

Transforming waterfront: from urban renewal to resilient development

A case study of Wuhan, China

YANG SHU¹, JIAMING QIN²
Department or Centre, Institution
1318579332@qq.com,

Abstract: Creating more resilient and livable waterfront cities is a critical element of planning for our future. This paper focuses on the relationship of the cities with their waterfronts. It presents a case study of Wuhan – a Chinese metropolis, where waterfronts play an important role in its urban planning policy. It attempts to investigate the mechanism of waterfront transformation, and to find out which strategies to adapt and what resilience means in terms of urban waterfronts in a rapidly changing city. This article examines some representative urban projects on the waterfront and summarizes spatial models applied on the waterfront with distinct policies. Finally, it establishes a framework of understanding waterfronts on two crucial dimensions: temporal dimension and spatial dimension. It demonstrates that an urban waterfront should be more correctly envisaged as a network of places, functions, additions and hinges between the city and its water environment.

Key words: Waterfront, resilient development, urban renewal, adaptive strategies, Wuhan.

1. Introduction

Urban waterfronts, where the land of city meets a body of water, are unique and finite resources representing the best opportunities for community enhancement and enrichment. Meanwhile, waterfronts are also high-risk areas, where the water-related disasters could seriously affect the long-term sustainability of urban environment.

Nowadays, waterfront redevelopment has become a global trend.^{3 4} Waterfront areas represent a multidisciplinary and multitasking issue in perspective of urban resilient development. The need to reconstruct waterfront areas has been a complex reality to deal with in the past and it is likely to become more and more an urgent reality for the future.⁵ Architects and urbanists are demanded to define compelling visions and integrated design measures for shaping resilient waterfronts. In this way,

1. School of Urban Design, Wuhan University, Wuhan 430072, China.

2. Wuhan Land Resources and Planning Bureau, Wuhan 430014, China.

3. Breen A., Rigby D., *The New Waterfront. A Worldwide Urban Success Story*, Thames and Hudson, London, 1996.

4. H. Meyer, *City and port: Urban planning as a cultural venture in London, Barcelona, New York, and Rotterdam*, International Books, Rotterdam, 1999.

5. Giovinnazzi O., Giovinnazzi S., *Waterfront planning: A window of opportunities for post-disaster reconstruction*, in: 4th International I-Rec Conference Building Resilience: Achieving Effective Post-Disaster Reconstruction, Christchurch, Apr. 30-May 2, 2008.

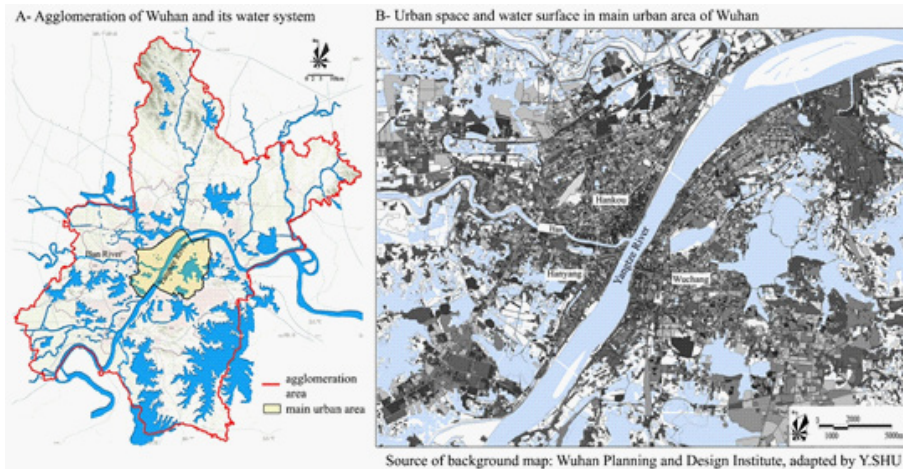


Fig.1. Water system and urban space of Wuhan

our paper focuses on waterfronts and discusses what resilience means in terms of waterfronts and how development projects can enhance the “resilience” of cities, starting with the regeneration of waterfronts. We employ a case study of Wuhan, a typical waterfront city in central China. Over a quarter of its metropolitan area is occupied by water, representing an area of 2,117.6 km². The world’s third largest river – Yangtze and its longest tributary – Han run through the city dividing it into three parts: Wuchang, Hankou and Hanyang. 164 lakes spread throughout the agglomeration (Fig. 1). The shorelines are central to the city’s history and also crucial to its future.

