

# Dynamic Capacities;

Re-envisioning Dam Infrastructure for Water Management Strategy in Tokyo Metropolitan Region

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DECENTRALIZED  
rather than CENTRALIZED
- 

SOFT & POROUS  
rather than HARD
- 

MATERIAL FLOW  
rather than STAGNANT
- 

DYNAMIC INTERFACE  
rather than CLEAR-CUT

Even over 60 years of constructing dams, Tokyo is not ready for another 1/200 storm event.

In order to prevent 2.3 million people to be affected, \$400 billion of economic loss,

We need more DAMS

However, facing population decrease, aging society, it is not the time to envision a mega-infrastructure as water management strategy

Here I propose a decentralized system of holding water, at low-flat lands, maximizing ecological functions and incorporating urban activities.

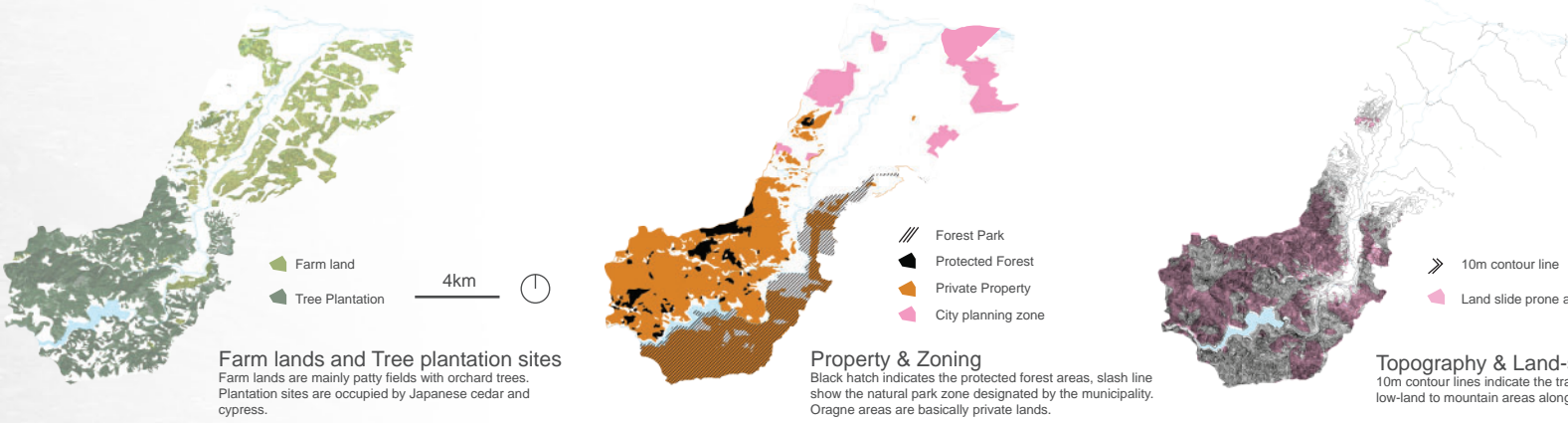


## SYSTEM DESIGN

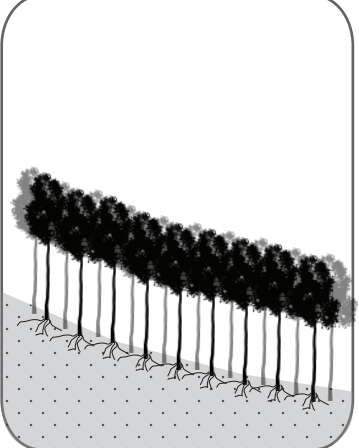
220,000 cubic meter of sediment accumulation occurs at dam site reservoir every year. By harvesting and shipping the sediment will become the base for hydro-infra-structure.

15.3 square kilo-meter of tree plantation in 5 km diameter (78%) from dam site. Cedar and Cypress timber will be the material for wooden infrastructure.

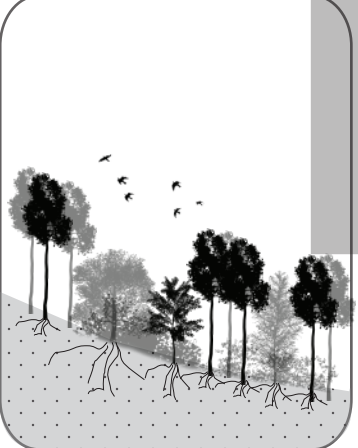
Rehabilitating the pre-tree-plantation site  
= Reduces the sediment load to reservoir  
= Extending the life-span of existing dams



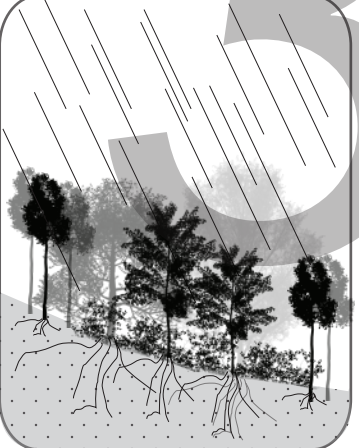
**Tree Plantation Sites**  
Unmaintained plantation sites are occupied by over-populated trees, causing erosion and poor bio-diversity.



