



A SONG OF “ICE & FIRE”



Country / City China

University / School Beijing Forestry University

Academic year 2019-2020

Title of the project A SONG OF "ICE & FIRE"—Treatment of concentrated rainfall based on arid and semi-arid regions . Shanxi Datong , China

Authors Chao Zhou, Shuang Li, Hongda Wang, Keji Zhao, Yadi Wang

TECHNICAL DOSSIER

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Authors	Chao Zhou, Shuang Li, Hongda Wang, Keji Zhao, Yadi Wang
Title of the course	Landscape Architecture design studio
Academic year	2019-2020
Teaching Staff	Xiao Feng, Xiaodong Zheng, Wei Duan
Department/Section/Program of belonging	School of Landscape Architecture
University/School	Beijing Forestry University



Written statement, short description of the project in English, no more than 250 words

The project is located in arid and semi-arid regions of Shanxi, China. People are mainly concerned with the local drought and water shortages while ignoring the risk of flooding. Therefore, when arid soils encounter concentrated rainfall, farmlands and villages, including the remains of the ancient Great Wall, will be severely eroded.

The arid climate, concentrated rainfall and severe soil erosion have caused a vicious circle of local ecological environment.

In the context of the extreme climate with drought and flood, in order to solve the concentrated rainfall that has a great impact on the local ecology and life, we propose 3 strategies: grooming, savings, and utilization of rainfall. The innovation lies in :

(1) During rainfall, runoff points to the design path. Along the runoff path, ecological catchment landforms are set to reduce soil erosion, and keep water and soil intact. In addition, we use self-healing concrete to heal cracks and prevent further destruction of the Great Wall.

(2) In the low-lying areas, reservoirs were set up, and the rainfall was introduced into them according to the designed route. In order to slow down the evaporation of rainwater, plants are planted around the pool.

(3) During the dry period, the collected rainwater is used for agricultural irrigation and domestic water, and rainwater is used effectively.

Ultimately, these strategies will bring positive benefits to the local ecology, production and life, to realize a virtuous circle of ecology.

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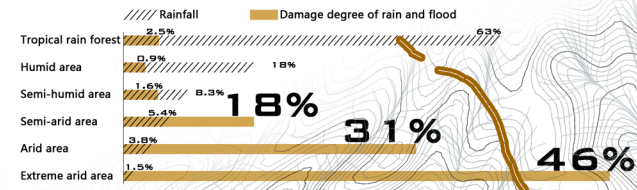
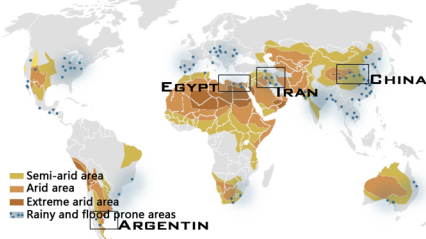
CLIMATE CHANGE AGAIN