2. Historic Perspective: Evolution of Wuhan’s Waterfront

Wuhan has a long history of waterfront development. The urban space on waterfronts has been formed and transformed according to different urban policies and strategies. The following historic survey can perhaps shed light on context of current operations on Wuhan’s waterfronts.

2.1 Fortified City with a Defensive Strategy

As early as 1,800 years ago, Wuchang and Hanyang each built a fortification on opposite sides of the great river of Yangtze. Following a defensive strategy, appeared two military capitals on the waterfronts. In use of an enclosed city model, these capitals were protected by the fortification walls. Two cross streets made the frame of the street grid, and the compounds with quadrangle houses around a courtyard formed the urban fabric.⁶ The waterfronts were characterized by the fortress, watchtowers and military ports (Fig. 2).

2.2 Commercial Port-City Structured by the Waterway

From the Tang Dynasty (618-907 A.D.), with the commercial development, the twin-city took advantage of a strategic position in the regional water network, became

6. YANG 2011.

the biggest commercial and transit center in central and south China. The urban space extended along the waterways and a number of towns appeared around commercial ports. Especially at the junction of the Yangtze and the Han, Hankou grew rapidly and became the biggest inland port of central China in this period.⁷ A linear structure of urban space connected ports with their hinterland. The low rise, high-density buildings, with mixed-use residential and commercial, dominated riversides. Numerous pile dwellings were created in flood areas. And the dikes were built to protect the city against flooding (Fig. 3). The waterfronts becoming the scene of citizen's everyday needs and activities.

2.3 Radical Changes in Process of Industrialization

In the industrial age, the iron works, arsenal, great textile factories were erected one after another in front of great rivers and outside the city wall. Furthermore, the port of Hankou was opened to western powers from 1861, the foreign concessions were established on a Bund area of 2.2 km². The waterfronts, largely artificial, were transformed as a special zone separated from the rest of the city. They were contributed to the industrial ports and productive activities. They became henceforth an exhibition place of the fruits of new industrial civilization. The scale of building and neighborhood was enlarged, the roads were widened, and the new system of street grid was formed in adaptation for the automobile circulation and industrial production⁸. The urban space extended discontinuously on shore and several new axes appeared to inland following the development of highway and railway (Fig. 4). In 1926, the three towns: Wuchang, Hankou and Hanyang, separated long time by the great rivers, were united in one city named "Wuhan". This administrative combination promoted a further integration of urban space. In the late 1920s, the fortification walls around the old towns were destroyed, and the ring roads took their places. In 1957, the first bridge was built cross the Yangtze, the urban spaces of three towns were finally joined together. Consequently, the waterfronts originally at the frontier of each town, became the center of the new city.

3. Urban Project Reality: towards a Resilient Development

From the 1990s, under the influence of the Chinese economic reform, Wuhan experienced huge economic progress and development of the tertiary sector.⁹ This change of local economic structure stimulated the reorientation and reorganization of urban functions, especially concerning industry and port sectors in the center of city. As a result, Wuhan's waterfronts went through a large transition.

