

Don't waste the river!



Recycle

Preface



Albania

To me, Albania is about wilderness and hospitality. There was no European country where it felt so remote and the city seemed so far away, but the people are so close. They are warm and generous, and they will always welcome you with open arms. At the same time Albania is locked up between the sea and the mountains. Somehow awaiting until someone opens doors, takes initiative and brings change. Because, among all those beautiful mountains, there are devastating dams, rivers full of waste and flooded cities.

The project

These are challenges we have worked on with a multidisciplinary team of students from the Technical University of Delft in the Netherlands and several universities in Albania. Eventually, a development strategy was made for three locations in and around the capital Tirana. This report is a landscape architectural elaboration of one of these locations: the Limuthi valley. This place has great potential given the location between the port city of Durrës and Tirana. By combining technical interventions, a landscape architectural design and a strategic cooperation proposal between residents, municipality and development organizations, flood problems in this area can be tackled.

Thanks

I want to thank my Albanian and Dutch group members for the fruitful collaboration and the cooperating to the report. Also, I want to thank my teachers Fransje Hooimeijer, Mark Voorendt and Francesca Rizzetto for the organisation and feedback on the project. And of course the Polytechnic University of Tirana, the Dutch embassy, and the municipality of Tirana for facilitating us.

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Introduction



Albanian water system

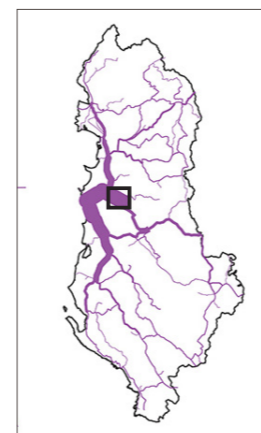
The inland of Albania is completely surrounded by mountains, from where rivers flow to the coast. Most of these are artificially guided through the wide valleys towards the Adriatic Sea. In the dry season the cities and agricultural areas benefit from this extensive water network. In addition, countless lakes and valleys have been dammed to supply the land with hydropower. This intensive use of the water network creates bottlenecks, such as in the Limuthi valley. Image 1.1 shows how several rivers merge at this location, indicated by the black square and image 1.2 shows the importance of this area through infrastructure density. Because of the mountainous features of this landscape, there is only one route from the capital to the port city Durres.

Location

About 12 kilometer from the city centre of Tirana, the Limuthi river flows gently through the farmland of this valley in the outskirts of the capital. This agricultural landscape is both drained and supplied by water from the river which is sourced by three basins up in the hills. Only in winter, the discharge of the river changes into unforeseeable amounts of water and the valley floods. After the annual floodings, the farmers have to they restore the damage to their homes and fields and that causes economical damage. Besides that, it is also dangerous when this small stream changes into a wild river with almost 30 times the amount of water compare its average discharge.

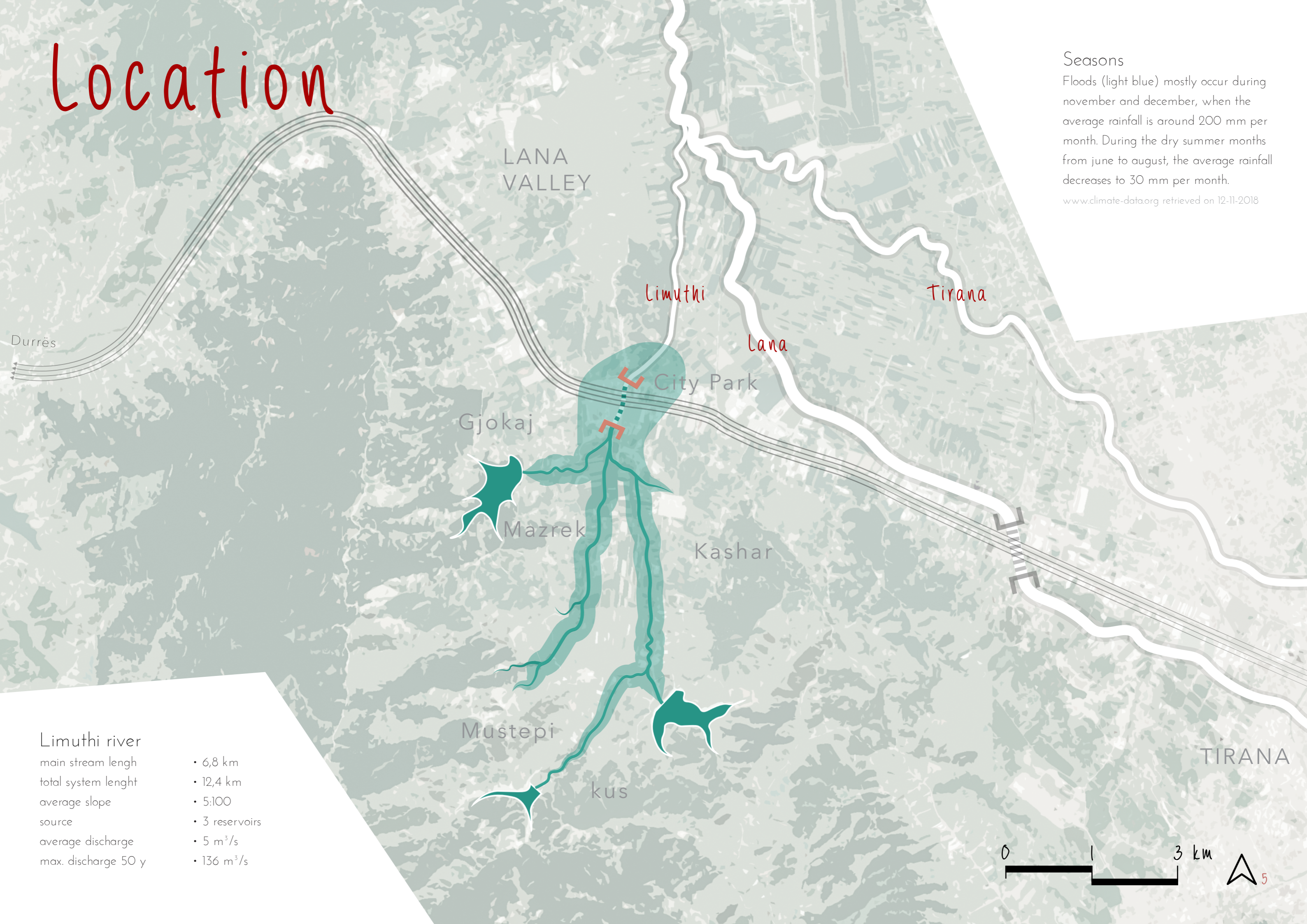
Challenges

The challenge in the Limuthi valley is to control the river, both in rainy and dry season. The narrowed river bed, which is mainly caused by cultivating land for agriculture, needs to be widened and protected against erosion. This is the only way to guarantee a safe living environment and allow agriculture. Also, a social environmental problem occurs: trash bags, construction materials causing major blockades in the river, which increases natural sedimentation and result in a obstruction of the water flow. Besides not having a garbage system, the local residents also lacking awareness. People do not know why floods reoccur every year and what they can do to prevent this. These two major challenges are interrelated and need to be approached at the same time, because a technical design for the river could only work with support of the local community.