11th International Biennial Landscape Barcelona

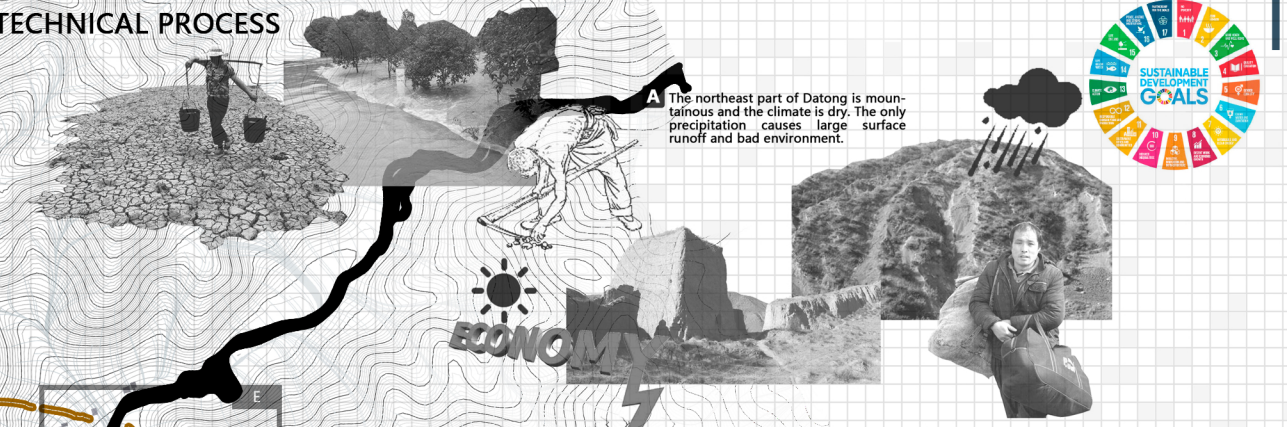
Barcelona September 2020
SCHOOL PRIZE

PROBLEM POSING

Flooding can also be found in arid and semi-arid areas, and climate change in arid and semi-arid areas not only exacerbates drought and water safety problems, but also increases the risk of flood, as well as the distribution of the world's flooding points and the distribution of the world's arid regions. However, due to the low cognition of flood risk in the semi-arid areas, the focus of the planners is mainly on drought and limited water resources. Therefore, it is necessary to fully explore the resilience of drought and semi-arid areas in developing countries and to implement the concept by means of local planning practice and culture.



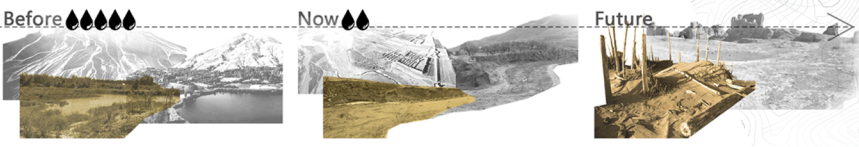
TECHNICAL PROCESS



CURRENT PROBLEM

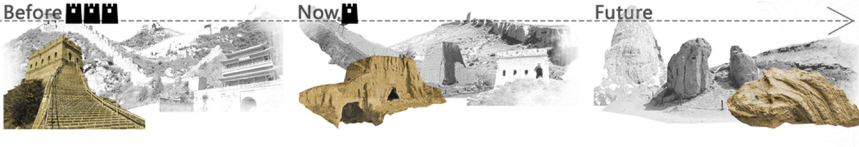
Water and Soil Loss

Soil degradation is caused by climate deterioration and drought, and rainwater disasters further aggravate the situation of soil and water loss, resulting in lack of vegetation, environmental degradation and drought. If we do not take control measures, the place will eventually be wasted.



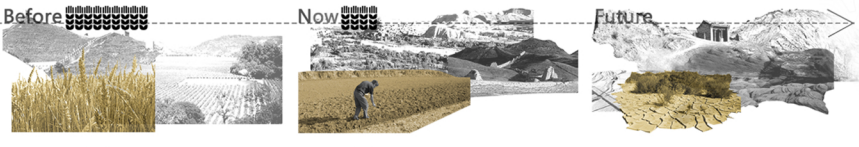
Ruins Destruction

The untreated rainwater runoff has caused serious erosion and destruction to the ruins of the Great Wall in the site. The arid environment has caused the Great Wall to be eroded. If the rain is not dredging, the Great Wall remains will not exist.



Cultivated Land Degradation

In arid climate, crop growth is restricted, and only a small amount of rainfall is not used. If not designed, it will eventually lead to the waste of cultivated land.



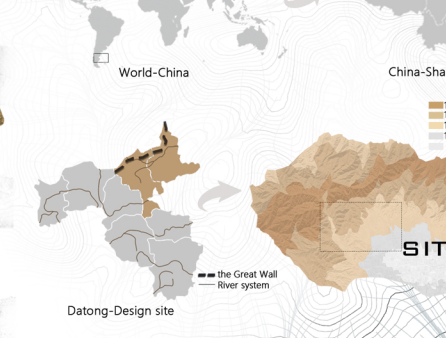
Population Loss

Because of the deterioration of the environment, the villagers choose to leave home to work in the field, leaving a large number of elderly and children left behind in the village. The decrease of the young labor force makes the home without maintenance and development, and the final choice is to leave the place.

