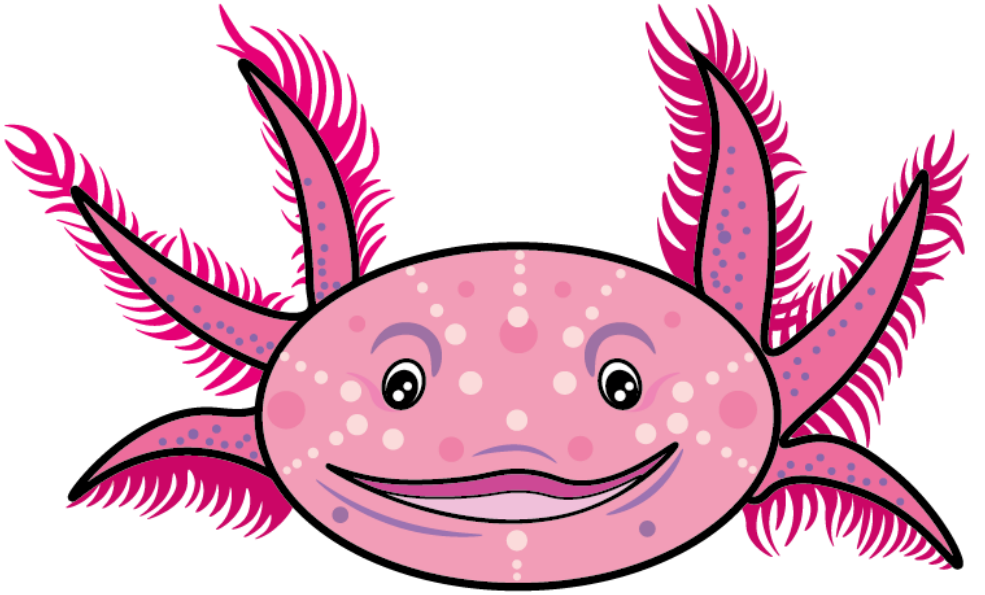
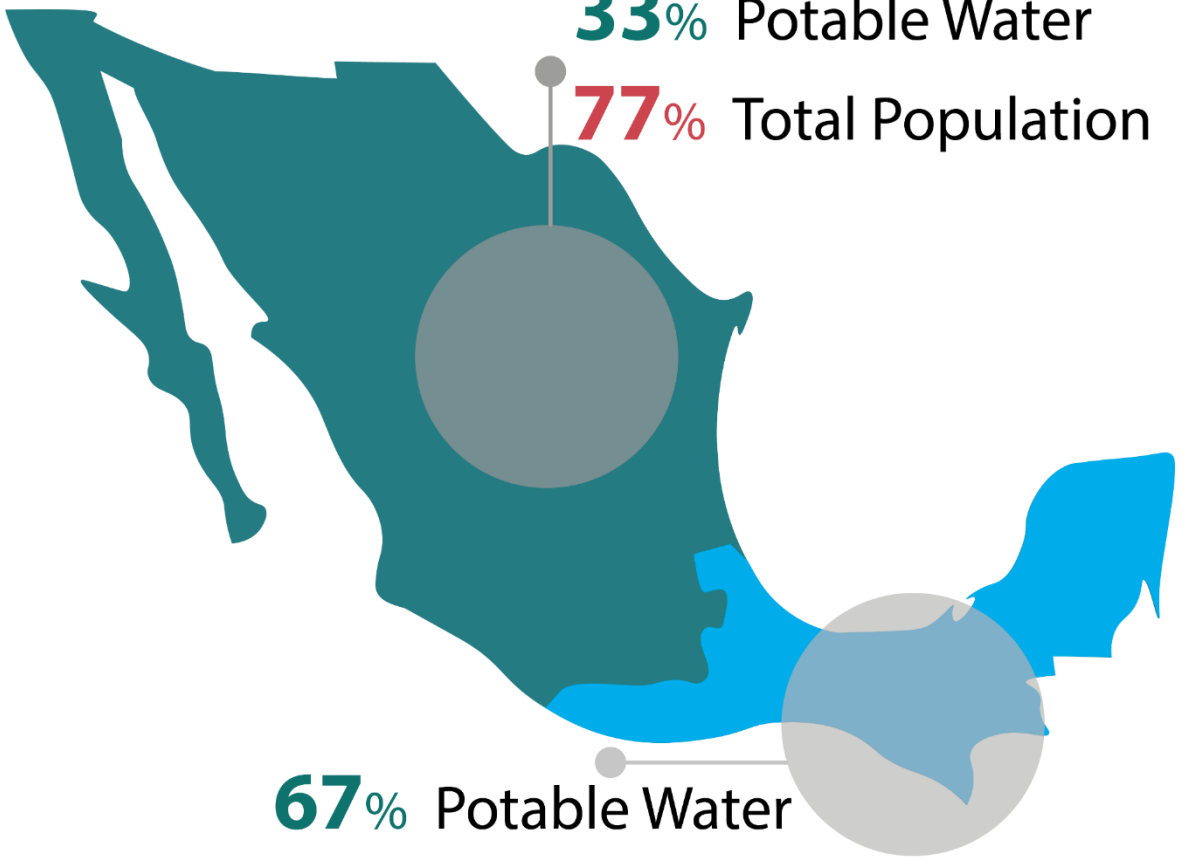