Left to right: 1.1 watersystem: rivers, direction and discharge points 1.2 Infrastructure density
Atelier Albania (2016)

Location



Seasons

Floods (light blue) mostly occur during november and december, when the average rainfall is around 200 mm per month. During the dry summer months from june to august, the average rainfall decreases to 30 mm per month.

www.climate-data.org retrieved on 12-11-2018

Limuthi river

- main stream lengh • 6,8 km
- total system lengh • 12,4 km
- average slope • 5:100
- source • 3 reservoirs
- average discharge • 5 m³/s
- max. discharge 50 y • 136 m³/s

TIRANA



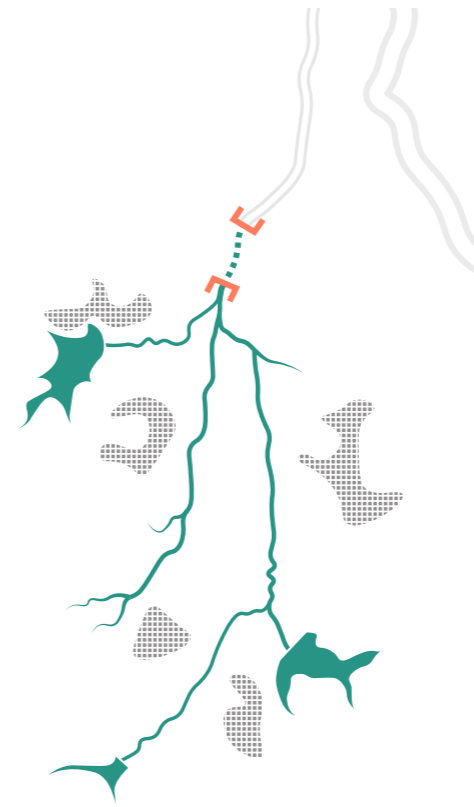
Current situation

Villages +
Unregistered buildings +
Commercial zone SH2 +
Agriculture +

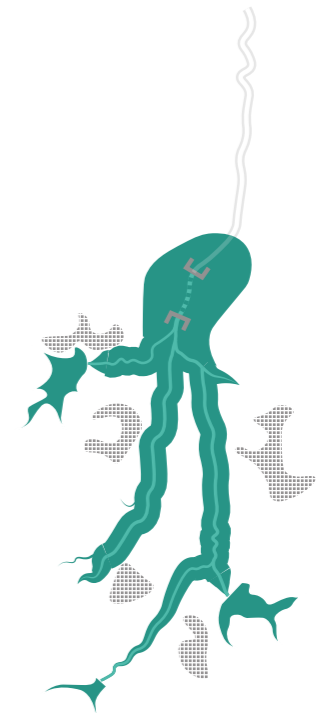


Villages

According to State Authority for Geospatial Information (ASIG), five small villages can be found in the valley: Gjokaj, Mazrek, Kashar, Mustepi and Kus. All of them, except for a small part of Gjokaj, are outside the flood risk area. These foundations were built on higher grounds that protects the inhabitants from flood.



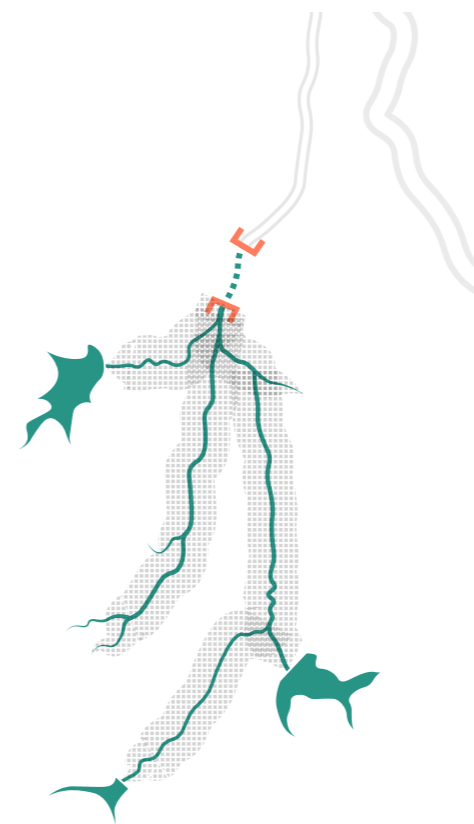
Location villages



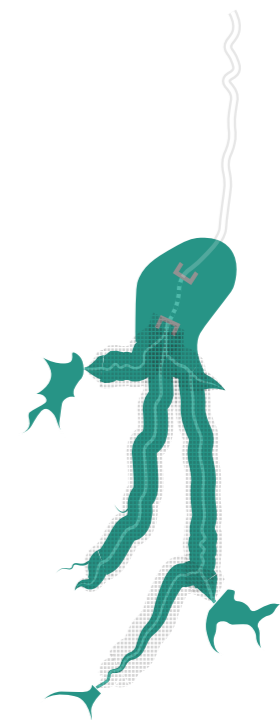
flood risk area

Unregistered buildings

When we visited the site and look at a satellite map, it becomes clear that another cluster of buildings can be found in the valley. Unregistered houses, barns and sheds were built along the river, right in the flood risk area. An explanation could be that most of the roads were constructed next to the river and that makes these areas easy accessible.



buildings along river

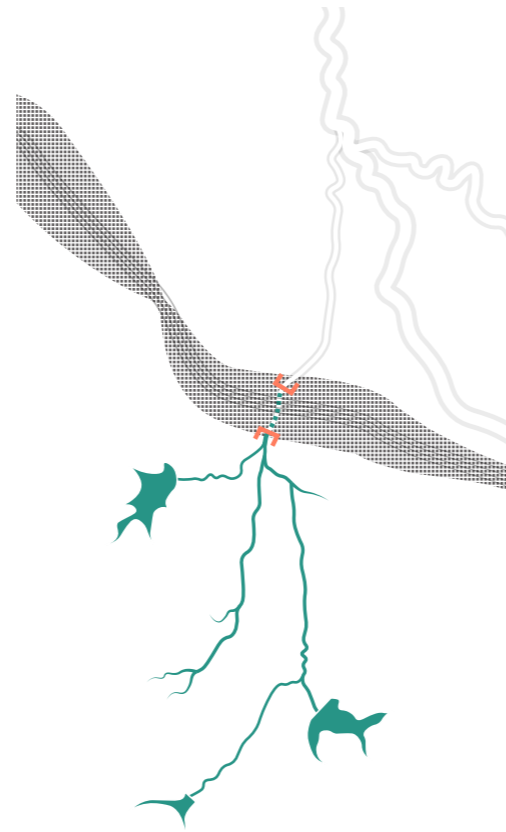


flood risk area

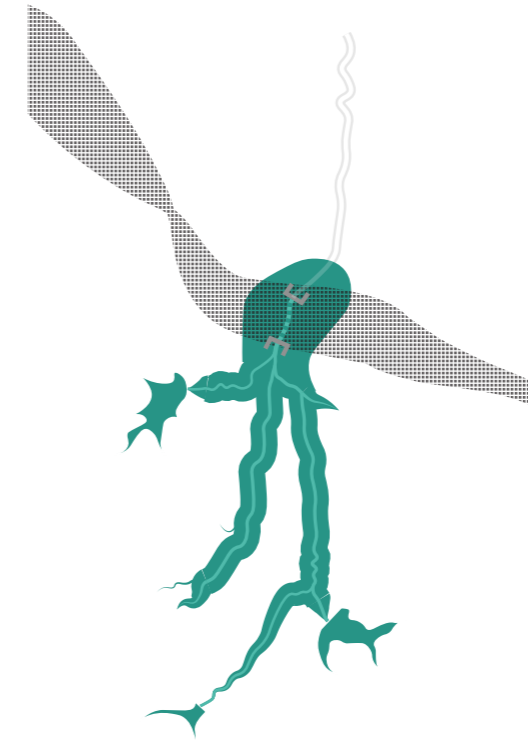
Current situation

Commercial zone SH2

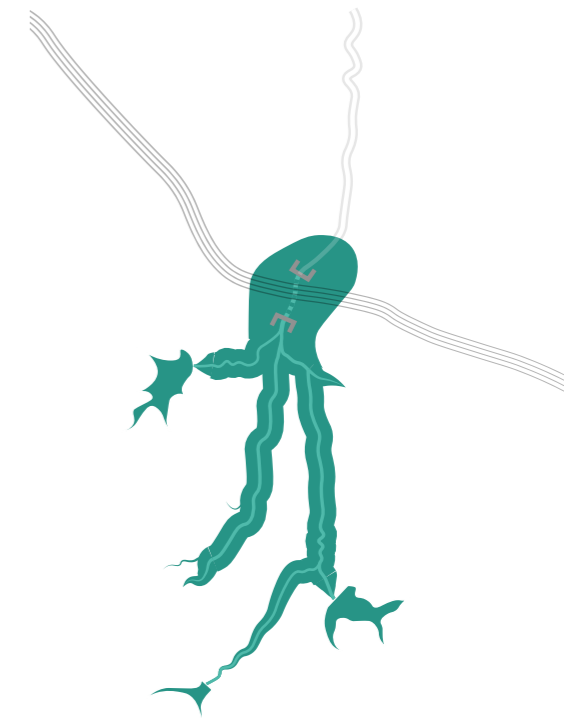
Right at the bottleneck of the river is the location of highway SH2 and a commercial zone parallel to it. Both have high economic value to the region and the whole country. SH2 is the only connection between port city Durrës, the capital and the airport, so therefore essential for import, export and tourism. The commercial zone called City Park provides the bigger area with light industry, shops and leisure. Floods occurring at this bottleneck can have unforeseeable consequences for the economy.