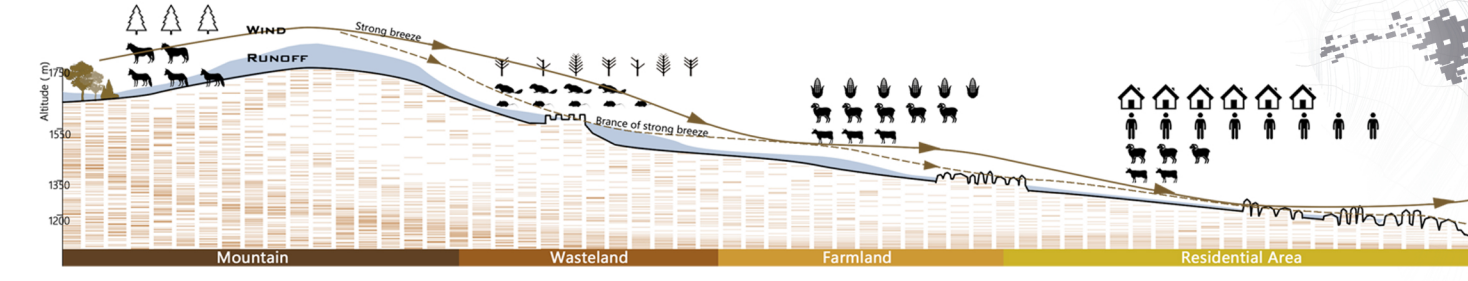


LOCATION

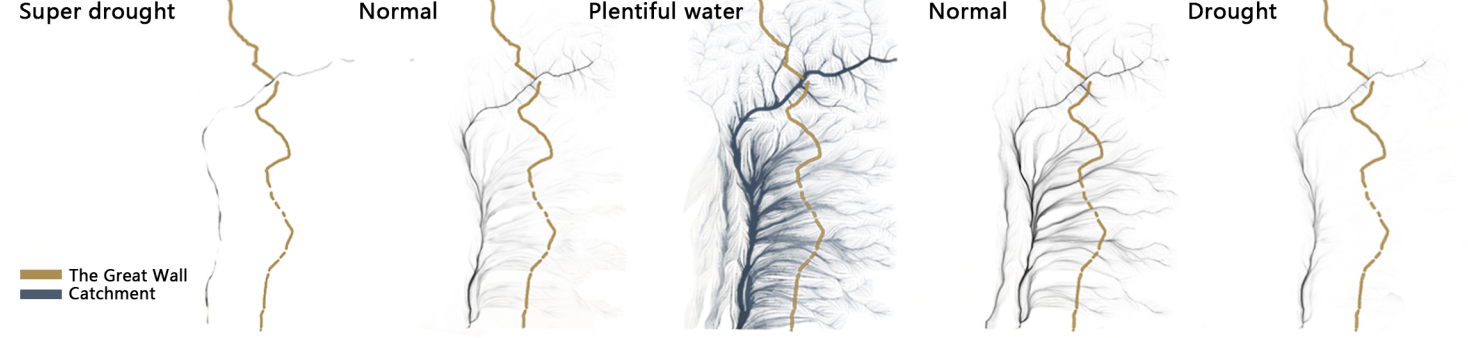
The site is located in Datong, Shanxi, Beijing. There is an ancient Great Wall crossing the site, which is more than 600 years ago. The climate of Datong is dry. The rainfall is less but concentrated. High intensity rainfall, low vegetation coverage and poor soil retention capacity, leads to serious soil erosion, which is mainly manifested in the destruction of the Great Wall and the deterioration of the ecological environment.



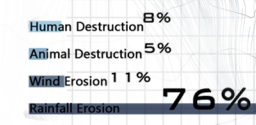
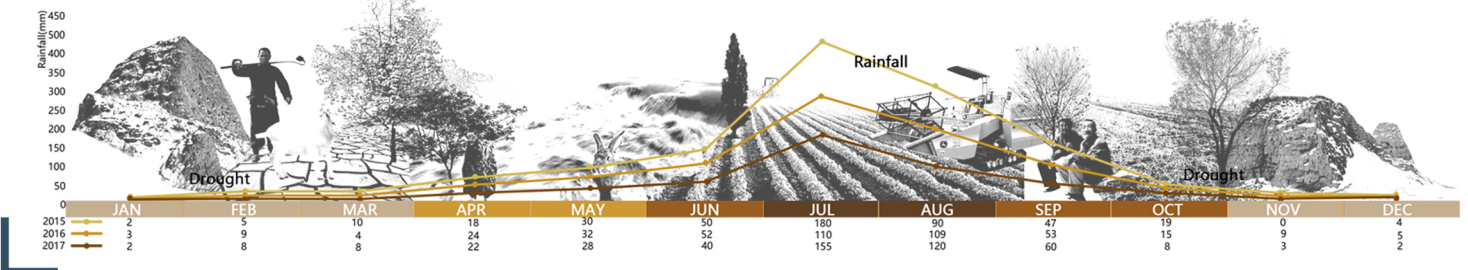
TERRAIN