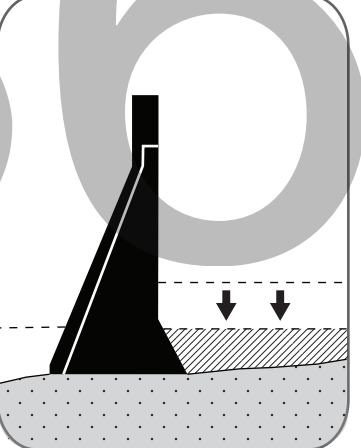
**Periodical Logging**  
Plantation trees are cut down from the site, and this process will generate natural succession to Jaku's place.



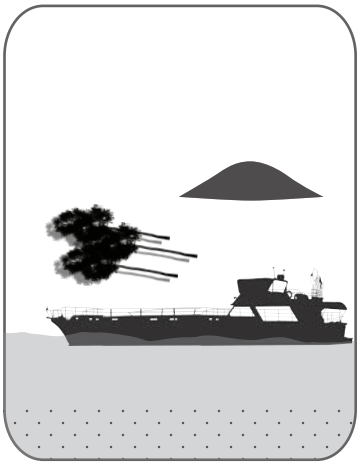
**Resilient to Land Slides**  
Multi-layered healthy eco-system will eventually help to improve the slope from erosion at heavy rain events.



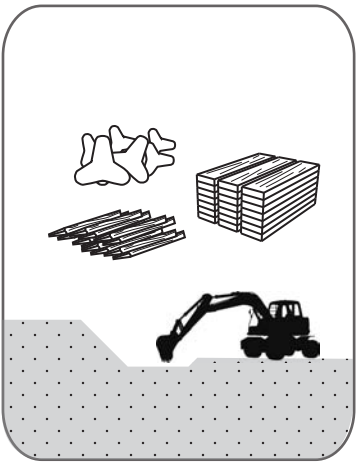
**Reduce Sediment at Dams**  
Improvement of forest will reduce risk of land slides, thus reduce the sediment accumulation at dam reservoirs.



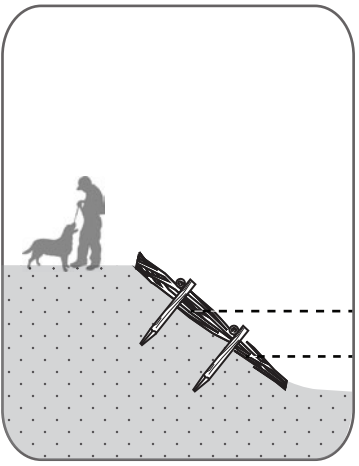
**Sediment & Timber**  
Sediments and timber are transported to the low-land, using the flow of river.



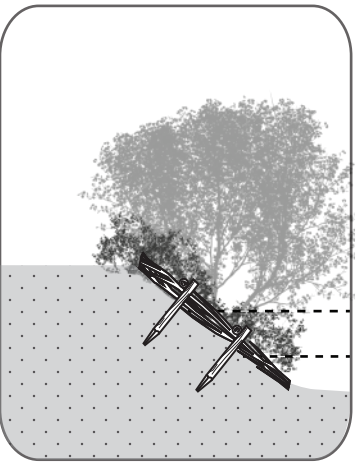
**Material Processing**  
Sediments are processed to concrete, timber are cut into pieces to be part of the hydro- infrastructure along the river.



