Landscape Approach Greater Bay Area, China

Landscape architecture explorations in the Pearl River Delta, Beijing and Jakarta through eight MSc-graduation projects

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The graduate students, July 2020

Contents

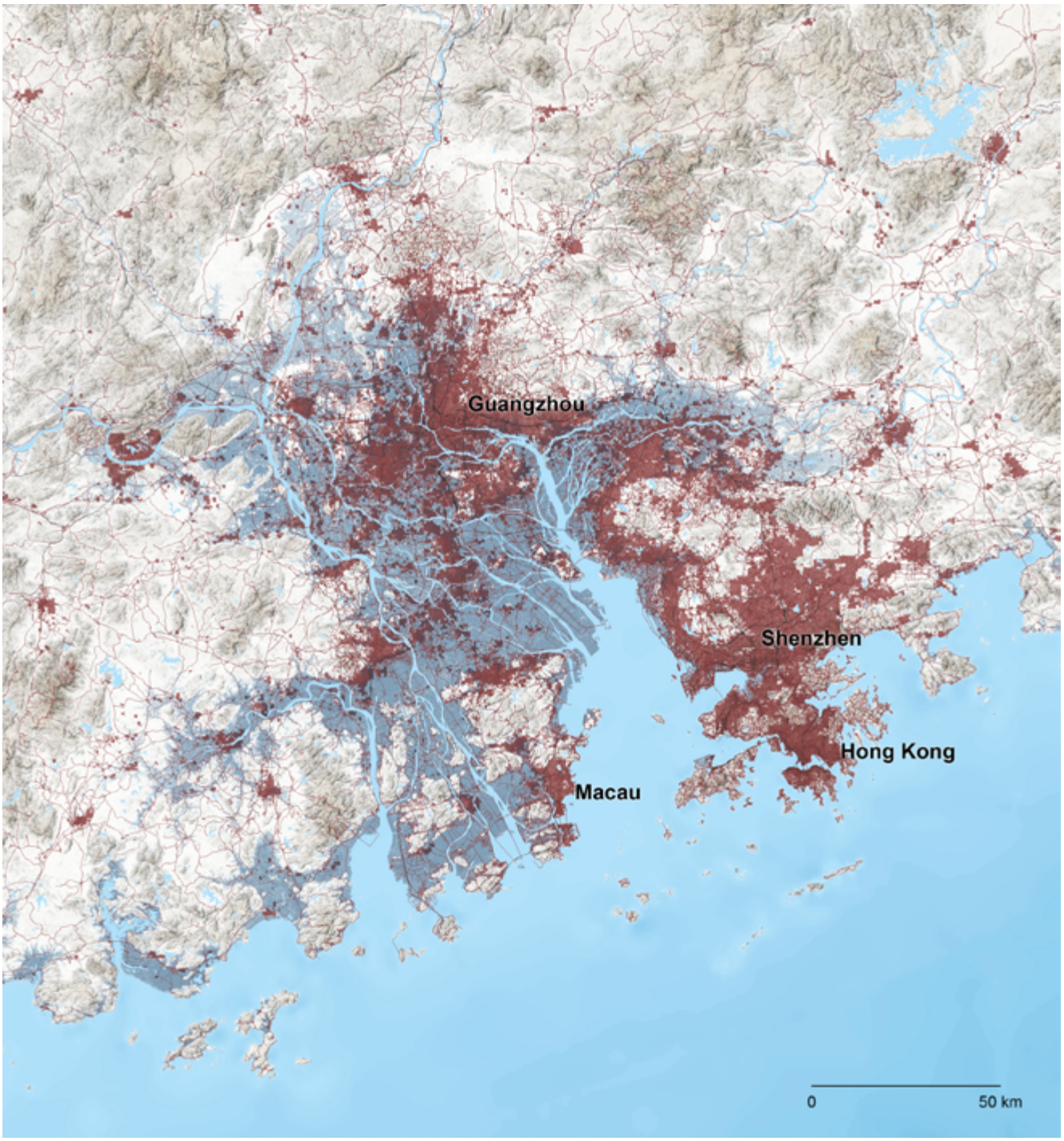


FIG. 1.1 The Pearl River Delta (Steffen Nijhuis, 2018)

Introduction

Deltaic areas are among the most promising regions in the world. Their strategic location and the superior quality of their soils constitute the main factors that have been supporting human development and the rise of these regions as global economic hubs. At the same time, deltas face extreme vulnerability and multiple threats related to climate change and urbanization with increasing flood risk and loss of ecological and social-cultural values as a result.

Pearl River Delta

The Pearl River Delta (PRD) in China has been the fastest developing delta in the world for the past four decades. In 2014, it even surpassed Tokyo to be the world's largest urban area in regards to both size and population (World Bank, 2015). The PRD has led to groundbreaking changes in Chinese urbanization and socio-economic transformation changes since the 1980s (Yeh & Li,1999). In spite of this, the PRD faces immense challenges regarding its long term economic development because of the threats posed by climate change and environmental degradation. Challenges include:

- Increased floods by rivers and sea level rise
- Water logging in urban areas
- Transformation and abandonment of industrial areas
- Ongoing urban expansion
- Socio-spatial segregation
- Loss of cultural heritage and destruction of historical villages
- Loss of ecosystems and biodiversity

Objective

This design lab explores landscape-based design approaches for adaptive urban transformation in fast urbanizing deltas. Based on an assessment of the dynamics of change and transformational cycles of the natural and urban landscape eco-dynamic, multi-scale spatial design strategies are identified to provide opportunities for water, nature and social-cultural aspects in urban development processes. While using

design as a research strategy landscape architecture principles are explored that ensure water safety and inclusive socio-ecological design. The projects as presented here explore water resilient industrial transformation, flood protection, socio-spatial integration and the reintegration of urban villages in the Pearl River Delta. There are also two sheer projects with similar approach applied in Beijing and Jakarta.

This lab is connected to the NWO-NSFC-EPSRC funded project 'Adaptive Urban Transformation' and a collaboration of Delft University of Technology, South China University of Technology and The University of Sheffield. The lab contributes to the project with design workshop participation, MSc-thesis and publications. www.adaptiveurbantransformation.com

Flowscapes

The lab belongs to the "Flowscapes" studio that aims to explore dynamic landscape system from different perspectives and in various contexts (Nijhuis & Jauslin, 2014). We specifically discuss 'infrastructure as landscape 'and 'landscape as infrastructure', while understanding the urban landscape as a living system. The studio encourages students to explore spatial, societal and environmental issues by design research and research-by-design approaches. By working through scale, present a constellation of networks and locations with multiple levels of organization. This approach is elaborated through different individual projects while generating knowledge in an exploratory research and design process.

Eight projects

/Stitching Lijiao/ Margherita Ghini

The expected result of this project is an improvement in quality of both the public space and the water sanitation system. The goal is to re-integrate the water landscape as a carrier into the urban village, strengthening its identity and reviving the lost connection between built and green and blue structure.

/Water resilient industrial transformation/ Yijing Li

Make use of the chance of industrial transformation to deal with flooding and water logging problem in Shunde district by making room for river and improve water capacity inside of the dike.

/Mediating waterscapes/ Tapasya Mukkamala

The outcome of the project aims to look at an alternate perspective to approach the flood and water management structure of the city of Jakarta. It is done by looking at "urban poor not as a problem but as a part of the solution" to primarily address the issue of flooding.

/Retrofitting Panyu/ Bo Peng

In the process of industrial transformation, by constructing a green and blue structure and organize the inefficient industrial area to find an adaptive way for water logging.

/The new productive landscape of post-industrial area/ Marina Rani

The new productive landscape of post-industrial area. How do we appropriate decommissioned industrial areas located along waterways to mitigate the impacts of urban flooding and water pollution while also redefining the relationship and interaction of the inhabitants working and living nearby with water using landscape based solution?

/Water resilient and adaptive development/ Jiajun Wu

This project aims to design a landscape framework and explore adaptive design principles for water resilient urban development of Pazhou. The ability of design through scales (from delta scale to single building) and time (learn from the past to deal with the uncertain future) is highly addressed.

/Redefine the border of water/ Linyu Qu

This project describes the potential of transforming the Grand canal as an adaptive and resilient landscape infrastructure in the city, the fundamental element for the space of society and ecology. In the meanwhile, dealt with the management of water.

/From segregation to integration/ Xinyan Zhao

Create an integrated and comprehensive socio-ecological network in multiple scales that can improve the socio-spatial integration and regenerate the fragmented green and blue spaces for Haizhu district.

URBAN EXPANSION

FIG. 1.2 With the rapid development of the Great Bay Area, cities in the Pearl River Delta are also expanding rapidly. The photos show the Old Town and Zhujiang New Town in order from near to far. Along the riverbank, row upon row of tall buildings spread across the New Town area. Even in the Old Town, there are scattered buildings that break the unified height of the Old Town.

INTERACTION WITH WATER

FIG. 1.3 The height of the water surface changes according to the natural phenomena of high tide and low tide. The silt is exposed to the water surface when the water level is low, so it produces the possibility of interaction between people and water. The natural flow of the river is in sharp contrast with the high-rise buildings in the city, which tells us that the natural changes cannot be ignored in the process of urban progress.

NEW PUBLIC SPACES

FIG. 1.4 Water is an important element for play and cooling

ECO-UTILIZATION

FIG. 1.5 Dense urban regions like the PRD ecological development often goes hand in hand with utility. The new developed mangrove forest in Shenzhen is also a city park and serves as flood protection

URBAN AGRICULTURE

FIG 1.6 Lychee orchard in university campus. The orchard existed already a long time before it was integrated in the urban tissue

LINGNAN GARDENS

FIG. 1.7 An ancient garden type specific for this region

ADVANCED TRANSPORTATION

FIG. 1.8 The transportation network in the Pearl River Delta is well developed, which consists of the well-connected highway, the high-speed train system and the convenient water transportation. In this picture, the highway network in parallel to the river spreads from Zhujiang New Town to the old city and then to the suburbs, bringing great convenience to the city, but it also splits the city.

THE FORGOTTEN VILLAGE

FIG. 1.9 The close side of this picture is the edge of the urban village in the city, and the far side is the Zhujiang New Town. The tangible and the intangible boundaries split the dilapidated urban village and the highly developed city, showing a state of extreme inequality. The "urban villages" is a problem that remains after the rapid urbanization in the Pearl River Delta.

INDUSTRIAL TRANSFORMATION

FIG. 1.10 The Pearl River Delta is famous for the manufacturing industry in the past 30 years in China, however now, because of the competitive market and overproduction, most of them are facing industrial transformation.


大戏台

TRADITIONAL CULTURE

FIG. 1.11 The Pearl River Delta is famous for the Cantonese traditional culture , such as Cantonese opera, Cantonese food and water village.

Projects


7. Redefine the border of water
5. The new productive landscape of post-industrial area
8. From segregation to integration
6. Water resilient and adaptive development
1. Stitching Lijiao
4. Retrofitting Panyu
3. Mediating waterscapes
2. Water resilient industrial transforamtion

Project overview

1. /Stitching Lijiao/ Margherita Ghini
   Urban village, Urban regeneration, Identity

2. /Water resilient industrial transformation/ Yijing Li
   Industrial transformation, industrial heritage, green-blue grid

3. /Mediating waterscapes/ Tapasya Mukkamala
   Urban river deltas, Landscape infrastructure, Flood resilience

4. /Retrofitting Panyu/ Bo Peng
   Industrial transformation, water logging, green and blue structure

5. /The new productive landscape of post-industrial area/ Marina Rani
   Industrial transformation, landscape perspective, spatial and temporal design

6. /Water resilient and adaptive development/ Jiajun Wu
   Water resilience, Adaptive design, Identity

7. /Redefine the border of water/ Linyu Qu
   Canal, Identity, Urban landscape infrastructure

8. /From segregation to integration/ Xinyan Zhao
   Socio-spatial segregation, socio-ecological network, urban regeneration

FIG. 1.12 Night view of the energetic urban village and developed city in the Pearl River Delta

Stitching Lijiao

Towards the reintegration of urban villages in the landscape of the Pearl River Delta

Margherita Ghini

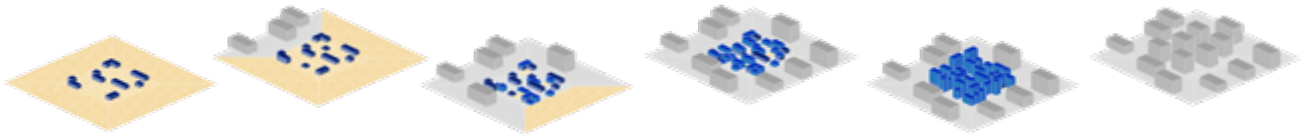
Supervisors
Janneke van Bergen, Landscape architecture
Yang Zhang, Architecture

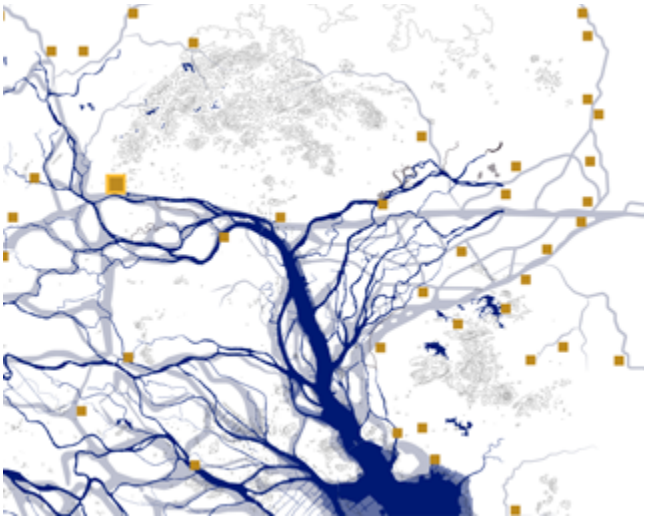
Introduction

Loss of unique urbanism

During the last four decades, China experienced the fastest urban population growth in the world. After the establishment of the Special Economic Zones (SEZ) in 1979, due to the tremendous demand for new construction land, cities authorities expropriated farmlands to establish new urban developments. However, in order to minimise compensation costs, they left the housing plots of the former villages untouched. Hence, those were encroached into the city's structure becoming urban villages (villages-in-the-city). The SEZ began to attract more and more migrants from all over China. Since the hukou registration system precluded the legal settlement of migrants inside the cities, the result was the establishment of non-hukou migrants in urban villages, which were the only places within the cities without government's management. The demand of housing in the villages kept on rising and the expansion of the plots became extreme and illegal.

The spatial results of this process are overpopulated but also lively, active, mixed-used, and human-scaled urban villages. Since most of them are located in valuable locations for the real estate market, the Chinese government deals with the "issue" with their demolition. Diversity and variety of the built environment diminish with each bulldozing, slowly authorising the loss of a unique urbanism.





Loss of relation between urban village and the water-landscape

Historically, villages were located in strategic points according to the characteristics of the landscape, and closely related to the blue system. This relationship has gradually diminished. The water infrastructure within the entire Pearl River system is now extremely polluted, mostly due to industries. As a result, nowadays water is seen as an issue and a threat, rather than an opportunity. In Lijiao village, the chosen design location situated in Haizhu District (Guangzhou, Guangdong Province), the high demand for housing made possible the demolition and replacement of numerous cultural landscapes along with the underground canalisation of watercourses. Only the main stream is still uncovered but the water is polluted and it serves as linear parking lot for the villagers.

FIG. 1.13 Historical time-line of the urban development of Guangzhou and reduction of the amplitude of the river pattern. Redrawn by the author.

FIG. 1.14 Typical Urban Villages Stages (Steven Siwen Qi, 2014). Redrawn byt the author

FIG. 1.15 Overlap of historical maps dating 1850, 1950 and actual status of the blue network. Drawn by the author

Objective

The aim of the thesis project "Stitching Lijiao", is to highlight and eventually exploit the positive aspects and the values of urban villages, through the process of research-by-design. In such manner, the urban village of Lijiao is re-integrated into the city's structure and the lost connection with the water landscape is re-defined, serving as a carrier into the urban village while strengthening its identity as Lingnan water. The expected result is an improvement in quality of both the public space and the water sanitation system.

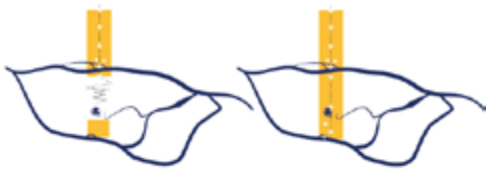
Method

The process can be described as research-by-design. Starting from the establishment of the main research question up to the design exploration, there lies a process of optimisation between functional, spatial and representational demands, consistently supported by literature studies. A deep understanding of the context and the cultural living of people is strongly required for contributing to a pertinent and coherent graduation project on the development of urban villages.

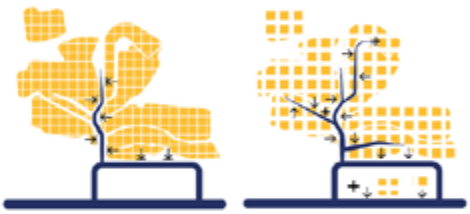
Fundamental to design a consistent development project for Lijiao was historical mapping, which served to trace back the identity to its origins as a Lingnan water village. Each urban village has in fact its own built and landscape character, and it is of great value to support the design choices with clear references to its genesis. Because of this, case studies on the development of urban villages are crucial to extrapolate principles in order to re-integrate the village-in-the-city considered with its metropolitan area.

Principles

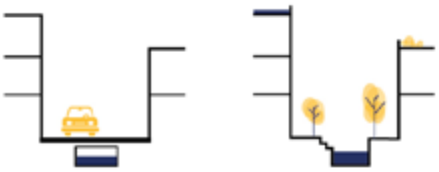
Before After



Regional scale
Haizhu district and new urban axis



Lijiao scale
Re-opened canals



Small scale
Architectural level

Three main design strategies are applied to the design proposal on three different scales, namely: preserve, adapt and connect:

1. Preserve, not only in the physical sense of maintaining the structure of Lijiao to safeguard diversity within the regional urban fabric, but also by cultural means; re-defining its identity, and maintaining the community, along with preserving the heritage buildings;

2. Adapt Lijiao to the new urban development aiming to a longer time perspective, as well as designing climate adaptive spaces. By doing so water is converted from an issue to deal with to a quality public element to benefit from;

3. Connect from within the village its urban fragments and Lijiao to the city; but also re-connect people to water.

The south of China is characterised by heavy rain periods. In Lijiao, the current water drainage system, the residential waste sewer is connected to the surface water drain, this results in combined sewage outflow during extreme downpours. The overflows of the combined sewer system, along with the many industries, causes the water stream to be polluted.

In order to alleviate the issue, a toolbox of climate adaptive spaces is proposed. It presents an overall flood mitigation infrastructure. The new local detention water strategy on one side decelerates the release of storm-water and on the other side re-establishes the identity of Lijiao as water village, improving the quality of its public spaces.

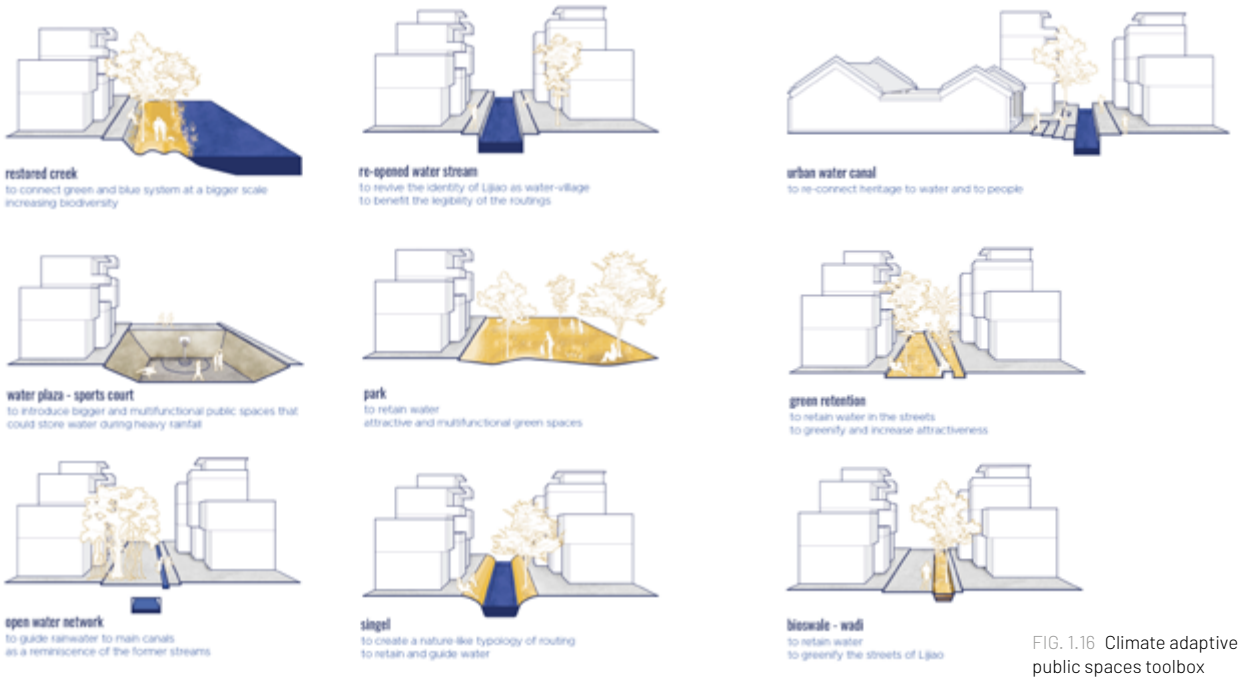


FIG. 1.16 Climate adaptive public spaces toolbox

Result

On the masterplan at the regional scale an ecological corridor is proposed as the South ending point of the North axis of the current Central Business District. Through the corridor the existing ecological area of the Haizhu Lake will be re-connected to the Pearl River. The area is currently occupied by industrial warehouses, which by 2035 are planned to be demolished and relocated, as indicated by Guangzhou's government. The ecological corridor will replace the current paved, private and inaccessible industrial area with a greener, more public and easily accessible ecological area. By doing so it also control the possible urban expansion from happening on the East side of the village, preserving the overall structure of Lijiao. This green and blue system is then expanded and re-introduced in the village itself, reviving its identity as a Lingnan water village.

The waterfront of the village is re-adapted into a climate dike with wide recreational green public spaces. Moreover the former industrial Xinsha Island is designed as a new green pole, with both ecological and recreational function. Through the insertion of a new harbour Lijiao can serve again as a docking point, gaining new accessibility from the riverside.

At the village scale the design makes use of the vacant places left by industries, which will not be in used by 2035, and of the removal of some of the existing housing in order to re-introduce three of the former canals along with new green retaining areas. By doing so, bioswales and pocket parks can be included, to serve as sponges for rainwater, absorbing water-logging, and relieving the existing storm pipes. The Ancestral Hall's water plaza proposed increases the amount of water storage, and it will function as recreational public space during the dry season. The re-introduction of the lost water veins as a strategy will re-connect the different areas of Lijiao and also re-link the village with its outskirts. In such manner the transitional spaces between districts will be more fluid and the whole area accessible as part of the green axis. The heritage buildings are also re-connected to the public spaces and finally highlighted.

Lastly the different typologies of street profiles and water edges will help give hierarchy to the overall structure, helping villagers and visitors finding their way in the village.

FIG. 1.17 Masterplan proposal:
South Haizhu District scale

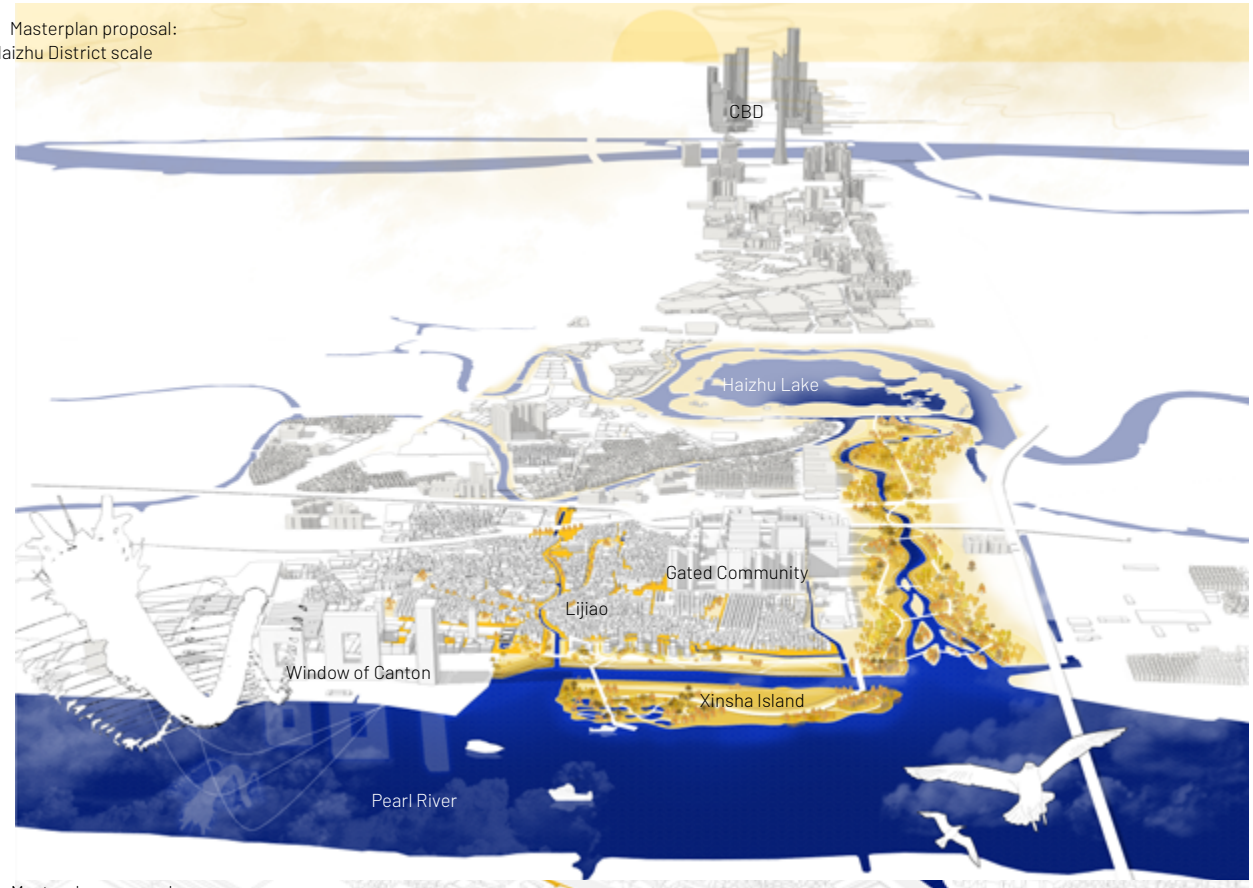


FIG. 1.18 Masterplan proposal:
Lijiao scale

FIG. 1.19 A walk into Lijiao: Urban canal and commercial street

FIG. 1.20 A walk into Lijiao: Waterfront and climate dike

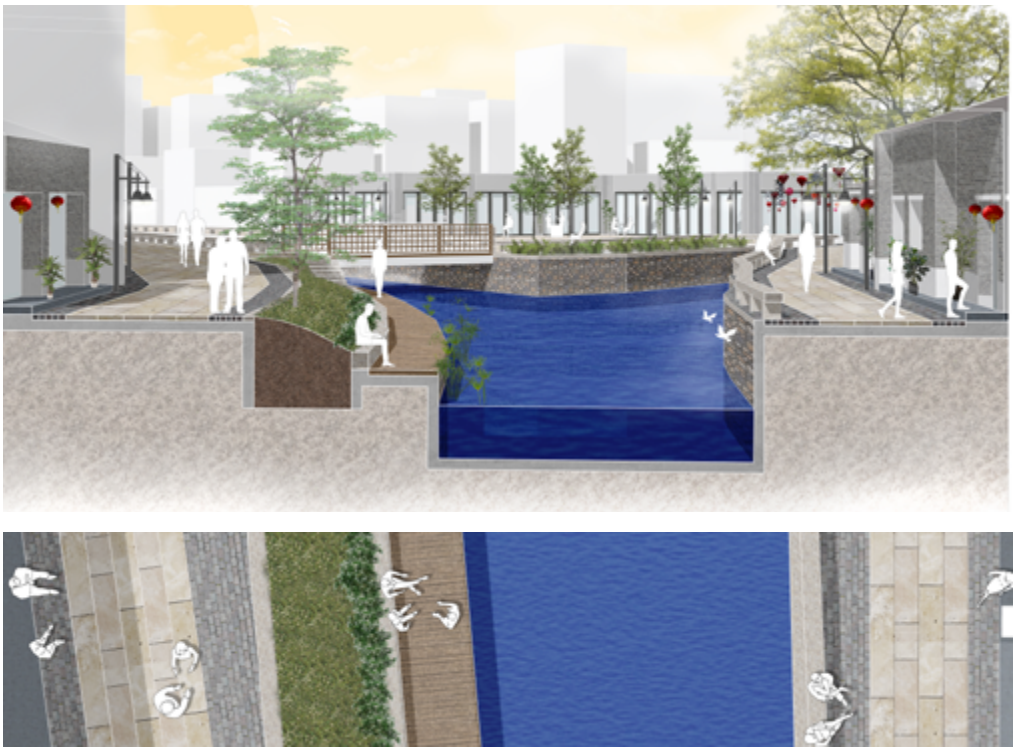


FIG. 1.21 A walk into Lijiao: Village central node

FIG. 1.22 A walk into Lijiao: Residential street (rainy season)

Conclusion

"How to preserve and strengthen the identity of the urban village of Lijiao, by re-defining the historic relation between the village and the water landscape?"