RUNOFF

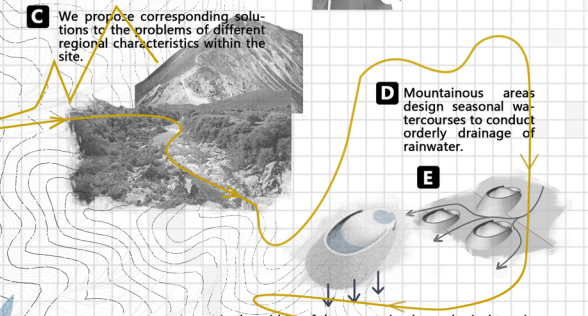


RAINFALL

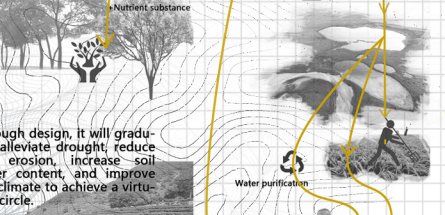
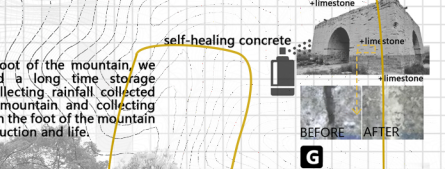
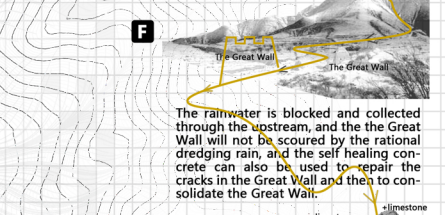


- Ecological Catchment Landform
- Water Storage
- The Great Wall
- Village
- Water Runoff
- Farmland
- Wasteland
- Ecological Using Water Net
- Domestic Using Water Net
- Process Using Water Net
- Main Water Net
- River
- Potential Erode Zone

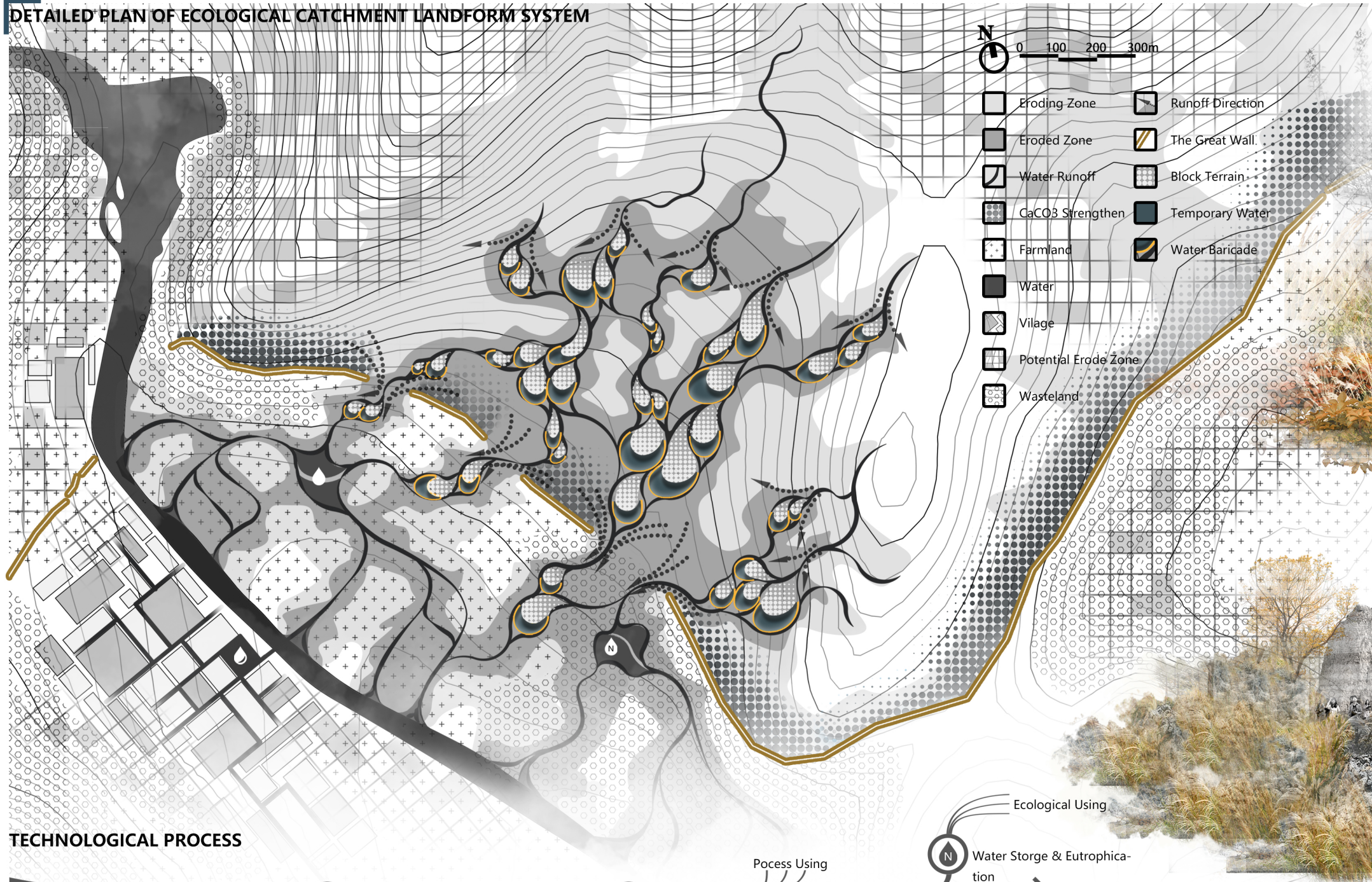
Is that what we want in the future?



