Renewal of Riverfront Residential Blocks by Public Space: A Case Study of Suzhou City

Author: Yun Xu
Tutor: Xavi Llobet
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Acknowledgement
Abstract

During long period of interacting with natural environment, the unique spatial forms, lifestyles and cultural dispositions had formed in the traditional cities with river networks in the area of the south of the lower reaches of the Changjiang River. This thesis tries to do some research on Suzhou City, the author’s hometown, as a typical case, which is the first and most thoughtfully planned and preserved city with water system as grid. Based on the theoretical review and case studies of successful waterfront renovation projects around the world, this thesis traces the historic evolution and morphological study of Suzhou city from different aspects, and then to find out the existing problems in Suzhou riverfronts today. Finally, through a design project in a typical site, it comes to the conclusion on the design strategies of riverfront blocks by public space. It aims to interpret the features of constitution, expounds and propagates their modern value, and then probes the ways from the view of architecture, to guide people protecting and renovating the traditional river networks rationally, and thus keep the particular charm and everlasting vigor of the local culture of the city.

The thesis is composed of six chapters. The introduction explains the reason for the topic-choosing, gives out a general background information for the research on "water-grid city" and "urban renewal", and shows the main structure and methodology for this thesis. The second chapter reviews about the successful waterfront renewal projects both in China and throughout the world, and summarizes the renewal strategies. The third chapter is a general morphological study on Suzhou city, through its historic evolution, and characteristics of the Suzhou water system and unique grid of "water", "street", "house" and "public space". This study could help us better understand the essence of the city context, which is the foundation of the design project. The fourth chapter figures out the different existing problems of the riverfront residential blocks both in oldtown and newtown, to discuss the modern value of the context of river networks with people’s life. The fifth chapter chooses two typical sites in oldtown and newtown, to specifically analyze the problems and gives the corresponding strategies for different situations. The aim is to consider about the recovery and regeneration on the riverside residential blocks, to keep the context and memory of the tradition, and at the same time improve the living condition for residents, as well as citizens and tourists. Then comes to the final chapter of epilogue, to show that the from the previous research and the typical design project, the whole Suzhou city could be renewed in this way. The public space regeneration could be an important method to reactivate the this ancient city with over 2500 years history in the future.

The thesis stresses that the protection, utilization and renewal of the riverside residential blocks, are not just returning to the traditional water city pattern. The thesis is a research on the developing strategy of the city. From the author’s view, the renewal design of public space of the riverfronts is a key point, which could be a contemporary way to maintain the context and modern life, in the sense that a new era will come out in Suzhou City.

Keywords:

Suzhou City, riverfront, renewal, public space
1 INTRODUCTION

1.1 Research Background

"Water" has been always regarded as "mother" of a land throughout the world, while it raises up human life, civilization, and shapes the city. The four ancient civilizations, without exception, are originated from the range of water, such as the Ancient Egyptian Thebes across the Nile, and the Ancient Babylonian city across the Euphrates. China is also a country where water is playing an important role in the developing process. During the various dynasties, the capital or important cities are usually located near the canal.

Ancient city and the river have maintained a close relationship. River is an important natural element for city. Water system could help a lot in transportation, defense, anti-drought, drainage, fire protection, recreation, improving the microclimate environment, and promoting ecological balance, etc. So, waterfront is the embryonic form where the ancient town formed, and gradually become the core of the city.

With the gradual improvement of social and technological level, many modern cities are sited in a river bank, or across the river. The blockade and negative effects from the water are weakened, but bring about more possibilities and diversities to cities.

There are three main typologies of city with water:

1. **Water at the edge of a city.** City is developed at one side of the water, so that water becomes the edge of the city, such as Toronto and some cities in Switzerland. And cities like New York, Boston, Vancouver and some Australian cities are developed by coastal bay.

2. **Water across the city.** The main river across the city, becomes the main axis of the city. Cities like Paris, London and Seoul are constructed and shaped from the main river of the Seine River, the Thames River and Han River.
3. Water grid throughout the city. The water system cross all over the city, to form a complete river network covering the whole city. This happens more in East Asian countries, such as China, Japan and Korea. And also some European cities like Venice in Italy and Amsterdam in Netherlands.

In China, during long period of interacting with natural environment, the unique spacial forms, lifestyles and cultural dispositions had come into being in the traditional cities with river networks in the area of the south of the lower reaches of the Changjiang River. Suzhou is the most typical city of the third typology of “water-grid” city. It is the first and most thoughtfully planed and preserved city with water system as grid, with a history of over 2500 years. Today it still maintains the ancient grid from the very first period of formation, which is really a miracle in urban planning.

The history of Suzhou city construction is a history about how to control, plan and make use of water, to integrate canal with the natural river system, and slowly make adaptations throughout time. The double grid of "street" and "river" is a creative urban grid in China, creating diverse possibilities of "water", "street", "house" and "public space".

However, while some new cities are fast developing around waterfront, some historical cities which are developed based on river system are being polluted or losing the good conditions around riverfront as the pictures show. For many historical water-grid cities, water has become a negative element, while during the new construction, water is slowly being isolated from the city and life. Context of diversity of street-water-house-public space are forgotten by residents nowadays.
Therefore, regeneration of the riverside residential buildings, to recover the diversity of water, street, building and public space is urgently needed.

Throughout the world, we could see many successful cases of the waterfront regeneration. Projects like HafenCity in Hamburg, Canary Wharf Dockland in London, and some waterfront recovery in Venice, Amsterdam and Copenhagen, etc.

![Image of HafenCity, Hamburg](image1.png)

*Figure 1.9-11. HafenCity, Hamburg, 1990-1997-2011

![Image of Porsuk Stream in Eskişehir in Turkey](image2.png)

*Figure 1.12-14. Porsuk Stream in Eskişehir in Turkey Porsuk Çayı: (a) before; (b) in application; (c) now (Eskişehir Greater Municipality, 2006)*

![Image of Cheonggye Expressway](image3.png)

*Figure 1.15-17. Before and after of Cheonggye Expressway
(Seattle Urban Mobility Plan, 2003)*

These waterfront renovation projects make good use of the water resource and give the surrounding area a second life. From these cases, we could learn much excellent experience and understand the value of regeneration.
1.2 Research Aim

In Suzhou, we are also facing the issue about waterfront regenerations both in historical areas in oldtown and new developing districts in newtown.

In the historical areas, many old residential buildings by river are in poor quality where people's living condition is quite bad. Some public space by river is invaded by private use and some are not used because of the bad condition.

![Figure 1.18-19: Xiangqiao Alley in Suzhou, street view map from www.baidu.com](image)

In some new developed area, we could see more new-typology housing, while at the same time, the diversity of the relations between houses, street and water is losing. The gated community are pushing away the identity of water. By riverside, there is no longer interesting public space but only fences and walls.

![Figure 1.20-21: Xinxiangyuan in Suzhou, street view map from www.baidu.com](image)

Through the theoretical research and case study, and the previous research on Suzhou City grid and river system, this thesis is aimed to figure out different design strategies to solve the current situations in Suzhou, to recover the context of "water", "street", "house" and "public space". The regeneration of riverside residential blocks through public space would be important in the urban development, to preserve the context and improve the living quality at the same time. In this way, the ancient city Suzhou could regain its unique charm and beauty in the future.
1.3 Research Methodology

(1) Comparative Research:

Use Quantitative methodology to research different cases of waterfront renewal projects in the world in different periods, to summarize about the different aims, typologies and strategies. And use Qualitative methodology in specific case studies to conduct deeper research. On this base, to compare different cases, and find out the similarity and difference between different situations, to get the useful information and good experience for my own case study of Suzhou City.

(2) Historical Research:

To find out how water as a central element, to shape the city of Suzhou, throughout the whole history of over 2500 years. In case of Suzhou City, the historical evolution of urban grid and morphology --- water, street, housing with public space would be an important factor for today's riverfront renewal.

(3) Field investigation:

To analyze the current situation and problems existing in Suzhou today, both in traditional neighborhoods and modern ones, I would do the field investigation and some interviews with some residents and experts (with help of my friends and family in Suzhou).

(4) Research covering different subjects:

Besides history, fields within Geography, Sociology, Water Conservancy, Ecology and Economy, etc. are also integrated with my research. The mix and integration of different professions would be interesting to give more useful solutions.

Using the different research methodologies mentioned above, I would follow the process of study as the framework shown in the right:
1.4 Research Framework

**Introduction**

**Case Studies**

**Different typologies Summary (Global)**
- Two cases of Spain & China
- Summary of renewal strategies

**Morphology of Suzhou Urban Grid - Water, Street, House with public space**

**General introduction**
- Water & House
- Public space by water & house

**Evolution and features of water system**
- Water & Street
- Public space by water & street

**Bridge as infrastructure**

**Current situations and problems in Suzhou riverfront blocks**

**Reasons of decline and destruction**
- Urban structure
- Traffic system
- Ecological system
- City life
- Historical places

**Situation and Problem**

**Importance and Urgency of renewal**
- Pingjiang Street Renewal Case

**Renewal strategies**

**Site analysis**
- Project in oldtown
- Project in newtown

**Conclusion**
Case studies of worldwide waterfront renewal projects
2 CASE STUDIES OF WORLDWIDE WATERFRONT RENEWAL PROJECTS

2.1 Different typologies of waterfront redevelopment

Obviously, there are varieties of waterfront projects in the world throughout the history, which differ a lot in different situations. However, from the methodology, we could categorize them into three types: **Development, Preservation and Renewal**. From the perspective of land property, we have different typologies like waterfront park, residential area, commercial area, historical monument, natural sightseeing area, culture facilities, industrial district, port, farmland, etc. From the integration and assessment from different views, I would summarize 6 different typologies of waterfront redevelopment projects:

2.1.1 Tourism and Leisure

Taking advantage of "Water" as a leading feature, to redevelop leisure service facilities like shops, canteens, restaurants and coffee bars are quite popular among mid-class groups both local and tourists. The Baltimore Inner Harbour redevelopment project is always seen as a pioneer by experts and scholars, and at the same time a successful example of tourism leisure project.

