Chapter 2 Research Sections

2.1 Introduction

The waterway was frequently renamed by people in the history of China, this is to better describe its complex contents, multi-values of the great canal. In this chapter it will introduce the study area follow the nominations of this great canal, it was renamed in thousands of years, were not only showing appellation but more about the narrative space of territory and identity, also the enormous influence in cities' lives.

Grand Canal was a very large water corridor system in the territories which included the natural rivers and artificial canals. This water system could reflect various scales of the cultural landscapes. So this chapter intends to summarize a diachronic study on how this waterway was developing into a recognized and identified objects from ancient China.

Moreover, the human geographical scientists have concluded the processes how to build the China Grand Canal, in almost 2500 years (Cheng Yu Hai,
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2008): 8th-5th BC, it firstborn and had its initial section in Yangzhou, was named Han Gou (Channel of Han); the great canal with its cities and towns formed the strong economic belt from the politic centre to eastern economic centre, and improved to be strengthened water transport way in Song dynasty, called the Da Yun He (Grand Canal); then, the great canal connected new capital in the northern of China and eastern economic regions, it formed a entirely new waterway from political centre, Beijing, to southern traditional economic city Hangzhou, the waterway entered its first renewal stage, called the Imperial Grand Canal; in the pre-industrial society, after the invention of steam engine and railway, the water corridor renamed as Beijing-Hangzhou Grand Canal was partly stopped and replaced by advanced transports, it looked like move away from modern history, but when comes the post-industrial period, the great canal re-plays a role in protecting cultural heritage, it has values in tourism, recreation, education, ecology, etc. Now the canal will begin its second renewal time with a name of China Grand Canal.

Water route could clearly show that how the canal was growing, from where it departures and arrived, but also what happened in the areas of waterfront activities. So that the thesis drew a study area in a macro background about growth of canals. A case study from Yang Zhou, a typical city of canal, has experienced some urban scaling processes with its waterway changing. From the study case of Yangzhou I would like to discover the importance of spatial characters between waterway and the city.

2.2 8th-5th Century BC, the construction of a canal at Han (Yangzhou) city as a means to expand state territory

Yangzhou originally was named Han in its earliest history, it was a normal colony in Wu state two thousand years ago which located in the north bank of Yangtze river. Many researchers think that the Han city had already been built here before the water channel\textsuperscript{11}. When the Wu feudal state attempted to expand its northern region, Han became a favourable springboard, also an exchange centre of military materials in the northern frontier. With a strong will to gain benefits from the north to south commercial market and territory extends, the monarchs of Wu began to build the waterway from Han city to northern areas. After this water project, due to geographical location, Han played an important role in connecting the south-east Wu

\textsuperscript{11} Dong Guoyan. The history of State Wu and the nature of the Ancient Yangzhou city. Journal of Yangzhou University.vol 16, No 03. May 2012.
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Figure 2-2 BC 8th-5th century, Han (Yang Zhou) city located on the north bank of Yangtze river, it was a start point of water channel to the north area.
Figure 2-3  AD 10th century, Grand Canal has linked Yang Zhou city to the national capital.
Figure 2-4 18th-19th century, Yang Zhou was one tax collect station in national financial system through the Grand Canal.
Figure 2-5 AD 19th-20th century, railway partly began to replace the waterway in freight and passenger transport.
Figure 2-6 Beginning of 21st century, Grand Canal seeks to discover multiple values under rapid urbanization in historical cities of canal.
Figure 2-7. Topographic map of eastern China, edited by Arcmap 10.2
state to many other central territories in China. And indeed, compared to other cities, Han was a start point of the ancient waterway, but it was more as a springboard helped the Wu feudal state got involved in central political and economic activities.

The channel of Han was dug in BC. 486, known as the origin of the Grand Canal of China, which has 2500 years history\(^\text{12}\). This first artificial water channel was dug by the state of Wu to the northern Huai An city, firstly channelled the water from Yangtze river to northeast She Yang lake, then turned into the north-west region of Huai An and last went into the Huai river. During this period, the king Fu Chai of Wu state constructed new settlement with defensive work in Han city so that the first built water channel was called Han by the name of the this town. Han Gou (Channel of Han) was the first artificial river recorded in the Chinese historical documents, it still conserved the old section of the historical channel now after many reconstruction projects. In one sense, we may say that the digging of a water channel of Han was the starting point of China Grand Canal(Cheng Yu Hai, 2008)\(^\text{13}\).

The early stage, Han water channel only used as the military transportation, kept far away from the town. By the needs of the defence, this channel only had a single function, seldom utilization, the channel of Han could not be used in a common social function. Therefore, it is known as a water channel, we can expect it more narrow than the width of the natural river, the length is also very limited.

The water channel of Han was not dug in a straight way, because it was able to use the local water body, such as lakes and streams to reduce the artificial work for construct embankment. The earlier route of Han water channel showed a meandering way like "Ω" from the departure to destination. The initial route was north passing the today's Gao You town, bending to the northeast She Yang lake, then passing the north-west, around a big river bend\(^\text{14}\). This is obvious construction to make full use of natural lakes, reducing the length of the canal digging.

From Han (Yangzhou) to Huai An, is the main path of the artificial waterway, the first time north-south communication in eastern China between Yangtze River and Huai River. While this is a temporary military channel, but it was soon used as a commercial trading line for local economic areas.

