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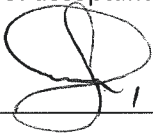
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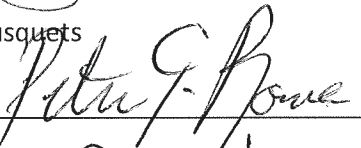
Between the Past and Future: the Transformation of the Pearl River Delta

Presented by
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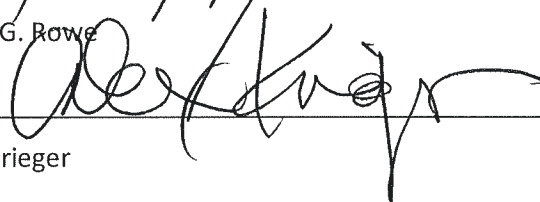
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BETWEEN THE PAST AND FUTURE
THE TRANSFORMATION OF THE PEARL RIVER DELTA

A dissertation presented

by

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BETWEEN THE PAST AND FUTURE
THE TRANSFORMATION OF THE PEARL RIVER DELTA

ABSTRACT

Between the Past and Future: The Transformation of the Pearl River Delta examines the Pearl River Delta (PRD) and its spatial transformation from 1370 to present. It unravels the complex evolution of the Pearl River Delta in five distinct stages and probes the proposition of the region as a changing urban concept through a methodology that is the aggregation of the important maps, plans and critical mappings. Through the objective interpretations and spatial analysis on the urban reality of the Pearl River Delta, the dissertation challenges whether or not the most recent blueprint of the central government of making it into the Greater Bay Area as a consolidated singularity is in fact viable or achievable. It brings the scholarship on the Pearl River Delta a new dimension, which contains different and special meaning compared with the previous studies on the Pearl River Delta from the geographical and social-economic standpoints.

The dissertation offers certain abstract models and conclusive remarks generated from different stages of the PRD's development, puts forward the vital implications of these

observations, and conclude with six different spatial models of the Pearl River Delta across the history. The main body of the dissertation is structured in six chapters: a geography with three distinct cities (1370s-1900s), developing into territorial regions (1900s-1980s), constructing a territorial chain of twin-cities (1980s – 2000s), experimenting with new districts (2000s-2010s), the new infrastructure of the Pearl River Delta (2010s-present), and towards a polycentric megalopolis.

The central finding of the reading on the Pearl River Delta is the presence of its sheer diversity issue regardless of infrastructure and other attempts to consolidate connectivity. It consists of a diverse set of parts, principally centered at Guangzhou, Hong Kong, Macau, Shenzhen, Zhuhai, Foshan, Dongguan, and Zhongshan. The dissertation concludes with a critical review of the current scheme of the Greater Bay Area through six lenses including built-up area, population, economic pattern, accessibility, administrative complexity and cultural multitude to scan the “conditions” of the urban reality of the Pearl River Delta. The outcome indicates the importance of *vive-la-différence* that the Pearl River Delta as a polycentric megalopolitan aggregation should respect, nurture and when necessary even amplify the differences of the eight PRD cities in order to reach a long-term regional prosperity.

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INTRODUCTION

INTRODUCTION

The dissertation examines the Pearl River Delta (PRD) and its spatial transformation from 1370 to present. It is conducted in the light of the central government's conception of it as the Guangdong-Hong Kong-Macao Greater Bay Area, raised by Chairman Xi Jinping and the National Development and Reform Commission in July 2017.¹ The goals of the Chinese central government could be understood to further deepen cooperation amongst the existing cities of the Pearl River Delta, facilitate in-depth integration within the region, and eventually consolidate the territory into a singularity. This ambition is manifested in the promulgation of the "Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area" in February 2019.² Through the objective interpretations and spatial analysis on the urban reality of the Pearl River Delta, the dissertation challenges whether or not this idea of the central government of making the Greater Bay Area is in fact viable, achievable, or even the right idea. It brings to the research a different meaning compared with the previous studies on the Pearl River Delta from the geographical and social-economic standpoints.

¹ National Development and Reform Commission, People's Government of Guangdong Province, Government of the Hong Kong Special Administrative Region, and Government of the Macao Special Administrative Region. *Framework Agreement on Deepening Guangdong-Hong Kong-Macao Cooperation in the Development of the Greater Bay Area*. July 1, 2017.

² National Development and Reform Commission. *Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area*. February 18, 2019.

The major methodology of the research is based on the aggregation of the important maps/plans and critical mappings, which led to the periodization of the Pearl River Delta from 1370 to present unfolding in five phases with the observation of six different spatial models. (Figure 0.1)

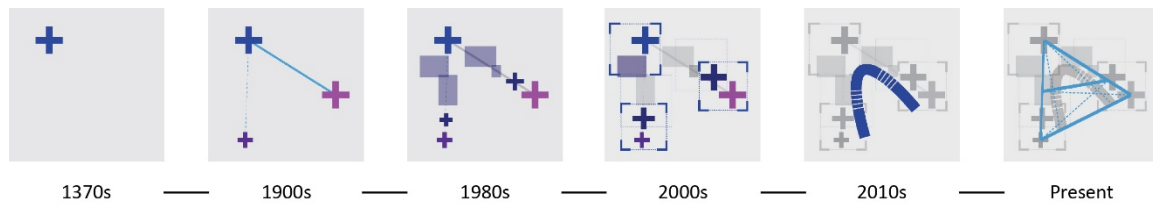


Figure 0.1: the spatial transformation of the urban structure of the Pearl River Delta.

The Pearl River Area had been a monocentric territory with Guangzhou as its single political and economic center since Ming Dynasty around 1370s. This phenomenon remained unchanged until the rise of Hong Kong and Macau as major trade centers by 1900s when the structure of the place was developed into a collection of three distinct cities with different cultures and systems of jurisdiction.

Since the beginning of the twentieth century, especially after Mainland China started its Open-Up Policy and the economic reforms in the late 1970s, the structure of the Pearl River Delta evolved from a succession of principal cities into an area of eight adjacent territorial regions of which Guangzhou was the capital of Guangdong Province; Hong Kong and Macao were important colonial urban outposts; Shenzhen and Zhuhai were newly established Special Economic Zones; Foshan, Dongguan and Zhongshan were cities upgraded from

manufacturing counties. These eight territorial regions are heterogeneous in their processes of formation and development, and have undergone different trajectories of urbanization.

