



HAOZHEN YANG

Graduation Portfolio of
Columbia University, GSAPP

2021-2022

CONTENTS

01 A New American Index- "AfterDams" 3

Shifting of public perceptions toward dams' lifespan
Columbia University- Marco Ferrari's Studio 2021.06-2021.08



02 Studio Island of Earth- "Seismic Field" 13

Earth Experienced Through the Form of Movement and Energy
Columbia University- Bernard Tschumi's Studio 2021.09-2021.12



03 A Think Tank in Los Angeles- 19

"The Earth Institute (LA)"

A place of experimentation for eco-social issues in LA
Columbia University- Galia Solomonoff's Studio 2022.02-2022.05



A New American Index-"AfterDams"

Shifting of public perceptions toward dams' lifespan
Columbia University- Marco Ferrari's Studio

2021

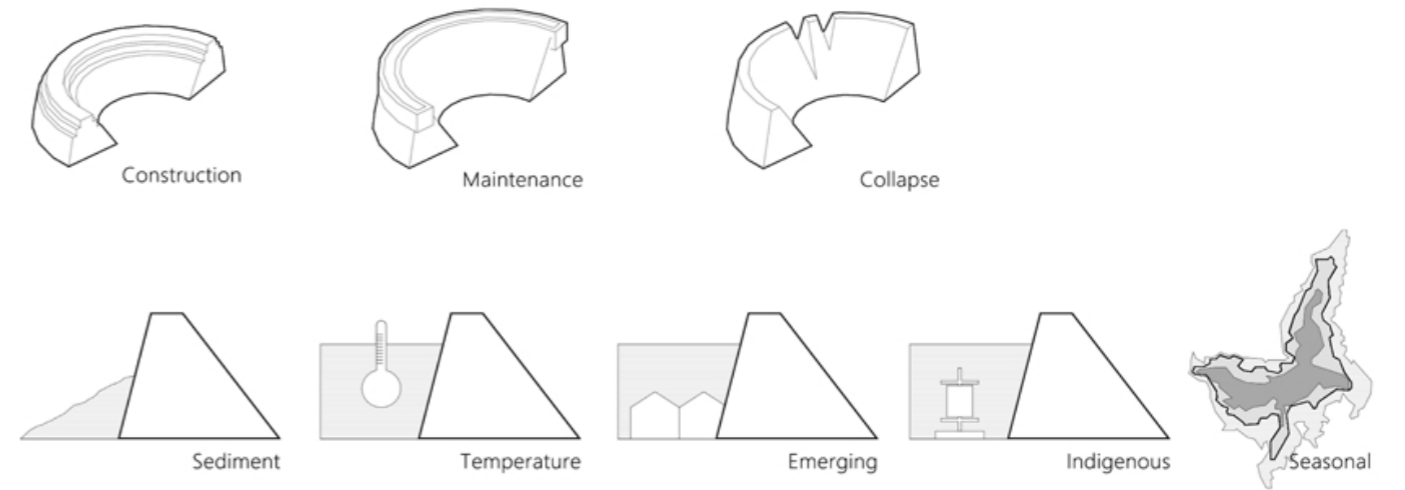


The vast land of the United States breeds abundant water resources, and dams have become a symbol of the prosperity of American industry with the help of topography. For a long time, especially after the WW2, dam construction in the United States has shown a rapid growth.

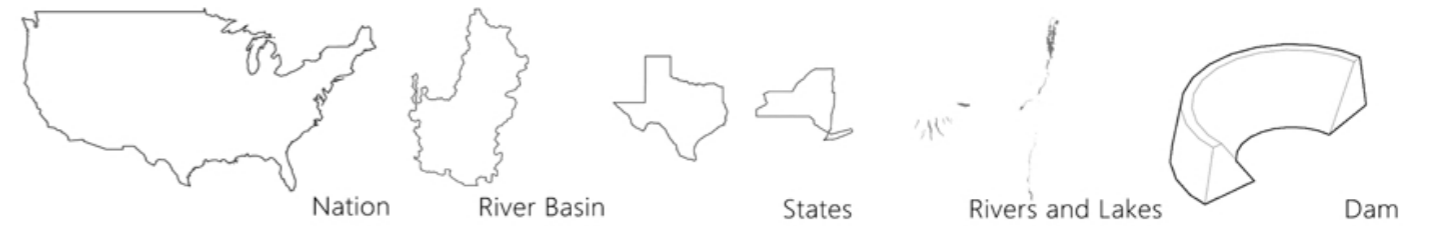
In different regions of the nation, dams play different roles. In addition to hydropower, which gives people the initial impression, they also include many purposes such as water supply, flood control, irrigation, recreation, navigation, fishery and other. Dams have shaped American lifestyles in many ways, and people in different regions have different perceptions of dams.

The purpose of this project is to study the roles and impact of dams as massive infrastructures from the relationship between dams and people together with nature all over the United States and in typical regions. The project mainly studies the ages, purposes and storage of dams, so as to analyze the construction of dams in the United States with years and the geographical distribution and density characteristics of various types of dams, and find areas with outstanding characteristics from the drawn map for research to form a territorial organization from the whole nation to river basins, states, counties, rivers, lakes and a single dam. In particular, New York state, Texas and Colorado river basins are selected as samples to describe people's perceptions of dams under different landscape and climate conditions:

Elements



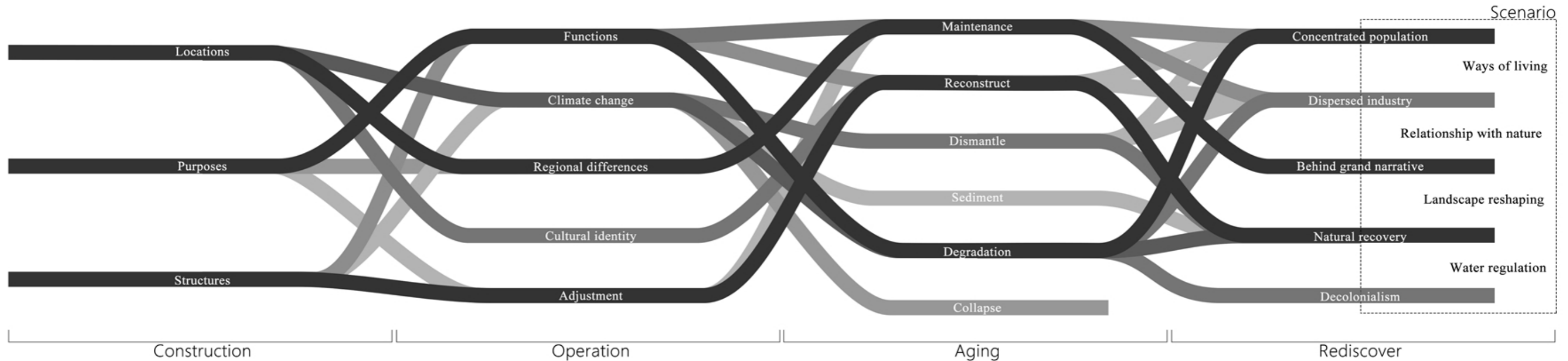
Territorial organization



Logical connections



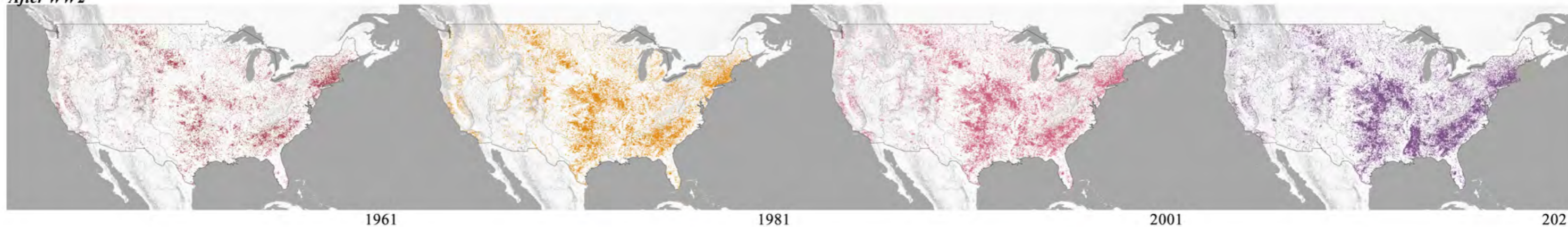
Scenario



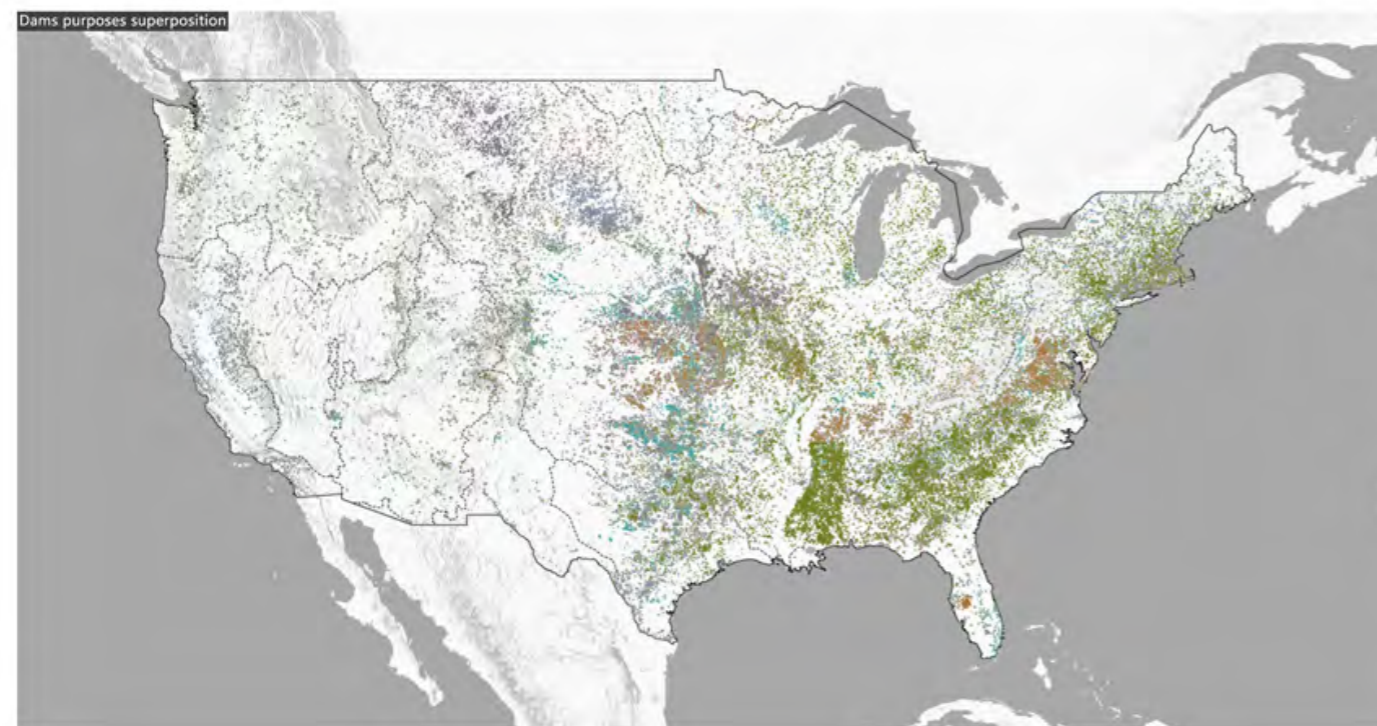
Timeline of US dams construction



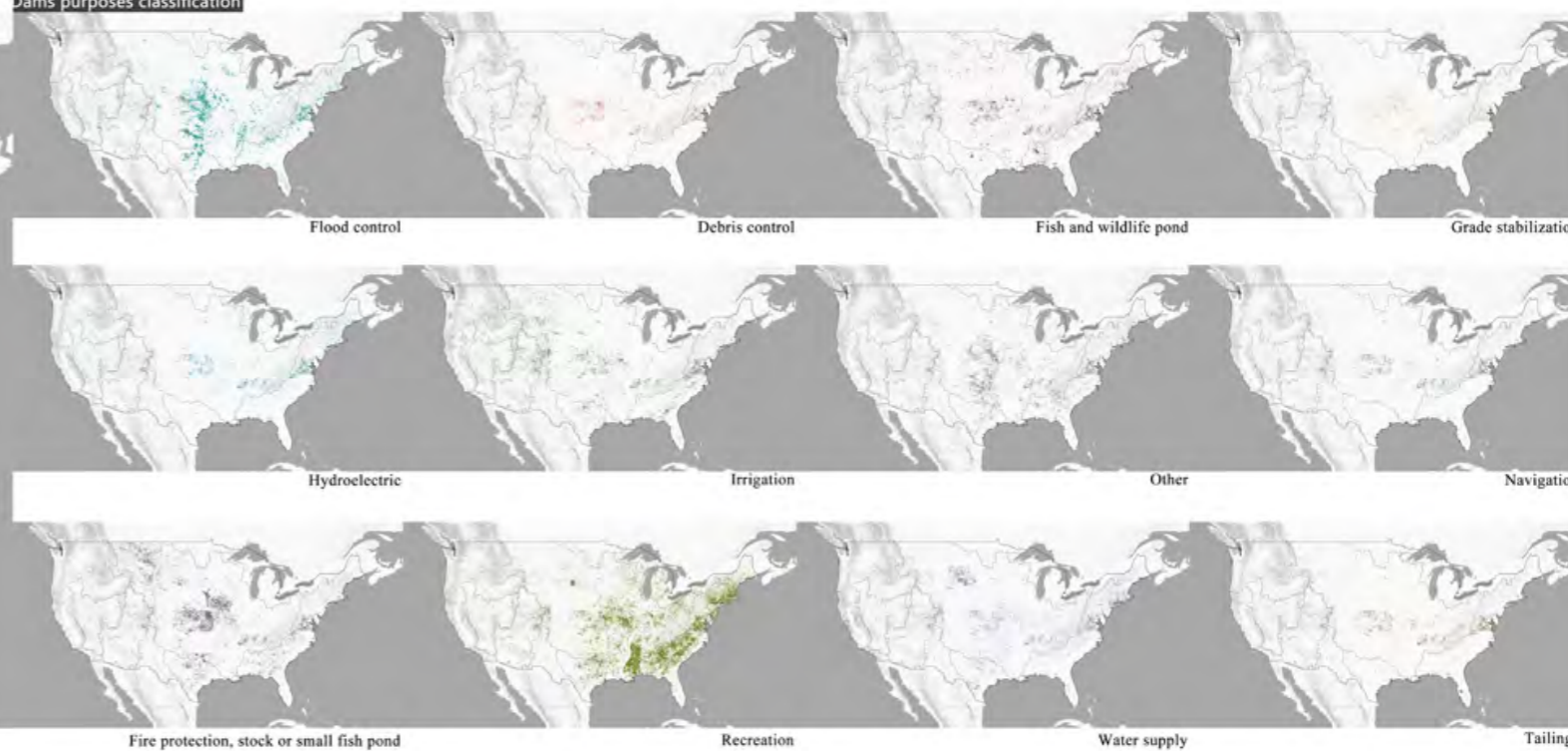
After WW2



Dams purposes superposition



Dams purposes classification



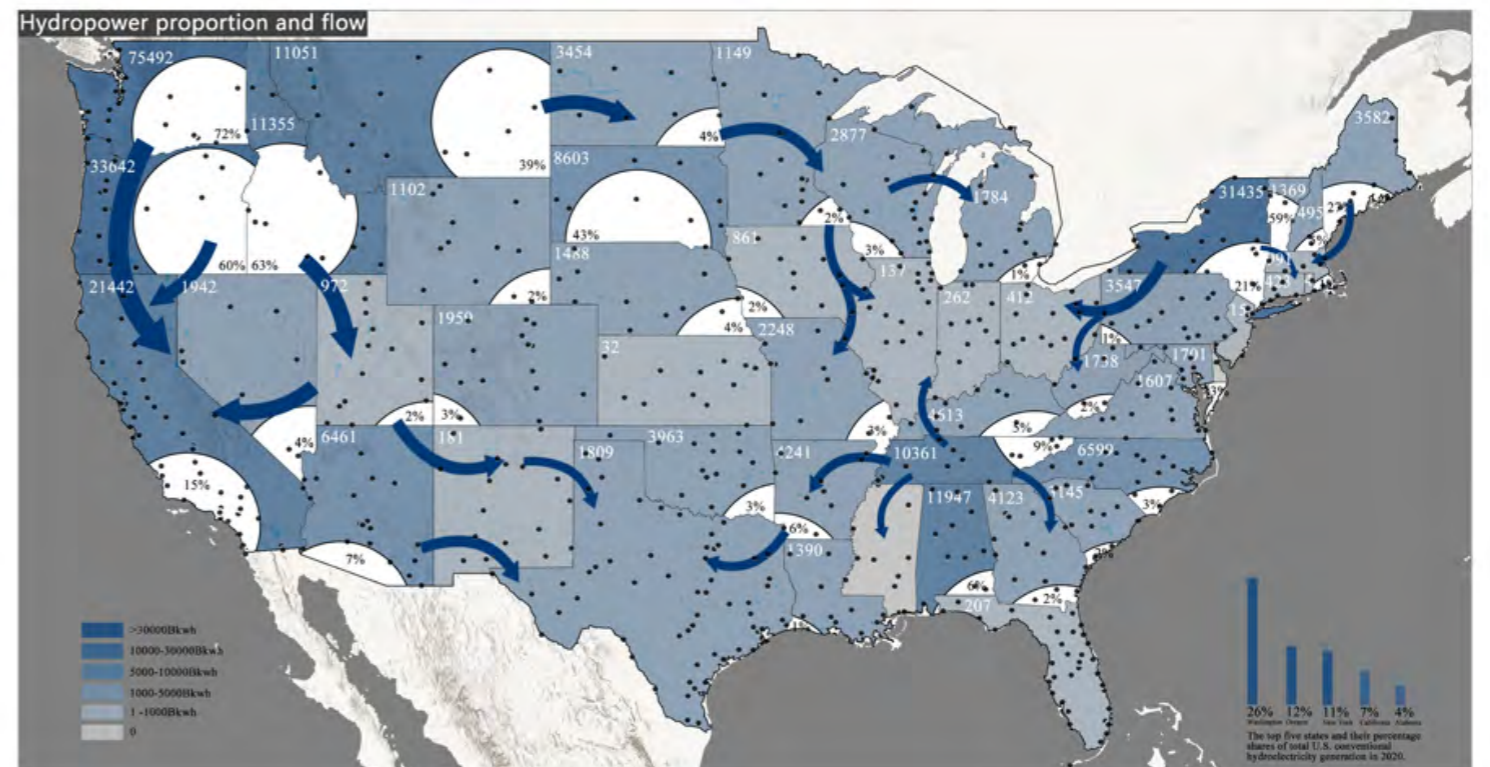
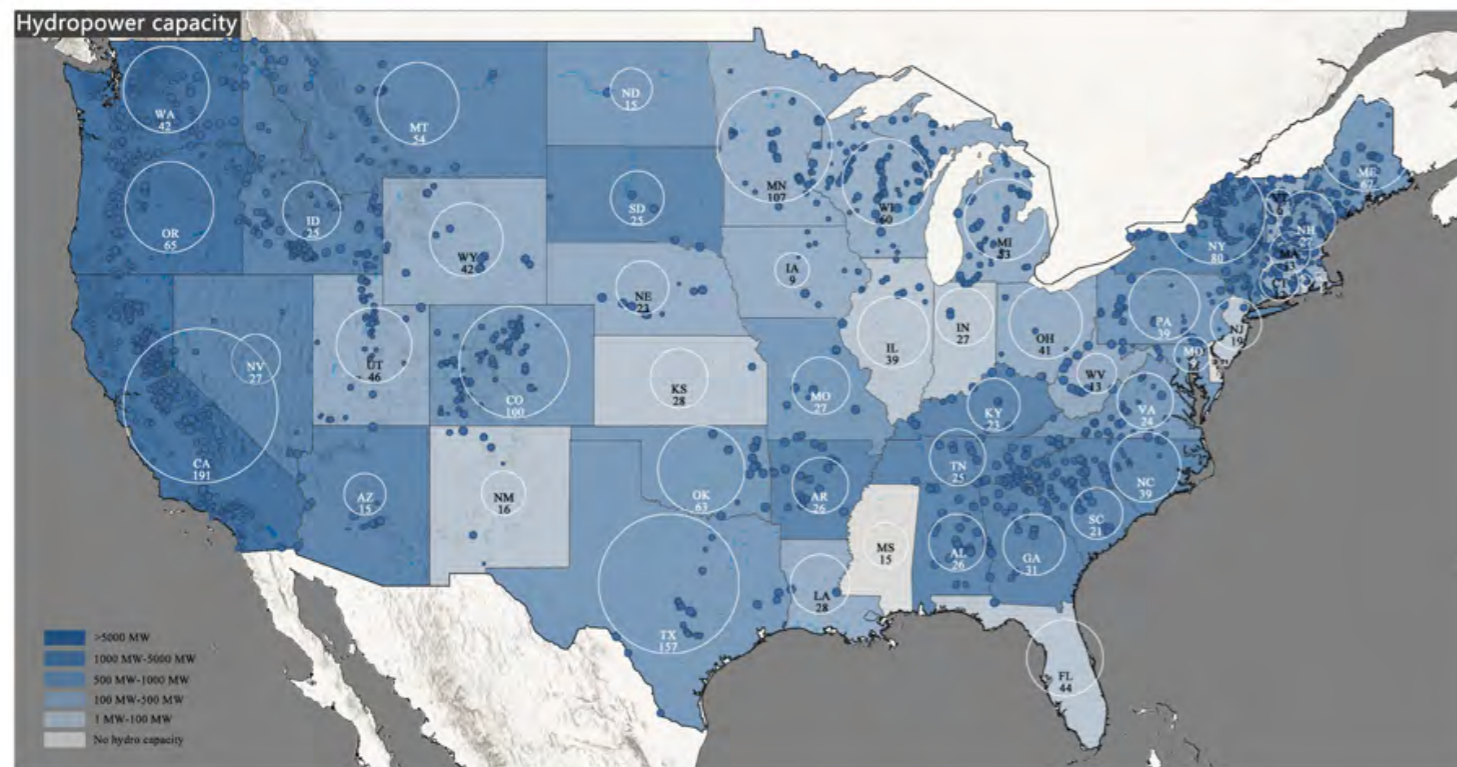
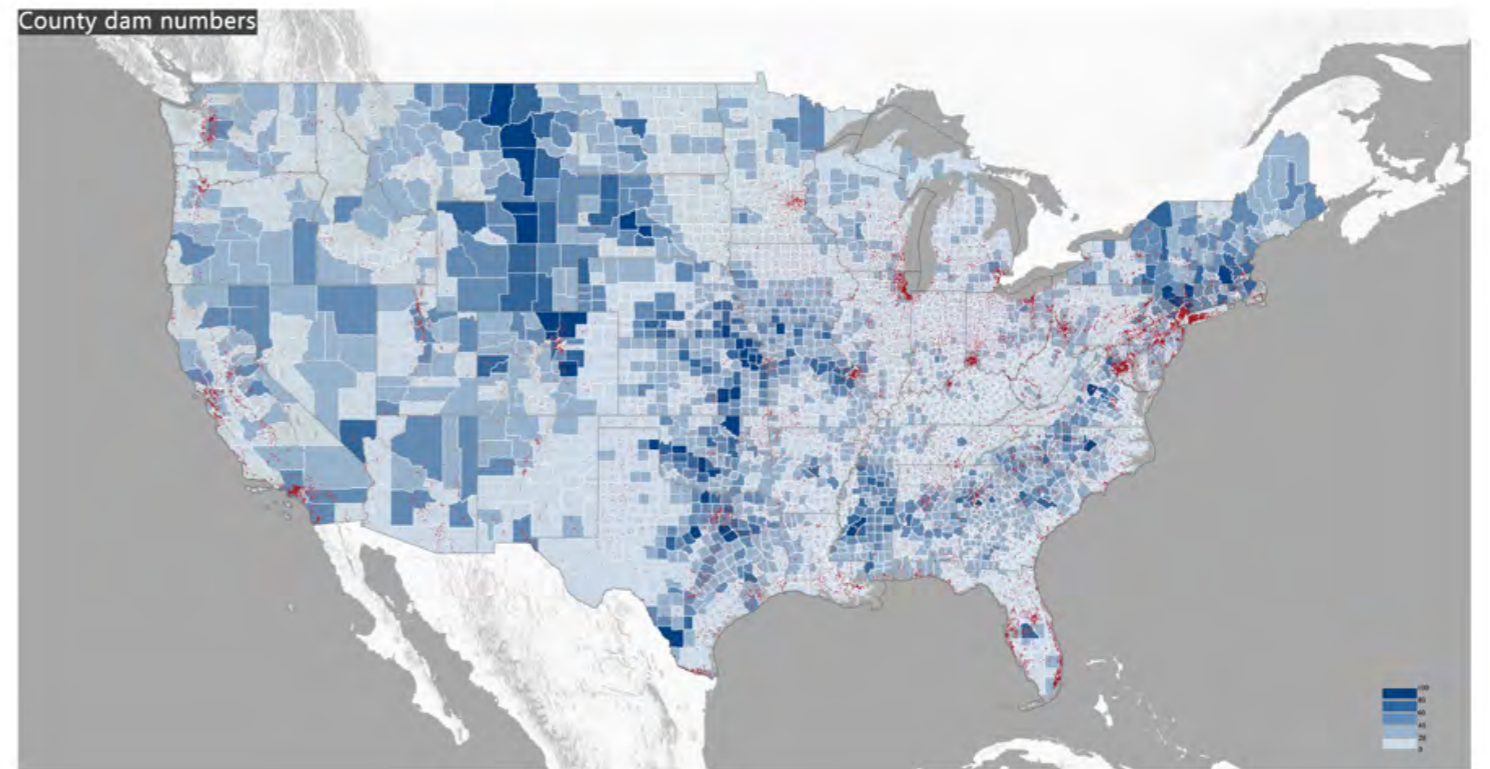
OVERALL TEMPORAL AND SPATIAL DISTRIBUTION