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12 Chen Mu. Han water channel and Beijing to Hangzhou Grand Canal. JSDFZ, 2004.
14 SJ.HSZ
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Then, the ancient managers dug more similar water projects in the eastern plains, established a regional water network of natural rivers, lakes, achieved the material and cultural exchanges between many regions.

From the Figure 2.2, Wu feudal state was located in southeast of Yangtze river, it used Han as a necessary springboard to northern expand by the water channel. In the other side, Wu had developed an efficient network of waterways in the south of Yangtze river, the water transport system to connect cities and towns. Han was far away from capital of Wu, the regional political centre, but it was not only a military fortress in the frontier, it was goods collecting and distributing centre, a springboard for regional economic expanding by using the north-south water channel. In the beginning, the Wu State was betting on Han and achieving location advantages for north expanding. Furthermore, Han and its water channel not only improved the inner land transportation, even more, linked in international maritime route.

2.3  10th Century AD, The Grand Canal as a national transport route and the transformation of Yangzhou city into a commercial centre

After the national canal system completed in Sui dynasty, Han water channel had linked the national water transporting system, then the Han city was nominated to Yangzhou was developing to a great city. The name of Yun He (canal) was first written in the chronological books, Xin Tang Shu, by the editor Ou Yang Xiu, in the earlier Song dynasty (960-1127), said that Yun He (canal) of Yangzhou drains off in a dry summer of 837. The Yun He (canal) is a artificial river but could be administered by local authorities in many sections of the canal, those sections were named the "槽 cao" (water groove), "渠 qu" (water channel), or "道 dao" (waterway), etc. The canal was firstly popularly called the "大运河" (Grand Canal)in Earlier Song dynasty, the book Xian Chun Lin An Zhi said that, pass through the Dong Cang city to bridge into the Grand Canal. Since the Song dynasty, the chronological books began to illustrate the water channels in the name of Grand Canal, although these sections of the water channels had their own name, such as its sections, Tongji, Yongji, Tonghui, Huitong, and so on. For instance, Qing dynasty, the book He Qu Zhi Shu said that, "the Grand Canal has not enough water support Ma Chang lake", "the east bank of Baoying and

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15 XTS, vol 36.
16 XCLAZ, vol 35.
17 HQZS, vol 1.
Gaoyou lakes is the west bank of Grand Canal, just as the Ci Hai notes that "Canal was named from Song dynasty, which became the general designation in Yuan and Ming dynasty". In this stage, the Grand Canal system gradually improved in wide geographical space, and actually connected six major rivers from north to south China, forming the main water traffic artery (Cheng Yu Hai, 2008).

The system of Grand Canal supported to transfer lots of food and tributes to the capital, Chang'an, in Sui Dynasty. From Sui to Song dynasty, AD 581-1279, almost seven hundred years, the mass construction of the canal developed on the basic route. Grand Canal was built in the most important stage in Sui dynasty when it constructed 2700 kilometres water route in the whole state. Many advantages had benefited from maintaining the water route, such as the navigable national water system for transporting grain and tributes, the international commercial route linked eastern sea from opening Yangzhou port city, advanced bridge structural engineering and efficient administration of water route by the central government.

Grain and tributes from south regions along Yangtze river, they are needed to be transported to

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18 HQZS, vol 7.
the capital by official ships, therefore Yangzhou became a transfer station on the north bank of Yangtze river. According to archaeological research (Figure 2.4), the relics of official grain granary area was found near Luoyang where was a east capital in Sui dynasty. In historian book, Hui Luo official granary stored 2,400,000 units of weight in Sui dynasty\textsuperscript{20}, and increased to 5,800,000 units of weight in Tang dynasty\textsuperscript{21}, Yangzhou could transfer almost 3,000,000 units of weight\textsuperscript{22}. Zou Yi Lin analyzed the locations of the official granary, many of them were set near Luoyang, an east capital for supporting consumption\textsuperscript{23}. As we know, there were eight revenue offices in Ming dynasty, were signed in the old map, Quan Cao Yun Dao Tù\textsuperscript{24}, seven offices set in Grand Canal riversides, and one in Yangtze riverside. Currently, only one revenue office was conserved very well in Linqing, in the west bank of canal, the most important revenue office could collect a quarter of the state tax in Ming dynasty. The seven revenue offices administered five sections of the Grand Canal from capital Beijing to Nanjing, but actually, this five section could seem as the parts of a financial route for collecting tax from all over the country.

Except as an inland river port, Yangzhou also was considered as a commercial centre for various products gathered here, because of the large number of goods transferring here by the waterway. In Tang dynasty, Yangzhou was seemed as one of the biggest city had 16 square kilometres, only smaller two national capital in central China, Chang'an and Luoyang. Since it was a transfer station between the political centre and southeast economic area, Yangzhou rapidly developed to a international trade city in east Asia, along with coming more and more foreign merchant from Korea, Japan, even Arabs states, who can purchase necessaries of life and luxury goods here, the silk, jewellery, porcelain, etc. Yangzhou was not only an origin of goods but a large commercial centre for exchanging products.

Compared to the urban fabric of two capitals, Yangzhou had a different urban form with the rectangle urban blocks were divided by the bridges in the city every nearly 300 metres\textsuperscript{25}. These blocks seem like planned by regulation, which helped to transport goods conveniently from east port to west market of the city. Urban structure supported to distribute and

\textsuperscript{20} Zi Zhi Tong Jian, Vol 180.
\textsuperscript{21} Zi Zhi Tong Jian, Vol 180.
\textsuperscript{22} Tongdian, Shi Huo, vol 12.
\textsuperscript{24} QCYDT, Map of the Grand Canal water course, grains and tributes transportation.
collect goods in the river port city. Yangzhou had a condition to develop its commercial activities under the urban blocks near the main waterway.