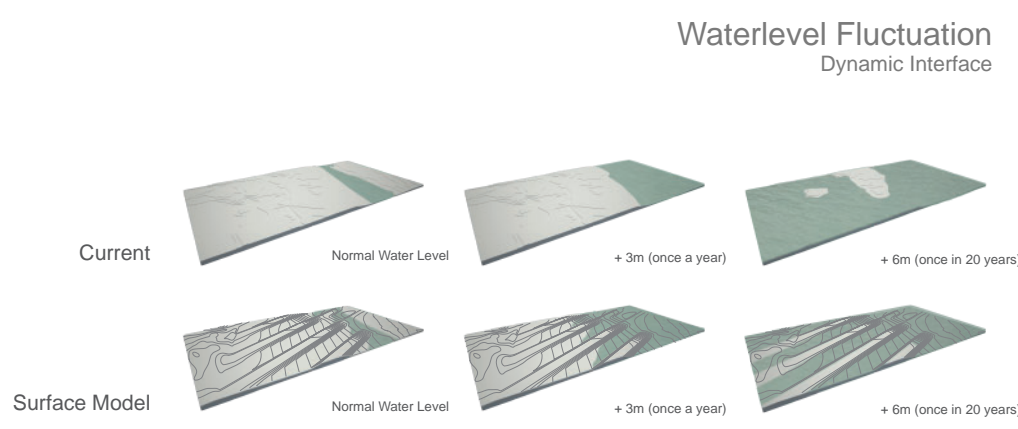
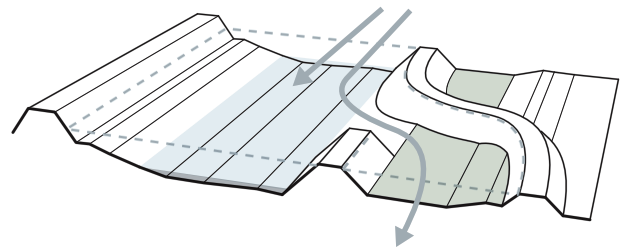
**Implementing to the Site**  
Base materials are placed along the river to host unique riparian conditions for urban dwellers and diverse habitat.



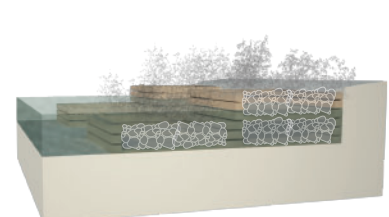
**Succession & Resiliency**  
Soft materials allow natural succession to take place along the river. Vegetation will be part of the infrastructure.



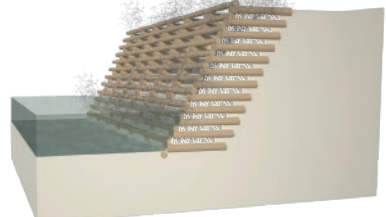
**INTERCEPT...**  
Discontinuous banks are placed along the river with an angle to the river flow, allowing water to enter the gaps in case of high water levels. In this way, water and sediments will be intercepted, increasing storage capacity.



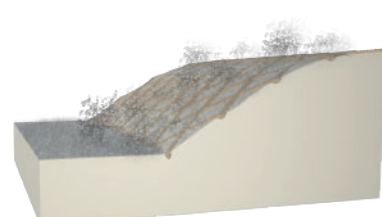
Technology; Japanese Traditional Timber Hydro-Infrastructure  
Module + Porous



