

Country /City

University / School

Academic year

Title of the project

Authors

China /Shanghai
Shanghai Jiao Tong University
2022/2023
Photosynthesis: The Landscaping Regeneration of an Industrial Dockyard
Xinyue Pan, Shuoyu Zhang, Haozhe Wang

TECHNICAL DOSSIER

Title of the project Photosynthesis: The Landscaping Regeneration of an Industrial Dockyard
Authors Xinyue Pan, Shuoyu Zhang, Haozhe Wang
Title of the course Landscape Engineering and Digital Landscape
Academic year 2022/2023
Teaching Staff Liqing Zhu, Kai Fu
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Written statement, short description of the project in English, no more than 250 words

The southeast dock on the Huangpu River's cross estuary is a storage area for shipping goods and features a small shipyard. However, noise, dust, pollution, and abandoned industrial structures intensify conflicts between industrial production, outdoor living, and the environment. With urban economic transformation and increasing environmental concerns, the dock's transition from production to a sustainable living space is inevitable.

Our regeneration plan draws inspiration from "Photosynthesis" to integrate production, activities, and ecology harmoniously. The site is envisioned as a leaf section, with different parts collaborating like a leaf's mesophyll to complete substance and energy conversion. By balancing production, activity, and ecology, we aim to find the optimal solution. Through virtuous cycles, the industrial heritage of the site will transform into new activity spaces, achieving the desired outcome.

"Photosynthesis" provides an ideal model for regenerating industrial brownfields, seamlessly integrating production, activities, and ecology. The energy of people promotes rejuvenation, while ecological benefits bring well-being to both humans and the Earth.

For further information

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SCHOOL PRIZE

BACKGROUND

— The urgency of ecological restoration is emphasized by urban economic transformation and the need for environmental protection. As the mother river of Shanghai, Huangpu River has undergone a process of transformation from production to life along its coastline, and a large number of outdated dock areas have been transformed into riverside open spaces.

SITE LOCATION

— Located at the Cross Estuary of the Huangpu River in Shanghai, China, the site is a shipyard dock awaiting transformation.

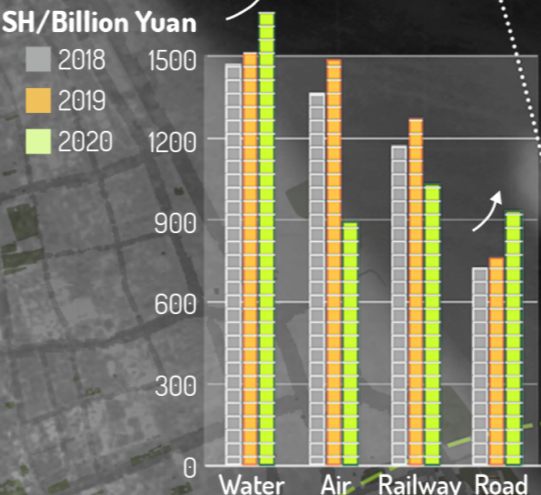


Cross Estuary of Huangpu River

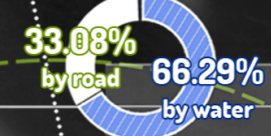
Minhang District

Shanghai, China

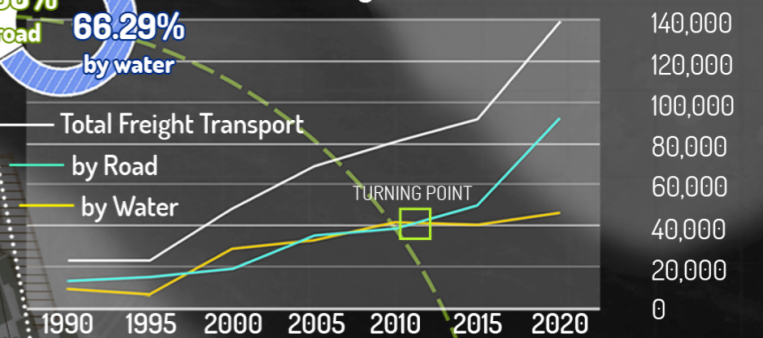
RESOURCE & PROBLEM ANALYSIS



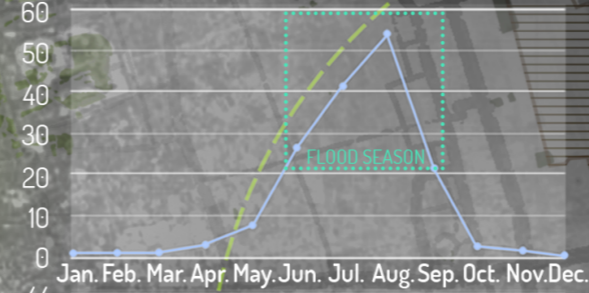
Distribution of Freight Traffic in SH in 2020