The main waterway could get to many other Asian countries, through the noted the Silk Routes on land and sea. Yangzhou was considered as a cross point of the two routes. Kim Sang-bum had analysed the foreign communities in Yangzhou in late Tang dynasty, he thought that existed many navigable route from the port of Yangzhou to some countries, for example, the ships could go north through the Grand Canal from Yangzhou to eastern sea mouth of Huai river, then make voyages to east Asian countries, Silla, Korea; access to Japan from sea mouth of Yangtze river; and transfer goods to south port city, Guangzhou, connect to west Asian countries by Maritime Silk Route\(^\text{26}\). Yangzhou attracted most of the foreign merchants who lived and did business here, was a place for providing lots of commodities also an international trade centre.

The technology of constructing the stone bridge well has advanced in this period, it helped efficiently link both sides of the river. Such as the famous Zhao Zhou Bridge, the world’s earliest open-spandrel stone segmental arch bridge, credited to the design of a master Li Chun, in the years 595-605 during the Sui dynasty. Now it has worked well in 1400 years, considered as one of International Historical Civil Engineering Landmark, by American Society of Civil Engineers\(^\text{27}\).

The national waterway had completed huge works for improving a great water route, the bridge, water gate, artificial lake to regulate waterline, construction of river embankment and road. It was a great waterway resulted in a more rational and scientific engineering, worked on more functions such as navigation, flood defend and water irrigation. Meanwhile, the authority of canal has been strengthened under its administrative power, so that the total 2700 kilometres long water route could be controlled by the political centre. Luo Yang was the east capital and linked four main sections of canal, the Tongji, Yongji, Shan Yang Du and Jiang Nan. These canals not only dug for the military actions, it was upgraded to the lifeline of the state, and was a busy artery of traffic, transporting and immigration, since the canal linked the economic areas to the capitals.

After Grand Canal first directly connected the central capital to a southeast economic area in China, Yangzhou city became to the international trade


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centre because it was an important inner official grain collecting and transferring centre, also was a key node in Silk Road linked east and west Asian areas.

2.4 18-19th AD Century, The Imperial Canal as a financial route bringing prosperity to Yangzhou city

Imperial Canal was once nominated from a foreigner's journey, the special envoys George Macartney and George Leonard Staunton28 visited China from the United Kingdom in the 18th century, a west European country sent a diplomatic envoy to China. After met the emperor, the fleets of envoys left the capital Beijing along the Grand Canal, and visited the cities and towns through the whole national waterway, then they reached the south seaport of Guangzhou and Macao after a long time, then back to England. William Alexander was an accompanying painter in the group of the envoy, published the album in 1805, The Costume of China, described the landscapes of the canal, such as cargo ships on the river, the classical arched bridge, and traditional buildings on the riverside. In 1842, the London press published a sketch of the canal and

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28 He wrote down and edited a book, An Authentic Account of and Embassy from the King of Great Britain to the Emperor of China, was a western vision to recognize the flourishing age of Imperial Grand Canal.
named it the Chinese Imperial Canal. In 1843, the British architect, artist and cartographer, Thomas Allom who drew the completed illustrated books based on the sketches from William Alexander, and G.N. Wright wrote the descriptive notices, they once again introduced the old eastern country and the imperial canal to the West social.

The name of Imperial Canal, in fact, it confirmed that this canal had a great influence on politics and economy, which reflected in the cultural landscape of the canal and its flowing areas. The authors' painting and sketches drew the scenes of the busy water route, the architecture characters near the ports and riversides, some open spaces, such as the opera, retail shops, pagodas, the places showed the rich livings in the urban riversides. In 1828, Nicholas Wilcox Cundy had written reports about constructing an inland imperial ship canal from London to Portsmouth, he made an effort in this new water route for British trading market, the landowners, merchants, bakers, ship owners, manufacturers, etc. But it never was adopted by congress.

Actually, people could recognize that the benefits from constructing a waterway, such as the local economic activities. The Imperial Canal worked as the most

29 The Illustrated London News I, No. 27 (12 November 1842): 421.
30 From London to Portsmouth. Nicholas Wilcox Cundy. Year: 1828 Book from the collections of: Oxford University
significant wealth from the 15th century.

Seven tax collect offices were set on cities along the imperial canal had collected more than 90% of total tax from the whole country along the imperial canal, in 1429, Ming dynasty. Taxation system was built up and administered by the central government, had the two kinds of tax from the boatman and merchant. Yangzhou was one of the city set the customhouse, with other seven customs along Grand Canal. The taxes normally were used to maintain the national waterway, such as to restore destroyed dyke and relieve people after flood disaster, to build official ships for transporting grains and tributes, also support the working of customhouses and military affairs in provinces. Large numbers of merchant ships had to pay taxes when they needed to pass the waterways through cities. After a time, the commercial and urban facilities were developing near the customhouses, for instance, the retail stores, markets, hotels, restaurants, etc. Cities had customhouses rapidly became an economic centre and transportation hub, because of convenient water traffic and trade prosperity.