AXOLOTL

Prepared by:
Santiago Martinez

With the guidance of:
Christian Frenzel

Motivation



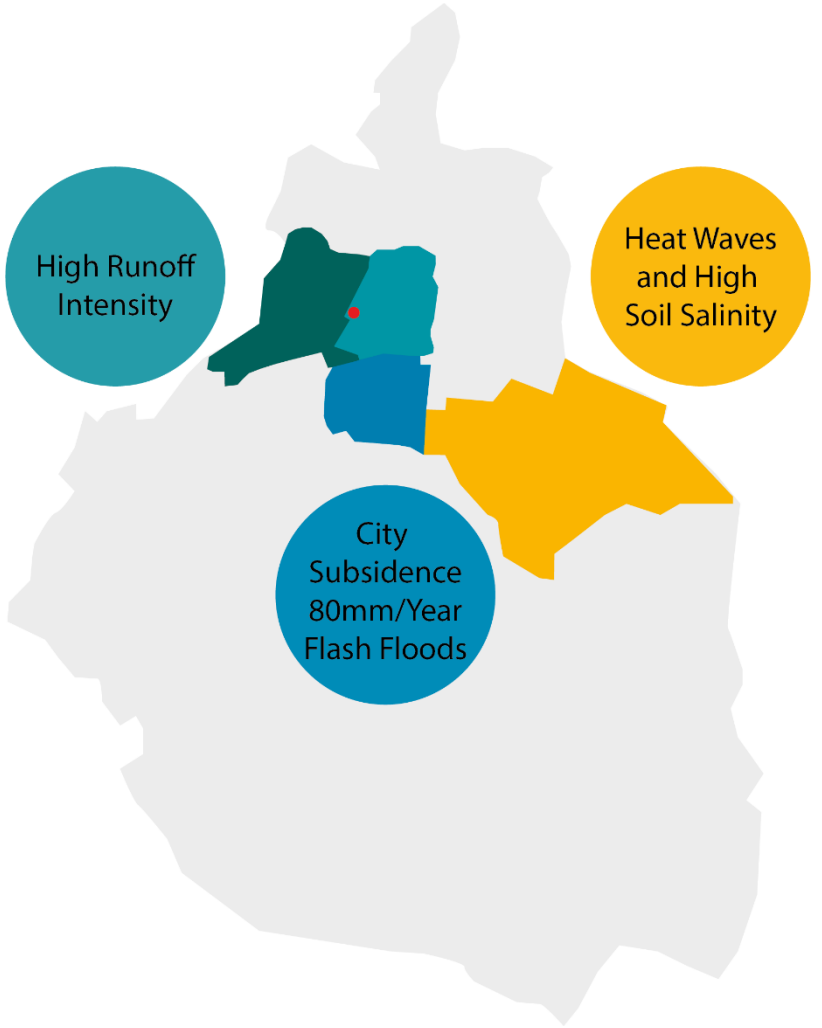
36% Mexican citizens without regular access to potable water

2 Million People are not connected to any potable water pipeline system

More than 25% of homes in Mexico have irregular access to public potable water services and 6% don't have connection to any clean water network system.

In the south part of Mexico the people have access to 67% of the total potable water, in the north its only 33%