The main research question of the graduation project "Stitching Lijiao" intends to re-integrate the urban village with the metropolitan area of Guangzhou while preserving and reviving its former urban and landscape identity.

The three proposed design strategies (connect, adapt and preserve) aim to this initial goal through the aid of a general toolbox. The landscape and its lost water veins are reintroduced, re-establishing the historical identity of Lijiao as a Lingnan water village. Furthermore, the re-defined identity helps to preserve and maintain the morphological structure of the village, and to highlight the heritage buildings and landscape. The landscape elements, as the re-opened canals, the climate dike waterfront, the pocket parks and bioswales, function as public spaces.

In fact, they are meant to connect both the village within itself, while, at the same time, expand outside the edges, networking with the surrounding context both physically and socially.

Therefore, the three main lessons learned are:

1. *Water as a restructuring element.* Tackling issues as flooding and water-logging can help to restructure urban villages, not just to increase their sponge capacity but also to increase and create quality public spaces. Both the re-qualified existing and the designed blue structure can help to better define clear routings and connections.

2. *Definition of the village edge as preserving element.* Defining clear, wide and possibly green edges to the urban village can help control the expansion from happening from the outskirts of the village. When possible, the use of medium scale buildings typology can mediate between the surroundings built fabric.

3. *Heritage buildings as integral part of public space.* Reviving and linking the heritage buildings of each urban village can help preserve the architectural identity of it, but also habits and customs of the community.

FIG. 1.23 A walk into Lijiao: Ancestral Hall's water plaza (dry season and rainy season)

Water resilient industrial transformation

Yijing Li

Supervisors
Steffen Nijhuis, Landscape architecture
Lei Qu, Urban planning

Introduction

Based on the excellent location, convenient transportation and extensive fertile plains, the Pearl River Delta (PRD) has always been taking a leading position in the industrialization of China. In the past 30 years, a large number of manufacturing factories have been constructed there, and the PRD has grown into a global manufacturing hub around the whole world. However, due to backward technology, excessive production and competitive market, currently, the PRD is facing the problem of industrial transformation.

At the same time, with the uncontrolled industrialization and urbanization in PRD, the problem of waterlogging becomes more and more severe. During the rainy season, after a heavy rainstorm, the city will become an "ocean" where all the public infrastructure is shut down, and people's lives and properties are threatened. In this time of industrial transformation and a large number of old abandoned factories are waiting for regeneration. So how to make use of this chance to deal with or alleviate water problems is the starting point of this project.

Shunde is located in the hinterland of the PRD, where the Xi river and Bei river meet. Because of the low-lying natural terrain and the climate, it is threatened by water for centuries. The ancestors of Shunde used their wisdom to protect their homeland and live with water. They constructed the dike-fish pond system to retain and make use of extra water inside of the dike. However, after the urbanization and industrialization, the dike-fish pond system is filled and replaced by impermeable pavement, and as a result, waterlogging by rainfall is getting worse. Moreover, excessive uncontrolled industrialization has also resulted in a waste of land. The low-efficiency manufacturing industry urgently needs to be transformed into the high-tech industry.

The objective of this research is to explore and identify landscape-based strategies and design principles for water resilient industrial transformation in the Shunde district. The primary methodology is characterized by design research and research by design, which consists of design-oriented analysis, case study and literature review, in which design principles are revealed and tested via design explorations.

FIG. 1.24 The change of water system in Shunde

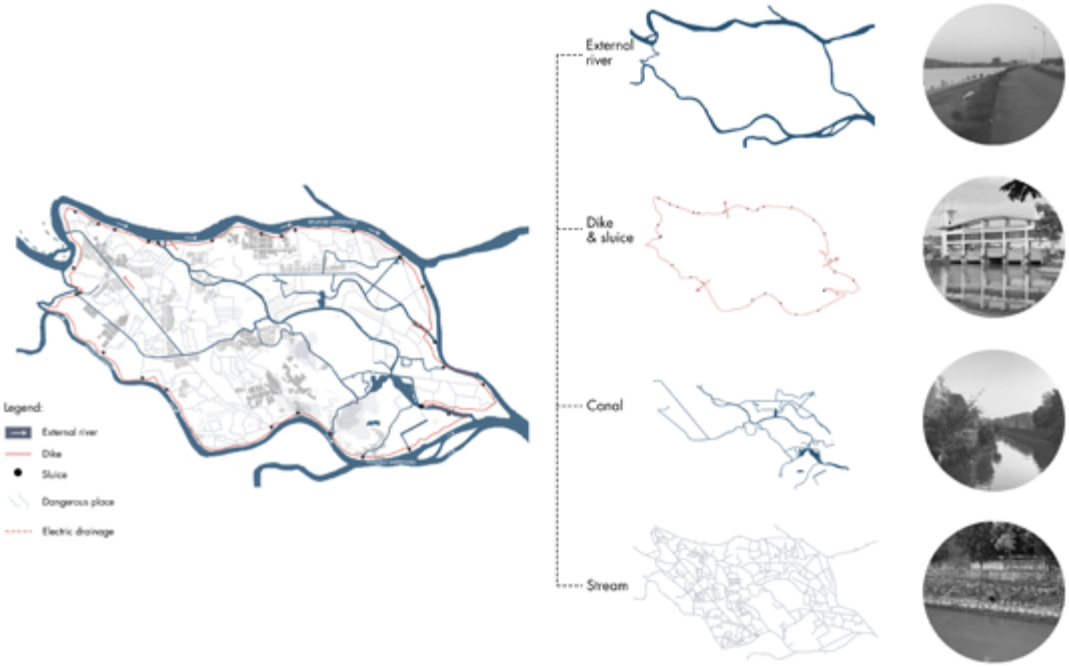


FIG. 1.25 The existing water management system in Shunde district

Principles

Through the case study and literature review, two approaches are identified as the fundament of this project: the development of a green-blue system, and the transformative perspective. The first one combines green space and the water system, which are both adaptive for a weather change. On the one hand, it improves the water capacity; on the other hand, it costs less and promotes the interaction between people and nature. The transformative perspective means it doesn't start from a vacant area. For industrial heritage, the value of the system in the factory is more than the individual. The first step is setting a final goal according to the context and evaluating the buildings, facilities and spaces according to the ultimate goals. Then through adding, subtracting, disassembling and decorating to reuse and re-function the old buildings and facilities.

For water resilience strategies, it mainly consists of three levels: top, ground and underground level. These layers take care of water collection, water purification and water reuse. Terrain grassland, green roof and water tank can be implemented for water collection; sunken garden, bio-swale and riparian wetland can be used for water purification.

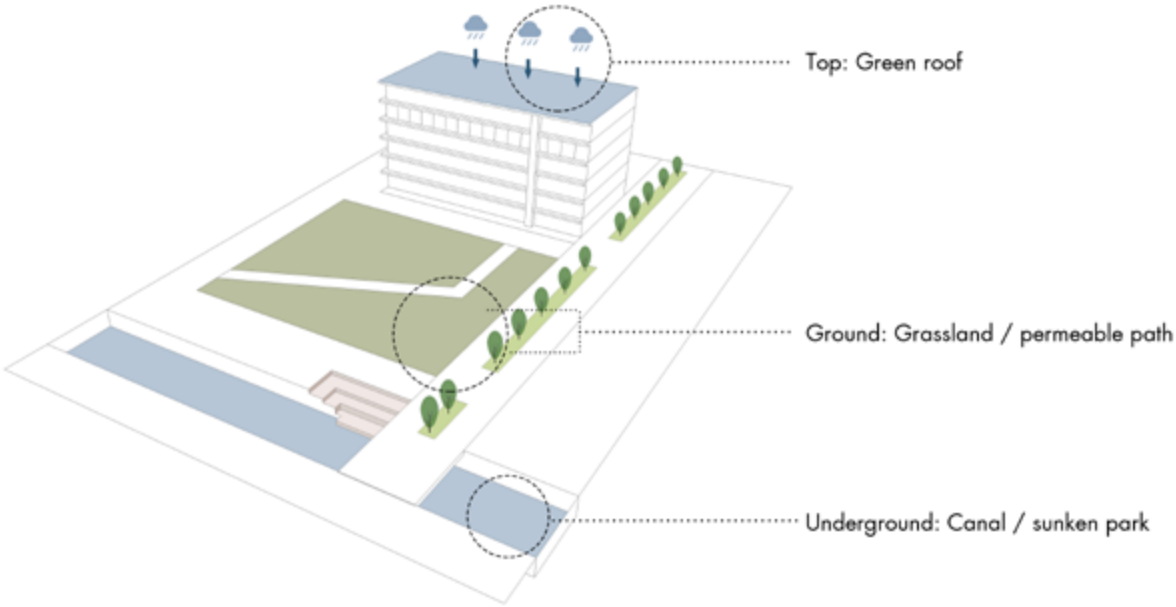


FIG. 1.26 The three layers water strategies

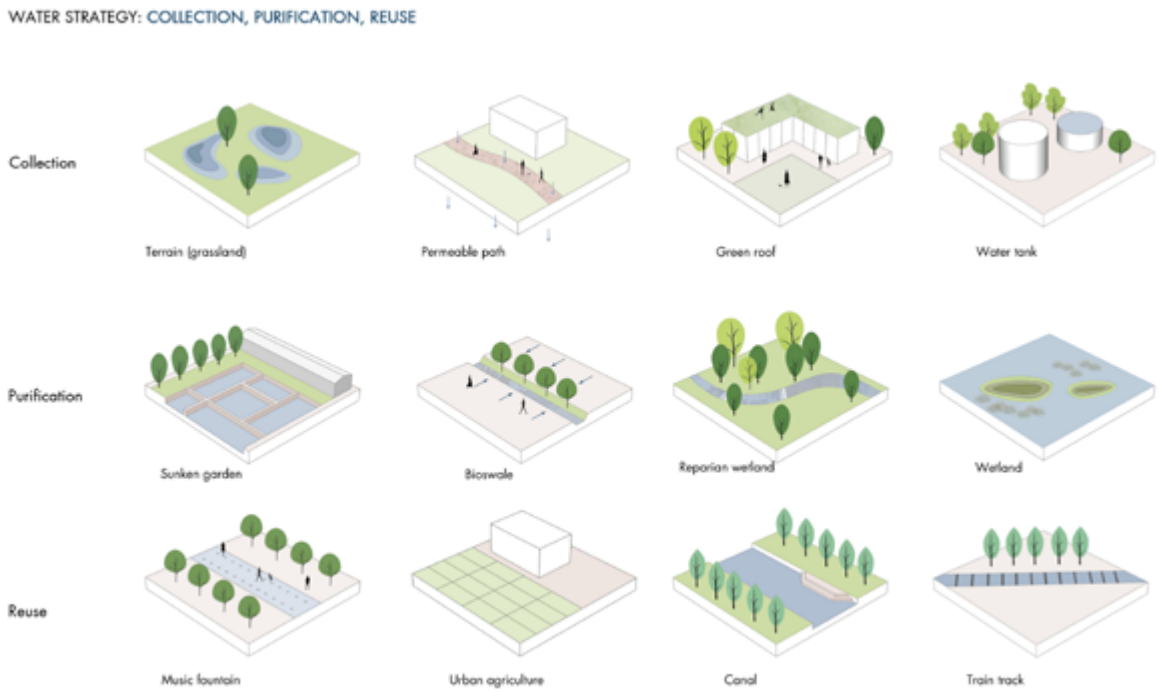


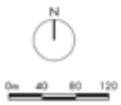
FIG. 1.27 Water resilience strategies

FIG. 1.28 Industrial transformation strategies

Results

By the design exploration, four layers are developed and integrated into one system: water, industrial transformation, mobility and public space. The overall plan, compared with the old situation, organically forms a new industrial park. In this park, the water system is mainly developed by restoring the ecology and using the aged facilities. Water collection, water purification and water reuse in this area will slow down water flow, increase water retention in the extreme weather or the rainy season, and release water for waterscape or productive use in the ordinary days and the dry season.

The design consists of several key areas, the terrain grassland, the natural stream, and the water system which was transformed from the old water facilities in the factory. In the park, people can not only experience nature but also witness the traces left by industry. People can have a dialogue with the old trails of industrialization in the process of visiting and interacting with the park.



1. Entrance plaza
2. Grassland theater
3. Tourist service center
4. Creativity market
5. Artificial forest
6. Technique park
7. Outdoor exhibition
8. Outdoor performance
9. Climbing gym
10. Lotus pond
11. Sunken garden
12. Ecological park
13. Observation plateform
14. Creativity industry
15. Memorial plaza
16. Sugar museum
17. Tourist elevator
18. Mirror pond
19. Water theater
20. Music fountain plaza
21. Ecological canal
22. Main entrance
23. Parkway
24. Lingnan garden
25. Club
26. Food plaza
27. Basketball playground
28. Skatepark

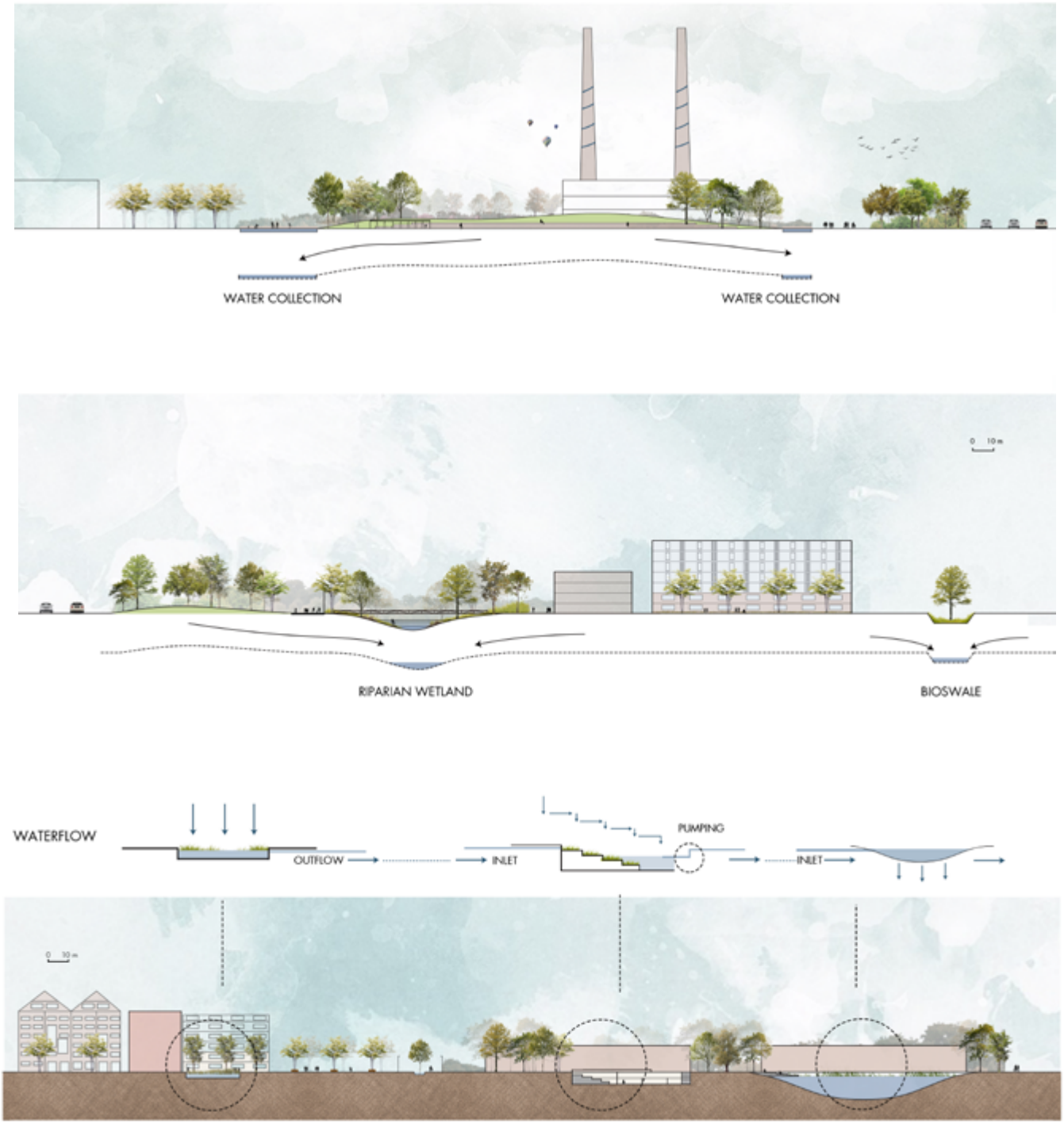


FIG. 1.29 Sections for water collection, water purification and water reuse

Conclusion

The project started with the question "can we make use of the chance of industrial transformation to explore landscape design strategies for water resilience". There are three keywords in this question: industrial transformation, water resilience, and landscape strategies. Industrial transformation refers to partly preserving, partly demolishing or reconstructing the old industrial area for reuse and re-function. Water resilience means when it rains, the water system can absorb, infiltrate, purify and retain water, and it can also release and reuse the water if necessary. In this way, rainwater can achieve free migration in the city.

Firstly, industrial transformation and water resilience are not separated problems. In the construction of the industrial area in the past time, most of it is covered by impermeable pavement, which severely intensifies waterlogging in the city. The other way around, waterlogging also threatens the safety of the industrial area. Secondly, now the industrial transformation is a chance for us to rethink what alternatives we have for water management, especially after reflecting on the previous water management system. Landscape strategies, such as green and blue structures, can deal with water problems in a more efficient way. By adjusting the terrain and restoring the ecology, it can achieve water collection, water purification and water reuse in the industrial area. In this way, rainwater can be slowed down and stored during rainstorms. In regular days, the water can be released for daily use, waterscape or irrigation. Landscape strategies can also bring added value to industrial transformation, which activates the industrial area and improves the interaction between people and water, people and facilities. It also increases vegetation diversity in the industrial sector. In the meantime, it promotes the regeneration of the industrial area.

Landscape strategies are not only about constructing a park, but it is also a multi-disciplinary way to combine hydrology, ecology and meteorology to deal with the challenges and turn them into an opportunity for future development.

FIG. 1.30 Perspectives for key nodes

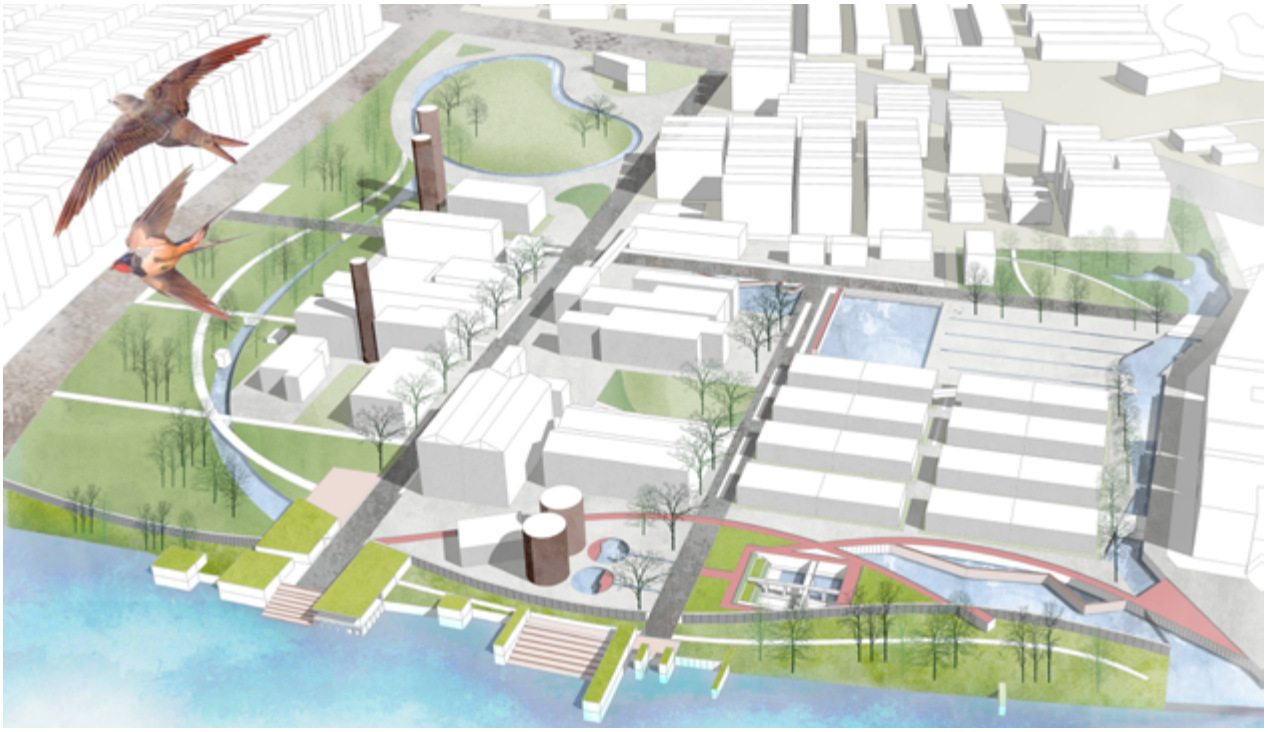


FIG. 1.31 Birdeye view for the industrial park

Mediating Waterscapes

[Re]activating the flood vulnerable kampung communities along the Ciliwung river through "Adaptable landscape and water management strategies and design"

Tapasya Mukkamala

Supervisors
Steffen Nijhuis, Landscape architecture
Fransje Hooimeijer, Environmental technology

Introduction

The phrase "water, water everywhere but too much or too little" aptly explains the current situation of many global cities. With the innumerous challenges due to Climate change and urbanization, water ranks the highest as a risk to society. This risk ranges from water related catastrophes like floods to availability of portable water to the growing population. Many cities in the world are threaten with this issue. One global city, that witnesses severe water related risks is Jakarta. It is a second most populous metropolis in Southeast Asia that is located on the Ciliwung river delta on the West Java coast. Apart from being the capital and cultural-economic hub, Jakarta often witnesses intense floods due to high precipitations and river water discharges. Nevertheless, on the other side also has a severe shortage of potable water.

Through research into the history of the Ciliwung river delta, Jakarta has been reporting floods as early as in the year 1621. Since then there have been various flood events over the centuries (Goh, 2019). Thirteen significant rivers and streams pass through Jakarta carrying the water from the mountains of the South forming a very sophisticated water structure within the region. Constant urbanization and human interventions have tampered the river dynamics but also cause severe water pollution that adds to the stress of floods and functioning of the infrastructure. One such pressing issue is the unmonitored extension of the kampung communities into the flood plains of the river. In the early days, the Kampungs lived with the natural dynamics of this intricate river system. However, as the city expanded, the focus

shifted to an infrastructure-oriented development the perception of the river and kampungs began to change. A lot of alterations were and are still continually being made to the physical morphology of both the river and the kampungs leaving them without an identity. At present, the Kampungs are the "informal trouble" to the city, and the rivers are canalized drains of water and waste.

This shift to a constant dependency on linear approaches of flood management and inequity in the planning policies leaves the Kampungs and river network vulnerable to the imbalance in the natural-built systems. Therefore, the objective of the graduation project is to re-activate the flood vulnerable kampungs along the Ciliwung river through integrated top-down, bottom-up Landscape and water management strategies and design to improve the flood and socio-ecological resilience.