Salt industry played an important role in Yangzhou regional economy. Yangzhou controlled the eastern coastal area of salt industry and developed to the largest place for producing cooking salt among other 11 salt industrial area in Qing dynasty. From 1370 to 1832, the Qing empire inherited the official monopoly system of salt trade, it allowed designated merchant buy and sell salt among provinces. Although the salt merchants were administered by central government, they could take the profit by control the salt price. He Bing Di researched the wealth of salt merchant in Yangzhou in the 18th century, he concluded that the amount of tax to be paid by Yangzhou salt merchants could reach nine times more than a total of other industries. He thought that the salt merchants in Yangzhou were the richest people in all over the country who had greatest financial power.\footnote{He Bing Di. The salt merchants of Yang-chou:A Study of Commercial Capitalism in Eighteen Century China. Harvard Journal fof Asiatic Studies, vol 17, No1-2.}

Salt merchants changed the urban life of Yangzhou, they rebuilt the urban landscape with the public parks and private gardens. Ming and Qing dynasties, the urban area of Yangzhou had 5 square kilometres, it was divided into two parts, the western urban part had grids planning with more public buildings, the city hall, library, educating institution, and temples; the eastern urban part had an unrestricted streets system closed to Grand Canal, were located salt merchants' residences, the commercial chamber, salt industry administration
office, storehouses and markets, most of businessmen and boatman settled down here. An open space formed the public park between the city and northwest hill, salt merchants rebuilt this area as a big beautiful public park for welcoming the emperors' family, because the royal troop could sail to Yangzhou through the Imperial Grand Canal. An album of paintings recorded many elegant gardens in Yang Zhou, it described that the garden design and rockwork were best in China\textsuperscript{32}. In 1765, another book, was edited for Qian Long emperor visiting, it marked all the gardens along the waterway from north-west to Yangzhou city in the map\textsuperscript{33} (figure 2.9). From this time, the gardens became opened to public from a private collection, and its gardening style began to accept the northern aesthetic culture, such as the White Pagoda in Tian Ning Temple learnt from the royal garden in Beijing.

In the time of Imperial Grand Canal, Yangzhou obtained large economic development by salt industry. The urban expanding which were promoted by salt merchants confirm that Yang Zhou has collect wealth by the financial line of imperial canal. Through the salt trading market, the salt merchants invested in building elegant gardens for business needs in the city, also promoted the tourism and recreation.

2.5 19th-20th AD Century, Beijing-Hangzhou Grand Canal attempts to develop cross-regional values and the new start to the regional waterway project at Yangzhou city.

After China was proclaimed a republic country in early 20th century, "京杭大运河" (Beijing-Hangzhou Grand Canal) was renamed from the "帝国运河" (Imperial Canal), it kept the main function of navigation in modern times.

Bai Shou Yi edited the book, History of China, described Beijing-Hangzhou Grand Canal, said that, "digging the straightway of the Beijing-Hangzhou Grand Canal from capital to southern Yangtze river area\textsuperscript{34}, this could replace the old central canals of Sui and Tang dynasty", and "the whole system of waterway has been renovated in Beijing-Hangzhou Grand Canal"\textsuperscript{35}. This Beijing-Hangzhou Grand Canal only could describe the canal from Yuan dynasty, because it straightway from Beijing to Hangzhou, not included the old canals in the central plain from

\textsuperscript{32} YZHFL, vol 1.
\textsuperscript{33} PSTTZ, vol 6.
\textsuperscript{34} Jiang Nan is the area of south basin of Yangtze river, generally it includes south of Jiangsu province, most of Zhejiang province.
\textsuperscript{35} ZGTS, vol 113.
earlier periods. In the geographical space, it was one of the water routes between the capital and the other destination city like Hangzhou in ancient China (Cheng Yu Hai, 2008).

On the water route from Beijing to Hangzhou, cities and towns have built almost 1700 kilometres of waterways, they provided trade markets, business streets, the residents of merchants, public parks, and religious buildings, these scenes of prosperity were drawn in the sketches from the foreign envoys who visited China in the 19th century. This north to south water route had many functions, such as the transporting waterline, tax avenue system, the imperial shipping tour, and local tourism, even there was an urban expressway run parallel to the canal in the ancient canal’s map. In the small scale regions, this Beijing-Hangzhou Grand Canal now also has the function in irrigation for the farming land, to regulate the waterline, because it was built based on the man-made network of the rivers and lakes. In the large scale, the Beijing-Hangzhou Grand Canal could help the water conservancy projects to regulate the two big rivers and defend the heavy flooding from Huang and Huai rivers in eastern of China.

In 20th century, Beijing-Hangzhou Grand Canal is a new water expressway for updating its transport capacity. It is the longest waterway from north to south in the eastern of China, which passes the two important economic areas in China, the northern Bohai-Rim Economic Circle (includes Beijing, Tianjin, Cang Zhou, etc), and the eastern Yangtze River Delta Economic Circle (includes Hang Zhou, Su Zhou, Shang Hai, etc). The ship cargo has continued to rapid rise in recent years between the two economic circles in the canal. The report from ministry of transport, said that there are more than one hundred thousand ships sailing in the canal all the year around, they were carrying capacity reach 15 million tons, and total freight transport capacity could be 0.26 billion tons, this capacity equal to three times than Beijing to Hangzhou railways (Xue Zhi Wei, 2010). Therefore, the provinces of canal have to improve the transport capacity, for instance, the Zhe Jiang province has invested 6 billion Yuan in rebuilding its section of the Beijing-Hangzhou canal. The navigation standard would be promoted to the third level from the fourth. Shan Dong province also keep updating the three ship locks for pass more large boats, due to they are planning to navigate the boat in kiloton level (Chen Hai Dong, 2012). The modern Beijing-Hangzhou Grand Canal, the south end is recognized as a new start point, because the endpoint has changed from the oldest inner port Gong Chen bridge to the new San Bao ship lock. In the future, the route of Beijing-Hangzhou Grand
Chart 2-1 Beijing-Hangzhou Grand Canal develops its multiple values in recent years.