3.1 Public Space-Led Waterfront Regeneration

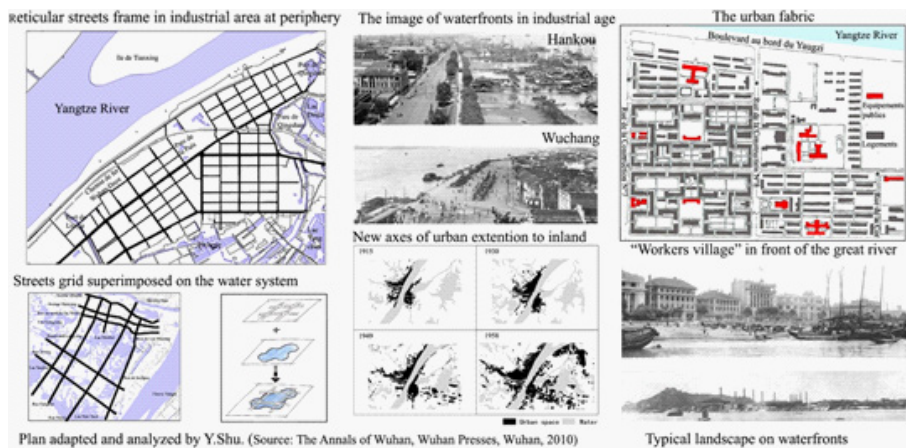
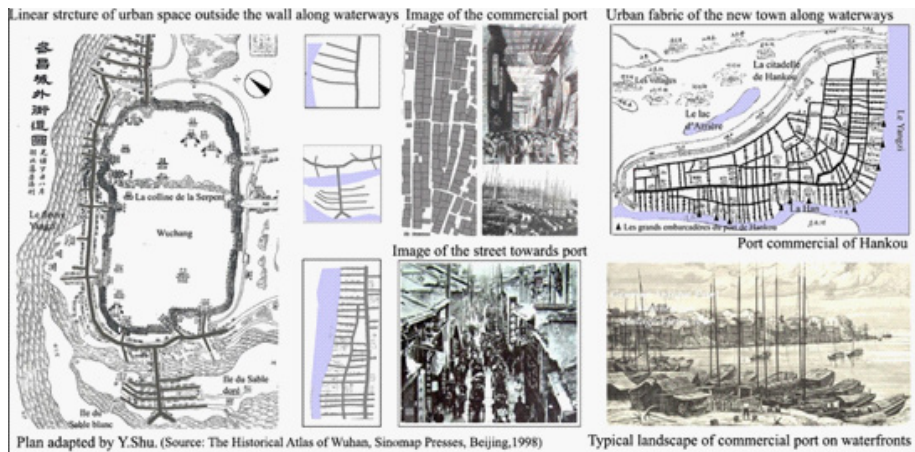
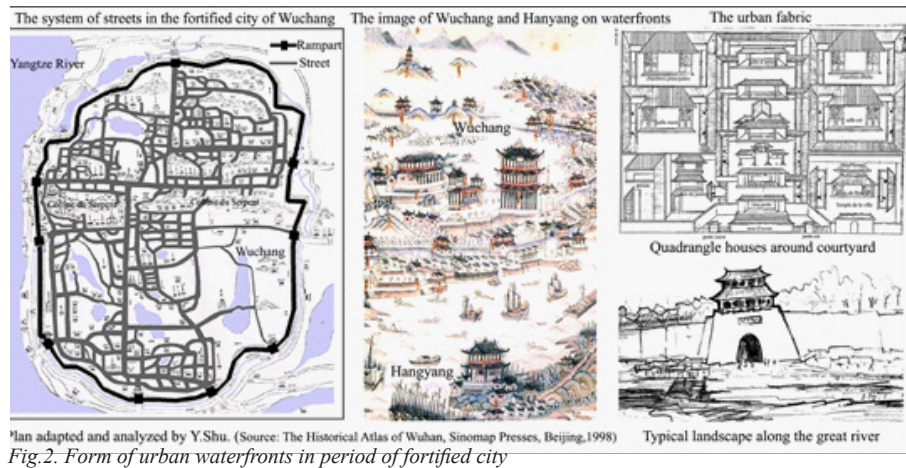
In 1996, Wuhan envisaged the transformation of the waterfront of the Yangtze in Hankou. The waterfront with the dimensions of 150-420 m wide, 7 km long, and

7. CHEN 2006.

8. LI 2005.

9. Wuhan Annals Committee, *Wuhan Annals* (1985-2009) Presses de Wuhan, Wuhan, 2010. [En ligne] the official website of Wuhan's Monograph Office <http://www.whfz.gov.cn:8080/pub/dqwx/whnj>.