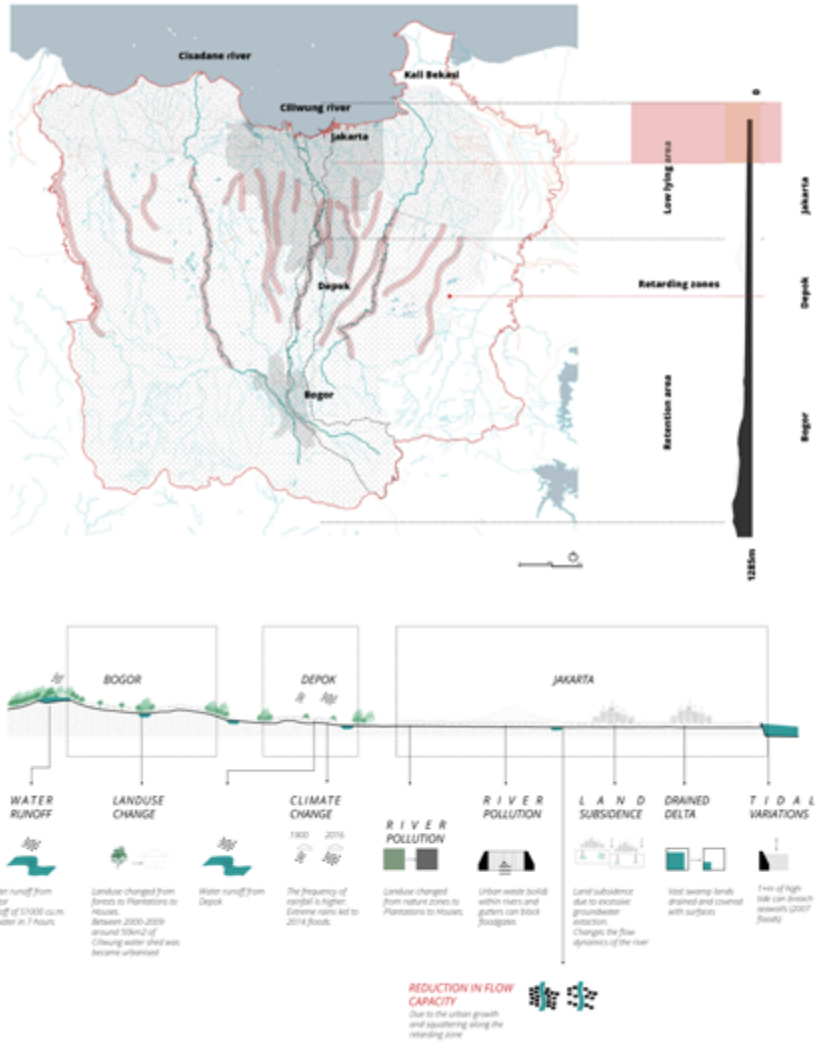


FIG. 1.32 Urbanisation as cause of floods

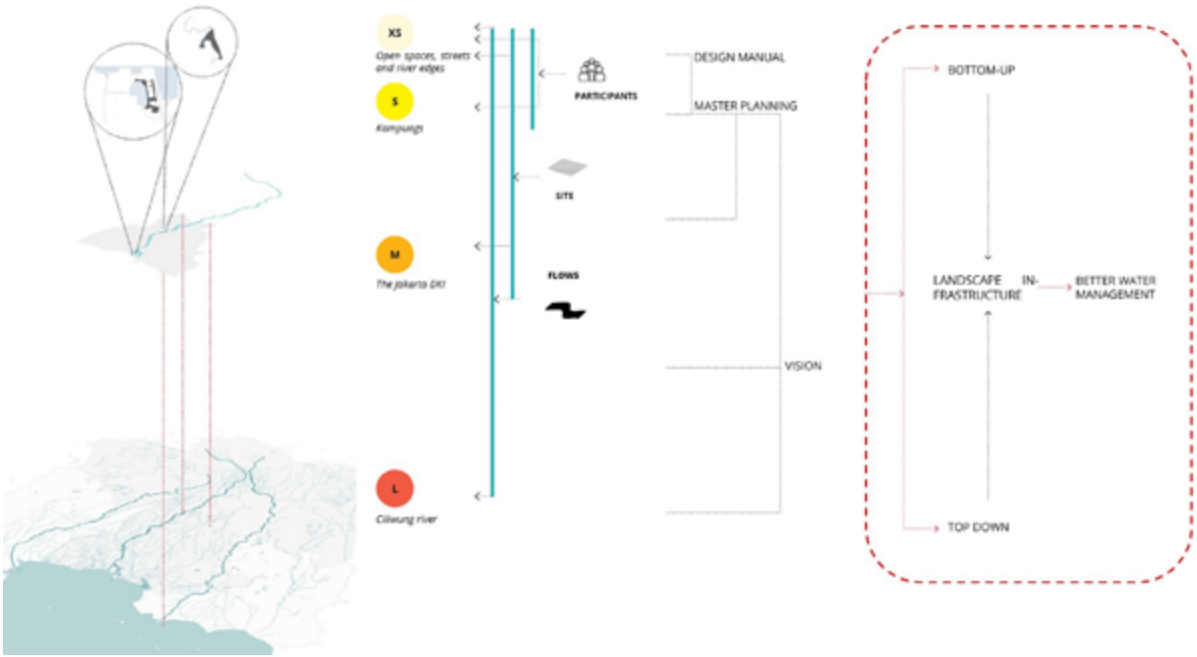
FIG. 1.33 Watershed of Ciliwung river showing the different zones along longitudinal cross-section of the river

Principles

One needs to rethink infrastructure in terms of resilience and not just build it. There is already much effort put into formulating sustainable water and flood management schemes across the world, especially in developed countries. This project tries to adapt and implement these schemes in a context specific way to address the high risks of climate, developing cities like Jakarta face.

The project follows the design by research method wherein the natural and built systems of the urban river delta of Ciliwung are studying across scales and time to understand the phenomenon of flooding and the evolution of the relationship of the urban fabric with the rivers. The principles of ECOPOLIS, ecologically sound urban development by Tjallingi (1995) and urban landscape infrastructure; design operative landscape structures for built environments by Nijhuis (2015) form the basis to analyze and address the complexity of the issues in the changing urban and natural systems with the help of landscape design.

Through the ECOPOLIS strategic framework we understand the relationship of urban ecosystems through the three lenses of FLOW, SITE and PARTICIPANTS. The theory helps in breaking down the several complex layers, making it simple to understand them independently and as an entity. In the case



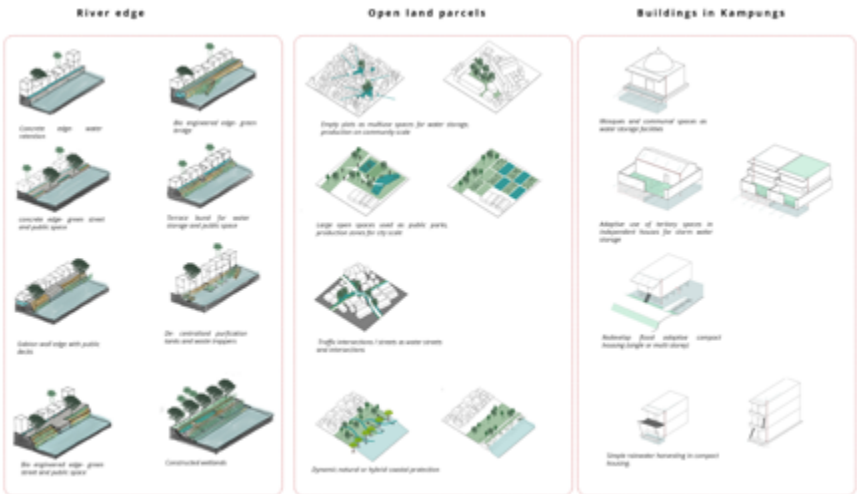


FIG. 1.34 The framework integrating principles of ecopolis and landscape infrastructure

FIG. 1.35 Adaptive design strategies

of Mediating waterscapes, the Ciliwung river network is the flow, the urban and natural ecologies of the Kampungs along the river are the sites and people of kampungs as participants. This led to a concise and comprehensive strategy addressing the issue of floods and understand its relation and impact on people.

At the same time, the methods of the urban landscape infrastructure helped in formulating spatial strategies of integrating the existing greywater infrastructure with the blue-green infrastructure of the river to create a more circular and inclusive flood management system.

In short, ECOPOLIS provides the framework for the spatial masterplan, while the methods and principles of Urban landscape Infrastructure become the tools that translate into the spatial design in order to create socio-ecological balance and flood resilience within these communities across scales.

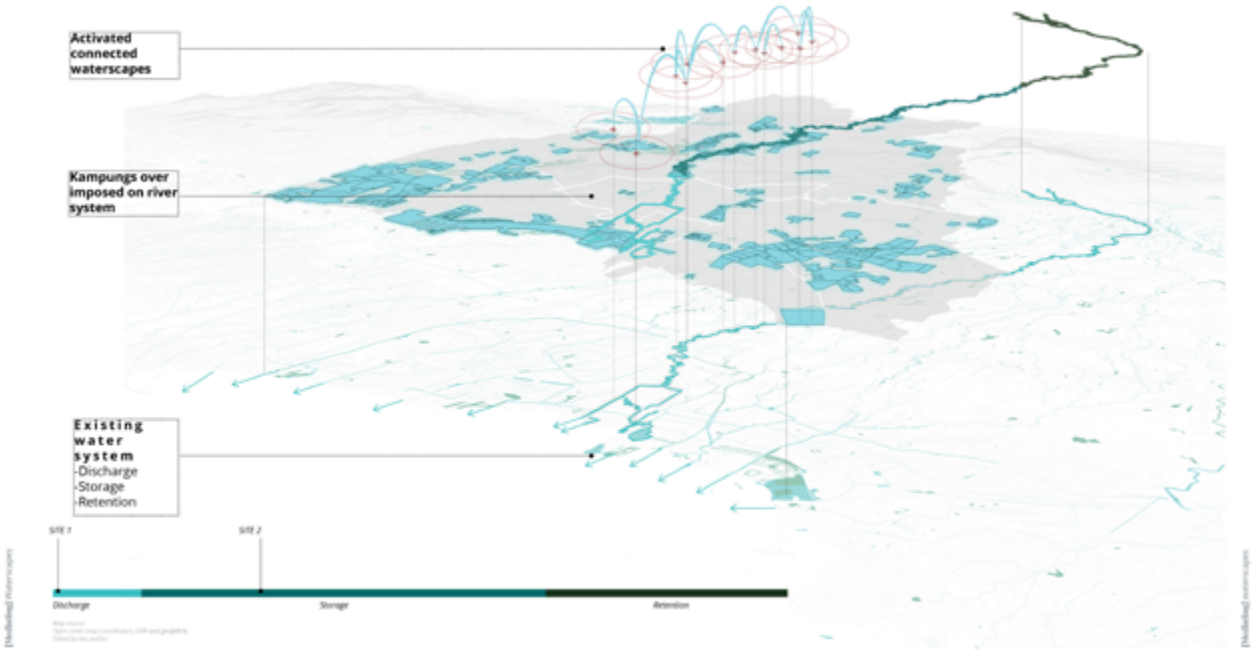


FIG. 1.36 The strategical masterplan of Kampungs as mediating waterscapes

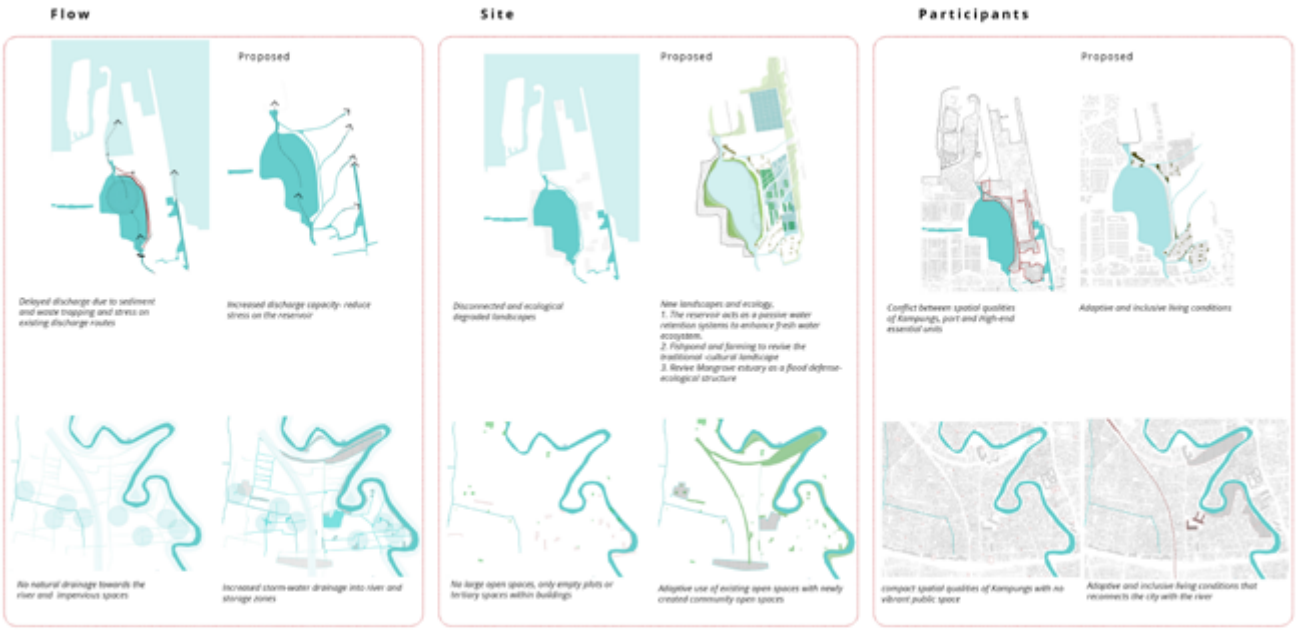
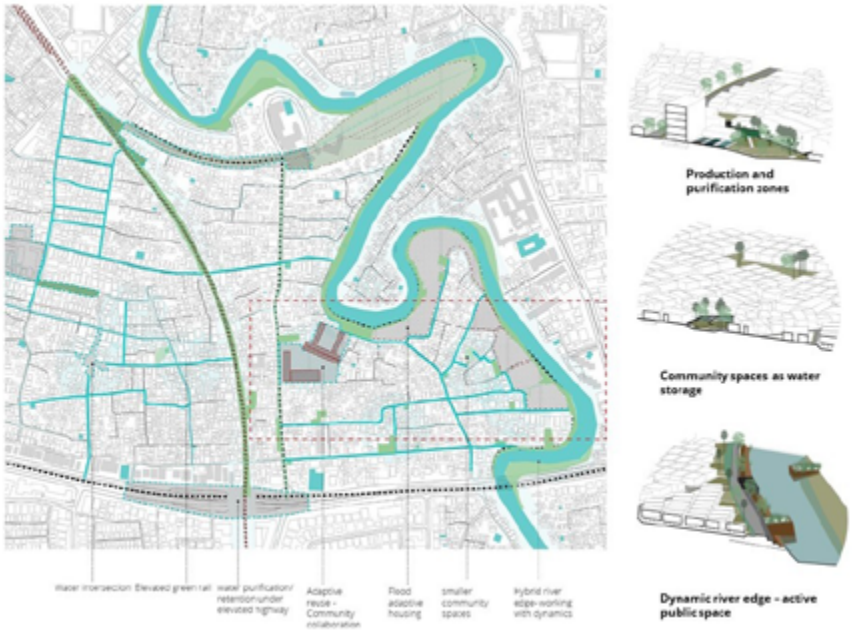


FIG. 1.37 The existing and proposed layers of flow,site and participants

Result

The strategic masterplan elaborates on the characteristics of watersheds through the three zones: Downstream, middle stream and downstream.
The role of each of these zones is to discharge, store and retain the river water respectively to form a sound river ecosystem. Through the vision of the mediating waterscapes, the kampungs along the river are proposed to be re-activated to perform these three functions. The Landscape infrastructure design typologies generated provide hybrid solutions to tackle the flow, site and participants within these Kampungs to achieve socio-ecological balance and flood resilience.

To establish this theory and feasibility of the proposed landscape infrastructure, two kampung sites in two different zones of the watershed are taken as pilots to implement the same. The different layers of the site are analyzed and proposed through the three lens of flow (stormwater discharge and river water discharge), site (ecological-spatial qualities of the kampungs) and the connection of the river with the people of the kampungs.



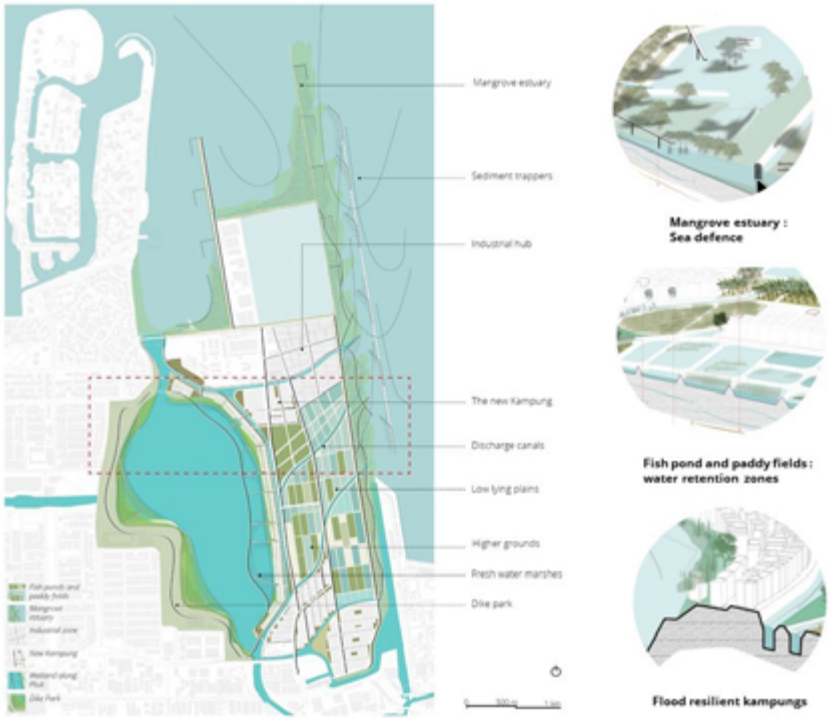


FIG. 1.38 Bukit Duri proposed masterplan

FIG. 1.39 Muara Baru proposed masterplan

Kampung Muara Baru:

The first site is in the discharge zone of the river right at the mouth near the sea, which is an ancient fishing community. The name translates into "New estuary" but the reality is far from what the name suggests. Currently it is an active fishing port and industrial zone with the Kampung scattered in the leftover spaces. The site has high stress and vulnerability of floods from both river and the sea and the poor conditions of the Kampung only adds to the problem. Therefore the project looks at reviving the estuarian conditions of the coastal area by proposing a hybrid landscape infrastructure of additional discharge canals, this dynamic coastal edge is a combination of Mangroves and fish ponds with the new zoning and design for the flood adaptive kampungs and industries.

At the smaller scale of the Kampung, its design provides room for the development of a healthy and self-sustained community that contributes and is responsible for the functioning of the proposed top-down landscape infrastructure. Flood adaptive housing, collaboration of the communities in managing the purification of water and also the mangroves and fishponds are an essential part of the bottom-up strategies.

Kampung Bukit Duri:

The second site is in the storage zone of the river on higher elevation. It is a highly dense settlement occupies the retarding zone of the meandering river of the Ciliwung river until the edge. The kampungs in this zone witness flood every year during the high discharge periods, but the lack of proper water management systems and open pervious spaces to store or drain water add extra stress both on the river and the community. The new masterplan optimizes the existing open land parcels and tertiary pockets in built spaces as adaptive storage areas using the existing open drain network along the roads. These spaces also function as active community spaces. The river edge is also designed to re-establish the socio-ecological value of the river as well as improved the drainage from the site. Retrofitting the transit infrastructure and the community itself as a flood adaptive blue green network are proposed as long-term strategies.

On the smaller scale of the kampungs, the micromanagement of water, wastewater purification and the proposed open spaces act as collaborative and self-sustainable ways to keep the community future proof.

As the project aims at addressing the inequity in stakeholder participation in flood resilience, an overview of the stakeholders and their involvement at various stages is clearly explained through an implementation scheme

FIG. 1.40 The mangrove hybrid estuary as a coastal defense and urban ecosystem service provider

FIG. 1.41 The tertiary open spaces with kampungs as adaptive water storage, purification and community space

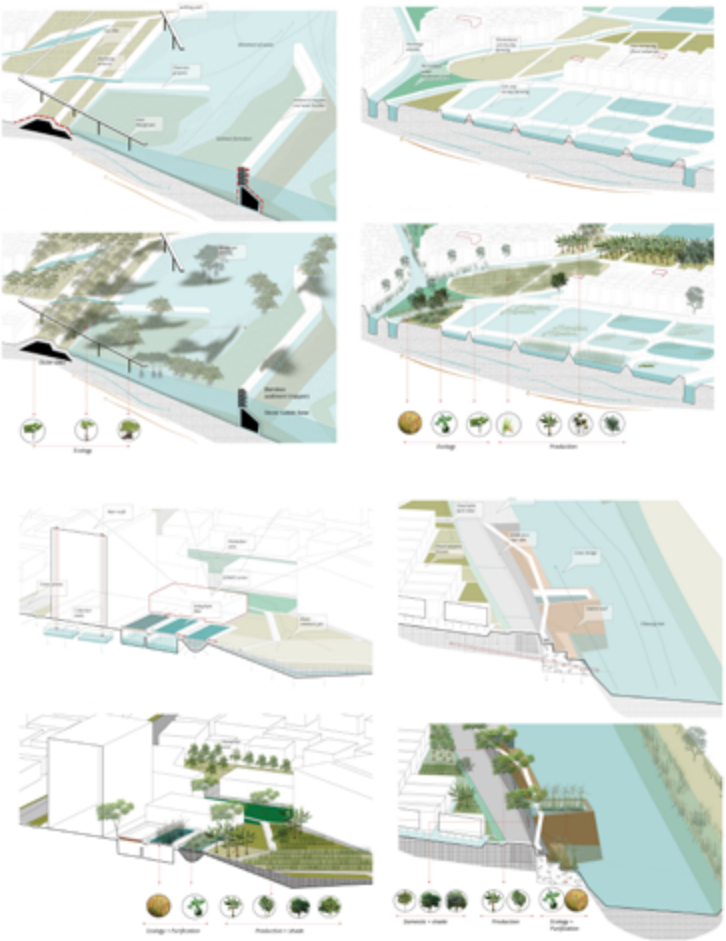
FIG. 1.42 The hybrid river edge for improved rive dynamics and ecology

Conclusion

The Strategic masterplan highlights the currently neglected and exploited river structure and the kampung communities as the essential factors for flood mitigation. There function becomes the guiding principles supported by landscape infrastructure of various scales the master plan for water resilience and healthy living environment. Even with this broader guiding principles and designs in place, the overall strategy is quite flexible considering the diversity in the geographical, socio-ecological, cultural and financial factors of each of the Kampung.

Mediating waterscapes taps in into the potential of the close relationship of the kampungs with the rivers as well as the strong sense of community and integrate it with top-down flood mitigation. Thereby shifting from a hierarchical method of water management to a collaborative way of addressing the water-related problems in Jakarta for future resilience.

FIG. 1.43 Kampungs as mediating spaces for flood resilience, circular waste water management and self-sufficient collaborative communities



Retrofitting Panyu

Adapting green-blue infrastructure to sustain waterlogging and regenerate Panyu by industrial transformation

Bo Peng

Supervisors
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Lei Qu, Urban planning

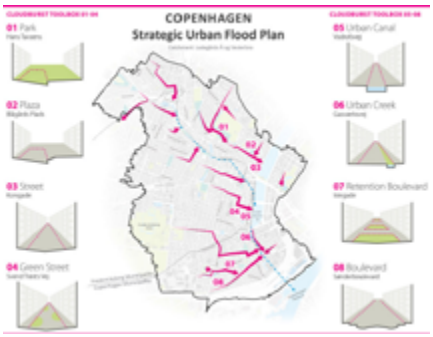
Introduction

The Pearl River Delta region includes nine cities in Guangzhou, Foshan, Zhaoqing, Shenzhen, Dongguan, Huizhou, Zhuhai, Zhongshan and Jiangmen in Guangdong Province, with a total area of 56,000 square kilometers. It is one of the three largest urban agglomerations in China with the most developed industry and the densest population. Among them, Guangzhou is a representative city.

This project serves as a laboratory for another metropolitizing delta's that deal with waterlogging and industrial transformation. In this project, Guangzhou, one of the most representative cities in the Pearl River Delta region, is selected as the research area. The main goal is to solve the problem of waterlogging. After the literature study and research "landscape as infrastructure" and the concept of Green and Blue infrastructure, this project will focus on solving the problem of waterlogging by constructing Green-Blue structures. In the process, some industrial transformation sites are treated as potential sites to expand the new structure.

At the same time, in the design project, the multi-scale analysis and design method is carried out, from the Guangzhou scale to chosen site scale, more detailed planning and design are carried out step by step.

Principles



Principle on Waterlogging

- *On a large scale :*

1 Expand connecting green and blue network to retain rainfall.

2 Increase the green and water space at higher places and upstream to leave a part of rainwater to relieve the drainage pressure of low land.

3 Increase the storage space (pond, water square...) and the permeability of the ground in low areas and downstream areas that are prone to water accumulation.

- *On a smaller scale:*

1 Each green or blue space establishes flexible rainwater runoff discharge methods according to its own characteristics.

2 Sites with pollution problems also assume responsibility for purification.

3 Sites lacking public spaces nearby also assume the responsibility of entertainment.

FIG. 1.44 Copenhagen green and blue structure plan Source: Atelier Dreiseitl

FIG. 1.45 Copenhagen strategic urban flood plan Source: Atelier Dreiseitl

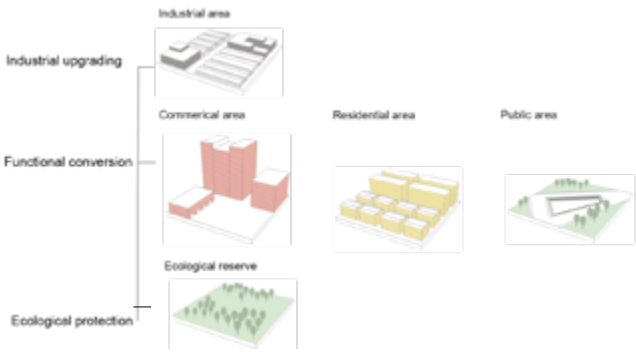


FIG. 1.46 Different types of industrial transformation

Principle on Industrial Transformation

Many metropolitan areas deal with the decline of former industrial sites due to upscaling and regional reconfiguration. Former industrial sites can be treated threewise: .

- Industrial upgrading: Industrial areas mainly located in important industrial blocks.

- Functional conversion: Industrial areas located within the range of city expanding area. They have the location with convenient transportation and high land value.

- Ecological regeneration: Industrial areas located in the future ecological protection area or have pollution. This type of conversion will give industrial sites the task of managing pollution and water purification.

In this project, the strategies of functional upgrading and ecological regeneration have been combined.

Result

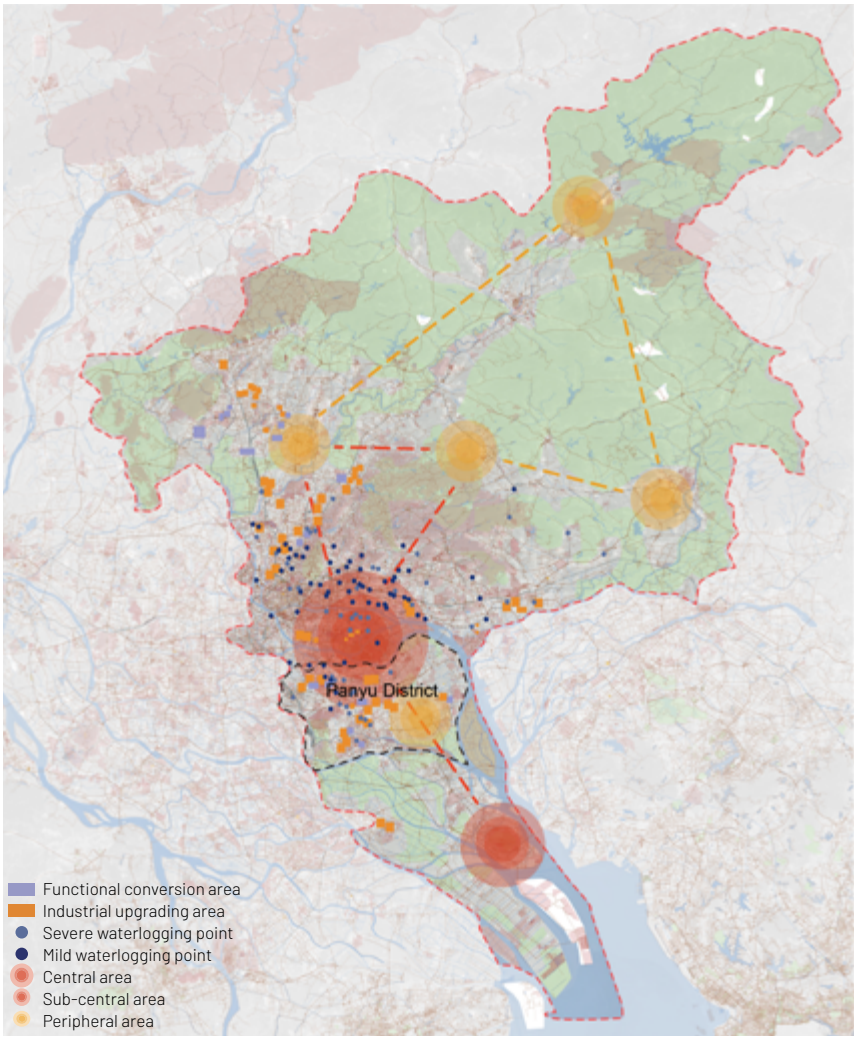
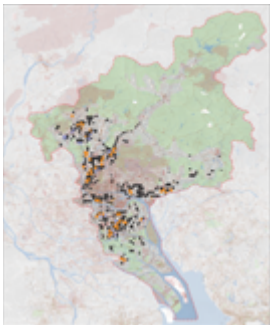


FIG. 1.47 Combined map of the Guangzhou region, illustrating waterlogging, industrial transformation sites, and urbanization processes

The waterlogging points in Guangzhou are mainly concentrated in the most densely constructed areas in the city center and along roads, Haizhu District and Tianhe District.According to Guangzhou's urban planning, the center of Guangzhou has expanded from the original Haizhu District and the southern part of Tianhe District to the former two plus the northern part of Panyu District.