Water expressway in sections of Beijing-Hangzhou Grand Canal.

The regions of Beijing to Hangzhou Grand Canal rebuild new water expressway to improve capacity of transportation. Photo from Jiangsu Grand Canal Cultural Center.

Grand Canal cultural route protects the relics in historic area in front of water.

Gaoyou Zhenguo Pagoda. Photo by Chen Zhong.

Yang Zhou, Jiang Du Water Conversancy Project.

This project worked for water transferring from south Yangtze river to the north area of China to balance the water resource. Yangzhou city built the largest pumping system in 1960s which was improved in 40 years to complete water distributing. Now this place of pumping system in Yangzhou was developed to a famous scenic spot for citizen recreation. Photo from http://www.jdlsn.com/

Hang Zhou, Gong Chen Bridge, a new start point to oversea maritime transporting route.

Photo from China National Geographic Journal.
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Canal will extend 240 kilometres from the this ship lock, and open its new starting point for the ocean transporting.

For solving the problem of shortage of water resources in northern area of China, Beijing-Hangzhou Grand Canal is one water projects transfer water as a eastern water channel. At the same time it has more regional projects in those provinces for supporting water quality. In 1952, the first president Mao Ze Dong of P.R China who proposed that "we could transmit the water from rainy southern China to dry northern area". After fifty years investigation, surveying and planning, the State Council approved the General Planning of Transferring Water from South to North in 2002, in this plan has designed three channels for transferring water, in the eastern area, central area and western area. In 2005, the National Development and Reform Commission approved the first phase of Project of Eastern Way for Transferring Water from South to North. The eastern water channel for transferring water mainly worked in the Jiangsu Province, they will pump water from Yangtze river and collect in Yang Zhou's water regions that has connected four lakes, Hongze, Luoma, Nan Si and Dong Ping, and then transferred step by step by the Beijing-Hangzhou Grand Canal to the northern area. Finally, the water will pass 1156 kilometres to north cities, Tianjin, Cang Zhou, De Zhou, etc. This water project has a strict quality control from water resources, has to adopt many strategies for keeping a good quality water, such as protection of water resource, monitoring the navigation canal, improvement of sewage treatment in the urban area. One of canal cities, Ji Ning insisted on building the clean water corridor in its urban area for realizing a new energy-saving function\(^\text{36}\), the local urban authority relocated the high polluted industrial factories and built more new wastewater treatment plants. In water sources sites have water monitor system in order to avoid the negative effects after transferring water from the south to north. Ecologists argued that the influences in water resources, especially in the four lakes of south area, and proposed strict managements in water security and ecological monitor which should investigate the favourable and unfavourable effects (Wu Zhou Hu, 2006). More ecological projects such as artificial wetlands were used for restoring the degeneration of the natural wetland, also prevents the pollution of water going into the natural lake (Zhang Jian, 2008). New ecological function is allowed as the regional administration intervention for protecting the water quality and ecological security.

\(^{36}\) Ji Ning, completing the object of energy conservation and building the water corridor for south to north water transfer project. Construction Conserves Energy, 2009, 01.
After the local governmental intervention, a larger scale green infrastructure developed under the large scale water route, the Beijing-Hangzhou Grand Canal who connected many lakes, big ponds, branches of river, marsh and wetland, becoming a network of regional ecological environment, also a cross-region process in the eastern plain of China (Yu Kong Jian, 2004).

Moreover, Beijing-Hangzhou Grand Canal still considered as an important national heritage corridor, a great artificial engineering work has changed the nature. In September 2006 the Beijing-Hangzhou Grand Canal was listed in the 6th National Cultural Relics Protection Unit by the State Council. One year later, it was renamed to China Grand Canal by adding the canal of Sui-Tang dynasty that has linked to thirty-three cities from the former eighteen. In the view of heritage, the Beijing-Hangzhou Grand Canal is one part of China Grand Canal.

Actually, the Beijing-Hangzhou Grand Canal has most complex conditions about its heritages. It has the oldest section of canal, left abundant tangible and intangible cultural heritage resources. Ruan Yi Shan (2009) emphasised that the urban heritage in canal cities are very precious, especially urban texture and its relationship with the canal and river. The canal city has very particular landscapes are related water, such as the shipping facility, the dock, bridge, dam, embankment, floodway; the administrative institution, the customhouse, canal transport office, and granary; the travelling services, such as hotels, shops, provincial guilds, post stations, etc; the cultural places, academy of classical learning, Confucius hometown, historical relics and public parks; also many religious sites, the churches of Catholicism, Mosques, and temples of Buddhism. Tan Xu Ming and his group concluded that the irrigation work is the crucial element of China Grand Canal heritage, includes a system of the waterway, sources of water, administrative institutions and other associated facilities. In short, the Beijing-Hangzhou Grand Canal was a most significant achievement before 17th-century industrial revolution. Tan Xu Ming thought that the canal has double values in natural and cultural heritage: the Beijing-Hangzhou Grand Canal distribute the water to clean the waterway. When the Huang river rush into the south Huai river with uncontrolled large quantities of sand which led block river in five hundred years, the canal did in cross-regional rivers and lakes which were a creative water management to control natural river (Tan Xue Ming, Yu Bing, Wang Ying Hua, Zhang Nian Qiang); moreover, the regional industrial heritage corridor has existed in the Jiang Nan section of canal (Zhu Qiang, 2007). The canal played an...
The major river basin of China Grand Canal linked the north Yellow River and the south Yangtze River in thousand years.