The basic idea is based on that, commerce, tourism as the core to attract local customers and tourists, and then put residence, hotel and office surrounding. The shopping mall, square, promenade and leisure facilities like music hall, exhibition centre are right beside the water. Starting in 1930s, the government could profit 25-30 million dollars per year from it till 1990s. It is a good example for later projects like Darling Harbour in Sydney and Cardiff Bay in Wales.

![Figure 2.1: Baltimore Inner Harbour Redevelopment](http://baltimorewaterfront.com/harbor-2-01)
2.1.2 Historical preservation

By restoring and repairing the current facilities and buildings, the original space, building and materials are preserved and focused after renewal. Single building like church, warehouse and factory, or waterfront blocks or squares, or even a whole city, like Venice could be the objects to preserve. Restoration and little changes with the functions are usually applied in this case, in order to maintain the space, morphology, at the same time the local traditions and lifestyles.

The famous project, Gas Works Park in Seattle, was a gas plant before. In the restoration, numerous pieces of the old plant were kept. Some stand as ruins, while others have been reconditioned, painted, and incorporated into a children's "play barn" structure, constructed in part from what was the plant's exhauster-compressor building. Now the good landscape has become a popular place for neighborhoods.

Figure 2.2-4: Gas Works Park in Seattle, (https://yting.com/w/4-YTBpxoFGa)

Similar cases are South Street Seaport in New York and the Rocks urban regeneration in Sydney. In the New York case, vehicles are forbidden into the streets. The pavements are redesigned more suitable for the historical buildings and cultural atmosphere. The original warehouse was reused as modern shopping mall and canteens, so that the historical area has become one of the most attractive places in New York.

Figure 2.5: Venice City (http://www.brazee.com)  Figure 2.6: South Street Seaport in New York (http://p3.pstatp.com/large/14e0003162bc3e98945)
2.1.3 Natural ecology

Focusing on the ecological recovery as the leading factor, considering the multi factors in the water surrounding, such as banks, wetlands, lakes, watersheds, vegetation, aquatic plants in the general plan, it is expected to achieve the goal to restore the ecological stability of the water. Restoration of natural beaches and wetlands, the plan integrated with polluted water treatment and collection and emission of raindrops are the main means.

Early successful examples are the Charles River Reservation in Boston. The river system is the core of the plan. The riverfront is kept with 200-1500 inches of forest on the side as park. The linear green system along the river is connected with the city green system. Certain trees which could resist the periodically flood are planted, so that the wetland is like a container for flood to protect the near blocks. A water circulation system could well control the situations raised by flood and pollution. The whole ecological system is recovered after renewal.

![Figure 2.7: The Charles River Reservation in Boston](http://www.mass.gov/eea/image/dcr/parks/boston/)

Similar ideas are shown in some projects in China in recent years, like the Red Ribbon Park in Hebei by Kongjian Yu. The good environment is perfectly restored for people’s rest and activities, at the same time, improve the microclimate in this area.

![Figure 2.8-10: The Red Ribbon Park in Hebei](http://www.furenlandscape.com/ykj/design/)
2.1.4 Life comfort

As mentioned before, places along the water are always natural and romantic, which has always been the first choice of human residence. Undoubtedly, residential use will continue to be an important part of waterfront land.

There was a canal built in the 1830s in Indianapolis City in the US. But with the transformation of transport, the canal as water traffic ways was declining (which was similar to Suzhou). In 1965, the Government started the revitalization of downtown area, one of which was to change the original old houses and abandoned warehouses into new neighborhoods. The newly developed residential areas are mostly collective housing, which attaches great importance to the design of the urban landscape along the river, including the bridge across the river, lights and green vegetation on the embankment. Since the riverbed and river water levels are in the lower position, therefore, the development of the river bank are redesigned into two different vertical level. The high shoreline is balanced with the newly developed residential area, while low one with the water level. Promenades for walking and jogging are created with different width, where open-air cafes and restaurants are place in the wide parts. People could well enjoy the riverfront space here.

Figure2.11-14: Indianapolis Canal
(http://www.indianapolismonthly.com)
2.1.5 Commercial and business

With the special location of waterfront, the area is like a "gate" or 'window' of the city, so many big cities establish CBD in the waterfront space. The skyline of skyscrapers is also a nice landmark of the city.

The Pittsburgh CBD is a typical case of this type. The city sits where the Allegheny River flowing from the northeast and Monongahela River from the southeast form the Ohio River. In the 1970s financial crisis, many enterprises were closing down. Some abandoned factories and offices were being transformed into residence and public space. In the joint centre of the three rivers, a new CBD was built. At the same time, a big urban park was constructed for better connection with office and river.

Figure 2.15: Pittsburgh CBD
(https://upload.wikimedia.org/wikipedia/commons/a/a3/)

This also happens a lot in Asian cities in recent years. The Lujiazui CBD along the Bund of Huangpu River in Shanghai is also a typical case. It is a well-developed and growing project, which is the most important business centre in Shanghai, even in China.

Figure 2.16-17: Lujiazui CBD in Shanghai
2.1.6 Industrial management

This type of waterfront is mainly used for industrial use, including following 4 types: (1) Water transport and related industrial applications; (2) Terminal and related facilities; (3) Luxury ferry and commercial sightseeing purposes; (4) Traffic purposes (including ferry, small civilian airport, heliport and railways, etc.), while some are also for civic and public use. Some of them should be at certain locations by water, and some are located in the surrounding area according to their specific uses.

The case of Granville Island redevelopment and the Boston marine industrial park are good examples. The industrial installations as cement loading facilities, are reused and shaped like sculptures. Functions like offices, warehouses, and public markets are introduced into the old industrial facilities, and the buildings have also become a good view for citizens and tourists.

![Figure 2.19-20 Granville Island redevelopment](http://thumbs.dreamstime.com/z/)

![Figure 2.21 Boston Marine Industrial Park](http://www.bostonredevelopmentsauthority.org/)

**Summary**

It should be mentioned that above is just a theoretical reference of categorization, while in reality, each project is usually involved in several different typologies. This categorization is done by their leading and overwhelming factors.

In the case of Suzhou City, different situations also happen in the old town inside the ring river, the border of old town and new developed districts with some large lakes. I would focus on the previous two situations, considering about the historical context and the improvement of the riverfront neighborhoods. **So Type 1,2,4 are mainly referred to in my own case, to preserve the history, improve the living quality and develop the tourism at the same time.**
2.2 Two cases in Catalunya and China

Here I choose two cases for further study, one in Catalunya and one in China, which is more convenient for me to do field research. They are both successful cases of waterfront renewal, using the contemporary architectural language in the historical context, to reshape and improve the quality by public space with "water" feature. What’s more, the scale of space and the context as historical cities with water are similar to the case of Suzhou city in the two projects, which would be useful for me to do further research in Suzhou.

2.2.1 Banyoles Old Town Refurbishment by Josep Miàs

Banyoles Old Town has one of the region’s most emblematic heritage architectural and urban centres. The refurbishment modernises the public space and its systems, and builds a new sense of public landscape by uncovering the old drainage canals and reincorporating them into squares and pedestrian streets.

Practice: Miàs Architects
Designer: Josep Miàs
Miàs realised this project through his practice Miàs Architects.
Title: Banyoles Old Town Refurbishment
Output type: Design
Function: Pedestrian public space and services infrastructure
Location: Banyoles, Girona, Spain
Client: Banyoles Town Council [international competition]
Competition: Hereu Espanyol, Bosch Tarrús Vives, Josep Lluis Mateo, Bosch Genove
Budget: € 4,000,000 for phases since 2008
Area: 18,000m²
Engineers: Príncipet

Figure 2.22: The whole plan for the old town has transformed the experience of the city, returning its pedestrian use and accessibility.

Photograph: Addà Goula

Introduction

In the ninth century the monks of Sant Esteve Monastery, in the first settlement of Banysoles, built a system of drainage canals, or recs, excavated from the lacustine travertine plate beneath the town, to provide water from Banyoles’s lake and to avoid the frequent localised flooding. The recs run from the south-east bank of the lake through the old town and branch out into irrigation canals before emptying into the river Ter. The water was used for farming and pre-industrial craftworks.

However, the canals were then covered until this project, which stripped away the existing cement to expose the historical substra of the town, uncovering the remains of buildings, tombs, objects and old canals. The aim is to render these vestiges visible within the redevelopment project, reincorporating the recs back into the streets.
Context
This refurbishment explores the use of the past as a material for designing a contemporary public space that is highly equipped, comfortable and flexible for modern life. Due to its unique circumstances, the project is one of the first of its kind, especially in terms of using the local material to pave and channel the water. By choosing the same stone used in Banyoles architecture, lacustrine travertine, we have revived the public space of the town as a new, meaningful, folded and cut pavement.