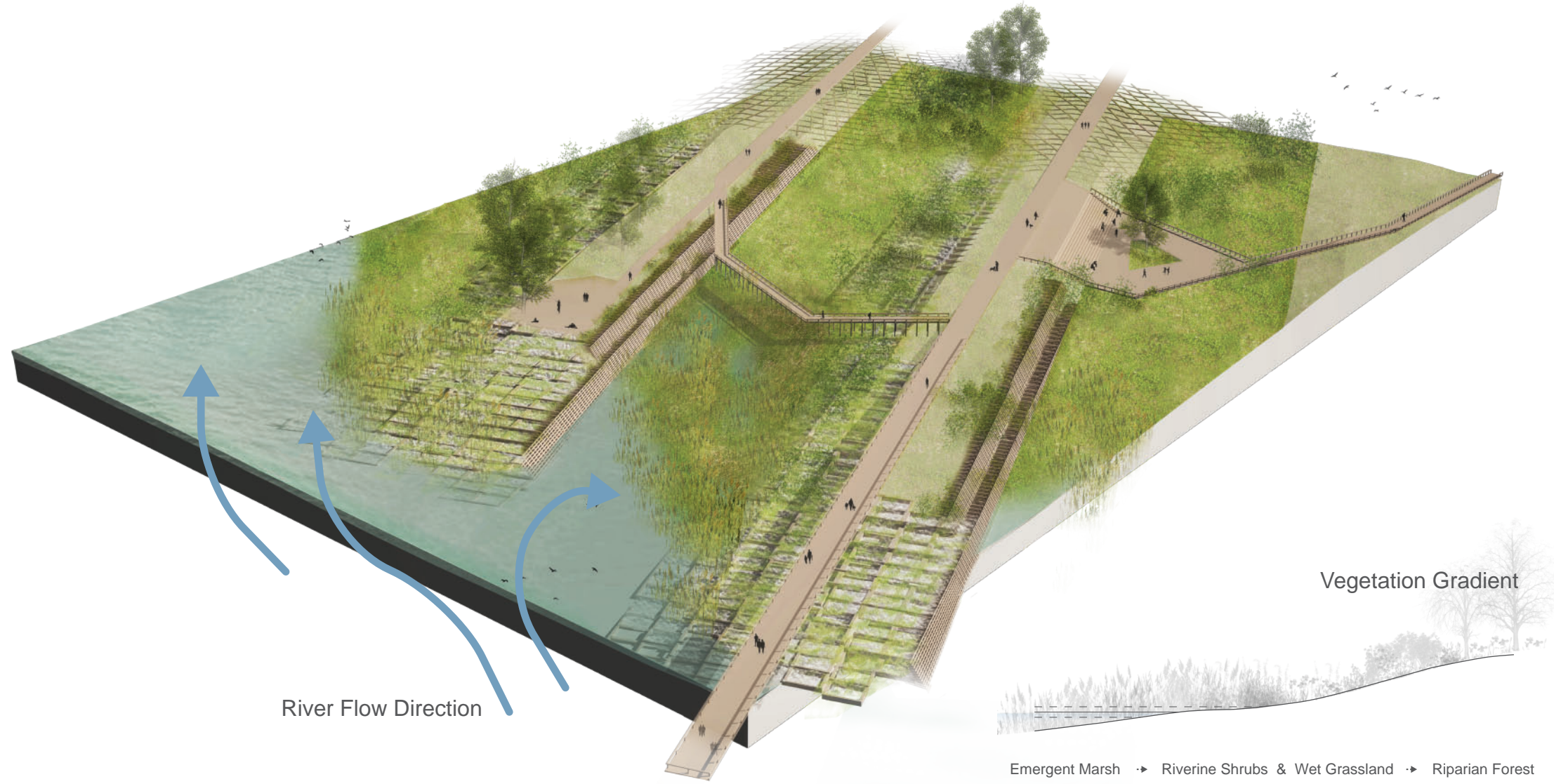
Wooden Riverbed with Rocks



Wooden Structure Stacked in a Rack



Wooden Frame for Slope



River Flow Direction

Vegetation Gradient

Emergent Marsh → Riverine Shrubs & Wet Grassland → Riparian Forest

Common Reed  
*Phragmites australis*  
Manchurian Wild Rice  
*Zizania latifolia*

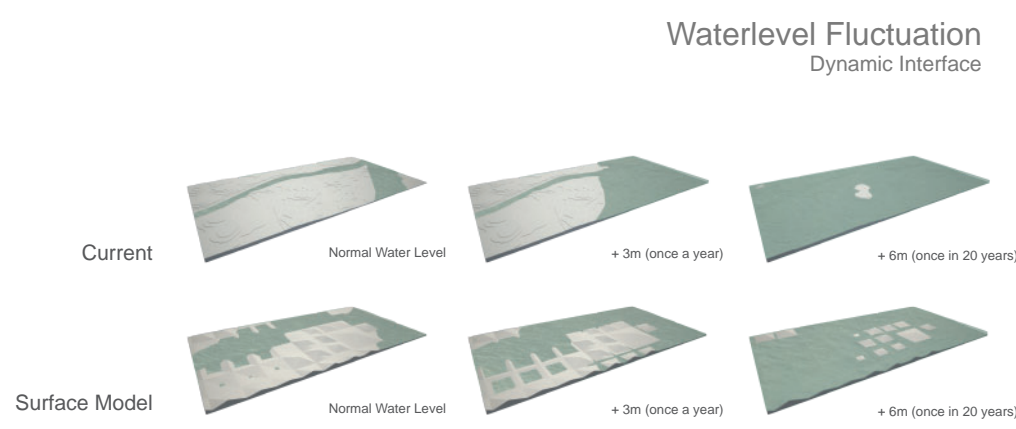
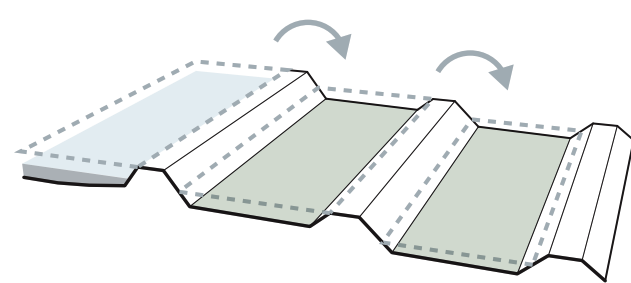
Snake's Tongue  
*Ophioglossum namagatae*  
Violet  
*Violet redodens*

Tall Viburnum  
*Viburnum sadii*  
Japanese Green Grass  
*Microstichus sinensis*