The twin-city approach abstracted from the research, which was a primary urbanization logic in the region from the early 1980s to 2000s, transformed the Pearl River Delta into a territory anchored by three powerful twins —Hong Kong and Shenzhen, Macau and Zhuhai, as well as Guangzhou and Foshan. The spatial connection of former two twins got strengthened since Hong Kong and Macao became the Special Administrative Regions after their sovereign handover in 1997 and 1999 respectively.

A common urban strategy conducted by different cities since the early 2000s to create new experimental districts along the Lingdingyang Bay indicated a potential of reconfiguring the edge-condition of the Pearl River Delta upon completion, by making a regional center around the estuary. Although they actually originate from different intentions, the new district schemes eventually developed into co-related reactions to the state's will of constructing a single integrated "megapolis".

Since 2010, various mega-infrastructure systems being constructed contribute to promoting the urban development of the Pearl River Delta and increasing mutual interconnectedness among the PRD cities. The new comprehensive multimodal infrastructure metastasizes into a robust and finely-kit regional infrastructure network, which provides the region a "new ground" of accessibility and conditions of flexibility for its future growth.

The methodology then largely determined the overall structure of the dissertation which is organized in six chapters: A Geography with Three Distinct Cities (1370s – 1900s), Developing into Territorial Regions (1900s – 1980s), Constructing A Territorial Chain of Twin-Cities (1980s – 2000s), Experimenting with New Districts (2000s-2010s), The New Infrastructure of the Pearl River Delta (2010s-Present), and with the sixth chapter Towards A Polycentric Megalopolis as the conclusion.

During the process of identifying different phases and the spatial models of the Pearl River Delta, different types of materials have been collected and generated through different channels and various resources. (Figure 0.2)



Figure 0.2: The materials that have been employed during the development of the dissertation, collected and generated through different channels and various resources and vitally helped the identification of different phases and the spatial models of the Pearl River Delta.

The historic archives including maps, charts, and plans that helped understand the changes of the Pearl River Delta before the 1970s were collected from municipal museums like Hong Kong Maritime Museum, Shenzhen Museum and China Merchants History Museum, different libraries such as the SUN Yat-sen Library of Guangzhou Province, Guangzhou National Archives, Zhuhai Municipal Archives, Macau Public Library and the Library of Congress in Washington DC, as well as important instructive books, including Frank Welsh's *A History of Hong Kong Paperback* (1997), HE Peiran's *Making Hong Kong: A History of its Urban Development* (2018), *Historical Atlas of Guangzhou* (2003) edited by Guangzhou National Archives and a series of chronicles for the cities in Guangdong Province.

Photo-documentation were collected from different departments and institutes such as planning bureaus in Guangzhou, Shenzhen and Zhuhai, Hong Kong Public Records Office, and Macau Port Works Department to help see the physical transformations of the Pearl River Delta in recent decades since 1970. Besides, the high-resolution satellite images from NASA and decoded military keyhole satellite gigaphotos from GeoExplorer largely contribute to the research of these periods.

Data of the flows and densities inside the Pearl River Delta that were collected from the regional and local institutes and organizations including planning bureaus, Global Human Settlement, Baidu Map and Didi GAIA has been visualized to allow staggering changes,

functioning manners and spatial patterns of the Pearl River Delta in the most recent decade to be properly and evidently displayed.

It needs to be acknowledged that there is a limitation to this methodology. First, it largely indicates what occurred but does not provide much of rationale as the why it happened; hence it by no means explains the complete transformation of the Pearl River Delta. The mapping exercise doesn't cover the complete episodes that happened during the history. For instance, the second phase of the PRD's evolution from 1900s-1980s, in many historical discourses are divided in two phases —1900-1945 and 1945-1980 for reasons of the actual changes that occurred historically. But the maps of the Pearl River Delta didn't demonstrate the changes in its urban structure so that the dissertation stayed with a longer period as the second phase. Second, none of the maps are neutral, especially the historic maps. They were always drawn for particular purposes by particular groups on behalf of particular agencies. In this sense, the maps and plans are open to different interpretations between the different points, which results in subjective definition of the stages of transformation of the Pearl River Delta. Nevertheless, it is important to have this in mind that the major concern of the dissertation is on the physical transformation of the Pearl River Delta rather than necessary completely understanding the full reasons behind what happened in each stage there.

Within the dissertation, the term *Megalopolis* has been mentioned quite a few times. It is a controversial and vague term in many existing papers and studies, without a complete

definition. Here the dissertation uses the term *Megalopolis* as an assumption to describe a large urban aggregation as a polycentric arrangement of urban settlements of various sizes, which are highly interlinked together by physical infrastructure but still operate in a highly locally-centered way.

The dissertation implies megalopolis is a form that is close to what the central government has in mind for the Pearl River Delta and points out that the Guangdong-Hong Kong-Macau Greater Bay Area is essentially an aspiration. Its singularity, however, is over-emphasized in the state's development blueprint. This dissertation argues the Pearl River Delta as a polycentric megalopolis may not fulfil a condition of complete complementarity and complete cohesion due to its complex of cultures, administrations, markets and economic systems in between the PRD cities.

CHAPTER 1

A GEOGRAPHY WITH **THREE DISTINCT CITIES** (1370s-1900s)

CHAPTER 1: A GEOGRAPHY OF THREE DISTINCT CITIES

(1370s to 1900s)

The urbanization of the Pearl River Delta historically originated from ports. Guangzhou, Macao, and Hong Kong subsequently became the major trading centers in the region.

Through the exploration of these three cities, this chapter reviews the urban history of the Pearl River Delta from the Ming Dynasty to the end of the nineteenth century. It indicates the procedure of the area's regional development from a mono-core spatial structure into a piece of geography of three distinct port cities.