Based on the above analysis, Panyu district was chosen as upcoming central zone (still partly unbuilt) dealing with both waterlogging and industrial transformation. Finally, northern Panyu will become part of the central area. In this context, Panyu District is a place where opportunities and challenges coexist.

Waterlogging is existing and increasing due to urbanization and climate change. Industrial transformation is apparent and can be employed to establish a green-blue network to sustain the metropole. One of the districts that are dealing with these issues is Panyu. It is centrally located, shows a rapid urbanizing process and therefore faces increasing waterlogging and industrial transformation. Therefore, in future development, it is necessary and meaningful to find an adaptive development direction that can adapt to the needs of urbanization and reduce the cost of natural water bodies and green spaces.



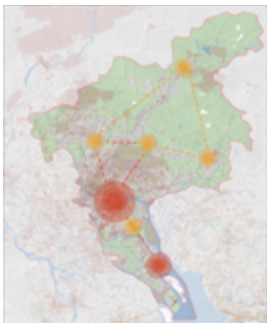


FIG. 1.48 Waterlogging point

FIG. 1.49 Industrial transformation

FIG. 1.50 City expansion

Design Strategy

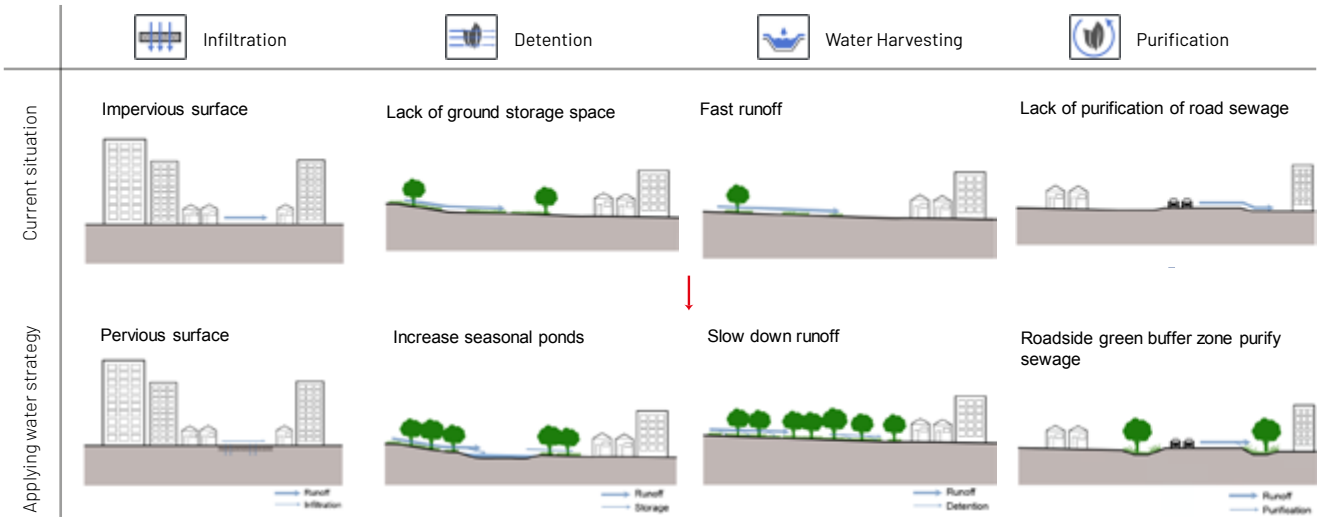
Expanding and Connecting Green-Blue Structure

The "landscape as infrastructure" concept assumes some of the functions of the city's grey infrastructure. At the same time, it can also be used as a medium to connect other urban facilities, thereby creating landscape projects with multiple functions. The concept enables landscape design to generate sustainable value in urban development.

After the previous analysis, it can be seen that most of the waterlogging occurred near the main roads. Therefore, the new Green-Blue structure first needs to find potential spaces along the main road following the guiding principle of 'landscape as infrastructure'. Then, adding some structure to cross the obstacles(roads) and connect the green spaces on the sides of roads to ensure the smooth flow of water.

FIG. 1.51 Expanding and connecting Green-Blue infrastructure

Water Strategies



The four water strategies are related to the current four water problems, which have an influence on waterlogging. the four water strategies will be incorporated in the design of the new Green-Blue structure.

Macro Scale- Panyu District

To expand the Green-Blue structure in Panyu District, some potential areas need to be found.

By employing former industrial sites located in some high dense area, like neighborhoods or villages and close to roads, (water) parks can be created to increase water capacity and increase public green spaces and parks for the local and eco-corridor along roads for drainage, water purification, and noise reduction.

By activating current left-over 'buffer' spaces in some low dense area, like between neighborhoods and along roads, around road crossing, green spaces can be created to increase water capacity and slow down runoff in the upstream area and green buffer along the road is good for drainage, water purification, and noise reduction.

FIG. 1.52 Potential areas-Industrial transformation spaces

FIG. 1.53 Potential areas-Left over "buffer" spaces

After reclamation of the left-over buffer spaces at the higher and more densely built areas and along highways. And reclamation of the old industrial sites near roads and neighborhoods where waterlogging is occurring.

The new Green-Blue structure are built, the green coverage has increased from 37.8% to 43.1%.

Comprehensive analysis of the newly added green space and water body, the high-dense neighborhood with both waterlogging problem and reclamation of former industrial areas is selected for the next analysis and detailed design.

FIG. 1.54 Overview of Green-Blue structure

Meso Scale- Neighborhood

In the previous content, the green-blue infrastructure has been introduced on the district scale. In this map the network is shown on the neighborhood scale. The green spaces in the new Green-Blue structure can be divided into five categories according to their functions in the system. The green bridge is used to restore natural drainage and to make sure the animal can pass safely. The other four types can combine with four water strategies and be used by the locals.

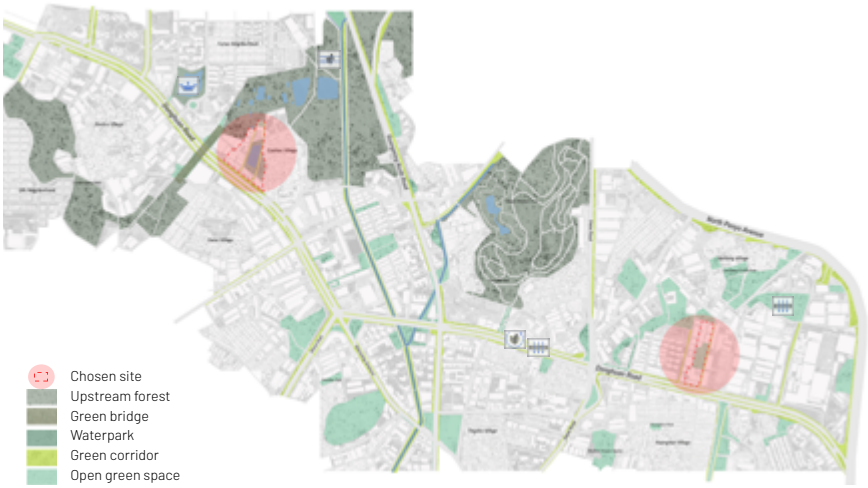


FIG. 1.55 Expanded Green-Blue structure with green typologies and chosen sites

Green Typologies

Green bridge | Water park | Upstream forest | Open green space | Green corridor

FIG. 1.56 Vision of the neighborhood

After reusing the former industrial areas and left-over "buffer" zones to expand the new green-blue network to solve waterlogging, the natural drainage system in this area is restored and the water storage space is increased. At the same time, this connected green-blue structure has become an important landscape viewpoint in the city, which increases public space and improves the living quality of local residents.

Micro Scale- Chosen Sites

FIG. 1.57 Chosen site 1

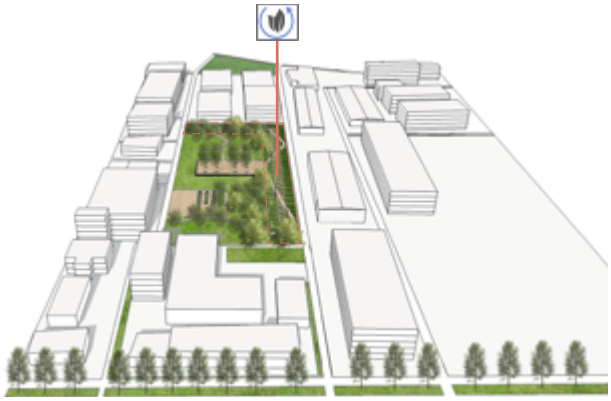


FIG. 1.58 Chosen site 2

Because the site 1 has a waterlogging problem and is closed to the urban villages. The site is designed as a public park with shops(reusing former industrial buildings) and water square in the lowest area in the park that serves as a water overflow system.

Because the site 2 is close to an industrial park and office buildings. This site is designed as a park with purification plants pond to deal with the sewage flow from the factories, and resting square for the works.

Conclusion

Reflecting through the process

After comprehensive consideration, the establishment of a new Green-Blue structure based on the theoretical basis of "landscape as infrastructure" was taken as the main design direction. The project hopes to add water bodies and green spaces to form a new connected Green-Blue network by making smart use of left over spaces and industrial transformation sites that is conducive to urban drainage. This strategy will also provide local residents with the public green space to improve their living quality.

In the process of establishing the new framework, possibilities for abandoned factories are discovered. Because many small factories are close to residential areas and urban roads, and urban roads are the main places that have the waterlogging problem. They can become an important part of the new Green-Blue structure. After that, each site itself is designed with its unique functions. These functions can give new meaning to abandoned factories and spaces according to their own problems and needs. The first park combines the function of water retention and entertainment, the second one combines water pollution and resting. So the new structure is flexible and adaptable. At the same time, this method does not directly limit the development of the city but explores the possibility of problem areas, and the Green-Blue structure itself can generate value, such as reducing the need for urban grey infrastructure. The public green and blue spaces can bring vitality to the surrounding area.

Reflecting on the outcome

The multi-scale green-blue structural design reflects the above advantages. For the large-scale Green-Blue structural design, the structure must be large enough and well connected to play a role in helping drainage and storage. Neighborhood scale design can be seen as the connection between the macro scale and the micro scale, which can more clearly express the unclear water flow direction and drainage facilities on the macro scale. Miniature design sites are the scale for people to feel the spatial quality. These selected locations not only solved their own problems and paid attention to the needs of the local people around them, but also formed a complete blue-green structure.

Of course, the design of the blue-green frame is somewhat idealized. To truly realize this structure, the project needs the support of local government policies and the cooperation and understanding of local people. But it is a meaningful attempt and a solution that can be considered. For governance, it is important to acquire the Green-Blue structure in a growing metropolitan area. The structure is not the only way to solve the problem, but it is more sustainable and flexible. Green spaces add value to surrounding communities. Because the entire Pearl River Delta region has similar geographical characteristics and similar development models, many cities are facing similar problems, such as industrial transformation and urban waterlogging. If this method proves to be effective and can be implemented, then for the entire region, this is a new possibility that can be widely used.

FIG. 1.59 Water square in chosen site 1 with a pond of water after rain

FIG. 1.60 Wooden path in chosen site 2

Exploring New Productive Landscapes

Landscape-based spatial and temporal planning and design of post-industrial areas along Foshan's waterways

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Supervisors
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Introduction

The definition of productive landscape has different programmatic and spatial meaning when viewed in different eras. The Pearl River Delta (PRD) has seen multiple cycles of different types of production subjugated upon their land. In the past decades, with the rise of consumerism and globalization, parcels of rural land were more and more transformed into factories manufacturing goods, which brought about rapid rural industrialization and urbanization throughout the region. This process resulted in as much as 60% of new urban land cover being converted from previously non build-up areas such as agriculture land and forested areas in this industrial city between 1988 and 2003 (Zhang, 2008). The change in landcover placed pressure to the drainage system and water retention capability in the area, which resulted in increasingly deadly flooding. Water plays an essential role during the manufacturing process, and at the same time is affected by the latter: most of the waterways in the PRD are nowadays heavily polluted and toxic for the environment and for people living around it. Unfortunately, the environment took most of the direct impact of the rapid and uncontrolled industrialisation and urbanisation.

In 2019, the PRD was rebranded to The Greater Bay Area (GBA), where economic development plans were laid out for market integration and advance development among the cities in the region. One of the impacts of this new development plan is that most cities area will likely shift to a higher skill labour and high-tech advancement in their manufacturing industry. The shift from traditionally intensive production to advanced and high-tech manufacturing will create changes in many

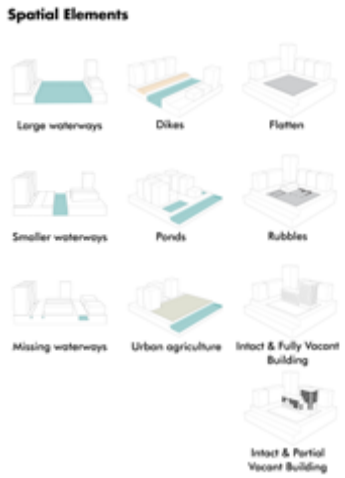

FIG. 1.61 Common spatial elements ,natural and urban found along the waterways of Foshan

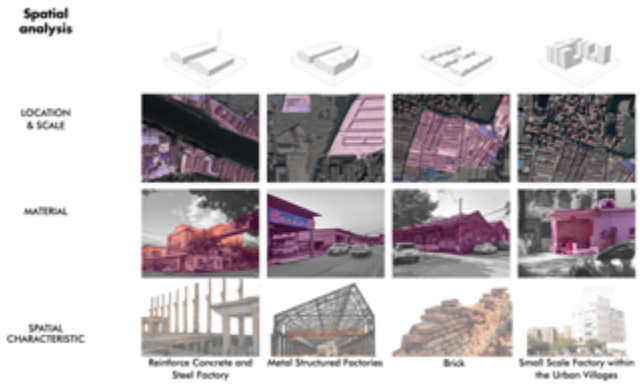

FIG. 1.62 Spatial analysis of typical industrial typology

different aspect, ranging from the labour market to infrastructure. The streamlining of production due to the technological advancement implemented by businesses will result in the reduction of factory operations and labour size thus leaving cities with decommissioned industrial areas. Nevertheless, the transitioning period allows for the opportunity for transforming these scarred land sustainably, looking at the opportunities that emerge from such transitional conditions, to remediate polluted soil and water using landscape based solutions to give back safer and healthier spaces for the benefit of the ever changing community and the environment, while setting the bases for new and more sustainable economic activities. Delta regions are characteristically dynamic, they evolve in space and time, so must be the solution. So how do we appropriate decommissioned industrial areas located along waterways to mitigate the impacts of urban flooding and water pollution while also redefining the relationship and interaction of the inhabitants working and living nearby with water using landscape based solution?

Principles

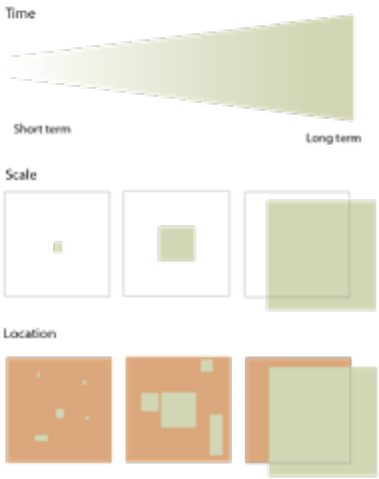

FIG. 1.63 Temporal, spatial & geolocation lense

Time | Scale | Place

The landscape-based planning and design approach on Foshan allow for the area along the waterways to be more adaptable and resilient to the future scenarios. The principles used are able to deal with the dynamism of the deltic region and the uncertainty emerging from the future changing conditions. While we cannot precisely predict the future, Projects that address the transformation of the urban landscape must propose spatial layouts and programs that are flexible enough to adapt and mitigate the impacts of climate change and human activities.

The temporal aspect allows us to understand how the area worked in the past, what worked, and what did not. The environment is a dynamic entity which is constantly shifting. Hence, understand-ing processes on a timely dimension can help to have a grip on how structures and processes co-evolved, and at the same time provides a hint on what elements can be readapted and how to solve current issues.

Looking at different scales is essential, especially because water is a continuous element which flows from one point to another according to pressure and gravitational force. Projects involving wa-ter must be tackled in an inter- and multi-scale manner; pollution in a small waterway will eventually reach the bigger waterway. Although pollution in one small waterway may not harm the whole sys-tem, if the entire small

Landscape Principles & Spatial Solution

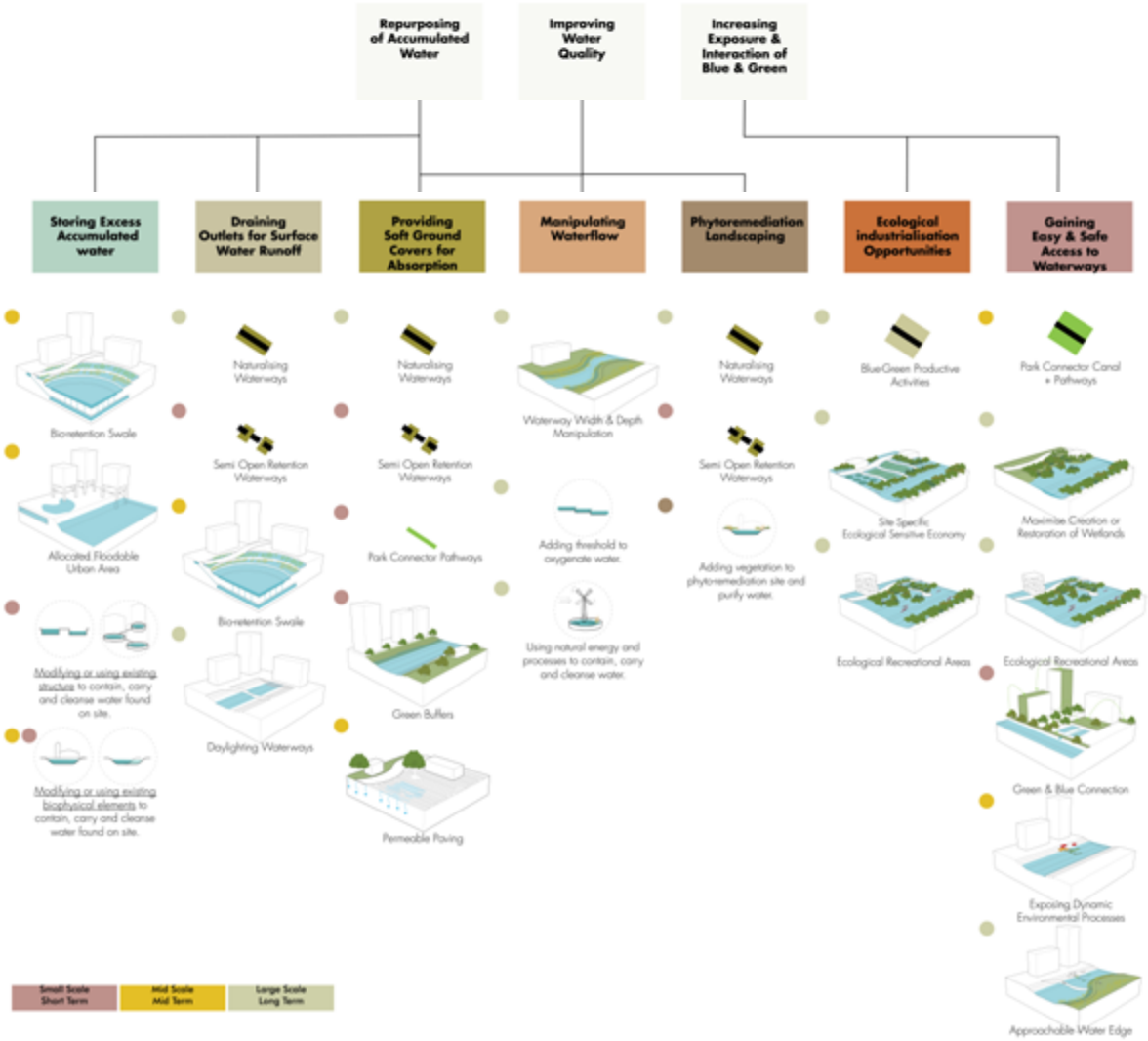

FIG. 1.64 Landscape emphasised principles and spatial design solution synthesised from case studies and analysis that will aid in tackling the challenges encountered on site.

waterway network (made of many small waterways) is polluted, then it will definitely impact the waterway system downstream.

Addressing the design looking at the context is also important, especially during the planning stages as depending on how large space and where is it located and vice-versa how small spaces and where it is located will determine the permanence or flexibility of a programme. In the end, these three parts are interrelated and when taken into consideration altogether, they will have a programmatic outcome that allows for a long term, infrastructural level programmes like wetlands that anticipate and respond to the predictable impact and consequences climate change and nature such sea-level rise and typhoons or flexible short term programmes such as urban squares that allow for quick adaptation in response to sudden and unforeseen disasters like a broken dike.

Result

To address, the three above mentioned challenges the project explore design through 3 issues on-site namely, i) missing waterways ii) urban flooding, and iii) polluted waterways. As water is a multi-scalar element, working with it requires a multi-scaler approach. The project takes into consideration four scale; the city, the district, the neighbourhood and the building scale. The design solutions work through multiple scales and many of the solutions also overlap with others and build upon each other. Some of the solutions are part of the long-term infrastructure type of programmes while others are for short-term and flexible programmatic areas (Fig1.4). This temporal aspect of design will lead to a certain portion of the area to evolved into the different programme as years go one and as the area develops while some area will have multiple functions within a timeline as demonstrated in Fig1.15.

Missing Waterways

The resurfacing of missing waterways is essential as an open waterway promotes will allow for i) the addition of soft ground covers to allow for absorption of water into the ground ii) provision of more outlets for surface water runoff drainage iii) opportunity for phytoremediation landscaping, iv) community to move towards eco-industrialisation and v) allows for easy and safe access to waterways for human interaction. This will result in the re-establishment of a green and blue network of the district. Various waterway, big and small, open and semi-open, resurfaced and connected.

Urban flooding

Urban flooding is an major issue in the region, due to the cities' highly build-up surfaces, heavy annual rains and its low lying land elevation. Analysis have shown that much of the flooding happens in the historical district of Foshan, located ironically in the highest elevated area. To solve this,the i) storage of exceeding water ii) additional permeable ground covers to allow for absorption of water into the ground iii) provision of sufficient outlets for drainage and iv) the manipulation of waterflow speed in the waterways; are measures proposed to increase water retention and permeability in the area as demostrated in Fig. 1.10 - 1.12.

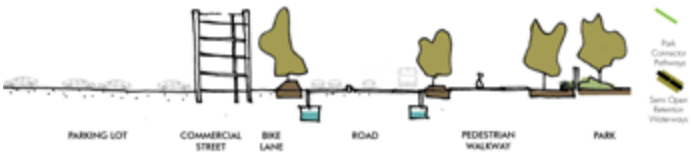

FIG. 1.65 Existing condition of an existing build-up commercial area with a missing waterway

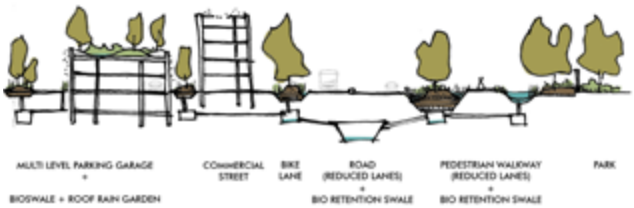

FIG. 1.66 Semi-open waterway system along with landscape solution applied to the area to improve drainage, awareness and district green-blue connectivity

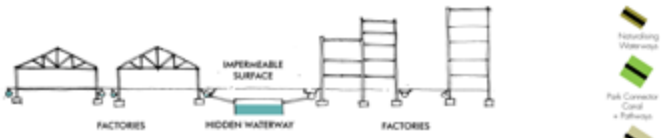

FIG. 1.67 Existing condition of an industrial area with missing waterway

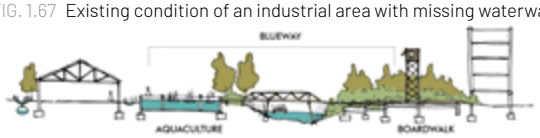

FIG. 1.68 Open system: Adaptation of factory structures into aquaculture ponds and boardwalk foundation

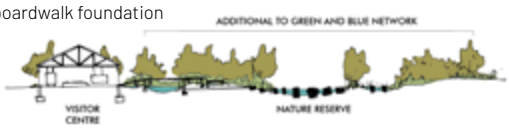

FIG. 1.69 Open system: Naturalised waterway and wide green buffers as new wateredge and new G+B network

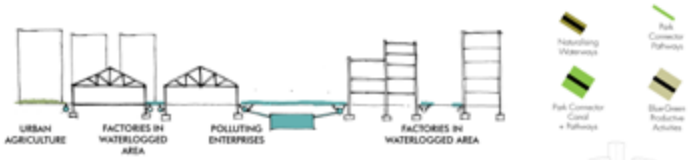

FIG. 1.70 Existing flooded industrial area nearby urban village

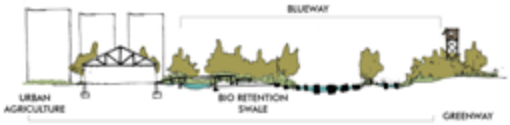

FIG. 1.71 Nature Oriented Transformation

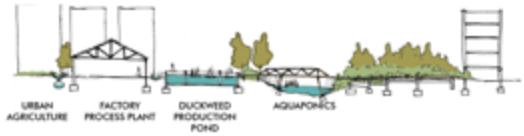

FIG. 1.72 Ecological Industrial Transformation

Polluted Waterways

Waterways in Foshan are still heavily polluted due to the decades of industrial activities and the difficulties of enforcement of illegal pollution disposal. While some of the larger and main waterways conditions have been improved by the city, the many smaller waterways remain polluted, which ultimately spreads the pollution to other cleaner waterways. The water quality of these polluted waterways will be improved by i) designing elements in the water network that allows for manipulation of waterflow speed and ii) growing plants for phyto-remediation along waterways. The width, depth and water edges of waterways in existing and resurfaced ones will be manipulated to adjust the waterflow speed. Wider waterways with gentle gradient slope that will be planted with phytoremediation enable plants will allow water to slow down and for microbial and metal pollutants taken up by plants. The slower water will also allow for sedimentation of heavy particles in water. And the pressure when water enters into narrower and deeper waterways will cause water to move faster, hence preventing water to stagnate in the waterways. This will help to flush and move water to other parts of the waterway where it will continue to be treated as seen in Fig 1.13 and 1.14.