CDMX



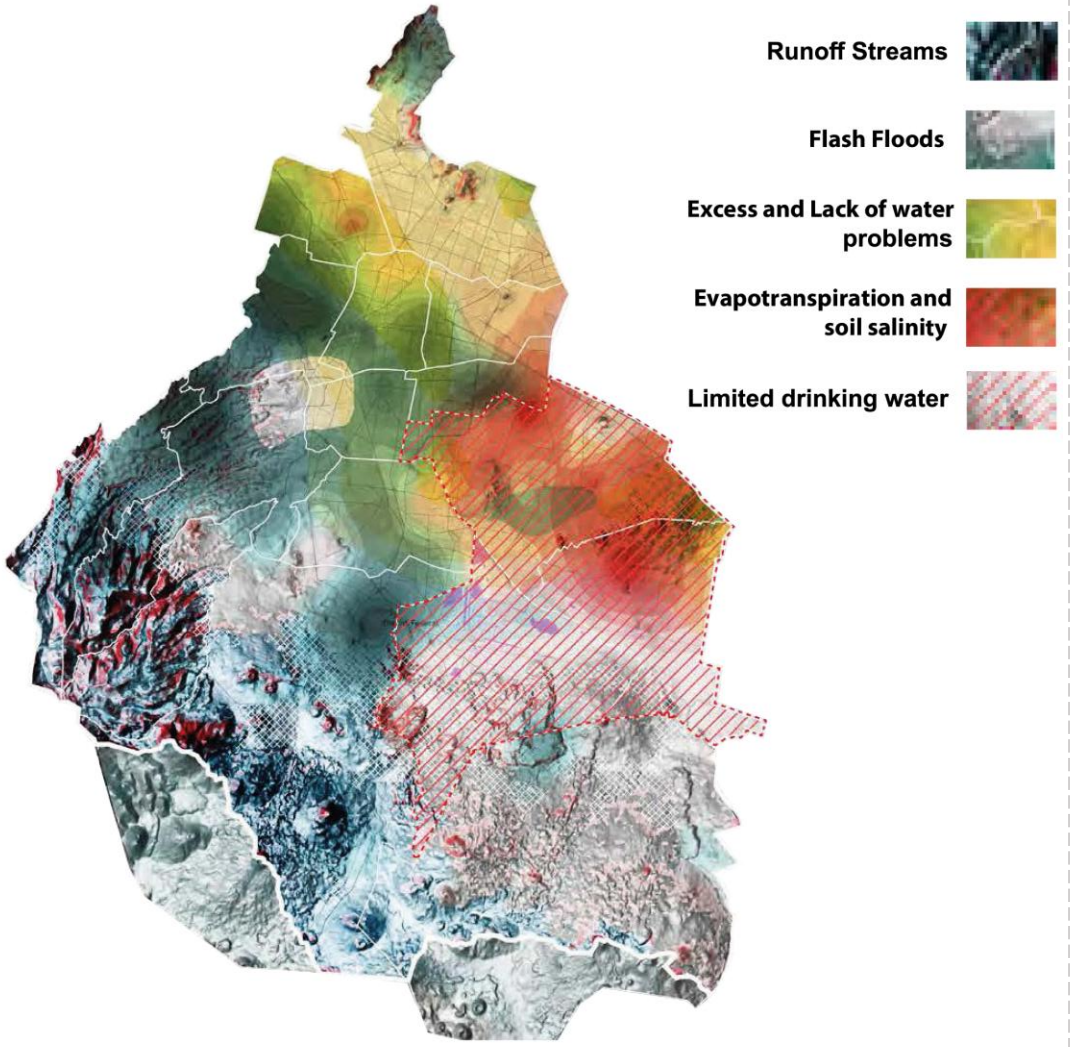


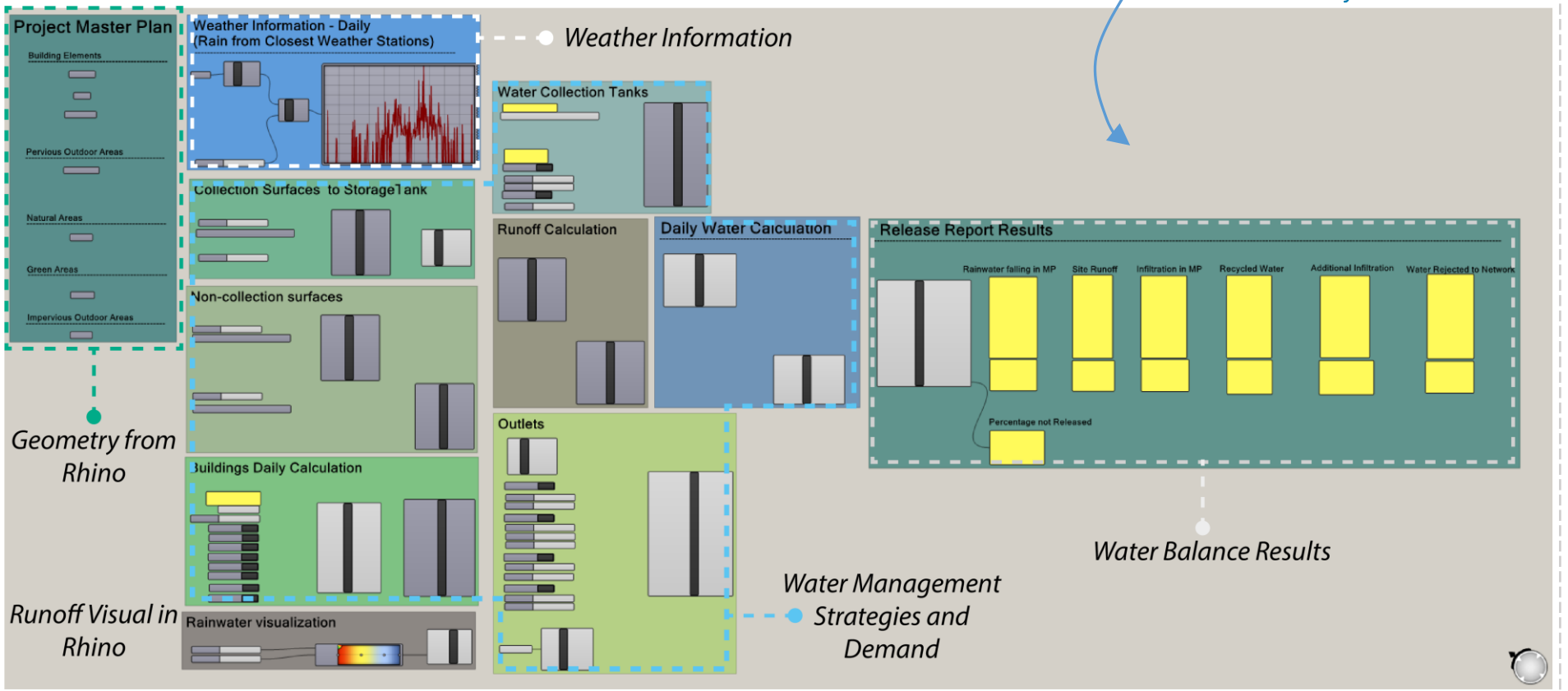
Figure CDMX

As presented in the report "Towards a water sensitive Mexico City" there are different problems associated with water management in the city.

The project will show the application of Axolotl in Paseo de la Reforma, as shown on the left map this area is highly vulnerable to high runoff intensity and flash floods.

Figure CDMX Source : Report "Towards a Water Sensitive Mexico City", 2016, Mexico City Government

AXOLOTL Rhinoceros – Grasshopper



Axolotl definition in Grasshopper has been developed in Python, each block component is based on the previous work of F. Penet .

The main outputs are listed below:

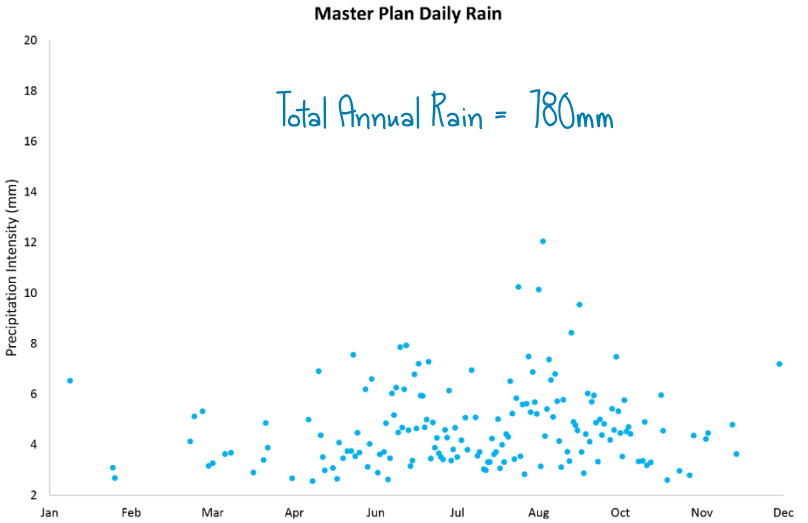
1. Runoff to Offstreet
2. Water Stored and Reused
3. Water Infiltration
4. Water Rejected to Sewerage Systems