In the middle of the mountain, the ecological terrain is designed, which leads normal precipitation to the rainwater collecting pool at the foot of the mountain. At the same time, when the rainfall is large, a large amount of rain can be collected and the runoff can be blocked. The rainwater collected can increase the humidity of the mountain soil, thus forming an environment suitable for plant growth.



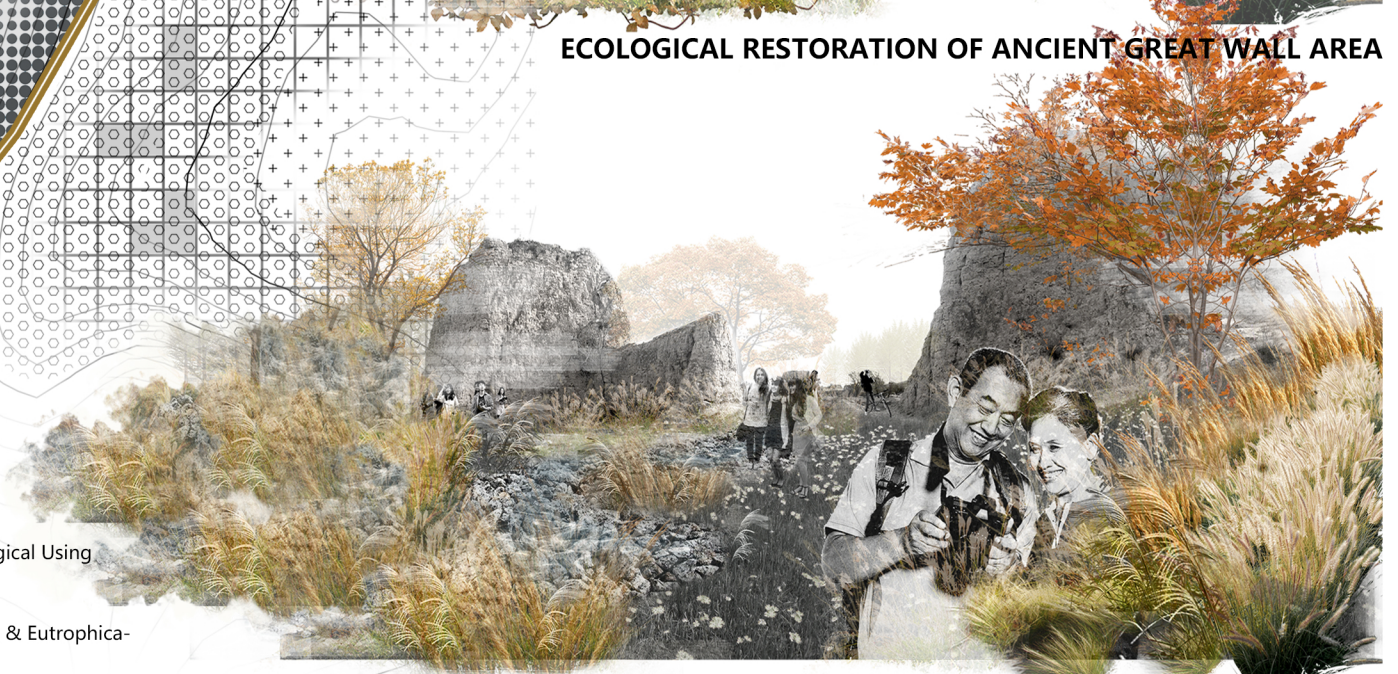
DETAILED PLAN OF ECOLOGICAL CATCHMENT LANDFORM SYSTEM



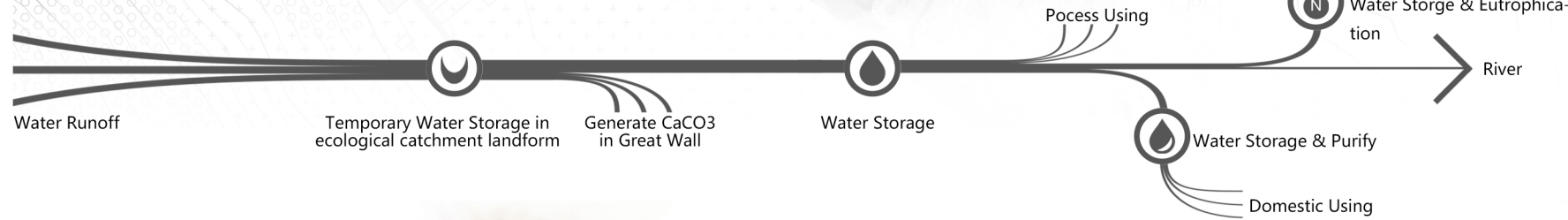
WATER CATCHMENT UNIT



ECOLOGICAL RESTORATION OF ANCIENT GREAT WALL AREA

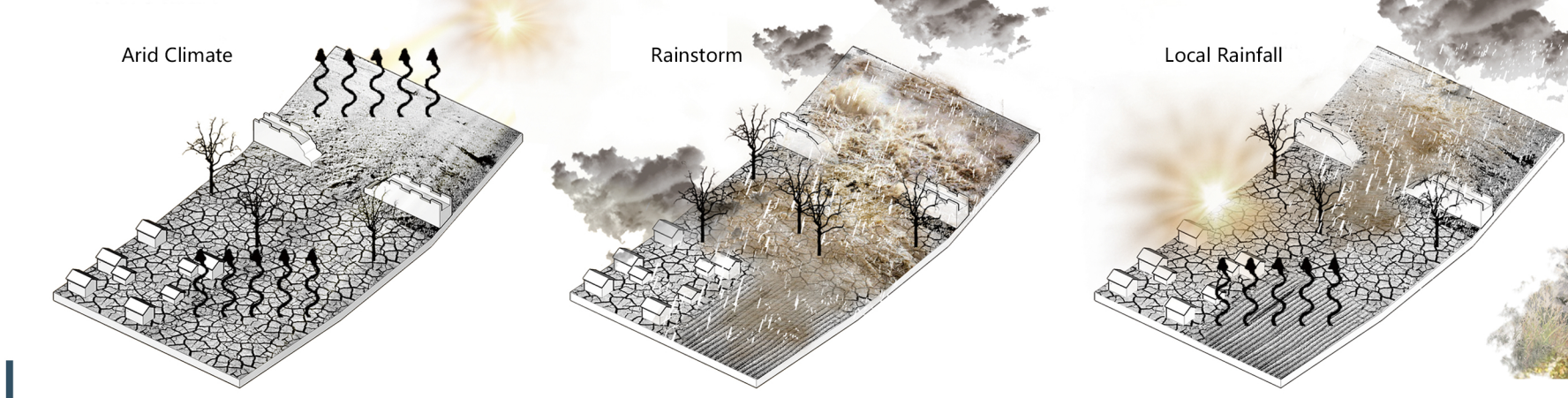