Industrial Structures

The de-industrialisation of the region provides the opportunity to adapt the land and existing industrial structures as part of the landscape design solution to tackle the challenges. These decommissioned factories can be transformed and help in making the area resilient to current and future challenges by taking in consideration of its surrounding context, social and physical elements, and the architectural spatial characteristic (Fig. 1.1 - 1.3). This is sustainable approach as it minimise construction waste and it helps the area retain part of its industrial past. Afterall, this factories are part of the production landscape of the region. So it is interesting to explore spatially how landscape solutions can integrate with the different types of industrial structures.

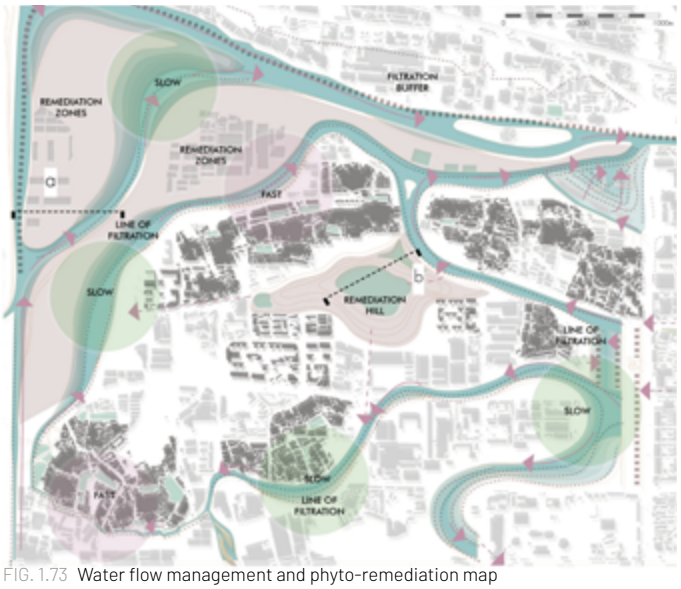

FIG. 1.73 Water flow management and phyto-remediation map

FIG. 1.74 Water flow management and phyto-remediation map

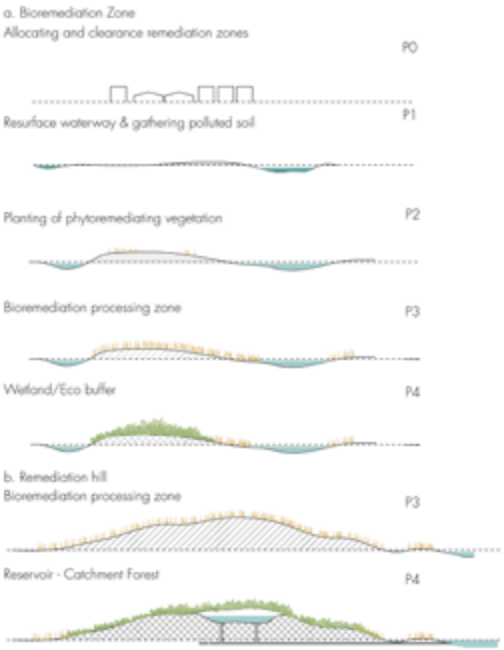

FIG. 1.75 Industrial transformation and remediation phase

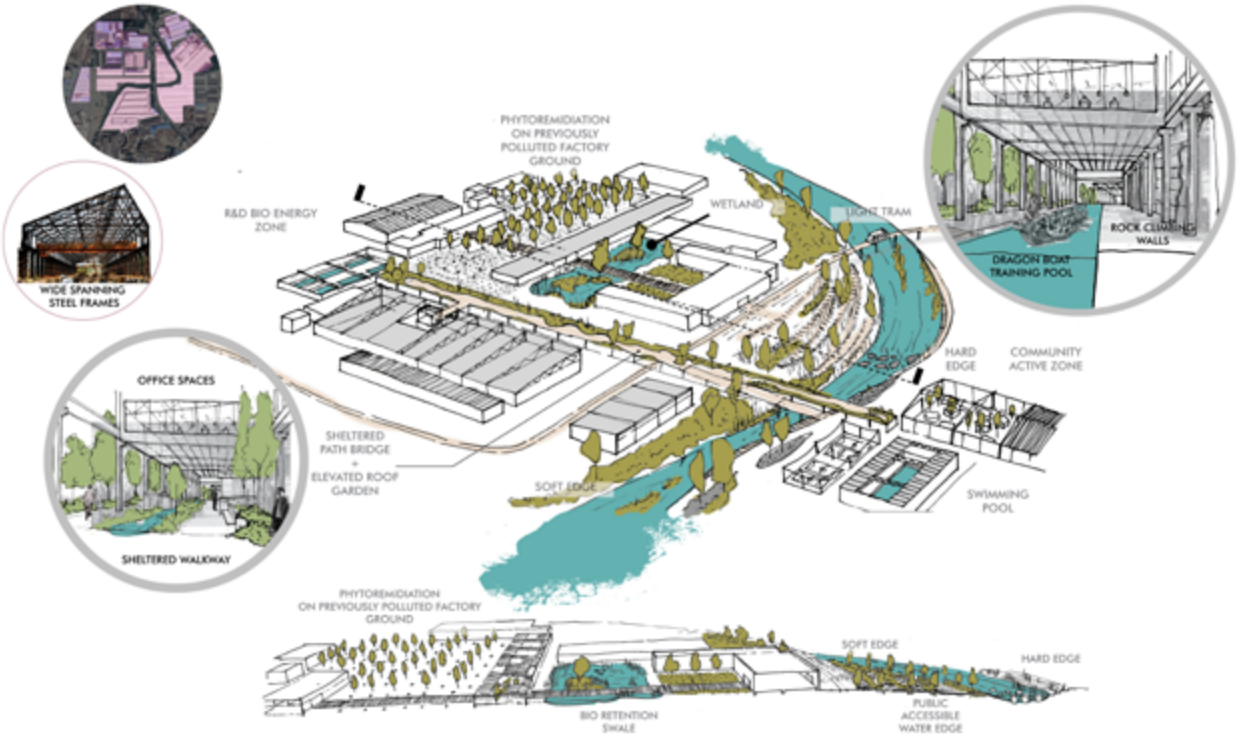

FIG. 1.76 Area transformation of predominantly steel frame structure factories

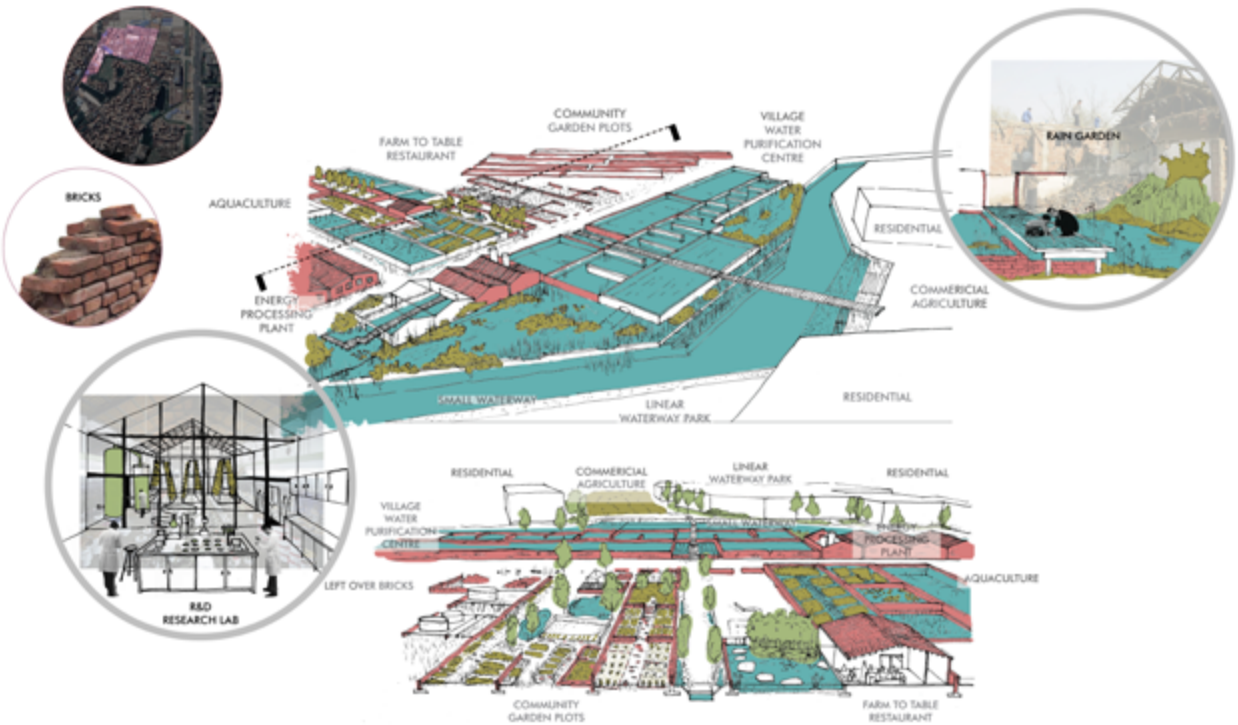

FIG. 1.77 Area transformation of predominantly brick structure factories

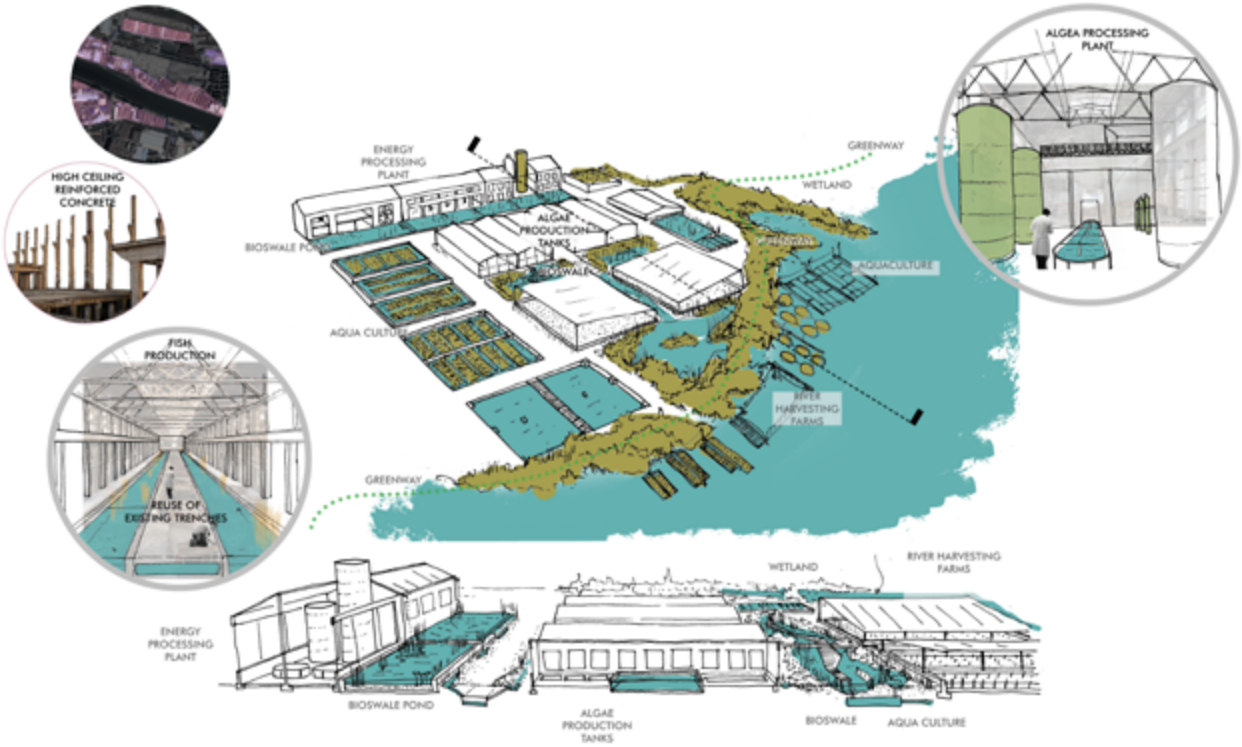

FIG. 1.78 Area transformation of predominantly reinforced concrete and steel structure factories

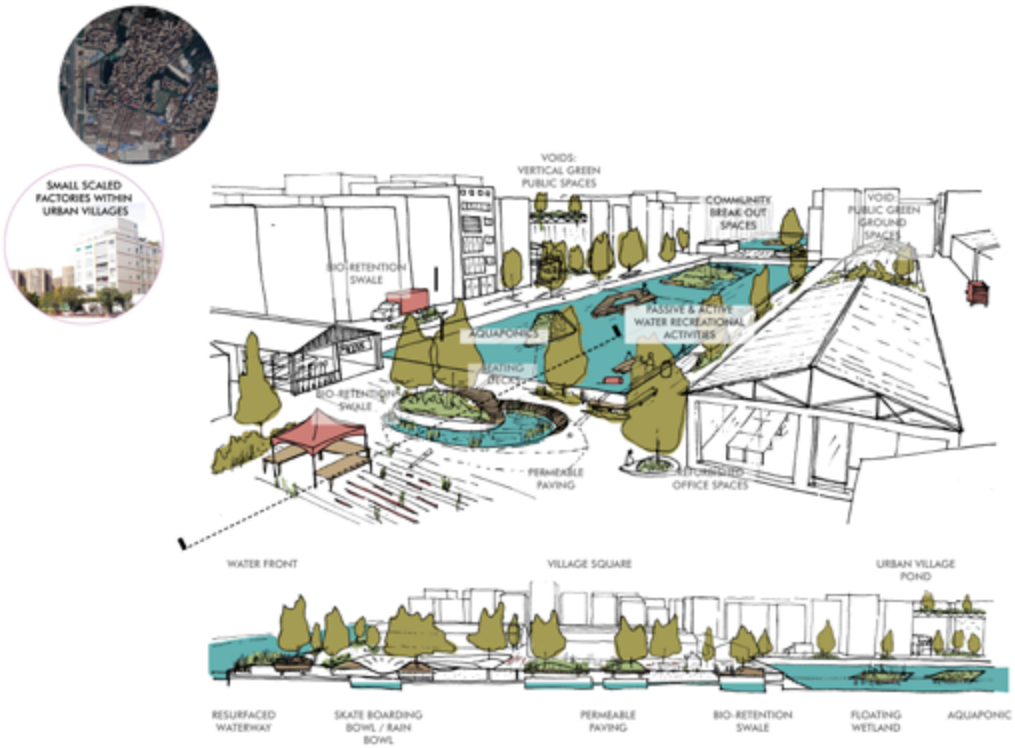

FIG. 1.79 Area transformation of predominantly small scaled factories within the urban villages

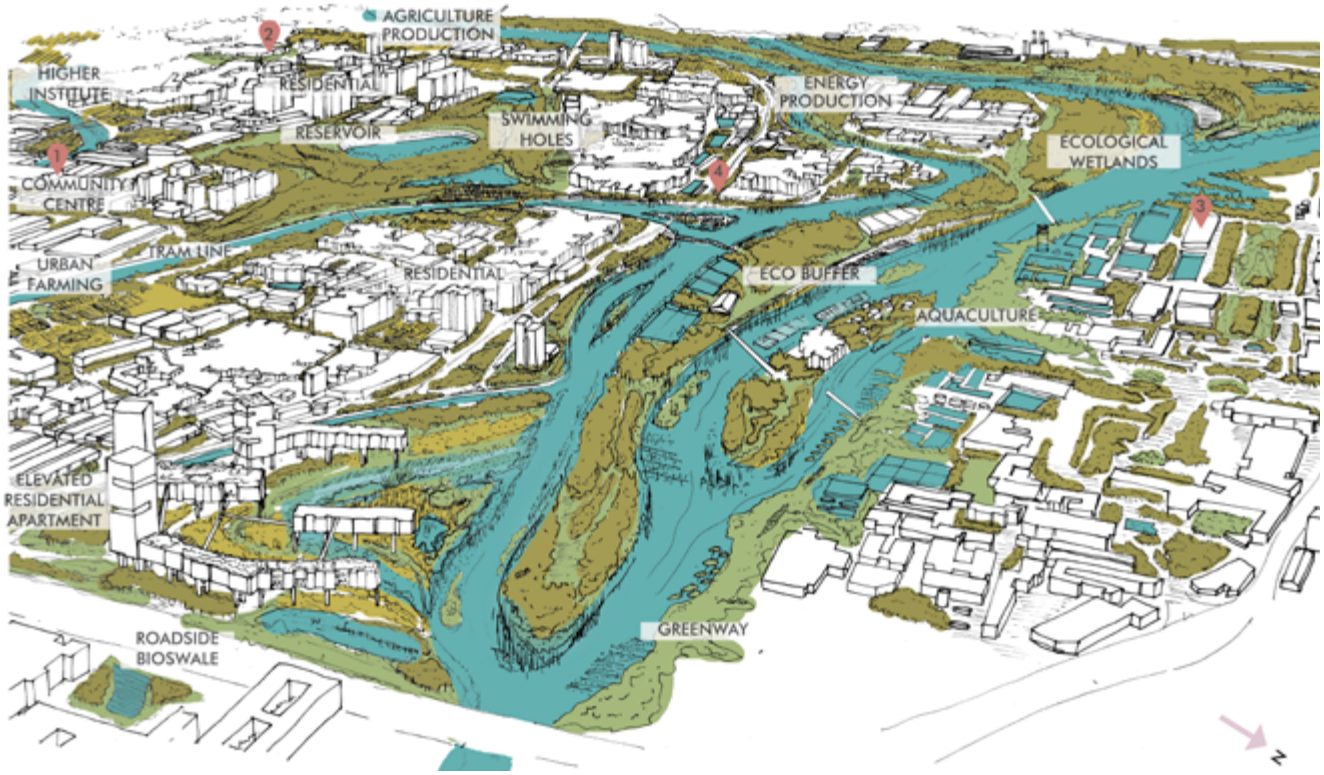

FIG. 1.80 Fenjiang Foshan Waterfront

Conclusion

An adaptive approach with a landscape focus where the temporal, spatial and geolocation context is prioritised much needed in dealing with a dynamic region such as the Pearl River Delta. Many delta regions naturally attract urban migration due to their favourable natural conditions that put them at an advance economically. In the past centuries, cities were planned with economic efficiency in mind hence neglecting the environment and the consequences of all the harmful activities. And with the advancement in technology, commitment to cleaner and sustainable practices and also with the change of socio-demographic of industrial cities, many these redundant industrial spaces can be transformed to adapt to the dynamic delta conditions. This project provides principles and a toolbox of design strategies that delta cities at risk can implement, not only onto their decommissioned industrial sites but also other types of wasteland that are also facing hydrological and pollution issues. The value that the design can add into this project is the seamless and gradual integration of the landscape into the urban structure and spaces; landscape as solutions to the climatic and urban environmental issue and as an element to improve the overall quality of living space.

Water resilient and adaptive development of Pazhou island

Jiajun Wu

Supervisors
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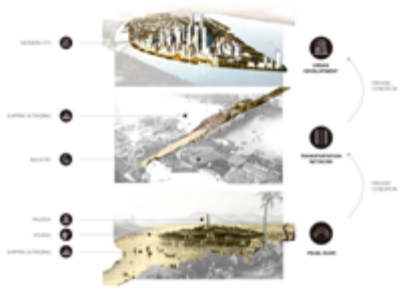
Leo van den Burg, Urban design

Introduction

The Pearl River Delta (PRD), as one of the fastest developing deltas in terms of land expansion and urban development in the world, is facing severe challenges related to Urban expansion and densification, urban flooding, and identity crisis. Also, climate change will increase urban flooding by sea-level rise, increasing river discharge, heavy rainstorms and hurricanes. How to find a balance between space for urban expansion, space for the river, and space for historical heritage? The chosen site for the research and design is the Haizhu district and Pazhou island in the centre of the delta.

Through research into the history of the delta and the site, a clear development logic appears: from the landscape to network, then urban development. Stretching back to ancient times, the Pearl River provided conditions for fishing and trading and was the location of the first urban centres in the region. After some decades, the construction of the regional infrastructure networks provided conditions for the later massive urban development process.

Such a development logic can be explained by decomposing the landscape into layers that address different dynamics. Here three layers are distinguished that have different changing speeds. The more resilient way for planning is to take the



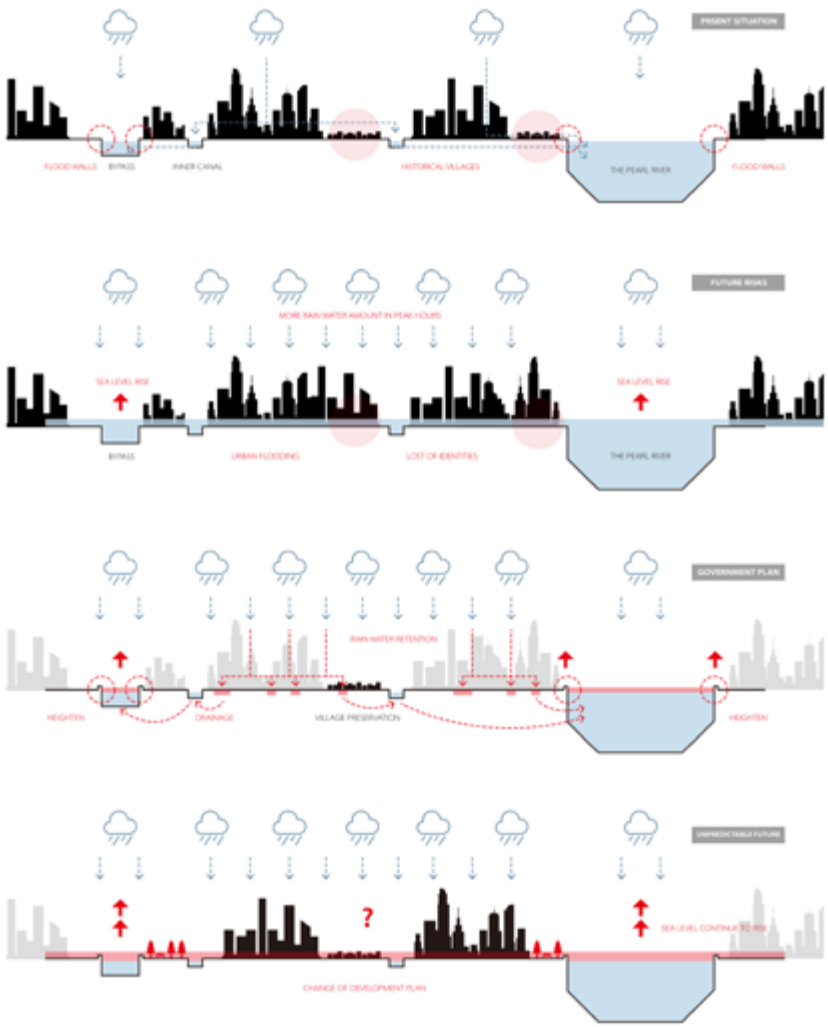


FIG. 1.81 Problem statement

FIG. 1.82 Historical development conclusionProblem statement

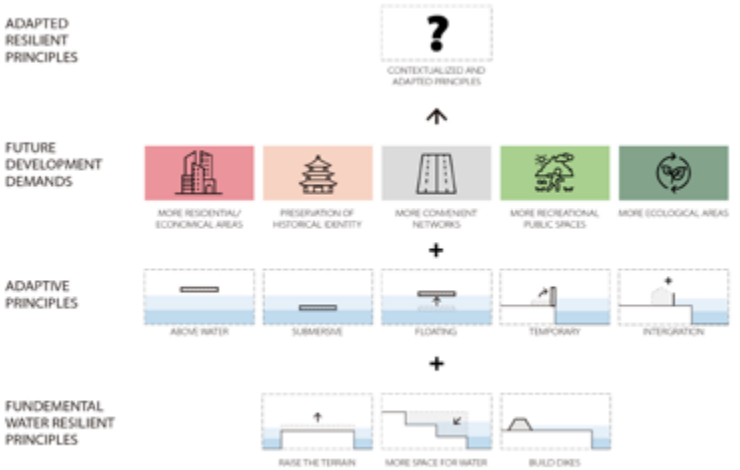
FIG. 1.83 Design site Pazhou island

FIG. 1.84 The existing planning practice and future challenges

landscape as the basis, then develop a network structure, which together provides conditions for urban development. The contemporary planning practice, however, takes the urban development as the basis for altering the networks and natural landscape system, resulting in unsustainable solutions.

The objective is to design a fundamental water resilient landscape framework and explore adaptive principles for urban developments, taking Pazhou island as an example. The possibilities are explored in the process of research by design, which is a back and forwards working process. The research helps design decisions, and the design helps backwards to understand the research objective.

Principles



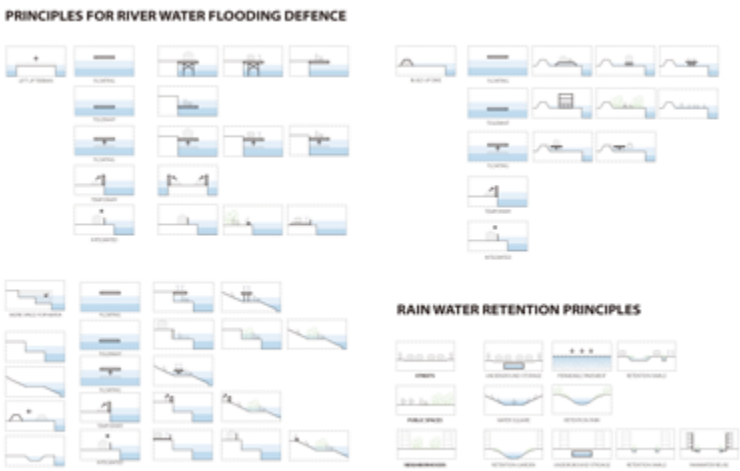


FIG. 1.85 Adaptive principle

FIG. 1.86 Water resilient principle

Based on the analysis of flooding risks of Pazhou island, there are multiple sources of coming floods: river water, rainwater, and storm surge coming from the sea. Thus design principles for water resilience should address flood protection by rivers and sea and also increase rainwater retention in the inner dike area.

First, three necessary water resilient principles are defined that are suitable for Pazhou island. The next step is to explore how the principles can adapt to different situations: five adaptive principles are defined. Then the third step is to research the possible future development demands of the area that address five different categories. This process resulted in a set of adaptive design principles that serve as a base for the design explorations.