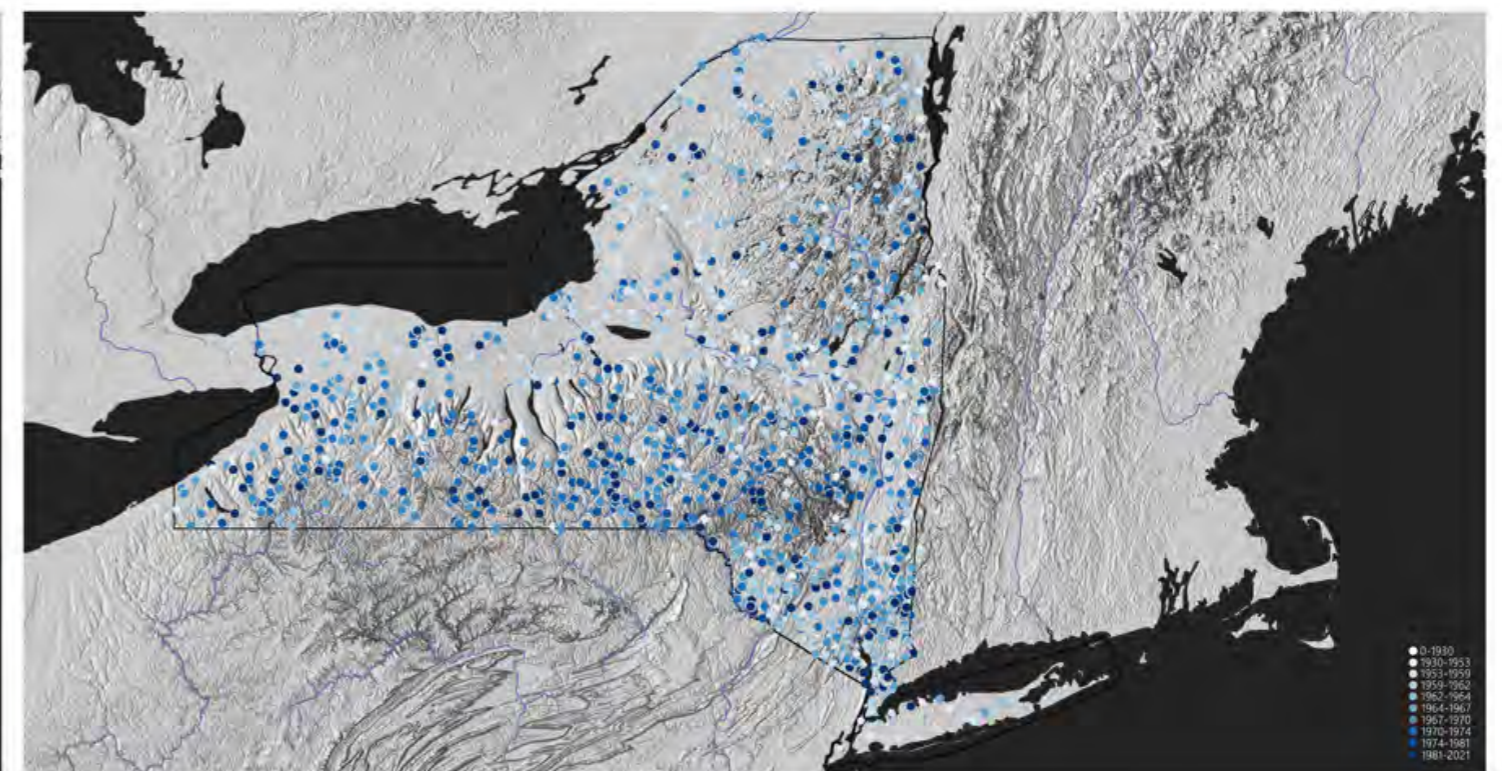
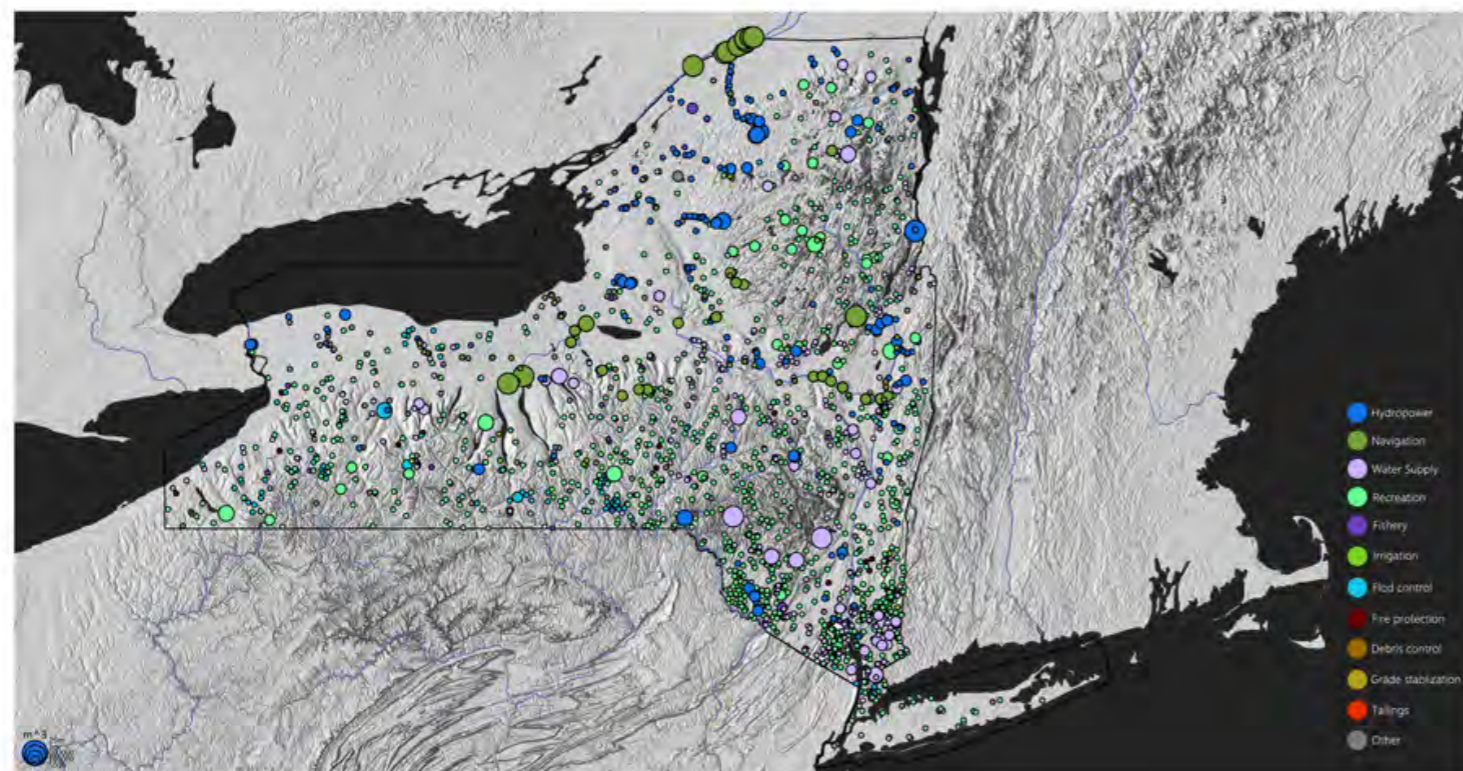
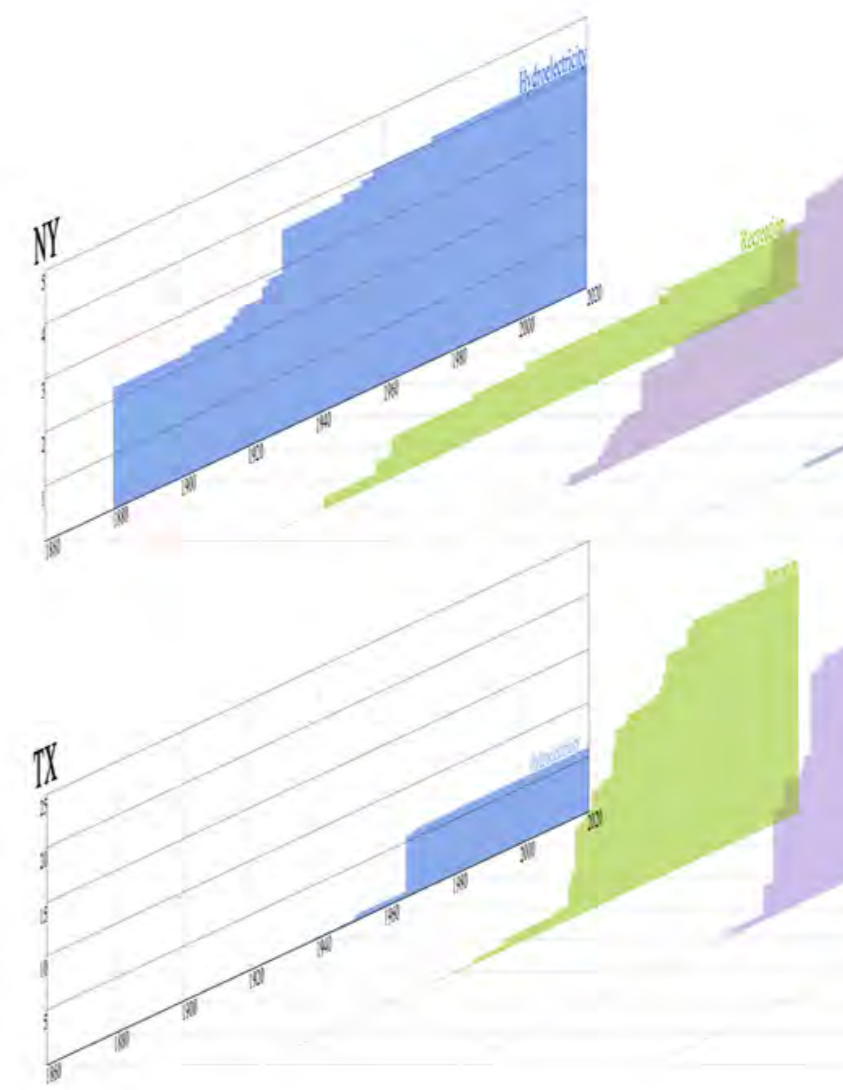
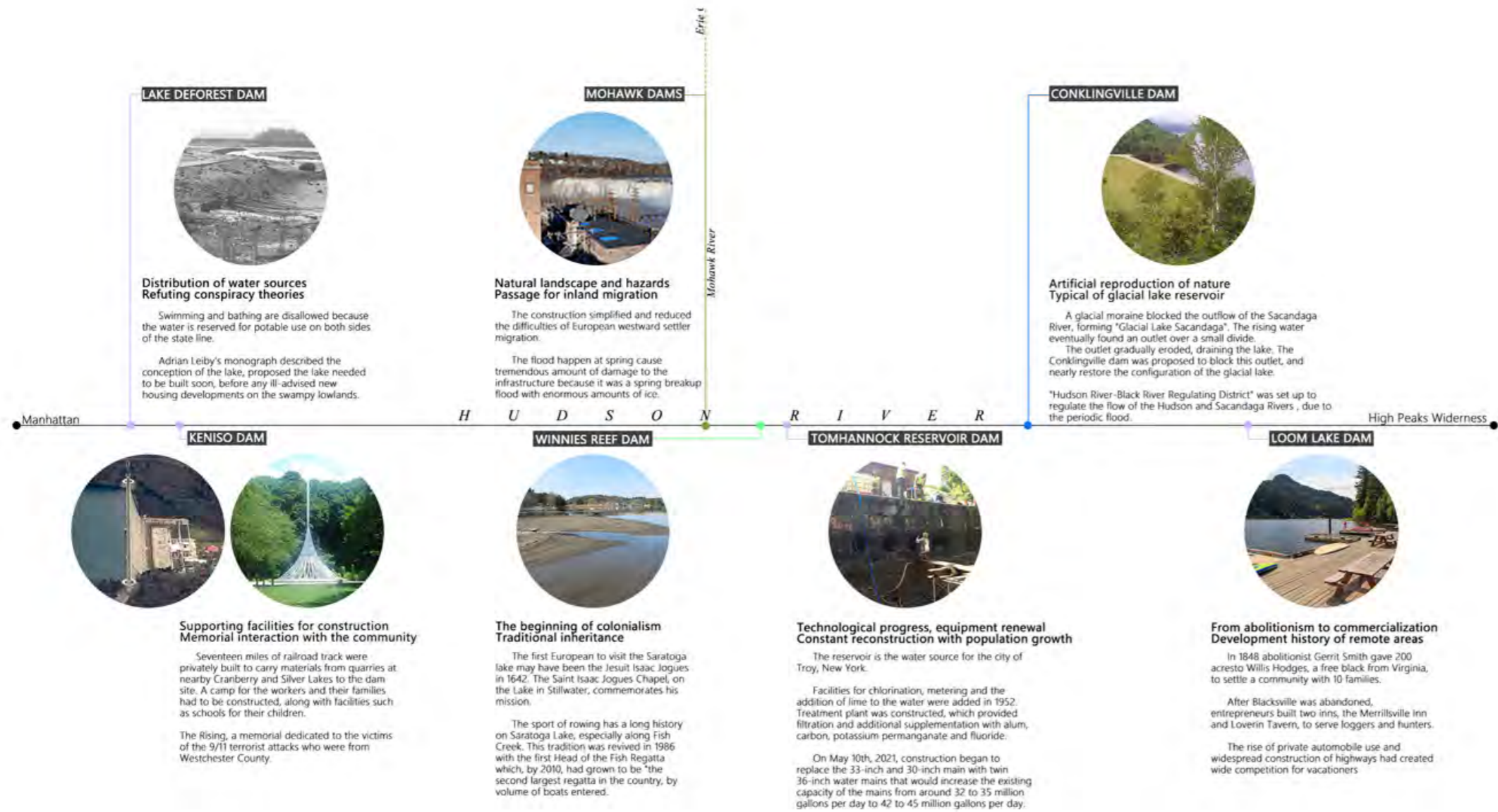
NATIONAL DISTRIBUTION
91000+ DAMS

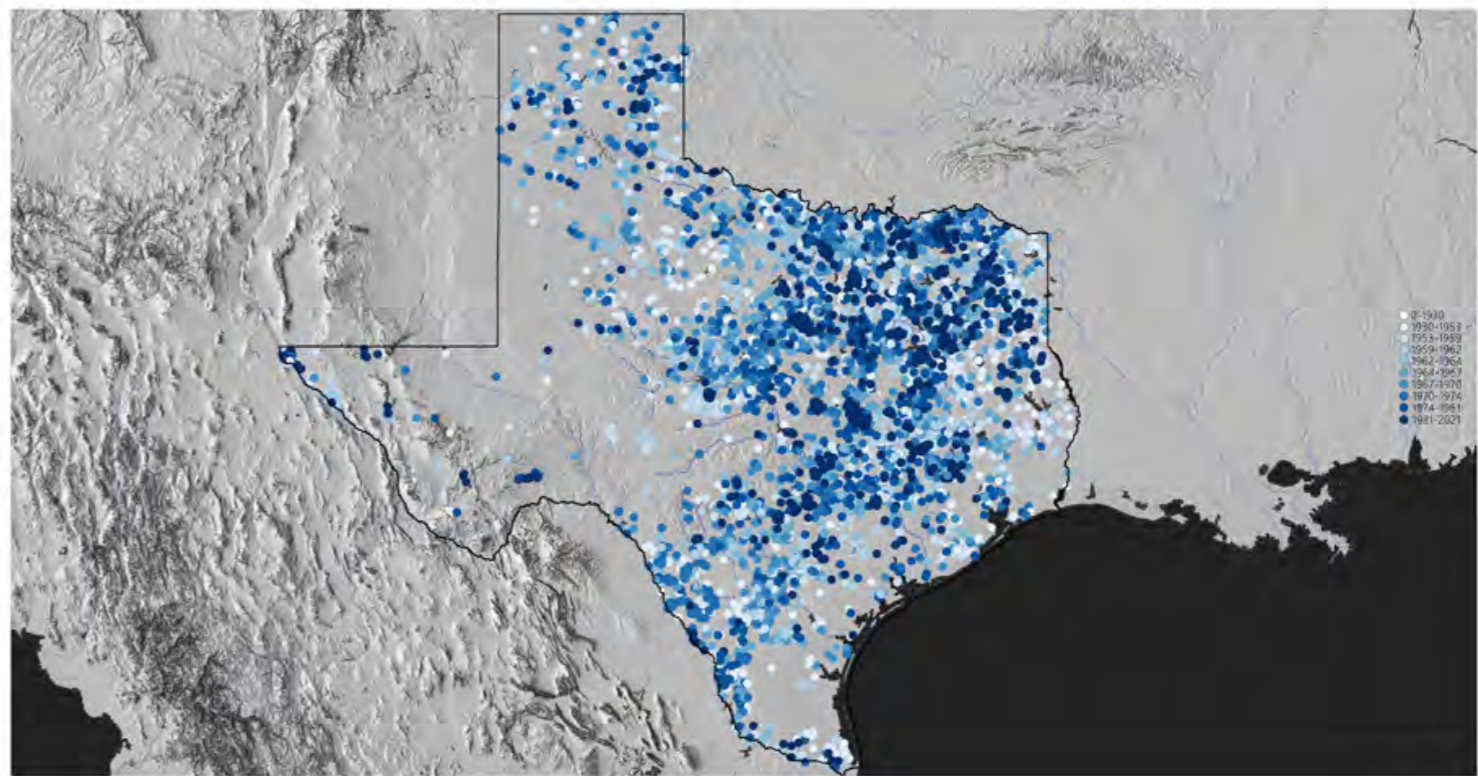
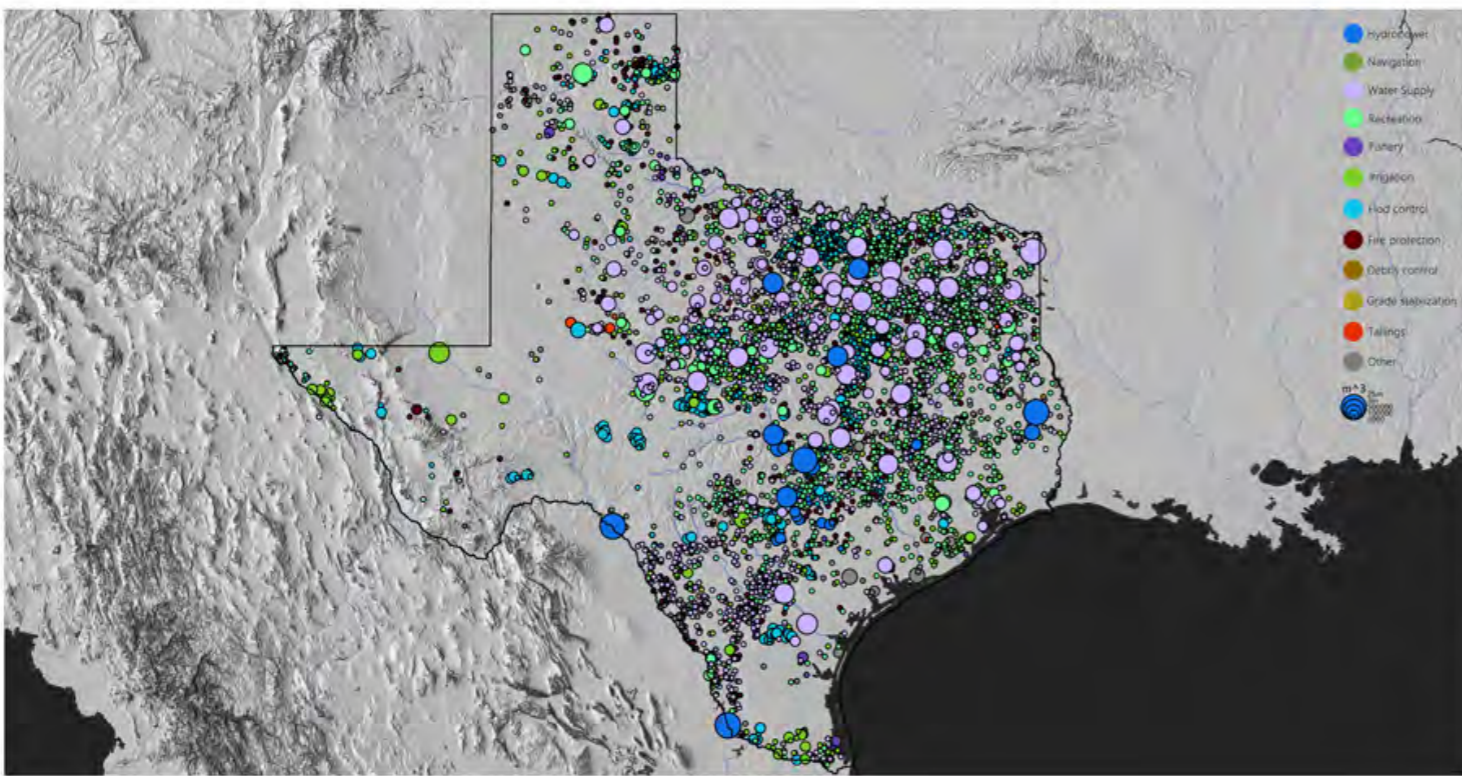
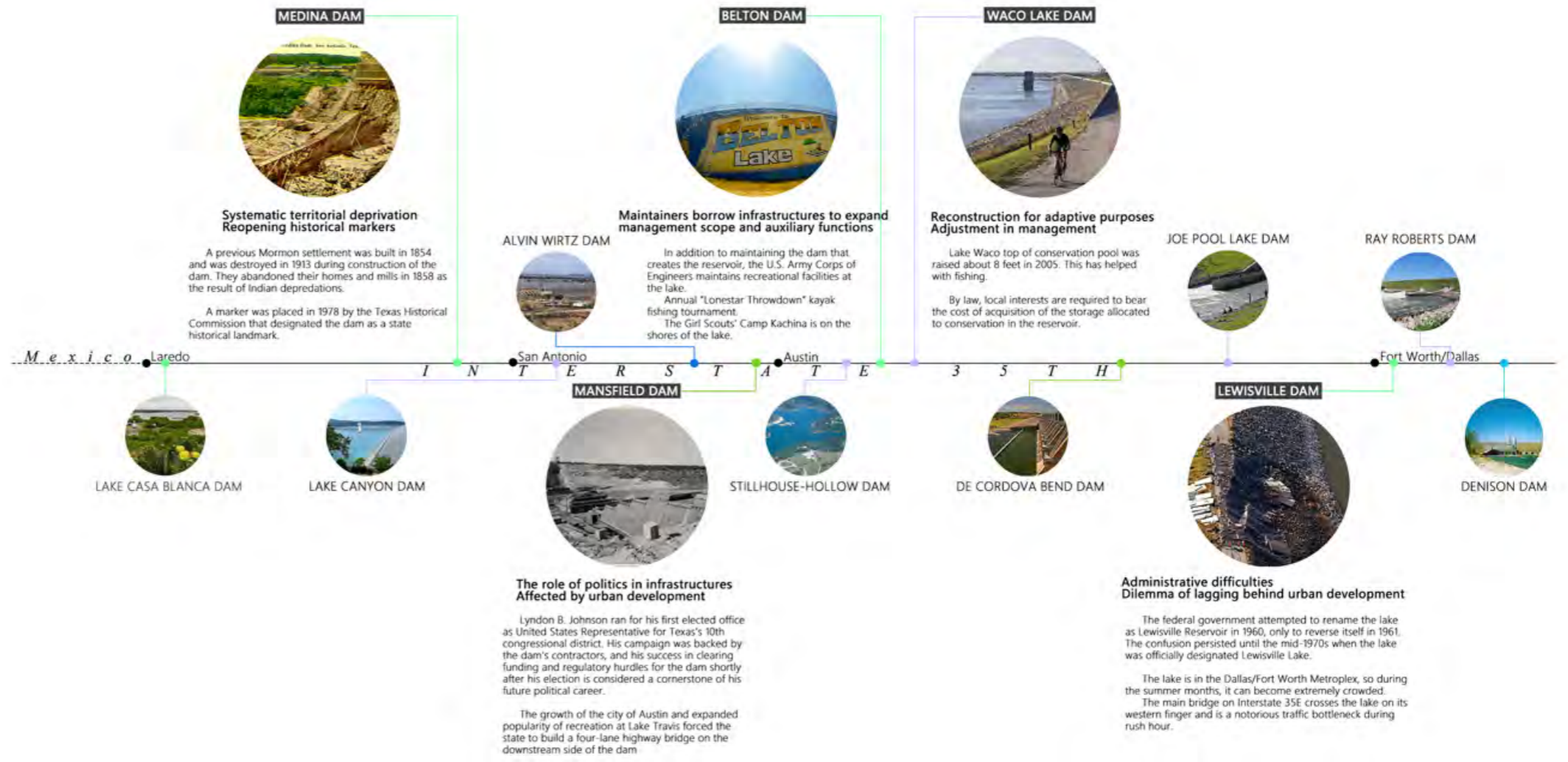
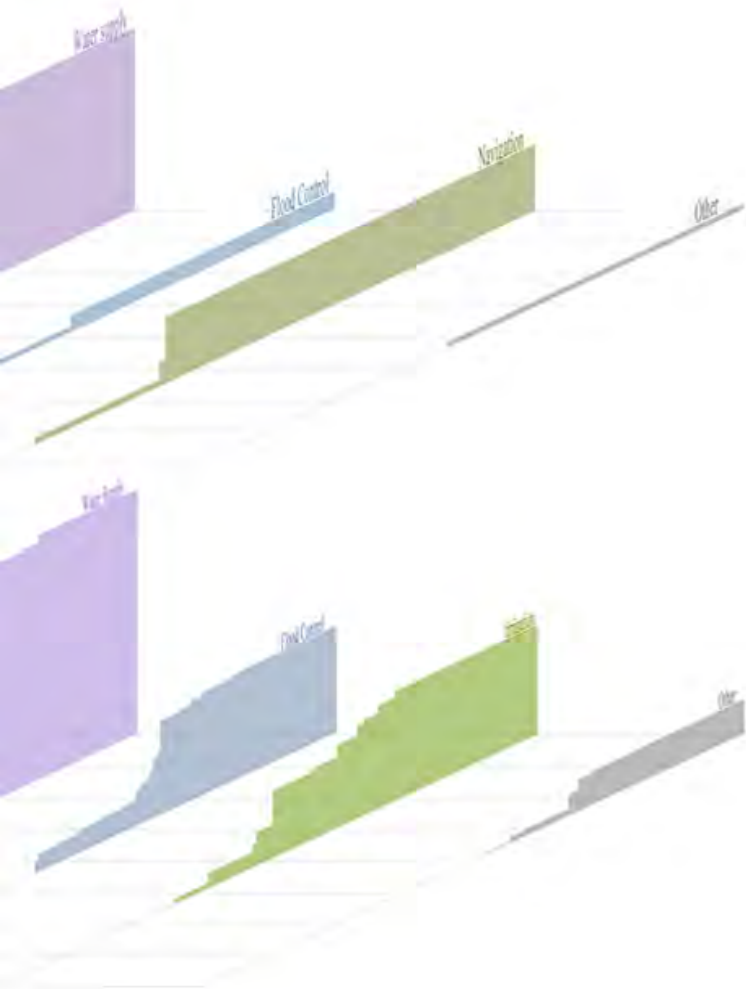
CONSTRUCTION TIMELINE
FROM 1640-2021, ESPECIALLY AFTER WW2

