

REGENERATING WATER

RETHINKING OF AN URBAN TYPOLOGY

THESIS 2021
ECE BEZER

This thesis explores how water can be saved, rehabilitated, and reused by architectural means in a future drought. The thesis brings the forgotten urban typologies, the cistern, and the public bath to modern day Istanbul.

Water Regeneration Center acts as a prototype for the future severe drought in Istanbul by diminishing Istanbul's water needs at its minimum, rehabilitating the polluted streams to access fresh water, and by forestation along the streams to increase precipitation.

GENERAL OVERVIEW / DROUGHT IN THE WORLD

**30
MILLION**

There is a yearly
groundwater
consumption of
30 million m3.

**2.5
MILLION DAILY**

In 2003 the daily water
consumption was 1.9 million
m3/day. This number rose
to 2.5 million m3/day
in 2014.

**225 L/
CAPITA-DAY**

In 2050 the gross water
demand will rise to
225L/capita per
day.



THE WORLD POPULATION INCREASES.

DUE TO THE RAPID INCREASE OF THE WORLD'S
POPULATION, THE CONSUMPTION OF WATER WILL
RISE AS WELL. THERE IS A YEARLY INCREASE OF
6.99% OF WATER CONSUMPTION.

CONSUMPTION BASED SOCIO-ECONOMIC ORDER.

THE NEGLIGENCE AND WRONG PRACTICES OF THE CAPITALIST
SOCIO-ECONOMIC ORDER TO USE THE RESOURCES OF THE WORLD
INCREASES THE PROBLEM OF DROUGHT. EACH YEAR, MORE SOIL
IS TRANSFORMED INTO CONCRETE. EACH YEAR MORE TREES
ARE CUT. PROTECTING THE NATURE- THE EXISTENCE OF TREES, SOIL, AND
WATER RESOURCES ARE CRUCIAL TO COPE WITH GLOBAL WARMING.

THE INCREASE IN URBANIZATION.

THE EXTRACTION AND USE OF FOSSIL FUELS, THE
GLOBALIZATION OF TRADE, AND THE INCREASE IN
URBANIZATION CREATE AIR POLLUTION AND MAKE THE
SOIL DESOLATE.

WORLD'S RESOURCES ARE INSUFFICIENT IN SERVING THE POPULATION.

THE INSUFFICIENCY OF WORLD RESOURCES IN THE FACE OF THE INCREASING
WORLD POPULATION, COMPLICATE THE PROBLEM OF DROUGHT.

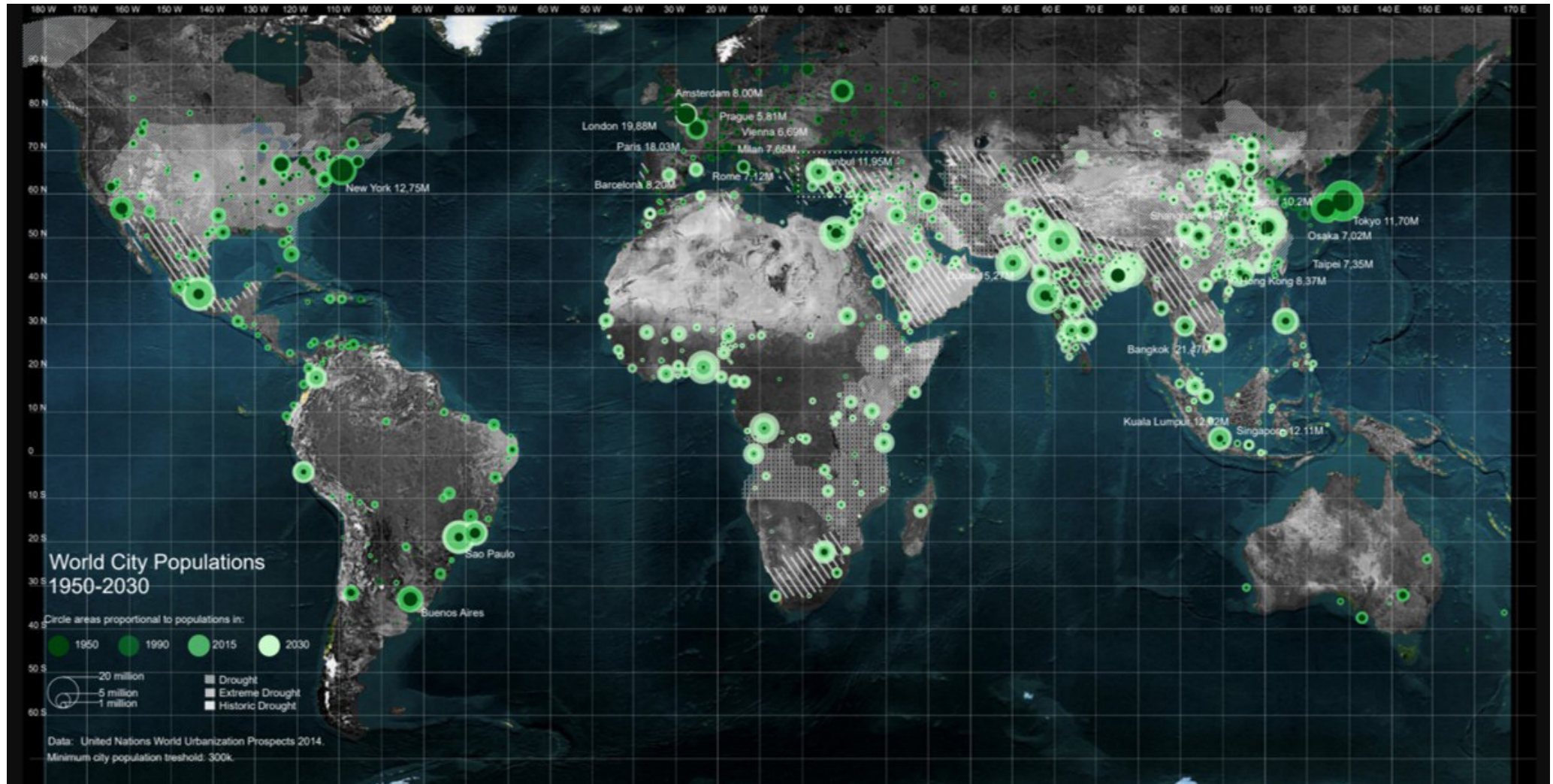
THE EXTRACTION AND USE OF FOSSIL FUELS.