TECHNOLOGICAL PROCESS

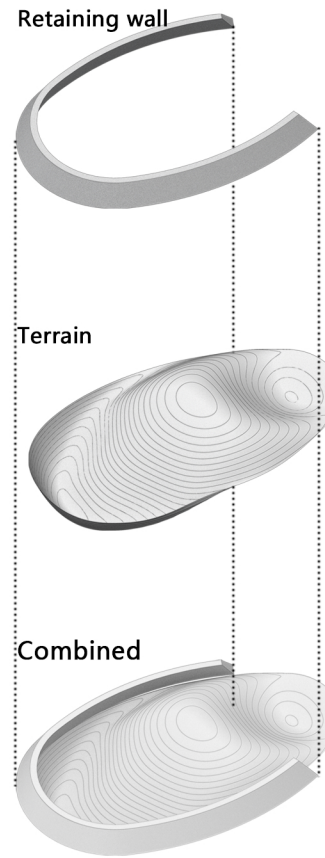


FARMLAND WITH RESTORED WATER SYSTEM

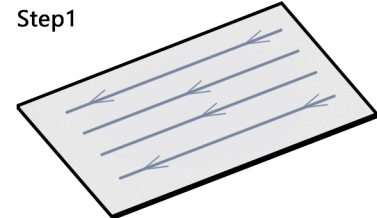
RAINFALL PATTERN



DISMANTLING

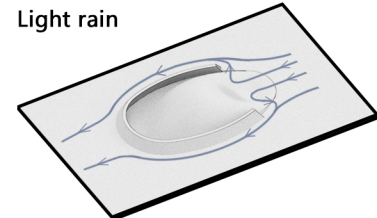


SHAPE GENERATION



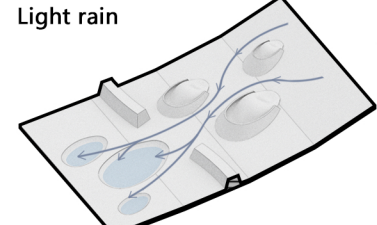
The original terrain will make the rain run away quickly.

SINGLE MODULE

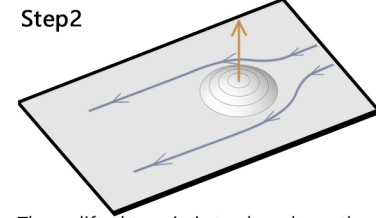


In light rain, the slopes slow down and divert the rainwater flow.

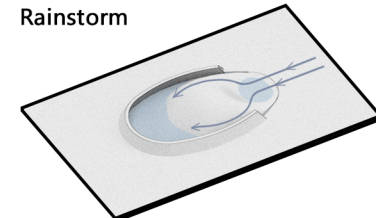
MULTIPLE MODULES



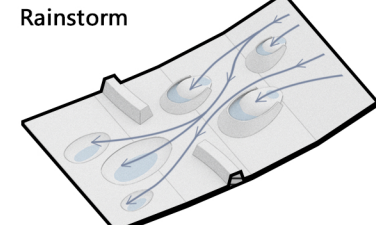
In light rain, the slopes slow down and divert the rainwater flow. Eventually brought together in the following puddle.