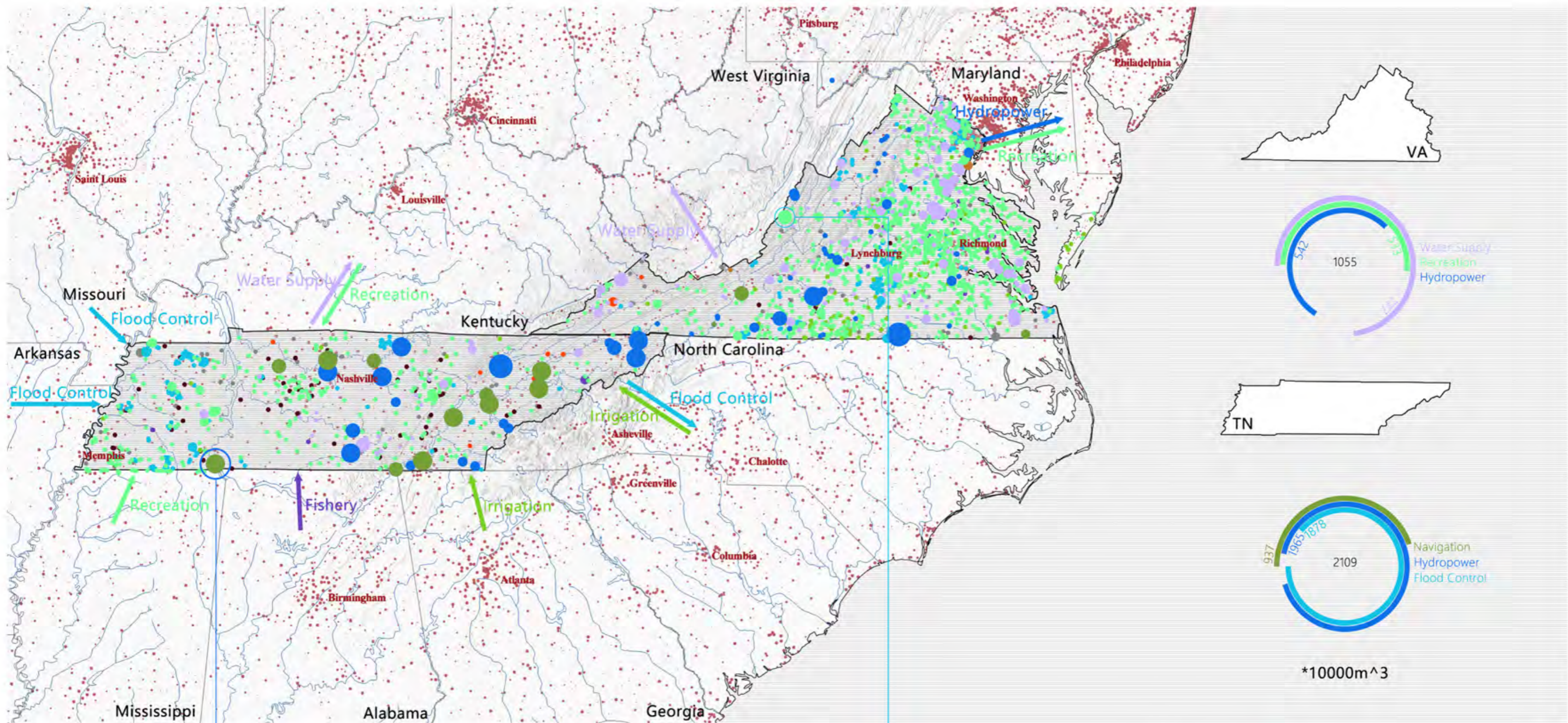
CATEGORY OF PURPOSES
12 TYPES

REGIONAL DIFFERENCES
WATERSHEDS/STATES/RIVERS AND LAKES









PICKWICK LANDING DAM



Pickwick Landing Dam was completed and the gates closed on February 8, 1938, although dredge work continued until 1941. Tennessee State Route 128 crosses the top of the dam, connecting the area to Savannah to the north. Parts of Riverton and Waterloo, Alabama were flooded. Pickwick is also popular for boating and water skiing. A large campground is located below the dam and includes 92 sites with water and electric (five are accessible sites) and eight tent sites without utilities.

Purpose: Hydropower/Navigation/Water supply/Flood control/Reservation

POWERHOUSE



Pickwick Landing Dam is 113 feet high and 7,715 feet long, and has a generating capacity of 240,200 kilowatts.

SWITCHYARD



Pickwick Landing Dam's first turbine was the largest of its kind in the country when it was installed; its runner was more than 24 feet in diameter.

SHIPPING LOCK



Pickwick Landing Dam is serviced by two locks. The locks' lift raises and lowers vessels up to 63 feet between Pickwick and Kentucky lakes.

SPILLWAY



The dam's spillway has 22 bays with a combined discharge of 650,000 cubic feet per second (18,000 m³/s).

GATHRIGHT DAM



INTAKE TOWER

A vertical tubular structure with one or more openings used for capturing water from reservoirs and conveying it further to a hydroelectric or water-treatment plant.

The Gathright Dam's intake tower contains nine portals that allow it to release water between reservoir depths of 12 to 87 feet. This allows the dam to manage the temperature and flow of water released downstream.

Code of Virginia



All dams in Virginia are subject to the Dam Safety Act and Dam Safety Regulations unless specifically excluded, under the Code of Virginia.

USACE



The Gathright dam is operated by the U.S. Army Corps of Engineers (USACE). USACE implemented risk reduction measures which include increased monitoring, updating emergency operation plans and reducing the water level in the reservoir due to the classification of "Urgent" in September, 2009.

VSWCB/DCR



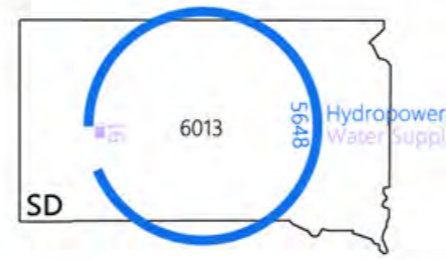
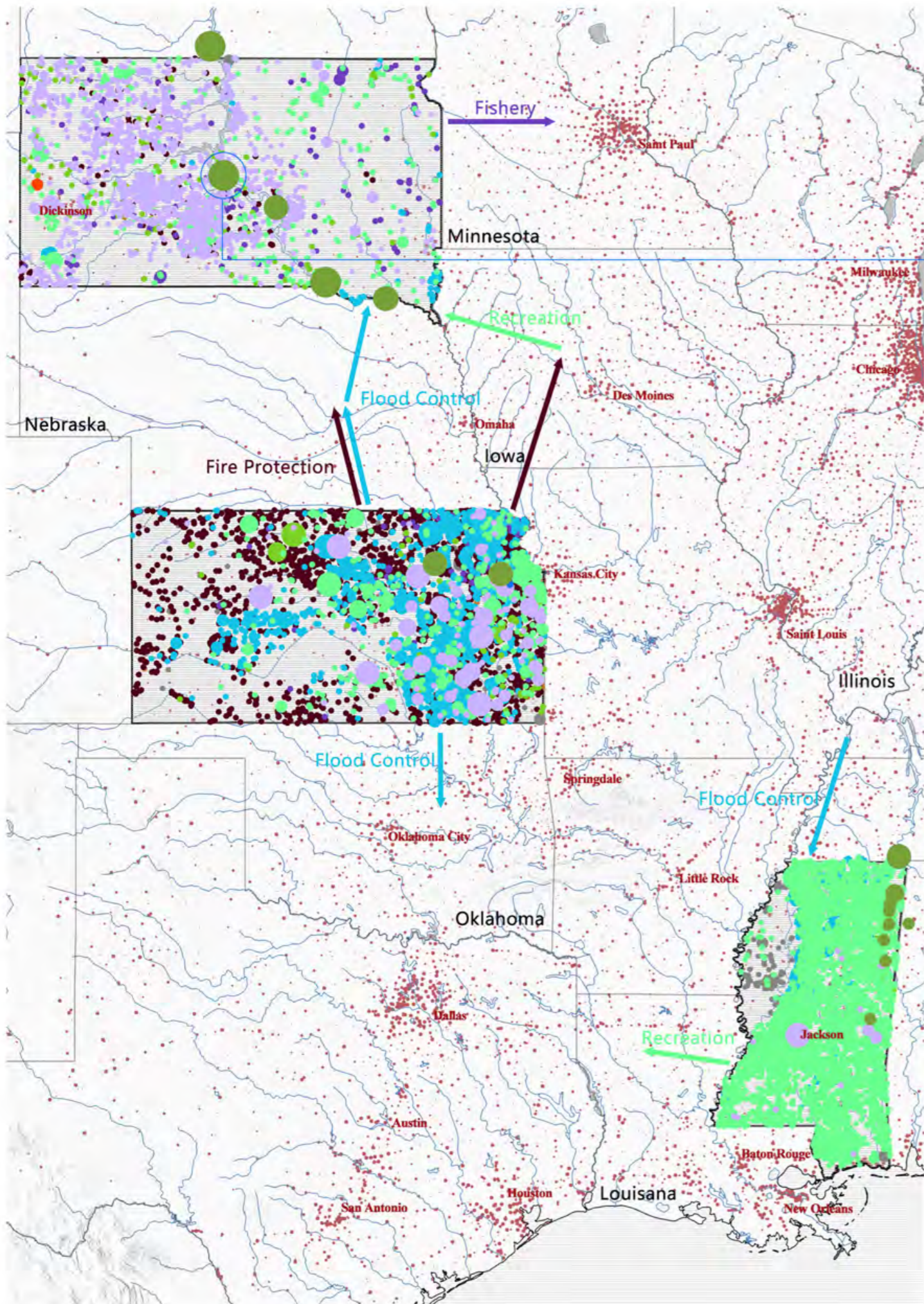
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

Hazard Potential Classification of Dams
Dams are classified with a hazard potential depending upon the downstream losses anticipated in event of failure. Hazard potential is unrelated to the structural integrity of a dam.

LYNCHBURG



Threatened metropolitan if the dam collapses.



● OAHÉ DAM

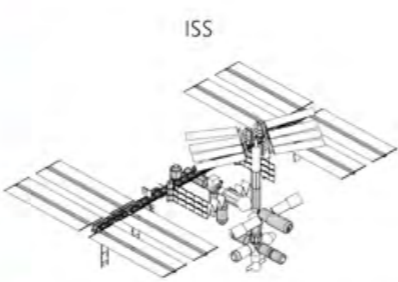


The dam creates Lake Oahe, the fourth-largest man-made reservoir in the United States. The reservoir stretches 231 miles (372 km) up the course of the Missouri to Bismarck, North Dakota. The dam's power plant provides electricity for much of the north-central United States.

SURGE TANKS



A water storage device used as a pressure neutralizer in hydropower water conveyance systems in order to dampen excess pressure variance. It can absorb sudden rises of pressure, as well as quickly provide extra water during a brief drop in pressure.



Oahe lake is clearly visible on the International Space Station. Several photos have been taken from the ISS, which is a typical example of the dams changing landscapes.

The world's first rock tunnel boring machine was invented in 1952 for the Oahe Dam project, which marked the beginning of machines replacing human tunnelers.

SEASONAL CHANGE

Excessive precipitation in the spring, along with melting snow from the Rocky Mountains forced the dam to open the release gates in 2011.



● KANSAS FIREFIGHTING DAMS

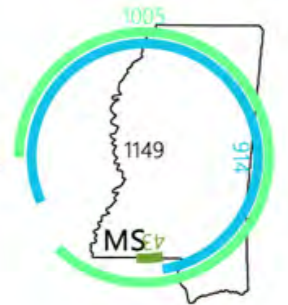
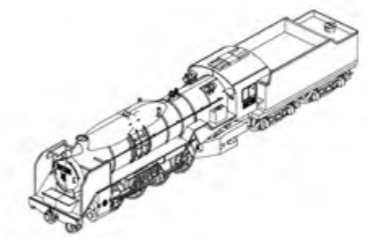
LIVESTOCKS



RURAL FIREFIGHTING DEPARTMENTS



STEAM LOCOMOTIVES



● DELTA NATIONAL FOREST



The Delta National Forest is located in Sharkey County north of Vicksburg, Mississippi, within the floodplain of the Mississippi River. It is one of the few hardwood forests remaining in the Mississippi Delta and the only bottomland hardwood national forest in the nation.

BOTTOMLAND HARDWOOD FOREST



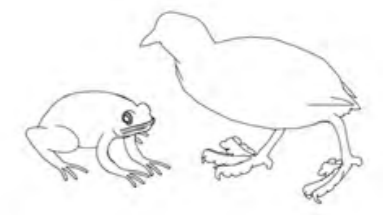
A type of deciduous and evergreen hardwood forest found in US broad lowland floodplains along large rivers and lakes. Occasionally flooded, which builds up the alluvial soils required for the gum, oak and bald cypress trees that typically grow in this type of biome.

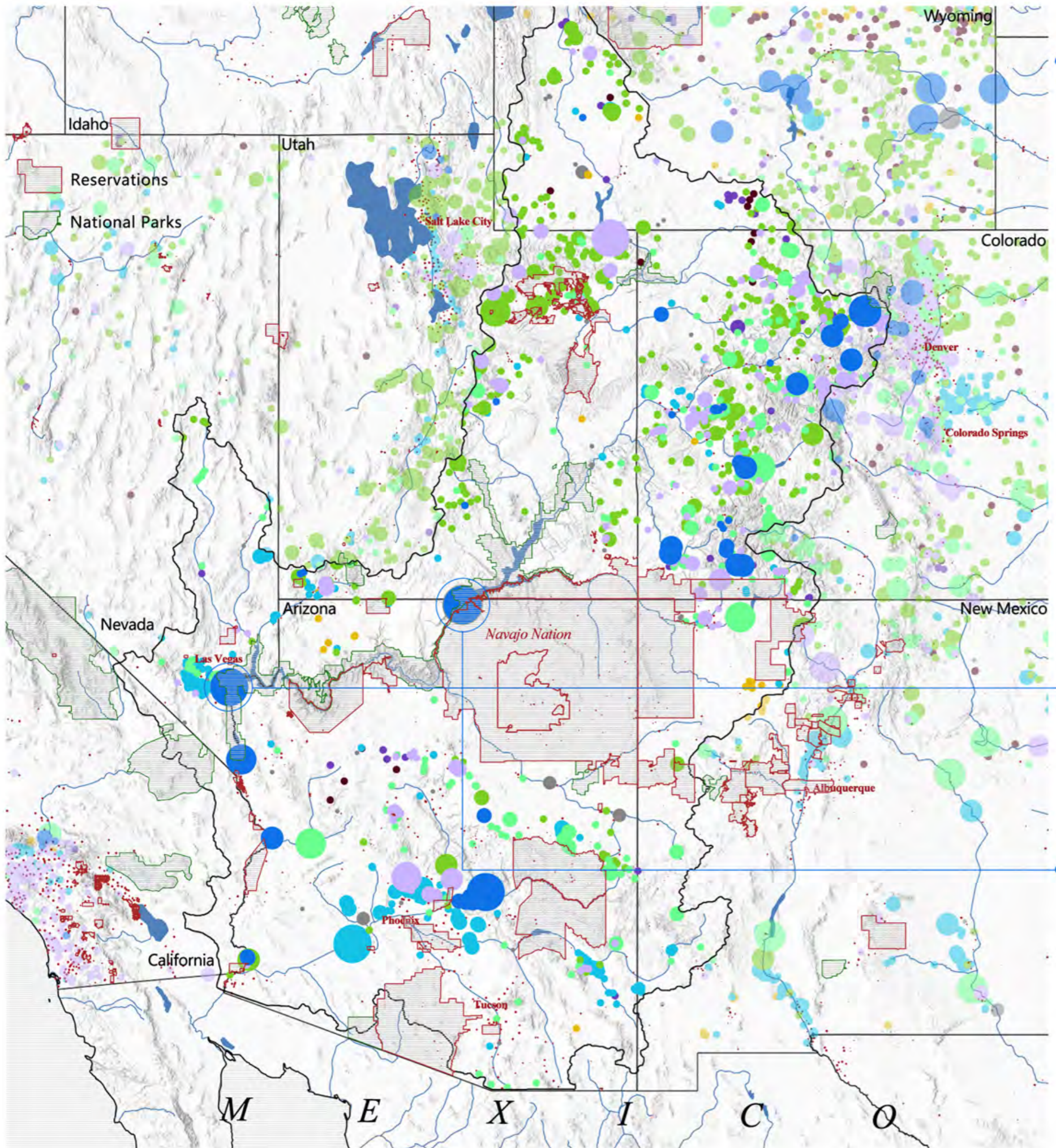
"GREEN TREE RESERVOIRS"

A green-tree reservoir (GTR hereafter) is a forested lowland that is temporarily flooded during fall and winter to attract ducks, mainly mallards and wood ducks. It is designed to hold water while trees are dormant. This prevents permanent tree damage and possible death.

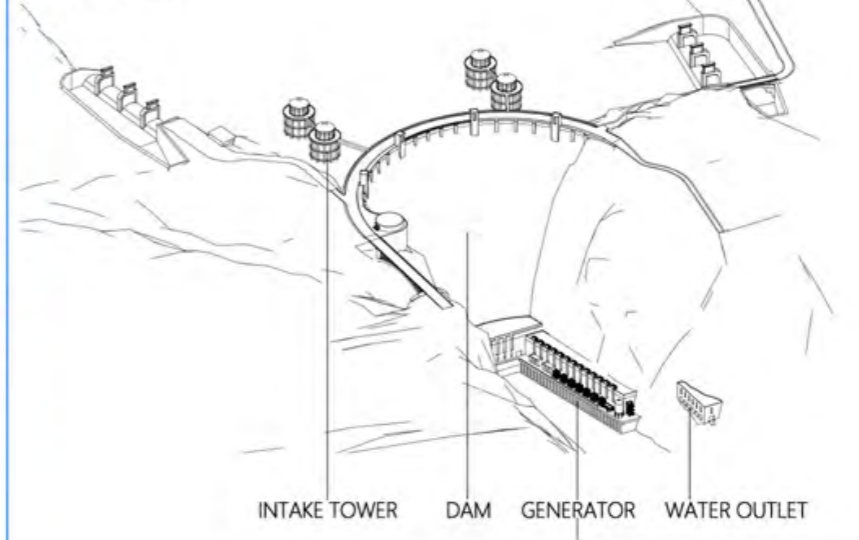


WATERFOWL AND AMPHIBIANS





Hoover Dam



PROPOSED SITE SELECTION



INTERSTATE COMPACT

MECHANISMS



TUNNELS
COFFER DAMS

WORKERS



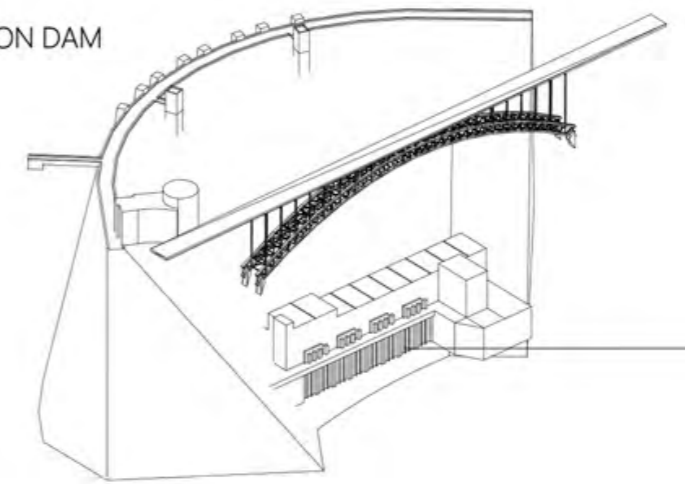
PREVENTING "MONGOLIAN LABOR"
112 DEATHS

CONCRETE POURING

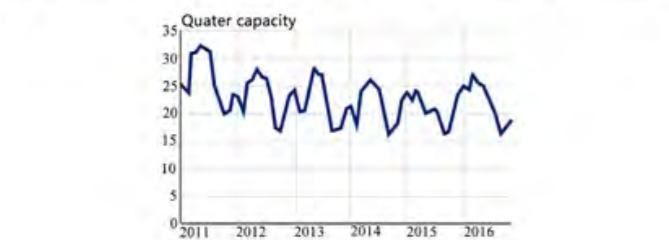


CONCRETE BLOCKS IN COLUMNS
WATER COOLING BY STEEL PIPES

GLEN CANYON DAM



PERCEPTION DIFFERENCES



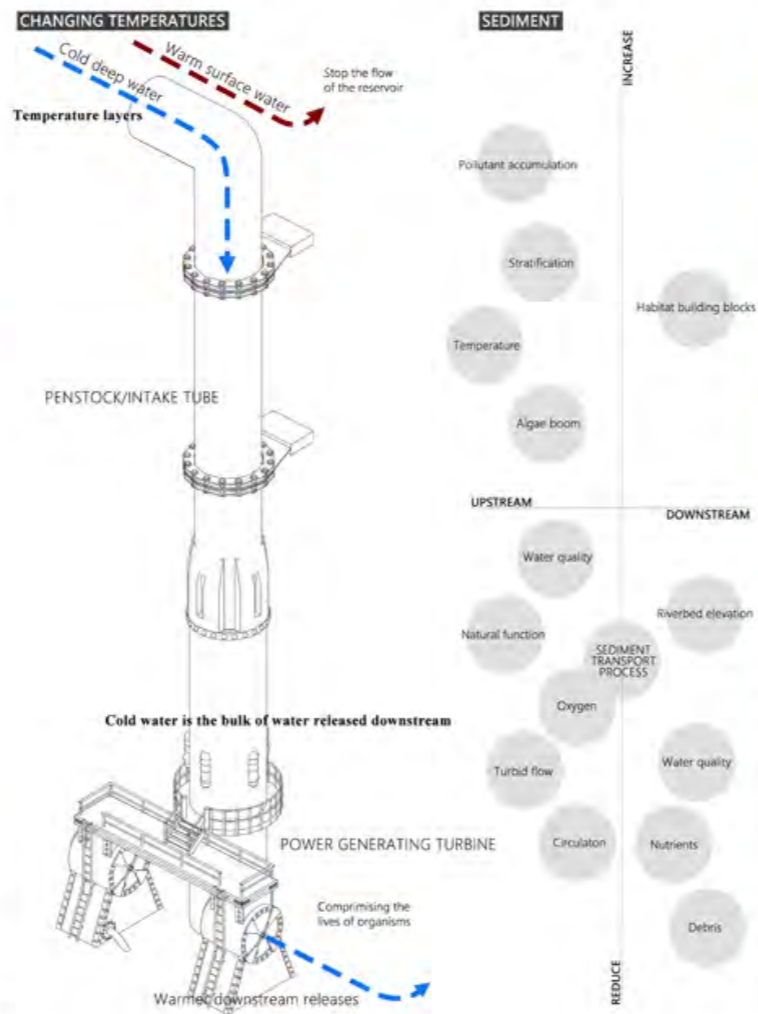
Climate change and the weakening regulation effect of runoff from the upstream Glen Canyon Dam as the aging of the dam, as well as other factors, result in the continuous decline of the water level of Lake Mead and the gradual decline of hydropower supply to Las Vegas, so that Nevada needs to seek new and more stable electric sources.
The lowering of the water level also exposed the rocks and raised the water temperature.