THE INSUFFICIENCY OF WORLD RESOURCES
IN THE FACE OF THE INCREASING WORLD POPULATION,
COMPLICATE THE PROBLEM OF DROUGHT.

RESULT IN IMMIGRATIONS.

HABITATS NARROWED BY
DROUGHT WILL TRIGGER LARGE
MIGRATIONS AND AFFECT THE
LIVES OF ALL COUNTRIES.

AN OVERVIEW OF THE DROUGHT PROBLEM IN ISTANBUL



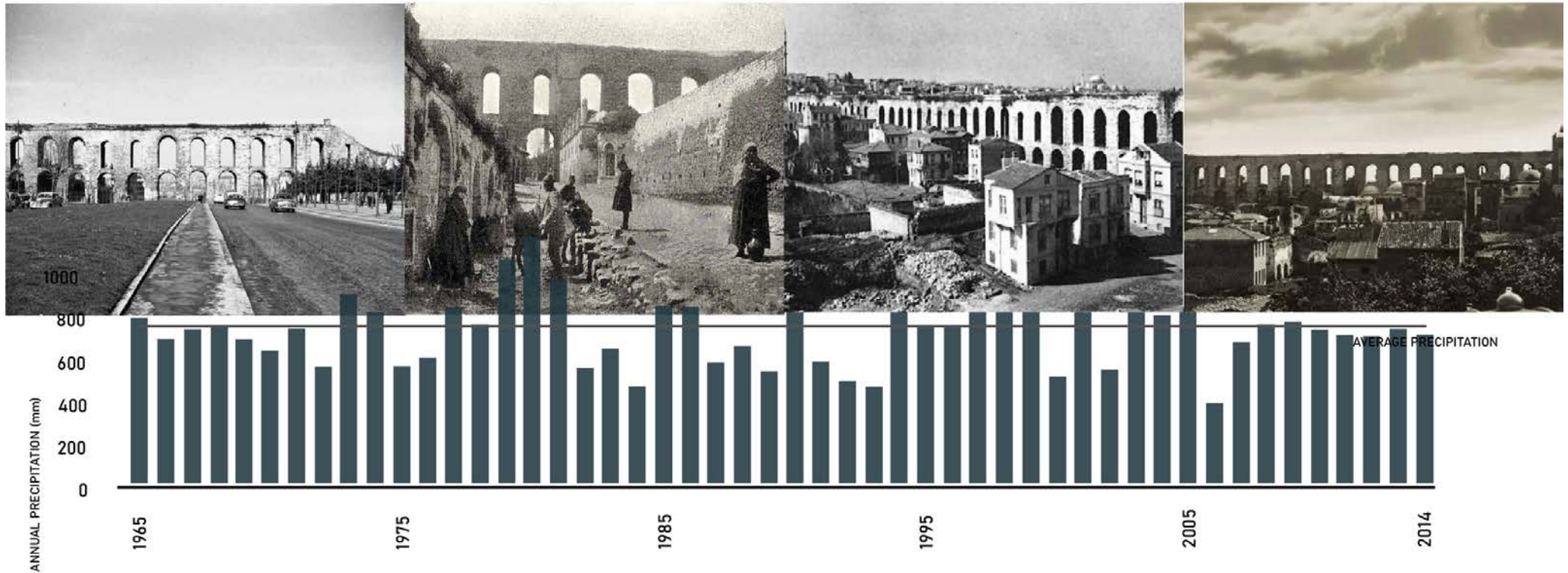
Istanbul, that was founded in BC 8000 in the historical peninsula, receives the highest rate of immigration in Turkey and is the most crowded metropolitan city. The wind blowing from the Black Sea to the south, the Northern Forests, and the streams extending into the city along deep valleys are the vital points of the city that is located on both sides of the Bosphorus. In the past, water was brought to the city by aqueducts and stored in cisterns. Water is now supplied from the reservoirs built on streams. However, the change in the precipitation regime due to the climate crisis makes it difficult to keep sufficient water in the reservoirs. The forests and water basins that are in the north of the city have suffered serious losses over the years due to wrong growth strategies. This also aggravates the negative effects of global warming on the climate.