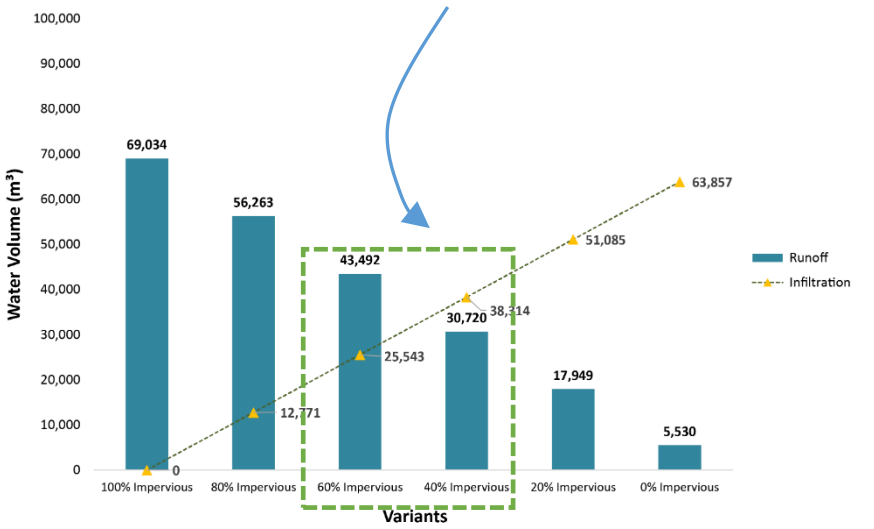
Case study – Master Plan

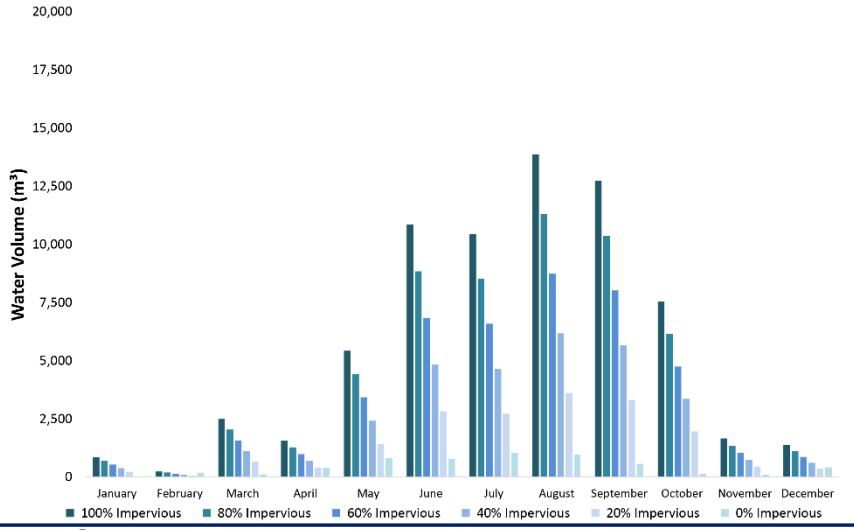
Case study master plan, Paseo de la Reforma, Mexico City.

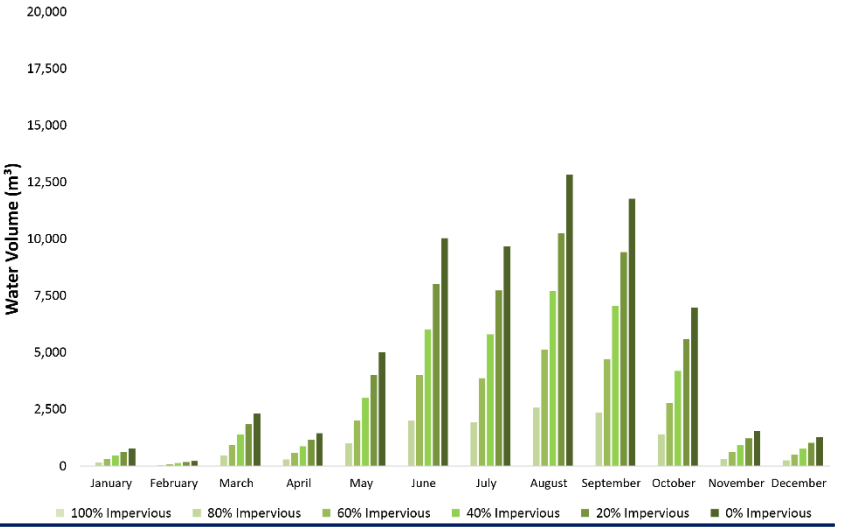
Two parametric studies have been done; the first one is related to the project master plan outside areas percentage of pervious and imperviousness, and the second one is related to the whole master plan program water management strategies.