OFFSET BETWEEN INFRASTRUCTURES AND POPULATION UNILATERAL IMPRESSION OF DAMS

HYDROPOWER GENERATION / ND TRANSMISSION HYDROPOWER STATION AND ENERGY STRUCTURE

FROM MOUNTAIN TO SEA / CROSS THE FIELD

NEW YORK/TEXAS
PURPOSES/STORAGE/AGES
HUDSON RIVER/INTERSTATE 35



VIRGINIA/TENNESSEE INDUSTRY AND LIFE

SOUTH DAKOTA/KANSAS/MISSISSIPPI MULTIPLE CONNECTIONS WITH NATURE

COLORADO RIVER BASIN CONSTRUCTION TECHNOLOGIES ECOLOGICAL RISK

WITH INDIGENOUS PEOPLE NAME, LIFESTYLE AND TRADITION

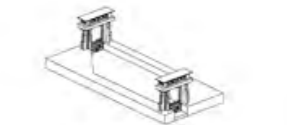
MULTI-FACETED DAM EFFECTS



Caughdenry dam-Oneida Lake



Oneida people: One of the six Iroquoian Native American nations, losing most of their land during the Revolutionary War.
Commercial shipping increased substantially after a canal across the Oneida.
In 1825, Erie Canal bypassed the Oneida Lake system and enhanced travel through the entire Mohawk Valley. This caused the population around the lake to lose their navigable waterway eastward.
After the Erie Canal reconstruct in early 20th century, towns along the shoreline of Oneida Lake were provided with access again to navigable waterways east and west.



The water level is regulated by the Mud Lock at the north end of the lake. The drawing down of the lake is to minimize ice damage and to maximize its capacity to store heavy spring runoff.



A popular summer boating destination, thanks to its shallow water and sandy bottom. Together with winter sports of ice fishing and snowmobiling.



The Erie Canal was redesigned and reconstructed to form the New York State Barge Canal in the early 20th century. The new barges were powered internally, so they could travel open water and against a current.

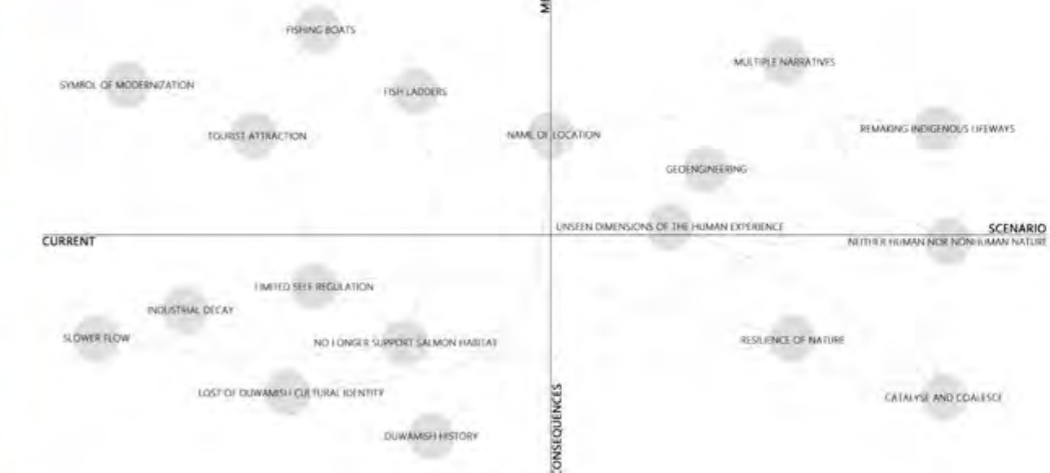


Cool power plant using Cayuga Lake as a cooling source.

Mud Lock Dam-Cayuga Lake



Seattle



For New York state, the project sets a route along the Hudson River so that a hypothetical city resident can realize the old history of building dams in New York state, together with the change of focus in construction purposes and the distribution of dams according to landscapes from the densely populated Atlantic coast to the glacial lakes in mountain area. Through this, scenarios of shifting in the roles of dams through time can be drawn.

For Texas state, the average distribution and construction purposes, together with the shorter history of building but larger storage can be highlighted by the supposed linear journey along the 35th national road, showing the relationship between agriculture and cities and dams in the Great Plain of the US. The comprehensive utilization of dams can be explained by the maintenance of dams, corresponding to the dam reconstructions in New York state.

For Colorado river basin, the most powerful symbols of US industry like Hoover dam show sudden increase in hydropower, but the byproducts like destroying fish habitats caused by sediment and increasing water temperature, emerging natural sceneries, impact on indigenous traditions are also severe, reflecting colonialism and fake definition of so called "clean energy". Besides, the climate change and new plans of building dams in tributes also effect the operation of the huge dams. The dismantle problem of dams may be take into consideration.

Other states like Tennessee, Kansas, Virginia, South Dakota and Mississippi also have dams contributing to local characteristics, these cases will help to form more comprehensive and coherent understandings of dams. Indigenous names like Cayuga and Oneida in New York state and Duwamish in Seattle shows the contradiction between modern ways of living and tradition cultural lifestyles, while the divergence was largely caused by the dams' impact on both people and the nature.

NARROWING THE DISTANCE
FROM IMAGINATION TO WITNESS



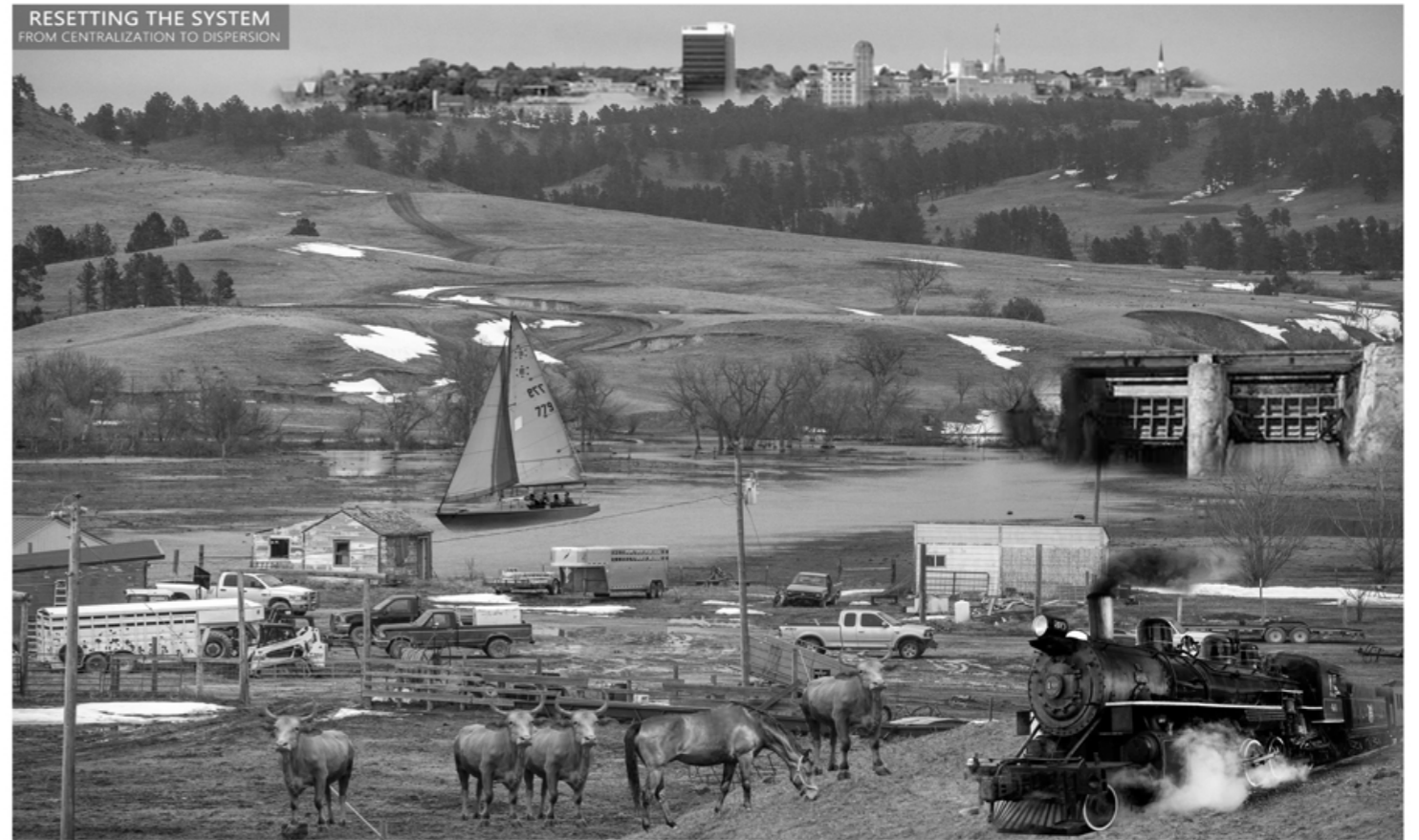
BOLISHING THE CENTRALISM
FROM BLOCKING TO DREDGING



BREAKING THE BOUNDARY
FROM CHAIN TO NETWORK



RESETTING THE SYSTEM
FROM CENTRALIZATION TO DISPERSION



Manifesto

Siesmic Field

Hudson River - 42nd Street, New York

Studio Island - "Earth" - Earth Experienced Through the Form of Movement and Energy
2021

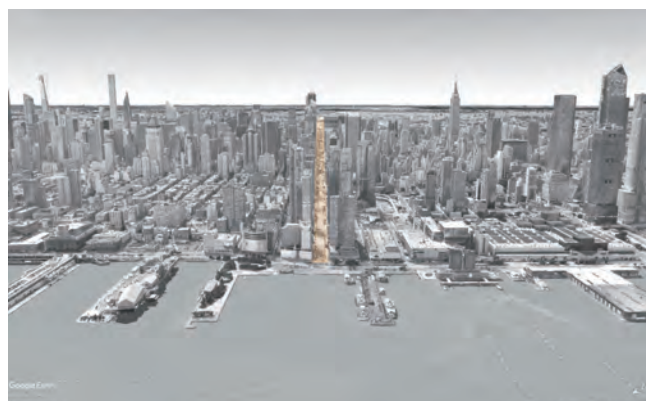
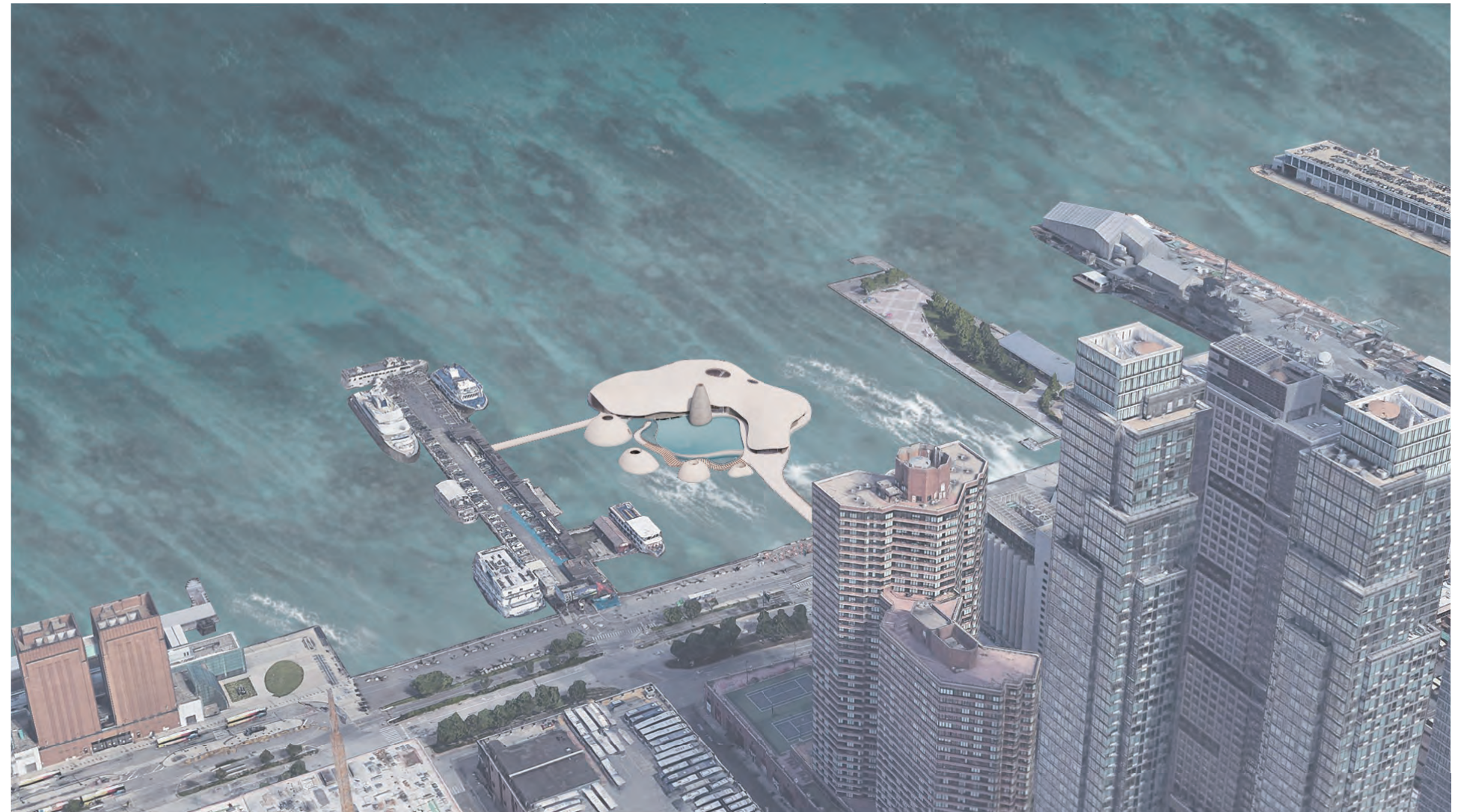


Co-operators: Haozhen Yang with
Risa Mimura, Zihan Sun, Enfeng Xie

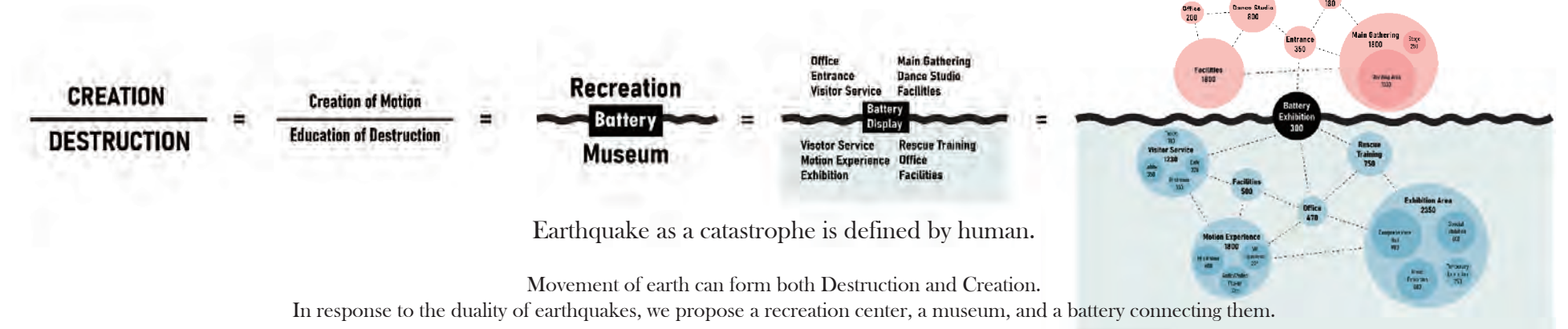
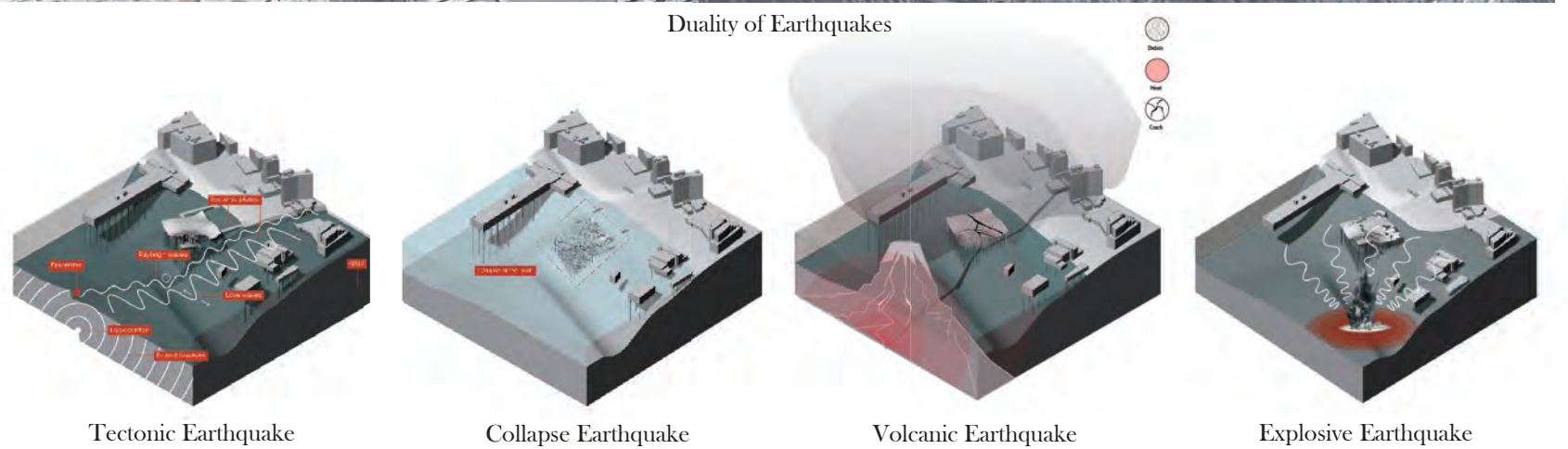
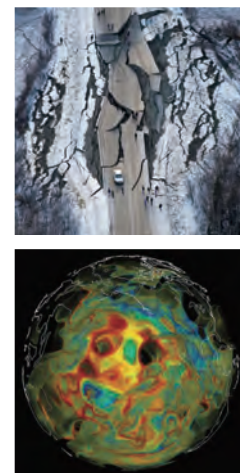
Instructor: Bernard Tschumi with Valeria Paez Cala

Earth as one of the "Four Elements", is long ignored by people in such Concrete Jungle as New York city. Earthquakes as destructive catastrophis are not easy to get along with in modern lives of urban citizens also. However, earthqukes themselves have the characteristic of duality, combining destruction with creation -- the seismic waves contain huge vibration energy that may can be harvested in the future.

To set an aim of having contrasting perception of the element earth in New York City, this program selects the 42nd Street's Hudson Riverside point as the site, showing the pattern of an archipelago. People in the "Seismic Field" will not only think back on the earthquakes, but also be a member of creating energy that can be used in case major earthquake happens. Together, as an urban activity site, museum and other purposes, the island Earth will lead a new way of discussing the relationship between modern people and the nature.



Location: On the extension of the Concrete Jungle,
A contrasting perception of element Earth





Sumatra Earthquake and Tsunami in 2004, Indian Ocean

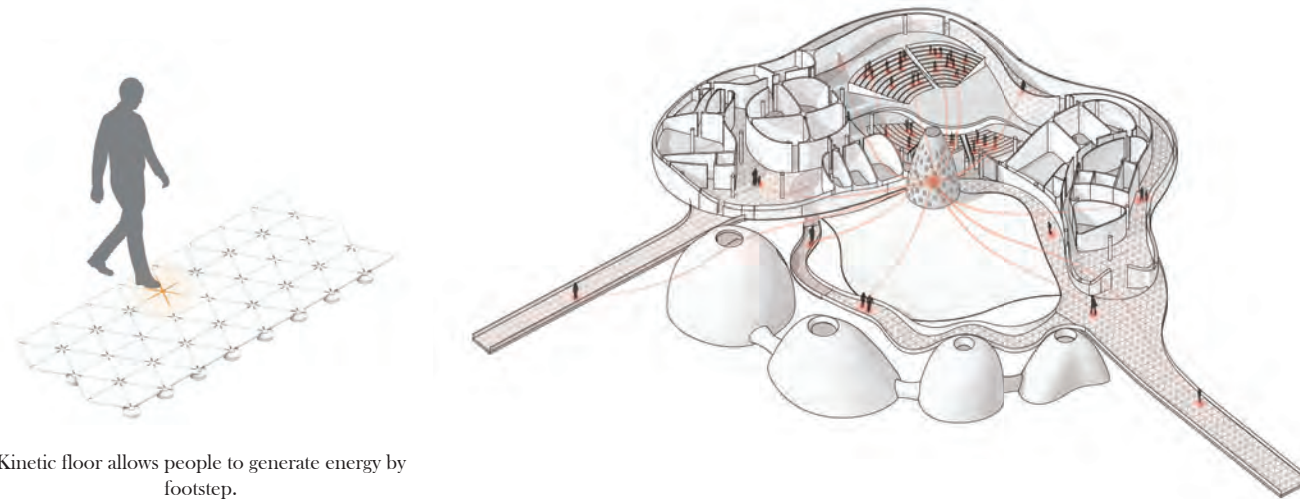


Tohoku Earthquake in 2011, Japan



Delhi Earthquake in 2018, India

Kinetic Floor Placement



Kinetic floor allows people to generate energy by footstep.

The main circulation of Seismic Field will be covered by kinetic floor to maximize energy harvesting. With movement of visitors, energy will be created and transported to battery tower.

The whole Seismic Field is covered by a kind of kinetic floor, which can respond to people's step on it and generate electricity. This kind of floor translates visitors' motion into energy, which is the reverse of earthquakes' emitting seismic energy into motion. We think by this way, people can have a new perspective on the earthquakes that the motion and energy can be transformed into each other.

Though one step can only generate very little energy, this way of producing electricity can add up to an amount that can be used in emergencies like starting up rescuing aftermath the earthquake, or providing digital signals. The storage of this energy is a dynamic process, so that the visitors can feel that they not only visit the Seismic Field, but also make effort to it.