Location commercial area



flood risk area City Park



flood risk area SH2 highway

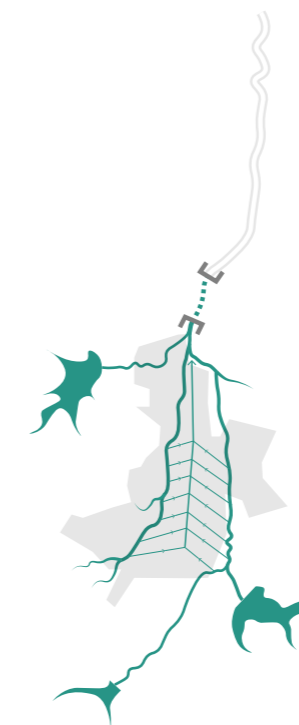
Agriculture

The Limuthi valley is characterized by arable farming in the centre, between two branches of the river. Clay sediments deposited by the river make this soil fertile and suitable for the cultivation of annual crops such as tomatoes and zucchini. Various fields have been converted into plastic greenhouses to increase efficiency, this is also a form of unregistered building.

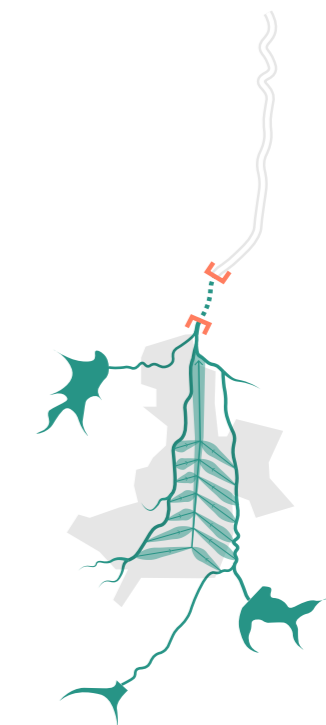
The area is supplied with water by an artificial water structure of ditches in the shape of a fishbone. Because of the slope in the landscape, the diagonal structure ensures the distribution of water and its drainage for the cultivation of crops. In case of a flood, this fishbone structure can actually cause more flooding in the middle of the valley, considering its dimensions.



Central agricultural valley



Fish bone water structure



flood risk of agricultural land

Current situation

Site visit

During a site visit to the Limuthi valley, a number of issues were formulated on the basis of previous research, conversations with the residents and our own assumptions.

1. Collapsed parking lot on the edges of the river at Park City, due to flood in the autumn of 2017.
2. Road through the central agricultural valley
3. Sedimentated river bed in central valley
4. Litter at the edge of Liqeni i Kusit
5. Dam without a water control element at Liqeni i Kusit



2



4



1



3



5

Vision & tools

Vision

The vision of the project is to tackle the challenges in the Limuthi valley, through a collaboration between all stakeholders for implementing technical and landscape architectonic interventions, explained below as solutions and tools. To further elaborate on various types of issues mentioned in the previous chapter, the interventions are divided into three categories:

Blue is water related, such as the water system, riverbanks and water control elements.

Green is environmental, including the ecosystem, soil and planting of the riverbanks

Red is the social system, focussing on awareness and creating a rewarding system.

The title Limuthi Re-cycle valley is based on reintroducing the bike as a means of transport in the valley, by designing the supporting infrastructure, to use for the residents as a way to collect and transfer waste.



Solutions and design tools



Create a regulated water system, by water control elements such as locks and thresholds



Change the dimensions of the river to deal with undercapacity, by widening the river bed.



Prevent erosion and pollution of the river, by using planting for purification and to strengthen the river banks.

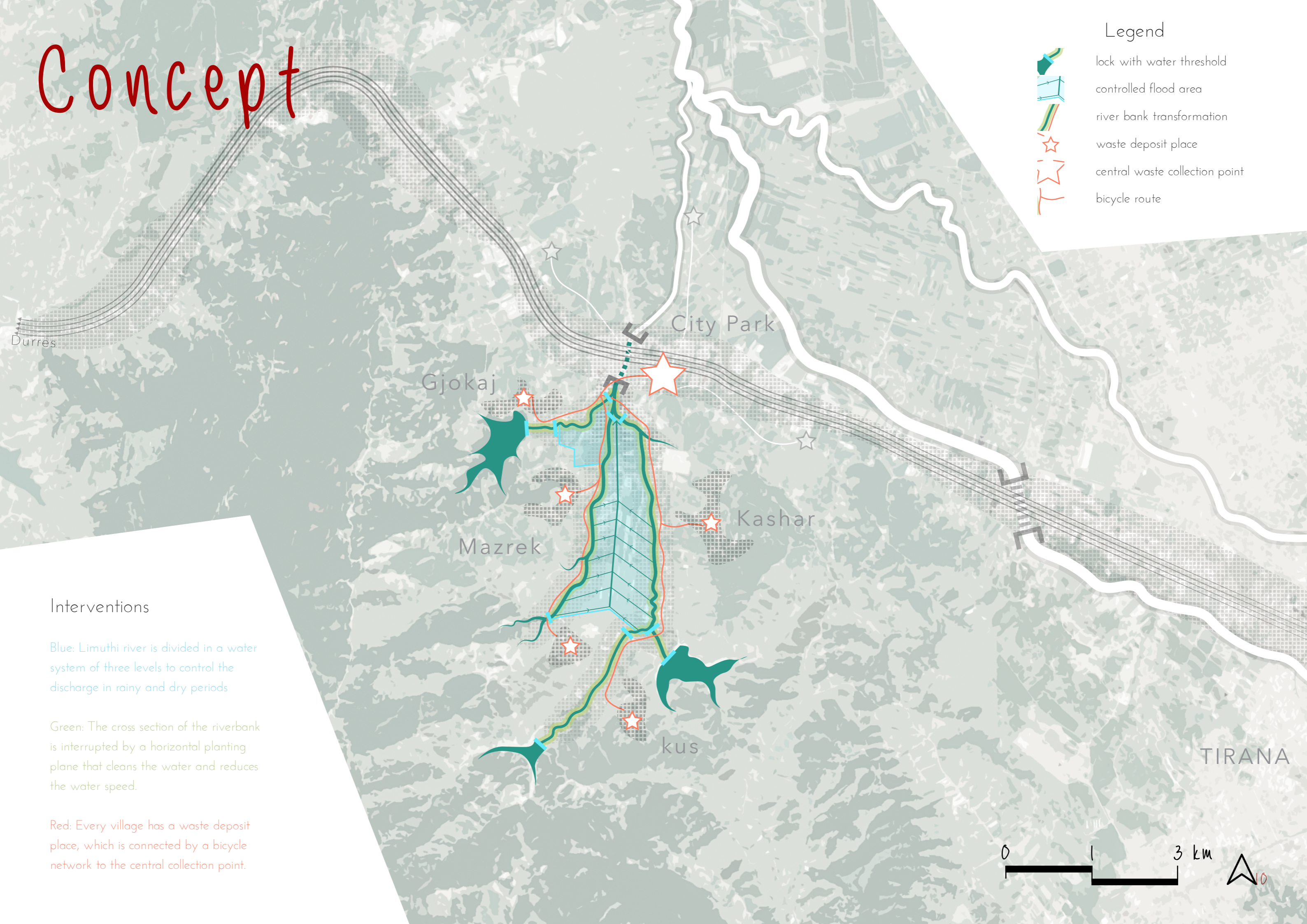


Deal with congestion and pollution, by setting up a structure for collecting waste with an associated infrastructure.