The forests and water basins that are in the north of the city have suffered serious losses over the years due to wrong growth strategies. This also aggravates the negative effects of global warming on the climate. The construction in the streams has destroyed air corridors that provide natural air conditioning by bringing the northern winds to the city. The construction also caused deforestation. The increase in heat caused by the high density of buildings in the city and industrial areas prevented the city from getting rain by heating the atmosphere.



WATER SYSTEMS IN CONSTANTINOPE



Throughout the history, İstanbul had insufficient amount fresh water. To bring fresh water into the city, aqueducts were constructed.

WATER SYSTEMS IN CONSTANTINOPE



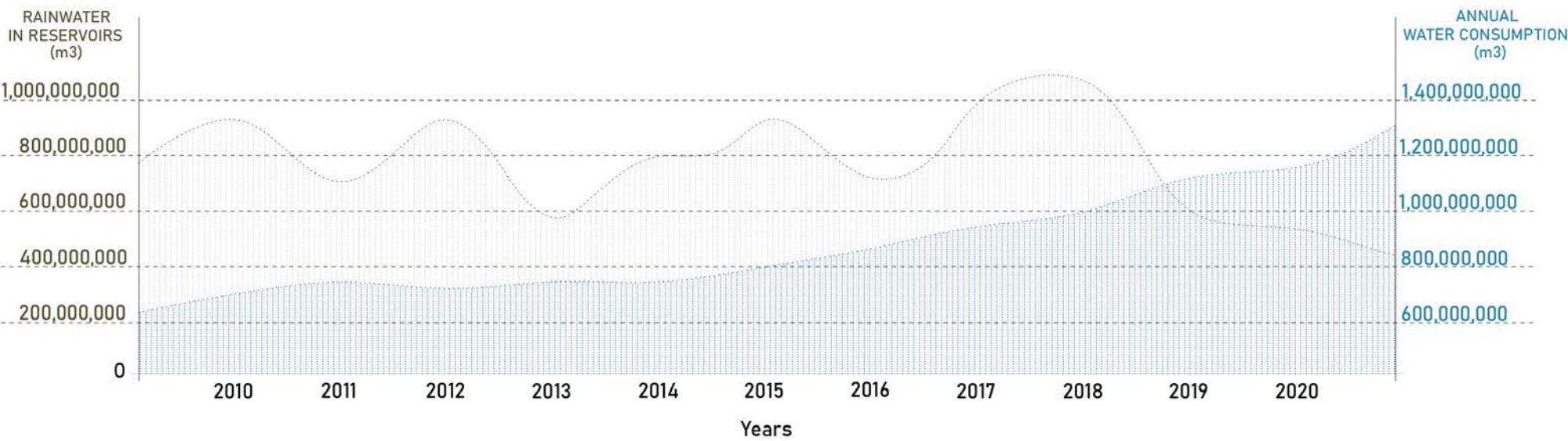
Among these aqueducts, the most important ones were the Valens Aqueduct and the Hadrianus Aqueduct. Water is now supplied from the reservoirs built on streams

ISSUE OF URBAN SUSTAINABILITY

The man's survival depends on the existence of nature. It is impossible to live in a world without water, air, and food. For this reason, protecting the nature - the existence of trees, soil, and water resources - and re-evaluating these resources with recycling systems lies at the basis of the studies carried out worldwide to cope with the negative effects of global warming. Urban growth strategies are also developed on this basis, and studies are carried out on self-sufficient-autonomous systems that can meet basic needs such as energy, water, and food, transform resources with zero waste technology and do not harm the environment. For instance, the use of renewable, clean energy sources that reduce greenhouse gas emissions may be increased, the utilization of gray water may be increased, the farm may fold back into the city to remove emissions-heavy delivery trucks from the road by shortening the distances in vehicle traffic.