REGENERATION WATERFRONT CITIES



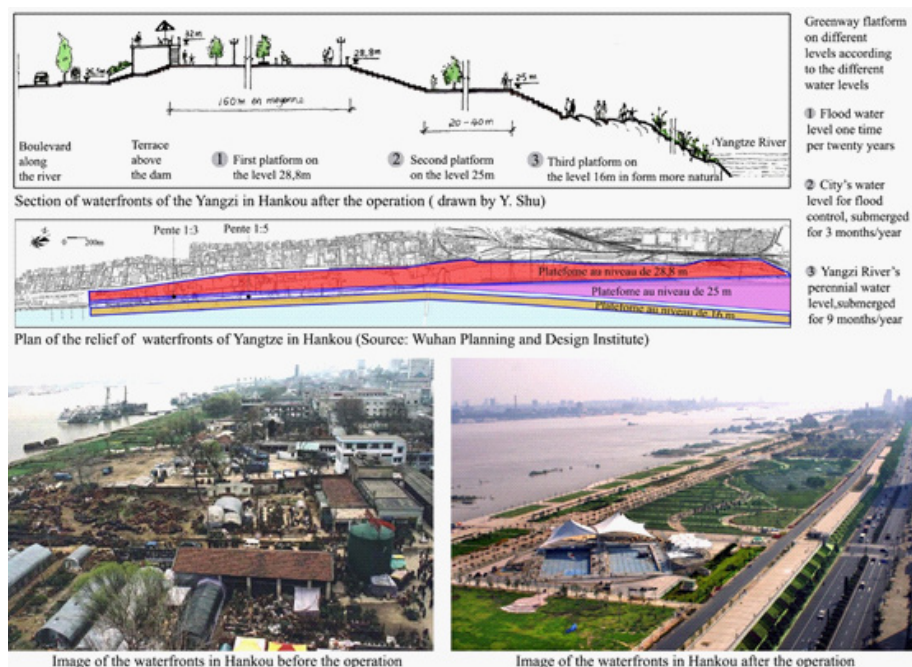


Fig.5. Transformation of the waterfronts of the Yangtze in Hankou

about 2,000,000 m², is located in front of the old foreign concessions in the center of city. It was abandoned after the decline of the ancient industrial port. The community decided to introduce a public green walkway along the great river. In fact, this huge project had two objects. Firstly, it was a local response to a national competition named “garden city”, carried out by the Ministry of Construction in 1990s. The waterfront, as main existing open space in the city center, was reconsidered as a strategic area¹⁰. Secondly, the regeneration of waterfront was also in view of the flood protection. In fact, in 1998, the basin of the Yangtze, including Wuhan, underwent a flood catastrophe which caused a loss of thousands of lives and a serious economic damage. During this catastrophe, the abandoned constructions on Wuhan’s waterfronts, strongly prevented the flow of water and caused a very dangerous acceleration of the rise of water level. Consequently, after almost five years of study and countless community meetings, the project of Hankou’s waterfronts was implemented in 2001. The municipality financed RMB 750 million (US\$120 million) in three phases. 200,000 m² of old warehouses and factories were removed, the infrastructures were improved, and a huge greenway park was created along the great river. The park was built on three different levels according to the water level in different seasons, so the people can enjoy the riverside both in the dry and the flood season. The landscape walkway and a number of recreational green spaces were created. The abandoned waterfronts