Concept

Legend

-  lock with water threshold
-  controlled flood area
-  river bank transformation
-  waste deposit place
-  central waste collection point
-  bicycle route



Interventions

Blue: Limuthi river is divided in a water system of three levels to control the discharge in rainy and dry periods

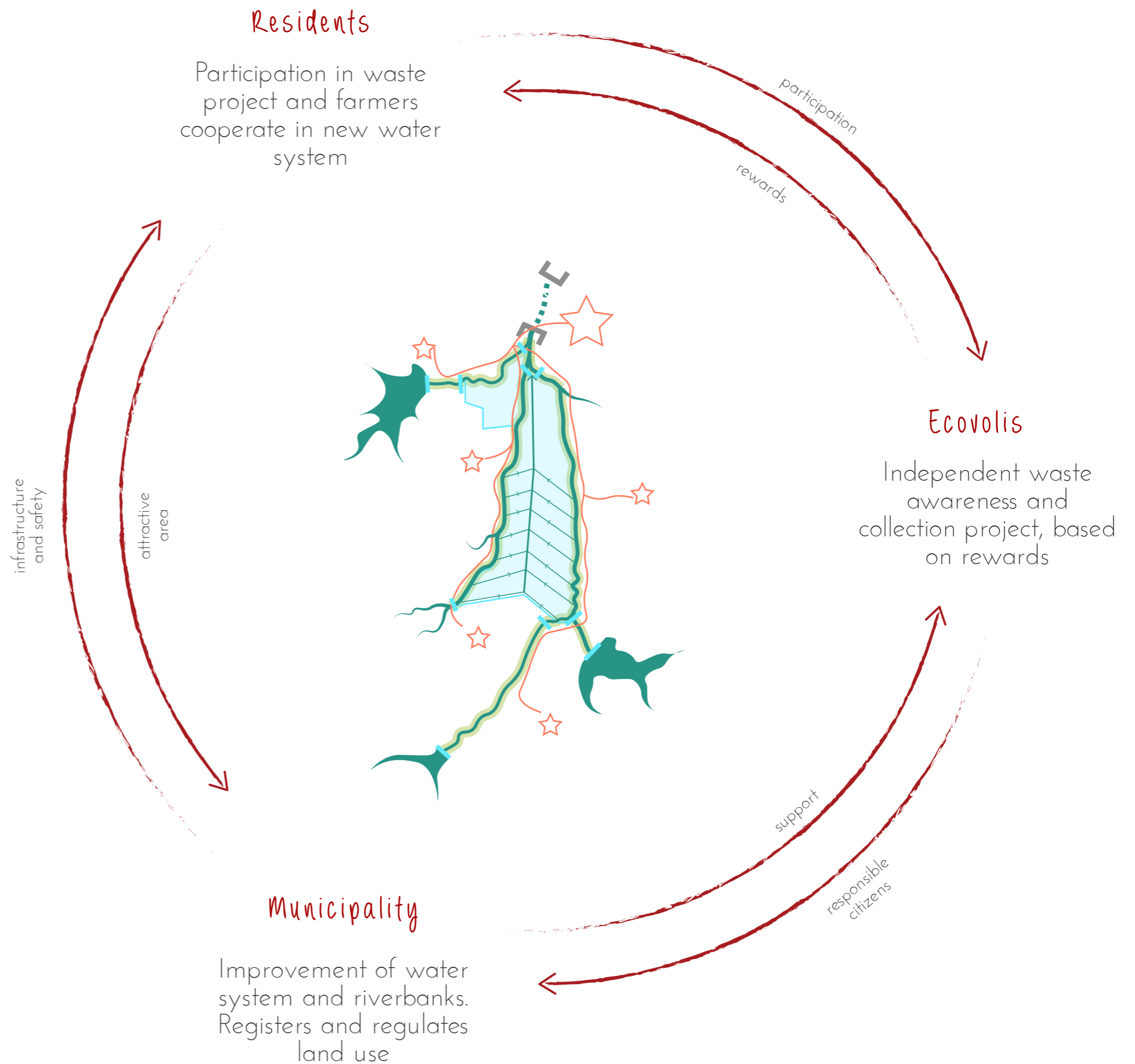
Green: The cross section of the riverbank is interrupted by a horizontal planting plane that cleans the water and reduces the water speed.

Red: Every village has a waste deposit place, which is connected by a bicycle network to the central collection point.



Strategy

Residents +
Ecovolis +
Municipality of Tirana +





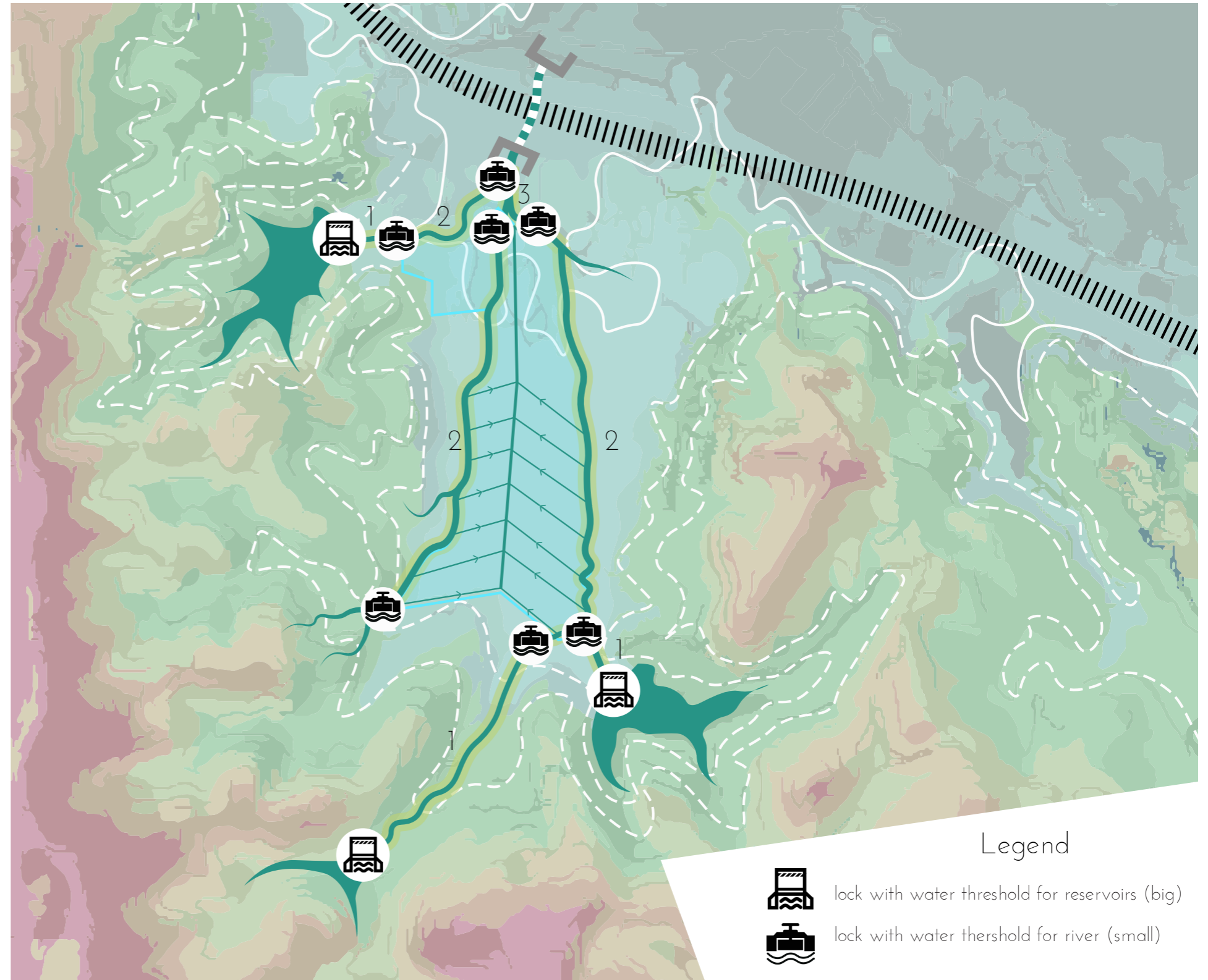
Elaboration

Blue +
Green +
red +

Blue

Water system

Water is retained and discharged into a system with three zones, which are controlled by locks and thresholds. Zone 1 is between the reservoirs and the agricultural area, zone 2 is the agricultural area and zone 3 is where all the tributaries together form the Limuthi river, just before the bottleneck at SH2. The agricultural land in zone 2, between the two rivers, can function as a floodplain. Here, water can be retained on the land in case of an extreme flood.