Pervious and Impervious Exterior Areas







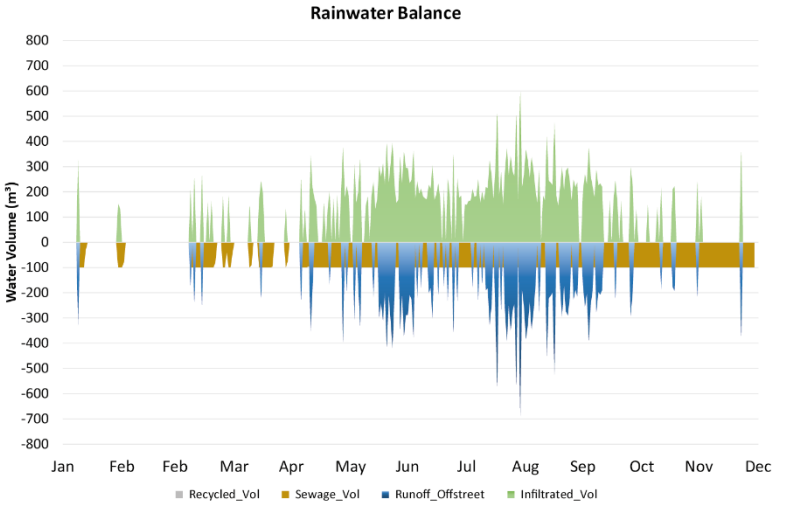


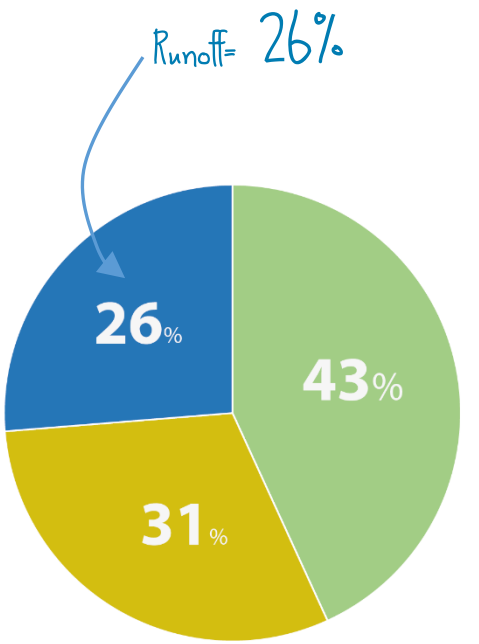
From these results was decided to include a 60% of pervious exterior areas, to decrease 56% the amount of water that would end up in outdoor offstreet areas and sewage networks.

Water Management

Variant 1

Infiltration





Rainwater Balance

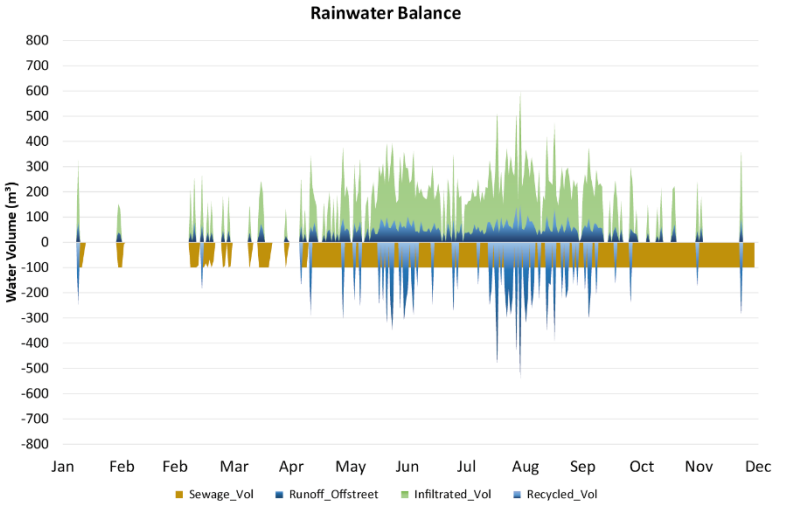
- Water Infiltrated
- Water Reused
- Water Stored
- Water Runoff
- Water to Sewer

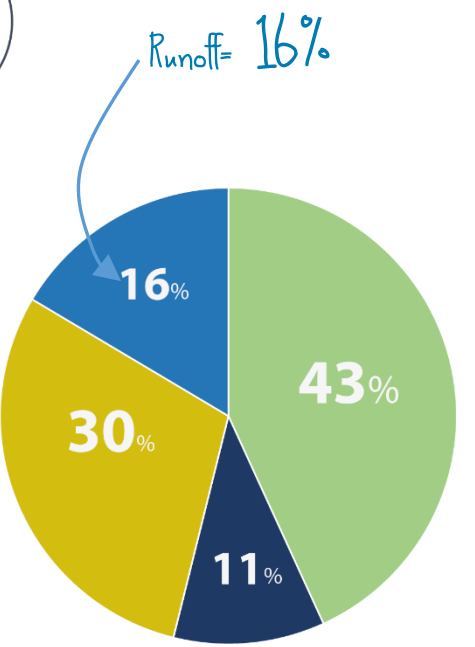
First variant, Increased infiltration: Includes the results from the parametric study for pervious and impervious exteriors areas, including a 50% of the total master plan areas for gravel and vegetation.