Banyoles, like many European towns or cities, is the result of historical layering. Different moments of its evolution can be imagined in a tiny detail. Our contextual research has considered material and immaterial heritage: buildings, objects, works of art, but also volumes, words and abstract structures. Our proposal aims to reflect this heritage that had ‘sunk’ underground to redefine the surface of a new social space. The project focuses the attention in two main ideas.

a. Latent history of water
In order to reinterpret the remains of the past and meet new needs, we used techniques to preserve the material heritage and protect it for other generations. The old town of Banyoles had completely lost the main features that defined it: water canals, orchards, materials, walkable streets, etc. It had been invaded by cars, and it had forgotten its lacustrine identity. Previously, the water canals irrigated kitchen gardens, and provided water for domestic use and public laundries. They also powered machinery in the town’s textile and agricultural industries. Once these industries had died out, the network of canals was relegated to a sewer system, where clean rain- and lake-water mixed with dirty water.
The project reconnects the town to Banyoles Lake, an outstanding feature of the area, karstic in origin, and the largest local natural lake of the Iberian Peninsula (2,150m long, surface area 111.7hm²). It has recently been declared as PEIN (Special Plan for Natural Interest Spaces) by the Catalan Government, and is part of the 2000 Natura Net and Wet Areas Ramsar List.

Figure 2.26: Banyoles was established on a limestone plateau (a result of centuries of lacustrine material sedimentation), surrounded by aquiferous wellsprings and former volcanic areas.

Figure 2.27: The map shows the relationship between Banyoles Lake, the old town and the modern city of Banyoles. The surface which occupies the old town corresponds to the walled area of the medieval city. The demographic growth is graphically clear from 172 inhabitants in the 16th century (blocks marked in black) to 18,700 inhabitants in 2010 (blocks marked in grey).

Figure 2.28: Both buildings and voids are part of the heritage, as well as patterns and plantations. Like many inland squares Catalonia, Plaça Major's pavement was made of granite gravel, the project's aim was to respect that value. Photograph Adrià Goula

Figure 2.29: Entrance of Carrer Avenadors to Plaça Major. Most of the buildings are catalogued and protected, representing a unified historic urban fabric. Photograph Adrià Goula

b. Pedestrianisation

Before the project began, the old town of Banyoles was full of cars, leaving little room for pedestrians, and causing physical and air/particle pollution damage to the porous travertine buildings. In addition, parked cars occupied public spaces which should have been for people and public activities.
Figure 2.30: The whole plan for the old town has transformed the experience of the city, returning its pedestrian use and accessibility. Photograph Adrià Goula

Figure 2.31: The pavement is an extension of the built environment, made of the same limestone that is naturally produced by the lake’s sediments and used for building the city. Photograph Adrià Goula

Figure 2.32: All the service networks were updated and integrated in the pavement layout. Photograph Adrià Goula

Figure 2.33: In some areas, archaeological remains have been discovered. In Plaça del Teatre, the pavement layout is designed following the wall lines of a demolished theatre that existed previously. Photograph Adrià Goula

Figure 2.34: Existing urban furniture, such as this stone fountain in Plaça de la Font, were refurbished and recovered. Photograph Adrià Goula

Figure 2.35-36: New details were added in order to give back the original meaning of the old urban furniture. Photographs Adrià Goula
Methods

Design research methods for creating a place for life that rediscovers the old town’s resources and re-envision its public spaces, e.g. by making its canals visible.

The research and design process involved:

a. Water systems separation: Complete separation of water systems into clean-rainwater canals and sewage system, which previously were mixed.

b. Recovering the original sections: Restoration of the best-conserved sections of the canals, as in Carrer Abecedadors.

c. Sculpting water and the local stone: The main materials of the project are those related to water. Water itself is the matrix material, running from the lake all along the town in canals. Travertine, formed in the waters of the lake as well, is the base material for covering, folding and opening the pavement. It is easy to cut and to transport stone quarried in the outskirts of Banyoles, where larger prehistoric lakes left deposits of travertine.

By using travertine, the project gets completely camouflaged in the context of treating the road as the third façade of the town. Travertine is used in façades and monuments, resulting in a complete continuity between façades and pavements. Pieces of urban furniture, such as benches, have been designed especially for this project as wooden trunks which have been drifted metaphorically by the ‘liquid’ pavement.

Figure 2.37: Plaça Major.  
Figure 2.38: Plaça Teatre.
Integrated design and historical research towards the creation of a continuous 'historical' pavement. The main design tools are based on traces of remains, plot divisions, ruins and water canals. The main design tools were based in historical research. Traces of remains, plot division, ruins and water canals were the leading design agendas in the project. This new pavement included different aspects related to conservation and design. The contact of façades with the soil was restored and several systems of protection were used to avoid damage caused by humidity or capillarity. Research included investigating how to manufacture and control a wide range of pieces, considering specific mechanical and material properties, resistance to erosion and water, prefabrication and cost.

Meeting local government heritage standards.
Departing from the available scarce information given by the Council, the deconstruction process of the existing pavement helped to reveal, catalogue and map precisely what was found. After that, and following government standards, objects were taken to the museum and ruins were protected and covered again. This new cartography was used to design the patterns of the pavement.

Physically there were just a few elements that had to be restored, the project focuses on public spaces which were formerly made of tar and concrete. However, some urban furniture and other elements needed restoration because they were going to play a part in the project: a stone fountain in Plaça de la Font; iron fountains in Plaça dels Estudis and Plaça del Teatre; stone arches of the original canal in Carrer Abescadors, near Plaça Major; and big medieval pieces of travertine which were later reused for paving Plaça Major. Each one of these elements was cleaned with non-abrasive techniques and protected against erosion. When mortar was damaged it was refilled with a similar one, and broken travertine pieces were repaired.

Figure 2.39: The pavement is designed to drive and collect both, rainwater and the water from the fountains. Photograph Adrià Goula

Figure 2.40: View of Plaça dels Estudis. Urban furniture helps to solve level differences, such as the entrance of the Dàctil Museum. Photograph Adrià Goula

Figure 2.41: By using the same material, the pavement turns out to be the third façade of the public space, making the void legible as a volume. Photograph Adrià Goula

Figure 2.42: Plaça de la Font, where the variety of the pavement pattern and shape can be noticed. Photographs Adrià Goula
2.2.2 Transformation of the Southern Song Imperial Street in Hangzhou by Wangshu

Introduction
As we know, the architect Wangshu is the winner of the Pritzker Architecture Prize in 2012, the first Chinese winner. He is always focusing on interpreting the Chinese context in a contemporary architecture language.

In 2007, the government of Hangzhou as the client, wished Wangshu to do the renewal for the Southern Song Imperial Street. Then Wangshu put forward 6 requirements:
1. He must take more than 3 years to do the deep research before design;
2. Forced evictions are forbidden in his design (which is common in China);
3. Renewal is not copying the old styles, like a fake antique;
4. Transformation is not just on the facade, but the space, the atmosphere and the spirit;
5. The width of street should be decreased to 12 metres as the original one, to recover the original human-scale space and small-block neighborhoods;
6. He would only do an example of 1 km, the rest should be done following his case.

Then, Wangshu as the professor of Chinese Art Academy, leded over 200 students to do the deep research about the site for nearly one year. All the old buildings, even the local residents are the most precious treasure for him to do the design.

History evolution
Hangzhou, which was called "Lin'an" in the ancient times, was the capital city of the Southern Song Dynasty. And the imperial street was one of the main streets at that time. Why it is called "imperial" lies in that, the emperor held the ceremony for sacrificing the god in this street every 3 years. The basic structure of the road is formed from that time due to the certain regulations by royal family.

![Diagram of the Imperial Street in Song](http://www.docin.com/p-1153925439.html)

Later, after Qing Dynasty, Hangzhou was a busy commercial city, so this street became one of the busiest commercial streets. However, after 1950s, the centre of Hangzhou was moving towards north, so this area was slowly fading away. Many old buildings are in poor condition and life quality of this neighborhood is quite bad.

![Development from 1900s to 2000s](http://www.docin.com/p-1153925439.html)
Transformation of houses
- Protect the important architecture of high historical value
- Reform and reuse the old buildings of relatively good quality;
- Tear down the bad and non-reusable buildings;
- Build new architecture in a contemporary language while maintaining the context at the same time.

![Figure 2.45-47: Buildings of local residents or special historical value are preserved](image)

![Figure 2.48-50: Small changes in facade or entrance for reuse](image)

![Figure 2.51-53: New contemporary buildings (Taken by author)](image)

Transformation of street with waterscape & vegetation
"River" as a traditional element like the original ones in Song Dynasty, it is reintroduced into the street system, to remind the memory of the street.
Figure 2. 54-59: Street with waterscape and vegetation (Taken by author)
Materiality

Just like his other projects, local materials are important in his design. He even collected the waste bricks from the demolished buildings, to reuse in the new construction, or some sculptures, to keep the memory with physical materials.

Brick is a very common and basic material for construction in this area. Both pavements and facades are using bricks as a traditional custom. It's interesting that usually bricks are laid horizontally, but in this street in Song, to prevent the brick from being destroyed by large numbers of horses in ceremony, it is laid vertically. Wangshu reuses this method as a small trick.

![Figure2.60-62: Bricks in pavement and facade](http://image.baidu.com)

![Figure2.63-64: The old materials from the demolished buildings reused as a modern sculpture](http://image.baidu.com)

New materials are also used in some parts, like the glass in the entrance pavement of the exhibition hall, to show the original basement of this street.