10. Principles for creation of Wuhan Garden City, Planning Report, Wuhan Planning and Design Institute, Wuhan, 1998.

have been turned into an important urban public space (Fig.5). The influence was not limited on the riverbank, but also on its inland neighborhood. The creation of new public space and the improvement of infrastructure have attracted more peoples and more activities. A great benefit was gotten from the real estate market. The average price of a new apartment on the waterfront quadrupled in just six years, and the highest price has increased from RMB 3,300 / m² to 16,850 / m²¹¹. The land value increased and the real estate investment stimulated the regeneration of the entire zone le long the waterfront. Subsequently, this strategy to create public open space on urban waterfront was executed in the entire city. In nearly eight years, 26 km of landscape walkways were created on the waterfronts not only in Hankou, but also in Wuchang and Hanyang, covering an area of 1,810,000 ha, including almost all of the densest parts of the city¹². Reconstruction of waterfront has improved the urban image and played an active role in regeneration of city center.

3.2 New Strategy of Renaturation

In the last ten years, a new trend of “back to nature” appeared. We present here one of the most representative projects – the reconstruction of urban water network. This operation was aimed to solve the water pollution problem of lakes which have been isolated one from the other in the process of urbanization.

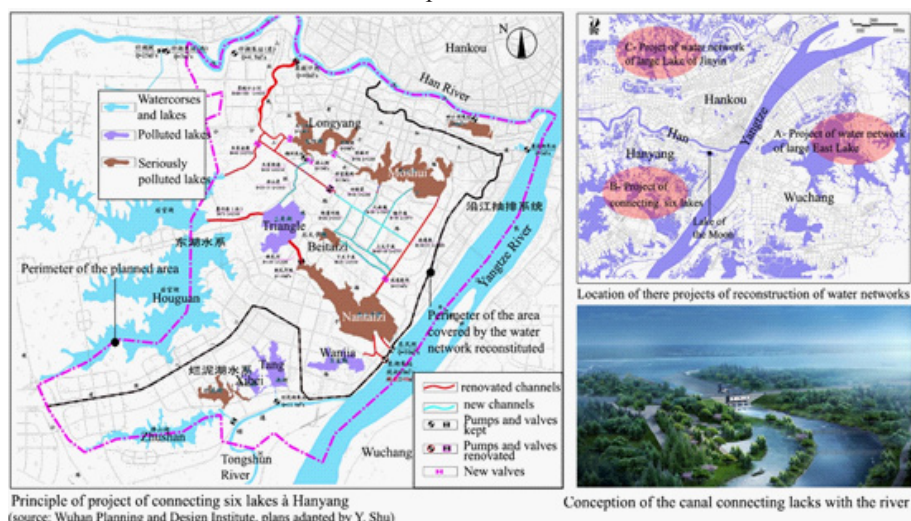


Fig.6. Projects of reconstruction of water networks in Wuhan

The idea is to join the lakes with the big rivers by digging new canals or using the existing waterways. The principle is to imitate the waters in their natural state by creating a semi-artificial water network, in which water can circulate and auto-purify.

11. HUANG 2007, p.

12. Research on the Development of Entire Urban Environment on the Waterfronts of Yangtze River in Wuhan, Planning report, Wuhan Planning and Design Institute, Wuhan, 2005.

This ambitious project was set in motion in 2007. At first, it was a small experimental operation. The lake of the Moon in Hanyang (surface of 37.3 ha) has been joined artificially with the Han River. In only one week, 70% of the water has been renewed, and the quality of the water has been improved considerably. After this operation, three large-scale projects have been put in place simultaneously: in Hanyang, a project to connect the six lakes; in Wuchang, a project to create the water network of the East lake; in Hankou, the project to create the water network of the Jinyin lake (Fig. 6). These projects have got the financial and political support not only from the local government but also from the central government. Wuhan has even been designated as one of the first three cities of experimentation on the protection and the restoration of urban water environment. In addition to the reconstruction of water networks, Wuhan also took advantage of a new program of “wetland parks”. A wetlands restoration plan has been elaborated by the local urbanism service in 2006. After two years of study, a big project implemented in 2009. This project envisaged to transform the waterfronts of the East lake (with a surface of water of 33 km², it is the biggest urban lake in China) into a national wetland park. Numerous aquatic floras have been planted and the mineral banks have been refitted with more natural materials.