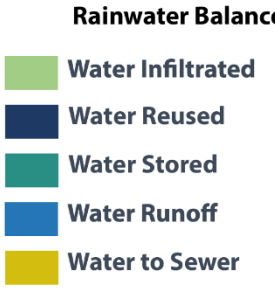
Water Management

Variant 2

Infiltration Reuse





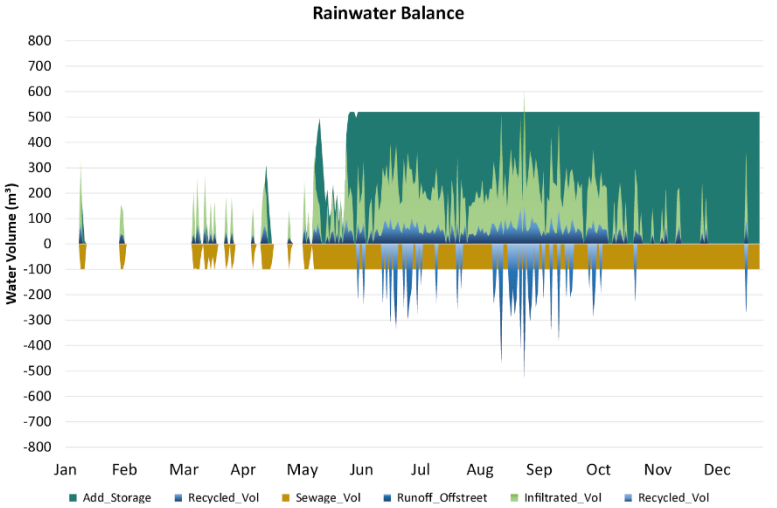


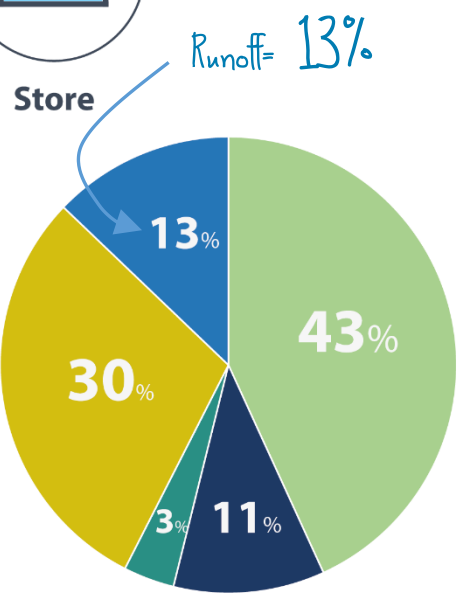
Second variant, Storage and Reuse: Includes the previous strategy for increased infiltration, and additionally uses the described rainwater storage tanks for water reuse.

Water Management

Variant 3

Infiltration Reuse Store





Rainwater Balance

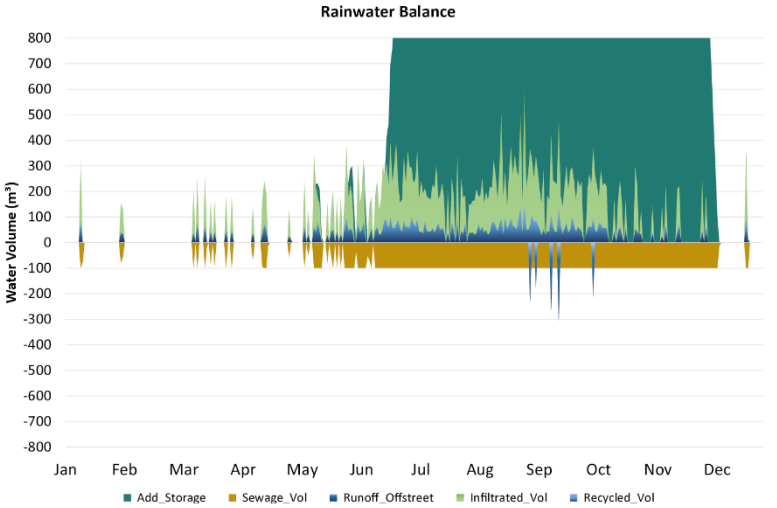
- Water Infiltrated
- Water Reused
- Water Stored
- Water Runoff
- Water to Sewer

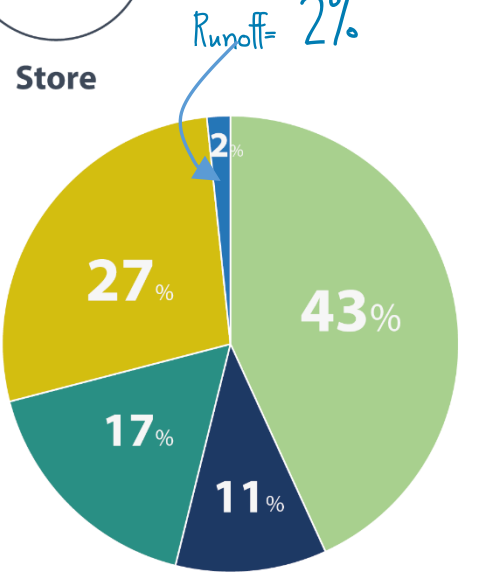
Third variant, Storage and Delay: Includes the previous strategies and is considered a water plaza in the center of the master plan plaza. The water plaza pool total volume capacity is 520m^3 with a discharge rate of 0.5m^3/hr.

Case study – Water Management

Variant 4

Infiltration Reuse Store



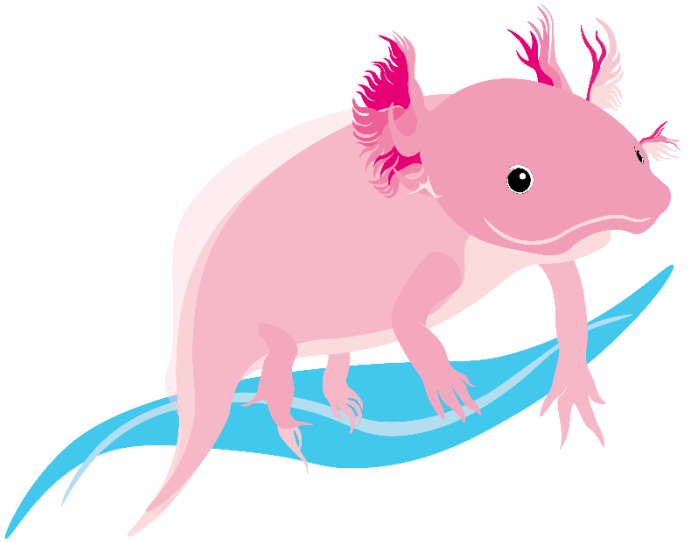


Rainwater Balance

- Water Infiltrated
- Water Reused
- Water Stored
- Water Runoff
- Water to Sewer

Fourth variant, Storage Increased and Delay: As variant 3, includes the previous strategies described in variant 1 and 2 but the water volume capacity for this central pool is increased to 4,800 m^3 with a discharge rate of 3.5m^3/hr.

Outdoor Comfort



An innovative and state of the art methodology to calculate the effect of water bodies surfaces has been designed and developed in parallel to quantify the impact in outdoor comfort performance in exterior areas.