Map with location of three zones and water management elements

Elaboration Blue

Water control elements

By strategically placing locks and thresholds in the river, so the water can be regulated over the entire length of the valley.



Reservoir lock + threshold

Locks

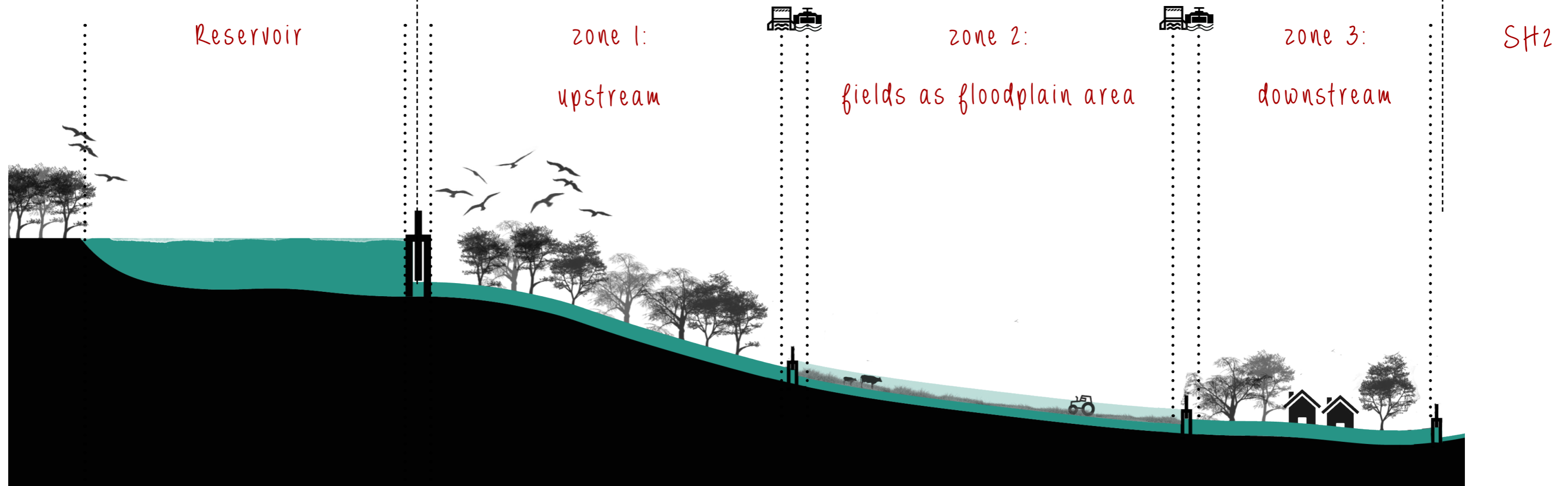
In the rainy season, the locks ensure that the water is gradually removed and the water speed is adjustable, which reduces erosion.



River lock + threshold

Thresholds

In the dry season, thresholds retain the water longer in the riverbed, so that it can be used in the agricultural area and no water from external sources is needed.