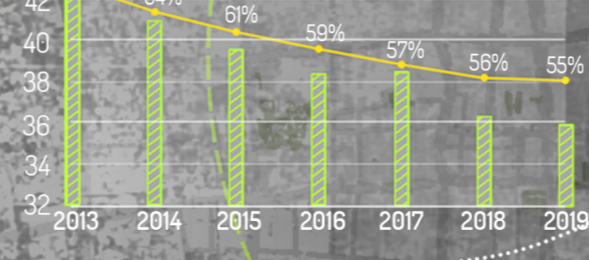
Freight Volume in SH/10,000 Tons



Flood Times of Huangpu River



Proportion of Primary Energy Consumption



LEGEND

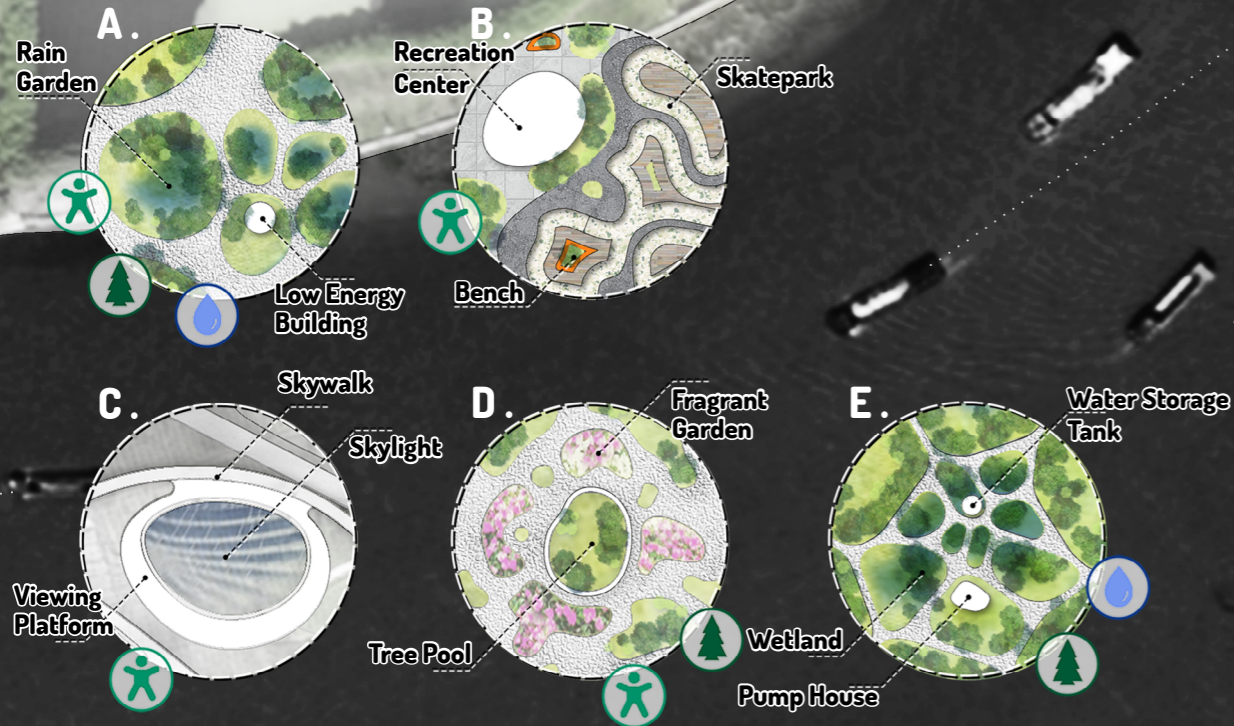
- Industrial Dock
- Transformed Dock
- Airport
- Shipping Company < 2 KM from Huangpu River
- Shipping Company 2-5 KM from Huangpu River
- Shipping Company 5-8 KM from Huangpu River
- Logistics Company < 2 KM from Huangpu River
- Logistics Company 2-5 KM from Huangpu River
- Logistics Company 5-8 KM from Huangpu River

There are 3 industrial docks, 2 shipping companies and 20 logistics companies within 8 km.