1.1 THREE CITIES

1.1.1 GUANGZHOU

Guangzhou, also known as Canton, throughout history had flourished as an administrative and trading center in Southern China and functioned as a point of contact between China and the outside world. With a long urban history which could be dated back to 214 BC (as Panyu), Guangzhou emerged as the largest trading port in China and one of only three legal ports of foreign trade shortly after the Emperor imposed the first of a series of sea bans in the early Ming dynasty (1371) which restricted private maritime trading and coastal settlement, reversing the earlier policy in support of foreign trade.³ Since 1384, maritime

³ Von Glahn, Richard. *Fountain of Fortune: Money and Monetary Policy in China, 1000-1700*. Berkeley, Calif.: University of California Press, 1996.

trade intendancies at Guangzhou were shuttered along with the ones at Ningbo and Quanzhou, and all foreign trade was required to be conducted by official tribute missions, handled by representatives of the Ming Empire. This policy continued to be broadly enforced for nearly two centuries until the arrival of the Portuguese in the Pearl River Delta in 1513, who generally expanded their trading business in the south of the Pearl River Estuary and found leeway in the policies through the occasional “bribery” and disinterest of Guangzhou’s departments.⁴ The increase of Portuguese ships at Tamao (Tuen Men) and the rise of the rejection towards foreign contact of the Ming Empire induced a military clash between the Chinese and Portuguese navies at Tamao in 1521.⁵ After defeating the Portuguese in 1522, the Ming Empire closed Guangzhou for national security concerns. While Portuguese merchants were expelled out of Guangzhou and Tuen Men they continued to attempt settling on other parts of the Pearl River estuary, and finally settled on Macau. The leasing of Macau to the Portuguese in 1557 began the system of regulated trade on the coast and confined Western traders to Macau. This resulted in the restriction of Guangzhou’s function of maritime trading as Macau monopolized trade in the region.

The maritime trade in Guangzhou recovered gradually from 1567 when piracy was under control. Guangzhou progressively regained its special and important position as the largest port in the Pearl River Area with a population of half a million in the mid-17th century during

⁴ Y. Zhou, “On the Historical Origin and Impact of Canton-Portuguese,” *Journal of Sichuan Normal University (Social Science Edition)* 32: 1 (2005) 117–122.

⁵ Hao, Zhidong. *Macau History and Society*. Hong Kong University Press. 2011

in the foreign quarter, sited outside the wall at the bank of the river.⁶ This is the famous “Canton System”, also known as *Single Port Trading Relations*.⁷ Foreign ships entered the Pearl River Area, firstly arriving at Macau before proceeding to Lintin Island, passing the Bocca Tigris (Humen) and up to the Whampoa anchorage (now Pazhou Island) before sending goods on smaller boats to the foreign quarter in Guangzhou.⁸ The foreign quarter was managed by the Thirteen Hongs or Thirteen Factories (Figure 1.2), a syndicated monopoly of Chinese merchants acting as an intermediary between the Qing Empire and the foreign traders, responsible for every foreign trading vessel entering Guangzhou Harbor along with its crew and cargo.⁹ From the late 1700s the center of Western trade activities shifted upriver to Guangzhou and made it one of the world's great ports.¹⁰ (Figure 1.3 and 1.4). This system was maintained until the outbreak of the First Opium War in 1839. Following a series of battles, the Qing Empire was eventually defeated by Great Britain and forced to sign the Treaty of Nanjing in 1842, which opened five treaty ports to foreign merchants and ceded Hong Kong Island to the British. Afterwards, the walled Canton City and the fenced foreign quarter became separated urban entities.

⁶ 广州市政厅. 《广州市沿革史略》, 1924. P27.

⁷ Carroll, John M. "The Canton System: Conflict and Accommodation in The Contact Zone." *Journal of the Royal Asiatic Society Hong Kong Branch* 50 (2010): 51-66.

⁸ Peter C. Perdue. *Rise and Fall of The Canton Trade System*. MIT Visualizing Cultures. 2009

⁹ Paul Arthur Van Dyke. *The Canton Trade: Life and Enterprise on the China Coast, 1700–1845*. Hong Kong University Press, 2005.

¹⁰ X. Zhang, “On the Features of Foreign Trade in Ming and Qing,” *Journal of Yanbian University (Social Science)* 37: 1 (2004) 104–106.



Figure 1.2: William, Daniel. View of the Canton Factories, 1805-06. (Source: Hong Kong Museum of Art)



Figure 1.3: (Left) W. Bramston. A Plan of the City of Canton and its Suburbs, 1840. It shows the Guangzhou's principal streets, fortifications, the thirteen factories and some of the conspicuous buildings from a Chinese survey on an enlarged scale with additions and references. (Source: Hong Kong Museum of Art)

Figure 1.4: (Right) Canton with the Foreign Factories ca.1800 (Source: Peabody Essex Museum)

The failure of the treaty to satisfy British goals of improved trade and diplomatic relations led to the start of what is known as the Second Opium War after the Arrow Incident happened in 1856. British and French forces were assembled in Hong Kong in 1857 then advanced to Guangzhou and raised the battle of Canton, which burned the thirteen

factories to the ground. After the war's conclusion, Guangzhou's port operations of foreign trade were rebuilt in 1859 at a new enclave on Shamian Island, which was a joint concession of the French and British in the south of the city's western suburbs. (Figure 1.5) Guangzhou then lost its privileged trade status as more and more treaty ports throughout China were forcibly opened to the Western powers.¹¹ In the aftermath of the wars of foreign coercion in the mid-nineteenth century Guangzhou was surpassed by Shanghai and Hong Kong as centers of trade, but the city still remained an important economic center for Chinese and foreigners well into the twentieth century.¹²