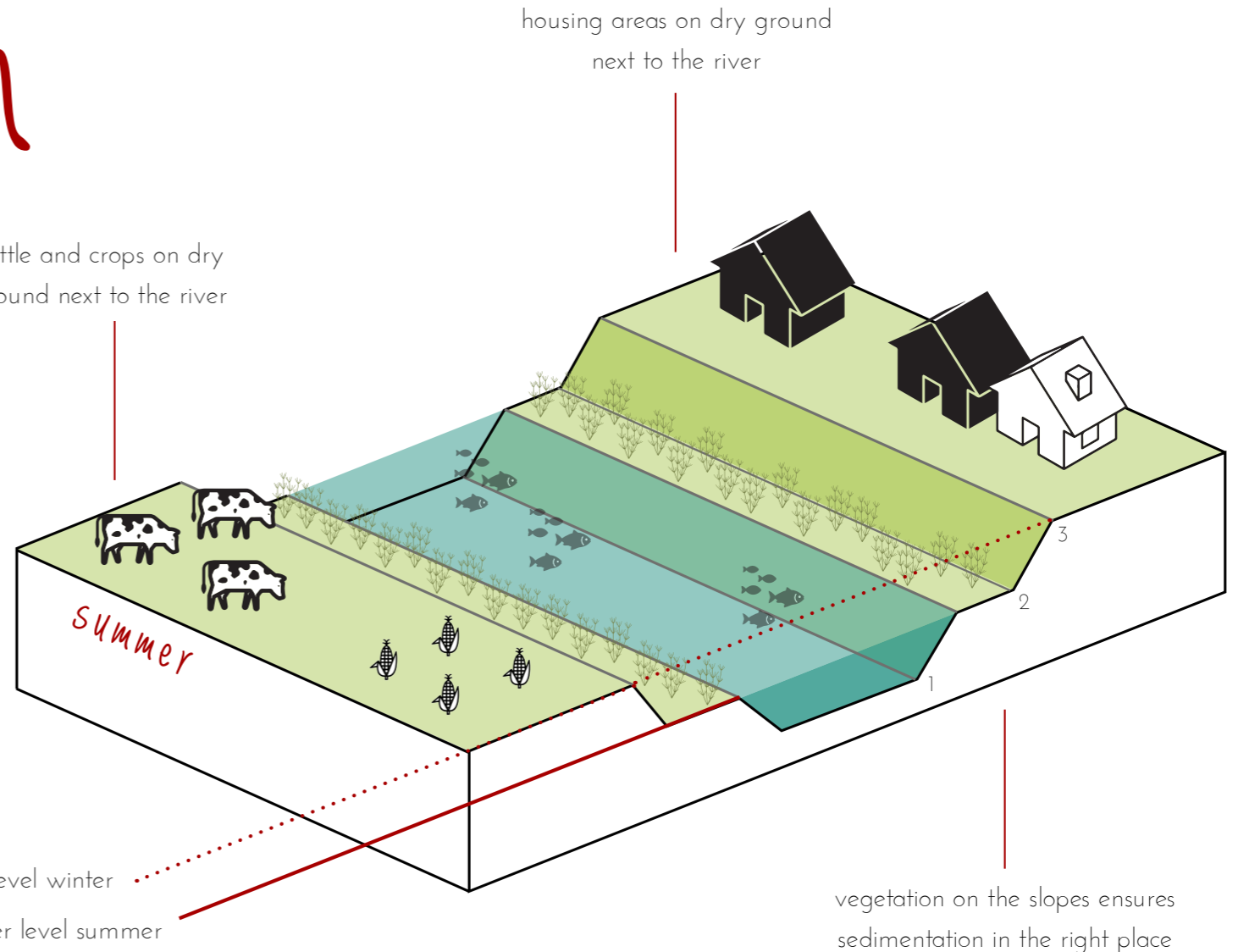


Schematic longitudinal section of the river

Elaboration Green

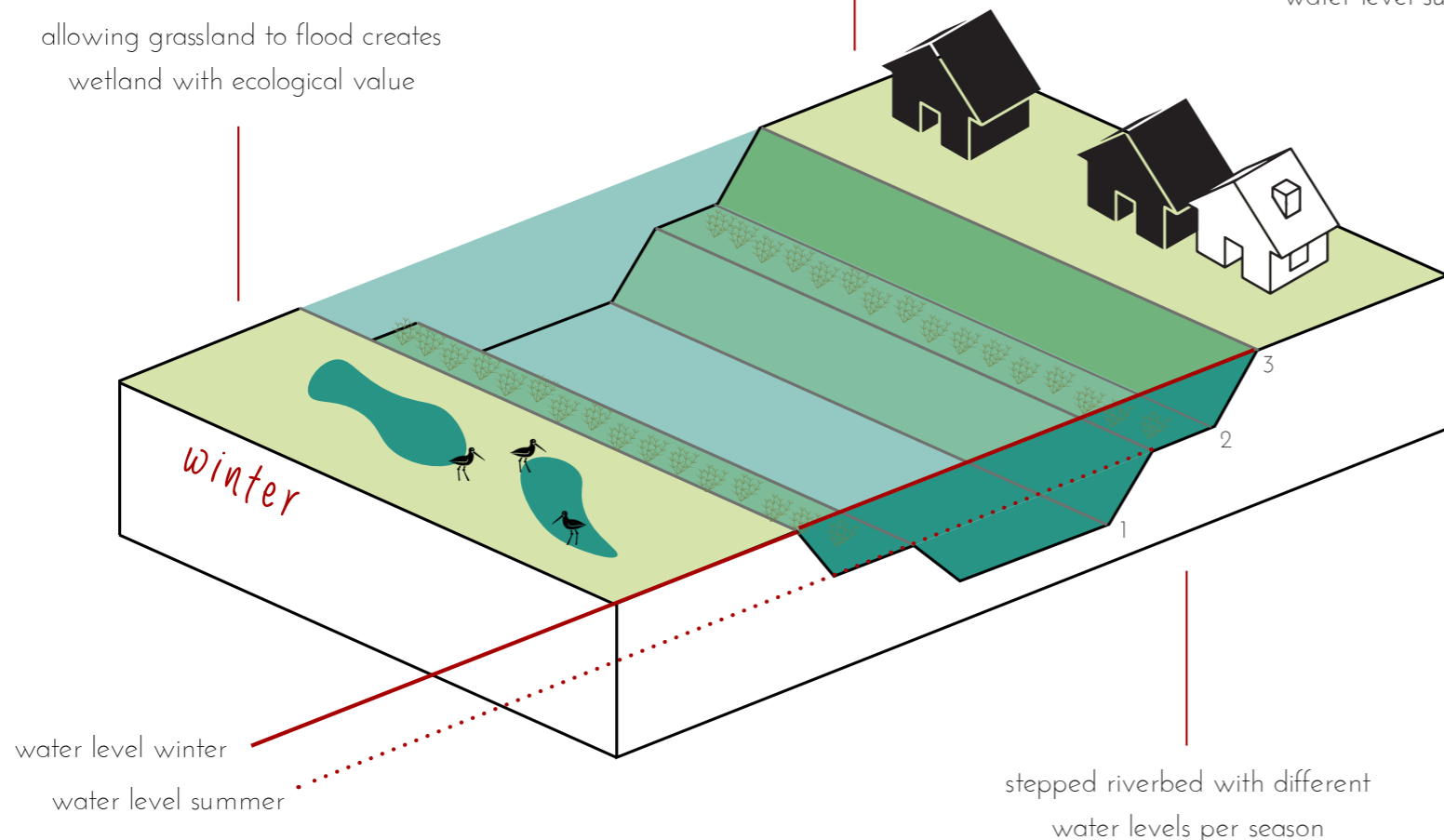
Winter

During the rainy season in winter the stepped river bank can be filled up to the third level. Because of the zoning plan and the water control elements, it is possible to maintain different water levels in the zones. The agricultural can be flooded and water can be retained in case of an extreme high water level. The fields are not in use and will turn into wetland and attract wading birds.



allowing grassland to flood creates wetland with ecological value

houses outside the flood risk areas



Summer

In summer the water level drops to the second level of the stepped river bank or even below. Thresholds in the water systems prevent the river from drying out during this season, so that the fields can still be supplied with water and life in the river will die from drought. Plants on the first level of the slopes hold sediments to prevent erosion and collapse of the sides. Housing areas, cattle and crops only can be found on third level of the river bank, to ensure them to be out of the reach of the water.

Elaboration Green

River section

The sections on the right show a new shape of the river bed. On the bottom, at level 1, there is a concrete frame that guides the river downstream and prevents erosion. A biodegradable cloth lies on the slopes between the second and third level, that functions as a foundation for the planting. The slopes are asymmetrical designed to create different water depths, that support different plants and other water creatures. Which side is higher or lower depends on the direction and curves in the river. In dry seasons, the higher side is accessible via stairs that appear every now and then. There is a cycling and walking zone on both sides of the river, that is separated from the road with a line of trees.

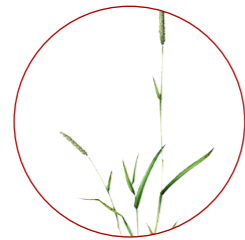
Planting

Plants in the riverbank between the second and third level hold sediments, decrease the velocity of the water and filter it. Besides that they create an environment for different fish species, insects and birds. The two different water levels can be defined as "marsh" and "wet" and have different planting schemes. Below, possible plants are shown for each habitat. The trees on the sides of the river, at level 3, should be resistant to possible flooding, like willow and poplar.