ISTANBUL'S DECREASING WATER RESOURCE

WHILE THERE IS LESS WATER IN THE RESERVOIRS EACH YEAR, THE ANNUAL WATER CONSUMPTION CONTINUES TO GROW.



KAĞITHANE AREA REHABILITATION AS A MODEL



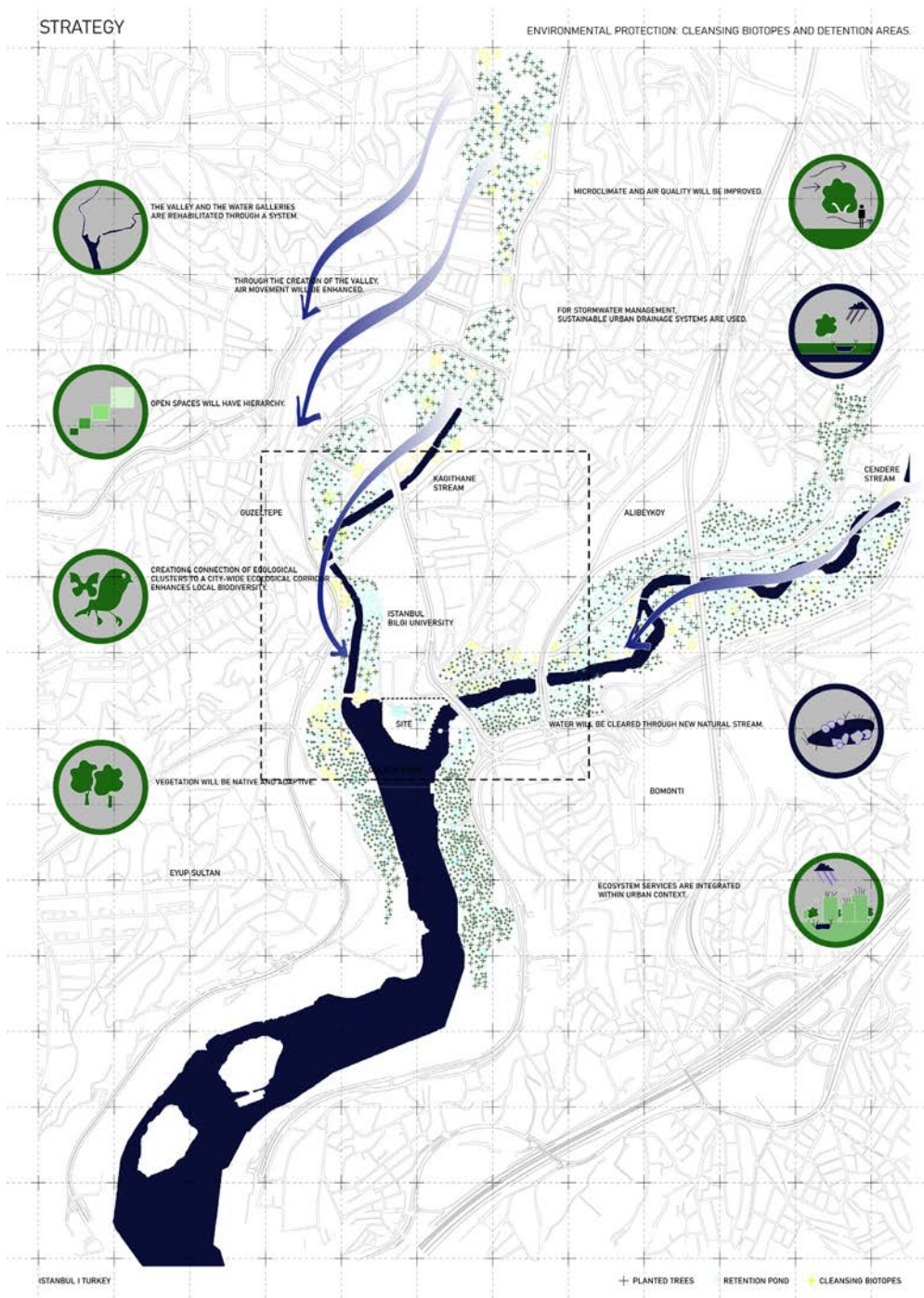
To make a sustainable urban environment in Istanbul, this growth towards the north must be stopped and the loss of forest and land must be prevented. Streams must be rehabilitated, stream beds should be cleared of structures, the presence of trees should be increased, and they should be transformed into an eco-corridor with landscaping arrangements. Thus, it will be possible to cool the city and reduce evaporation by making the wind movement feasible. These areas will also enable social interactions as they are open public spaces that will bring citizens together.