![Figure2.65-67: New materials](http://image.baidu.com)
2.3 Summary of renewal principles

2.3.1 Introduction of public space shared by different people

In this point, the land property policy is quite important. In China, the government sell the land. Many large waterfront projects are developed by some real estate companies, with too strong profit purpose. The waterfront space is occupied by hotels, offices with privacy. Common people could not get access to these places. Also, in some water-grid cities, like Suzhou, some riverfront space is taken by private houses. We could say that this is a characteristic of such cities, but still, certain space should be open. Citizens and tourists should have the right to feel and get access to the riverfront public space.

This could be understood as a kind of "democracy". It is important when we are designing such projects. In recent years, the successful examples all show the feature of "openness" and "sharing". The riverside promenades, squares, and public facilities like seats and sport facilities are built open to all.

Take the Baltimore Inner Harbour for example, the main idea is to create a multi-functional tourist project. Though large quantities of highrise residence are built by water, the waterfront public space is still shared by all users. In fact, as early as 1909, the urban policy requires that the 1 kilometre wide space by Michigan Lake should not be for private use. Only public buildings like stadium, art museum or aquarium could be built. This regulation is being obeyed for more than 100 years.

2.3.2 Integration of different functions for activation

"Mix-use" is always an important topic in contemporary architecture. It is obvious that mix of different functions could lead to mix of users to activate the atmosphere. Similar people and single activity could not bring the diversity and vitality. Integration of commercial, eating, office, residence and some culture functions could provide different options for both residents and citizens and keep it live. What's more, public function and space should be the leading factor to introduce the whole program, to keep the diversity and complexity of space.

In the case of Granville Island in Canada, in the first design, a park was decided to be built by most people, but the designer in charge put forward the idea of "urban park", which integrates industrial heritages with modern facilities like culture and commercial. A series of different functions are created for people of different ages, different professions and different incomes. The mixture turns out to be a huge success. The busy and energetic commercial and quiet leisure space with much vegetation form a special and interesting experience. Later, it became a new central area and landmark for Vancouver, at the same time, brought the government and developer much profit from the tourism industry.
2.3.3 Easily access to waterfront

Human naturally feel close to water. The beautiful view, the fresh air, the co-existence of animals and plants are all treasures given by nature, which could inspire human a lot. It is totally different from the main streets inside the city among skyscrapers. Nice waterfront space could easily get people’s attention and love. Different architecture method like platforms overhanging water, promenades crossing water, piers reaching inside the water, or some nice restaurants with water view are all giving the possibility to get access to water. The cases of Pittsburgh and Fisherman’s Wharf in San Francisco are both good examples.

However, the lack of easy access to waterfront is an important factor which restricts the development of waterfront in China. To prevent the flood, high dams are built to block the access to water in most projects. Today, we are improving our awareness of the importance of waterfronts, we are planting trees and grass to make waterfronts more beautiful. However, it is just for looking but not using. People still could not reach the water. Public system connecting water and public transportation is very important to organize the flow.

2.3.4 Reshaping of urban context

The redevelopment does not mean demolishing, especially for historical cities. The history and context of each place is a treasure for us. Once you ruined it, it would not come back any more. Nevertheless, in China, we are facing much trouble with this problem.

Actually, the research on the history, context, and the lifestyle of local people is the foundation and premise of the design. In my thesis, I would follow this principle. So the case studies, the research on history and urban grid of the city, and the investigation of the site would be conducted before and during the whole process of the project.
13/ Morphology of Suzhou Urban Grid
— Water, Street, House and public space
3 Morphology of Suzhou Urban Grid
— Water, Street, House and Public Space

3.1 General Introduction of Suzhou City

Basic information:

Area: 8488.2km²
Geomorphology: Plain
Climate: Wet & Mild
Inhabitants: (5,454,500) to 5,549,100
Economic statistics: GDP $190.294 billion, GDP per capita $13,064

Feature: Rich water resource, Traditional gardens

Suzhou is located in southeast China, in the middle bottom area of Yangtze River, about 100km away from Shanghai. The city of Suzhou consists of six major parts: urban area and another five county-level cities: Wujiang, Taicang, Zhangjiagang, Kunshan and Chengshan. But the old town of Suzhou we talk about later is only a part of Gusu District (marked in red). That is the original limit in the history.
Suzhou is one of the oldest cities in China which has more than 2500 year's history. The establishment of Suzhou City can date back to 514 BC. The construction of the city took fully advantage of the existing water system and a very dense canal system was constructed inside the city as well. From the establishment of the city to the 5th century, Suzhou experienced a steady growth owe to its peaceful location and suitable environment for agricultural. After the completion of the Grand Canal which connects Beijing to the South part of China in 6th century, the cities long the Grand Canal experienced a significant growth because of the exchange of goods and people between north and south and the city of Suzhou was one of them. Through centuries of development, Suzhou and its surrounding area have become the most developed area in China.

According to the archeology research, the site of Suzhou city never changes since its establishment in 514 BC. All the building and construction are conducted on the original site. During the 10th century, the urban form and morphology became mature and doesn’t change much till today. The city map, Pingjiang Map, which was created during the 13th century is the oldest city plan in China. It shows the streets, canals, city gates, main landmark and their names. Comparing with this map with the Suzhou City today, the urban structure almost remain the same and some of the names of streets, canals, gates is still in use today.

Suzhou is a famous tourist city, and of course, the development is focused on the feature of “water”, like the quiet alleys in watertown and the traditional Chinese gardens. "Water" is like the soul of Suzhou City.

![Figure3.3: Bird View of Suzhou, (Taken by author)](image)

![Figure3.4-5: View of traditional watertown in Suzhou, (http://www.99traveltips.com/)](image)

![Figure3.6-7: Traditional Chinese gardens in Suzhou, (http://image.baidu.com)](image)
3.2 Evolution and characteristics of water system in Suzhou

3.2.1 Historical evolution of Suzhou water grid
The water-grid Suzhou city does not happen by accident. It is closely related with the natural geography and physical productive activities while constructing the city. Suzhou is close to the sea in the east, right beside the Yangtze River in the north, and at the outlet point of Taihu Lake. Three main rivers (Songjiang, Loujiang, Dongjiang) and tens of lakes (Jinji Lake, Yangcheng Lake, Dushu Lake...) overlapped the whole city. But the height of city is quite low, lower than the main river. So since long ago, people are always trying to use advantage of water and fight against the flood disasters.

![Figure3.8: Natural waterland of Suzhou in history](Book «Water conservation in Wuzhong» in Ming Dynasty)

Before more than 5000 years, the emperor Yu in Xia Dynasty had taken actions to deal with water disasters, and use canals to connect Tai Lake and the sea, so that the flood was controlled. Then the irrigation system was started for growing crops.
In 514 BC of the Spring and Autumn Period, in Country Wu, Suzhou was set as the capital. The urban planner Wu Zixu, chose the site for the city, for its excellent natural environment of water and mountains, which is good for defending, planting, transportation and life convenience.

A canal system was introduced into the urban planning system, to integrate the different rivers and lakes. A ring river was dredged and the city was established inside the ring river to defend the enemies. In the connection points of different rivers, city gates were set with the natural advantages. That was the original city prototype of Suzhou, from which later transformation of the city was based on, and till now this prototype was still kept.

From the image, we could see that the construction of water system and city are always integrated at the same time. That’s why I say that water grid is the most important feature of Suzhou.

Then in Tang Dynasty (608-907 AD), with the well economic development, the water system inside the city was better developed. Smaller rivers inside the city was dredged and fixed, and streets were created along the rivers. With shipping as the fundamental transportation, the urban grid of water and street was created at that time. That is the original prototype of Suzhou Oldtown today. So Tang Dynasty was the most important period for shaping of the city.
In Song Dynasty (960-1279 AD), Suzhou has been well developed for its rich farmland with water irrigation and good location for shipping transportation. At that time, Suzhou City was called "Pingjiang Prefecture". Here shows the famous image on a stele called "Pingjiang Map" in Song Dynasty, which was the most clear and ancient map of Suzhou in history. The city structure is quite clear according to the record. We could find a ring river, 12 horizontal rivers, 5 vertical ones, many numerous small rivers inside the city, of which the total length is 82 km. At the same time, bridge as the most important infrastructure were everywhere to be seen (more than 300). The central was the administration and the most dense area was for residence.

It should also be mentioned that during this period, the rivers is no longer just for transportation. People began to enjoy the water as landscape, which could be speculated from the poems from that time.

In the early Yuan Dynasty (around 1300 AD), an Italian traveller Marco Polo travelled to China, and found Suzhou quite similar to his hometown Venice. That’s why Suzhou is called "Oriental Venice".

Then in Ming Dynasty (1368-1644 AD), with the rise of commercial and handicraft industry, Suzhou became an important capital and growing prosperly, due to its convenient water transport and open networks. Population was booming and space was expanding quickly.

After Ming, the grid inside the ring river was not changed much. Today the oldtown of Suzhou was still maintaining the urban structure thousands of years ago.

Figure 3.11: Pingjiang Map in Song Dynasty, (http://www.37230.com/history)
Figure 3.12: Water map of Suzhou in Ming Dynasty (Book "Water conservation in Wuzhong" in Ming Dynasty)
3.2.2 Characteristics of Suzhou water grid

Before the 20th century, Suzhou was relatively limited inside the ring river. From the map during the period of Republic of China, we could see that urban area was inside the ring, and surrounding are some rural areas undeveloped.

![Figure3.13: Suzhou Map in Republic of China period (1912-1949), (Book "Record of Wuxian" by Zhan Yixian, 1994)](image)

But after liberation in 1949, the city was fastly expanded with urbanization. The oldtown inside the ring as centre, four sub new districts were established mostly for industrial use. In new districts, there are mostly big lakes like Yangcheng Lake and Jinji Lake. The lakes are also important elements to influence the development, but the grid is quite different from the oldtown.