UTCI calculations were done in TRNSYS, using as interface TRNLizard-Grasshopper

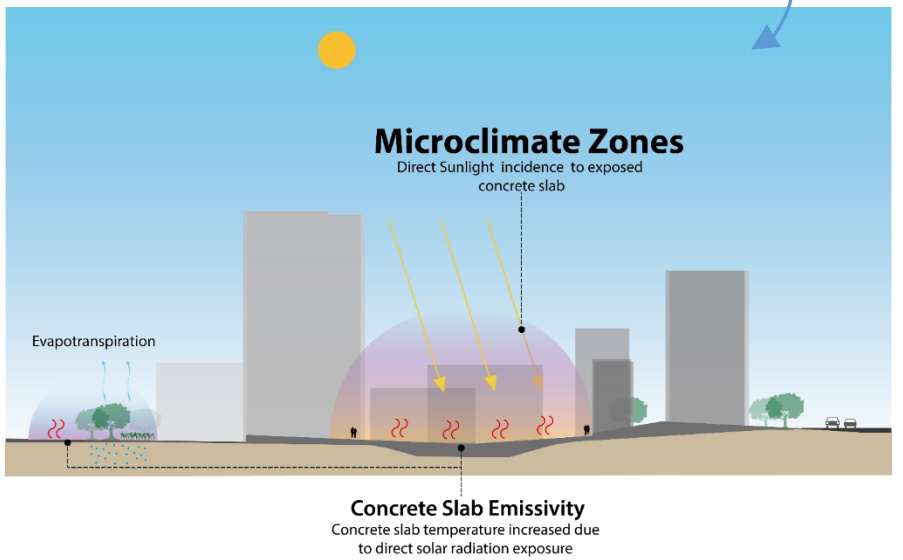
Outdoor Comfort– Water Plaza Location

An additional parametric analysis to compare the outdoor comfort in relation water storage available in outdoor areas is presented.

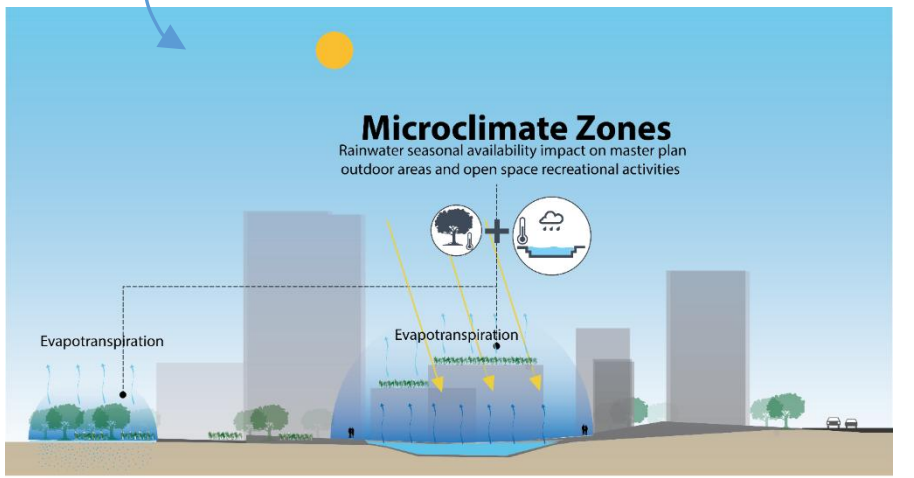
This water plaza will be filled according to rainwater runoff from surfaces in master plans Group 1.