Kağıthane Region is at the end of Alibeyköy and Cendere creeks, which come from the Northern Forests and flow into Istanbul's historical inner harbor, Golden Horn. In this unplanned region, construction in the stream beds causes pollution in the streams and causes death and demolition during floods. The reason I chose this area as the project area is that this place is an example that corresponds to the topic I have discussed in my thesis. My aim is to create a model that will enable urban and social sustainability in this area with urban and architectural proposals.



Golden Horn

STRATEGY

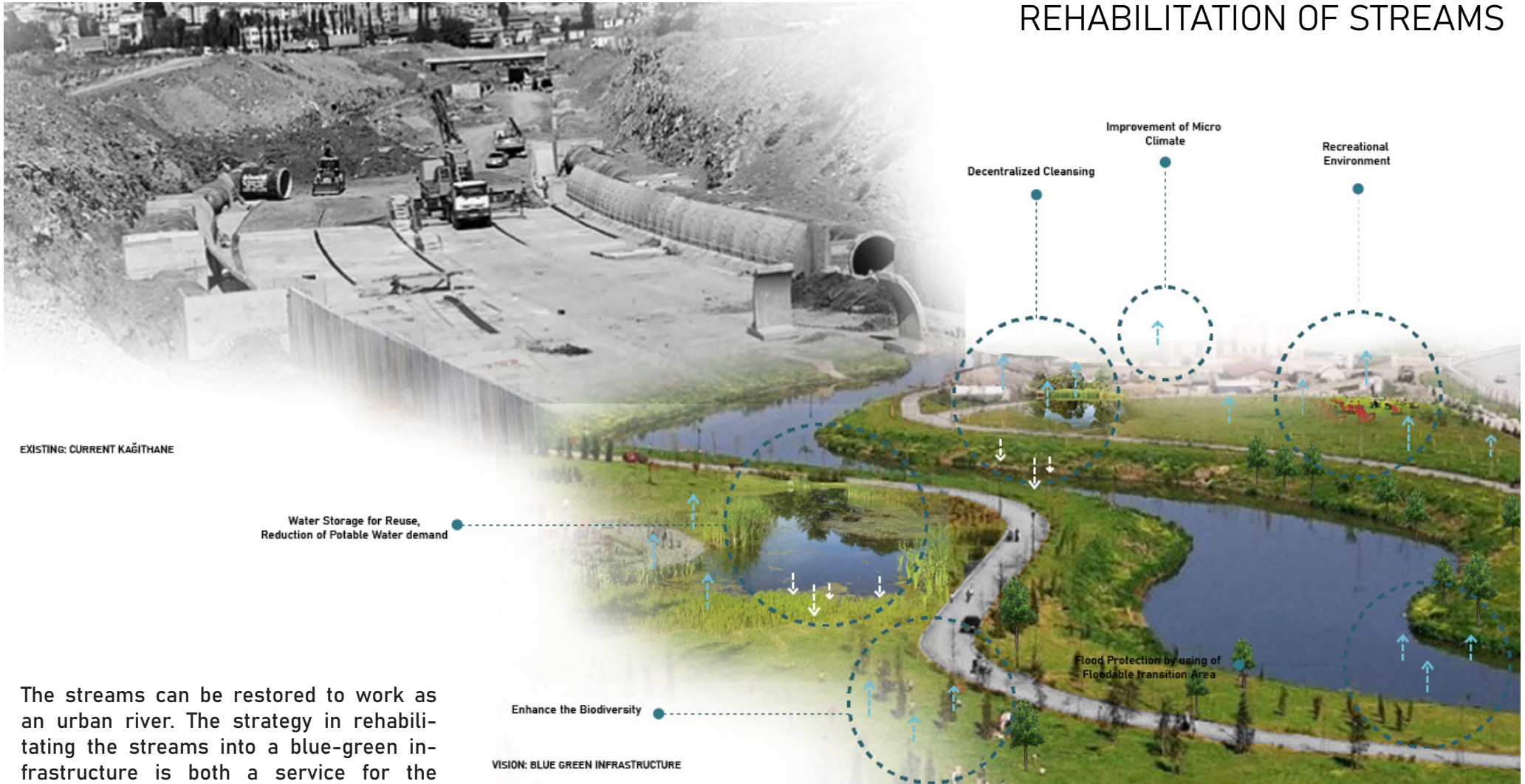


URBAN DECISIONS TAKEN FOR THE REGION

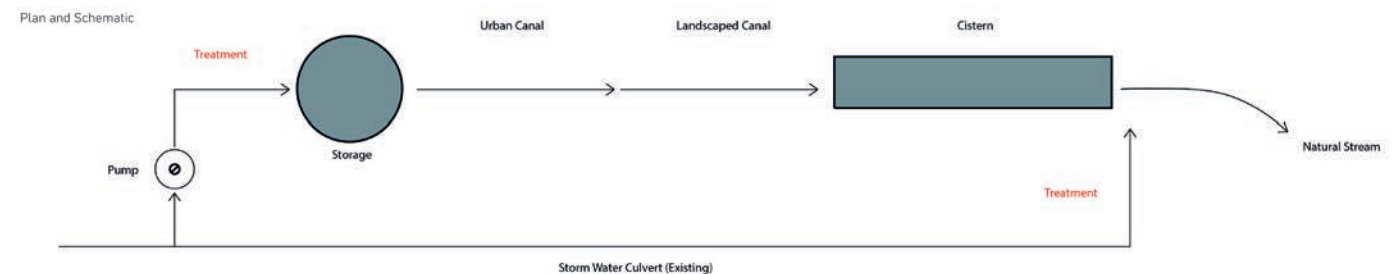
In this context, urban decisions taken for the region:

- 1) Rehabilitation of Kağıthane and Cendere Streams. (Purification of stream water from pollution)
- 2) Purification of the creek environment from the construction (re-creation of open-air corridors to the winds from the north)
- 3) Forestation along the stream and turning it into a public open space with landscaping arrangements - parks, playgrounds, outdoor sports areas, cafes, etc. (Increasing the presence of trees - providing air conditioning and oxygen increase)
- 4) Improving unhealthy (irregular, unqualified, shantytown) housing. (With the urban design to be made by creating a financing model with the Central Administration - the ministry, the local administration - the municipality and the residents of the neighborhood, Kağıthane is aimed to be a self-sufficient area. a place where water needs will be satisfied and open spaces will be utilized for neighborhood agriculture.

REHABILITATION OF STREAMS



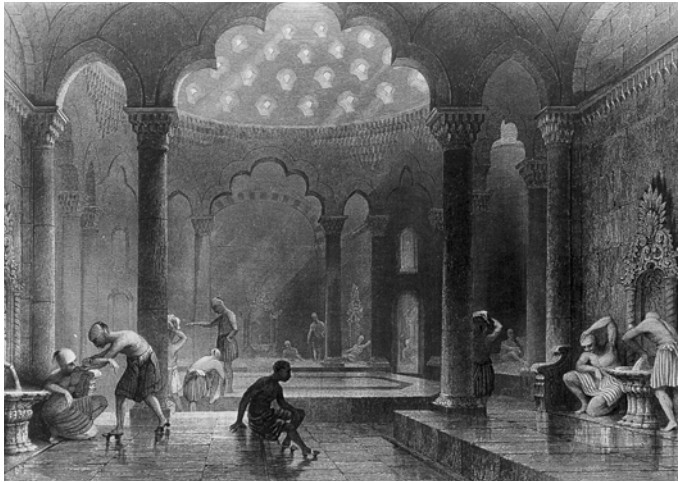
The streams can be restored to work as an urban river. The strategy in rehabilitating the streams into a blue-green infrastructure is both a service for the eco-system. This could also be crucial in terms of managing floods, improving water quality, and water storage. Through the rehabilitation, the recreational environment in the area will flourish. There will also be an increase in the biodiversity.