4. Reflections and Conclusions

Through the observation of the case of Wuhan, we will identify some general factors of waterfront resilience on two crucial dimensions: temporal and spatial.

4.1 On a Temporal Scale: Permanence and Rupture

The interaction between city and water is the main character of an urban waterfront. In terms of waterfront, the precondition to understand resilience is to compare the age of the water with the age of the city, to show the interactions between these two time channels coexisting in the same space and complementing one another (Fig. 7). In this way, we generalize the transformation of urban waterfronts into three stages:

- Stage 1 : constitution of urban territory in dependence on aquatic environment
- Stage 2: artificialization of territory and banalization of water
- Stage 3: metropolization and reconciliation between city and water

The first stage lasted a long time, since the origin of the city until the dawn of the industrial era. It includes two periods of “city-fortification” and “city-port commercial”. In this stage, the city had a tight and direct link with the water. Waterfronts were widely accessible to all people and used for a variety activities: dwelling, commerce, leisure, fishing, sacrifice... This fragile balance was broken in the second stage, named according to Wackermann¹³ “*artificialization of territory*”. With a process of industrialization, water became an element of utility and an auxiliary of production. Waterfront was specialized for production activities and gradually lost its amenity. This resulted in a rupture between living spaces and waterfronts, even a rupture between the city and water. The third stage is characterized in recent decades. The city experienced a process of “*metropolisation*” with the renewal of the old city center and the development of new urban centers on the periphery. In a new social and economic

13. WACKERMANN 2005.

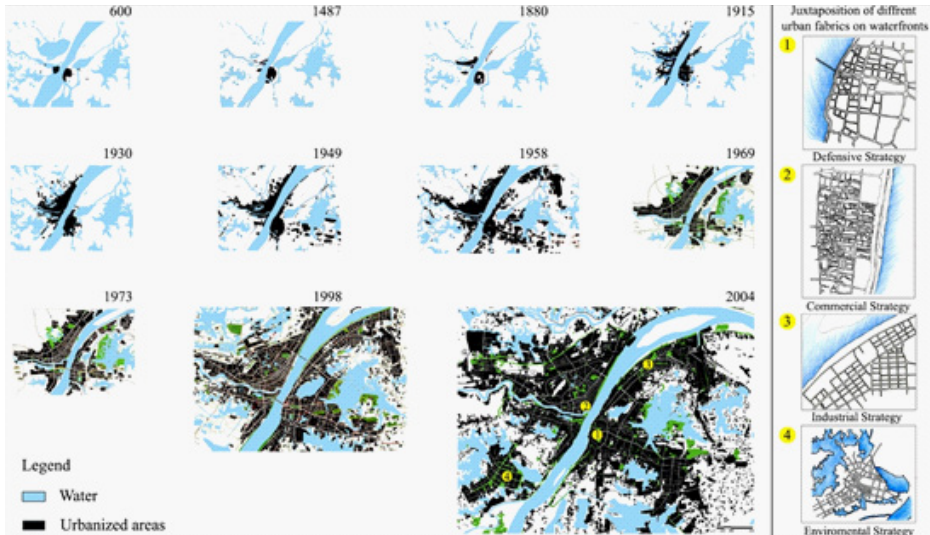


Fig.6. Projects of reconstruction of water networks in Wuhan

context, implemented an essential environmental policy, which led waterfront regeneration across a number of projects. All these projects show a new relation between the city and water, that of co-dependence and mutual adaptation: reconciled rather than separate. In practice, resilient waterfronts are long term projects. Waterfronts need to be redeveloped step by step, so the entire city can benefit from their potential. Public administration must give impulses on a political level to ensure that the objectives are realized while balancing short and long term interests. Resilient development is also an ongoing process. The ambition of strategies on waterfronts produces an effective interpretation of the past.