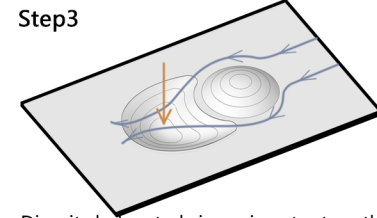
The uplifted terrain is to slow down the flow of rainwater.



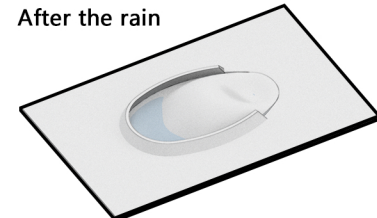
In heavy rain, the rainwater collects into the sump.



In light rain, the slopes slow down and divert the rainwater flow. And protected the Great Wall.



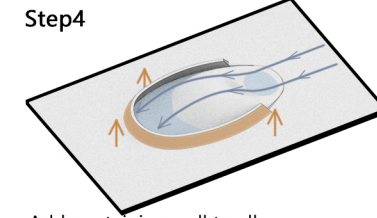
Dig pits below to bring rainwater together.



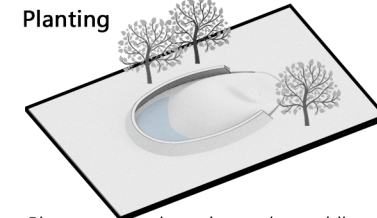
After the rain, the rain will gather in the puddles.



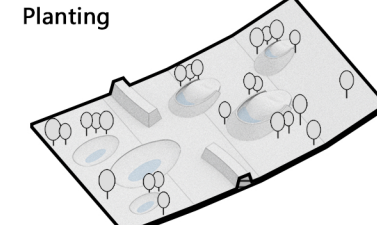
Above the puddles and below the puddles are gathered water.



Add a retaining wall to allow rainwater to converge here for a long time.

