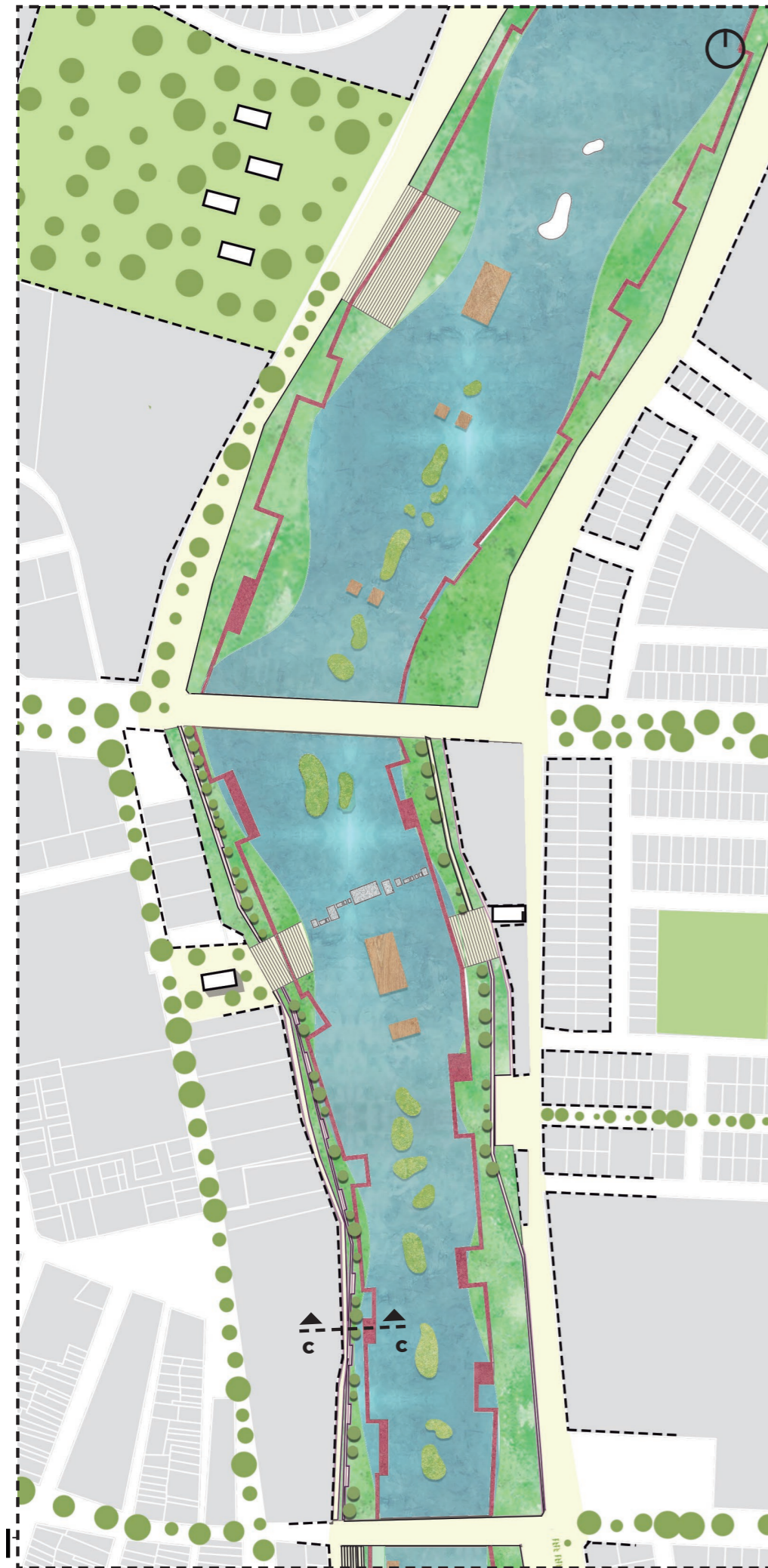
Section C - Before the project

0 5 10 15 20m



Section C - After the project

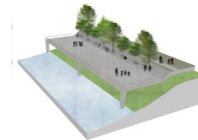
0 5 10 15 20m



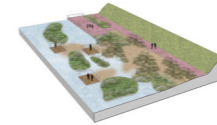
AREA 02 SECTION D1

PEDESTRIAN STREETS WITH PLATFORMS OVER THE RIVER

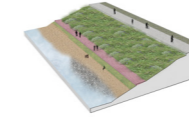
Used items from the toolbox:



P-01

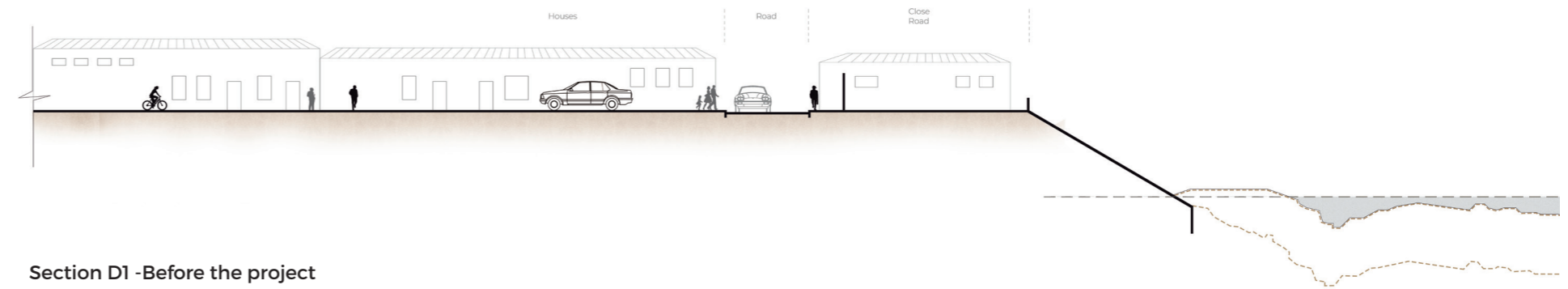


F-06

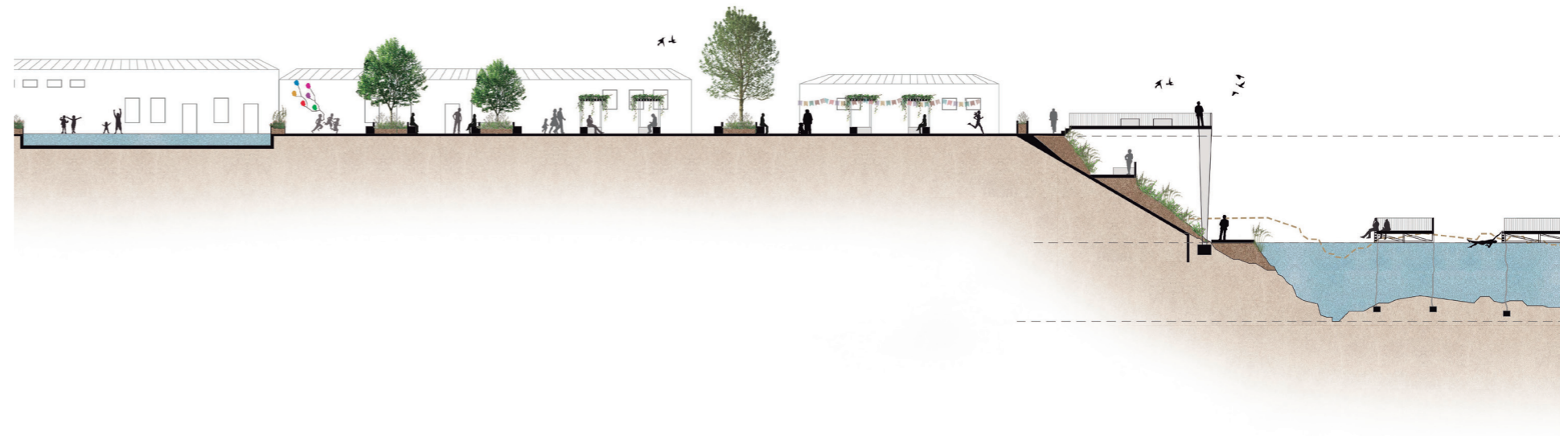
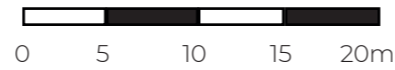


PA-05

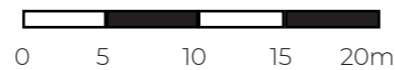
It is one of the new pedestrian streets on the roads without car transit. It shows how that path will work as an infiltration area for the water and how the platforms over the river could work as a bigger area for dancing or doing performances.



Section D1 - Before the project



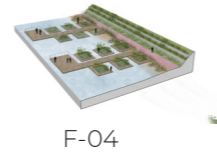
Section D1 - After the project



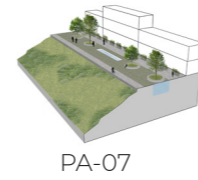
AREA 02 SECTION D2

FLOATING AND STAIRS ORCHARD GARDENS

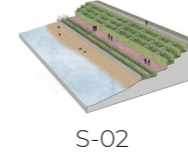
Used items from the toolbox:



F-04

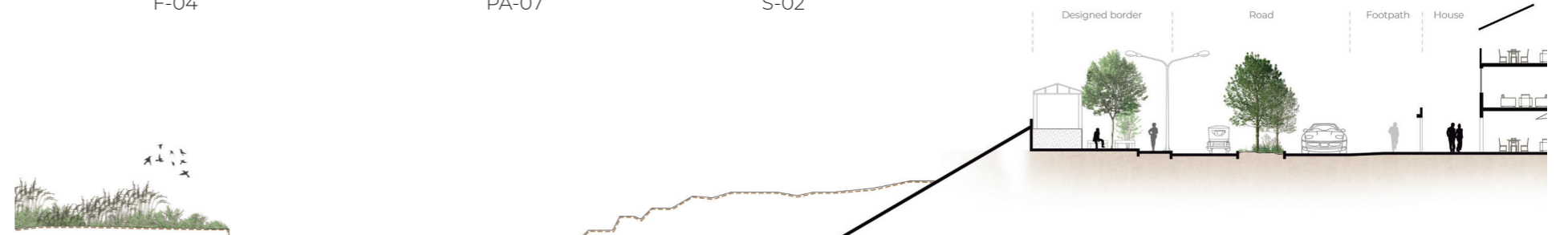


PA-07

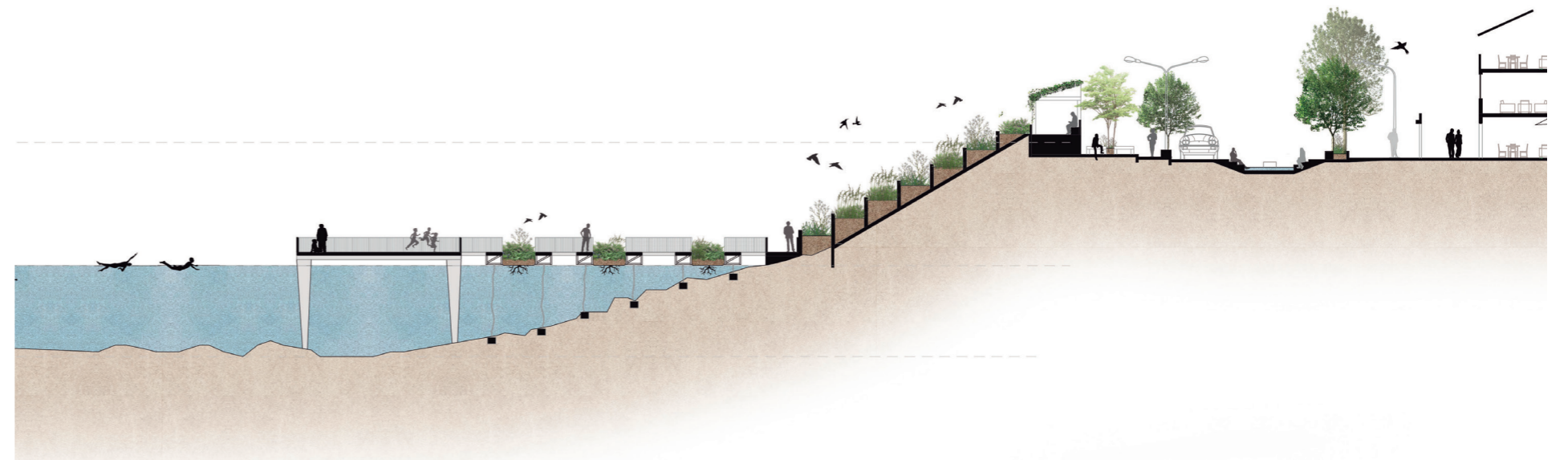


S-02

Around this area all the buildings are houses, so with the idea to create interaction and an activity that could link the neighbours with the river, I designed community gardens. Those could be agricultural stairs or floating gardens, which could be used also when the river increases the water level (reachable by boats).



Section D1 - Before the project

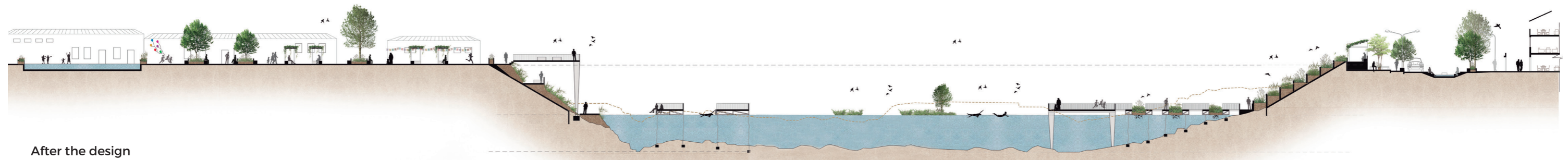
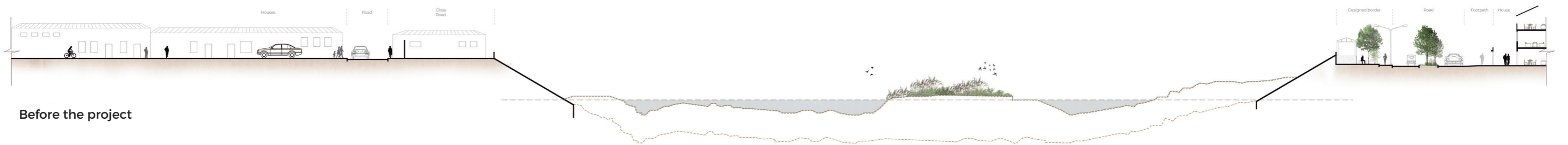
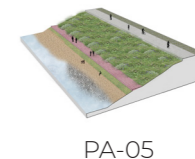
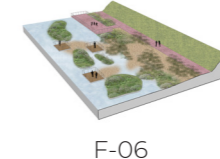
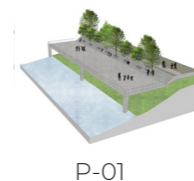
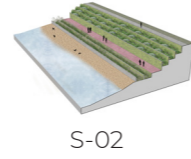
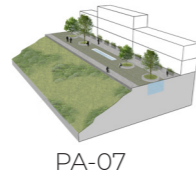
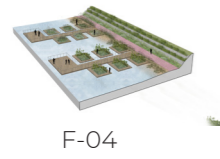


Section D1 - After the project



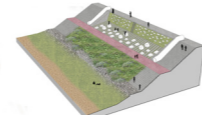
THE RIVER - Section D1 + D2

Used items from the toolbox:



AREA 03 SECTION EWITH HISTORY MUSEUM

Used items from the toolbox:

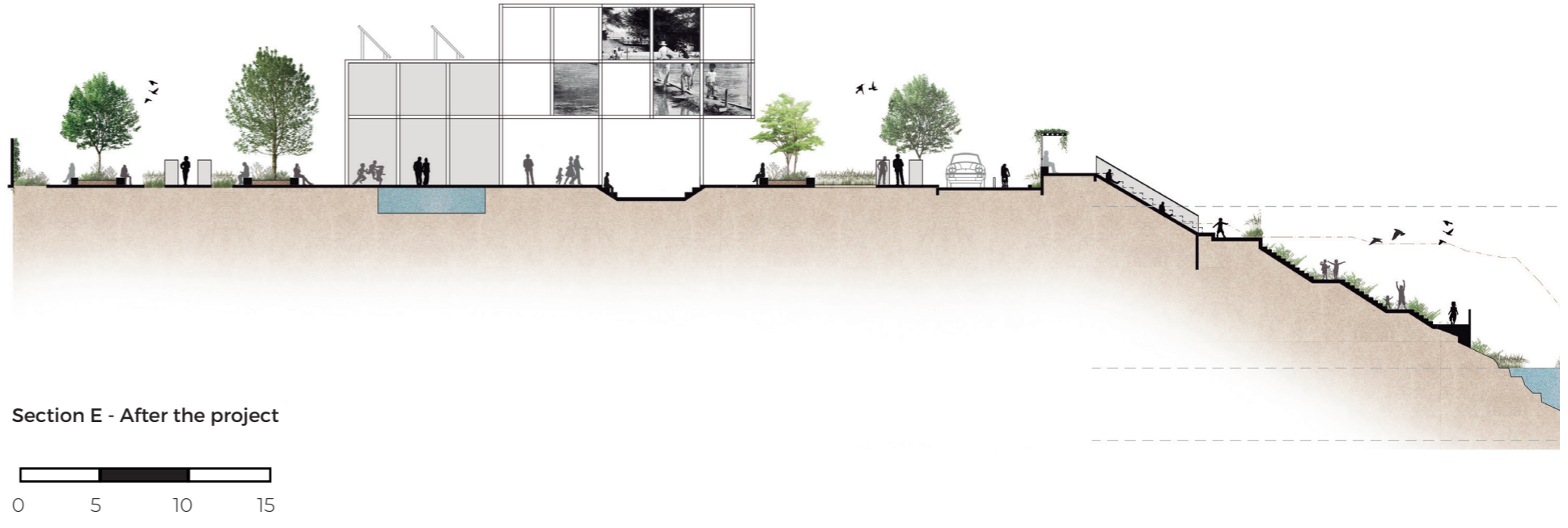
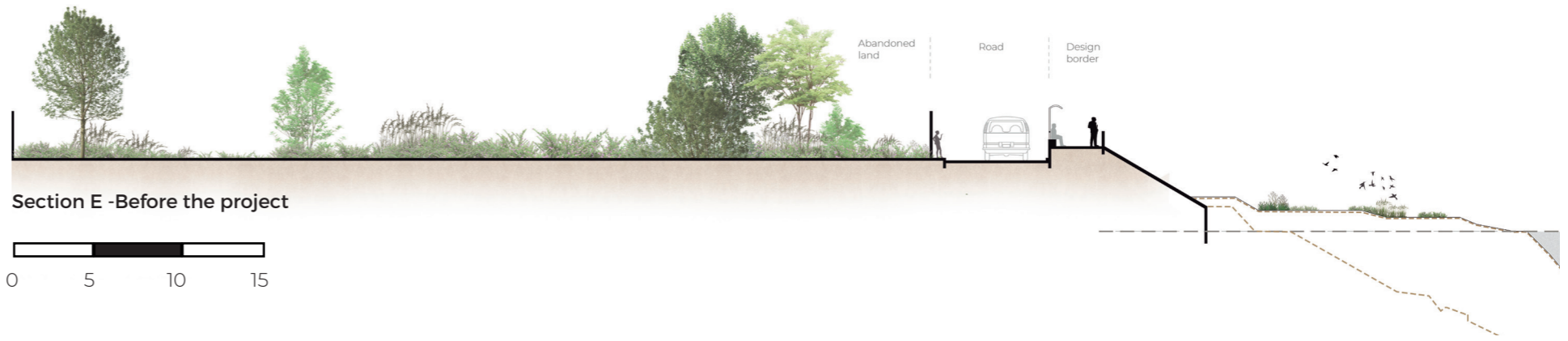


S-03



PA-01

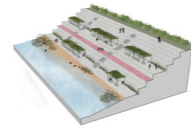
With the idea of remembering how was the city with the river as a public space, and also showing the citizens the traditional construction methods, I picked a history museum to activate this area of the river, complemented with an extension that also provided an interactive space, such as playgrounds.



AREA 03 SECTION F

CULTURAL HANDICRAFT CENTER

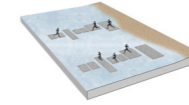
Used items from the toolbox:



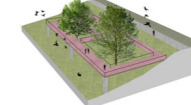
S-06



PA-01

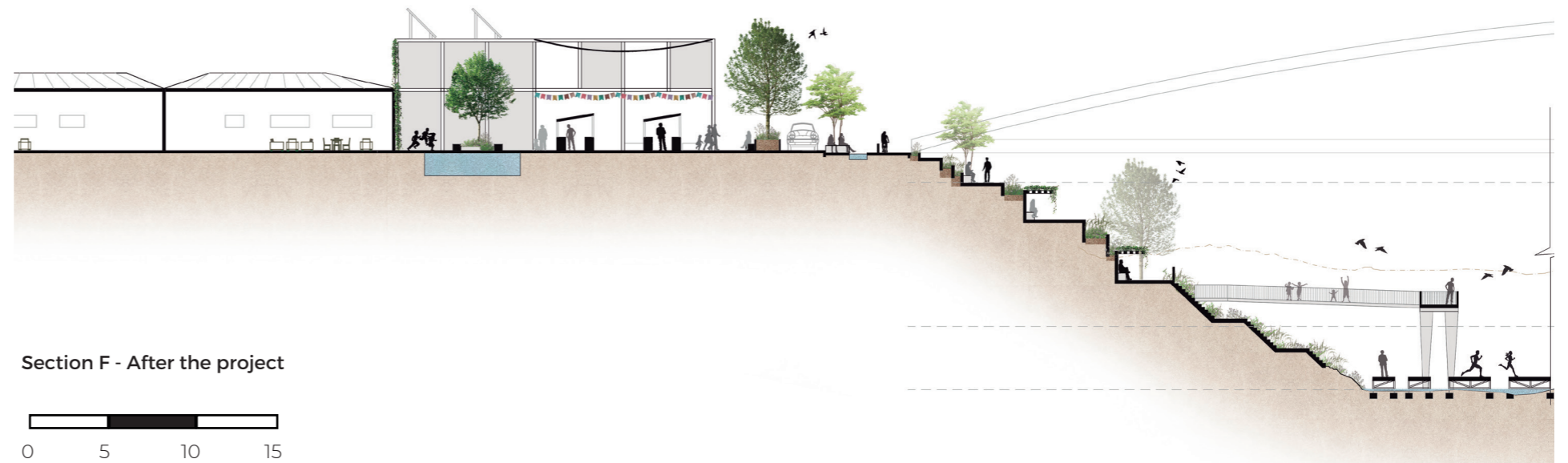
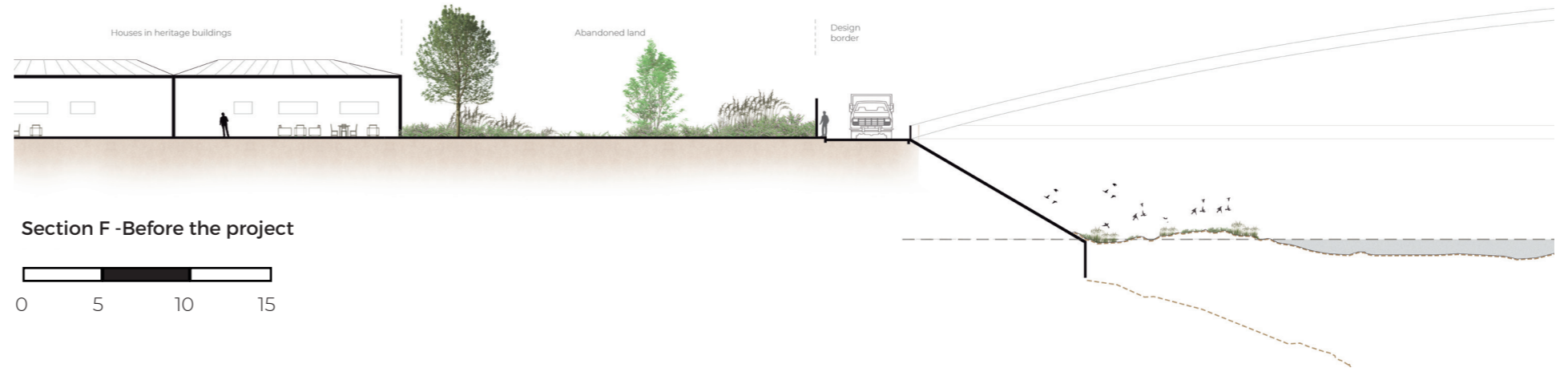


F-01



PA-04

As artisanal handicraft is one of the main economic activities in the city, there would be a centre to continue with this tradition and teach the new generations, complemented with an extension to the river that allows areas to sell this product or work outside with shade.

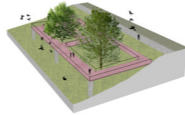


AREA 03 SECTION G

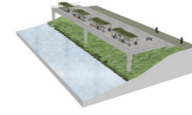
BIRDWATCHING + PLATFORMS

The idea of the red path next to the river is to create spaces to appreciate nature and have the opportunity to explore the river without being inside.

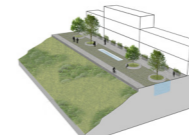
Used items from the toolbox:



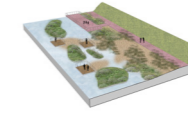
PA-04



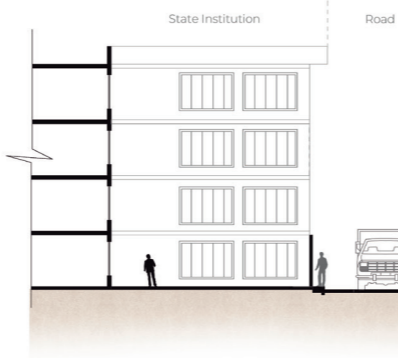
P-03



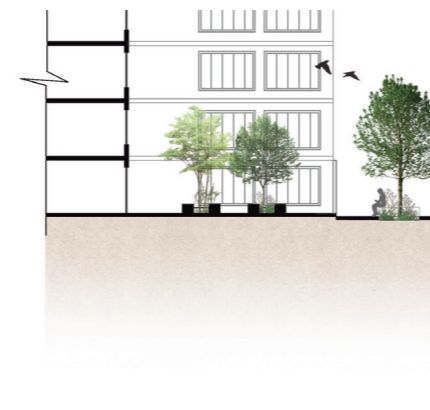
PA-07



F-06



Section G - Before the project



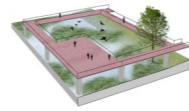
Section G - After the project



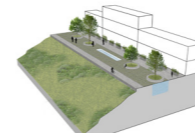
AREA 04 SECTION H

RAIN PARK / WETLAND

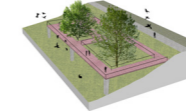
Used items from the toolbox:



PA-06



P-07

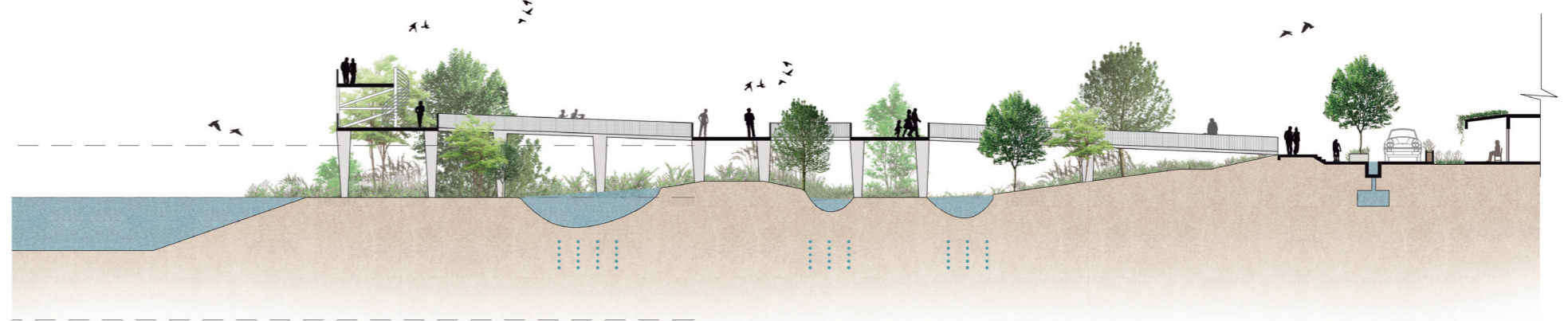


PA-04

At the beginning and end of the new border project, there are natural areas, that work as wetlands. So, the path in the section allows citizens to explore. Additionally, those areas will work as a rain park, included in the new drain system.



Section H - Before the project



Section H - After the project

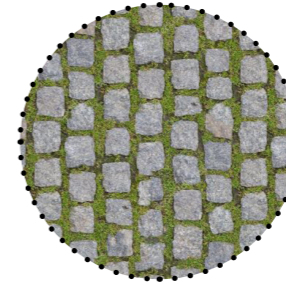






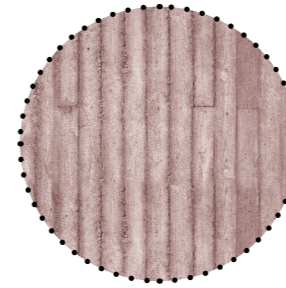
MATERIALS

Part of creating a new border is using typical materials or resources from the city and surroundings.



Located in the middle of the new design border at the level of the street

M.01 Infiltration paths



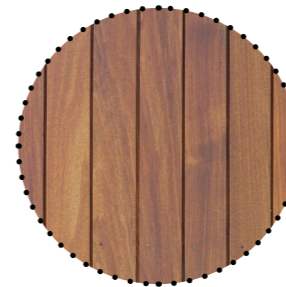
It is the red path on the master plan and the nearest one to the river. This path could be underwater.

M.02 Red concrete



The prehispanic culture used to build with earth walls which also provided a fresh sensation inside the rooms.

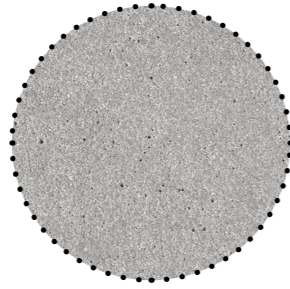
M.03 Rammed earth walls



This material is used on the floating platforms inside the river.

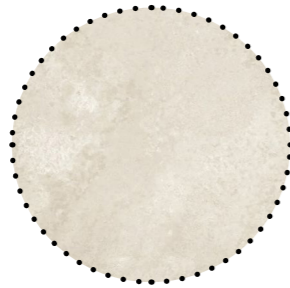
M.04 Wood deck

MATERIALS



M.05 Gray concrete

Use on the stairs in front of the new buildings.



M.06 Gray beige concrete

Use next to the infiltration path, for bike paths and platforms over the river.



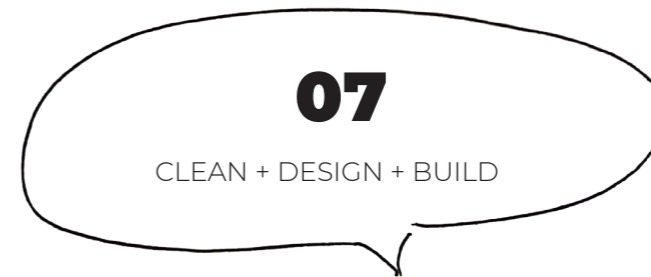
M.07 Reed panels

Another traditional construction method is the use of those panels, that I will use for the roof over the benches.



M.08 Green boxes

Use the flat roofs from the existing houses to build green boxes.

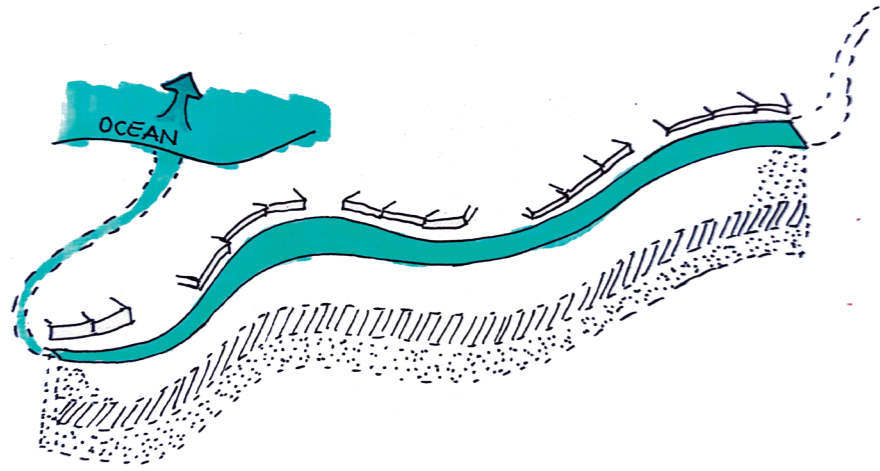


PHASES

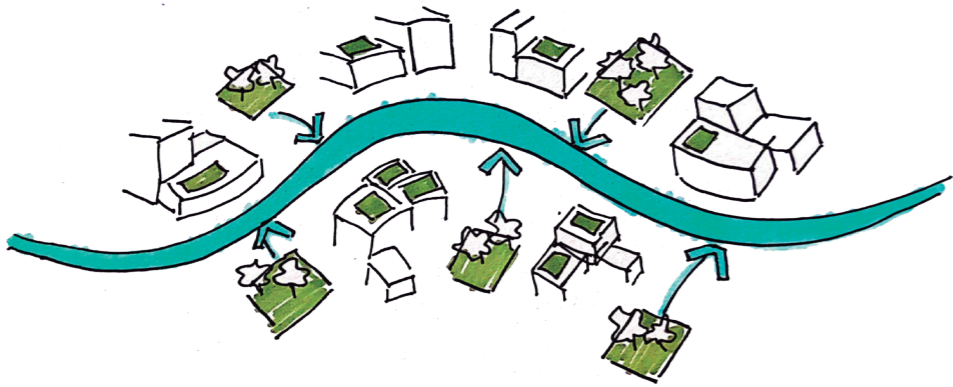
The phases are divided by subjects, but also more than 2 could be happening at the same time