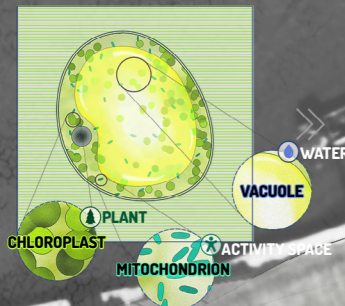
MASTER PLAN

---- We view the site as a microscopic cross-section of a leaf, containing the upper and lower epidermis, mesophyll cells and stomatal structures to complete photosynthesis. The activity of human is a kind of energy flow. People give space vitality, and space brings landscape experience to people. Each cell in the site acts as a small space with a specific function. When people interact with these spaces, energy flows in from the outside and participates in the regeneration process of the site.



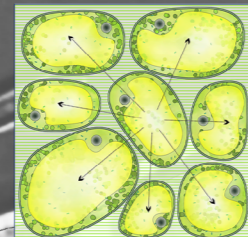
PHOTOSYNTHETIC PROCESS

1. Origin: A Plant Cell



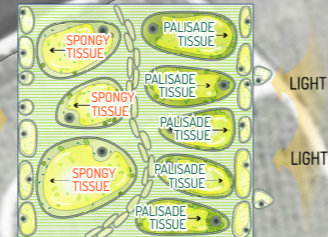
The initial site consists of three elements: plants, activity space and water.

2. Development: Cell Division



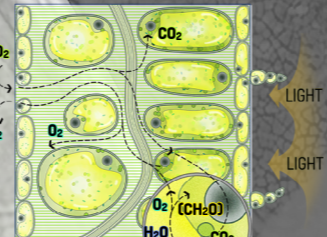
The cell begins to divide into several identical units. Their functions are similar. The cooperative relationship has not been established and photosynthesis has not occurred.

3. Development: Cell Differentiation



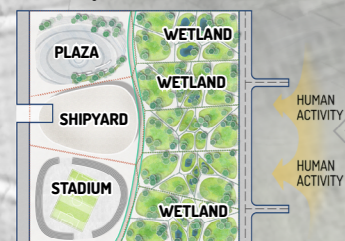
Because of the different intensity of light, cells began to differentiate into two different types: spongy tissue and palisade tissue. Leaf hairs, veins and stomata are also gradually formed.

4. Transformation: Photosynthesis



After differentiation, cells have completed transformation.

8. Completion



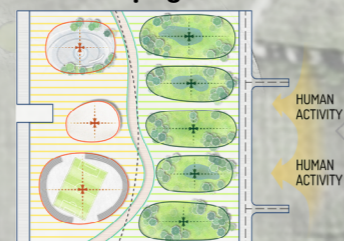
Eventually, the site evolved from a single cell to a complex system capable of photosynthesis. Human activities are accelerating the process of transformation.

7. Adjustment



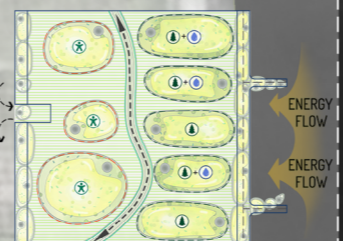
To improve the efficiency of photosynthesis, the control points are artificially increased to make the palisade tissue undergo cell division again. Using the voronoi simulate this process.

6. Landscaping



Each cell is regarded as a site with specific functions for landscape design. In this way, a series of different spaces such as plazas, buildings, playgrounds, green spaces and wetlands are obtained.