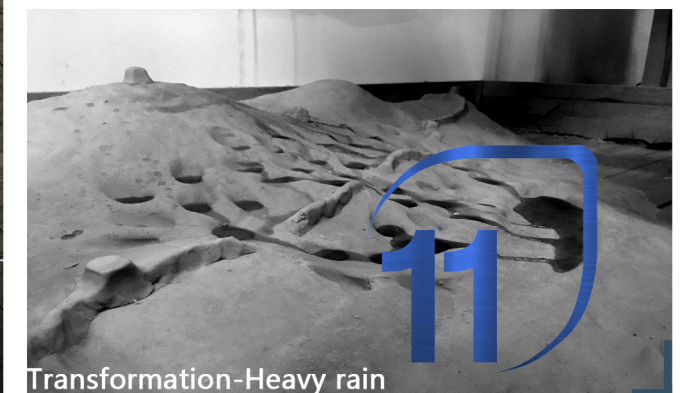
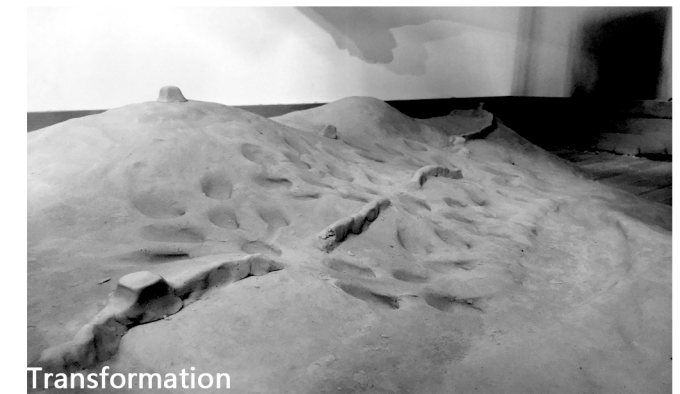


Plants can be planted near the puddle.



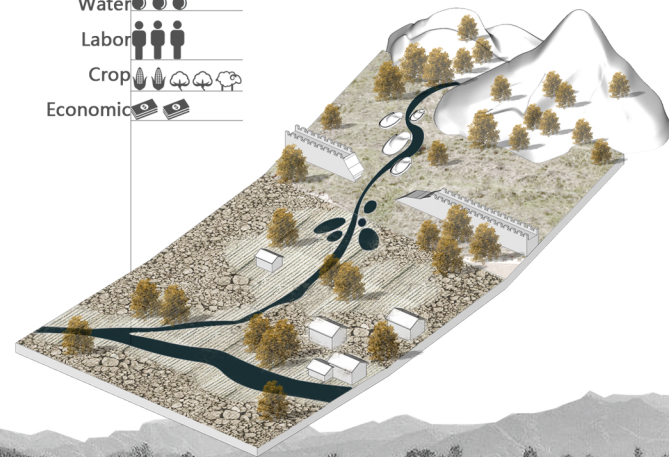
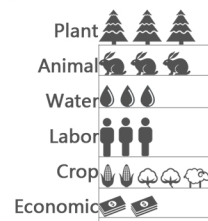
Plants and crops grow well near the puddle.

MODEL

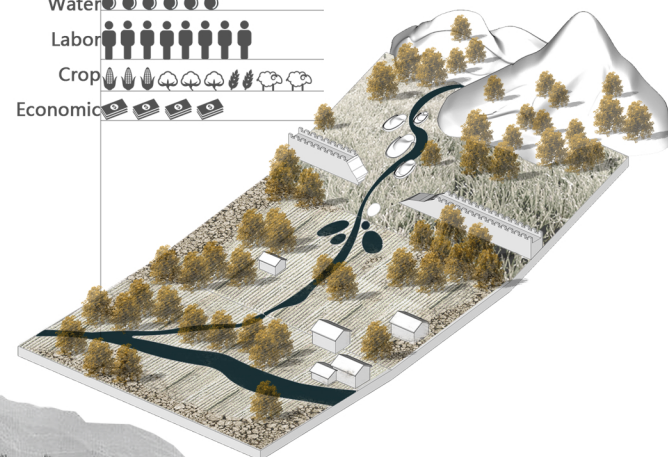
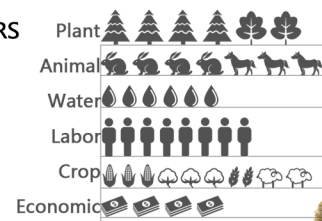


DEVELOPMENT

5 YEARS



20 YEARS



50 YEARS