Here in this paper, I focus on the situations based on the ring river considering the context, including the inner oldtown with traditional and the border of oldtown and newtown with modern housing, but not talk about the lakes in the new industrial districts.

![Figure3.14: Suzhou City Structure in large range (21st century), (Redrawn by author)](image)
The river-street dual system in Suzhou is also called "double chessboard system". As for the river-street dual system, it's a kind of unique and typical urban form in Suzhou historic city. Literally, it means that the canal goes parallel along the road and form a grid system composed by canal and road. During the ancient time, the major transportation means in the city was boat like today in Venice.

From the history evolution, it is clear to see the typical form of urban grid through the thousands of years. Water system is the most essential composition of the city grid. Actually, the pattern of water and street parallel and alongside each other, is totally a new creation in Chinese urban design, which clearly shows the feature of water as skeleton of a city. The two systems working together has brought convenience to the development at that time.
Water citygate as a transportation node

There are 8 city gates in Suzhou Old town, located at the important intersection points of the ring river. In the early times, they are for military use, to guard the city and defend the enemies, while the towers are for watching out the military situations. Later, it became an important node for transportation and trading. People inside and outside the town would trade around the city gates, so the public space around (including the bridge) was very busy at that time(Figure3.24-25).

Figure3.22: Citygates on Pingjiang Map (Edited by author)  
Figure3.23: Plan of typical citygates in Suzhou (Book <Suzhou> by Cao Zifang, 1986)

But now, we are losing this identity gradually. Some rivers were filled with earth so the city gate has become useless.

Figure3.24-35: Painting “Bustling Gusu” by Xu Yang in Qing Dynasty  
(http://www.360doc.com/content/13/0128/18/2519393_262903981.shtml)

Figure3.26-28: Changes of city gates in Suzhou  
(http://image.baidu.com)
3.3 Water, Street, House and Public space

3.3.1 Water and Traditional Housing

In Suzhou City, the water system is closely related to street and housing, which contributes to the typical urban grid we talk about in last chapter.

Regardless of water and housing, the traditional housing which faces the street and stays back of river is a typical type. Usually, the south-north direction is the main street, which gap 200-400 metres between, and the west-east direction is the branch, which gap 60-80 metres. This specific situation shapes the traditional housing prototype as the diagram shows.

![Figure3.29: Traditional riverfront housing in Suzhou, (edited by author)](image)

This long-rectangular block is taking advantage of the interface of street and river, better for transportation. So to deal with the long side, courtyard is the key element to organize the space. Sometimes, one block is for one big family, which we call a "big" house. And sometimes it is divided into different families, which we call "middle" or "small" house.

![Figure3.30: Big, middle and small house - typical traditional Suzhou courtyard housing block (Book <SUzhou> by Cao Zifang, 1986)](image)
Usually, "big", "middle", "small" houses are combined into groups in the same site, which forms a variety and complexity of housing grids.

From the analysis we could see that the courtyard housing typology is shaped from the river-street grid. The street is a quiet public space for neighborhoods and the river is convenient for life and transportation. To make better use of this, width of each house in the street is small.

Besides, with the street in the front and river at the back, some houses are developed with function of retail. Some big houses put retail shops in the first courtyard facing the street, and living in the back courtyards facing the river. Some small houses use the ground floor as retail or restaurants and upper floors for residence.

![Figure3.31: Shop inserted into housing](Drawn by author)

### 3.3.2 Public space by Water and Housing

Through long history of evolution, different typologies of water-housing relations were created. The diagram above clearly shows the variety of sections. Overhang platform, terrace, corridor were existing along the river, according to different function needs. In this case, different public or semi-public space was created.

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<tr>
<th></th>
<th>2nd Floor Overhang</th>
<th>Platform Overhang</th>
<th>1st Floor Overhang</th>
<th>Without Overhang</th>
<th>With Balcony</th>
<th>Platform Inside</th>
<th>Corridor</th>
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*Figure3.32: Different Typologies of Sections on Water and Housing (Edited by Author)*
Here I summarize 3 typologies of public space created by water and housing:

(1) Semi-public Pier
For houses directly beside the water, semi-public piers are set for residents to wash, which are usually set near the junction of two houses.

(2) Private Pier
Private piers are common in the past that each family of this house could tie up his own boat here and also do some washing. But today, by regeneration, this kind of piers is becoming less.

(3) Platforms and Balconies
To get more space, people build platforms in the back by river (Fig. 12), and today for commercial, these platforms are very popular, where they could enjoy the view and have coffee at the same time.
3.3.3 Water and street

(1) River-Street-House
Street is alongside the river in parallel, while the other side of river is housing. This situation happens a lot in the neighborhoods mentioned above. We have three different space layouts of street, house and river. In this case, the height of house/ the width of river + street is in average 1/1.8 to 1/2.

The banks by the house is usually stone revetment. Steps of piers are set to reach river from house, or sometimes, platforms overhang the river are set for the residents to wash clothes. In some cases, every 8-10 households would have a shared open space beside the river.

(2) House-River-House
Both sides of the river is housing, so that the river is in a private and quiet atmosphere. In this case, the height of house/ the width of river is 1/1.2 to 1/2 in average. In many Chinese poems, this is a quite beautiful image that people could sleep by river with some sound of water occasionally. What's more, the existence of river has some influence of micro-climate.
(3) Street – River – Street
Both sides of the river are streets. Houses are by the side of street, but not river. The height of house/the width of river + 2 streets is usually 1/1.

In this case, the river is more accessible for public, so the streets are usually busy main streets. Often, some public piers are set by riverfront for transportation use. Some shops and restaurants would be instead of residential use, so residents and customers are mixed in the streets by river. Some restaurants put seats right beside the river, so people could really enjoy the nice river view. Public space here is quite active as a result.

Figure 3.41: Section
(Drawn by author)

Figure 3.42: Street View
(http://image.baidu.com)

(4) House – Street – House
This situation also happens a lot, of which river could not be sensed from the street. Usually in this case, the street is quite narrow, so we call it "lane". It is often only for pedestrian, about 1 metres in width. So the street is a public space only for residents.

Figure 3.43: Section
(Drawn by author)

Figure 3.44: Street View
(http://image.baidu.com)
3.3.4 Public space by Water and Street

(1) Public Pier for boat
In the old times, ships and boats are the most basic transportation means for Suzhou, so piers are important nodes to connect the street and river by the few steps.

For this kind of public piers, it is usually used as docks for boats, so normally it is located in public areas with large population passing through, like the crossroads with bridges (Fig.02).

Today, though boat is no longer for transportation, piers of this type still work as docks for tourist boats.

![Typical Plan and Perspectives of Public Piers](http://blog.sina.com.cn/w/618)

(2) Semi-Public Pier
Besides the public piers for dock, it is quite common to see the semi-public piers along the streets by river. These are used for washing things by residents in the houses facing the street. It is estimated that every 30-40 meters we have one pier of this type.

![People washing in Semi-Public Piers](http://blog.sina.com.cn/w/618)
(3) Pavilion
To provide people with places to have rest and communication, pavilions are set in some open space alongside river. They are important and popular places for both residents and tourists.

![Image: People resting in pavilions by river](http://image.baidu.com)

(4) Corridor(Semi-exterior)
To provide shadow for sun and shelter for rain, corridors with roof like the photo below shows are set, which creates a different and interesting relationship between river and street.

![Image: Corridors with roof along the river](http://image.baidu.com)

(5) Lanes with Stone Railings
Without any attachment, the lane itself along the river with the stone railings is a good place to rest and enjoy the water view. Seats here are quite popular for the shops around.

![Image: Streets with railings along the river](http://image.baidu.com)

**Material Use:** Raw stones are widely used for revetments, bridges and railings in integration. We could also see interesting changes of stones and bricks in pavements. Last but not least, vegetation is an important element to qualify the space.

![Image: Materiality in space](http://image.baidu.com)
3.4 Bridge as infrastructure and public space

Bridge in Suzhou is an important part of the city infrastructure both for use of transportation and the context.

In ancient Chinese Hieroglyph, bridge is written like "橋", in which the left part "氵" means wood, and the right part "高" means high, that symbolizes the wood constructed high above the river. So we could see that bridge was originally wood structure. But wood could easily corrupt, so later in Song Dynasty, stone bridge began to appear. But long stone bar is tangible, then came up the stone arch bridges, which we could still see a lot in Suzhou today.

According to historic records, in Pingjiang Map in Qing Dynasty, 359 bridges could be counted. Later more bridges are built and now there are more than 30,000 bridges in Suzhou City, almost 15/km².

From the drawing "Bustling Gusu" in Song, it is clear that bridge is an important public space for citizens, like a market where people sell and buy. (This bridge still exist today) And even now, bridge is still an important place for some special traditional activities in Suzhou, which is said to bring good luck. So bridge could not be ignored in Suzhou's history and culture.
DIFFERENT TYPOLOGIES OF BRIDGES:
(1) MULTI-ARCH STONE BRIDGE -- Baozai Bridge

Baozai Bridge is one of the 4 most famous bridges in China, which is a masterpiece in bridge history. It was first built in Year 818, and recovered in 1872. It was built above the Jinghang Grand Canal, so the total length is up to 317 meters, while the width is 4.1 meters. It has 53 holes, which is really rare to see. The average span of the holes is 4.6m except the 14, 15, 16th. As the Grand Canal is always busy for shipping ever since the ancient times, the bridge should be high enough for big ships. So for the 14, 15, 16th hole, the span is expanded to 6.5m and 7.45m, specially for the big ships. The foundation of this bridge is soft, so 60 wood stakes, of which radium is 15-20cm, were used for each stone pier. So this bridge is both economical, practical and pretty.