Horizontal

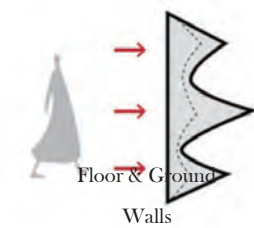


Motion Transmission

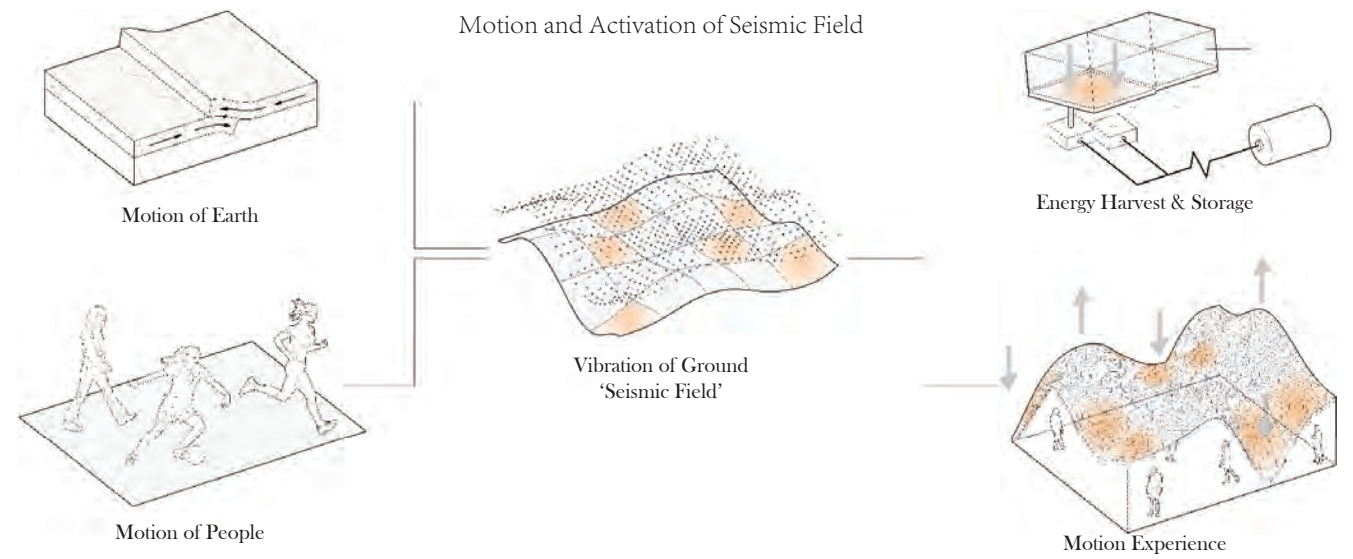
Vertical



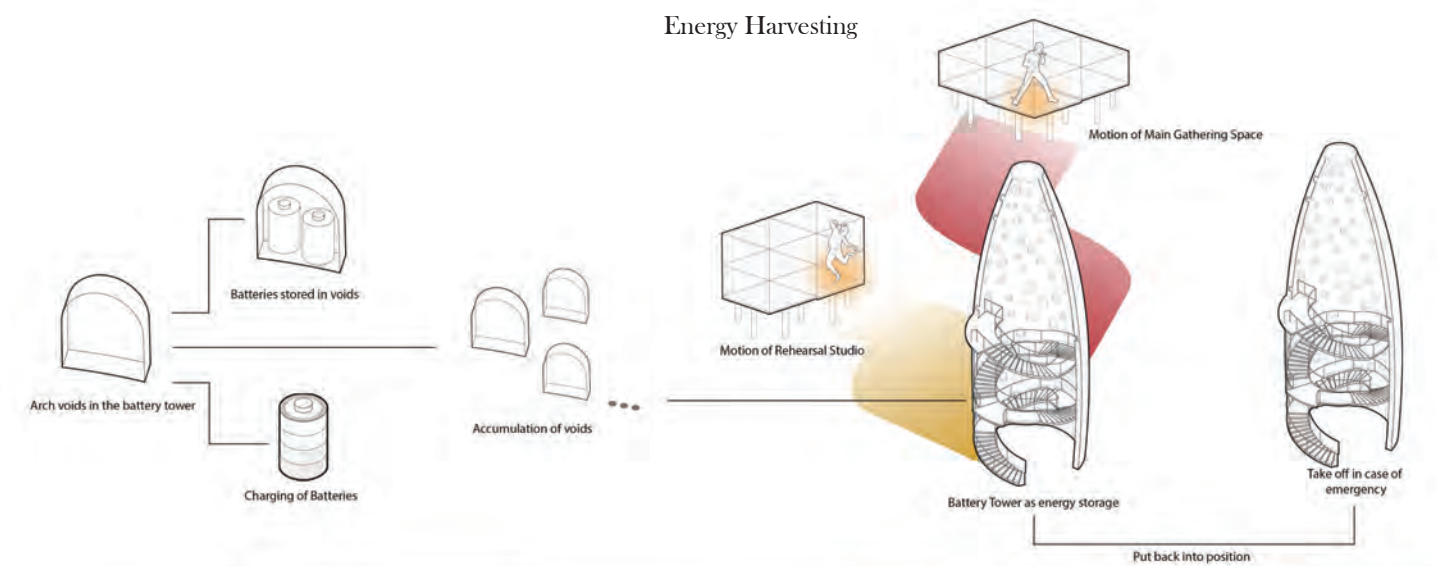
P Wave & S Wave



Motion Experience Ways

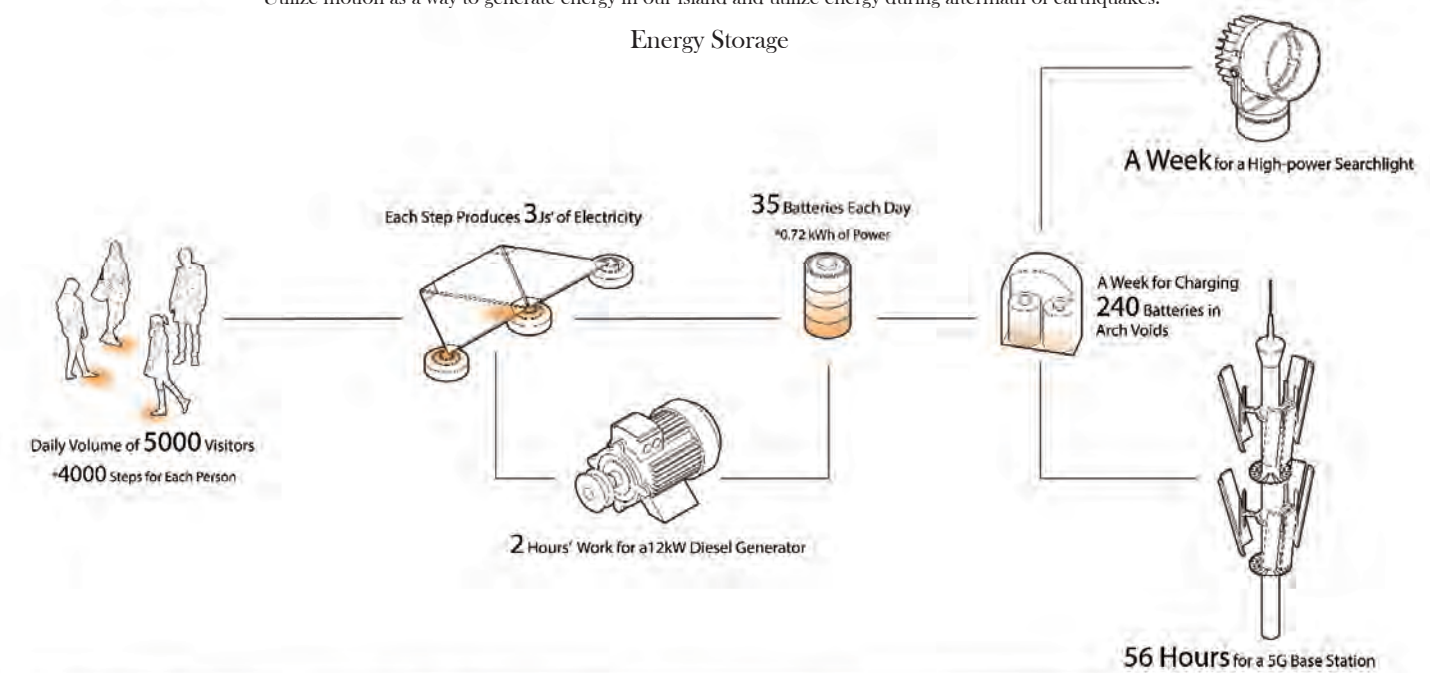


Through a seismic field generated by human activities, we are trying to recapture the essence of earth's movement. Motion translated into vibration, earth, or ground could then become the medium for motion experience and energy harvesting.



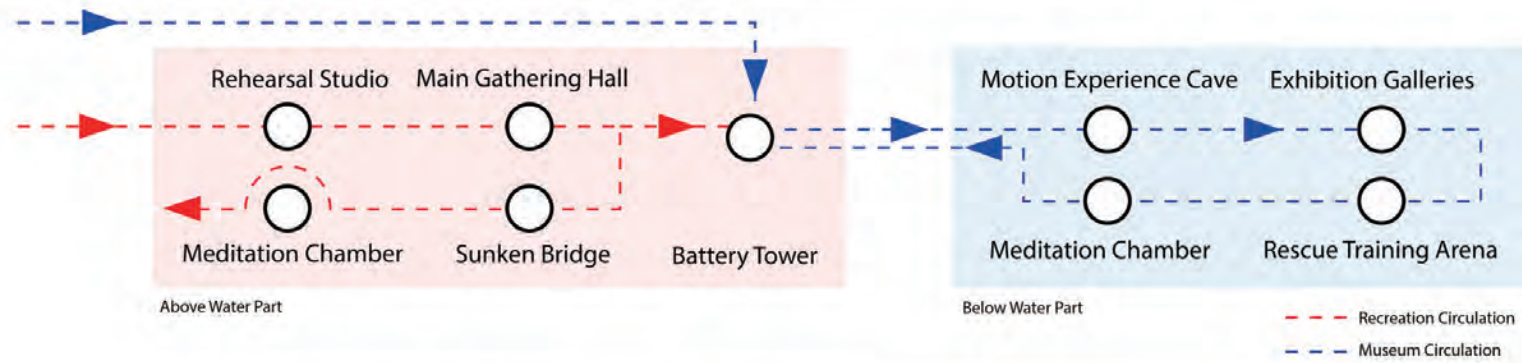
Utilize motion as a way to generate energy in our island and utilize energy during aftermath of earthquakes.

Energy Storage



Visitors are Attracted to the Island | Harvesting Energy Produced by Footsteps | Constant Charging of Batteries | Work as a Rescue Camp Providing Electricity
Visitors will be able to experience the process of generating energy while understanding they will become the one consuming the energy in the future.

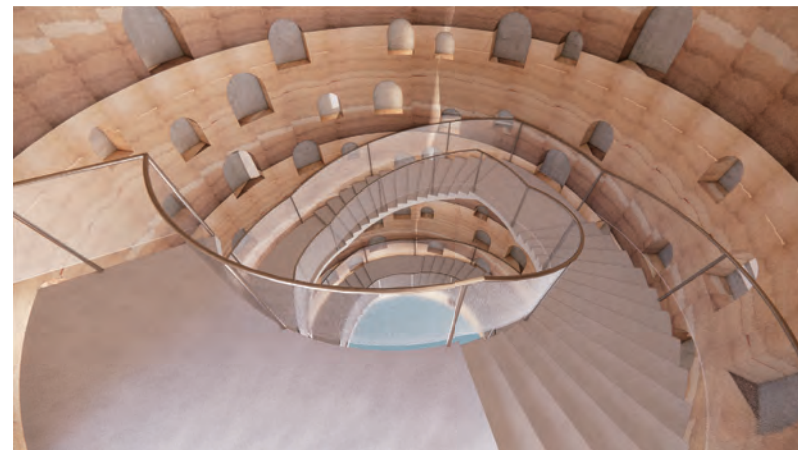
Motion Experiences - Seismic Wave & Motion



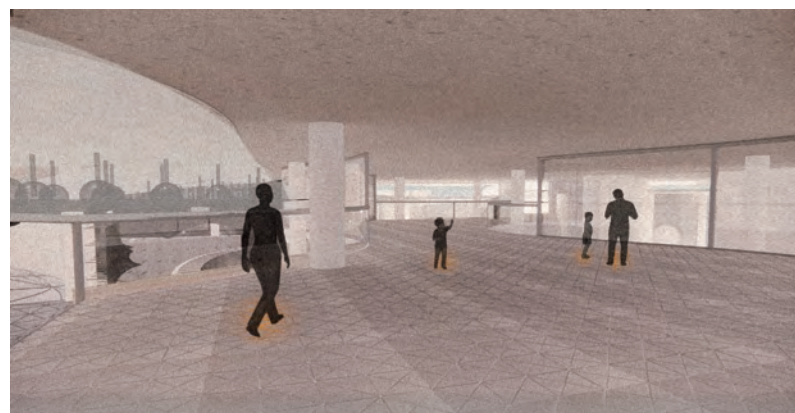
Two Circulation Sequences, seperated above water and underwater levels - For general public and internal visitors



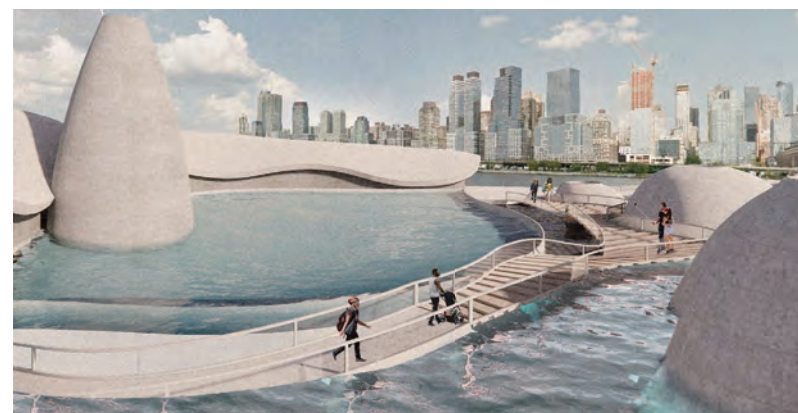
Battery Tower - Skylight



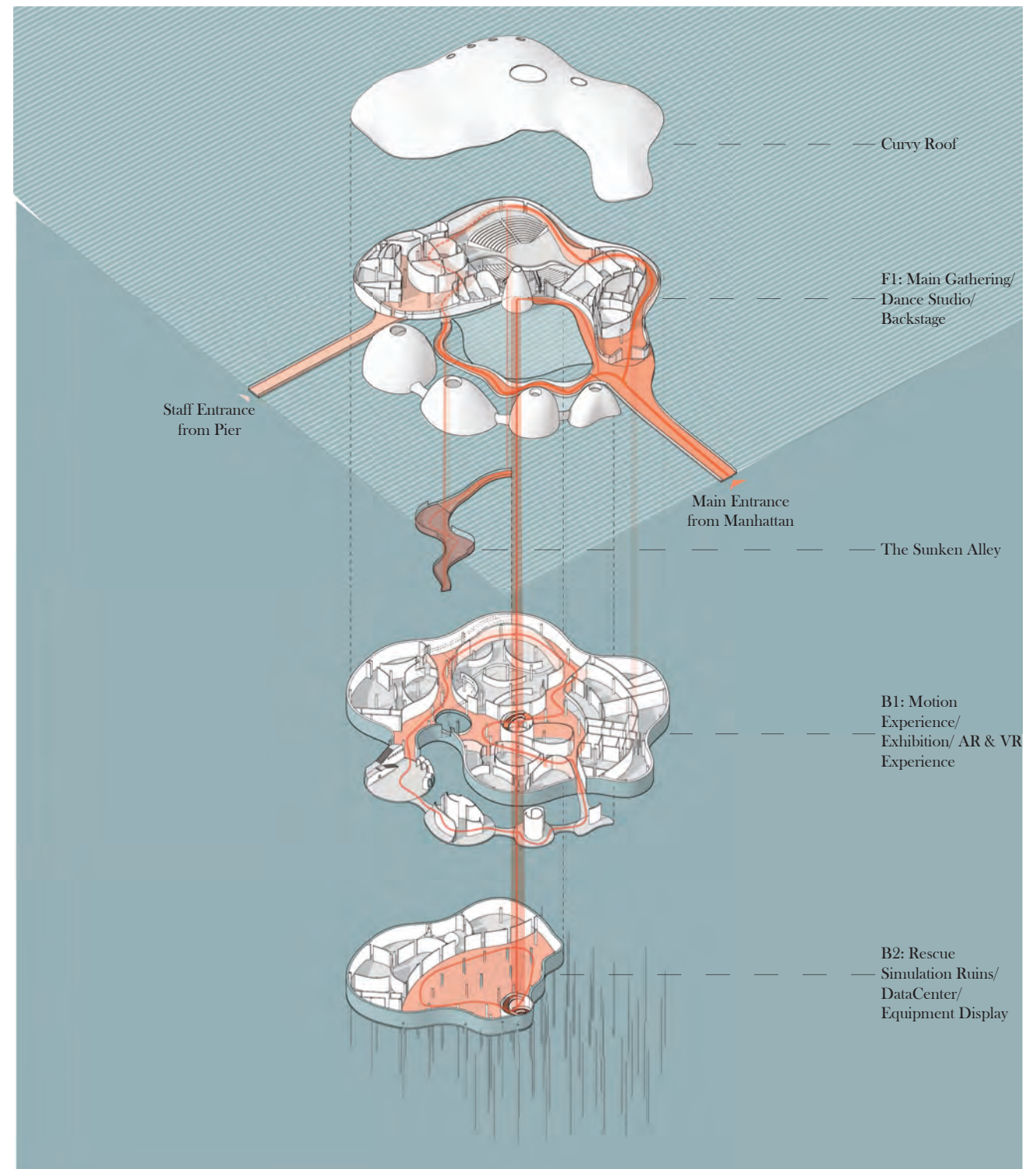
Battery Tower - Spiral Stairs



Energy Corridor - Sunken Alley



Energy Corridor - Floating Bridge



Circulation of the island

The Seismic Field provides multiple circulations on the archipelago, basically because of the need for the visitors to provide the most vibration by their motions during the visiting. From Manhattan, the Seismic Field is attracting people from the concrete jungle by its somehow organic shape, by which it draws the general public visitors. While those who need to learn the knowledge about earth and earthquake will go deeper into the archipelago.

The Battery Tower is the highest part of the Seismic Field, and it's also the conceptional core of it. By containing batteries the storage of energy is done there. Also, the tower connects the three floors of the main island, and also the above and below water part as the center of circulation.

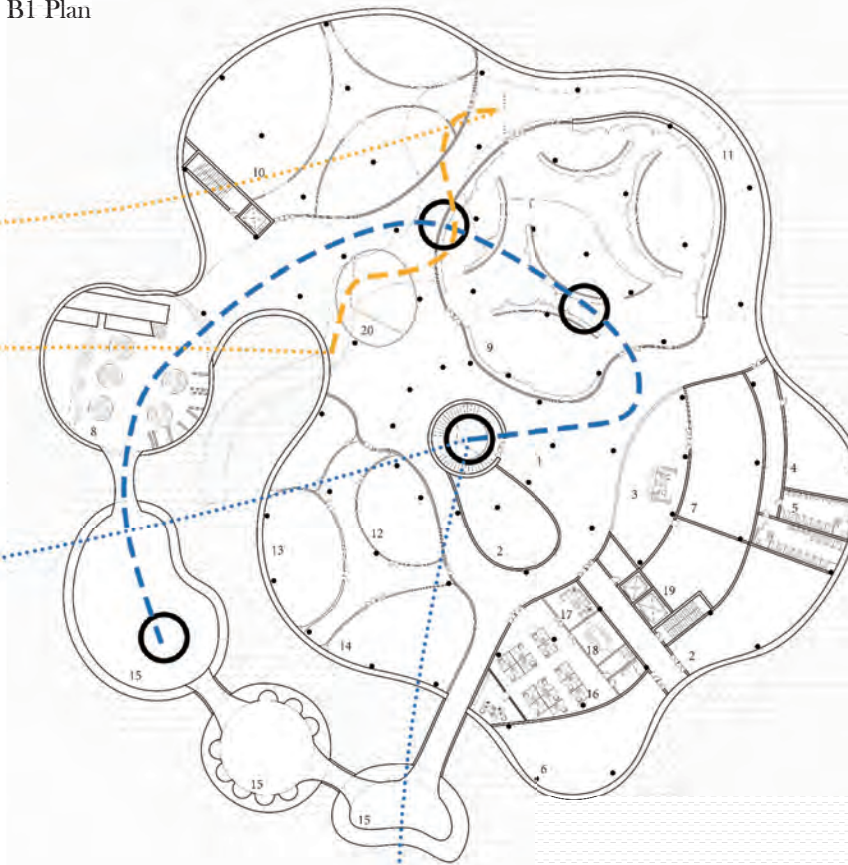
Another important part of the circulation is the Energy Harvesting Corridor, add up by the two parts, Sunken Alley and Floating Bridge. They link the main island together with the minor islands both indoor and on water. Main Gathering Space and Motion Experience Room are the main spaces for people to create and experience motion. These two spaces are linked together by visitors' eyesights. The atrium in the B1 floor also provides an eyesight link passage into the B2 floor Rescue Training Arena and Data Center.

1F Plan

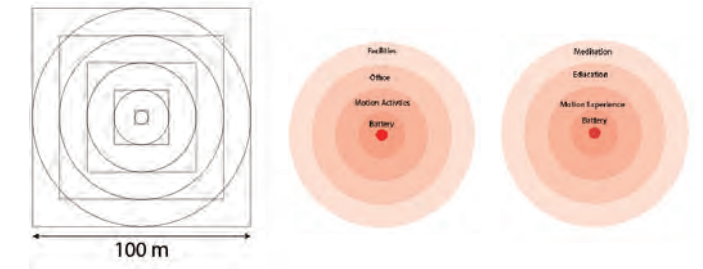


- 1 Lobby
- 2 Office
- 3 Rehearsal Room
- 4 Main Gathering Space
- 5 Facility
- 6 Storage Room
- 7 Security Guard
- 8 Sunken Alley
- 9 Reception Room
- 10 Meditation Chamber
- 11 Cafe

B1 Plan

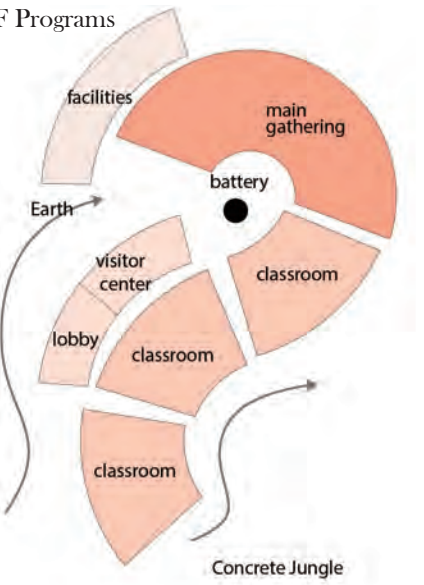


Motion Intensity and Epicenter

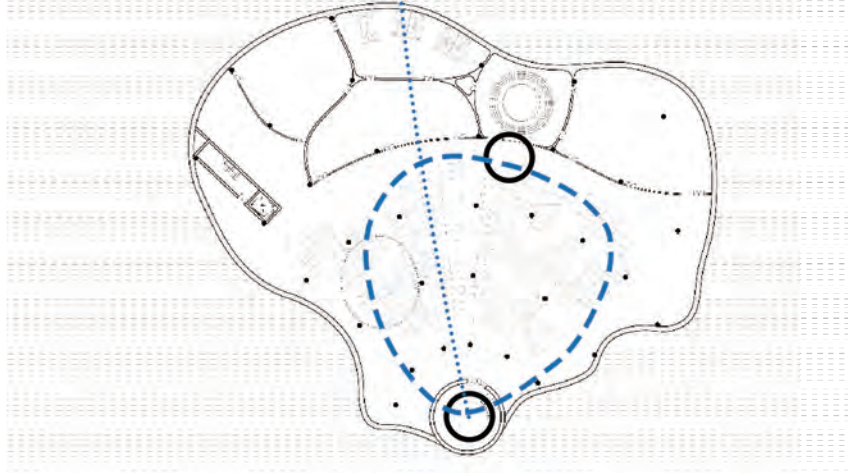


- 1 Lobby
- 2 Facilities
- 3 Ticket Office
- 4 Coat Room
- 5 Restroom
- 6 Storage Room
- 7 Bookstore
- 8 Teahouse
- 9 Motion Experience Hall
- 10 Basic Exhibition Hall
- 11 Special Exhibition Corridor
- 12 VR Experience Room
- 13 AR Experience Room
- 14 Interactive Experience Room
- 15 Meditation Chamber
- 16 Office
- 17 Reception Room
- 18 Conference Room
- 19 Central Control Room
- 20 Atrium