marsh



Carex elata



Phragmites australis



Iris pseudacorus



Sagittaria sagittifolia

wet



Elodea canadensis



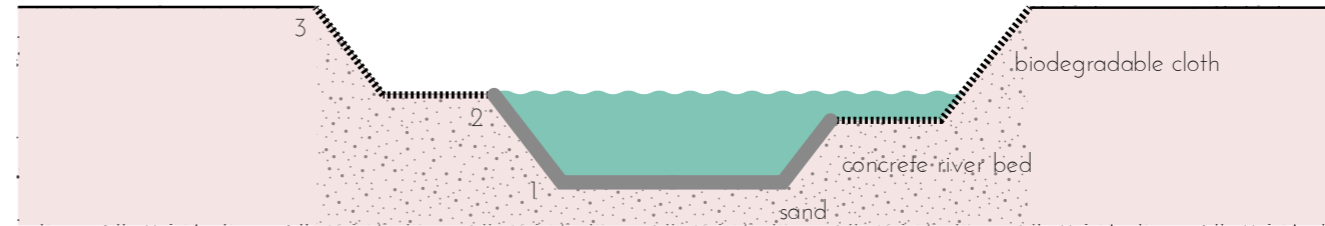
Nuphar lutea



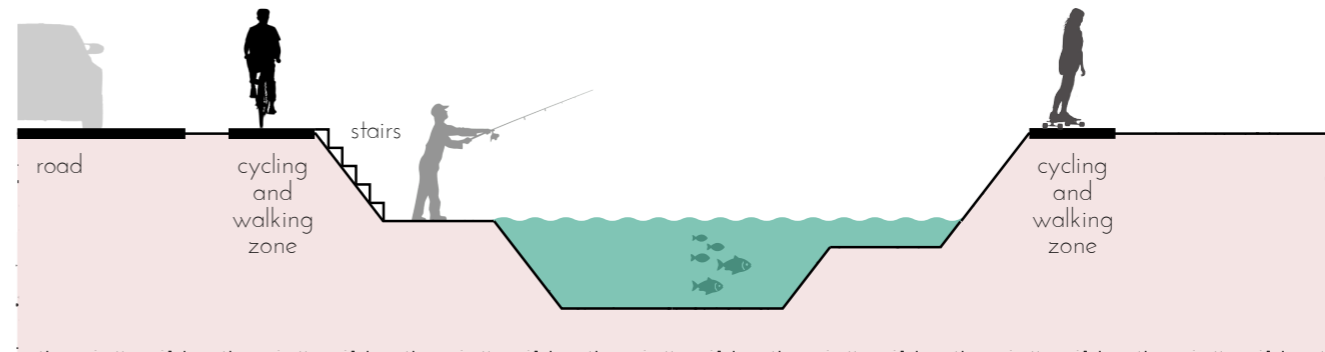
Nymphaea alba



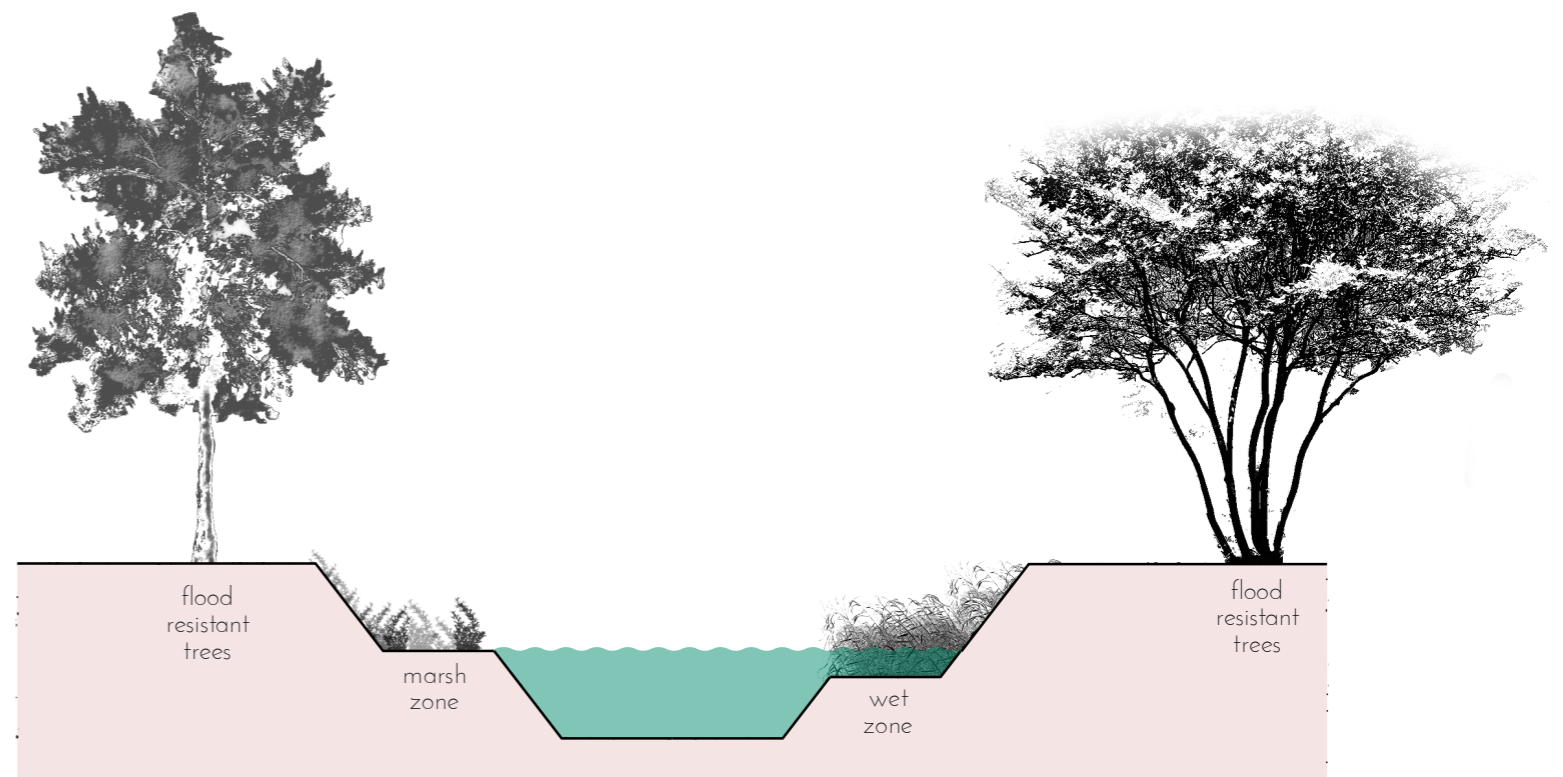
Typha latifolia



Materials

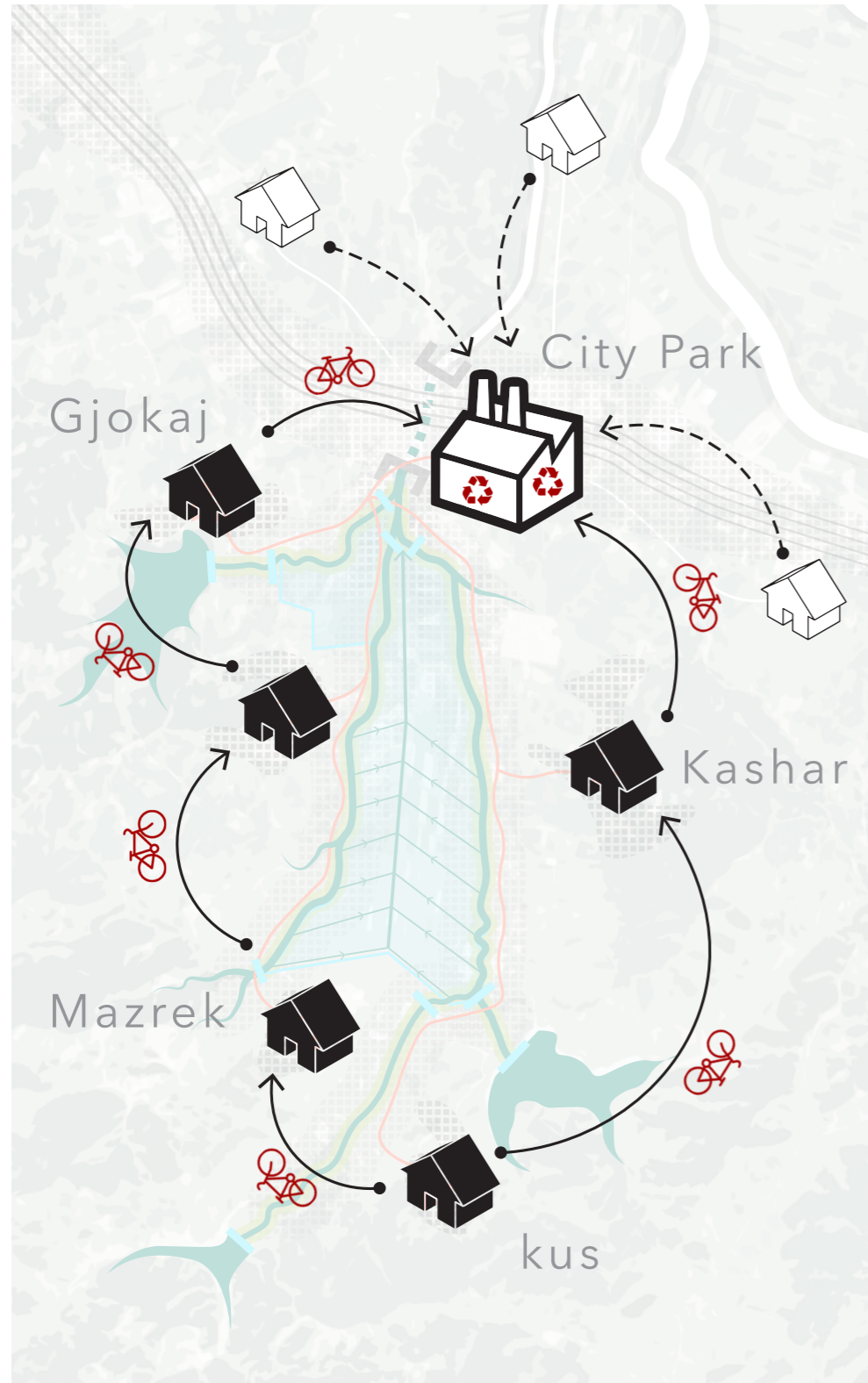


Accessibility



Planting

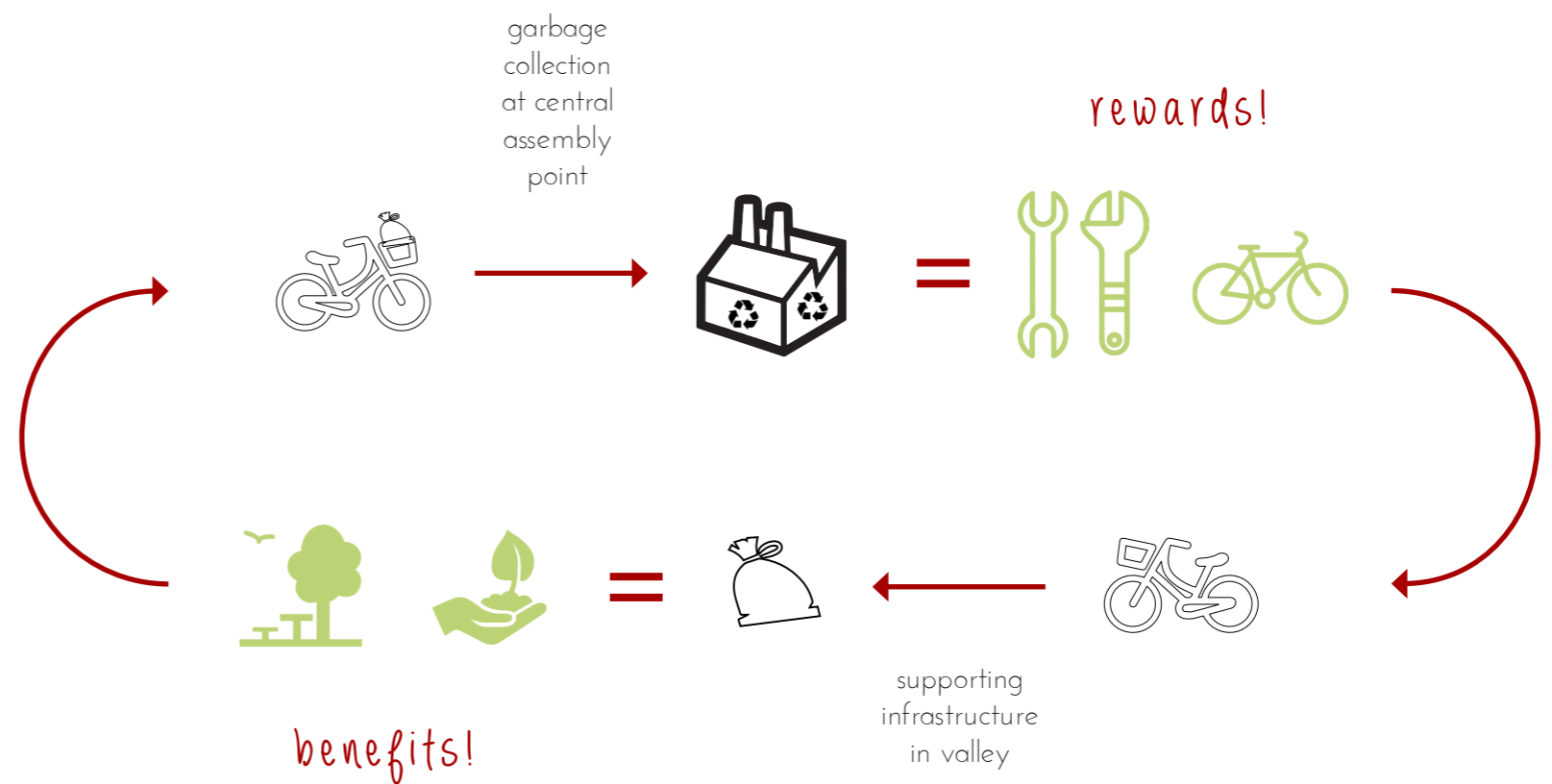
Elaboration Red



Communities in the Limuthi valley and connection to City Park

Rewards

In order to create support for the interventions in the Limuthi valley, a strategic collaboration (page 11) was devised, involving residents, municipality and Ecovolis community. In this elaboration it is specifically about creating support and raising awareness among the local residents. The combination of reintroducing the bicycle as a sustainable means of transport and collecting waste locally is the objective. The citizen is rewarded with bicycles and repairs for correctly collecting waste, separating it and bringing it to an assembly point.