Today, Baozai Bridge becomes a special and popular landscape for citizen. It's interesting that on each Mid-Autumn Festival, citizens gather here to enjoy the moon view with the sparkling inverted image under the water.

![Old Baozai Bridge](http://baike.baidu.com/item/Baozai%20Bridge)

![Baozai Bridge today](http://baike.baidu.com/item/Baozai%20Bridge)

(2) SINGLE-ARCH STONE BRIDGE
--- Feng Bridge

Feng Bridge is a single-hole stone arch bridge. It is 39.6m in length and 5.7m in width, and of which the span of the hole is 10m, which is relatively smaller to Baozai Bridge. In Tang Dynasty Zhangji had a famous poetry called “Mooring by Feng Bridge at night” (about Year 760), so we could see it has at least age of 1300 years.

Feng Bridge is located across the Moat (the river surrounding the city to defend the enemy). In history, the bridge would be closed for shipping at night for security. From the Fig.05, it's clear to see how the bridge is related to the ancient city gate. Because of the special location, it used to be a busy market centre in ancient times, but now with the expansion of city, it was no more the border of city and became part of the tourist attraction.

![Feng Bridge](http://baike.baidu.com/item/Feng%20Bridge)
(3) STONE BEAM BRIDGE—Xiao Fei Hong
It is a "gallery bridge" of stone beam structure and traditional wood components in Zhuozheng Garden. It is an integration of the bridge and traditional architecture form of "gallery" in Chinese gardens to provide shelter for sun and rain. The little slope here indicates the small changes in Chinese gardens.

(4) STONE BAR BRIDGE
It is clearly shown that the structure is just a stone bar to connect two sides, so the span for this type is all relatively small. It is quite common in Suzhou Gardens to create diverse atmosphere for different sites. Usually, it is surrounded by Tahu Rocks (a typical local material widely used in Suzhou Gardens), and sometimes even connected with the rock landscape, providing an interesting route and experience for tourists.

Suzhou has tens of thousands of bridges in different scales for ships, boats, pedestrians. But each of them has an interesting historic story behind. We have to say that bridge for Suzhou, is much more than simple infrastructure for transportation, but a special "Context" of geography, history, culture and traditional lifestyle. They are precious treasures for us to inherit and pass on to the future.
Current situations and problems in Suzhou riverfronts


4 Current situations and problems in Suzhou riverfronts

4.1 Reasons of decline and destruction
Since the 18th century, the situation of water system in Suzhou is becoming worse gradually through time. After liberation in 1949, the destruction was even worse. Lots of rivers were filled with earth as roads or dugouts for military use. Afterwards, to pursue the aim of rapid economic development, lots of large flat lands are needed for office and factories, so that many small rivers were filled.

To conclude, we have several reasons behind this destruction of water grid:

On the one hand, from the physical perspective,

(1) Change of transportation mode
With the industrial revolution, traffic modes are changing. Cars are largely produced and widely used in every city. But inside the Suzhou oldtown, the small scale of traffic ways are no longer fit for this kind of pace. The traditional traffic by boat is gradually vanishing, so water has become just landscape, but not for traffic use.

(2) Booming of population
Till 1810, the population of Suzhou had reached 3 million, and in ten years it doubled to 6 million. We need more and more residential space in limited land. Besides the expanding of city in rural areas, the oldtown was also experiencing serious problems.

(3) Transformation of leading industry
In history, farming and handicraft industry were the leading industry for Suzhou, but in the 21st century, for faster development, light industry of production is slowly existing, with better profit. Water irrigation and transportation are no longer that important.

(4) Water pollution
All the reasons above would lead to more serious water pollution. Before the clearing project stated in 2000s, over 80% of Suzhou rivers are polluted heavily.

On the other hand, from the mental perspective,

(1) Lack of actions by government
Before 1800 in Qing Dynasty, while China is fading away, the government no longer put emphasis on the management of water. Even after liberation in 1949, and after reform and opening in 1978, the regulation for water protection management was not set up.

(2) Awareness of citizens
With no promotion of the context and importance of water, citizens are also losing the awareness of water protection. Water has become a negative element in Suzhou city for a quite long time.
4.2 Current situations and problems
Since 1980s after reform and opening, the economy was developing steadily, so at the same time, the importance of water protection in Suzhou was recognized by the society. The basic water system was dredged and fixed. However, lots of problems still exist till today. I summarize into the following 5 aspects:

4.2.1 Water and Urban structure
(1) The double grid of water-street is no longer existing in many places. Land transportation takes up most traffic, so that rivers become a useless attachment to the roads. For land use, some are already filled with earth.

(2) Though the ring river is always kept, the surrounding plan was not so good. As the border of urban and rural area, large quantities of collective housing, factories and warehouses were invading the space around the river, so the skylines seen from the outside is so ugly. The ring river is losing its beauty and identity, and becoming a mess.

![Figure4.1-3:Large projects near city gate in 1990s and today,](http://img2.youdao.com.cn/files/blog/2016-02-26/)

(3) The city water gates are not well preserved. Some are demolished, and some become useless, because the river was filled in some parts. They are representative images for Suzhou, but now lose its sense.

![Figure4.4-5:Water gates in 1900s and today,](http://img2.youdao.com.cn/files/blog/2016-02-26/)

(4) The system of main rivers called "3 horizontal & 4 vertical" are under destruction. Many parts were filled and they are no longer the basic skeleton for the city.
4.2.2 Water and Traffic system

(1) With increasing load of cars, roads need to be expanded a lot, so that a lot of rivers are filled for roads. Though under some regulations for protecting the rivers, some are still existing, the scale of space, the environment and atmosphere are changing. The human-scale walkable streets are no longer comfortable for life.

(2) While constructing the traffic system, the integration of traffic use and river landscape are not being considered at the same time. The department of transportation only considers about the traffic and engineering problems. The river landscape and the control the water views are lacking emphasis.

(3) The streets parallel to river are widening, while the paths accessible to river are decreasing. Residents could no longer get easy access to the river, so that the river has become a negative element.

(4) According to point 3, the variety and complexity of the relations between water, street, house and public space is losing. The space is becoming dull and people could not feel the existence of river in many places.
4.2.3 Water and Ecological system

(1) **The quality of water is worsening** through time. The water being heavily polluted is increasing from 53% to 87% in a single year from 1998 to 1999. The water-city has become a city heavily lack of water actually today.

(2) **The treatment of waste water is not well managed.** According to the statistics, the outfall places for pouring the waste water directly into the river without treatment is up to 12000, including 370 public toilets. Suzhou is a famous tourism city, so many houses by river are changed into restaurants. Some restaurants directly pour their polluted water from the kitchen into the river, which caused heavy pollution. More than 250 restaurants are not qualified with the polluted water treatment.

![Riverfront restaurants and hotels](www.mafengwo.cn)

(3) The rivers are becoming more and more narrow, and river bed is becoming higher. Some water has been dead, and there is not enough water coming into the inner water system. The river water could not purificate itself with certain flowing speed, so the pollution is even worse.

(4) To prevent flood, the **flood gates** are set in many places, so the water system inside the city was seperated into closed dead water areas. At the same time, the ecosystem for plants and animals are being destroyed.

(5) Before, there is not much vegetation inside the oldtown, so the **riverside green system** is quite important for the whole city. But today, many trees were cut down to make space for cars.

![Decline of water flow](Chenyong,<The regeneration and development of water system in Suzhou Ancient City>,2003)

![Water pollution](http://news.subaonet.com)
4.2.4 Water and City life

(1) The moral virtue for protecting the river is declining. In ancient times, to maintain the river clean is like a social regulation everyone has to obey, because the river is the fundamental thing to rely on for life. It’s like a moral constraint. But today, the treatment of waste water has become a responsibility for government. People tend to consider that they have no obligation to be careful with the water pollution. Everyday, the emission of waste water in oldtown is 200,000 tons, but the sewage treatment factory could only deal with 57,500 tons. The rest would be directly flowed into the rivers.

(2) The traditional life is beside the water for better transportation and use of water. But today, the main living space is beside the roads rather than the river. The traditional life connected closely with water is slowing dying away. The public space by water like the bridge, piers and teahouses for daily neighborhood life does not get enough attention and improvement. Leisure activities for modern life is in the shopping malls, but not the riverfront space.

Figure 4.17-19: Before, riverfront public space is important and busy, (http://image.baidu.com)

Figure 4.20-22: Today, riverfront public space is neglected with few people use. (http://image.baidu.com)

(3) New popular places for leisure are usually not related to water, so the complete walking public system by river is no longer existing.

(4) Today, many large residential communities, or some schools, colleges or companies of large land area are built beside the river. They are invading the riverfront space as private use, so people could not get access to the river. This also led to the destruction of riverfront public system.

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4.2.5 Water and Historical places

(1) Water system in traditional gardens
Suzhou is most famous for its traditional Chinese gardens. Water is an important element in shaping the garden. Before, all water is combining as a whole system, flowing among each other. But now, with water system being blocked somewhere, the water in gardens is mostly dead water with bad quality.

(2) Temples, towers and ancient government offices
Temple and tower are important moral symbol in the old time. Just like in Europe, church is always related to plaza, in Suzhou, temple is always related with water. But it’s a pity that now the historical monuments are also losing connection with water.