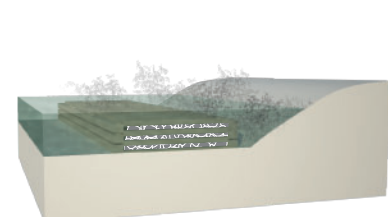
Japanese oak  
*Quercus crispula*  
Quercus Oak  
*Quercus acutissima*

**PURIFY...**

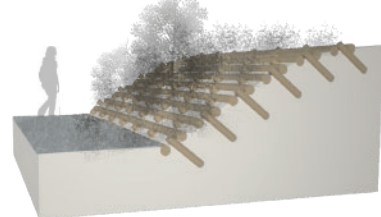
Series of retention basins will serve as storing as well as purifying water. Excessive nutrients (N & P) from farmlands will be absorbed by aquatic vegetation, and toxic substances will be filtered by charcoal.



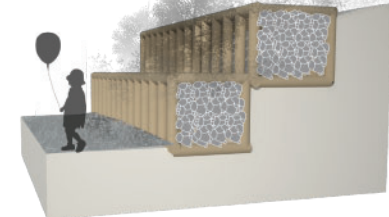
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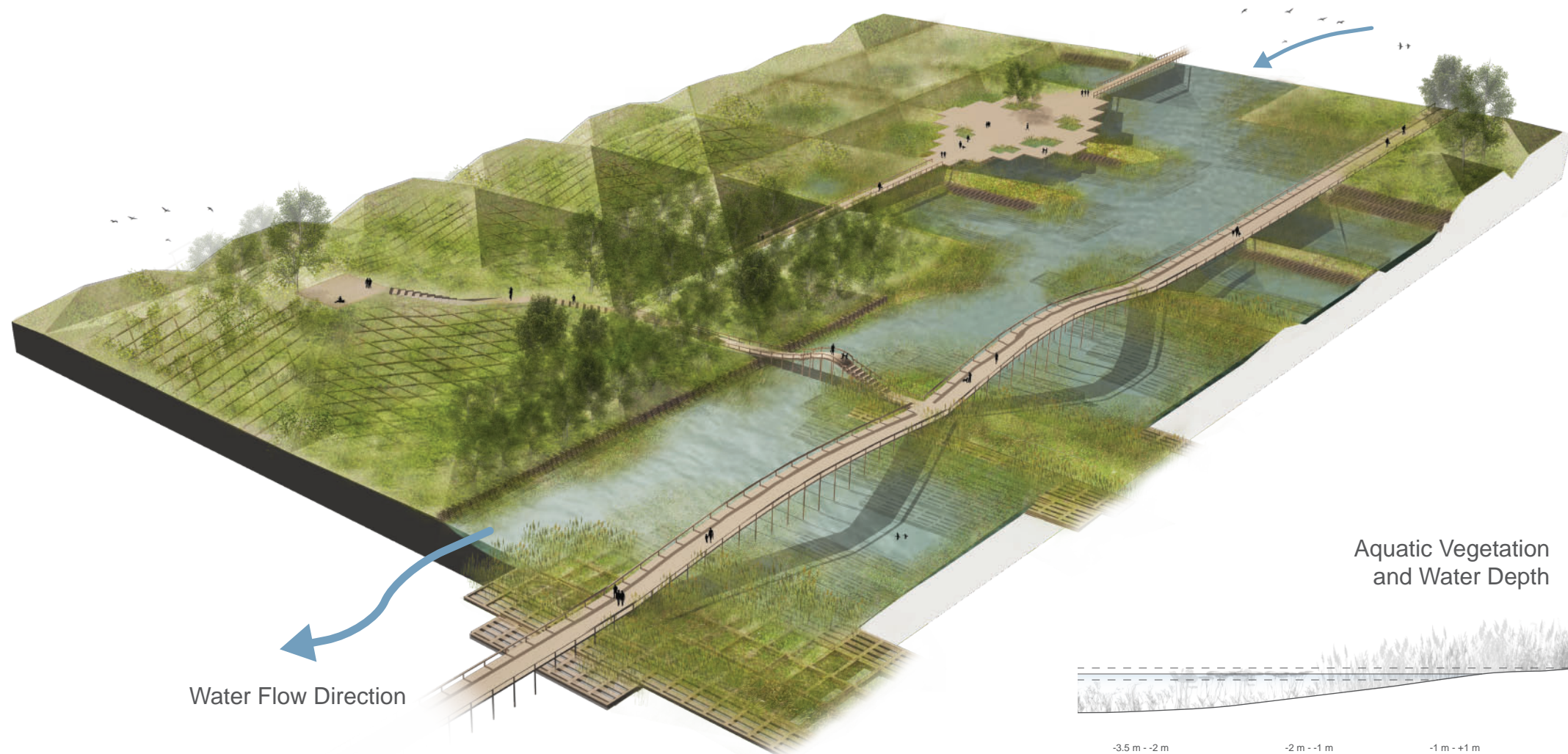
Charcoal for Water Purification