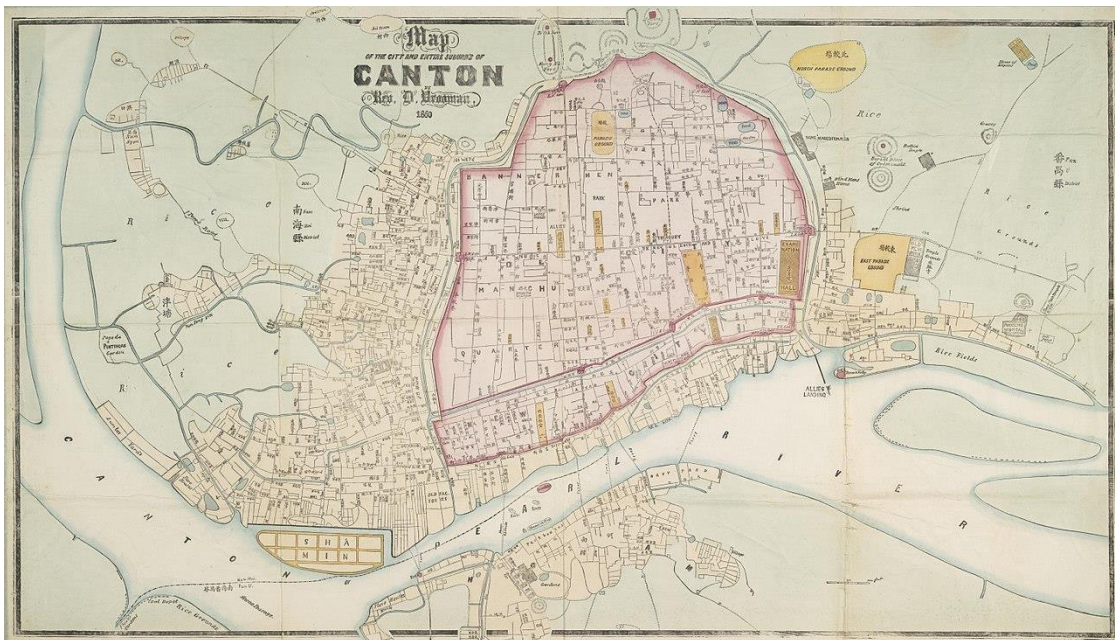


Figure 1.5: Vrooman, Daniel. Map of the City and Entire Suburbs of Canton in 1860. Shamian Island is colored in yellow on the southwest of Guangzhou. (Source: National Library of Australia)

¹¹ Z. Zuo, "Historical Development of Guangzhou Port and Foreign Trading," *Journal of Jinan University (Philosophy & Social Science Edition)* 24: 5 (2002) 39–47.

¹² Farris, Johnathan Andrew. *Enclave to Urbanity: Canton, Foreigners, and Architecture from the Late Eighteenth to the Early Twentieth Centuries*. Hong Kong: Hong Kong University Press, 2016.

1.1.2 MACAU

Macau made a transition from a fishing village to an important port city mainly after the arrival of the Portuguese, who, driven by commercial motives, first reached the Pearl River Delta in 1513. A diplomatic and trade mission commissioned by Portugal's King began trading at Guangzhou from 1517. At the same time, Portuguese merchants attempted to expand their business in Tamao around the Pearl River Estuary, which was against the policies of the Ming and led to the Battle of Tunmen. The Portuguese were expelled out of Guangzhou and Tuen Men after being defeated by the Ming fleets in 1522, and then eventually resided in Macau around 1535.

During the 1540s, the Portuguese aided the Ming Empire in suppressing coastal pirates led by Chinese smugglers collaborating with Japanese and other armed maritime groups, which contributed to the resumption of the good trade relations between the Portuguese and Chinese. In 1553, the Portuguese settled in Macau and gradually took control of the island through a sequence of favored relationship.¹³ Diplomatic relations between the two countries were further improved by the Luso-Chinese Agreement in 1554, which allowed for the legalization of Portuguese trade in China by paying taxes and annual rent to Xiangshan County (now Zhuhai); this opened a new era in Sino-Portuguese relations. In 1557, Macau was leased to Portuguese as an official trade base. After the Portuguese were allowed to permanently settle in Macau, both Chinese and Portuguese merchants flocked there,

¹³ Y. Zhou, "On the Historical Origin and Impact of Canton-Portuguese," *Journal of Sichuan Normal University (Social Science Edition)* 32: 1 (2005) 117–122.

although the Portuguese were never numerous.¹⁴ According to Fr. Baltasar Gago, SJ, there were between five hundred and six hundred Portuguese merchants in Macau in 1561, which increased to one thousand by the end of the sixteenth century among a total population of 26,000.

Macau became a major entrepôt for trade between China, Japan, India, and Europe soon after it was established, benefitted by its strategical nodal location in the development of Portugal's three major trade routes: Macau–Malacca–Goa–Lisbon, Guangzhou–Macau–Nagasaki, and Macau–Manila–Mexico. Macau's golden age coincided with the union of the Spanish and Portuguese crowns, between 1580 and 1640. King Philip II of Spain encouraged trade between Portuguese Macau and Spanish Manila, determined to not interfere with Portuguese trade with China, and promoted Macau from "Settlement or Port of the Name of God" to "City of the Name of God" in 1587. Thus, in the early seventeenth century, Macau had become a commercial city with substantial trading and international prominence.¹⁵ "Rua direita" mode had been adopted at the initial stage of Macau's urban construction.¹⁶ By the 1630s, a city wall along the boundary of the settlement was erected that separated the Portuguese from the Chinese settlements in the north and the deep south of the island. (Figure 1.6)

¹⁴ Porter, Jonathan. *Macau, the Imaginary City: Culture and Society, 1557 to the Present*. Westview Press, 1999.

¹⁵ L. Wang, "Analysis on the Rise and Decline of Macao's Trading Position in Ming and Qing Dynasty," *Journal of Kaili University* 25: 4 (2007) 34–35o, 40.

¹⁶ YAN Z M. 2004. The concept of the 'rua direita' and the rules implemented at the early stage of urban construction in Macau (直街观念与澳门早期城市建设的规则) [J]. *Historical Review (史林)*, (1): 40–43

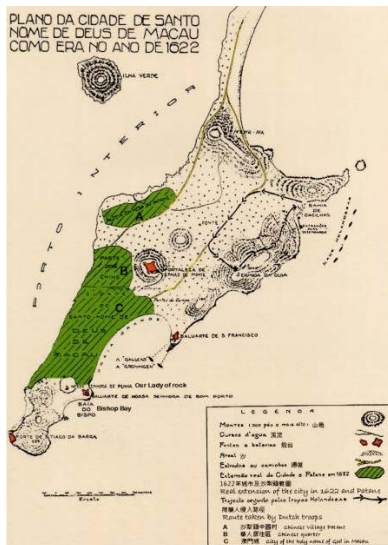


Figure 1.6: (Left) The plan of Macau, 1622 (Source: Charles Ralph Boxer, *STUDIES for the History of Macau: Centuries XVI to XVIII*. Lisbon: Fundação Oriente, 1991.)