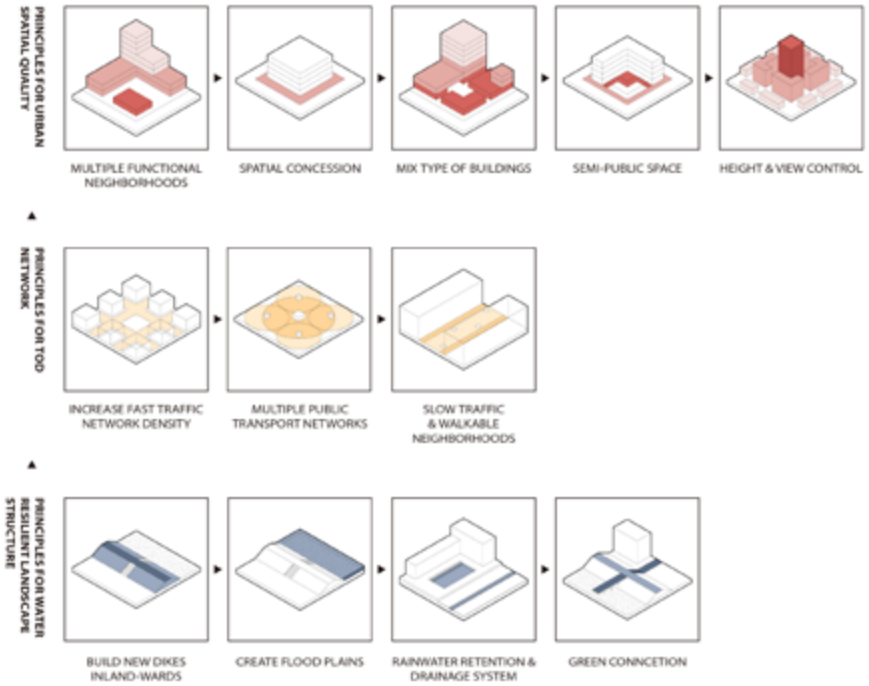


FIG. 1.87 FIG 7. Design principles for three layers

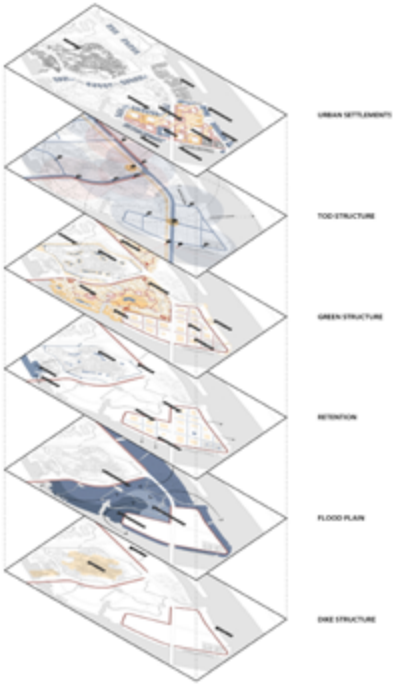


FIG. 1.88 FIG 8. Design layers from landscape to network and urban settlement

Result

The design is based on a layered approach taking the landscape as the basis. In each layer, specific design principles are used to address the challenges and exploit the spatial opportunities; from water inclusive principles to TOD principles to urban spatial quality principles. Layer by layer, step by step, the design will be naturally build up.

The detailed designs of the wetland park, try to balance the urban and ecological functions. The park consists of three levels of elevation. According to the elevation, the park will accommodate different vegetation communities that will develop according to their adaptive capacity to water and results in different spatial effects in the different elevation zones. The accessible areas of the park are located at the highest elevations, to keep dry feet and carry various urban functions like retail, exhibition, or more. The park also accommodates distinctive housing typologies such as a pile dwellings. Moreover, since the park is part of a regional ecological corridor, some native and migratory bird species might appear in different seasons.

In the design, the transition between the more natural environment and the urban environment is crucial. Spatial strategies for this transition include creating visual connections and by increasing accessibility by networks for pedestrians and cyclists.

By using resilient water principles, Pazhou island can adapt to different flooding scenarios. On the island scale, the outer dike areas, whether urban or wetland, can be flooded at different water levels while keeping the main urban functions like traffic or activities to go on. There are also strategies applied on the smaller neighbourhood scale. In the zoom-in perspectives, the spatial effect of some typical urban spatial typologies during different flooding situations are shown.

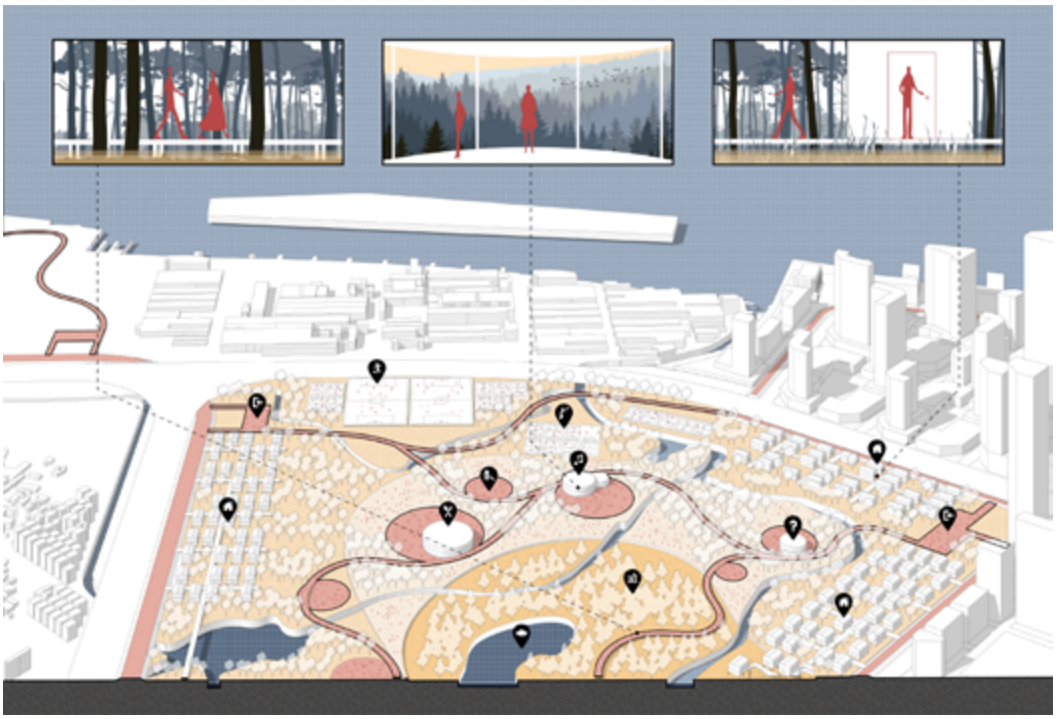


FIG. 1.89 Wetland park scenaries and function

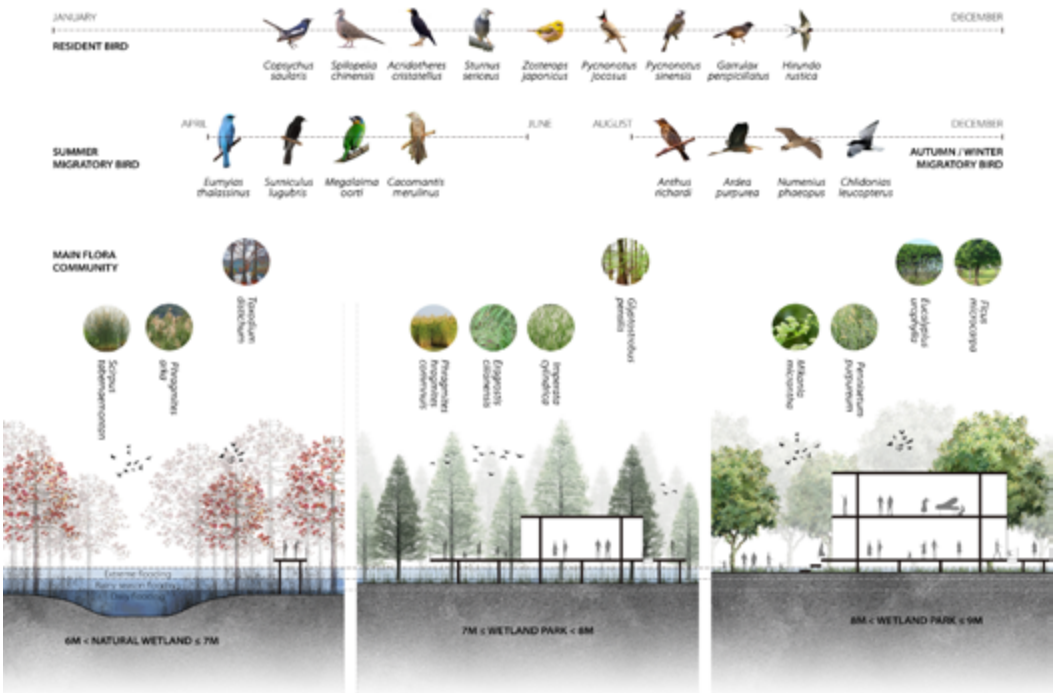


FIG. 1.90 Wetland park sections, flora communities and bird species

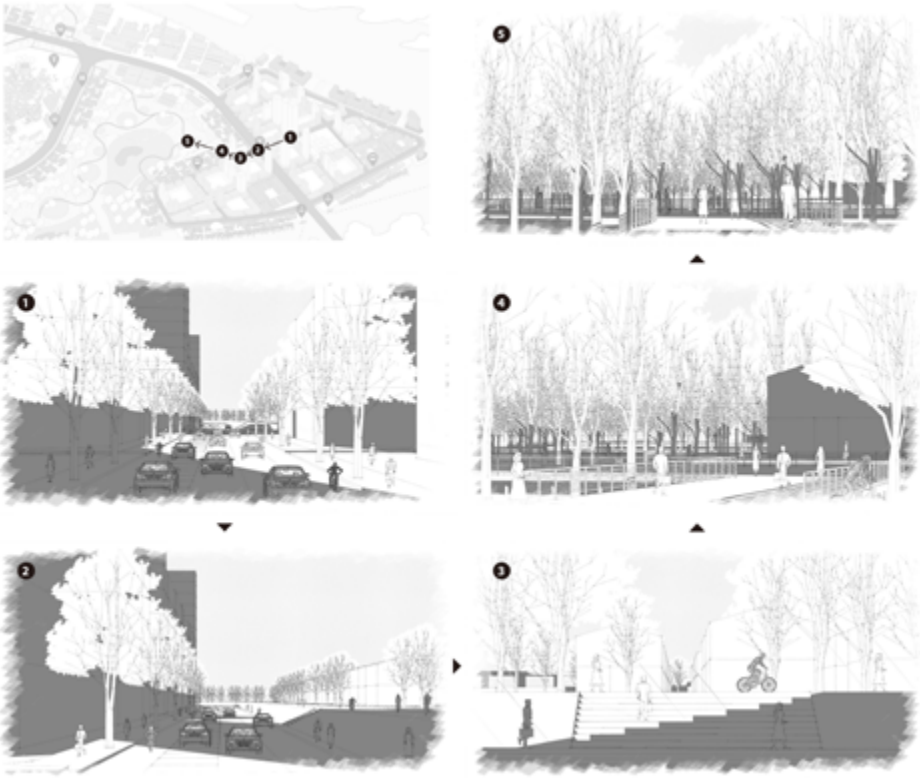
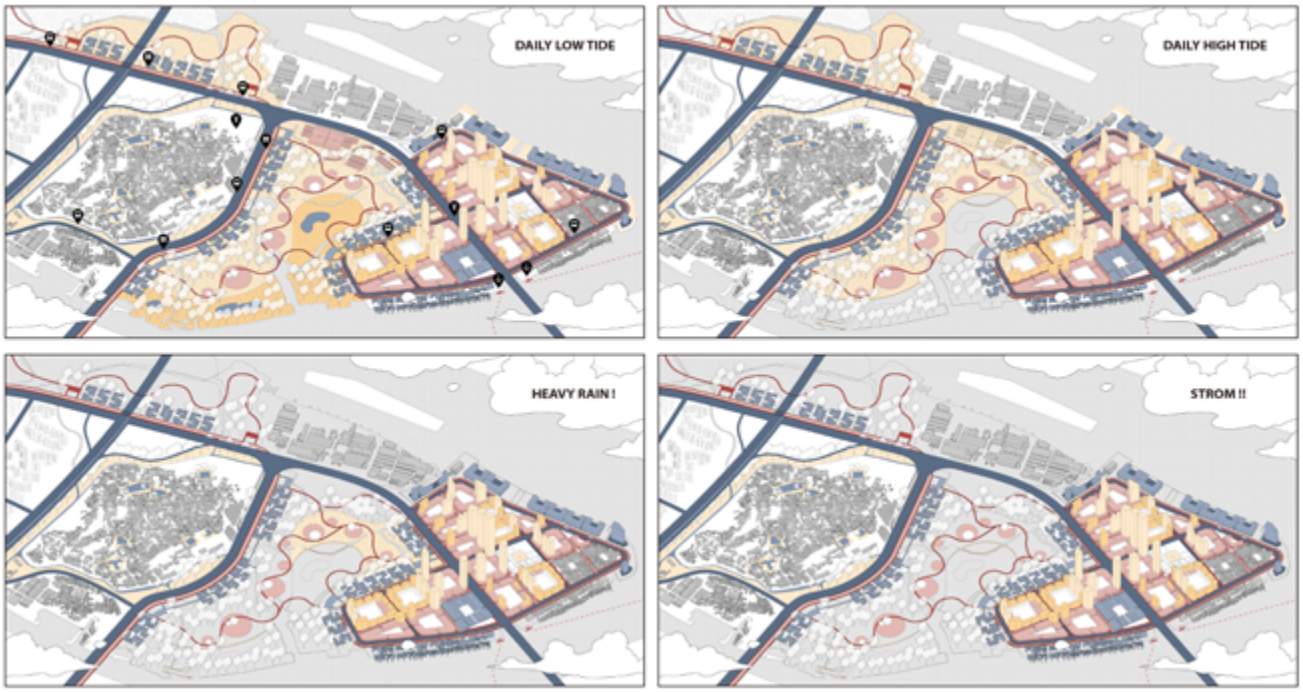


FIG. 1.91 Spatial transition from urban center to wetland park

FIG. 1.92 Changing water level of the whole eastern Pazhou



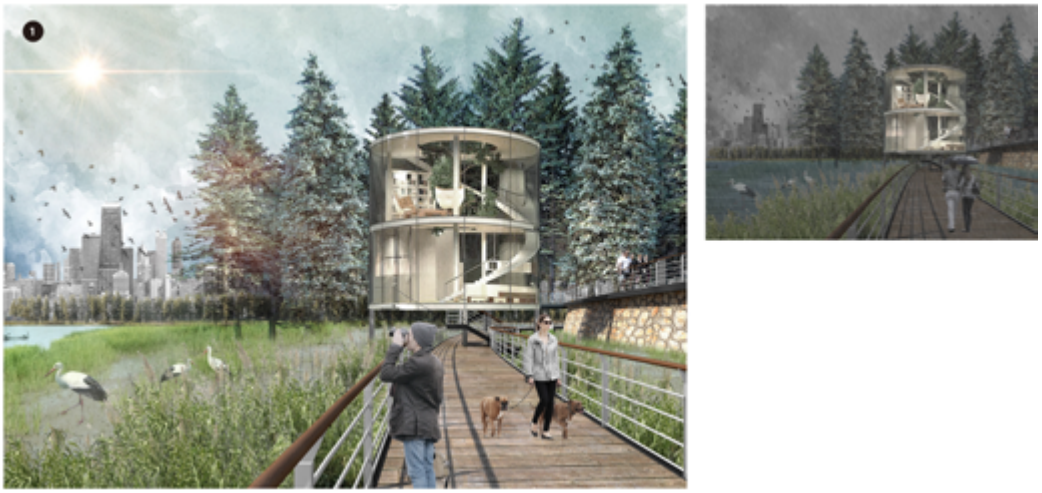


FIG. 1.93 Changing water level of wetland park

FIG. 1.94 Changing water level of outer-dike flood tolerant neighborhood

FIG. 1.95 Changing water level of inner-dike rainwater retention neighborhood

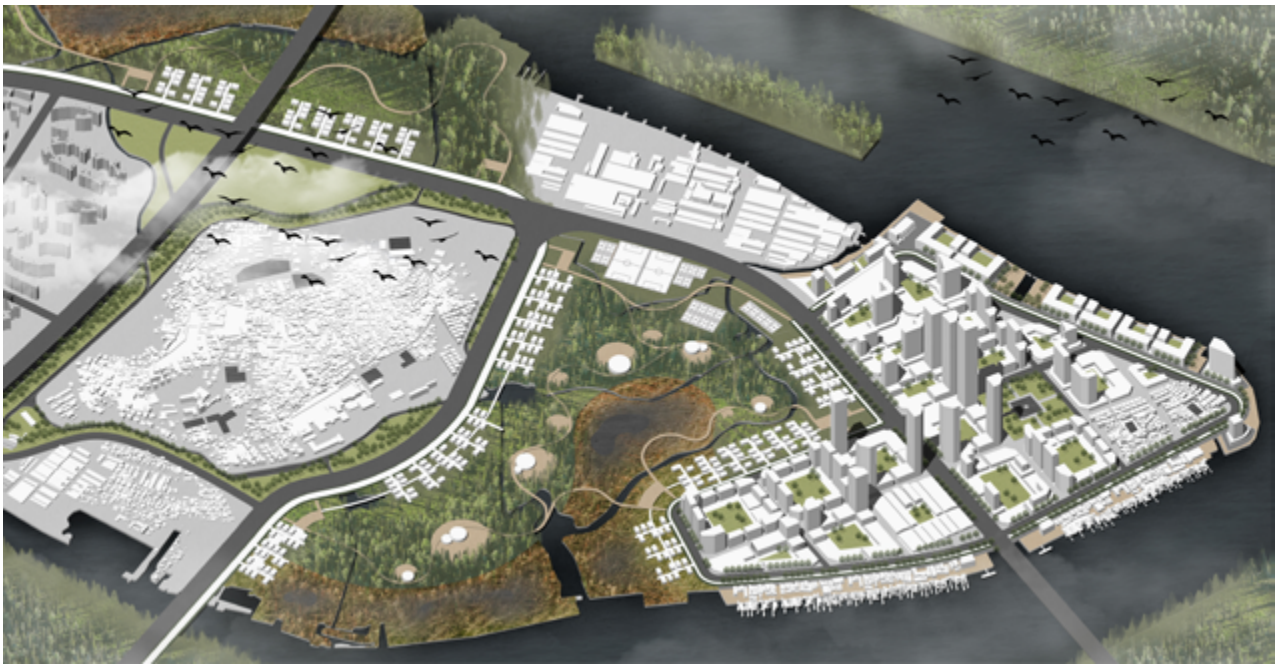


FIG. 1.96 Bird eye view

Conclusion

The layered approach is the core of both the research and design. In terms of research, through analyzing the historical and present conditions of the landscape, the network, and the urban settlements of the region and Pazhou island, a proper understanding of the whole context was gained. In terms of design, the order from creating a resilient landscape structure first, then a TOD network, then to a high-quality urban development makes the whole design process both logical and meaningful.

Following the layered approach, research by design is employed: "...through design explorations, and research questions can be answered related to the possible shape of urban, peri-urban, or rural landscapes, as well as how changes in the built environment can be designed or guided while using social or ecological processes." (Nijhuis, S & De Vries, J, 2020).

The research on the site, whether through scales or times, helped to understand the local conditions and identities that further guide the design decisions. On the other hand, the design exploration process helped to understand the site in a 'reverse way', which again benefited the design itself. The design exploration does not stop as a site-specific design for Pazhou island. It is a process of working between general knowledge (design principles) and specific design (site context).

Furthermore, due to the complexity and the uncertainty of the future development requirement, one site-specific design is not enough. The design needs to be adaptive. As long as following the proper design principles in each layer and base on the resilient landscape structure, the design itself can be looking different according to the development demands while still keep the resilience and the respect of the local cultural context.

Redefine the border of water

Exploring the potential of the Grand Canal as a backbone for adaptive and resilient urban development in Tongzhou

Linyu Qu

Supervisors
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Fransje Hooimeijer, Environmental technology

Introduction

Globally, cities are turning their back to the water. Despite their potential, many water infrastructures such as canals or watercourses are often not used as backbones for social-ecological inclusive urban development. This research seeks to activate water infrastructures through landscape methods and illustrate that water can be regarded as a generator for urban life.

The Beijing-Hangzhou Grand Canal in China, a significant water infrastructure stretching from Hangzhou to Beijing, used to be a backbone for urban life and played an essential role in the social, culture, ecology and economy of the territory. It was built as an infrastructure for defence and transfer of goods to the capital city and also acted as a lifeline for towns in history.

Beijing is a city with uneven rainfall, and the temperature varies greatly between summer and winter. The municipality is planning Tongzhou district as a subcenter for Beijing city centre, so there would be an influx of people to Tongzhou. Hence there would be a need for a new landscape infrastructure to enhance the social and ecological connectivity. The Grand Canal can serve as a landscape infrastructure in Tongzhou district, creating spatial conditions for social-ecological inclusive urban development. The watercourse is here about 14 km long, with a changing spatial context that ranges from a business zone to the community zone to a more natural setting. There are potentials to connect the different zones in the longitudinal

section and build interaction between the neighbourhoods to the waterfront laterally and vertically. So instead of being only used as a water container, there are potentials to turn the role of water in cities more positive and let it influence life in the urban area again through landscape methods.

This project explores the potentials of the Grand Canal as a backbone for urban development in Tongzhou. It is considered to be an urban landscape infrastructure that exploits the longitudinal, lateral and vertical dimensions and creates conditions for the development of a social-ecological inclusive urban landscape and sustainable water management.

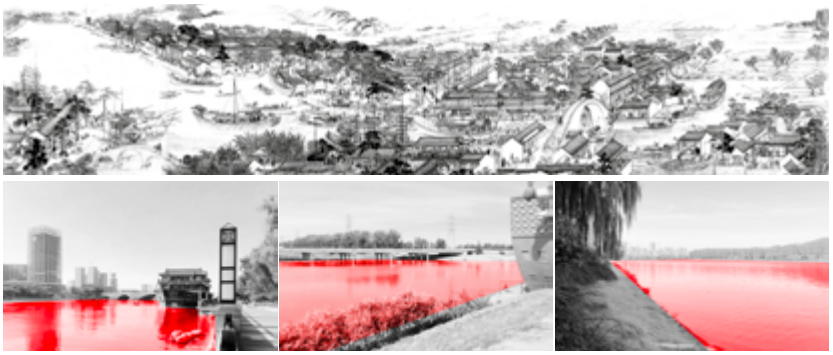


FIG. 1.97 Canal from lifeline to water container (Source: Prosperous Suzhou, Xu Yang)

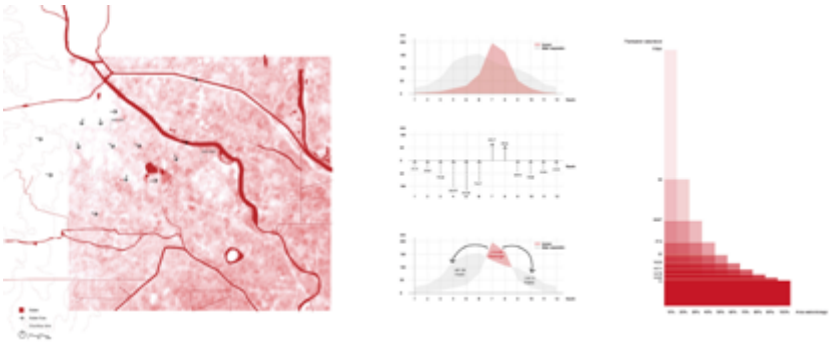


FIG. 1.98 Water flow and water evaporation

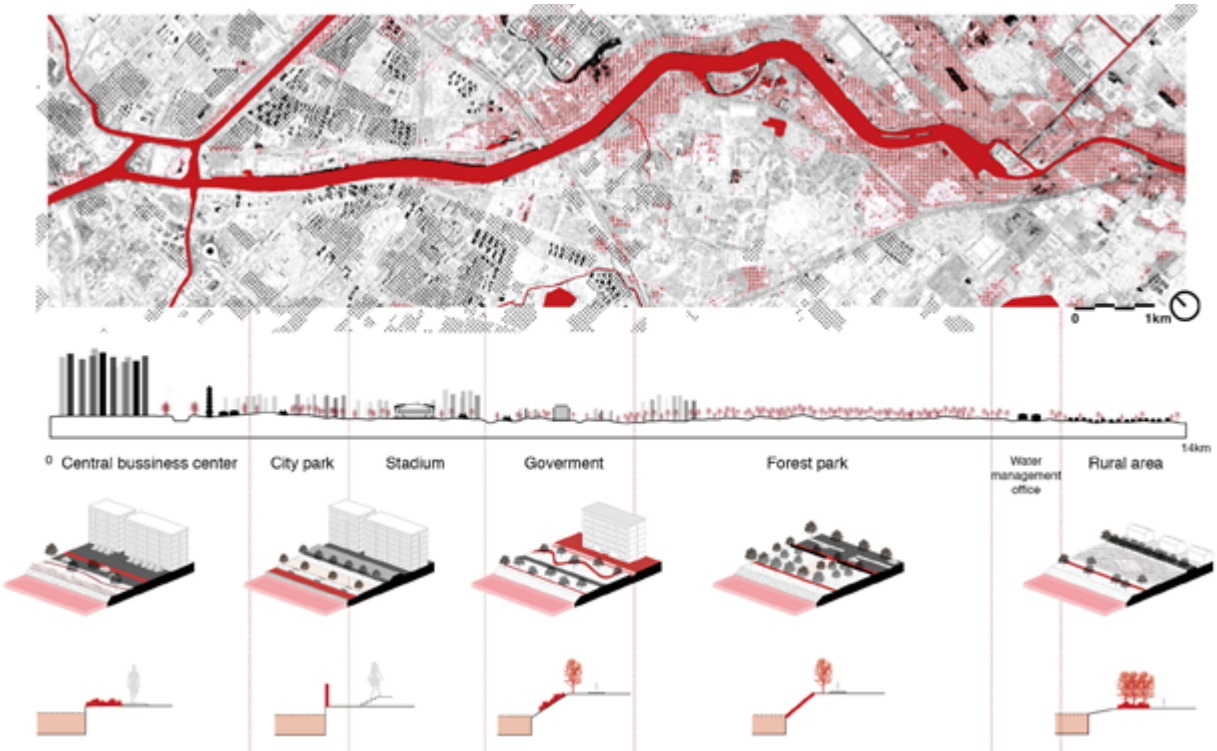


FIG. 1.99 The urban context and the unconnected network in longitudinal, lateral and vertical dimension

Principles

Inspired by Nijhuis (2014) and Kondolf (2017), there are four discourses and three dimensions to consider since this project focusses on transforming the infrastructure to landscape infrastructure. The four discourses can be divided into social, ecological, technical and spatial aspects, the three dimensions (longitudinal, lateral and vertical dimensions) refer to the social connectivity from neighbourhoods to the waterfront. Longitudinal refers to the flow of water and connection along the water bank. Lateral refers to the link from one's community to the waterfront and ecological connectivity, the vertical refers to the relationship down to the shoreline space between water and people, water and ecology.

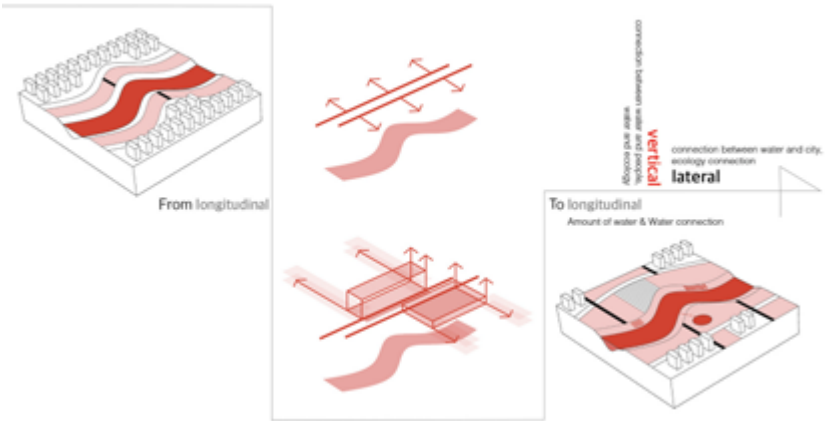


FIG. 1.100 3 dimensions. Inspired by: Kondolf, G., & Pinto, P. (2017). The social connectivity of urban rivers.

Social network

The social aspects are addressed by the new longitudinal connection of the waterfront space, and the lateral connection from the neighbourhood to the waterfront space. They are increasing the connectivity between the two sides by applying more bridges, increasing the lateral connection for pedestrians from the community to the waterfront, and increasing the longitudinal connectivity through the pedestrian and biking system and various activity spaces.