1F Programs

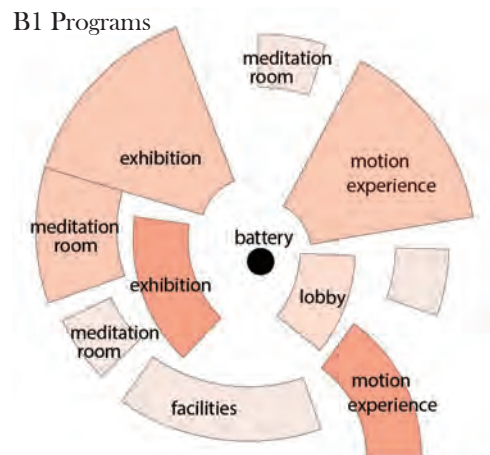


B2 Plan

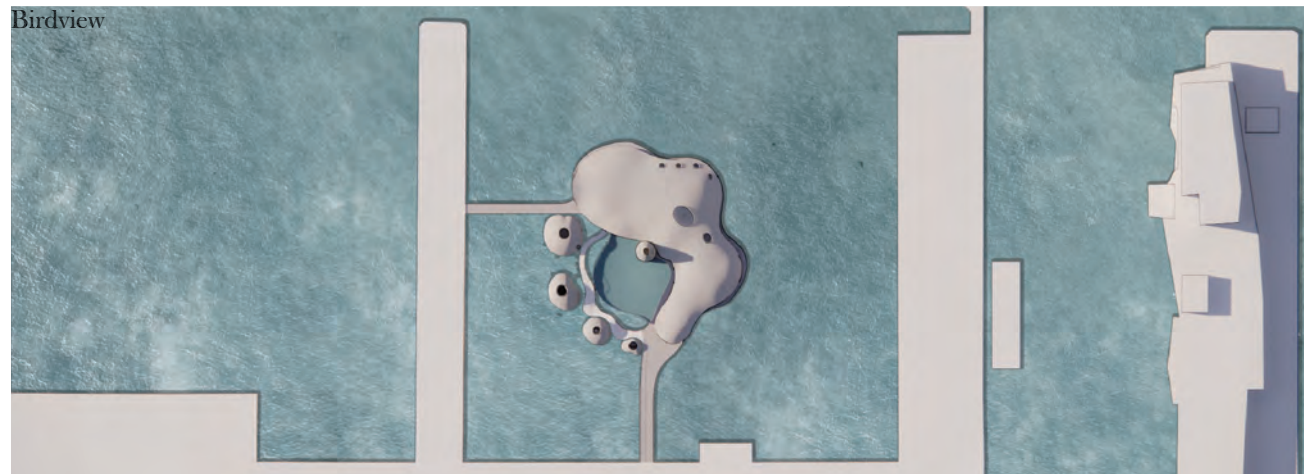


- 1 Rescue Simulation Ruins
- 2 Equipment Display
- 3 Rescue Team Training
- 4 Office
- 5 Data Collector Room
- 6 Data Visualization Room
- 7 Headquarter

B1 Programs



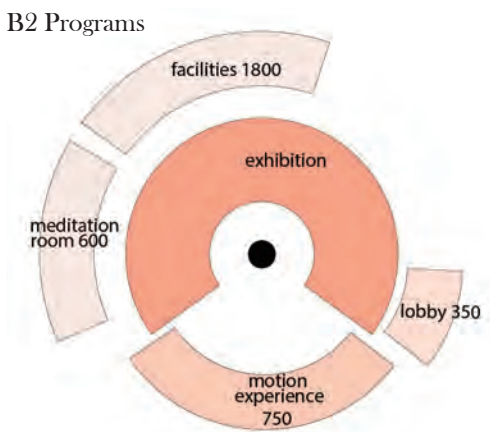
Birdview



Overview



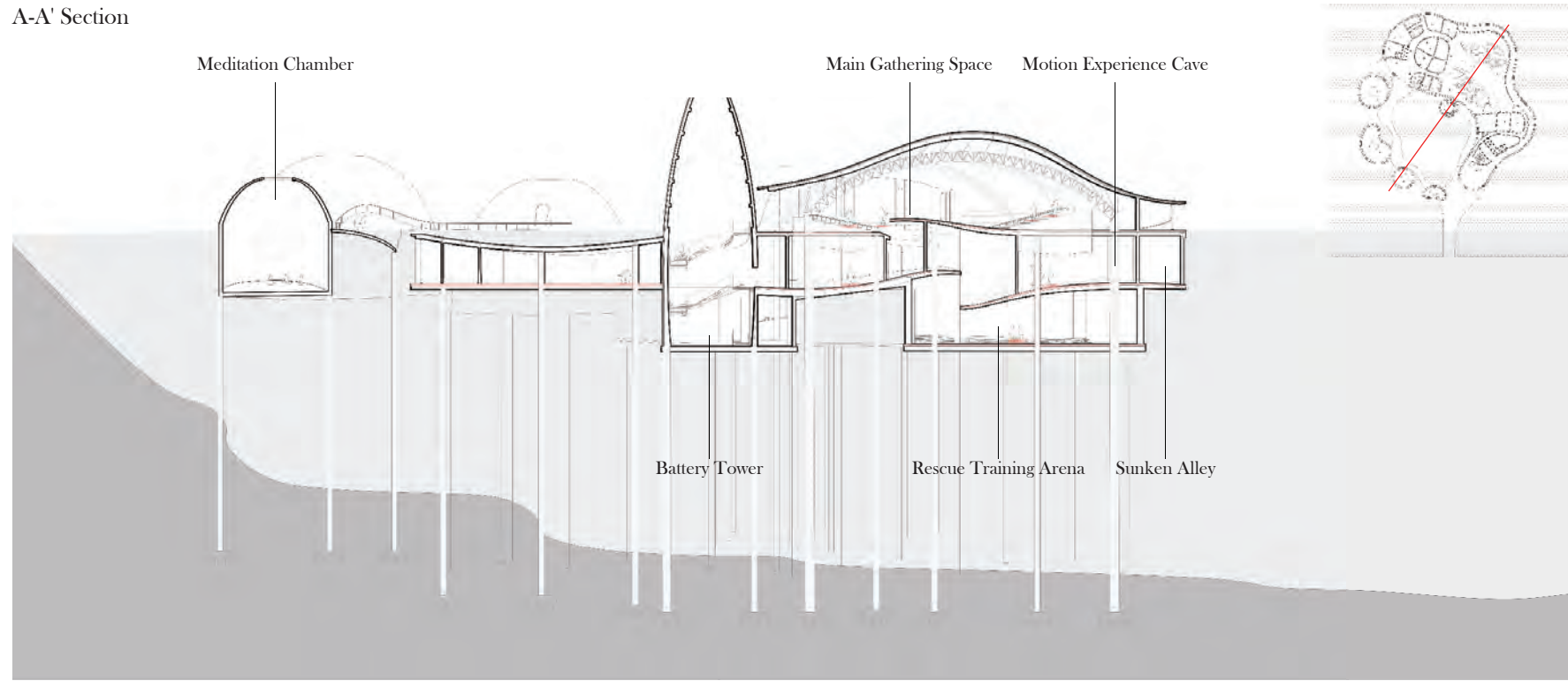
B2 Programs



In the form of Archipelago, Seismic Field consists of a series of islands surrounding the central battery tower. Seismic Field aims to recapture the nature of earthquake through the duality of recreational and museum programs. The flowing form of archipelagos provide visitors a contrasting perception of earth from the rigid geometry of concrete jungle.

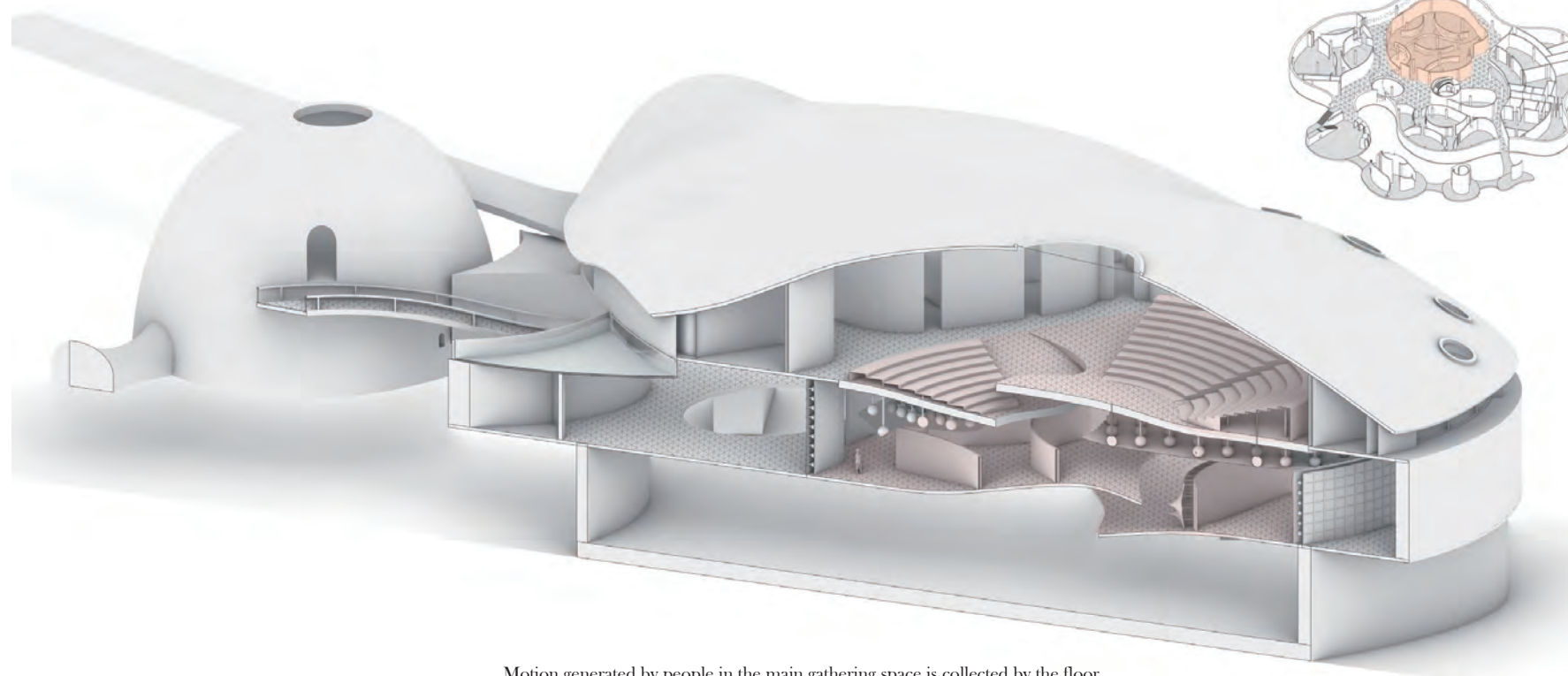
Simulating the seismic wave of earthquake, the program are arranged according to intensity of motion.

A-A' Section



A-A Section shows the main spaces through the central line of the Seismic Field. Also, the eye contacts are enabled by the cracks.

Main Gathering & Motion Experience

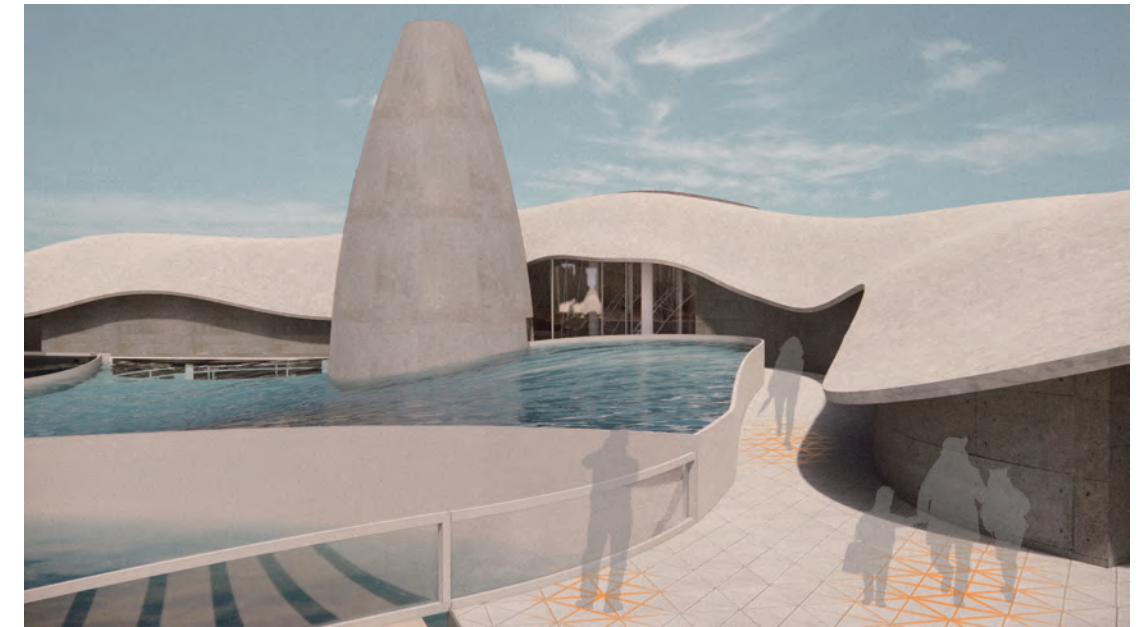


Motion generated by people in the main gathering space is collected by the floor.
Motion Experience Space lies in the B1 level underneath the Main Gathering Space.

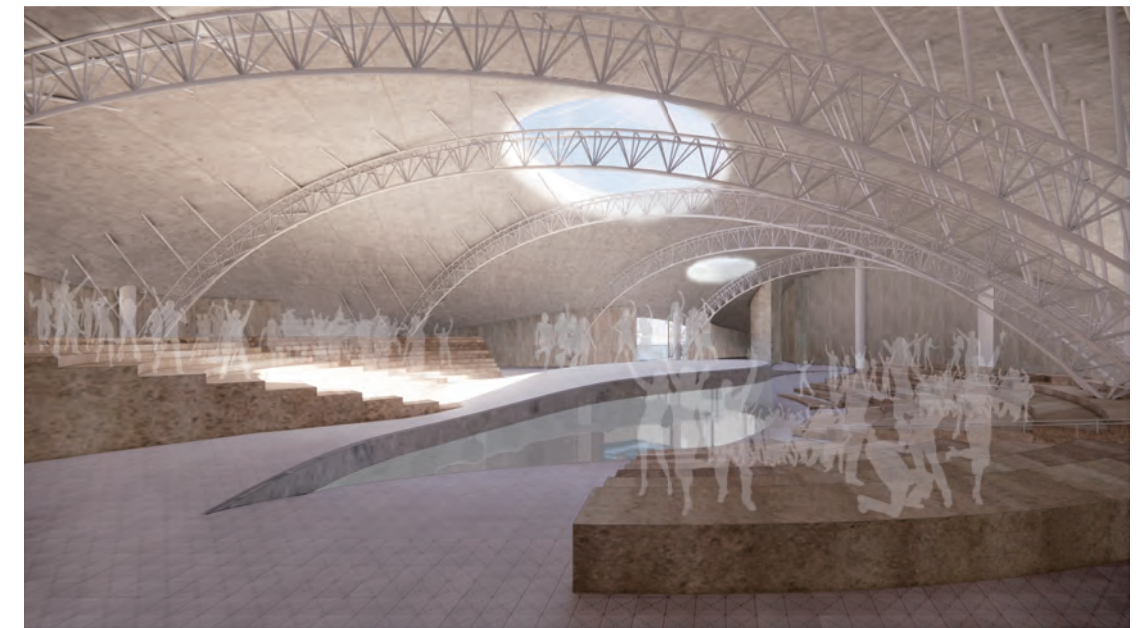
Motion experience wall transmit the motion outside of the room into the inside and sunken bridge allow visitors see such interaction from vertical and horizontal directions.

The Motion Experience Room serves as the main way of providing people a new way to think about earth and earthquakes. So the motion by people in the Main Gathering Space is visualized by two ways into the below space. P wave and S wave are the two kinds of seismic waves, one transmits horizontally and the other transmits vertically. So in the Motion Experience Room, the motion of people is also shown in two different ways, in response to 2 types of seismic waves.

Motion generated by people in the main gathering space is collected by the floor, and Motion experience wall transmit the motion outside of the room into the inside and sunken bridge allow visitors see such interaction. The ceiling can also respond to the moving of people above, thus the people in both spaces can have communication through the way how seismic waves travel.



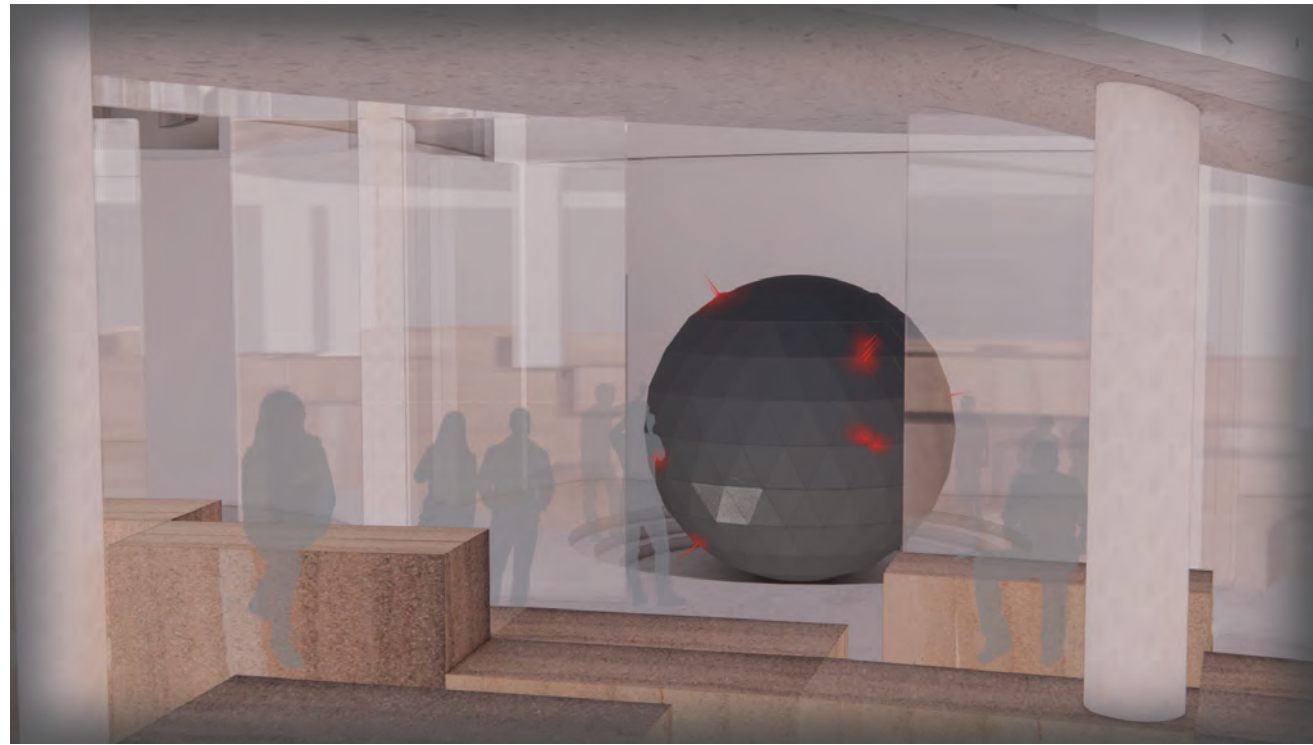
Battery Tower - energy and circulation core of the island



Main Gathering Space - Collecting motion generated by people by the floor



Motion Experience - Allowing visitors to experience the energy of movement through walls



A Center of Earthquake Memory and Looking Forward

The Data Center in the B2 floor provides a place for visitors who need further information of the earthquakes to find their needs. With AR technology, more details of major earthquakes and geological structures all over the planet can be shown on the globe. Those earthquakes causing great damage will be recorded and the B2 floor itself can be seen as a memorial hall.

With developing calculation power, the Data Center may also be used to predict the next catastrophic earthquake, and provide instructions to eliminate losses. The other parts of the B2 floor have similar functions, like Rescue Training and the Headquarter of civilian rescue teams.



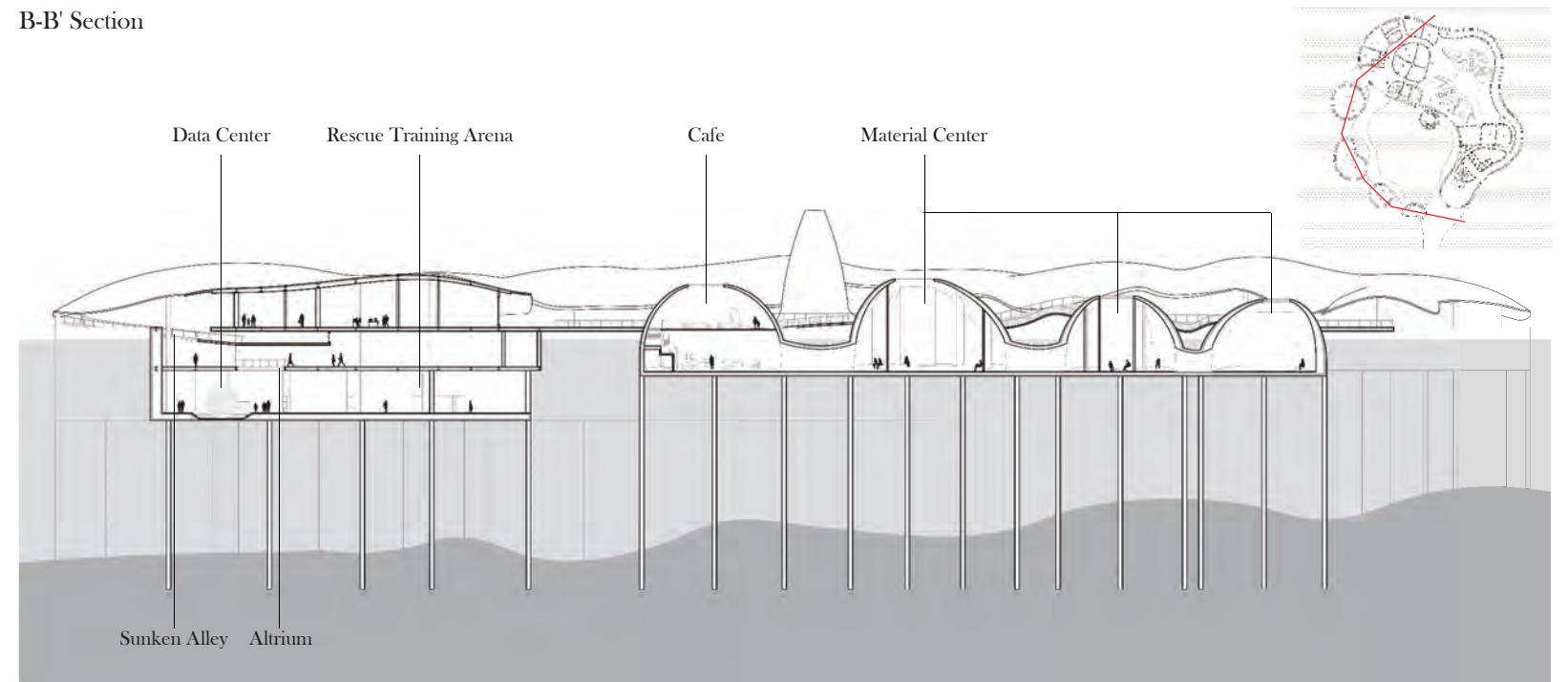
Aftermath the Earthquake

Seismic Field will correspond to the city's need during emergencies by providing electricity through battery tower.

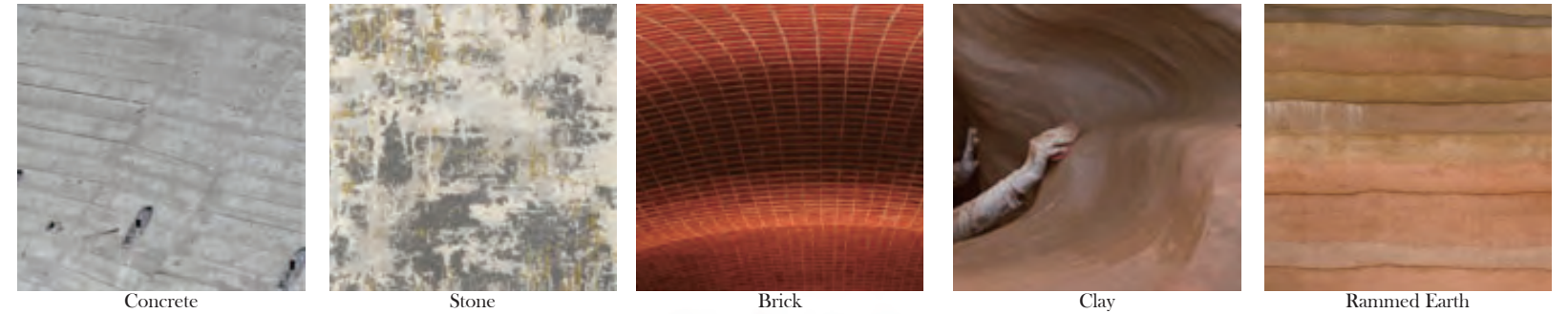
The minor islands of the Seismic Field are the main reason why it can be called as an archipelago. They are built in different materialities, like stones, bricks, rammed earth and clay. These islands can also be scaleplates of the magnitude of earthquakes, or seismograph, due to their fragility. The materialities are selected mainly because of showing the sequence of the earth's hardness and softness as an element and a kind of building material.

Aftermath of the earthquake asks the Seismic Field to serve as the rescue center and energy providing sources of the nearby community in New York City. Though some parts of it may collapse, the batteries in the Battery Tower can be taken of for use, letting the visitors to be bot providers and consumers of energy supplied by cir own.