(3) The bridges, revetments, piers and pavillions
These are also important monuments, but many of them are demolished. While building the new ones as a local feature, some are just for decoration because the traffic roads block the access to them, like the left picture shows such situation in Ganjiang River.

(4) Lack of diversity in river sidewalk
The traditional river sidewalk is varied in space, with lots of vegetation and shelters, which is good for neighborhood activities. However, when we are constructing new ones, we just fix the pavements with new materials. We are lacking consideration of the diversity.

Figure4.23: Unaccessible pavilion in Ganjiang River, (http://image.baidu.com)
Figure4.24-25: River sidewalk, before and now (http://image.baidu.com)

(4) Losing the identity of traditional housing
The traditional housing did not get enough attention and get regeneration. Most are in poor condition and not comfortable for living. Local residents tend to move out to the new districts with better environment. While at the same time, new residential housing are being built beside the river, but with dull form. The identity of riverfront housing is being lost.

Figure4.26-27: New riverfront housing (Street view from http://map.baidu.com/)
4.3 Importance and urgency of riverfront renewal

From all the previous research, it is clear to see that "water" is the soul of Suzhou City. The unique urban grid, the interesting form of traditional courtyard housing, and every detail of lifestyle are originated from the rivers in Suzhou.

Generally speaking, the early use of river in Suzhou is farming. Then traffic use takes up the place and based on this, trading, commercial and small handmade production industry is developed. With the rapid development of economy and technology, big industries began to exist. Industry is playing a more and more important role in the modern society, so water pollution is worsening at the same time. Also, more need of land caused many small rivers to be covered. The urban grid is also under destruction.

That's why we need to renovate the riverfront blocks. Only through the renewal and improvement of the quality of riverfronts, could people re-enjoy the riverfront space, and pick up the awareness of protecting the water grid. For Suzhou, the renewal also has many values:

(1) Improve the image of city, and increase the the Urban Competitiveness
Suzhou is quickly developing with the rise of light industry, with the cost of water pollution. However today, the competition among cities is not just focusing on economy, but also culture and identity. "Water" should be reused to recover the identity of Suzhou, so that it could attract more good resources.

(2) Develop the tourism industry
Suzhou is a famous tourism city with a lot of resources. The traditional Chinese private gardens are famous throughout the world, attracting millions of tourists. Moreover, the ancient city itself is a masterwork from history. Good way of renewal could both develop the tourism industry, as well as increase the job opportunities for citizens and promote the economical development in the old town.

(3) Improve the environment
In recent years, people began to strengthen the awareness of environment protection. The environment in the new districts of Suzhou is relatively good, with the big lakes and big parks. But the situation in the old town is not so good. With the limited land, much public space is invaded by private use. Public green space today, is reducing year by year, for car parking. We are facing problems like the urban heat - island effect and destruction of biodiversity. A clean and flowing river, as an important part of ecosystem, could help maintain the ecological balance, and integrate the natural system and artificial system.

(4) Ease the city traffic
The car traffic is increasing at an amazing speed in the 21st century. Traffic jams are so common in many big cities today. With the unique grid of narrow streets, Suzhou is facing a big problem of traffic. Though boat and ships could not take the place of cars today, they could still be used as a way of transportation, especially for tourists. Suzhou is receiving more than 10 millions of tourists every year. And they would love to experience the water transportation very much. A water bus transportation system could be considered, taking Venice as an example. This could help ease the city traffic to some degree.
(5) Improve living quality for residents
Suzhou could be regarded as a "rich" city, where the leisure time for citizens is quite important. Many people love to enjoy the different activities outdoors, like sports, culture, studying and interacting with other people. The places with natural elements are popular and comfortable for them. In Suzhou, the riverfront public space should be the first choice. If we improve the riverfront public space, they would be attracted rather than go out to other places.

Another point is that by doing so, the local residents of the riverfronts could live a better life. Today, with the poor living quality, few people would like to live in the old town. Only some poor people live there for the low rent, and some old people do not want to move out of the places they live for whole life. Local residents, as a part of context, is losing quickly. The improvement of living quality could attract more people to live in.

(6) Promote the local culture
"Water" could well represent the local culture of Suzhou. Our ancestors are trying their best to make advantage of water, creating this special culture. We should preserve and continue with it for our sons and grandsons.

Luckily, now the government is taking some actions. The cleaning of water is going on for some years, with a good result. In this year 2016, a public promenade around the ring river has been built for citizens to walk and exercise. Some riverfront block renovation projects are showing good outcomes such as the Pingjiang Street by Professor Ruan Yisan.

With the successful example of Pingjiang Street renewal project, Suzhou is working on similar projects to develop the tourism in the traditional alleys. But most of them are just demolishing the old houses, and imitating the outlook to make new ones, as restaurants and shops. This is really a disaster.

This tells that urban planners and architects are especially important. We should learn more about the essence of Suzhou city with "water" feature. Professor Ruan Yisan from Tongji University, is a local Suzhou resident and also a great expert on the historical preservation and renovation in Suzhou. He has made a great contribution to Suzhou. But still, we lack the professional scholars like him. We need more experts and citizens to take part in the projects.
4.4 Case study of Pingjiang Street renewal project

4.4.1 Site analysis

The places marked in the left map are all important historic areas. Pingjiang Street is in northeast of oldtown, close to tourist attractions of ZhuoZheng Garden, Suzhou Museum(by I.M.Pei), and Guangqian Street. It is easily accessible.

The water system is formed as a network alongside which is street system like the traditional pattern. This area is a traditional living part with the old low-rise and densely covered houses, where you could clearly feel the traditional lifestyle of Suzhou—facing to street and back to river.

There are a lot of historical monuments in Suzhou old town. The traditional gardens and old houses of celebrity could be seen everywhere here.

Pingjiang Street and its surrounding area is a gathering place for many old houses of famous people in ancient times. Most of them are senior intellectuals at that time, so it is of high cultural and historical value.

Figure 4.28: Historical preservation plan of Suzhou
(from National Research Centre of historic cities, Tongji University)

Figure 4.29: Historical monuments in Pingjiang Area,
(from National Research Centre of historic cities, Tongji University)
Pingjiang Street is for common people living with the most traditional lifestyle of Suzhou. But the house condition is not good for residents today.

How could we recover the space and reuse this excellent area to be a more comfortable and representative space for tourists to experience the Suzhou Culture? It is indeed a good space to develop tourism but we could never destroy the traditional layout.
4.4.3 Section analysis - water, street, house and public space

Pingjiang Street is a pedestrian street. The restoration plan contains two parts. The 1st phase is the south part of 1.2km in length, which is now well developed for tourism, and the 2nd phase is the north part of 500m in length which is still under development, and residents still live here. It's interesting that the width is ranged from about 3m to 6m, with different space connection between water and street, so you could experience the variety of spaces like the different sections shows. "Context & topography play an important role for this area.

Though today commercial use is integrated with residential use in this area, it is lucky that the urban grid is not destroyed, and the whole area is actually reactivated with the mix use.
4.4.4 Reuse of the traditional houses

No matter for Barcelona, or for my hometown Suzhou, as a city with long history, the preservation of old town is always top in schedule. However, with the booming of population and development of society, the regeneration of the old housing is more significant and urgent for us.

Pingjiang District is the most typical area with the old city texture, and it is also a successful case of regeneration of old housing. Though Pingjiang Road now is mainly for tourism commerce, the whole area still keeps 80% of the original residents, and at the same time, the tourism activates the traditional housing area. Here I take 3 different types of the housing regeneration projects.

1 Regeneration still as house in same structure—Wang' House

In Ming and Qing Dynasty, Suzhou is a well developed area in China, so there are lots of wealthy people in large family groups living here. But with the decadency of emperor and start of New China, the big family house in traditional 'courtyard' form was experiencing changing. In different social background, small families with 3-5 people are taking place of the big family group in the past. So the big houses should be regenerated and adapted to the new situation.

Take Wang' House in Pingjiang Road as example, it's clear to see the changed from the big family group to the small family group, while the general griding is preserved. To improve the living conditions, kitchen and bathroom are added to each small house. After renovation, each family has their own private space, while inner courtyards still exist as public space for communication. After regeneration, the living environment was greatly improved and still in traditional style.

![Figure4. 35: House Plan before and after renovation, (Drawn by author)](http://image.baidu.com)

![Figure4. 36-38: Improvement of living environment](http://image.baidu.com)

2 Reuse as commercial use in same structure—Zhuyuan Club & Hotel

Close to the famous Zhuzheng Garden and Shirilin Garden, the Pingjiang Preservation Area attracts many tourists to enjoy the traditional lifestyle of Suzhou. Some functional change to redesign some old houses into commercial use like hotels, bars, teahouse, and art workshops which are carefully selected by government to show the feature of Suzhou.

In this Zhuyuan Club Project, The main structure was preserved and some external walls and monuments were conserved to coexist with the new. The pre hall and main hall part were preserved but renovated as new functions(Fig.4.40, 4.41). The back part and side alley for fire escape in the past were reconstructed with modern elements. The useless alley was changed into an interesting art gallery(Fig.4.44). The outside drainage system was improved as well(Fig 4.42). It's interesting that the form of bookshelf was also originated from the traditional construction method called "Kongdou" Wall as Fig.4.43 shows.
3 Reconstruct as new building with old context - Suzhou Museum & Dong’s Teahouse

Projects mentioned before are all restorations based on old buildings, however, some old buildings were torn down to reconstruct new buildings which are also successful. This is also a way to continue the old context, Suzhou Museum by I.M. Pei and Dong’s Teahouse are such cases. The physical form and materiality are originated from the old housing.