Outdoor Comfort

This is a hot bubble and it Might be Uncomfortable

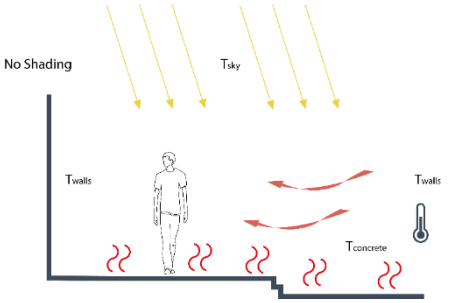


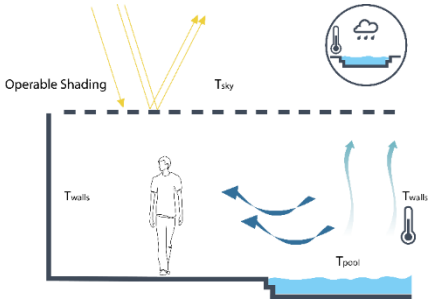
This is what we call Going Beyond

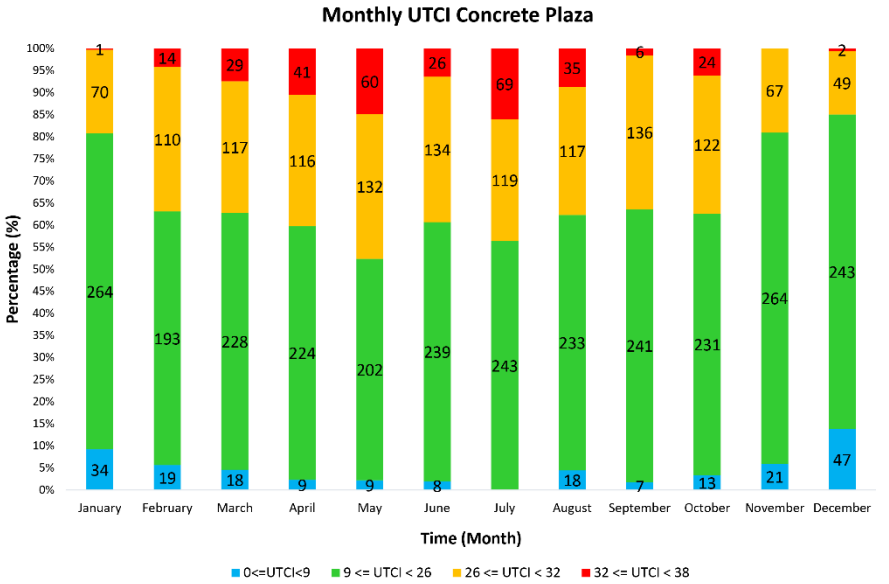


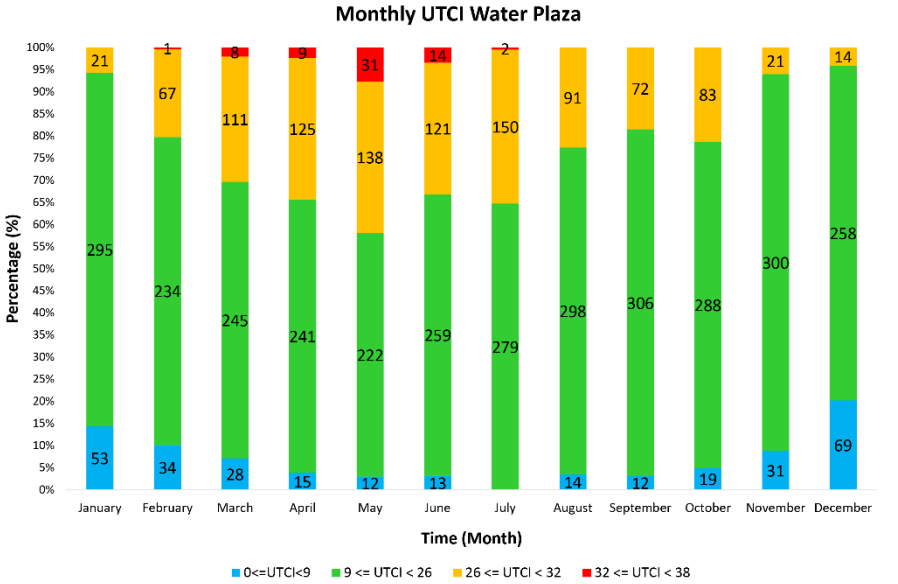
The purpose of the study is to compare the comfort change for a conventional concrete plaza and a water plaza with available water depending on the precipitation intensity through the year.

Outdoor Comfort



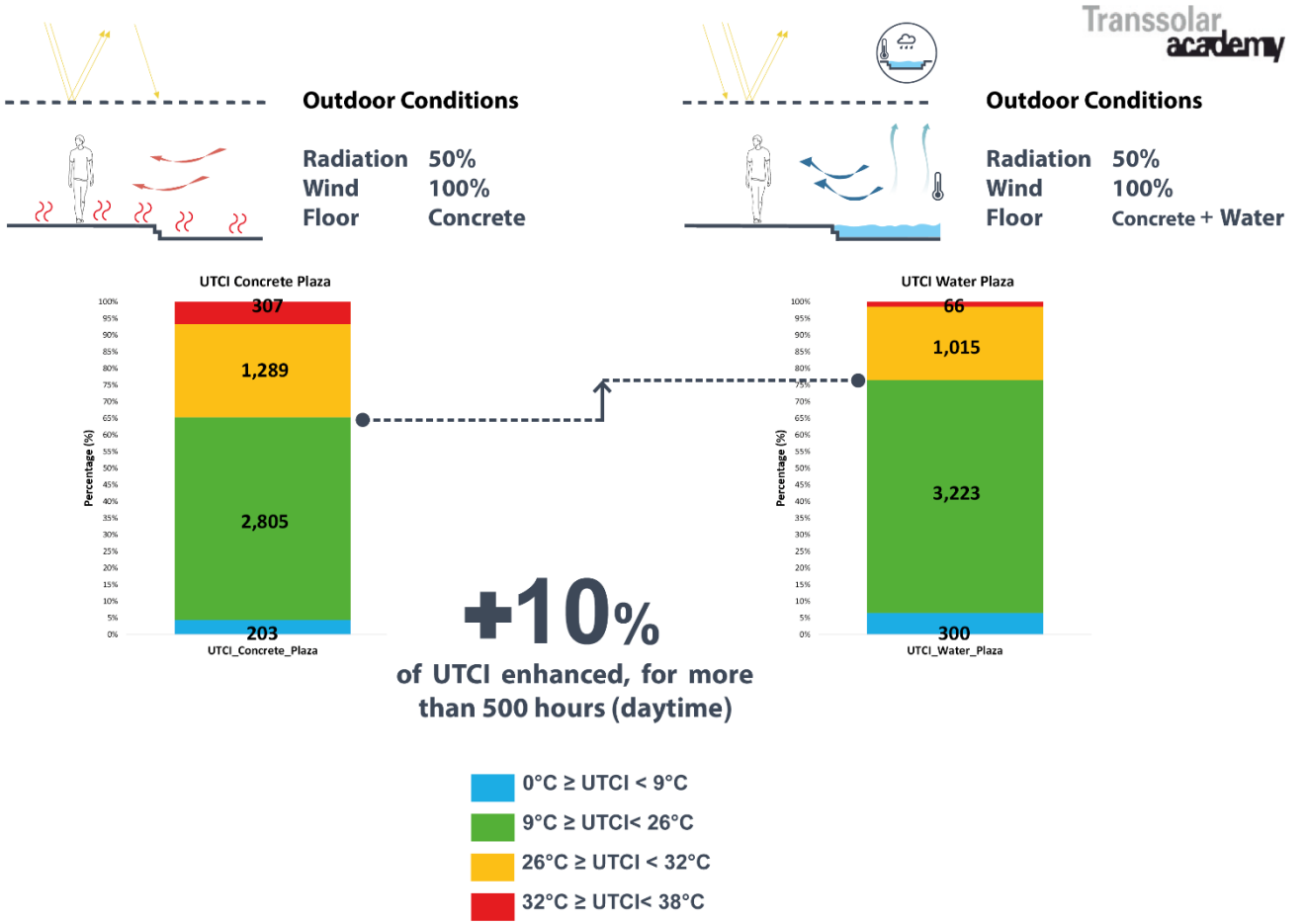






Monthly UTCI values improved for water plaza when water is available.

Outdoor Comfort



As an additional study the outdoor comfort analisys demosntrated that improving outdoor conditions might also be a potential use for water storage, while this water can drastically improve the city water sensitive program