FIG. 1.101 Social connectivity

Ecological network

The ecological network focusses on the environmental value brought by the landscape method. Lines of trees, wetlands, natural areas, public open greens, urban parks, and plazas form together an urban green system that connects the city with the waterfront space.

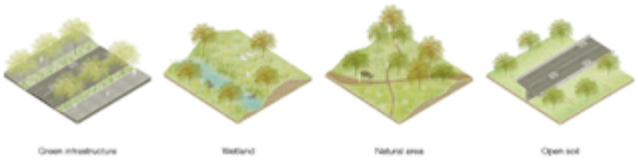


FIG. 1.102 Urban green system

FIG. 1.103 Ecologicalconnectivity

FIG. 1.104 Hydrological connectivity and water retention structures

FIG. 1.105 Flexible embankments and interactive infrastructures

Hydrological network

The hydrological network focuses on the adaptability of Tongzhou district to extreme weather conditions. By collecting rainwater during the rainy season and reusing it during the dry season, will alleviate the extreme conditions that the city faces.

There are soft surfaces, sports fields, rooftops, porous surfaces, waterways and ponds in the city to retain the rainwater. The spaces are connected by a separate rainwater system, that collects rainwater in the relatively low-lying southeast side. The rain is purified, stored and reused through the network of wetlands.

Spatial network

By applying different forms of flexible embankments and interactive infrastructures, a spatial network is created, which results in a diversified waterfront space that changes throughout the seasons.

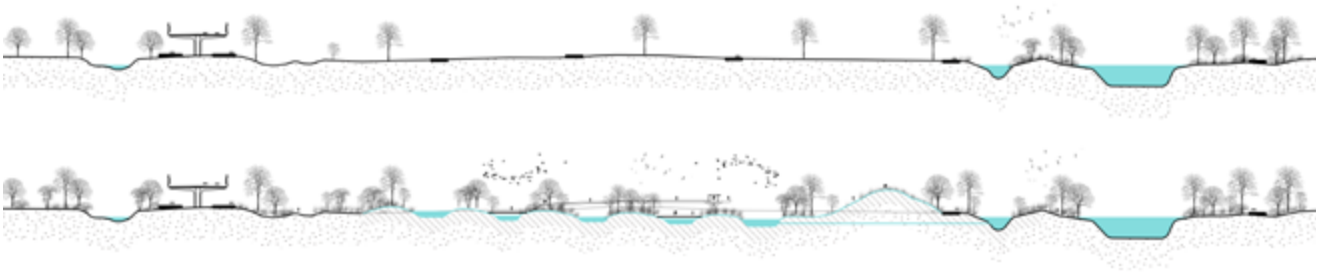


FIG. 1.106 Turn the abandoned industrial area to wetland for water purification and retention

Result

FIG. 1.107 Master plan

The master plan consists of four layers, the social, hydrological, ecological and spatial layer. The green corridor exemplifies the lateral connection from the neighbourhood to the waterfront. The green area from north to south are the neighbourhood park, city plaza, natural park and forest park. The longitudinal pedestrian and bike lane allow the urban residents from the upper part and the rural residents from the lower part to have more interactions. Within 30 minutes of driving, urban residents can reach the upper central business district or the lower wetland. The rainwater collected from the upper urban area will be purified and reuse in the lower marsh.

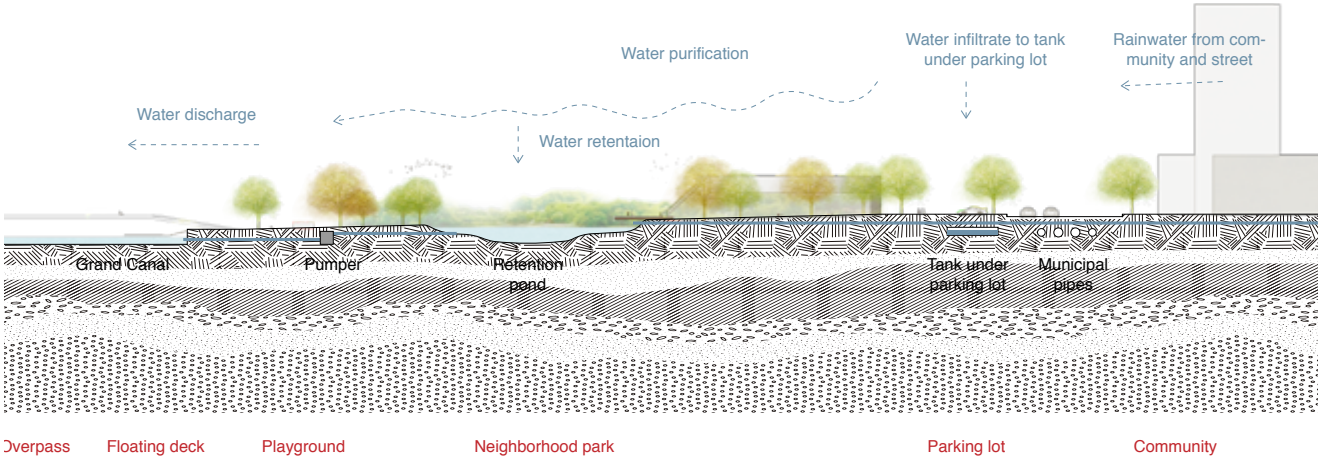


FIG. 1.108 Landscape infrastructure- social-ecological integrated design

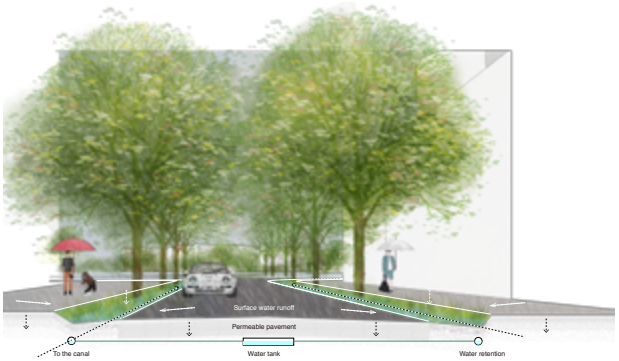


FIG. 1.109 From neighborhood to the water front

FIG. 1.110 Nighborhood park

Activate a resilient neighbourhood

By using the same species, creating a continuous visual experience and introduce visitors to the waterfront. The constant green from the urban area to the waterfront increase the lateral connection between city and water. The community park serves as a semi-active space to existing space from the neighbourhood to the waterfront.

In the storm season, the infrastructure turns to landscape infrastructure by connecting the urban rainwater system to the open water system. By flowing from the higher level to the lower level, the water from the city was purified in the park by the purification plants. Part of the water also infiltrates to the soil to recharge the groundwater.

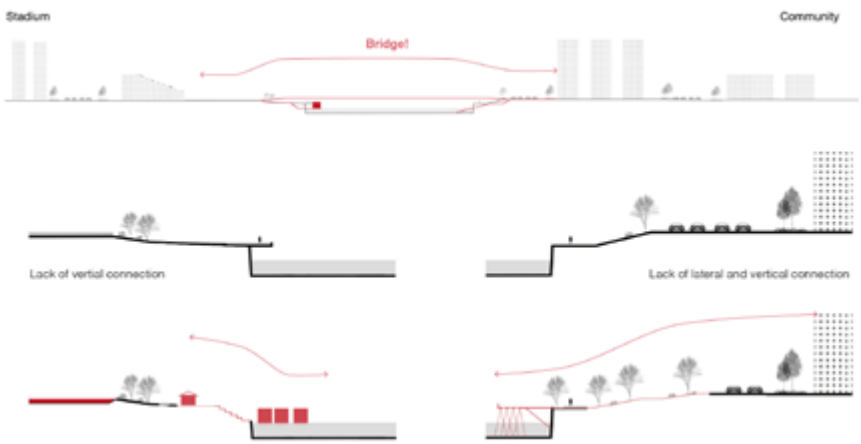


FIG. 1.111 Lateral connection and waterfront space at day time and night time

Now there are no connections between the two sides of the canal. The design applies a bridge only for pedestrian and bicycles to connect the two sides of the channel. The intention is to join the community and urban entertainment centre.

There are markets along the canal which activate the waterfront space. With the connection by the bridge, brings the people from the opposite bank to the waterfront. The stages leading to the instream water create space for people to stop and enjoy the opening view along the canal side. At night time, the boxes turn to bars to enrich people's nightlife.

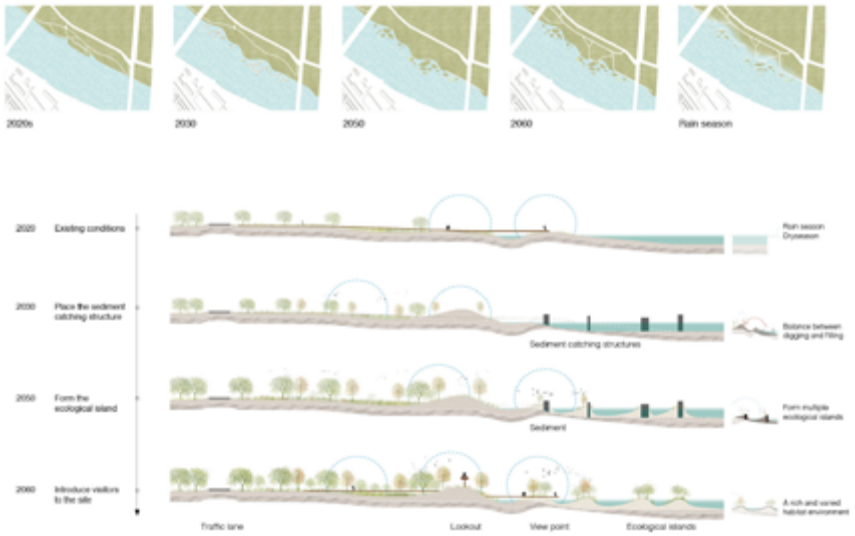


FIG. 1.112 Social connectivity, ecological succession and the developing process

Transition to the ecological paradise

Changing the existing waterline to increase the length of the waterline. Hence to enlarge the gradient space and create more habitat for the species. Simultaneously, there is more space for the water to flow in different seasons; the site will be more adaptive to deal with the extreme weather. By setting the sedimentation catching structure, gradually form ecological islands. Over time, as plants multiply, the site will attract birds or insects bringing seed, thereby engendering the bio-diversity after the stable ecosystem is formed in the place, set up the walkways and lookouts to invite people in the area and create a social-ecological integrated waterfront space.

Conclusion

This project aims to transfer the infrastructure to landscape infrastructure and provide alternative ways for the canal zone development. Therefore, it strongly needs an understanding of landscape infrastructure and how to benefit urban development and residents. Thus, the design is mainly focused on the social-ecological integrated plan to achieve an adaptive and resilient urban development.

By studying the literature about "Landscape urbanism", the "Infrastructure as landscape", "Landscape structure", "Landscape infrastructure" the essential focus of the transformation is on the lens of social, ecological, technical and spatial adaptability. These four discourses are partly overlaid with each other, but it helped to develop clear thinking over the research and design thinking process. The social aspect is mainly focused on public space and the diverse entertainments in the canal zone. The ecological aspect is focused on the green connection over the region and the various habitats along the canal zone. The technical aspect is focused on the water retention, purification and reuse of the rainwater; the spatial aspect is mainly concentrated on diverse spatial context made by different material and multifunctionality of each space.

Other than transforming, social connectivity cannot be neglect. Since there are projects only focused on green the zone along the waterway and brought in multiple functions but ignored the connection of the waterfront to the nearby neighbourhoods and the interaction between people and water. Thus, three dimensions need to pay attention to in parallel to the research and design of the four discourses. The three aspects are longitudinal, lateral and vertical. In this project, the longitudinal dimension means the amount of water the system can retain and the water connection. The lateral dimension focus on the relationship between water and city, the accessibility of neighbourhoods to the canal zone, the ecological connection from communities to the canal zone. The vertical dimension focus on the relationship and possible interaction between people and water, the ecological connection from the instream of water to the up-trail land.

As a result, by designing though scale on the four discourses and three dimensions mentioned above, the overall system achieved a more adaptive and resilient urban development. Turning the Grand Canal from a separate infrastructure to a landscape infrastructure by the social-ecological integrated design, connecting the neighbourhood with water, people and water. In another aspect, the canal and the nearby ecological system can benefit the city from infiltrating, retaining and reusing the rainwater, leave the space to nature to cope with the changes in the future.

This project is looking forward to creating a social-ecological integrated landscape. Through landscape methods, to increase the adaptability of the region to extreme weather. Through the landscape structures and new entertainments applied on the site, recall the historical memory of the Grand Canal.

FIG. 1.113 Recall the historical memory of the Grand Canal.

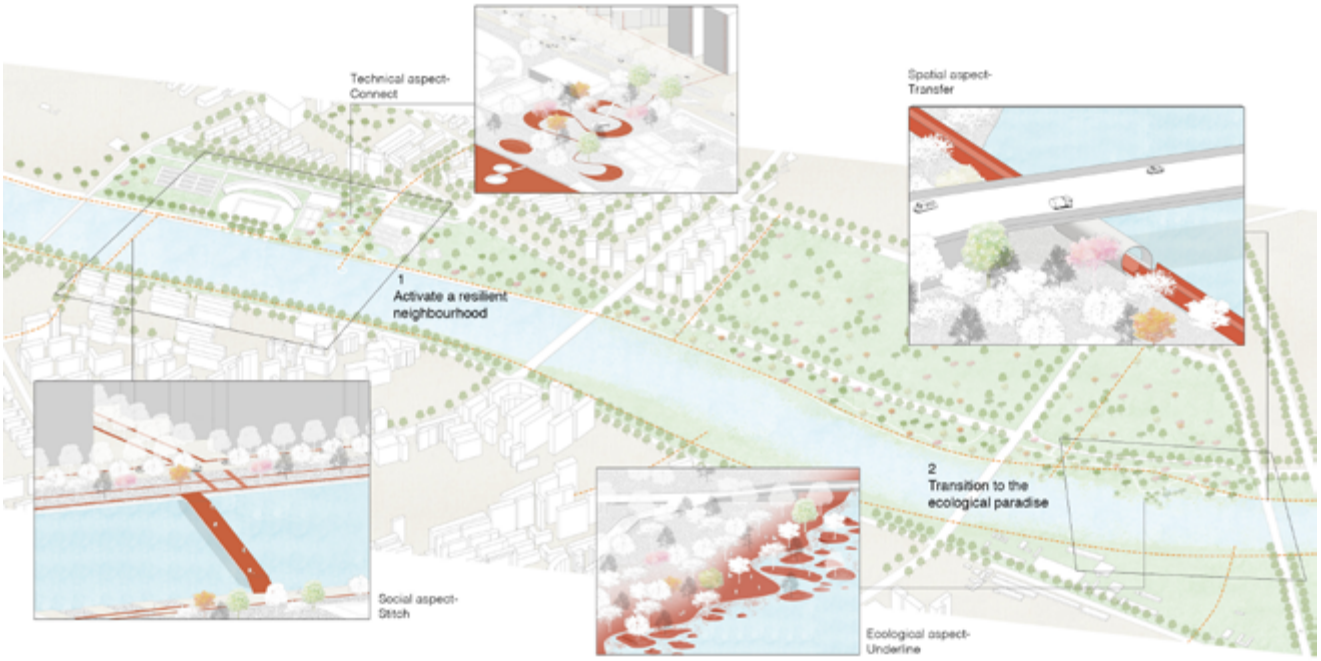


FIG. 1.114 Conclusion of the design assignments refers to the 4 discourses and 3 dimensions

From Segregation to Integration

Planning and Designing for the Enhancement of Socio-spatial and Ecological Integration in Haizhu district, China

Xinyan Zhao

Supervisors
Daniele Cannatella, Landscape architecture
Arie Romein, Urban studies

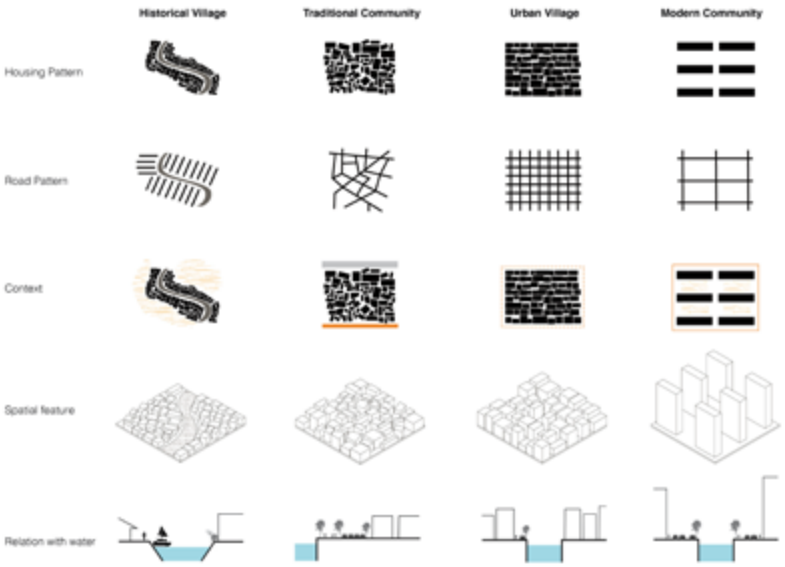
Introduction

The Pearl River Delta is one of the fastest developing deltas and has the largest urban areas in size and population in the world. The rapid urbanization in these decades in China has brought various opportunities to both economic and social development. However, this fast expansion of urban built-up areas brings potentials as well as threats. Firstly, due to the failure of the government in controlling the expansion of land exploitation and population growth in these decades, the polarization of living conditions in cities was increased. As a result, it caused significant residential segregation and consequently socio-spatial differentiation which has led to a series of negative consequences, such as unequal access to public facilities and social exclusion. Secondly, because of land exploitation and the decrease of the canals, more and more buildings are built leaving out limited and deficient blue and green spaces that would raise flooding and other ecological issues.

The Haizhu district is chosen as the test site for further research and design, located in the central part of Guangzhou, to show possible solutions that can address both socio-spatial segregation and fragmentation of ecological space using urban-landscape strategies. In order to understand the complicated context with social and ecological value, the understanding of the whole territory on different scales with related features is essential. Therefore, the layer approach (settlement layer, transport layer, landscape layer) is utilized to gain knowledge of the whole context in various settlements.

The objective of the project is to create an integrated and comprehensive socio-ecological network in terms of corridor and node at multiple scale that can improve the socio-spatial integration and reconnect the fragmented green and blue spaces for Haizhu district.

Due to the diversity of neighbourhoods contributing to segregation, it is important to understand and analyse the existing settlements. They are classified in a time frame, namely historical village, traditional community, urban village, and modern community. Besides of the neighbourhoods, the context and the relation of these settlements are also analyzed from both a regional and local scale.



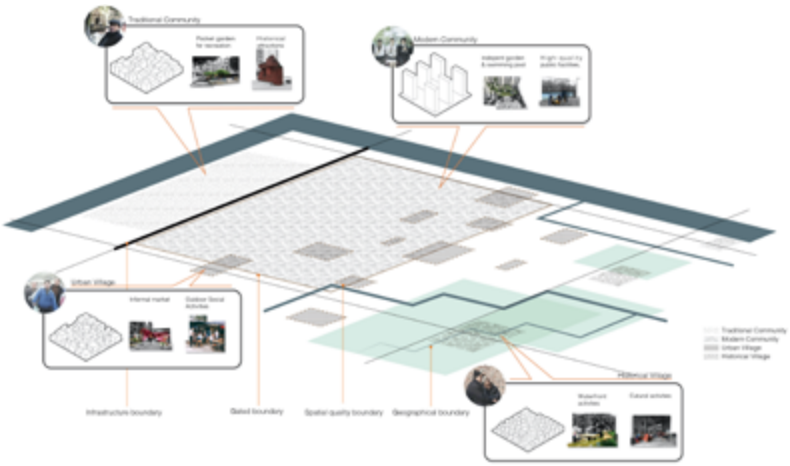
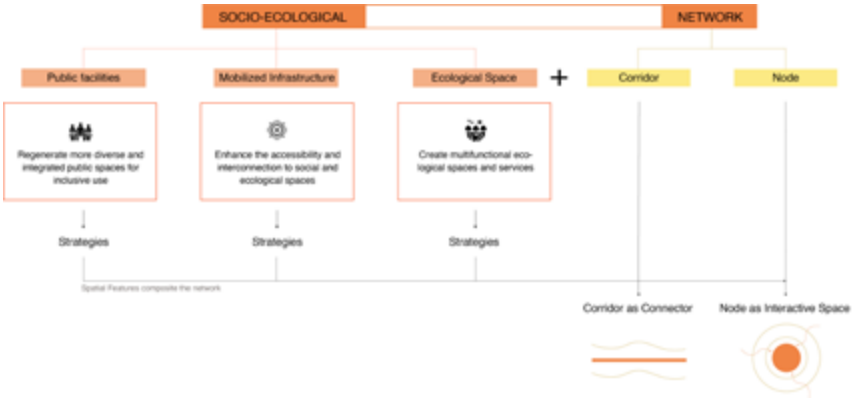


FIG. 1.115 Characteristics of four types of neighbourhoods

FIG. 1.116 Regional socio-spatial segregation

FIG. 1.117 The development of Haizhu district

Principles



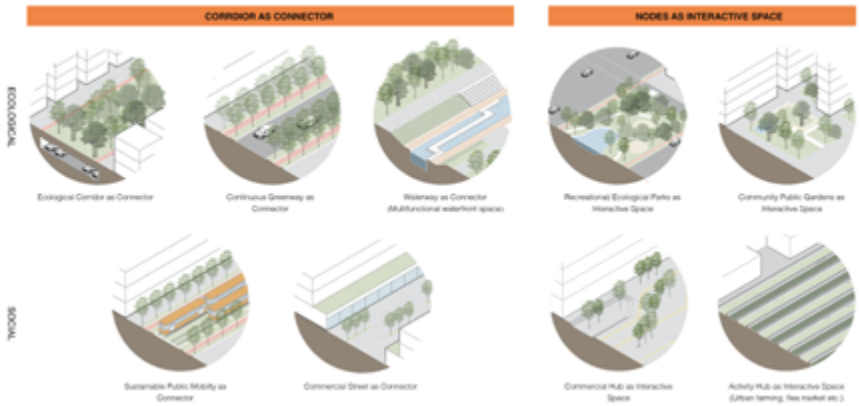


FIG. 1.118 The structure of socio-ecological network

FIG. 1.119 Strategies of corridor and node

The composition of the proposed socio-ecological framework is based on the analysis of three layers, settlement, transport and landscape, the three main characters of which are public facilities, mobilized infrastructure, ecological spaces. In order to improve the socio-spatial-ecological integration, two components should be positively applied to the network by using the principles: the corridor as connector and the node as interactive space. Instead of a linear feature as a boundary, the corridor is characterized by the implementation of a linear connection or movement between spaces with the inclusion of areas that act as buffer connecting the surrounding context, while nodes provide certain places where nature or people can integrate with each other. The elements defined from the understanding chapter in different layers can be further developed in these two main principles. And at the same time, three main characters of socio-ecological value acting as spatial features compose the whole network.

Corridors with ecological value can be defined as ecological corridors, continuous greenways, multifunctional waterways and cooridors with social value would use the sustainable public mobility and commercial street as connector to integrate urban spaces and residents. Recreational / ecological parks and community public gardens in neighborhoods function as nodes that can improve ecological value in the urban area, while the proposed commercial hub and activity hub, characterized by a high degree of social value, provide the physical and spatial conditions for the integration of different social groups.

The proposed framework, structured in three layers provides new opportunities for future sustainable planning. On the regional scale, the new structure in each layer is based on the existing situation and elements and then integrate them into the overall network. Corridors and nodes, from this regard, offer a practical conceptual method and are valuable operative tools to achieve the vision of integration.

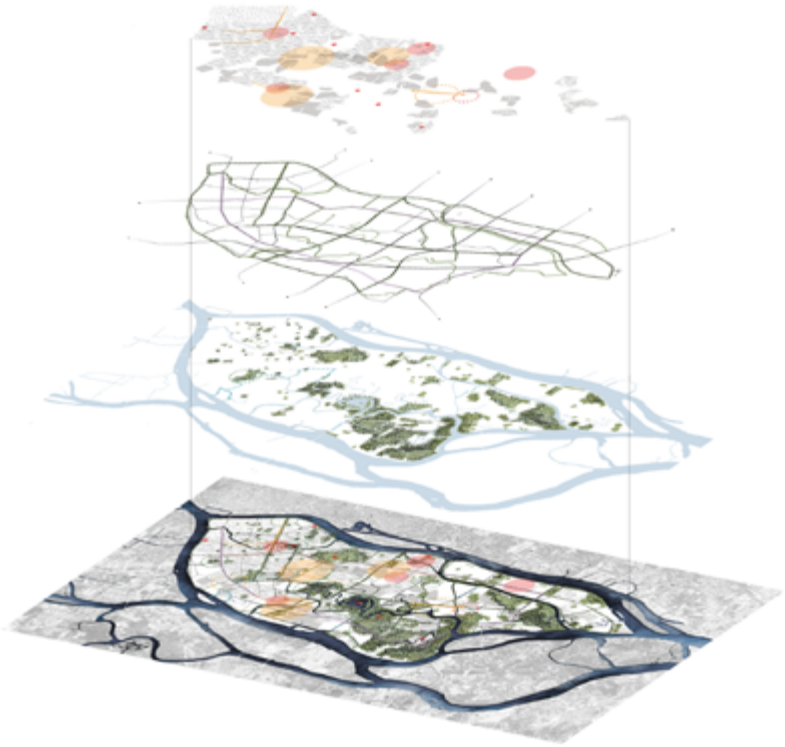


FIG. 1.120 The composition of socio-ecological network by three layers

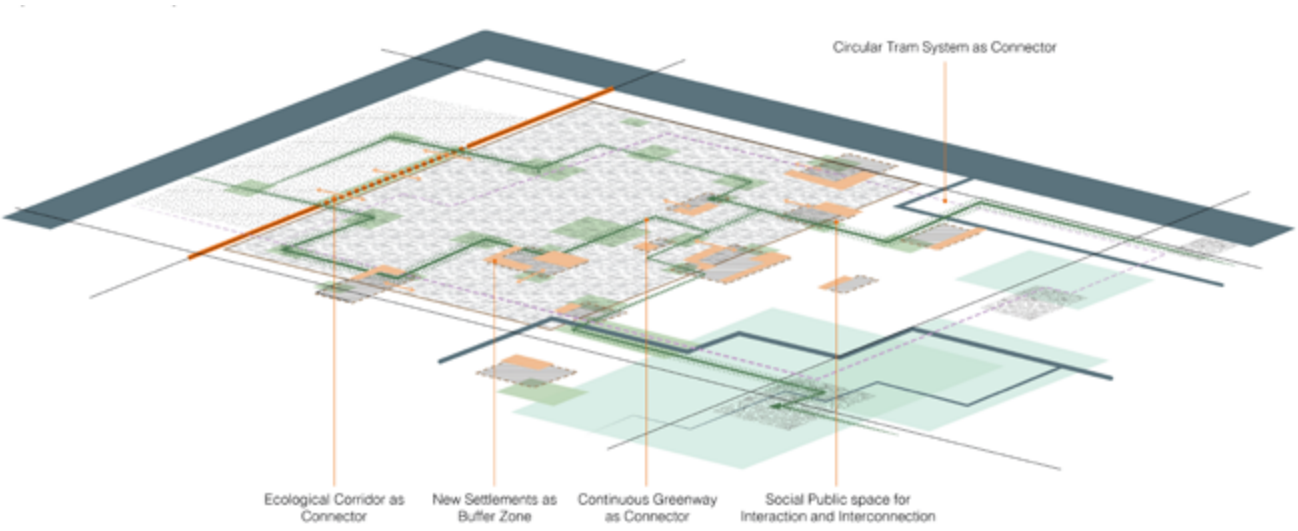


FIG. 1.121 Regional socio-spatial integration scheme

Result

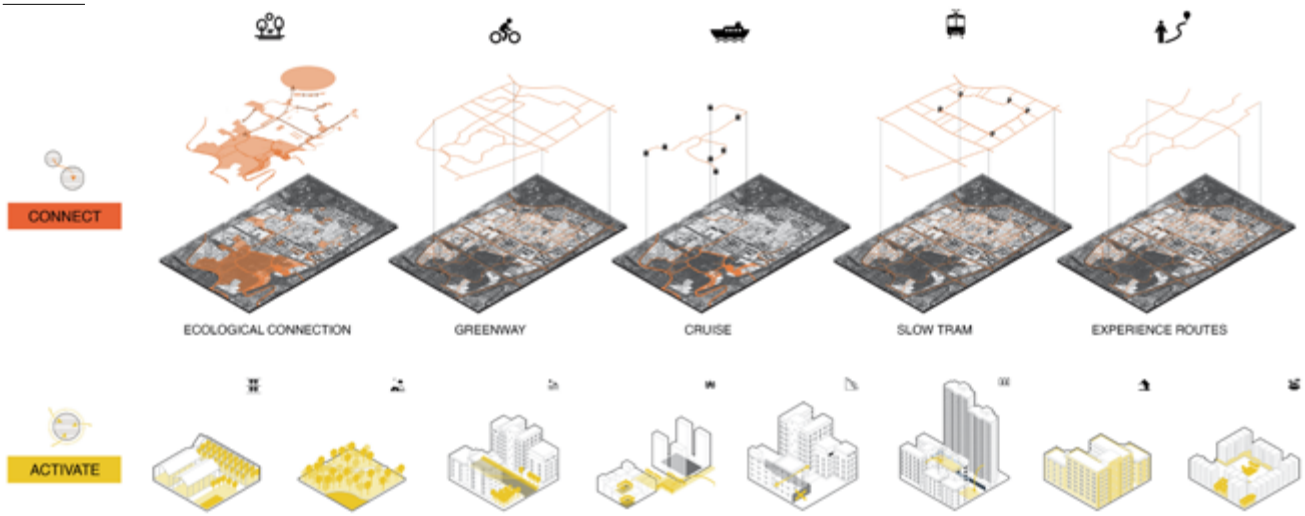


FIG. 1.122 Elaboration of strategies on local scale

The design elaboration on a local scale in specific context of Haizhu is explored based on the two main principles. Strategies related to corridors and nodes are put forward concerning both ecological and social aspects with the contribution of different urban and landscape elements.