Figure 1.7: (Right) Defense map of Macau, 1679–82. (Source: Peter G. Rowe and Har Ye Kan. *Macau and Its Borders*. 1994)

As a gateway for trade in East Asia, Macau became a target of the Dutch Republic (1581-1795), who attempted to take possession of the city in 1622 in the Battle of Macau. The Portuguese successfully repelled the Dutch and then strengthened the city's defenses, including the building of the Guia Fortress. (Figure 1.7) But the tranquility did not last long; the city's construction slowed after Japan halted trade in 1639 and after the Dutch seized Portuguese Malacca and cut off the shipping route from Goa to Macau in 1641.¹⁷ Macau then entered a period of decline, and the situation worsened after the privileged position held by the Portuguese in trade with China ended in 1685, when the Qing Empire decided to allow foreign trade with all countries overseas and strengthened their control over Macau.

¹⁷ Sit, V.F.S.; Cremer, R.; Wong, S.L. (1991). *Entrepreneurs and Enterprises in Macau: A Study of Industrial Development*. Hong Kong University Press.

New constructions by the Portuguese were firmly restricted since the early eighteenth century. From the city plans, we can tell the basic spatial layout of Macau stayed almost static until the Opium War broke out in 1841.¹⁸ (Figure 1.8 and 1.9)

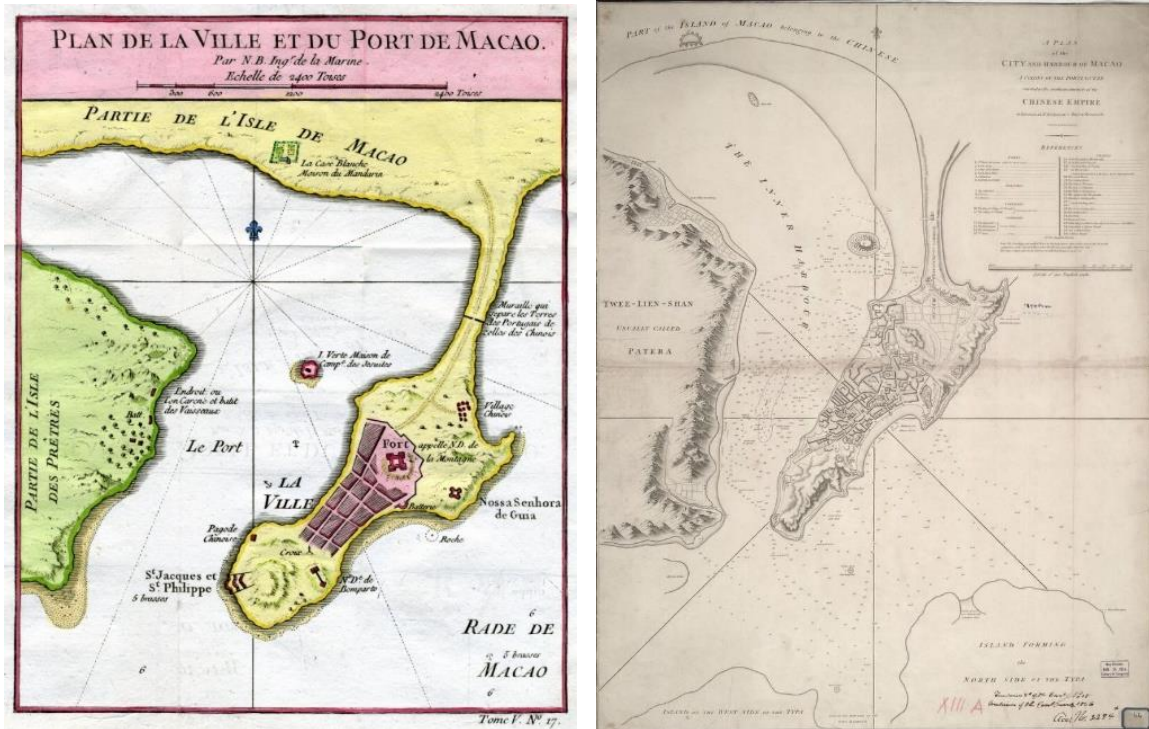


Figure 1.8: (Left) *Plan de la Ville et du port de Macao*, Gravure Couleur du XVIII^{ème} Siècle ca. 1764 (Source: *Histoire générale des voyages*, tome V)

Figure 1.9: (Right) Baker, Benjamin. *A plan of the city and harbor of Macau: a colony of the Portuguese, situated at the southern extremity of the Chinese Empire*. 1796 (Source: Library of Congress Geography and Map Division Washington, D.C.)

After the First Opium War, Hong Kong became a British colony and soon thereafter rose to become an international port city of importance at the expense of Macau, whose position as a regional trading center declined further. To reverse the decline, Portugal declared

¹⁸ 封晨, 王浩锋, 饶小军. "澳门半岛城市空间形态的演变研究." 南方建筑, no. 4 (2012): 64-72.