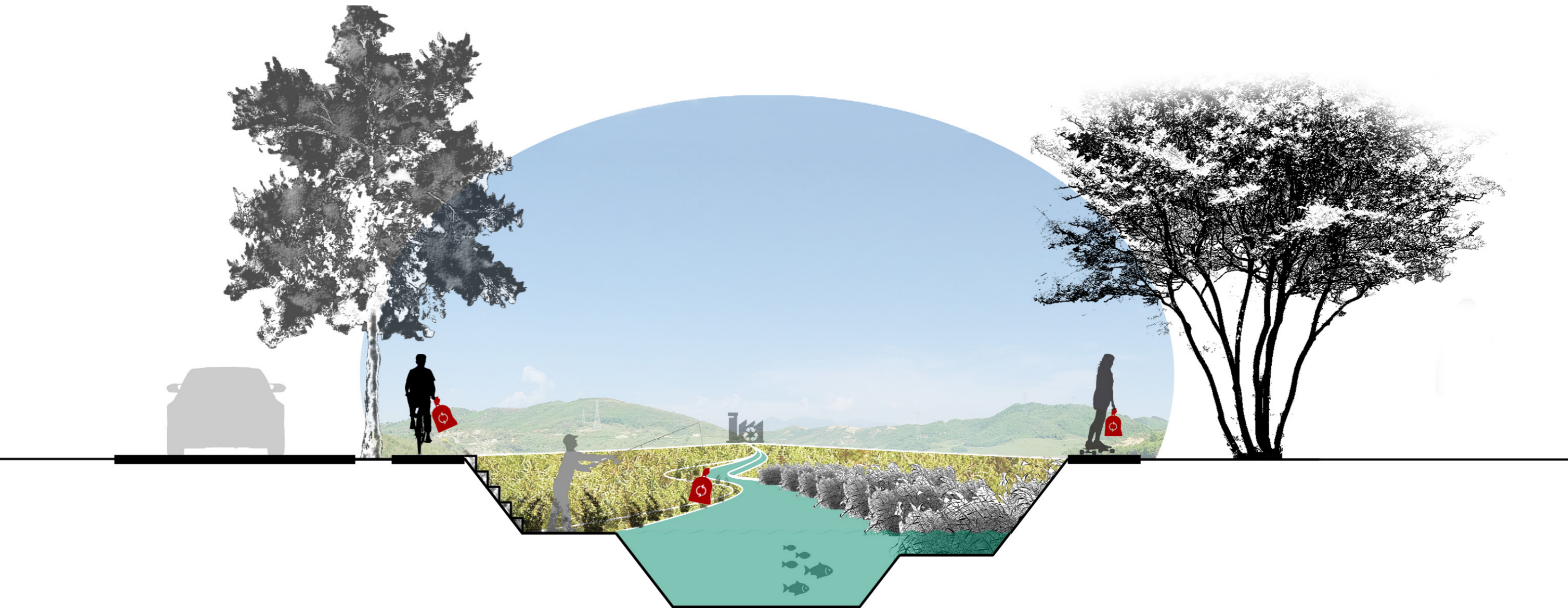
Benefits

The advantages of this system are that the local residents become more aware of their waste. By attaching a reward to their actions, waste gets a value and will no longer end up as pollution in the rivers. The overall benefits for all stakeholders (municipality or Tirana, Ecovolis and residents) is to create a clean and attractive area that has potential for recreation and tourism given its location.

Elaboration Red

Common objective

Besides creating a clean and attractive area, waste collection also contributes to the safety of the inhabitants of the valley and the commercial area along the SH2. Accumulated garbage in the river can no longer cause flooding. This will contribute positively to the entire water management plan proposed in this report.



Above: Impression of route to assembly point


Next page: Sketch of the valley after interventions

Don't waste the river!

Limuthi Re-Cycle Valley



Resources



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