5. Functional Partition

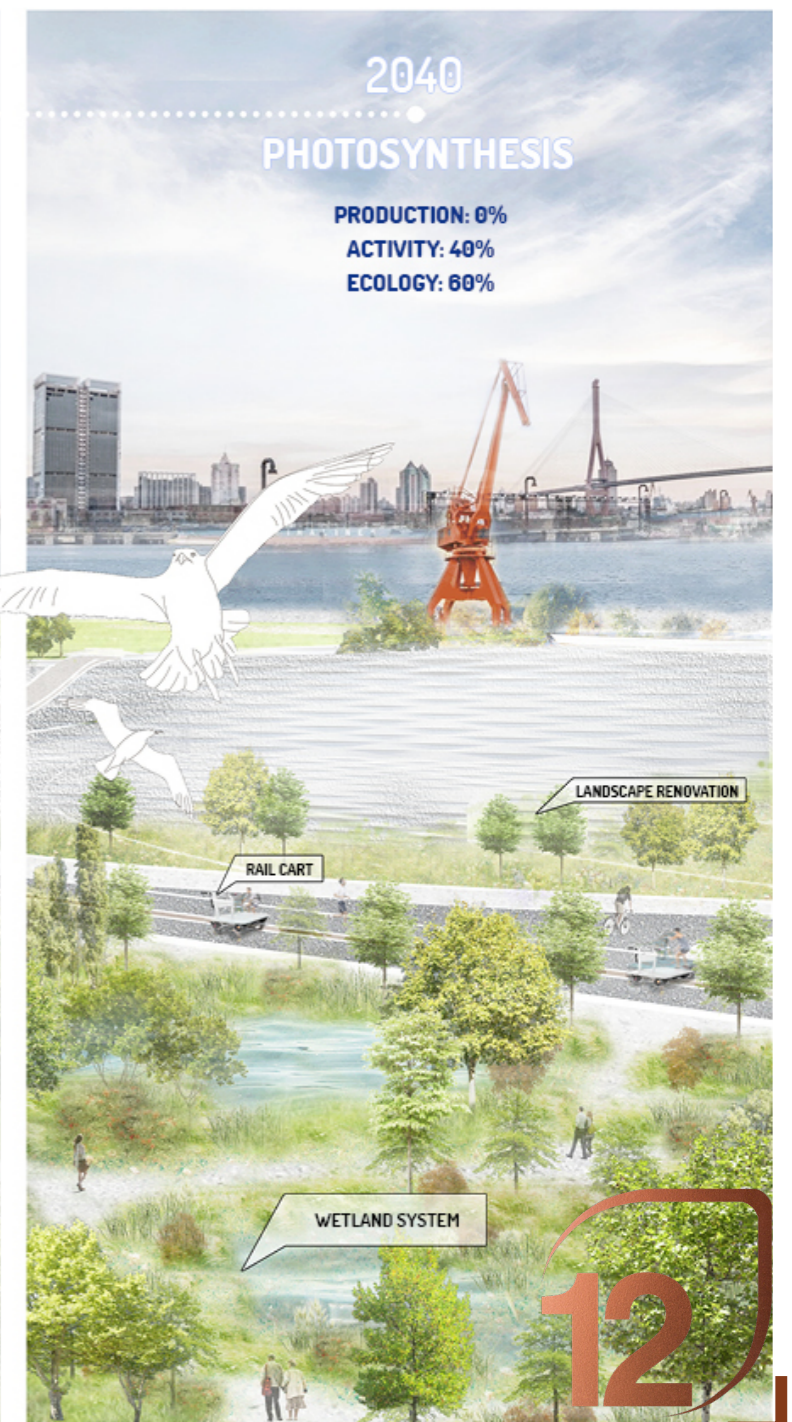


The functional characteristics of different types of cells are extracted, and the cooperative relationship between them is simplified.

NODES

- 1 Transport Rail
- 2 Fountain Plaza
- 3 Skywalk
- 4 Shipyard Roof
- 5 Receiving Dock
- 6 Cargo Station
- 7 Central Plaza
- 8 Lawn
- 9 Fragrant Garden
- 10 Ornamental Wetland
- 11 Public Rest Room
- 12 Parking Lot
- 13 Recreation Center
- 14 Football Stadium
- 15 Basketball Court
- 16 Badminton Court
- 17 Viewing Lawn
- 18 Watchtower
- 19 Rain Garden
- 20 Purifying Wetland





2023
ORIGINAL SITE

PRODUCTION: 100%
ACTIVITY: 0%
ECOLOGY: 0%

2030
CELL DIVISION

PRODUCTION: 70%
ACTIVITY: 10%
ECOLOGY: 20%

2035
CELL DIFFERENTIATION

PRODUCTION: 20%
ACTIVITY: 30%
ECOLOGY: 50%

2040
PHOTOSYNTHESIS

PRODUCTION: 0%
ACTIVITY: 40%
ECOLOGY: 60%