4.2 On a Spatial Scale: Fluidity and Connection

Waterfront represents a specific transition area between urban space and aquatic environment. On a spatial scale, the presence of water renders waterfronts distinct from the other spaces. All resilience linked with waterfronts are branded by the spatial property of fluidity. Fluidity represents a direction which engenders axis of mobility; fluidity implies a variable boundary which stimulates creative architectural experiences; and fluidity facilitates a transverse link in which we can integrate center and periphery, upstream and downstream (Fig.8). Meanwhile, waterfronts are also a part of the existing urban fabric. They should be conceived as an integral part of the city and contribute to its vitality. In this regard, creating connections between city and water is critical, and public access is a prerequisite. Waterfronts should be both physically and visually accessible for all users, and public spaces should be constructed with high quality to allow intensive use. Resilient waterfronts should celebrate water and facilitate the fluidity, by offering a diversity of cultural, commercial and housing uses. In this way, mixed use is a priority, not only in waterfronts, but also in housing neighborhoods. Nowadays, in dynamic and changing city context, there are a variety of

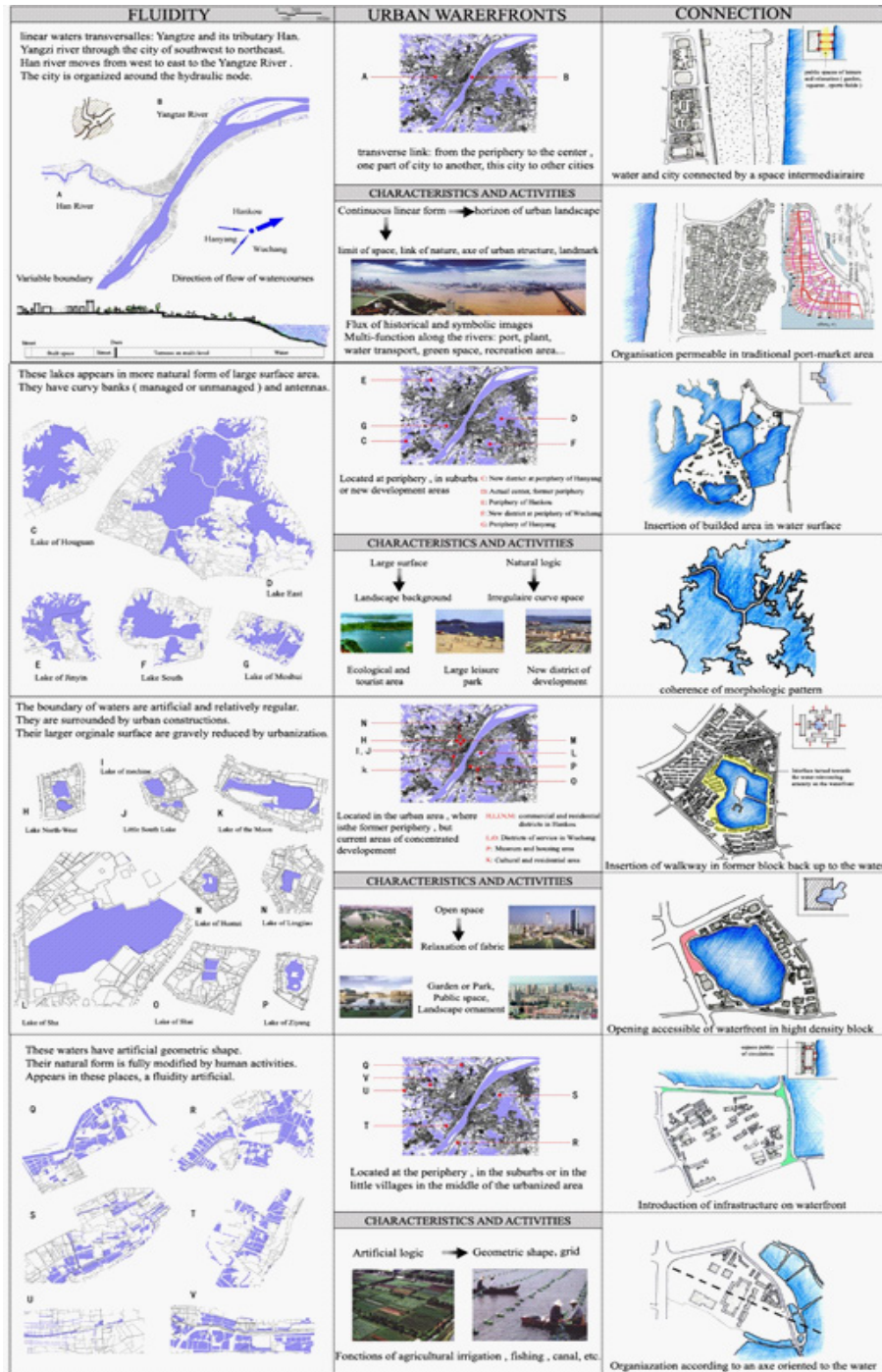


Fig.8 Fluidity and waterfront connection: an illustration of Wuhan

potential strategies to adapt waterfront areas to be more resilient. The experiences in Wuhan demonstrate that waterfront strategies and projects are capable of generating a new urban form and producing a new landscape to make cities more vital and competitive. All the adaptive strategies are rooted in local and metropolitan aspirations. While Wuhan is unique in many respects, the challenges we face are shared by many communities in the region, as well as elsewhere around the world. We established, in this paper, a framework of consideration based on temporal and spatial dimensions of waterfront, which can guide thoughtful and ongoing planning process for any city confronting an increasing resilience in the urban context.