Macau a free port in 1845, and the Portuguese set out to forcibly expand their colonial territory in Macau with the demolition of the previous city walls running from around St. Anthony's Church to the Guia Hill. After taking control of the northern peninsula, a system of arteries was strategically planned and efficiently constructed. At the same time, a series of reclamation and rehabilitation projects along the Inner Harbor were conducted in the latter half of the nineteenth century. These projects not only provided new available land for development, but also considerably improved the local living environment. (Figure 1.10)

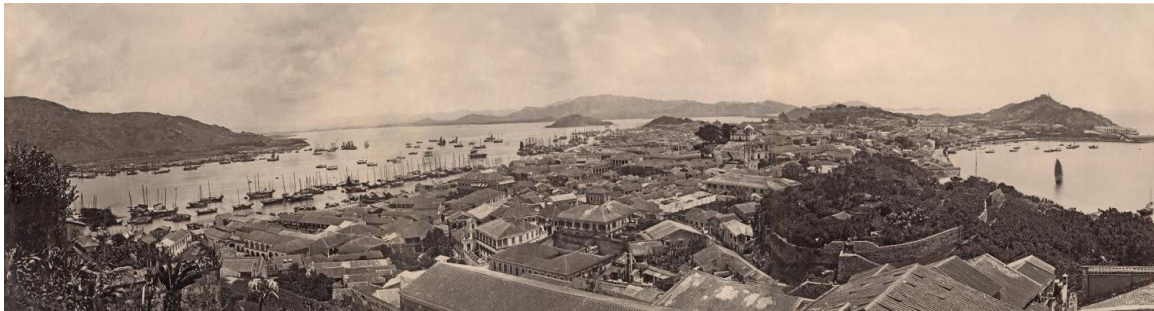


Figure 1.10: Jules Itier. *Panoramic of Cidade de Macau*, ca.1840

Taipa and Coloane, two islands south of Macau, were obtained by the Portuguese between 1851 and 1864 respectively. The *Beijing Treaty* signed in 1887 confirmed Portugal's occupation and governance of Macau, and Ilha Verde was incorporated into Macau's territory in 1890. By the beginning of the twentieth century, Macau's economy was largely dependent on trade and gambling (first permitted around 1851), and Macau Peninsula, Ilha Verde, Taipa, and Coloane determined the boundary and the basic spatial skeleton of Macau. (Figure 1.11 and 1.12)

Although Macau never attained the commercial importance of Guangzhou or later Hong Kong, it was a vital and thriving city and a crucial port during this period at the estuary of the Pearl River.



Figure 1.11: (Left) Portuguese Colony of Macau and surroundings in 1912 (Source: Atlas of Macau)

Figure 1.12: (Right) Maps of Macao Peninsula, Taipa Island Coloane Island in 1912, from up to bottom (Source: Arquivo de Macau)

1.1.3 HONG KONG

Situated on the southeast coast of China, Hong Kong's strategic location on the Pearl River Delta and South China Sea along with its unique geography as a deep-water harbor, together with the mountains on both sides to act as a natural barrier, has made it a perfect site for maritime logistics. (Figure 1.13) At the beginning, it was relatively uninhabited island unknown as "Heong-Kong", which was recalled as "Hong Kong" by the British in 1760.¹⁹

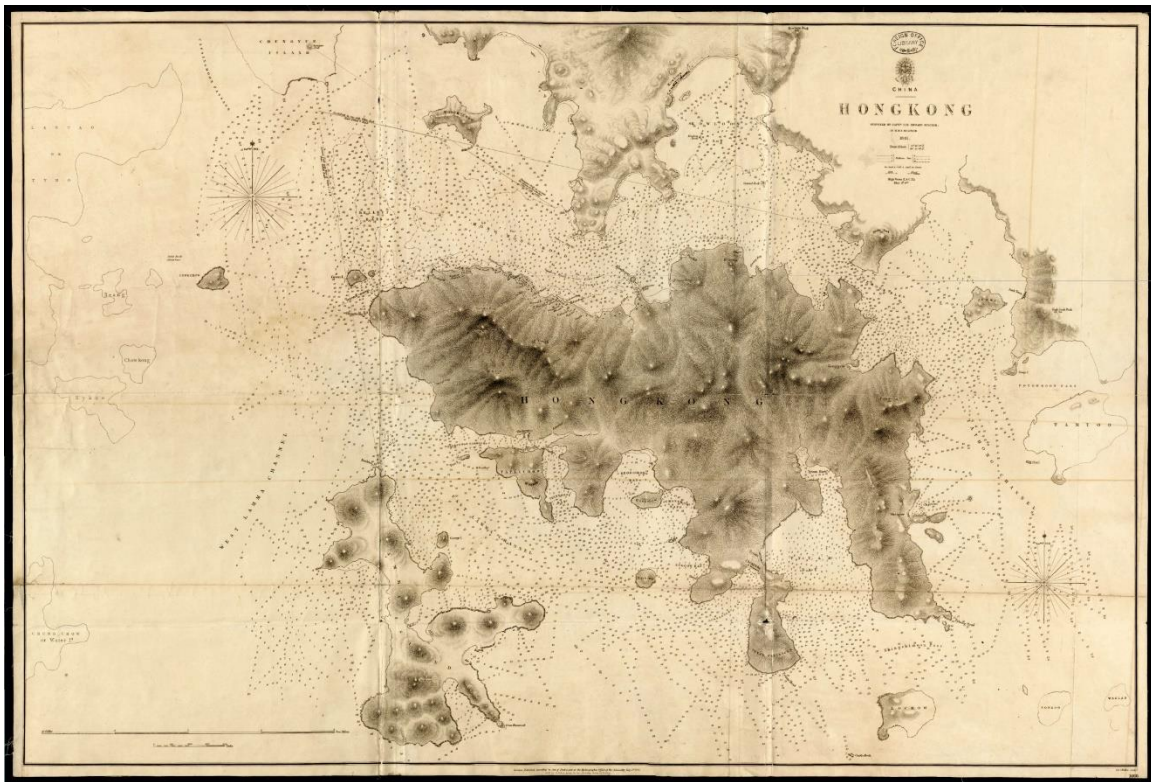


Figure 1.13: Sir Edward Belcher. *The map of hydrographic survey of Hong Kong and the surrounding waters. 1841.* (Source: UK National Archive)

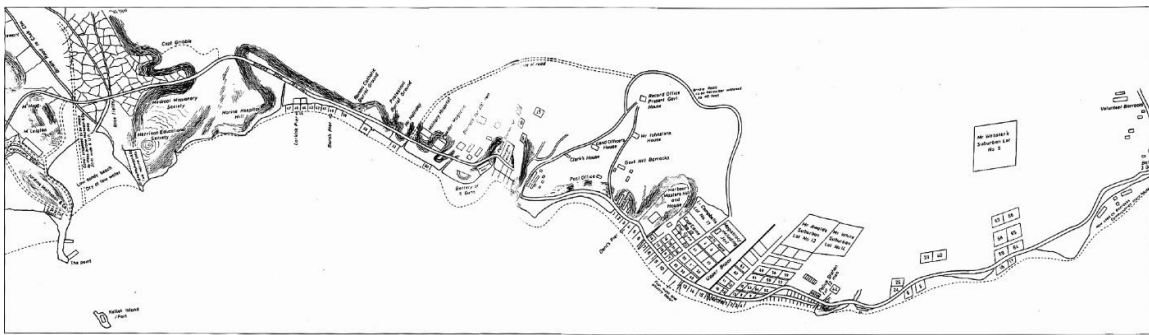
¹⁹ Rowe, Peter G. *East Asia Modern: Shaping the Contemporary City*. London: Reaktion, 2005. P49.