Grid-like Trunk Stakes



Wooden Frame as Retaining Wall



Water Flow Direction

Aquatic Vegetation and Water Depth

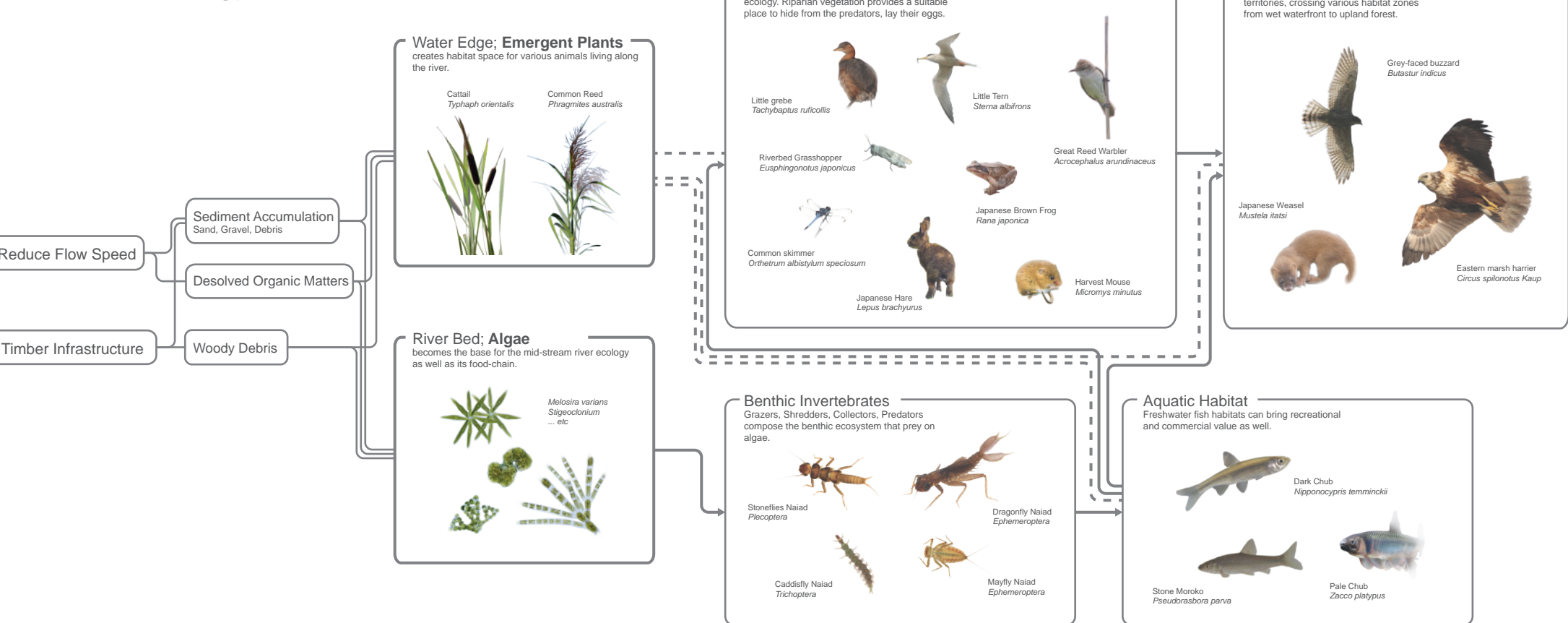
3.5 m ~ 2 m  
Submerged Plants → Floating Plants → Emergent Marsh