(Acknowledgements: We deeply appreciate the contribution to this paper made in various ways by our families, friends and colleagues.)

Bibliography

BREEN, RIGBY 1996

Ann Breen, Dick Rigby, *The New Waterfront. A Worldwide Urban Success Story*, Thames and Hudson, London, 1996.

MEYER 1999

Han Meyer, *City and port: Urban planning as a cultural venture in London, Barcelona, New York, and Rotterdam*, International Books, Rotterdam, 1999.

GIOVINAZZI O., GIOVINAZZI S., 2008

Oriana Giovinnazzi, Sonia Giovinnazzi, *Waterfront planning: A window of opportunities for post-disaster reconstruction*, in: 4th International I-Rec Conference Building Resilience: Achieving Effective Post-Disaster Reconstruction, Christchurch, Apr. 30-May 2, 2008.

YANG 2011

Shu Yang, *Wuhan: on the interfaces city/water, the urban forms in transformation*. Ph.D. Thesis, University of Paris-East, Feb.2, 2011.

CHEN (dir.), 2005

Chen Feng, *Research on the history of evolution of the society in the Yangtze basin from the Ming and Qing Dynasty*, Presses of Wuhan University, Wuhan, 2006.

LI 2005

Li Jun, *The evolution of urban spaces of Wuhan in modern times*, Press of literature and art of Changjiang, Wuhan, 2005.

Wuhan annals committee, *Wuhan annals (1985-2009)* Presses de Wuhan, Wuhan, 2010. [En ligne] the official website of Wuhan's Monograph Office <http://www.whfz.gov.cn:8080/pub/dqwx/whnj>

Principles for creation of Wuhan Garden City, Planning Report, Wuhan Planning and Design Institute, Wuhan, 1998.

HUANG 2007

Huang Feng, «High valuation of housing with a view to the river in Wuhan in six years », in *Journal Wuhan Evening*, May 20th, 2007, p.4.

Research on the Development of Entire Urban Environment on the Waterfronts of Yangtze River in Wuhan, Planning report, Wuhan Planning and Design Institute, Wuhan, 2005.

WACKERMAN 2005

Gabriel Wackerman, *City and Environment*. Ellipses, Paris, 2005.