STRATEGY

To store stormwater and rainwater, retention ponds are constructed along the valley. Some of those retention ponds are constructed in the site. Within the scope of the thesis, the building that I designed on the water where Alibeyköy and Cendere Streams meet the Golden Horn, is a public structure that provides its water need by refining sea water, obtains its energy from the sun, and offers its users a pleasant space experience with its open-closed areas. I think that the building, which I aim to contribute to environmental sustainability as an autonomous structure,

WATER REGENERATION CENTER AS A SOCIAL SPACE



Turkish Bath during Ottoman Reign



Moda Beach, Istanbul 1950



Bilgi University



Kağıthane Region

According to the research, a significant part of the water consumption in the city is the water used in the bathroom. Reducing tap water will be an important step to protect drinking water against the threat of drought. The bathhouse, which is a part of Turkish culture, were the structures where people needed to bathe collectively in ancient times. They were important places to visit since there was no water system in the houses yet. Even though the tradition of bathing in the bathhouse has become more touristic today, it still takes place in life. I aim to make the tradition of the past a part of the modern life and reduce the use of water with the program of the building I propose, consisting of a hammam, spa and outdoor swimming pool. Baths of the past were also places where people met and socialized. Kağıthane Region hosts the socio-economic and culturally middle-lower population of the city. Bilgi University, located in the same region, is an educational structure where mostly students from the economically and culturally high level of the city study. for the Water Regeneration Center I designed, I aim to create a socio-cultural sharing ground by bringing residents and university students together.