Its urban story began in 1841 when Hong Kong Island was ceded to the Britain after the first Opium War and the island's de facto capital was named the city of Victoria. After it officially became a British Colony in 1843 after the signing of the *Treaty of Nanjing* in 1842, Hong Kong's early growth was mainly due to the trade of opium, which soon diversified into other types of trade. As a result, it was developed as a port-city through early town planning overseen by the British Surveyor-Generals. During his time as acting administrator of Hong Kong, Alexander Robert Johnston designated the northern coast of the island as the city's boundary and promoted a policy to encourage settlement, releasing land lots for development that were classified into marine, town, and suburb. Governor Henry Pottinger invented a system of land sales through public auction to raise municipal funds and intended to develop the city with private investment.

The first masterplan for Hong Kong was made by Henry Pottinger along with the engineer Alexander T. Gordon in January 1843, which provided a comprehensive urban blueprint for the new colony and laid out the belt-shaped city for early Victoria.²⁰ With the governing philosophy focusing on economic development, the plan encompassed an area about four miles long between northern Victoria Peak and the harbor, and was highlighted by the Queen's Road as a main thoroughfare along the coast. (Figure 1.14) Hong Kong then experienced rapid but mostly piecemeal expansion of urban settlement, which later gradually climbed up the peak as the city grew. During the first two decades, not only

²⁰ Charlie Q.L. Xue, Han Zou, Baihao Li & Ka Chuen Hui (2012) The shaping of early Hong Kong: transplantation and adaptation by the British professionals, 1841–1941, *Planning Perspectives*, 27:4, 549–568

colonial government established government departments and built commercial facilities for the entrepôt, but also private firms were another strong force driving the city's development. In 1859 Hong Kong had over 85,000 residents and had become the center of a wide-ranging overseas Chinese trading network, dominated by the prosperous Hong Kong business elite under British colonial protection.²¹



Until October 1860, the territory of Hong Kong consisted only of Hong Kong Island. The termination of the Arrow War (1856-1860) ratified by the Treaty of Beijing in 1860, Kowloon was ceded to the British; thus it allowed Hong Kong's development to expand northwards to Boundary Street in Kowloon. However, the main commercial activities remained on Hong Kong Island while Kowloon Peninsula existed primarily as a British military stronghold.

Kowloon Peninsula to prepare the construction of Kowloon-Canton Railway's terminus. In the 1870s, the government began developing the western part of the Kowloon

Peninsula through public auctions and private developments, with the allowance of reclamation to be undertaken by the purchasers.



Figure 1.15: Map of Hong Kong with British Kowloon.1880. (Source: Hong Kong Public Records Office)

The British obtained a great amount of influence on trade in China, and Hong Kong surpassed and then replaced Guangzhou as the Pearl River region's most important international trade center.²² In the 1870 and 1880s, about a fifth of China's exports and a

²² M. Sang and L. Xiao, "The Evolution and Location of Guangzhou Applying Dual-nuclei," *Journal of Southern China Normal University (National Science Edition)* 4 (2003) 121–126.

third of its imports were transited through Hong Kong.²³ With the city's rapid development and the continuous wave of immigration from mainland China into Hong Kong since the second half of the nineteenth century, an overcrowded built environment with poor sanitation inhibited further development. Public health then became a crucial element of Hong Kong's town planning. Osbert Chadwick's plan in 1882 emphasized changing the unsanitary conditions of the city and introduced a series of ordinances to redesign the blocks and streets of Victoria. (Figure 1.16)

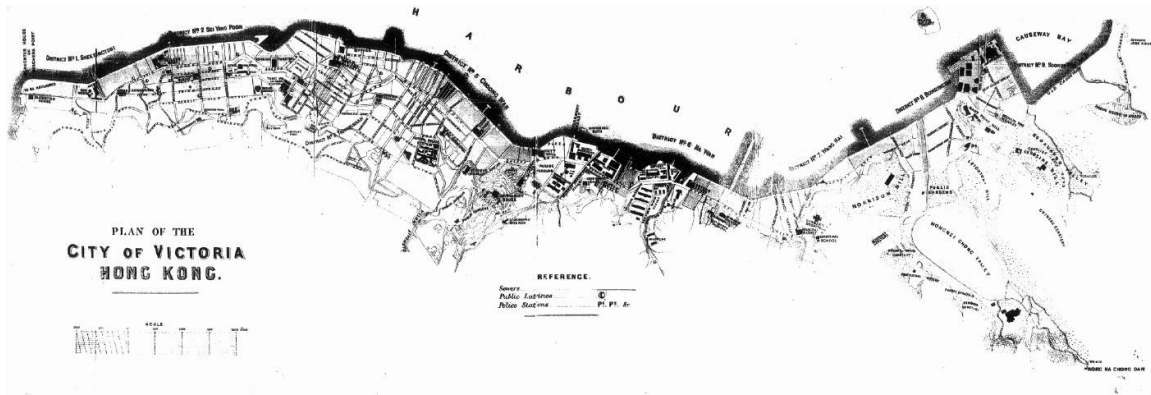


Figure 1.16: Plan of the City of Victoria Hong Kong by Chadwick's Report 1882. (Source: Chadwick, Mr. Chadwick's Reports on the Sanitary Conditions of Hong Kong 1882)