A composite system of tools is designed for different layers, resulting in a landscape-based multi-scale toolbox. Many activities can be introduced within the system of public facilities and the design of green spaces allow adaptation and ecological restoration in the urban context. The master plan proposes 5 experience routes that look at existing features and act as corridors for the integration and the connection of all the layers together. The experience provided in these routes vary from one to another with different functions and events.

Besides, a series of nodes along the routes are also propsed and interventions are implemented to activate the site by applying different design strategies concerning both social and ecological value. For example, the industrial area is transformed into a more inclusive and creative space providing a new set of public spaces, such as the recruitment square, and the sport park, and the buildings are connected by outdoor corridors.

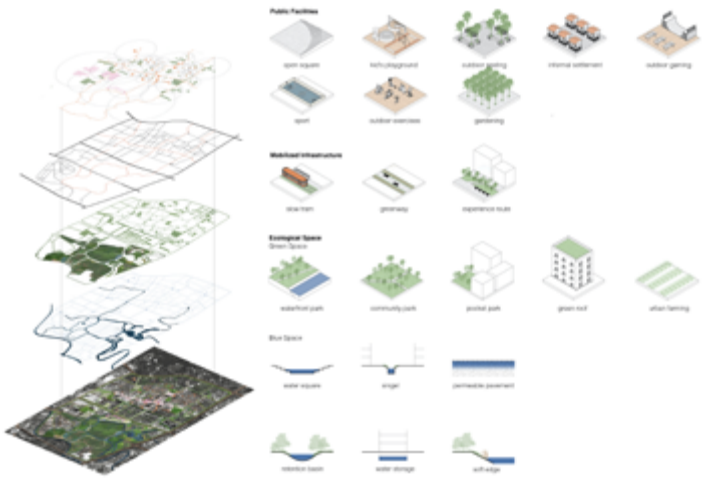


FIG. 1.123 Toolboxes for three layers

FIG. 1.124 5 experience routes as corridor and nodes along the routes

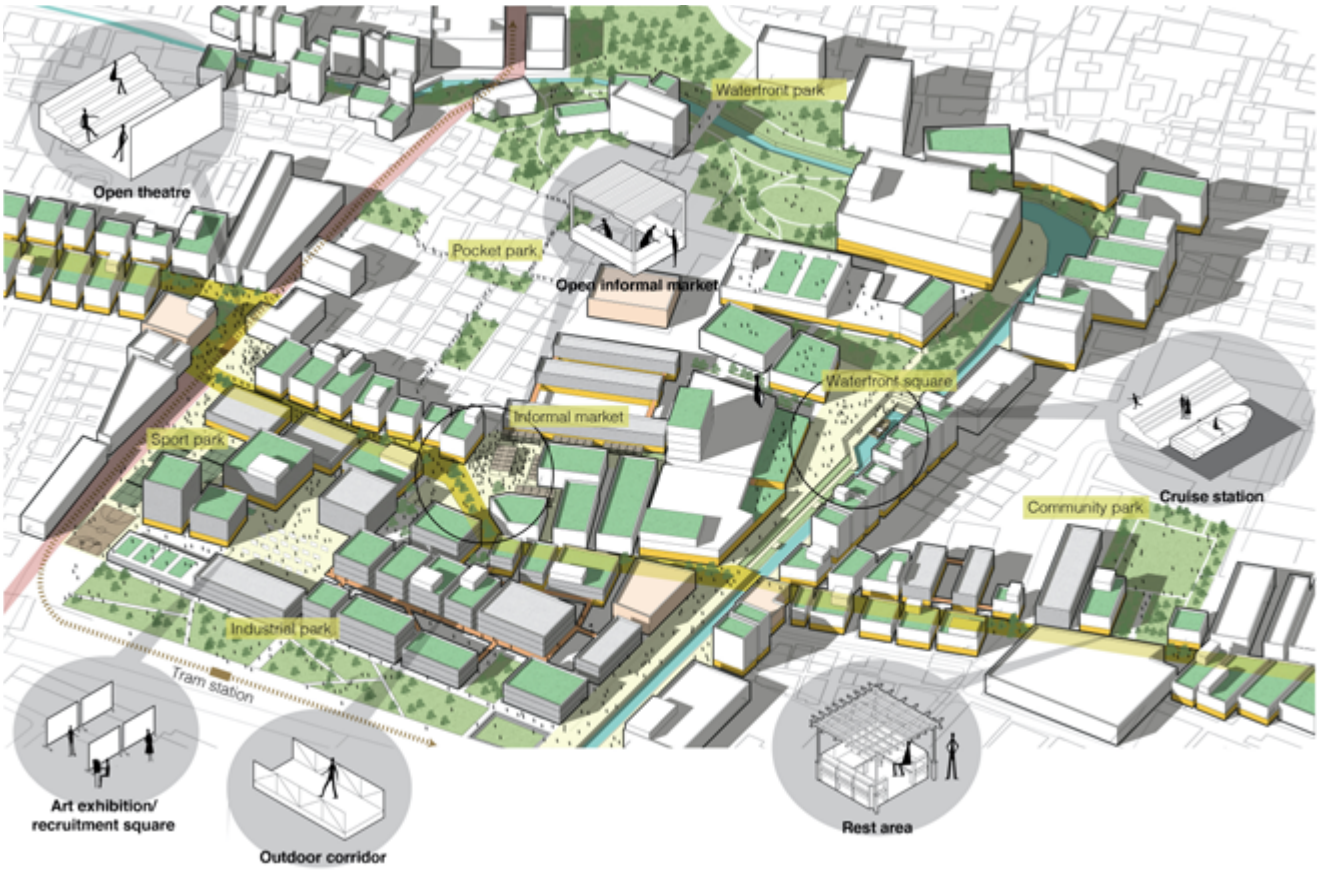


FIG. 1.125 Urban regeneration node along the active route

By introducing the corridors and nodes, socio-spatial and ecological integration can be improved at local scale. The amount of green spaces in urban area is increased, and ecological spaces are regenerated in neighborhoods to develop an integrated social-ecological network, providing spaces for people to have social contact, such as community park, waterfront park along the canal. Furthermore, spatial and functional connection is improved between the urban village and the modern community in the Haizhu district and the interaction between different social groups is promoted by providing activities based on the needs of the user group.

FIG. 1.126 Community park along the ecological route

FIG. 1.127 Livable waterfront area

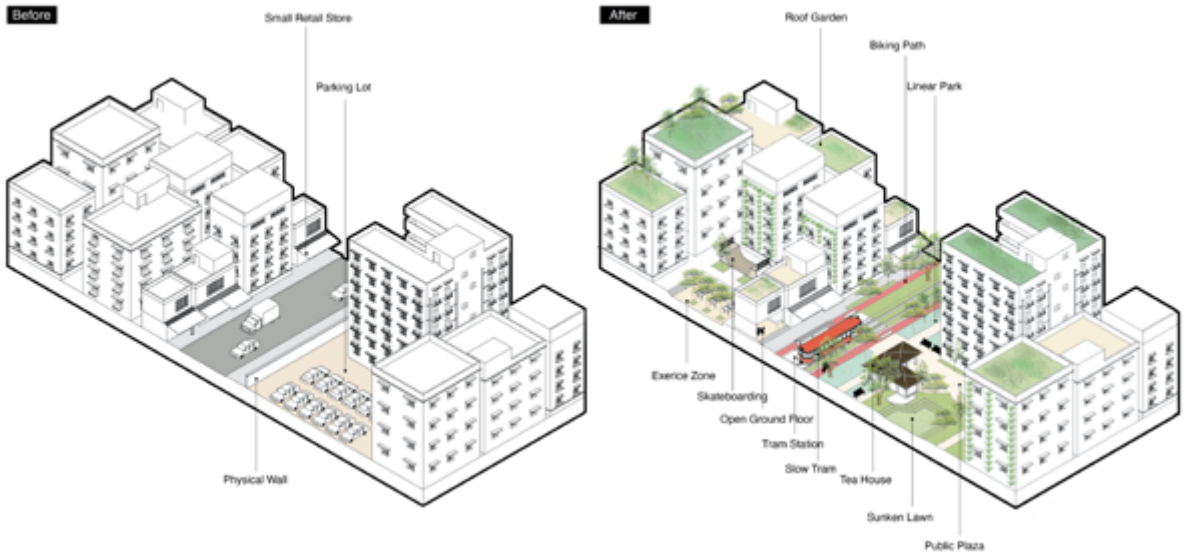


FIG. 1.128 Ecological route

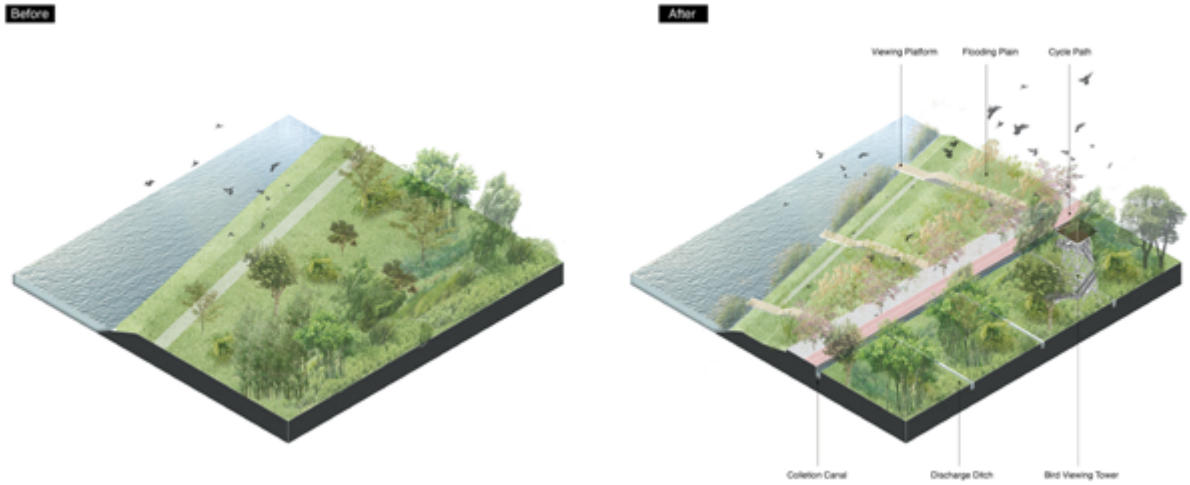
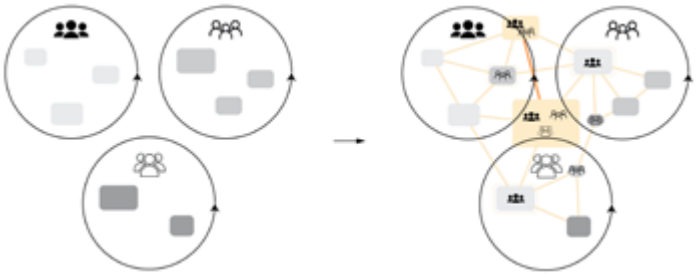


FIG. 1.129 Orchard route

Conclusion



The research of the project sets up a framework based on three layers that provide tools and elements acting as spatial features (public facilities, mobilized infrastructure, and ecological space) to implement a new socio-ecological structure.

FIG. 1.130 Socio-spatial integration on local scale

By proposing this socio-ecological network made of corridors as connectors and nodes as interactive spaces at multiple scales, the integration between different neighborhoods and between people and nature are promoted. The design interventions on local scale contribute to improve the socio-spatial integration between the modern community and the urban village and build up connection between nature and the built environment. In summary, the design, as an example, elaborating the principles and strategies enhancees the social as well as ecological value.

Due to the rapid urbanization in China, the problem of socio-spatial segregation and ecological fragmentation are two of the main planning issues affecting future sustainable development in fast-developing cities. The proposed research framework can be an effective tool to have a better understanding of the complex context. The knowledge from the settlement classification and spatial distribution can be one of the applications for other regions.

In conclusion, with the proper application of the principles with regard to corridor and node, the urban landscape could be better constructed and redeveloped in a more sustainable and inclusive way.

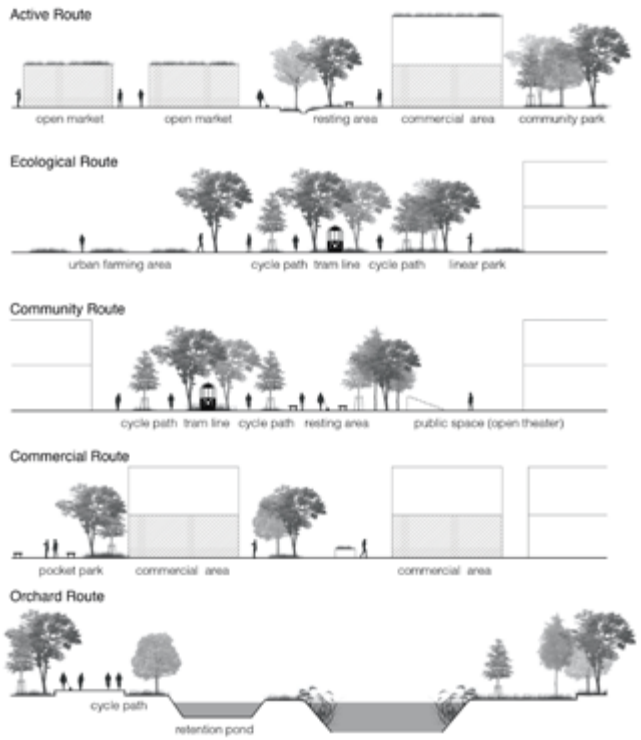


FIG. 1.131 5 Experience routes

FIG. 1.132 Socio-spatial and ecological integration

Collaboration

— by Margherita Ghini and Marina Rani

At the beginning of December 2019 the Symposium "Towards a Resilient Bay Area through Planning and Design" took place at the South China University of Technology (SCUT) in Guangzhou, China. At the symposium participated masters and PhD students along with professors from the Delft University of Technology, the SCUT University, and the University of Sheffield.

On the first day of the symposium, we followed lectures from professors from the three different universities. The second day we finally were able to share the different projects that students from the faculties were working on. It was interesting to see how the same area of the Pearl River Delta can be analyzed through so many different lenses. Sheffield University, for example, gave a new technological perspective and a different way of working on the topic. While SCUT contributed with insights along with punctual and detailed information through GIS technology. For us TUDelft master's students, it was a great opportunity to introduce our thesis projects, which reflect an adaptive landscape approach, and to receive feedback coming from a wider and more diverse academic audience. The same day we took part in a small workshop, where we managed to come out with principles on different topics, such as sustainable industrial/agricultural adaptive transformation, multifunctional river/waterfront design, and inclusive participatory techniques.

The third and final day was spent visiting culturally meaningful sites, which were deeply related to our thesis projects. We visited the Langton village in Guangzhou, an historical water village that demonstrated how the village made use of water, benefiting from it, in historical times. Nanfeng Ancient Kiln was the second and final stop, where we could observe how the former industrial site was transformed into a new cultural and touristic focal point for the city of Foshan. Overall the three days of the Symposium gave all of us a clearer insight and understanding of both the spatial qualities of the region and also a wider social and cultural perspective.

FIG. 1.133 Workshop feedback

FIG. 1.134 Presentation and discussion final outout of the workshop

FIG. 1.135 Workshop cooperation

FIG. 1.136 Exchanging ideas between students and academics from all different institutions involved

FIG. 1.137 Exploring the Langtou village and observing the local water management system

FIG. 1.138 Understand historical water management strategies in the ancient village

FIG. 1.139 Urban planning conversation in Guangzhou Urban Planning & Design Survey Research

Reflections I

– by Janneke van Bergen, Lei Qu and Yang Zhang

The Greater Pearl River Delta is one of the densest urbanized deltas in the world, and includes some of the largest metropoles of China, like Guangzhou, Dongguan, Shenzhen, Macao, and Hong Kong. This delta copes with major water issues, such as the effects of sea-level rise, excessive rainfall, and waterlogging due to climate change. How can this metropolitan delta be transformed once more to cope with this future agenda? This was the central question for Pearl River Delta (PRD) graduation studio, that included 8 master students from the urbanism department, section Landscape. The research task was 'to cluster and design spatial developments at various levels of scale and provide spatial frameworks that allow for the development of an adaptive and sustainable delta'.

The first months the students got familiar with the delta via mappings, with special attention to the urbanization processes and related water problems. This combination of rapid urbanization and rising water issues led to the shared ambition to redesign PRD as a sponge city; preventing and regulating flooding, whilst providing a sustainable, green and public network for the metropole to develop.

In December 2019 the group paid a site visit to the region. The expanse, complexity and exoticness of the metropole made a great impression and led to new closer

FIG. 1.140 Vision of the neighborhood: drawing by Bo Peng

insights of other aspects of the metropole, such as urban pressure, immigration, industrialization & pollution, identity & decline. These notions were intertwined within the studio's water agenda; and clearly defined the two projects that had my mentorship within the studio: Retrofitting Panyu by Bo Peng; and Stitching Lijiao by Margherita Ghini.

Intertwining urbanization, social and flood resilience

Both projects started with the notion of the progressing urbanization that in both cases led to a rapid loss of landscape, heritage and identity. They also touch on social issues, such as the adaptation of immigrants within the city, or the local living qualities of neighborhoods, leaning on industries that are bound to transform and decline. Both projects developed a landscape framework, on one hand to add landscape as regulating quality to solve current problems of the metropole, such as pollution, biodiversity or flooding; in other ways to re-establish and restructure communities within their living environment. The third goal of this landscape framework is to provide room for transformation as alternative to the tabula rasa strategy of the rapid evolving metropole.

Pengs project transforms former industrial sites and left-over spaces in urbanized neighborhoods to establish a green-blue network against flooding and urban fragmentation of the landscape, whilst offering green public spaces for the surrounding communities. Polluted water from the highways and industries is treated by the landscape and transported through the network, restoring the natural drainage system. By re-engineering and defragmentation of the landscape she constructs a green-blue network in a rapidly urbanizing district, sustaining the metropole before it is petrified. The project also adopts a multi-scalar approach, linking analysis and decision making at mainly three scales of Panyu, the chosen neighborhood and the test site for design. With this approach, the proposed green-blue network contributes to both planning and design processes with strategic interventions that bring together the two issues of industrial transformation and water logging, as well as the potentials of landscape.

Ghinis project employs the former waterways and original delta settlement typology to re-establish the urban village of Lijiao as a 'water'-garden city, as sustainable alternative to demolishment and as a concluding waterfront of the ecological corridor within the new urban axis of Guangzhou. To stop demolishment, an alternative urban strategy is developed, using the waterways as public routes to re-access the urban village, preserving the urban morphology, and unlocking the hidden temples within the villages as important portals of heritage, identity, and public urban life. The project takes the position to balance the eco, social and economic sustainability, with a conscious awareness of the economic background

hidden temples within the villages as important portals of heritage, identity, and public urban life. The project takes the position to balance the eco, social and economic sustainability, with a conscious awareness of the economic background in the demolishment and development toward urban villages. Adopting the method "research by design", as well in three different scales, the project managed to reveal the uniqueness in the local context.

FIG. 1.141 A walk into Lijiao: Ancestral Hall's water plaza (dry season), drawing by Margherita Ghini

Water: from enemy to friend?

Both projects chose to employ water as a continuum to string together the urban fragments, to add sponge capacity, and to introduce public space and spatial quality. This will demand a cultural change, since water is now treated as waste or enemy, but can be redesigned into a valuable driver for change and sustainability, as illustrated by all projects of the studio. Here the Dutch connection is clearly visible, with its historical canals as important carriers for public life in historic and present Dutch cities. Also, in their approaches these projects feature Dutch methods, such as analyzing the territory through layers- 'the Dutch Layers Approach', as well as 'Research by Design' at various levels of scales. However, these Dutch approaches were not imposed in the context of the PRD without consideration. On the contrary, the relevance and transferability has been carefully examined, which resulted in projects that reflect the local identities.

The projects illustrate how water can be reconnected to the metropolitan landscape, inducing public spaces and adding new programmatic qualities, such as waterfronts as public spaces, or green 'sponge' spaces as necessities in metropoles; but also, visual and social qualities, such as seasonality, heritage and water gardens. They sample new ecologies for the future delta-metropole, with water as generator for new public life.

Reflections II

– by Daniele Cannatella

There is hardly a more complex and fascinating area in the globe than the Pearl River Delta. Such intricacy is revealed even in the name itself, which simultaneously describes one of the most vibrant world-class economic regions and an astonishing variety of natural, semi-natural and man-made landscapes seamlessly disentangling and alternating between the mountains that crown the plain in the North and the waters of the South China Sea.

In between, water holds together these two apparently detached domains, acting as balancing fulcrum combining different spatial scales and temporal rhythms. When looking at the whole PRD from a satellite image, the water system appears like an intricate maze of blue lines of different thickness: grand rivers punctuated by docks, piers, and factories recalling the region's recent industrial history; rural canals and ditches dictating the orientation of dyke-ponds and paddy fields, the spatial outcome of a different way of coexisting with – and in – the territory; sinuous channels breaking the orthogonality of dense urban centres while signalling the presence of urban villages before disappearing, swallowed by the city.

At the same time, water poses exciting challenges for man to keep thriving in an area that has always been benevolent. Water scarcity and its poor quality conditions; the increasing flood threats coming from the changing patterns of precipitations; salinization and sea-level rise; the loss of water identity are the results of the increasing pressure exerted by urbanization on the territory. Such issues ask for visions and projects that must rely on a different understanding of both natural and socio-economic processes and look at the opportunities that emerge from the region's breakneck economic and spatial restructuring.

Water narratives for adaptive futures

The aim of the PRD graduation Lab was the exploration of landscape-based design approaches and principles enabling adaptive urban transformation paths toward a more sustainable future for the region. In this sense, both the projects I had the opportunity to supervise displayed an interesting insight into the potential of landscape in looking at the challenges posed by water and urbanization in terms of opportunities. The two projects are From Segregation to Integration, by Xinyan Zhao, and Exploring new productive landscapes, by Marina Rani.

Within her project, Xinyan addresses the problem of social and ecological fragmentation in the highly-dense district of Haizhu, in Guangzhou. In this area, urbanization led to increasing segregation and disparities within the social networks, as well as deterioration of the ecological ones. Xinyan looks at the diversity of the different neighbourhoods in Haizhu to extract their qualities and intervene in the physical elements that contribute to their social and spatial isolation. Through a landscape approach, she reinterprets these linear elements – transportation lines and waterways – transforming them in porous corridors connecting a new set of centralities within different communities. The outcome is a reticular infrastructure that acts as a connector and buffer, able to restore the water cycle within the urban landscape while providing open and green spaces hosting new social functions, breaking the rigid separation between the neighbourhoods.

Marina's project revisits the relationship between water and industry in Chancheng district in Foshan to restore water quality while providing newer and safer spaces for production and social interaction. Foshan is one of the most ancient settlements as well as one of the most prominent industrial hubs in the delta. However, about 80 percent of the industrial areas in the city is undergoing a change. Looking at the landscape's structures at multiple scales – from the water network to the diverse industrial typologies – Marina proposes a hybrid machine that expands over time, made out of different natural and artificial elements that overlap to clean the water making use of its dynamics and vegetation and improve the absorption and retention capacity of the area.

The two projects looked at the continuity between past and future, acknowledging the qualities of the urban landscape and using them as leverage to build a new identity for the region. This entailed going beyond the notion of borders, whether they were physical features of separation or conceptual divides between human activities and natural processes. Water becomes ubiquitous again, acting as a bounding element on which to construct novel and more balanced narratives.

FIG. 1.142 Group photo taken during the excursion to the Foshan's Nanfeng Kiln. This 300 year old kilm is one of the oldest industrial compound in Foshan that has been transformed into a cultural heritage and tourism site.

FIG. 1.143 Screen shot of the last group meeting via Zoom, which turned out to be only way to interact during the COVID19 pandemic.

Conclusion

The urban landscapes of the Pearl River Delta, Beijing and Jakarta are the result of various processes and systems that have different dynamics of change and influence each other. The projects illustrate that the ability to interrelate systems through spatial design has become increasingly important, as the interconnection of different systems and their formal expression is a fundamental aspect of contemporary regional development. In times of complex challenges the development of landscape-based approaches offer alternative ways of understanding, socio-ecological inclusive design processes and modes for collaboration amongst disciplines and stakeholders. Such approaches stimulates design disciplines like architecture, urban planning and landscape architecture to cooperate. It also reviews the agency of spatial design by giving shape to the built environment. In addition, as an inclusive design approach it establishes relationships between ecology and cultural aspects, process and form, long-term and short-term developments, and regional strategies and local interventions. In this line of thinking, landscape-based design approaches provide a new operational power for spatial design – as an integrative, creative activity – and recognizes the regional urban landscape as a significant field of inquiry that is context-driven, solution-focused, and transdisciplinary.

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