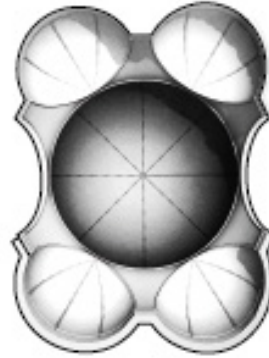
DOMES OF ISTANBUL



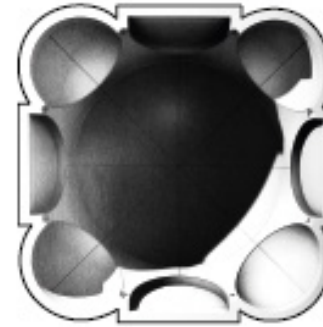
HAGIA SOFIA



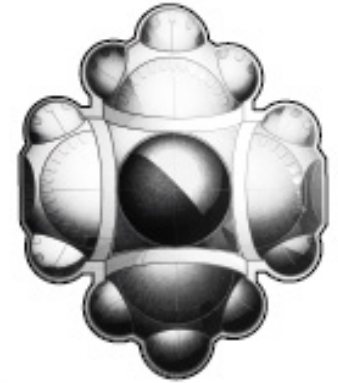
OLD FATIH MOSQUE



SOKULLU MEHMET PASHA MOSQUE



SELIMIYE MOSQUE



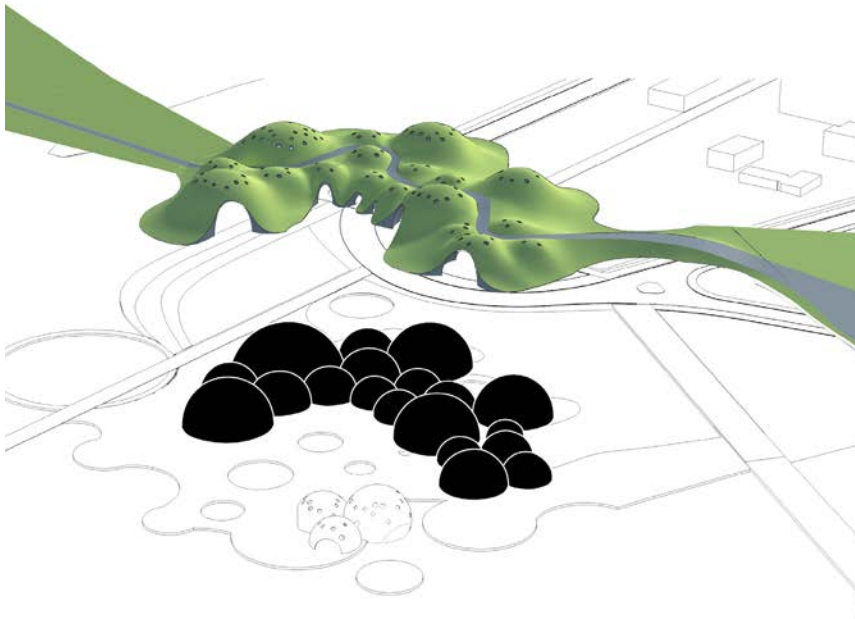
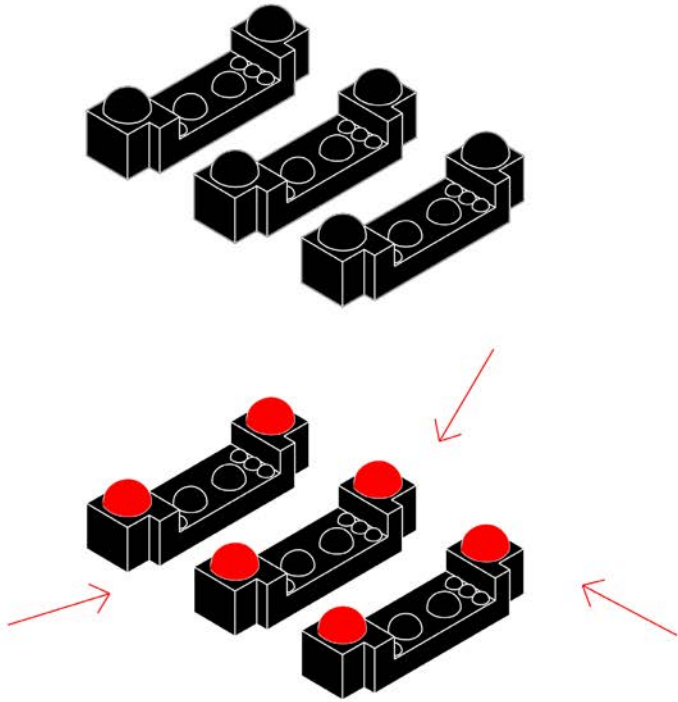
SULTAN AHMED MOSQUE