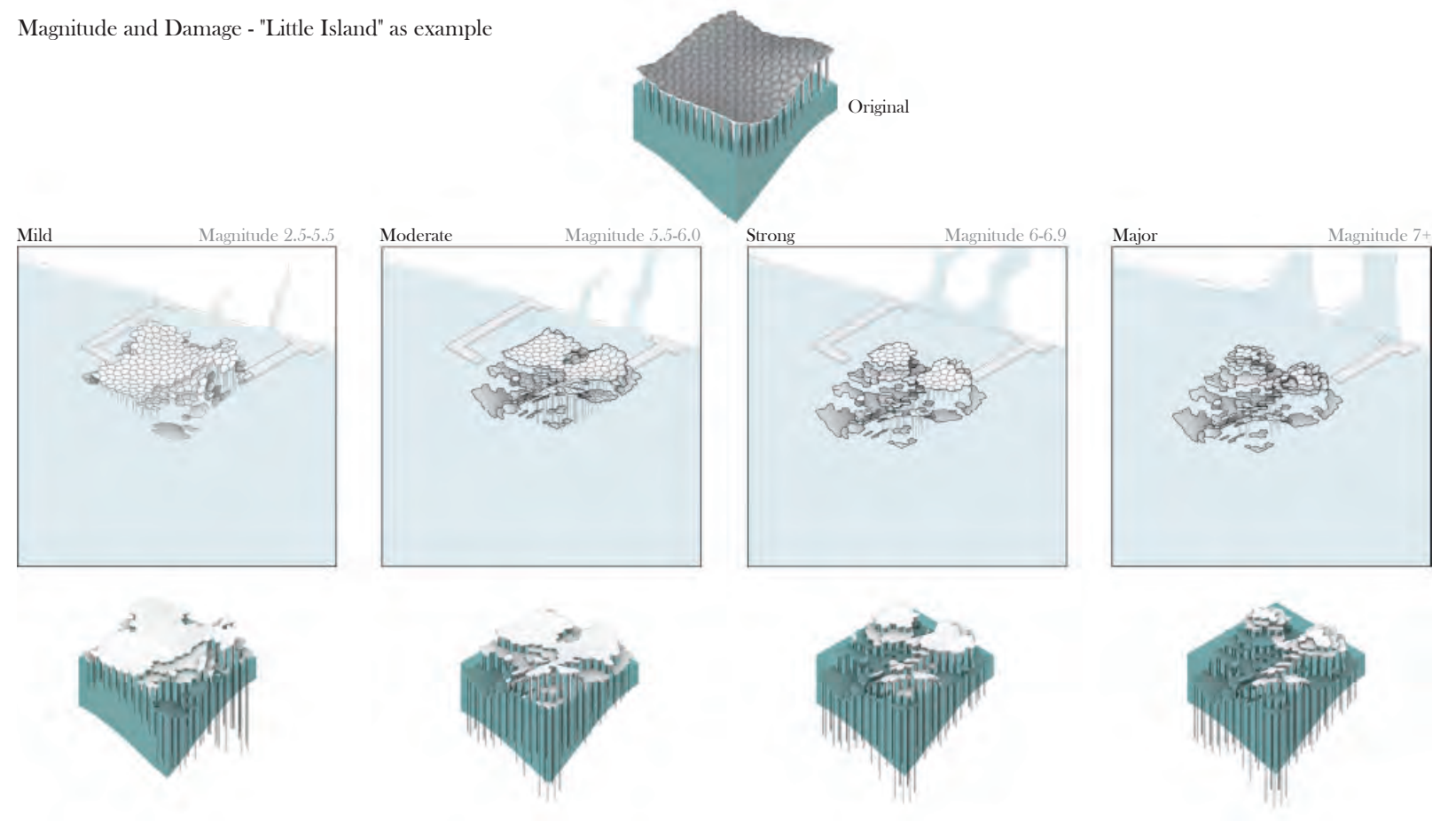
B-B' Section



Materiality



Magnitude and Damage - "Little Island" as example



The Earth Institute (LA)

Site of Berggruen Institute - Los Angeles

A place of experimentation for eco-social issues in LA
2022



Co-operators: Haozhen Yang with
Richard Sa

Instructor: Galia Solomonoff, Tung Dinh Nguyen

The new Earth Institute building on the hills of Los Angeles is an active campus that brings together multiple disciplines in one place. Taking advantage of the local environment and its proximity to downtown Los Angeles, this think tank is also a place of experimentation for scientists to research issues of air quality, wildfires, and drought in California.

This institution is a place for scientists and students to develop new technologies to capture CO2 emissions, reduce the use of fossil fuels in power generation, transportation and industrial processes. This is a place to develop change in every aspect of modern life from manufacturing, agriculture, and transportation. Discussions about change in every aspect of the economy would require multiple users from scientists, students, economists, and policy makers.

Our proposal introduces multiple circulation routes for these multiple users. As a place of experimentation spaces are flexible and programs overlap both visually and spatially.



Interior Perspective - Main Institute

Main Institute, as the entrance of the Think Tank, introduces different kinds of users to different paths. People may stay on the first floor and go to the lobby and service area, go down into the ground floor greenhouse or go up to either the second floor of the greenhouse, or the service area including cafeteria and meeting rooms. Visitors, scholars and CU person may have abundant ways of communication here.

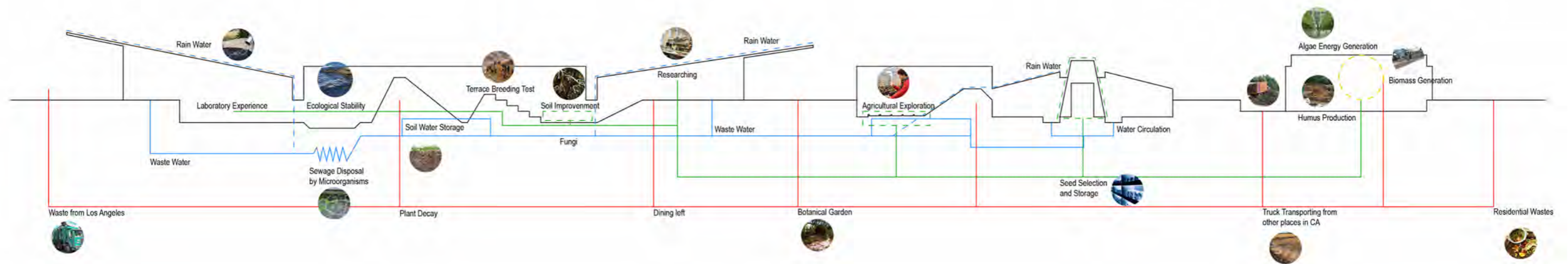


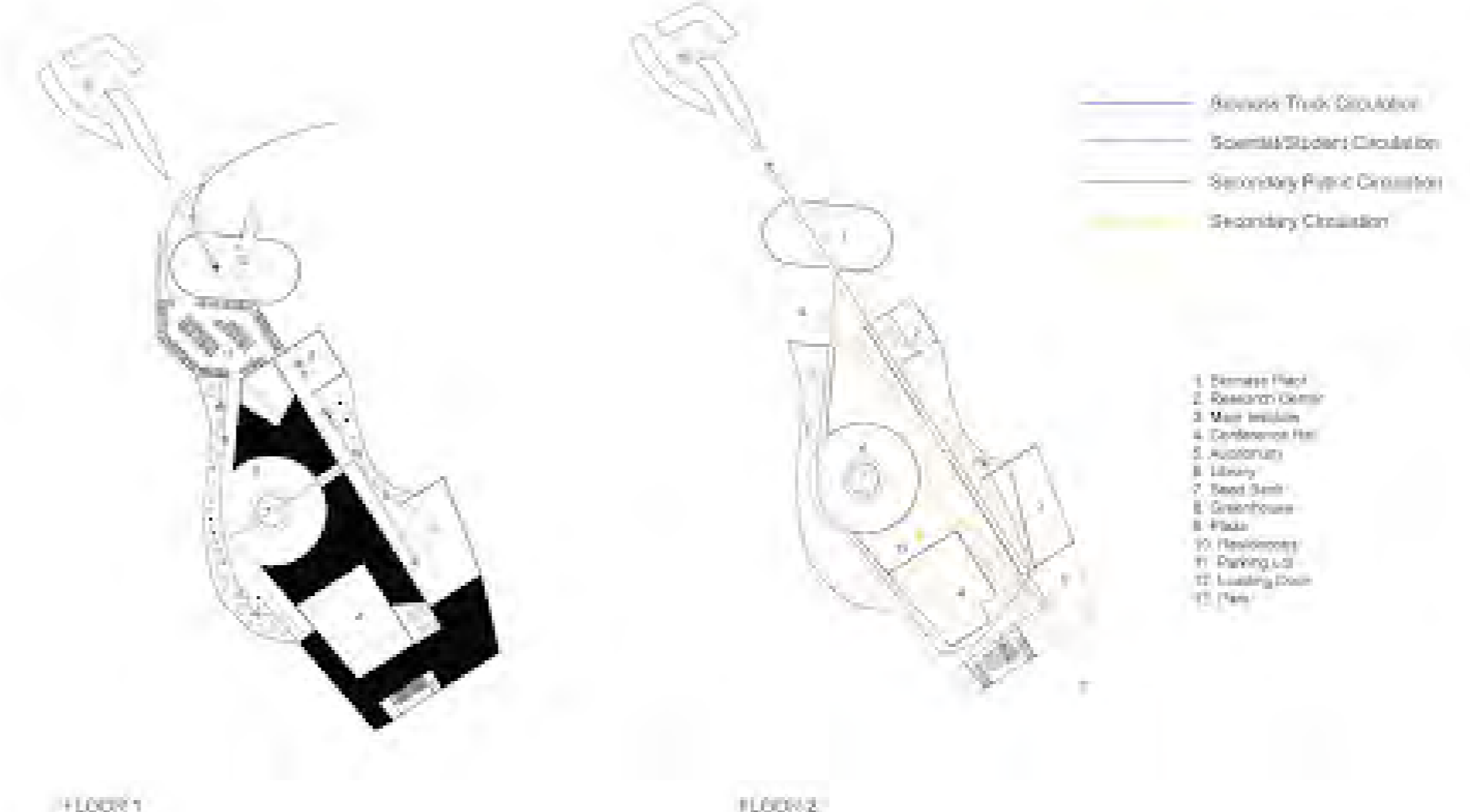
Diagram of Water, Biomass and Plants

The whole think tank creates circulations of water, plants and biomass. The slope roofs of the Main Institute and the Research Center collect rain water, the fillings and landscape areas in the greenhouses and library store them. Also, a mimic of wetland do the job of drainage disposal. Biomasses are either transported from outside (LA and nearby CA zones), or from the dead plants produced by the greenhouse and laboratories, and they are made into fuels or humus soil for the improvement of LA urban agriculture. Algae energy production add to the cycle in producing glucose to speed up the fermentation of biomass, and the seeds collected, stored by the seed bank can be used for agricultural cultivation and eco-revitalization.



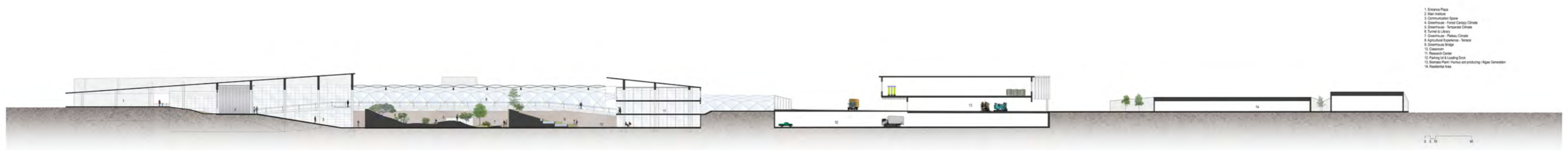
Biomass Sources

Biomasses are also brought from other places in CA, including agricultural and urban wastes. They come from Kern County and Chino, so that the transportation of biomass do not cost too much energy.



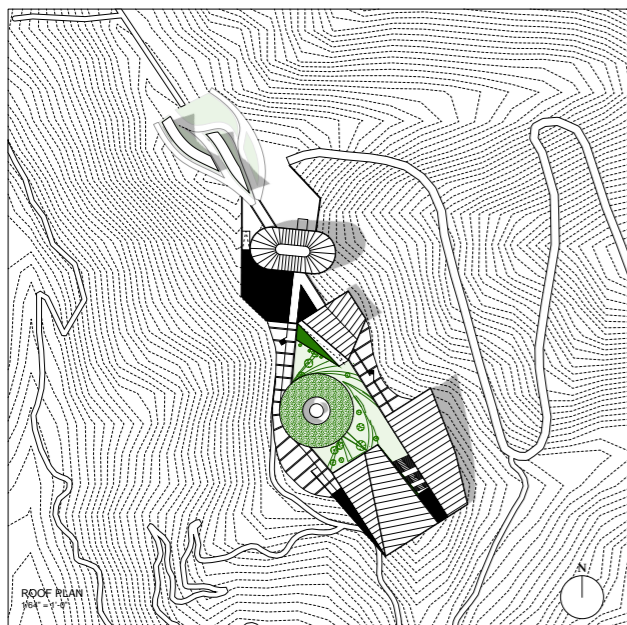
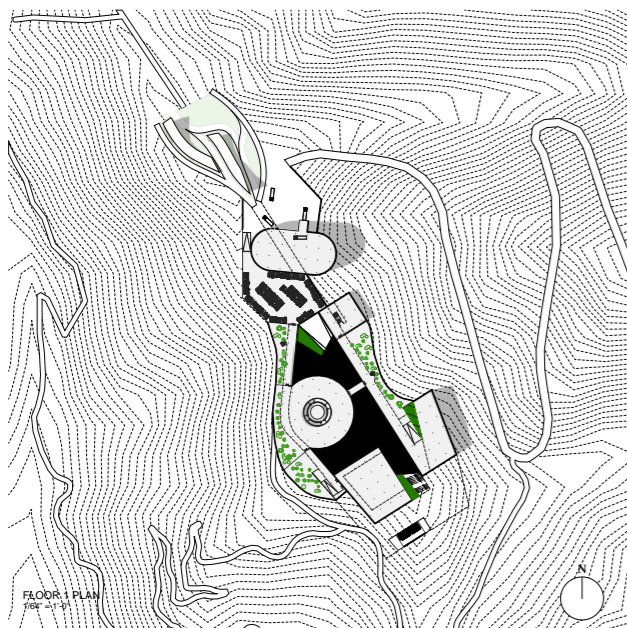
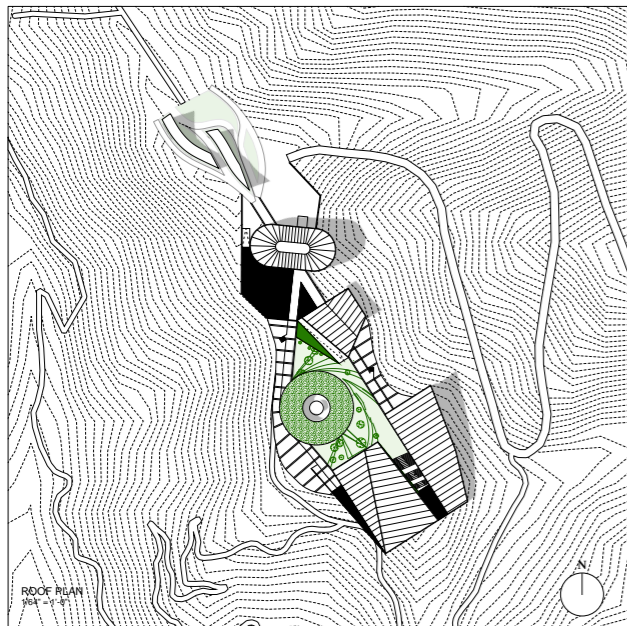
Circulations

People and vehicles are arranged in different routes in the think tank to minimize conflict between academic, visiting and production functions. Also, two levels of each circulation are divided, leading people and vehicles to a more regulated way of using this think tank park. Cars driven by the scholars and transportation trucks for biomass are divided, while visitors and researchers are led to different paths to make a communication mode of only eye contact, but no physical influence.



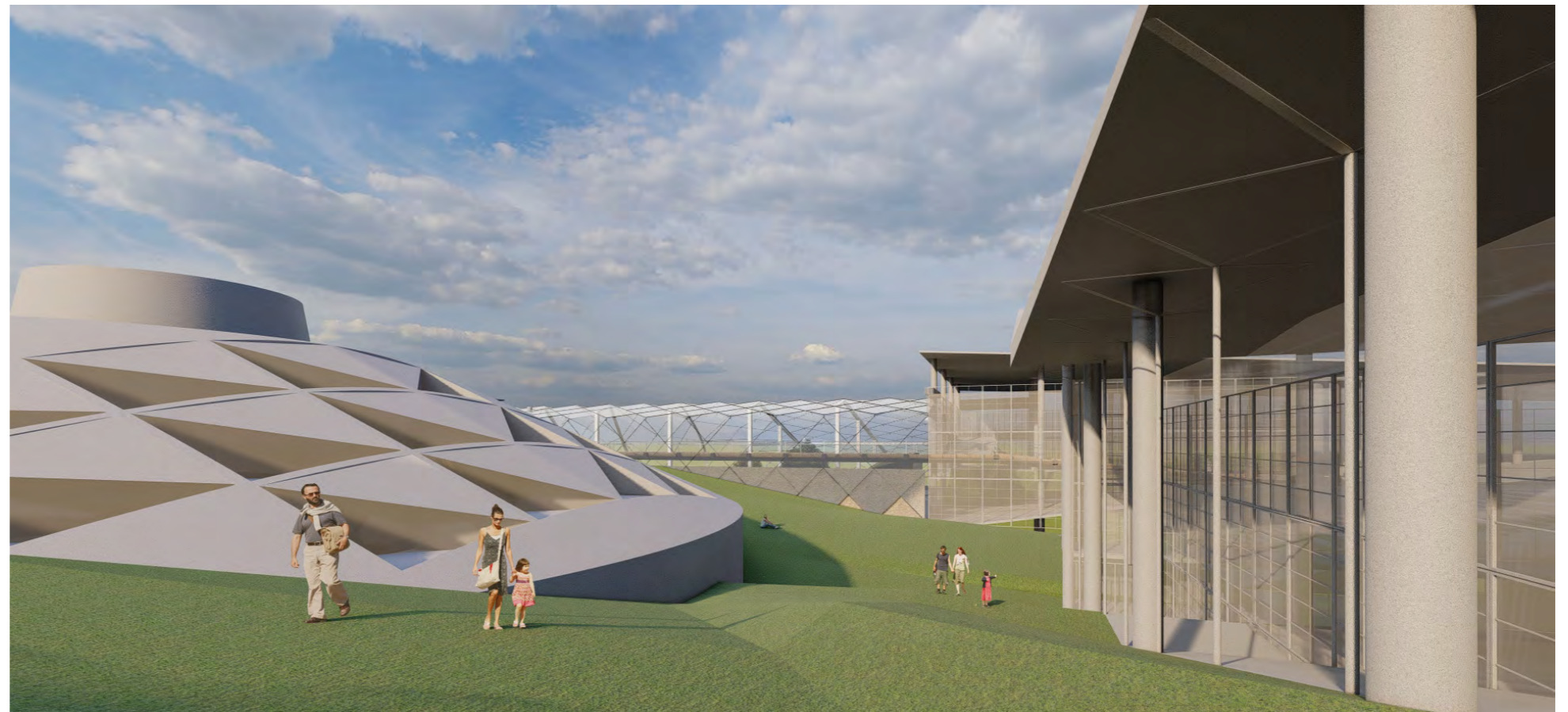
Longitudinal Section South - North

The South - North axis of the think tank park combines the zones of researching, visiting, energy production and residence together. From public to private, and also shows the spatial sequence of two levels of landscape - the outdoor and the indoor. People may feel that they are inside of the greenhouse, but they can go within the manmade landscapes, or people may stay outside in the filling landscapes, but they are actually in a courtyard surrounded by buildings.



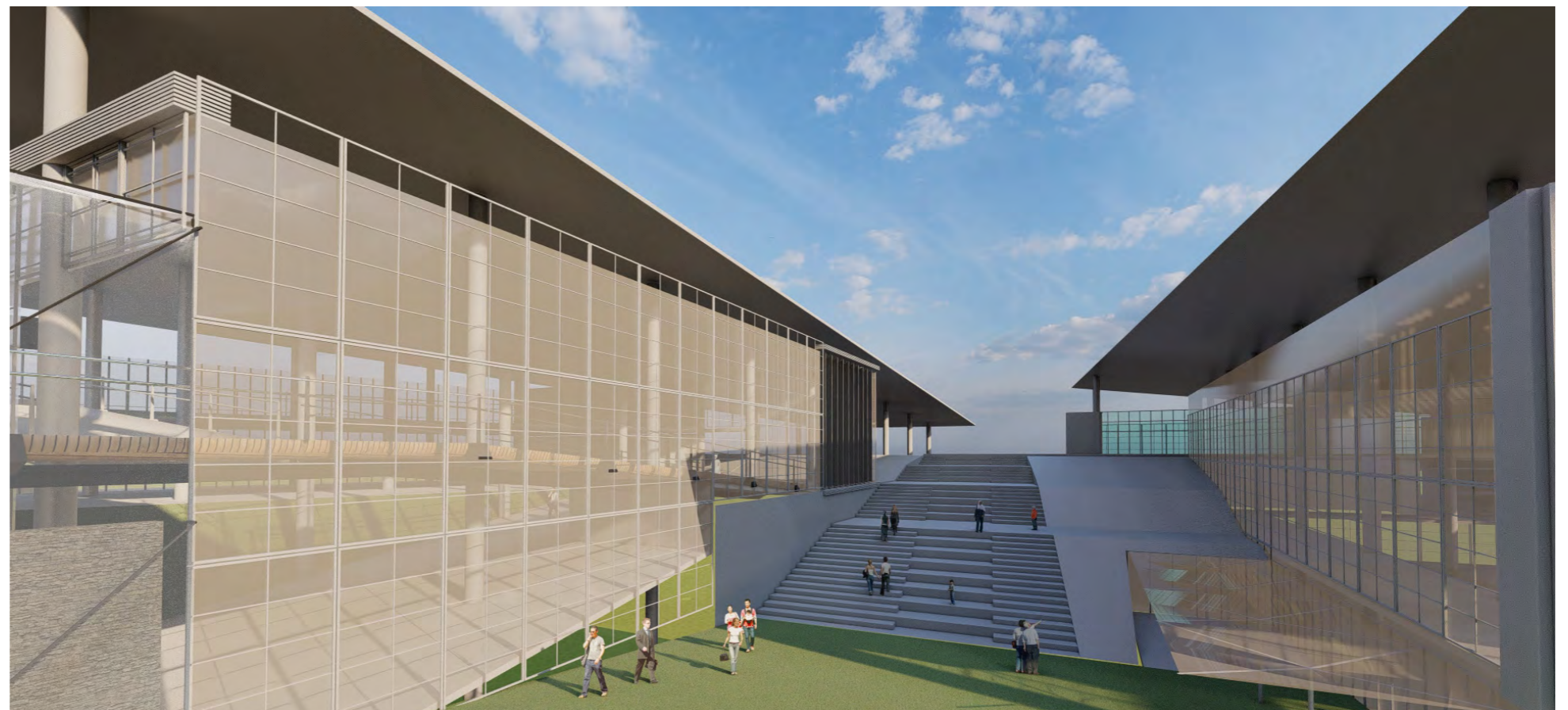
Plans

The plans show the main circulation loop and the secondary routes in the think tank park.



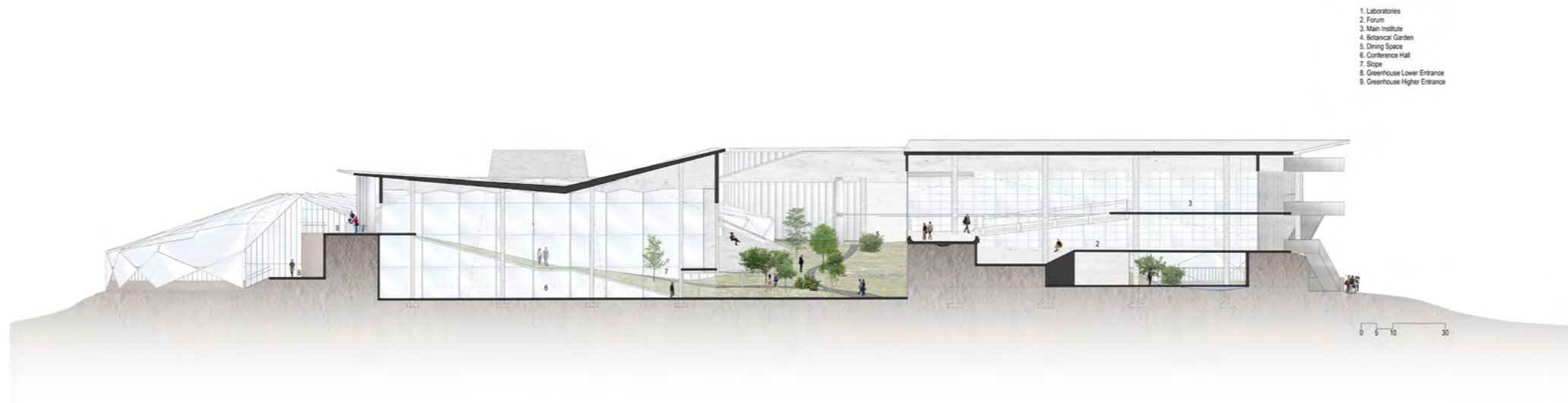
Exterior View - Filling Landscape

The filling landscape used the soil cut by the buildings around, creating a courtyard botanical garden, and a public area. Also, it can be used as shortcuts between the buildings in western and eastern side to narrow the gap created by the loop. Below it, there is also a tunnel.