Figure 2-13 The China Grand Canal area and thirty-eight cities' alliance.

Figure 2-14 Commemorative envelope was published in world canal cities forum in 2009, Yangzhou. Mayors' signatures signed in commemorative envelope for historic and cultural canal cities' cooperation in China Grand Canal. Image form World Canal Cities' Forum, Yangzhou, 2009.
important role in the development of the modern industrial revolution of China. The Jiang Nan section of canal was economic belt of industrial and textile, food production, these could be transported by the existing canal, in this period without developed railway, so that many factories and storages were set along the river and canal, and the goods were shipped from inner canal cities, Changzhou, Wu Xi, Su Zhou, to seaport of Shanghai, they formed a modern industrial belt.

The Beijing-Hangzhou Grand Canal has abundant intangible cultural heritages. In recent years the Ministry of Culture focused the protection of intangible heritages, for example, many canal cities have their particular traditional arts, new year pictures in Tian Jin, popular kites in Wei Fang, carving art and Pingtan opera in Yang Zhou, clay figurine in Wu Xi, porcelain and embroidery in Hang Zhou, etc. There are ten sorts of intangible heritage\(^\text{37}\), are closely associated with the local landscapes and historical places which provide us the interesting stories or legends. For example, the Tale of the White Snake began in Hang Zhou and Zhen Jiang\(^\text{38}\), some scenes happened in an area of West Lake in Southern Song dynasty (1127-1279), which reflected its society, popular culture, people's belief and values. Meanwhile, as the venue, in the West Lake of Hang Zhou, the tale gives rich cultural contents to tangible heritages, the monuments, bridges, pagodas, temples there, the cultural landscapes now attracted most tourists from all country.

In a word, the Beijing-Hangzhou Grand Canal keeps the traditional functions as a national waterway, but more significances to its history and culture which has come to more values by well treating this ancient Grand Canal. The waterway always gives us a regional transport, especially in the southern water system. Now it is a green way to recover and monitor the environment, distributing well quality water to northern land in the dry season for people living water and irrigating farmland. Still Cities of canal well protected intangible heritage that has presented us the urban image of local people dynamical living, the Grand Canal is alive.

\(^{37}\) Ten types in National Intangible Heritage in China, were published by Ministry of Culture in May of 2006, they were folk literature, folk music, folk dance, traditional theater, Quyi, Acrobatics and Athletics, folk art, traditional crafts, traditional medicine and customs. source from: http://www.ihchina.cn/

\(^{38}\) The Legend of White Snake, was edited in Ming dynasty by writer Feng Meng Long(1574- 1646), it was earliest edition collecting the oral tradition, which series stories happened in ancient cities such as Hangzhou, and natural scenic spots in the south of Yangtze river, the West Lake. Now it's in the first list of National Intangible Heritage of China, and attracting large number of tourists to visit those scenes were described in the literary works.
2.6 Beginning of 21st century: The Grand Canal of China is compared to an umbilical cord with multiple-values for regional development

China Grand Canal was first named as a member in National Special Protection, with the overall concept integrated multiple-values. Another human engineering, the Great Wall, it's same famous as China Grand Canal, 50 years earlier entered in National Special Protection List in 1961, and was listed in World Heritage by UNESCO in 1987.

Luo Zhe Wen, Zheng Xiao Xie, Zhu Bing Ren, three fine scholars insisted on protecting the canal in China from many years ago, in 2005, they wrote together a letter to eighteen mayors of the canal cities, a letter for speeding up the work in protection of Beijing-Hangzhou Grand Canal's heritages. Subsequently, 58 of the National Committee members gave fast response to the scholars, signed a proposal, the "declaration of protecting the Grand Canal Heritages". Then, the State Administration of Cultural Heritage started a wide investigation in 35 canal cities. At last, the Beijing-Hangzhou Grand Canal successfully entered in the China's World Heritage Tentative List, December 2006. The canal became a national heritage under the name of Grand Canal, prepare to bid for the World Heritage in 2013, this time, it had included Sui-Tang Grand Canal and Zhe Jiang Eastern Canal and Beijing-Hangzhou Grand Canal, the three most important sections in its history. Canal cities had increased from eighteen to thirty-five, then they work together to found an agreement between their governments, to found the Alliance of China Grand Canal Cities, under a regional protection and development for Grand Canal.