It is important to read the history, to respect the old residents, and to activate and improve the quality of public space in regeneration. This project works well today, which sets a good example in reusing the traditional housing in Suzhou.
Location of the reuse projects

Figure 4.49: Map of the reuse projects in Pingjiang Preservation Area
(Map from openstreetmap.org, edited by author)
/5/ Renewal strategies for Suzhou riverfront residential blocks
5 Renewal strategies for Suzhou riverfront blocks

5.1 Site analysis for renewal projects

Following is a diagram showing Suzhou urban grid with water and roads (highways and streets). The central ring river shows the limit of Suzhou oldtown as mentioned before.

Figure 5.1: Site of design in Suzhou, (http://openstreetmap.org, edited by author)
The site I chose for my design project is from a traditional street by river called "Xuanqiao Alley" (site 1) in the oldtown, crossing the ancient city gate, extending to Donghuan Neighborhood in the newtown (site 2). Both of them are riverfront blocks which are facing problems I mentioned in the last chapter, and could be regenerated for better quality. It is a typical site in Suzhou.

Figure 5.2: Site of design in Suzhou Old town, (http://map.baidu.com, edited by author)
5.2 Renewal project in Xuanqiao Alley in Suzhou Oldtown (Site 1)

5.2.1 Analysis of site and existing problems

![Image of land use and analysis](http://ghgs.szghj.gov.cn/)

*Figure 5.10: Current land use of Site 1.*

*Figure 5.11: Qualitative evaluation from the government.*

- **Red**: Historical preserved building
- **Deep Red**: Historical building to repair
- **Orange**: New-built building
- **Yellow**: Bad-quality building

![Image of site analysis](http://ghgs.szghj.gov.cn/)
According to the building quality evaluation from the government and the my own field research of the site, I reclassify the riverfront blocks into 4 types - preserved buildings with historical value; traditional housing; new-built housing; bad-quality building. This is an important premise of my design strategies.

Problems to be solved:
1 Bad-quality residential blocks should be rebuilt (especially new-built ones)
   Some traditional buildings of bad quality should be repaired or reused;
2 Lack of public function and open space for residents;
3 Single relation of house, street and river—river could not be sensed in the street;
4 Some good preserved buildings (most are old houses for famous people) could be used as tourism resource regarding to the successful renovation project of Pingjiang Street.
Different strategies according to municipal and self assessment:
1. Preserve
2. House
3. Demolish or Demolish & Rebuild

Figure 5.16-18: Three types of strategies in Xuanqiao Alley (Drawn by author)
Grid in contrast

Figure 5.21: Grid in Black and White, before renewal  
(Drawn by author)

Figure 5.22: Grid in Black and White, after renewal  
(Drawn by author)
5.2.3 Section analysis

Section 1-1
At the entrance, the riverside gated walls are demolished, as well as the bad quality small houses instead of open public space. People could directly feel the river at the first sight.

Figure 5.23-28 Section and Street view in Point 1-1, before and after renewal (Drawn by author)

Section 2-2
As in section 1, one riverside house is demolished, while on the other side a house is reused as community centre, where surrounding neighborhoods lack this kind of public function.

Figure 5.29-34 Section and Street view in Point 2-2, before and after renewal (Drawn by author)
Section 3-3
Here, an old factory is transformed into hotel. I also remove a small house, and make a small pier to get access to the river by tourists. Around the pier, you would have nice sitting places to rest and enjoy the river view.

Figure 5.35-40: Section and Street view in Point 3-3, before and after renewal
(Drawn by author)

Section 4-4
A house is reused as a cafe, and terrace by river is created, to make a different interaction between house and water.

Figure 5.41-46: Section and Street view in Point 4-4, before and after renewal
(Drawn by author)
5.2.4 Node design

Node 1 Public Pier for tourist boats

With a bridge crossing, a public pier is created for tourist boats. Different public space is created around. People would have a pavilion to rest and wait for the boats. Riverside stone railings are also fixed for sitting and enjoying the water view.

Figure 5.59 Plan (Drawn by author)

Figure 5.60 Bird View of the boat pier and shelter for waiting (Drawn by author)

Figure 5.61 View from crossing the bridge (Drawn by author)
Node 2 Public space and pier for restaurants

Public functions like restaurants and cafes should have some riverfront public space with seats and umbrellas for users. Here a small pier and riverside platform are set, to make better use of the water resource.

Figure 5.62 Plan (Drawn by author)

Figure 5.63-64 View from the river & street (Drawn by author)
5.3 Renewal project in Donghuan Area in Suzhou Newtown

5.3.1 Analysis of site and existing problems

In general, for the area located at the border of the old town and new town, there are many problems.

From a big view, the ring river blocked the connection between old town and new town. A continuous walking system should be built with a bridge. Secondly, the ancient city gate was an important node for transportation and trading, so public space here is busy. We should consider about this context. Moreover, the public space by water is not made good use of, with lack of accessibility.

Also, in the new neighborhoods, we have a lot of gated communities. The inside smaller river has become a negative factor. The walls and fencing made the riverfronts unaccessible and useless.
5.3.3 Design Strategies

(1) "Bridge" both as infrastructure and public space

In the ancient time, bridge as a transportation node, is also an important public space for market, especially near the city gate, where people inside and outside the town interact a lot. But today, especially outside oldtown, bridges are mostly used for car traffic, and no longer function as public space. Our site is just located at such a joint node, but bridge no longer exist and two sides of the river are isolated. I want to recover the context with bridge as public space and waken people’s memory of the history.

Here I design two bridges, one is for transportation, connecting the traffic roads from the old town, which crossed the city gate. The other is for pedestrian only, as a public space, for exhibitions, temporary markets and other activities. At the same time, the public space at the riverfront is designed with different platforms of different height, to get easy access to water.
Pedestrian Bridge as public space

Figure 5.75 Section
(Drawn by author)

Figure 5.76 Sketch of view
(Drawn by author)
Transportation Bridge

Figure 5.77 Section
(Drawn by author)

Figure 5.78 Sketch of view
(Drawn by author)
(2) Continuous walking system connecting old and new town

Figure 5.79 Plan
(Drawn by author)

Figure 5.80-81 Current riverside walking system
(Taken by author)

Figure 5.82-84 Sketches of the walking system in design
(Drawn by author)
(3) Introduction of public functions, facilities and open space by river

--- Ring river (90m), Empty space between road and water (20-40m)

Around the ring river, we have much wider empty space without good use. So I redesign the riverfronts, with integration of public buildings. The buildings are also a way to solve the accessibility to water by inside.
--- Inside canal (20m), Empty space between road and water (6.8m)

This scale is mainly for local residents. Today, the neighborhood public space by river is seriously lacked. Residents have no place to share and communicate. I cancelled one parking lane, and add two pedestrian lanes with public facilities like seats sports facilities. The walking system is connected to the current ring-river walking lanes.
(4) Transformation inside the residential blocks
- Introduction of water inside the community with public space

Figure 5.91-92 Current situation inside community
(Taken by author)

Figure 5.93 Reference image from DELVA landscape architect

- Renovation of walls or fences with public facility

Figure 5.94-95 Current Street View (http://map.baidu.com)

Figure 5.96 Reference image from Linu architect
Epilogue
As I said in the beginning, Suzhou, which is called “Eastern Venice”, has formed its unique spatial forms, lifestyles and cultural dispositions during long period of interacting with natural environment.

In present days, like many other historical cities, Suzhou also faces a difficult situation: How to adapt to the modern society? What method should be taken in the renewal of riverfront residential block? How to inherit the context in the new blocks?

According to the theoretical study and the worldwide cases studies, together with the deep research on Suzhou urban morphology and space characteristics, focused on “water”, I designed two renewal projects in Xuanqiao Alley in Suzhou old town and Donghuan Area in Suzhou new town.

The thesis comes up with renewal strategies for Suzhou riverfront residential blocks:
1. River is a natural gift by god, and also a treasure from the wisdom of ancestors. That belongs to all human beings. The accessibility and sharing of riverfront public space could show the democracy and publicity of the city.
So public space by riverfronts is the best opportunity to reactivate Suzhou, so we could create more public service buildings, facilities and open space considering the riverfronts.

2. Renewal projects should respect the traditional small scale, to keep the diversity and complexity. Here we have three senses: the functions, the space structures, and the users.
"Mix-use" is an important factor in contemporary architecture, which could bring the energy and vitality.

3. Pedestrian First. Now the pedestrian space is more and more invaded by cars. More pedestrian space should be integrated with water system. It is also a way to show democracy.

4. Respect and inherit the context. It includes, respect and reuse to historical buildings, considers the waterfront public space and reshape the traditional relationship between river and roads.

The design projects I showed here is just a typical case. This mode could be reinterpreted in many similar places in Suzhou. I choose the city gate as an intersection, to show the different situations both in old town and new town. As the diagram shows, there are 8 ancient city gates in Suzhou. Actually each of them could be and should be renewed in a good way.

So in conclusion, the thesis is not limited only in the two cases, but also for the whole Suzhou and other similar cities. For Suzhou and other Chinese waterfront cities, water has become a part of city context. The thesis has tried to explore a way to inherit traditional context in the renewal of waterfront residential blocks by public space. It is both a opportunity and challenge to make a better city in the future.
Figure 6.1 Eight citygates in Suzhou
(Map from openstreetmap.org. Drawn by author)
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