PHASES

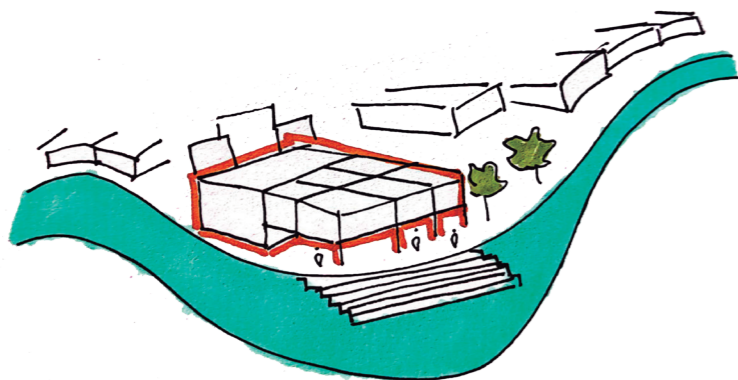
2024-2028 Clean the sediments from the river and change the water path to the ocean (peruvian government)



2027-2031 Design the drain system from the rain parks to the river and include green roof on the existing buildings around.

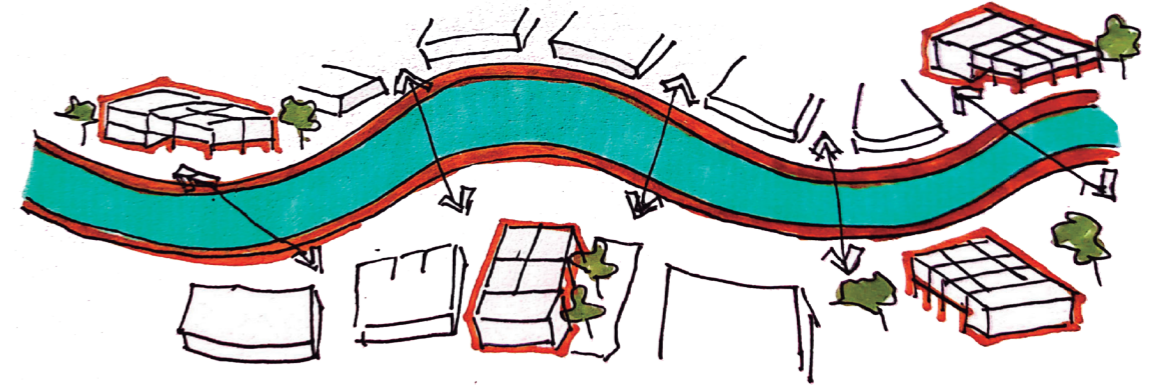


2027-2032 Construction of the new buildings, platforms and stairs inside the river

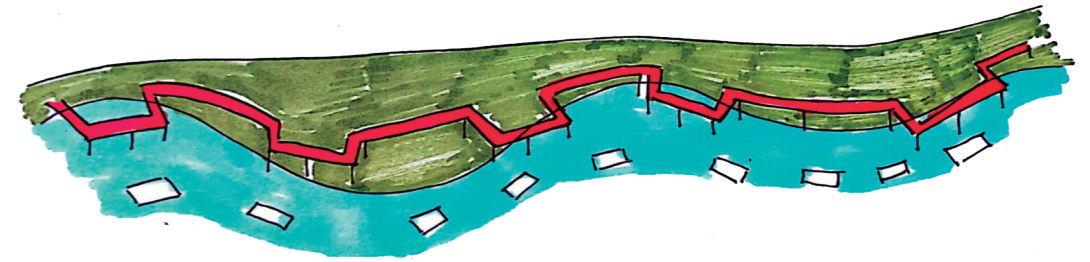


PHASES

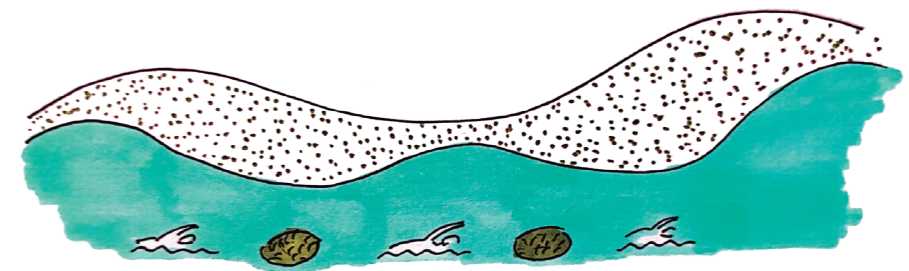
2029-2032 Build the path connection along the river



2030-2033 Integrate the green areas with the new path



2024-2084 Clean water with quality to swim





08

A new green heart to the city

POSITIVE POINTS & CONCLUSIONS

I will show the possible advantages for the inhabitants after the project

CONCLUSIONS

After understanding how the inhabitants see the river nowadays, and how these negative perspectives avoid dynamics around it; despite its historical use as a space for meeting, a beach and an area where farmers used to bring their animals to drink water.