Elodea  
*Valisneria spiralis*  
*Hydrilla*  
*Hydrilla verticillata*

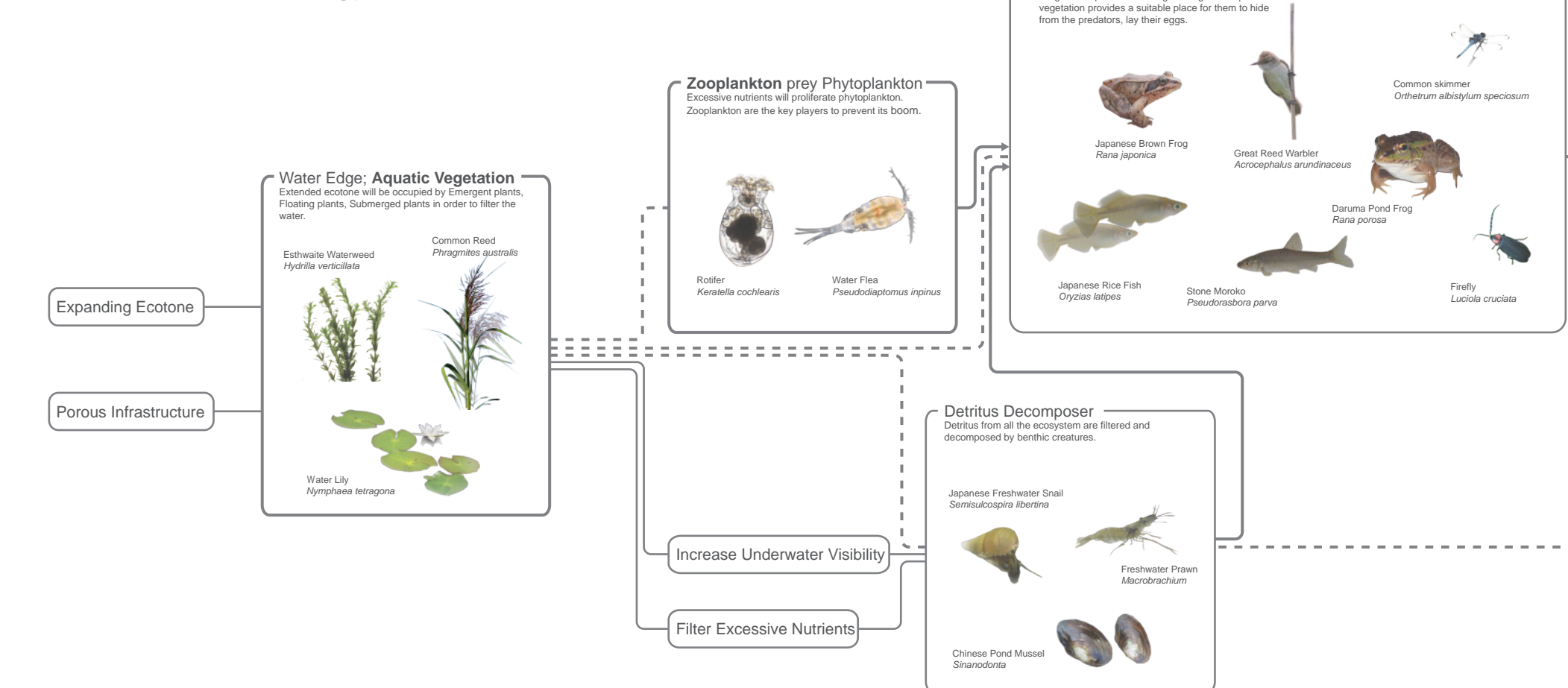
Water caltrop  
*Potamogeton*  
Papyrus  
*Phragmites australis*  
Nymphaea  
*Nymphaea longifolia*

Common Reed  
*Phragmites australis*  
Manchurian Wild Rice  
*Zizania latifolia*

## Raparian Ecology

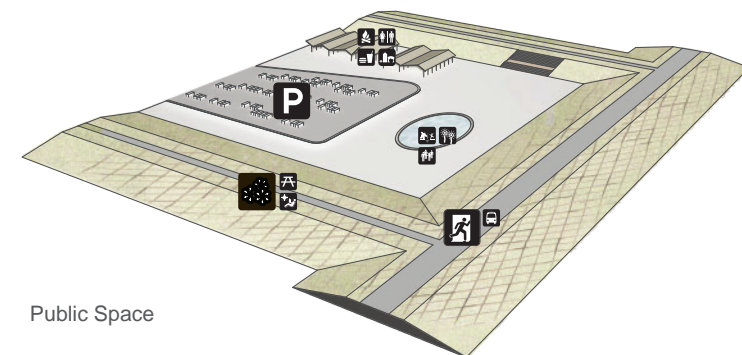
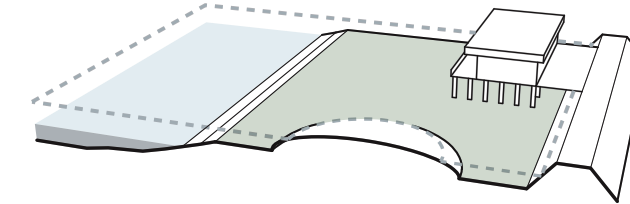


## Wetland & Pond Ecology

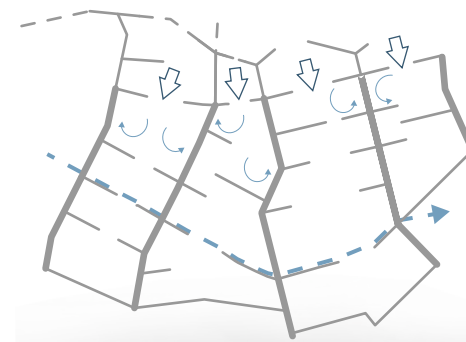


**STORE...**

By strategically locating high grounds / infrastructures, flood resilient urban model can be envisioned by integrating flood-plain as part of urban fabric.