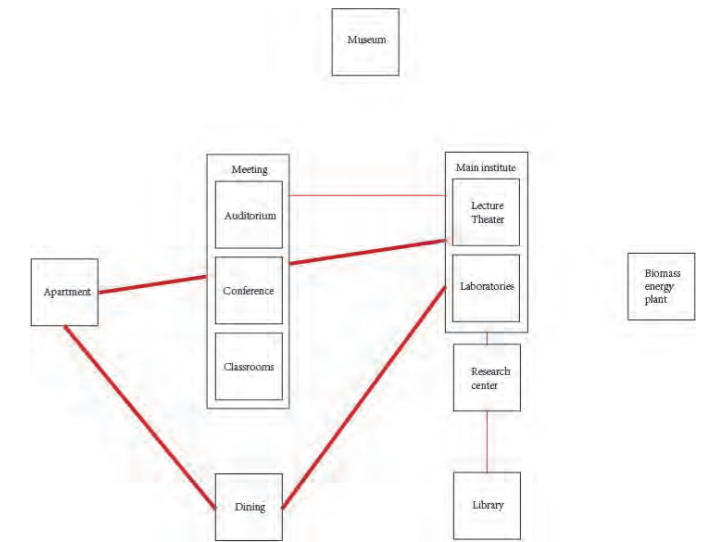
Exterior View - Entrance Stair

The entrance stair is from the plaza to the courtyard, and also the conference hall. Below it is the administrative office of the whole think tank park.

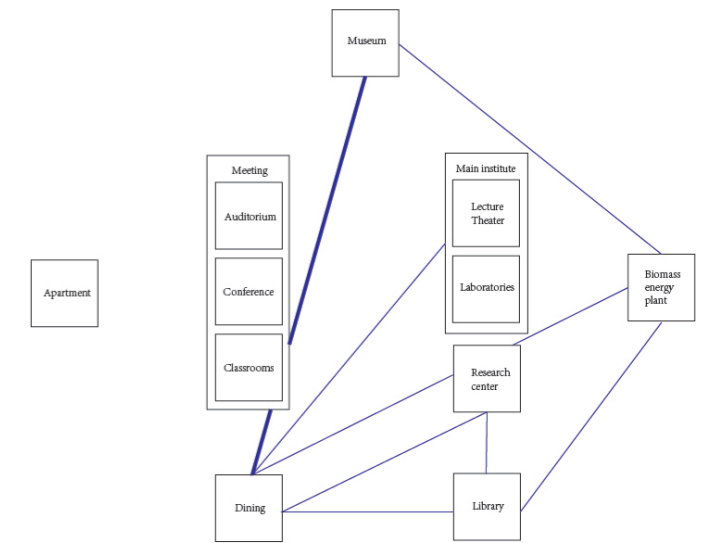


Transverse Section West - East 1

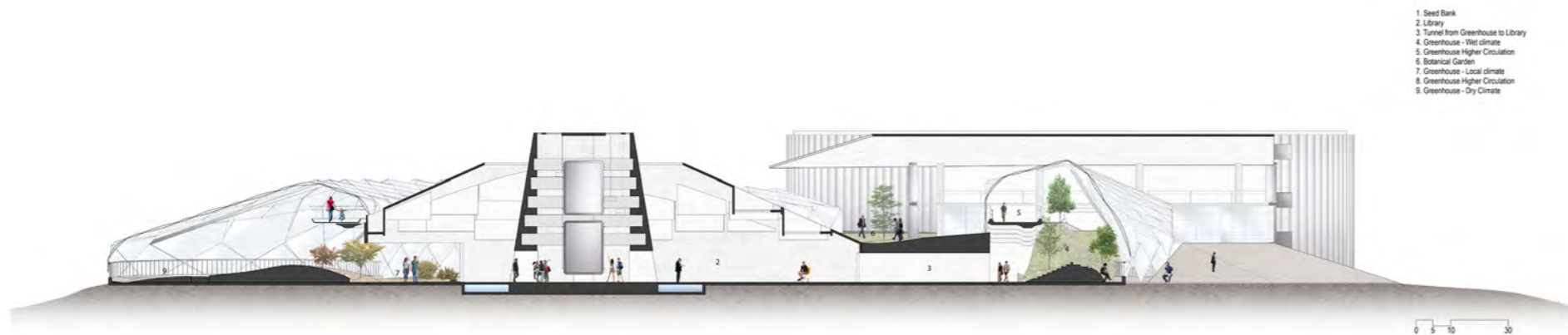
This section cuts through the walkway, the conference hall, the landscape area, the main institute, the laboratory and the outdoor stairs from west two east. The most public zones are arranged together to minimize the transportation distance of scholars, visitors and CU persons. This is the most dense place of buildings.



CU teachers and students
Coming five days per week

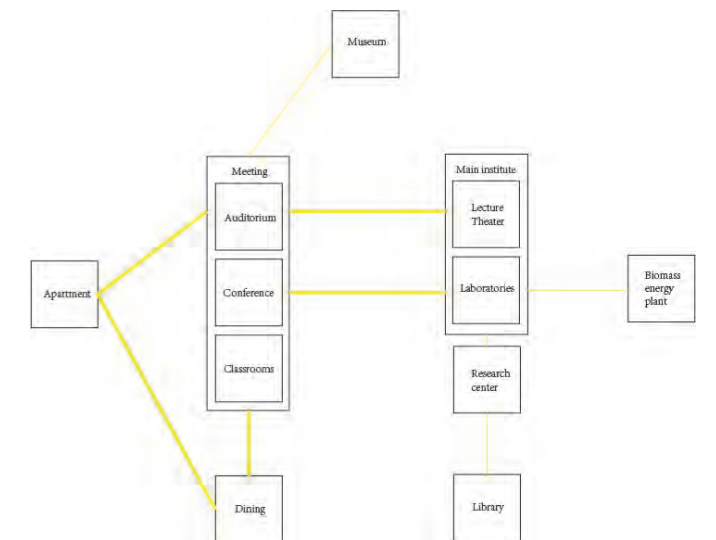


Public Visitors
Coming on weekend afternoon

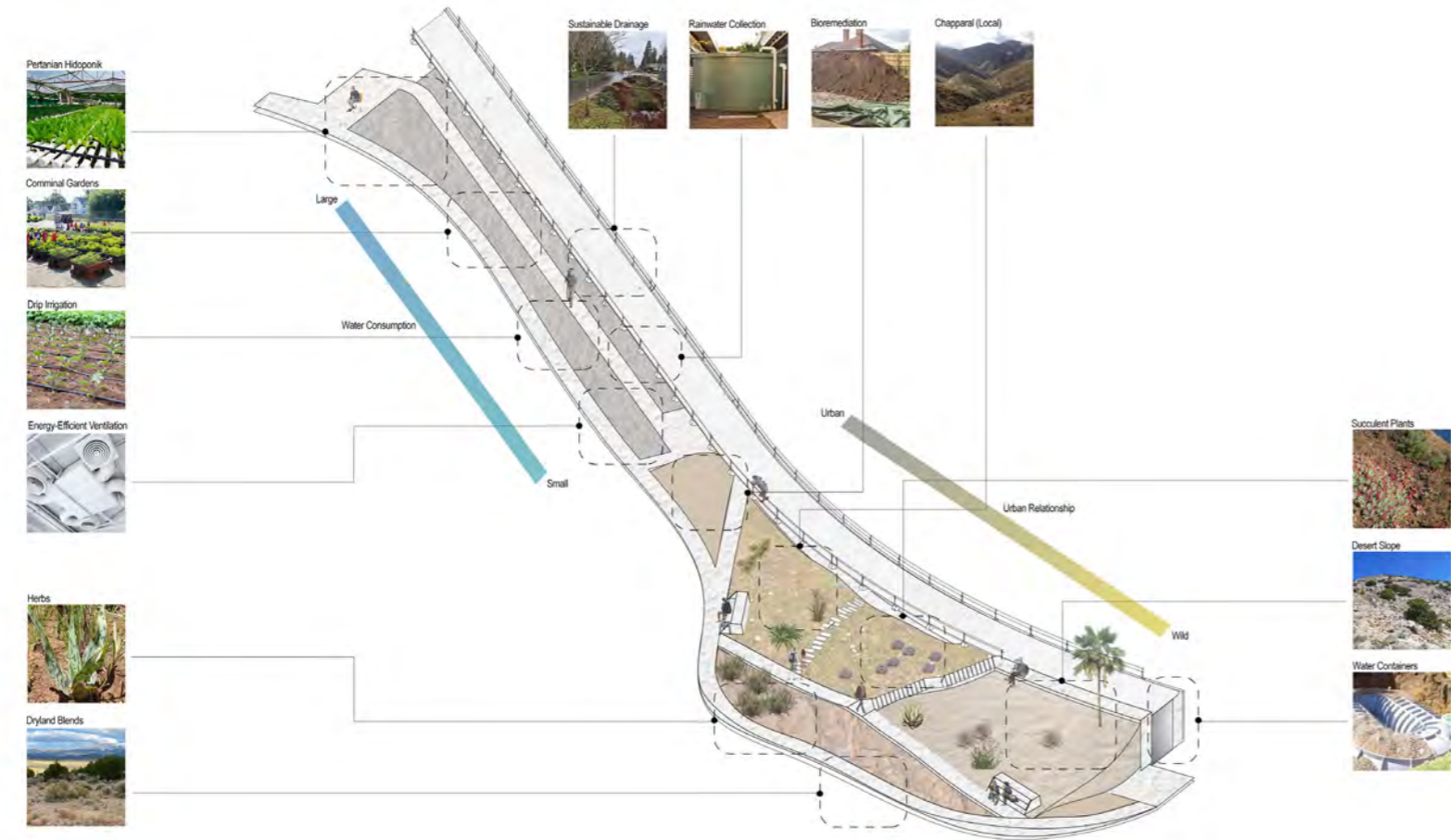
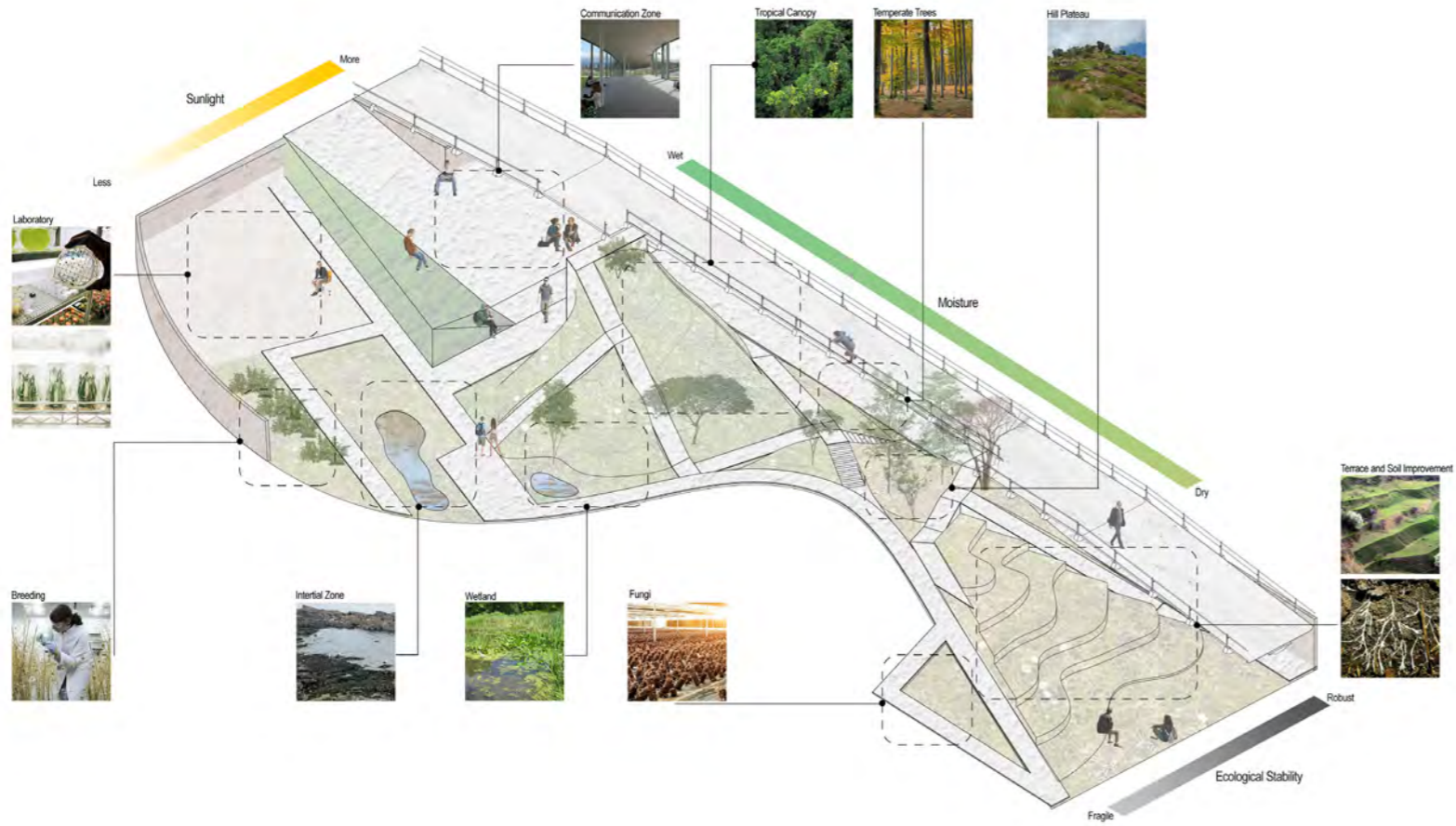


Transverse Section West - East 2

This section cuts through the west greenhouse (dry), the library, the seed bank, the linking tunnel, the east greenhouse (wet) and the entrance slope of the research center. This section shows the more academic places in the think tank, and it's way of solving eco - social issues of L.A. the circulation of plants, biomass and water can also be seen in this section, showing the will of making it a net-zero think tank.



Think Tank Scholars
Coming two weeks per year



Microclimates and Functions in Greenhouses

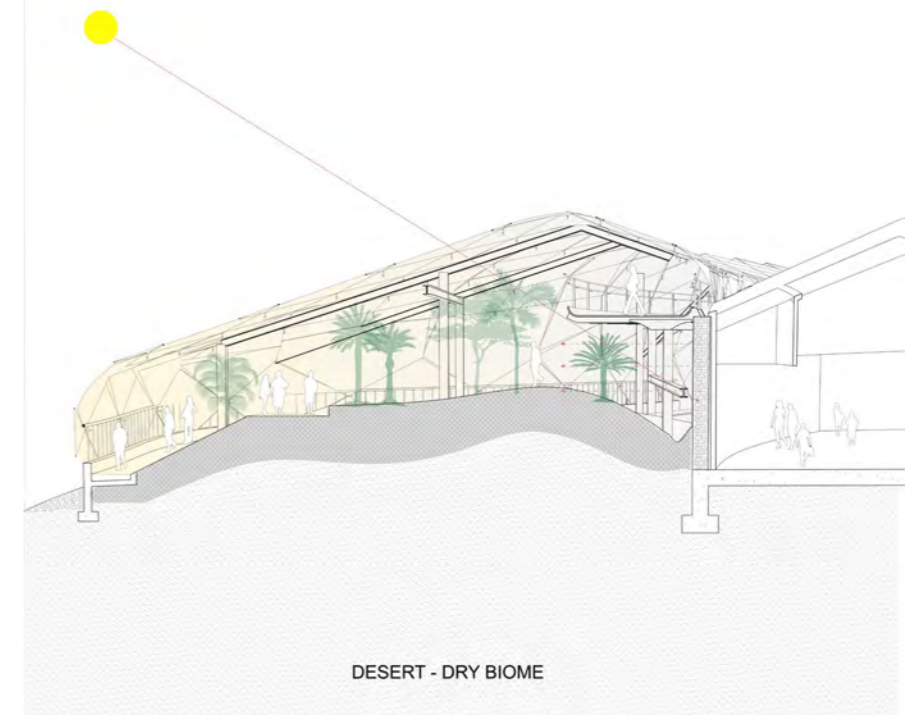
Different microclimates and functions are arranged according to wet and dry in the eastern and western part of the greenhouses. In eastern greenhouse, sunlight, moisture and ecology stability are also taken into consideration to figure out the layout of the greenhouse. Experiments, ecosystem preservation and agricultural teaching zones are arranged. In western greenhouse, local climate are located between urban agricultural testing field and the "desert", making efforts to ensure that the solutions given by the think tank are affirmative.



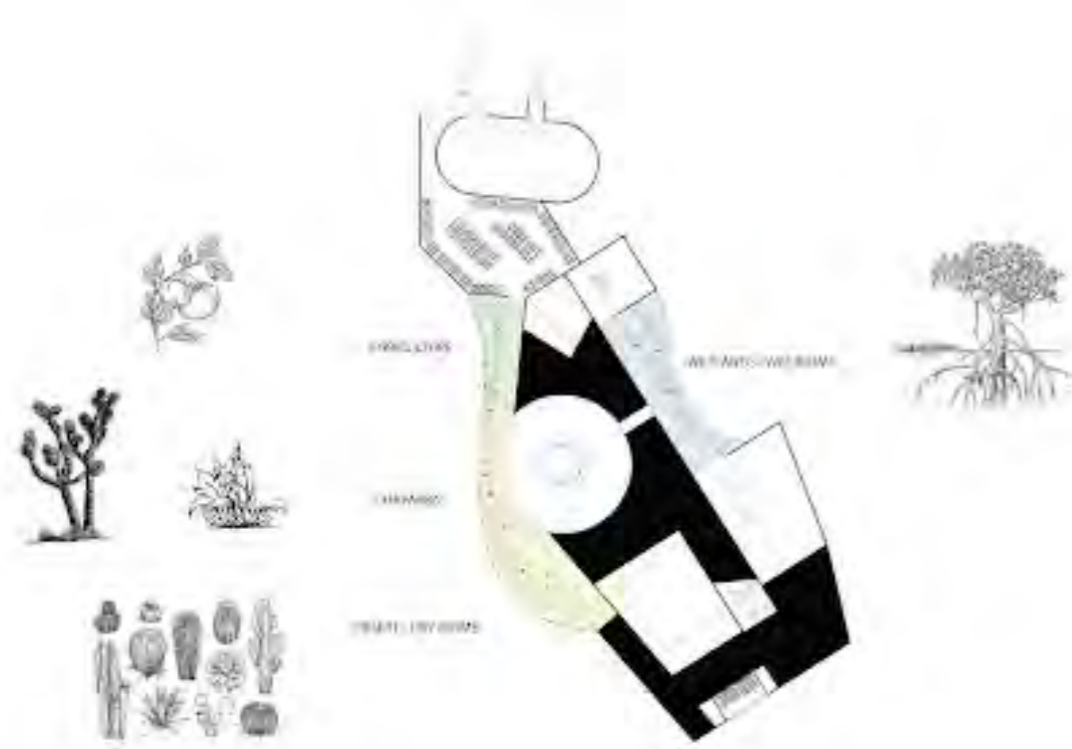
WETLAND - WET BIOME



AGRICULTURE



DESERT - DRY BIOME



Climate Sectors



Interior View - Library and Seed Bank

The library and the seed bank are located in the center part of the think tank. They are not only the center of material circulation, but also a place where visitors can meet with the scholars. Also, the seed bank is a way of future ecosystem preservation and re-vitalization, since it stores seeds of plants in danger and seeds selected by researchers that are suitable for future urban agriculture.



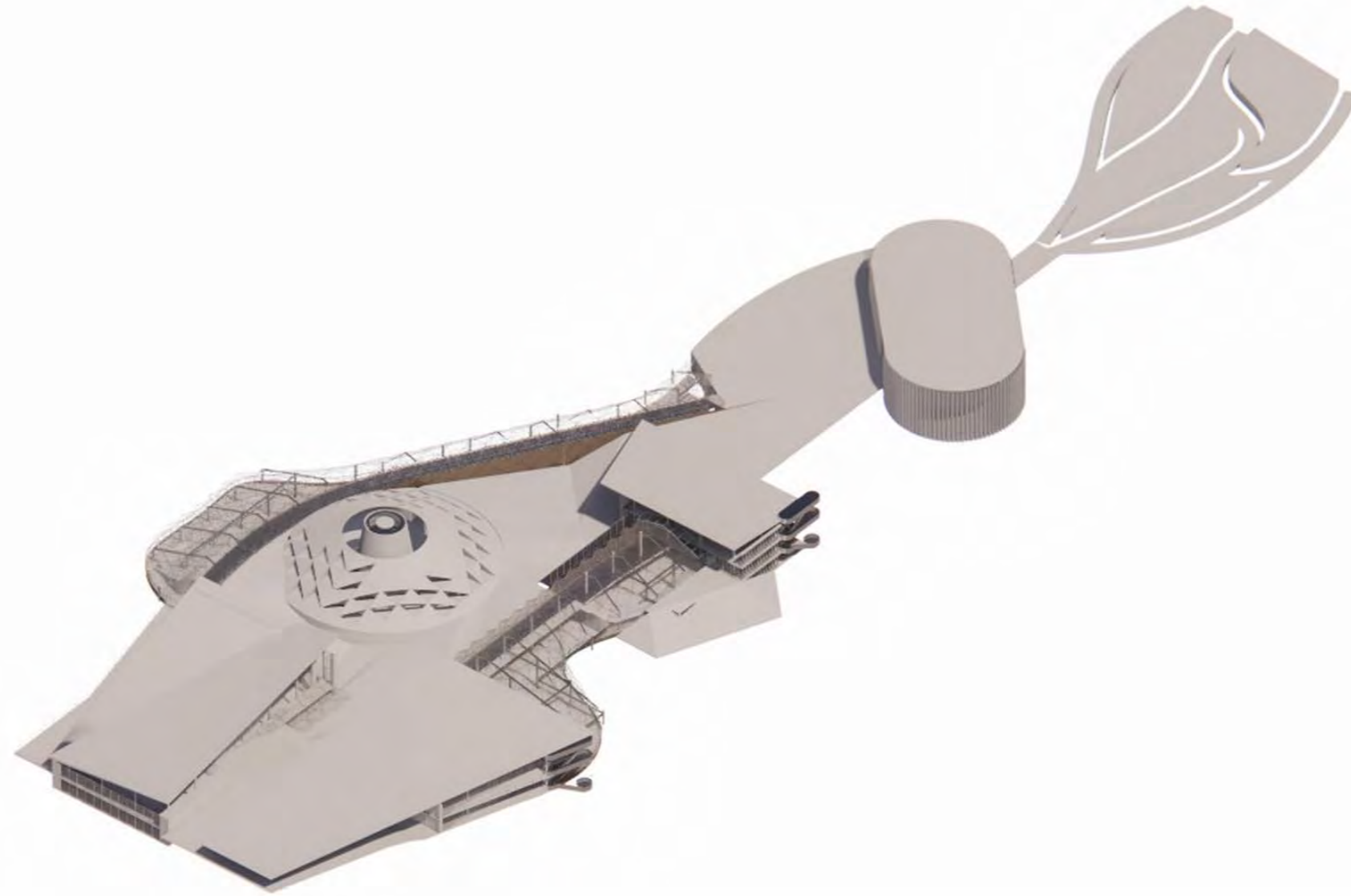
Model Photos of Greenhouse (East) and Research Center

Physical model of the east greenhouse and the research center is made to show the interior landscape, circulation routes, indoor - outdoor relationship and the ETFE roof material of the greenhouse. The inflation of ETFE pillows can be controlled according to daylight, and air flow inside of the buildings can thus be controlled. The site model shows the shapes of the buildings and their relationship with the mountain ridge landscape.



Interior View - Greenhouse (East) and Visitor Path

The greenhouses are divided by two layers of circulation paths, one for the researchers and one for the visitors. Visitors can look down from the bridge, knowing the work of scholars and CU person, without interfering them. Also, the bridge helps control the sunlight intake together with the ETFE roof material.



Updated May 2022

US: +1 646 255 9314
hy2715@columbia.edu
CN: +86 177 2139 3647
shsindex76@163.com