Then every spring, these cities meet in Yangzhou to celebrate the annual Canal Culture Festival Day. They also want to share the experiences in river development and urban projects. Furthermore the alliance need to assume the responsibility for protecting its cultural heritage, because the canal cities all have their distinctive cultural landscapes, historical sites, tangible and intangible heritages. The cultural landscape is a new concept, the urban administrator began to protect the cultural landscapes as heritages, especially after national park of mount Lushan successfully became the

March, 2006, fifty eight members of CPPCC called for protecting the Grand Canal in China, and started biding for world heritage. Two years later, thirty five cities stand along the canal founded the Grand Canal Cities' Alliance, at the same time they got the consensus of Grand Canal protect plan in Yangzhou, which is a the city considered as the canal's origin. A governmental institution was set in Yangzhou work with other cities to rediscover canal's values, study in urban structure, protect the heritage, restore cultural relic, in order to renewal the Grand Canal.
world heritage in 1996. Mount of Lushan has many human activities happened in two thousand years in the south of China, it left tangible heritages like religious architecture, the Taoism and Buddhism, also it attracted many Chinese painters. Chinese culture always learns from the nature to create its philosophical and artistic view. In 2011, Hangzhou city, the West Lake was listed in World Cultural Landscape Heritage contributed in protecting the urban heritages and landscapes. However, the West Lake is a good case to prove that the human live in a poetic habitat combined a harmonious between nature and human under an artistic intervention to reform an oriental aesthetic values, people could enjoy in the oriental mountain- water cities.

In addition to Hangzhou, there are many similar urban structures in canal cities have been constituted of the lake, mountain, river and canal, they all form the canal's cultural landscapes. Yangzhou, its city moats has gone through for hundreds year to be a public urban park also located in the northwest of city as Hangzhou west lake, it recognizes as the name of Thin West Lake by its small scale, long and narrow water routes; Liao Cheng, a traditional urban structure planned in Spring-Autumn period, two thousand years ago, the foursquare city surrounded by old moat up to now, but it could connect to the Grand Canal by its water route; still I could give more city cases like them, the Suzhou, Changzhou, Shangqiu, etc. Most of the canal cities are well known as state-listed historical cultural city, now they are looking forward to improving the overall value of the Grand Canal cultural landscape, the natural environment and cultural heritages should be considered in land use and urban planning, not only protect the tangible heritages, but concern more about the diversity of urban texture, developing public recreational places in riverside, offer the open space to natural and cultural education.

In the view of culture, the China Grand Canal is recognized as a completed linear cultural heritage. The researcher of heritage, Xie Qing Tong argued the Grand Canal with concept of cultural route and linear heritage, he thinks that the whole becomes greater than the sum of its parts, so that the Grand Canal reflect the immigrant of people in the whole, and its exchanges of business, ideology, science and value. Xie Qing Tong also compared China Grand Canal to canals and rivers in the world, the Canal du Midi (France), Rideau Canal (Canada), and upstream of Rhine Valley (German), he thought that it's possible to administer the canal as a heritage corridor, with evaluations of other sorts of heritage, like cultural landscape, artificial waterway, relics of engineering.
The experts in protection, Zhang Ting Hao thought that the China Grand Canal would be a challenge in Chinese heritage protection and administration because the canal was a treasure filled with countless relics, a cultural route (Zhang Ting Hao, 2009). These arguments overall summarized the concept of the canal in the view of heritage, with the memory of the history, the processes of the urban transformation along the canal which changing regional economic and spreading culture.

The cultural landscapes of canal and waterway, as distinct from others, allows discovering integrative value under the complex situation. More researchers compared China Grand Canal to other heritage canals in the world, in order to discuss more values. Tang Jian Bo argued for restoring the waterways and embankments, to recovery the landscapes of the un navigable sections of canal (Tang Jian Bo, 2011), the experiences from Ridau Canal. The protection of canal's heritages needs the support from the laws and regulations, Canal du Midi gives many good cases in France canal heritage (Wan Ting Ting, Wang Yuan, 2010). Also many researchers noticed the differences between China Grand Canal and other canals in classifications of the heritages, which could be a visual, monitored, in the way of cultural landscape.

China Grand Canal has two parts in geographical and historical elements, one is the older Sui Tang Canal in central plain, the other one is Beijing-Hangzhou Canal in eastern plain, both of them integrated to one unit under the significance of national cultural heritage. The archaeology of historical canal is always trying hard to looking for relics in canal's area, for better redraw the cultural landscape from old periods, not only the permanent cultural constructions, architectural heritage or monuments, but also the ancient artificial engineering, functional facilities combined the landscapes' elements, vegetation, farming land, lakes and natural rivers, all together become a integrative identity of national canal; the other side, under the global culture, the way of integrating cultural landscape are so distinctive by human intelligence, such as in China Grand Canal, the practice in natural environment is improved to create a poetic living between nature and urban area, the West Lake scenic spots in Yangzhou and Hangzhou.

Generally speaking, China Grand Canal is a national waterway which integrated the values of cultural heritage, water transportation, ecological infrastructure, and cultural landscape of canal's cities. It's a living waterway has worked more than two thousand years as an intelligent engineering, will have a renewal project to fit its functions in the
contemporary time.

2.7 Conclusion

Along the history, the China Grand Canal has been nominated 5 times, we can basically distinguish their reasons. From one small-scale district, to become multi-functions and cross-regions, the different regions are all together sharing advantages of the Grand Canal.

BC 8th-5th century, Han (Yangzhou) city, built a water channel used as a springboard in state's territory expanding. From the ancient state of Wu, to the ancient feudal society, foreigner businessmen, missionaries from all over the world come to China, people could exchange their products through the waterway; the canal is still witnessing of immigrant, a international trade line connected ocean sailing and the Silk Road, more and more visitors come to canal city for knowing oriental culture, looking for opportunities in commercial activities, and enjoying a wonderful touring in the long waterway.