I can conclude from this first point that the river has been excluded from the urban plans since 1957, after "El Niño" started to affect the increase of water in the river and the rainfalls, causing the river overflow and the flooding in the city.

That is why the Peruvian government prioritize the development of emergency plans to solve immediate problems such as the reconstruction of roads, and houses, and the closing of the river with concrete walls to avoid overflow.

This contributes to creating in the inhabitants the idea that the river should be avoided, instead of designing long-term plans that include the river as a public space that could mitigate the impact of those natural phenomena.

So this situation was the beginning of my thesis, bringing to my mind: **How does a river reconnect a city with social problems and natural disasters?**

Through the thesis development, I understood that the problem starts with hydraulic aspects, which should be solved first. The constant overflow is not caused by the lack of space in the river to contain the water during "El Niño". It is because the sediments and trash that it has at the base, have been growing and reducing the space of it.

So, as I mentioned in the phases, this situation should be managed before thinking of new spaces to **RECONNECT** with the citizens, as it used to be 70 years ago.

For this, I started analysing the daily life of the people and what are the aspects that could link or attract the inhabitants to go to the river and **REACTIVATE** it as a green public space where people could feel welcome and not worried about it.

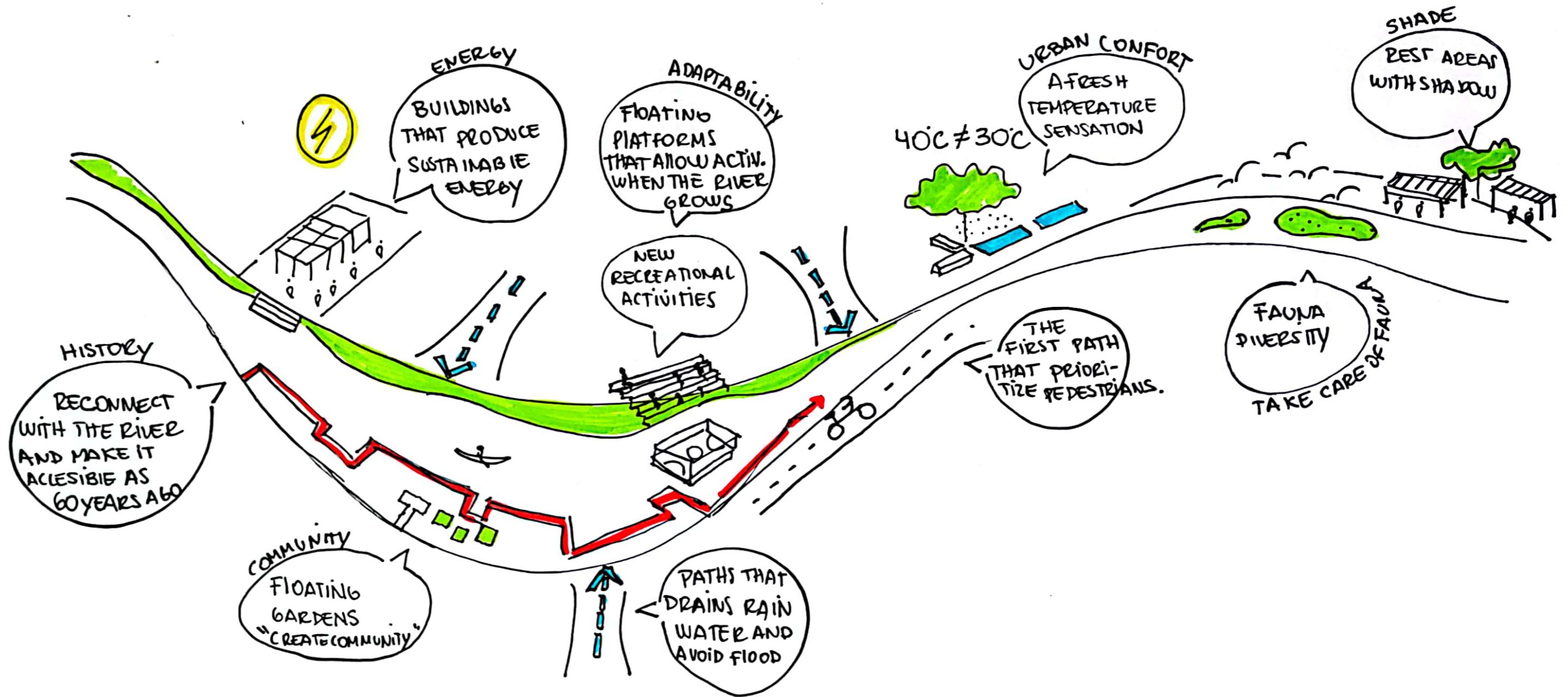
Understanding that this is a desertic zone with a temperature of 40°C people are always looking for outdoor spaces (it's not common to have air conditioning in the buildings) where they can meet, eat, dance, contemplate and rest from the traffic and noise pollution.

But also contribute to their economic activities, looking for areas where they can sell artisanal handicrafts, and traditional food, or learn those traditions, in the case of the new generations.

I realise that those will be my new buildings and spaces on the border of the river, in which the shade, reduction of temperature sensation, and security will be also my guidelines for this new pedestrian area where people could feel that they are part of the city designed for humans and not cars (nowadays cars are the ones who has the spaces).

Complemented by green areas at the level of the street but also inside the river, where the citizens can decide which kind of interaction they have on the river through different levels of paths. Increasing the green square meter per inhabitant they have.

This also helps to reduce the flooding by rain, through the connections of the existing parks (new reservoirs) to the river, and works as a sponge in the city, where everyone is **WELCOME**.



09

LINKS AND BIBLIOGRAPHY

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