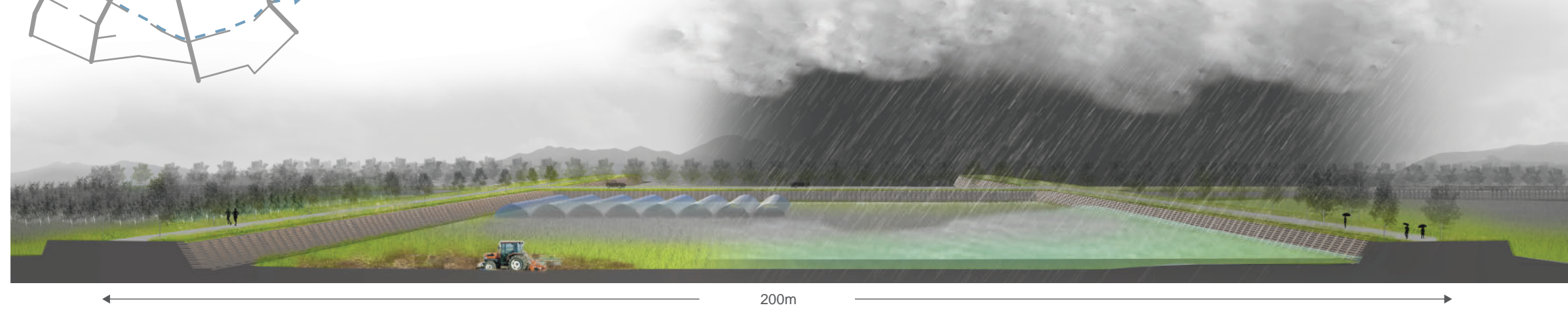


Public Space



### Scenario 1; Relocation

Relocation strategy is to restrict the area from any development. Main components are primary and secondary dikes with agricultural landuse

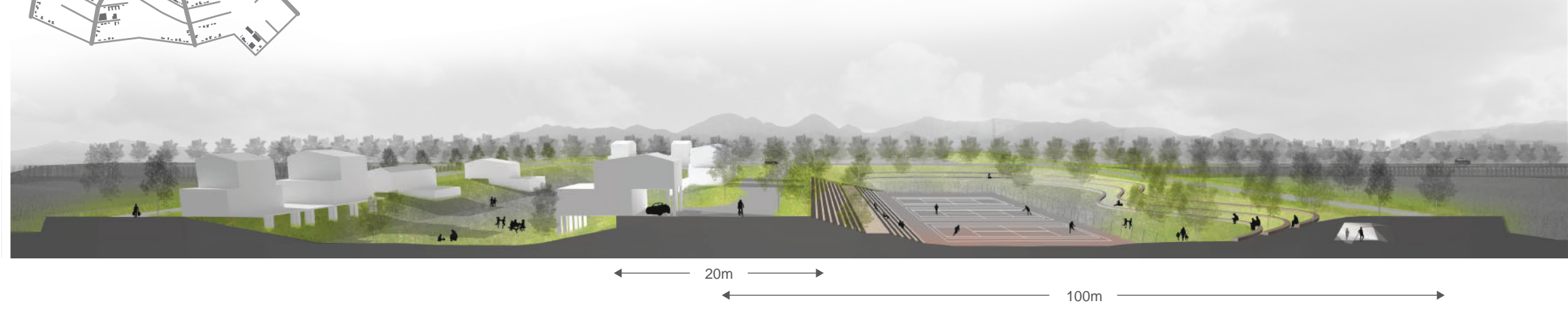


200m



### Scenario 2; Upgrading

Upgrading strategy is to maintain the current density and road network, but upgrading them to a flood resilient urban model. Houses and public spaces are incorporated with the dike system.



20m

100m



### Scenario 3; Densifying

Densifying strategy is to extend the development of residential and industrial blocks. Tertiary dike system is introduced to maximize the buildable area.



## Riverfront Landscape at Summer Night

Japanese love summer activities at riverfront. Fireworks as well as summer festivals will take place along the river's edge, providing vibrant and romantic place for people to chill and relax.



## Adventure Wetland along Boardwalk

These pocket play spaces provide rare opportunity for urban kids to touch naturally floating water, and play inside wetland. No more computer games.



## Community Plaza during Spring

Low, central spaces are shared by the same block community. "Hanami" (cherry blossom) in spring, fireworks in summer, "Otsukimi" (viewing full moon) in fall, Japanese know how to enjoy the seasons.