AD 10th century, Grand Canal became a national transport line and gave Yangzhou city as a commercial centre. Grand Canal was once used as a transport line to collect grains and foods to national granaries for capital. The farming irrigation needed the water in an ancient agricultural period, farmers had to dig the water channels in a wide area for crop cultivation, especially in the south of China which had its advantages in water network and enough rainfall. The south-east area had the richest farmland in China in that time, so in Sui dynasty, the emperor planned the first national canal to connect the capital Luoyang to the east, to transport the grain and other tribute from east to the capital. The canal firstly became an artificial water route used in goods transportation.

AD 18-19th century, Imperial Canal, was a financial line brought the wealth for Yangzhou city. Grand Canal became a national financial route in Ming dynasty. The state set up internal revenue system along the Grand Canal in many cities, to keep collecting the tax from all the provinces, that is main sources of state revenue. The state could realize an ideal management in national economic in the Grand Canal. Also, the merchants could use this financial route for trading activities. With the rapid regional economic developed, the urban areas began to transform to the new urban structures and forms, as the storage facilities built along the canal to keep grain and goods, many boatyards constructed in the centre of city for smaller family economy, resulted to a rich and diversified urban waterfront, the salt-
Part I  Waterway, as a great cultural landscape

Chart 2-2 Grand Canal formed after the canal political and cultural center changing in three stages in the history.

**Stage 1**
The first Han canal dug for connect two points, the capital Suzhou and the north fortress in Yangzhou. Its motive was military activities.

**Stage 2**
Sui-Tang canal served for center capital Chang'an, dug for two motives. North route used in building fortress, the south route used in collecting tribute. In this time, new capital Chang'an spread Buddhism to ancient China, and also improved remarkably construction technology. The Grand Canal started form its cultural landscape.

**Stage 3**
After the capital changed to the north, Beijing, the political center began to dig the canal connect to south economic area and decreased almost 900km than before. The eastern cities along the canal developed fast relied on the transportation water route. Along the Grand Canal, the urban cultural and public life widely exchanged in the cities which had built beautiful cultural landscapes.
The cities in Jiangnan canal has most long and rich history in the regional scale.
merchant houses with inner gardens, the public gardens near the riverside, the urban life embraced the Grand Canal.

AD 19th-20th century, Beijing-Hangzhou Grand Canal attempted to develop cross-regional values, Yangzhou city seeks for a new start in regional waterway project. Due to the first industrial revolution in eighteen century, the railways became the main transporting route in the land had its large capacity and high rate are more efficient than the canals so that the government had to give up Grand Canal as the national transporting route which was replaced by the railways. But in the south China, the network of canals existed in the regions worked for goods transportation in the towns and villages, less than before, didn't disappear in the economic activities. At present, in the view of ecological cultural, the canals play an important role in green corridors and cultural heritage route.

Beginning of 21st century, China Grand Canal is compared to an umbilical cord to support multiple-values for regional development. These canals' cities seek for a new sustainable way to transform the water route to part of the green infrastructure by consist of their green land and forest along the canal, combine the green route and land use in riverside.

In general, the Grand Canal has the cultural landscapes formed by the land and water. In one side cities depend on the canal to bring them the economic values, then to form their urban fabric and inner-river network. The thirty-five cities' alliance come to agreements in a protection of the canal cultural heritages and frame the new urban planning for city and canal. They implement the new urban development to revive economic in cultural tourism, urban recreation. The Hangzhou West Lake gives them a good case in cultural values. In the other side, the canal is a successful artificial water line has its functions, also has its diversity in the cultural landscape along the riverside go with the rich intangible heritages. Industrial period the water route was a military line far away from the city, but after the agricultural development and expanding of territory, it was a transporting and irrigation water route used in many cities and towns; since the state unified, the Grand Canal was a financial route used to collect the tax; but now, in the view of the sustainable development the canal could be a green infrastructure and cultural heritage.

The above is the research background in this thesis, the Grand Canal and regional development; the canal cities built the relationship between the urban planning and the water route.
The waterway is the major component of the water transportation network. Through thousands of years, the ancient China built an efficient and high dense waterway in its territory, which met the demands of agricultural economic and transporting administration, now it's preparing well maintenance and improvement. China's first canal was since the birth of water Channel of Han which built a route between the two major rivers, these technologies for rebuilding waterway and topographical surveying practiced in all country, and then more local provincial territories built the canal for communicating natural rivers. After the dredging and widening of canal, the China Grand Canal maybe play an important role in international shipping system, because that it tries to connect ports, in the eastern coastal cities, by the inner waterway access to the sea; the canal will have a sufficient condition in the shipping business growth in the future, at the same time, the canal cities could be considered as huge markets for exporting and importing the goods from abroad.

Last, as a symbol of a unified country, the Grand Canal could well tell the story of cultural exchanging in a long history, it is often the only expression of national identity. If the canal wasn't protected as a national cultural heritage in 2005, no processing of bidding for world heritage, the Grand Canal would not be considered as an integrated value, perhaps it would be separated to much individual values, a regional waterway, a local project for transferring water, small-scale irrigation work, or as an urban sewage pipe even more worse.

From the perspective of cultural landscape, China Grand Canal is of common concern and protection, it could be a national identity as a whole, and cross-regional, ecological civilization infrastructure in a new era.