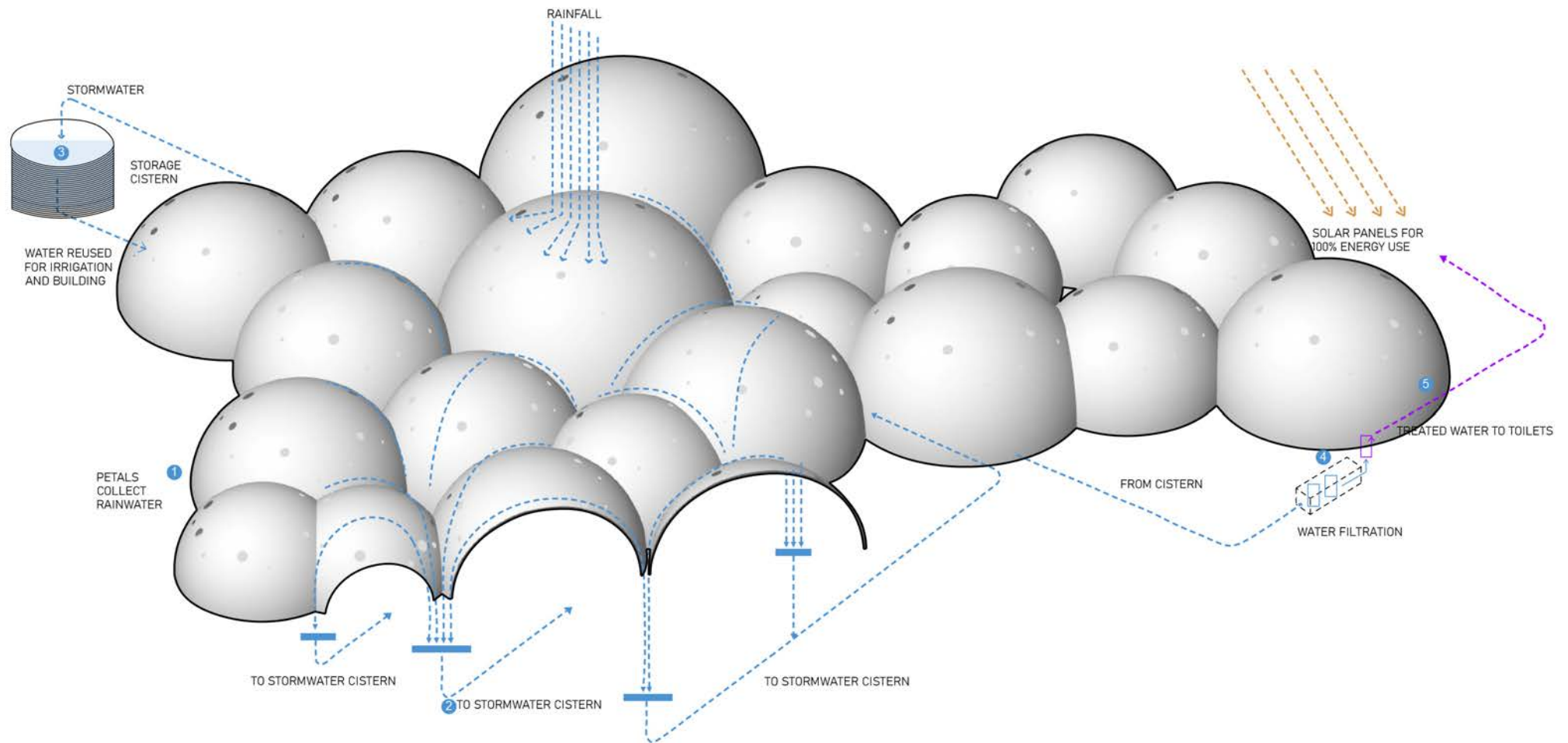
The domes are structures that are significant in describing Istanbul's silhouette. In the Water Regeneration center that I propose on the edge of the Golden Horn, I was inspired by these domes. Therefore, the building will be harmonious with this silhouette. Thus, it will be a part of Istanbul.

RETHINKING OF AN URBAN TYPOLOGY

Domes of various institutions; Byzantine churches, Ottoman mosques, Turkish baths, etc. are modernized throughout the thesis. The forms of these domes are manipulated according to their program, and to the hierarchy. Some of them became larger to incorporate more program inside and some turned out to be smaller. At the end, these domes are intersected and became one large space. People will circulate inbetween these domes. The exterior of the domes are covered with a green roof that connects the site to the landscapes at both ends of the Golden Horn.



STRUCTURE AS WATER FILTRATION SYSTEM



The domes will be constructed of concrete. The structure of these intersecting domes will also work as a water filtration system. Rainwater and stormwater will enter through the intersections inbetween the domes and will be transferred into the storage area for purification. The bath will be an autonomous structure. It will compensate all its water needs in site. As another method for providing water into the site, retention ponds are constructed at the skirts of the landscape. This also is a reference to historical open cisterns in Istanbul.