Despite Chadwick's Plan, living space continued to deteriorate largely due to the population pressure associated with urban land shortage. According to the census in 1891, Hong Kong's population was 220,000, a 38 percent increase from the 160,000 in 1881 by the Chinese migrants to avoid the disruptions and issues associated with the late Qing Dynasty.²⁴ In

²³ X.P. Tang, *Focus on Metropolis Circle: Enlightenment from the Pearl River Delta*. Beijing: Science Press, 2008

²⁴ Census and Statistics Department, *Hong Kong Census Reports, 1841–1897*

order to accommodate the growing population, Hong Kong had to through systematic planning reclaim land at the northern shore to open new space for development and solve the housing problem. During this period, besides the land reclamation projects, a series of large-scale infrastructure facilities were built which became the foundation on which Hong Kong established itself as a major entrepôt in the Asia-Pacific region. The New Territory was ceded by the Qing Empire to the British in 1898 under the Convention for the Extension of Hong Kong Territory and brought the opportunity for the extension of Hong Kong's urban territory. (Figure 1.17)



Figure 17: Map of Hong Kong and of the Territory leased to Great Britain under the Convention between Great Britain and China signed at Peking on the 9th June, 1898, (1899). Based on the 1866 map of Sun On District. (Source: Hong Kong Public Records Office)

1.2 THE PEARL RIVER AREA

Through history, the place we now call the Pearl River Delta was originally defined by its dominating geographical feature—the Pearl Rivers, also known as the Canton Rivers and the River Tigris. The Pearl River from north of Guangzhou to its mouth formed a large bay with Macau on its western side and Lantau Island (now Hong Kong) on the east, a distance of approximately 30 kilometers. A series of rivers flow into the Pearl River including the West River, North River, and East River. The whole area was regarded as one system sharing a common base, a piece of geography that was regularly recorded in various nautical charts and historical materials before the 1900s as “the Pearl River Area”.

The early history of the Pearl River Area is a history of maritime development. Scrutinizing the old charts and maps of this place contributes to the understanding of the systematic urban development in a regional pattern. Inside the *Guangzhou Tonghai Jiyao* documented by scholar and official Jia Dan (730-805), the Pearl River Area was featured as the origin of sea routes to Korea, Malacca, Sri Lanka, India, and the Middle East during the Tang dynasty (618-907), considering Guangzhou was then one of the most important ports for flourishing maritime trade.²⁵ The Chinese charts and maps also reflect administrative division. The Pearl River Delta as one administrative territory can be dated back to 1378 during the Ming Dynasty when it was established as Guangzhou *Fu* (Prefecture). It included one city—Guangzhou, one *Zhou* (State)—Lian Zhou, and fourteen counties—Nanhai, Panyu, Shunde,

²⁵ The Hong Kong Maritime Museum. *Charting the Pearl River Delta*. Hong Kong, 2006

Xiangshan, Dongguan, Qingyuan, Sanshui, Conghua, Zengcheng, Longmen, Xinhui, Xinning, Huaxian, and Xin'an Counties.²⁶ They were all governed by Guangzhou. The urban settlements along with the geographical circumstances of the Pearl River Area were drawn and described in the Map of Guangzhou Fu circa the 1700s²⁷, which is not a conventional plan-view chart orientated to the north, but a strip-style route map in which the coast is drawn running horizontally from right to left but not indicative any direction. The map relies on the descriptive text accompanying the drawing, but together they are surprisingly illuminating.²⁸ It diagrammatically but clearly illustrates the character of the place as a mono-centric region. (Figure 1.18)

As foreign traders came to the Pearl River Delta and Guangzhou, the catalog of their charts, views, and sailing directions reflect the great interest and value many of them placed in the region.²⁹ It was not until the Portuguese arrived early in the 16th Century that foreign chart cartography of the region was compiled. The first western map discovered over the course of this research that recorded the condition focusing on the Pearl River Area in a more cartographically precise way was the 1735 "Chart of the Entrance into Kanton from the Sea". It was part of the encyclopedic compendium made by Jean Baptiste Du Halde, documenting the history and customs of the Southern China.

²⁶ 《清史稿》卷七十二 志四十七 / 地理十九 / 广东 / 广州府

²⁷ *The map of Guangzhou Fu*, a record of the information about the territory estimated between 1685 and 1729.

²⁸ Empson (1992:10)

²⁹ The Hong Kong Maritime Museum. *Charting the Pearl River Delta*. Hong Kong, 2006



Figure 1.18: Guangzhou Fu (Prefecture). 1700. (Source: Zhongguo di 1 li shi dang an guan, & Yuexiu Qu. (2003). Guangzhou li shi di tu jing cui (第1版. ed.). Beijing: Zhongguo da bai ke quan shu chu ban she.)

Guangzhou remained the only urban destination of the area engaged in extensive trade relations with other countries, drawn in an inset enlarged map showing the divisions and some details of the city: the Tartar City, Chinese City, and Suburb, as well as the location of forts. Before 1800, Guangzhou was the only city recognized in this region; however, Macau and Lantao Island were always marked as critical geographical and hydrological points in nearly all regional maps of the Pearl River Area, as well as many early surveys of the Pearl River from Macau to Guangzhou and Lantao to Guangzhou made during the seventeenth and eighteenth century, which helps explain why Macau and Hong Kong later emerged as important port cities of the area.

Macau became a colony of the Portuguese from 1557 and emerged as a valuable entrepôt for trade between China, Japan, India, and Europe. It first appeared as a recognized important urban settlement in the regional map of the Pearl River Area in 1834 in the map published by Justus Perthes in Berlin as part of the Berghaus Atlas of Asia³¹. (Figure 1.19) In this map Macau is documented with detailed annotations and descriptions with well-detailed sections and profile views of the Islands, coastlines, and shores.

³¹ Justus Perthes. *Die Chinesische Küste : der Provinz Kuang-tung, zu beiden Seiten des Meridians von Macao. (The Chinese coast: Guangdong Province, on both sides of the meridian of Macao)*. Surveyed by British Marine Surveyor Captain Daniel Ross of East India Company. Berlin, 1834.

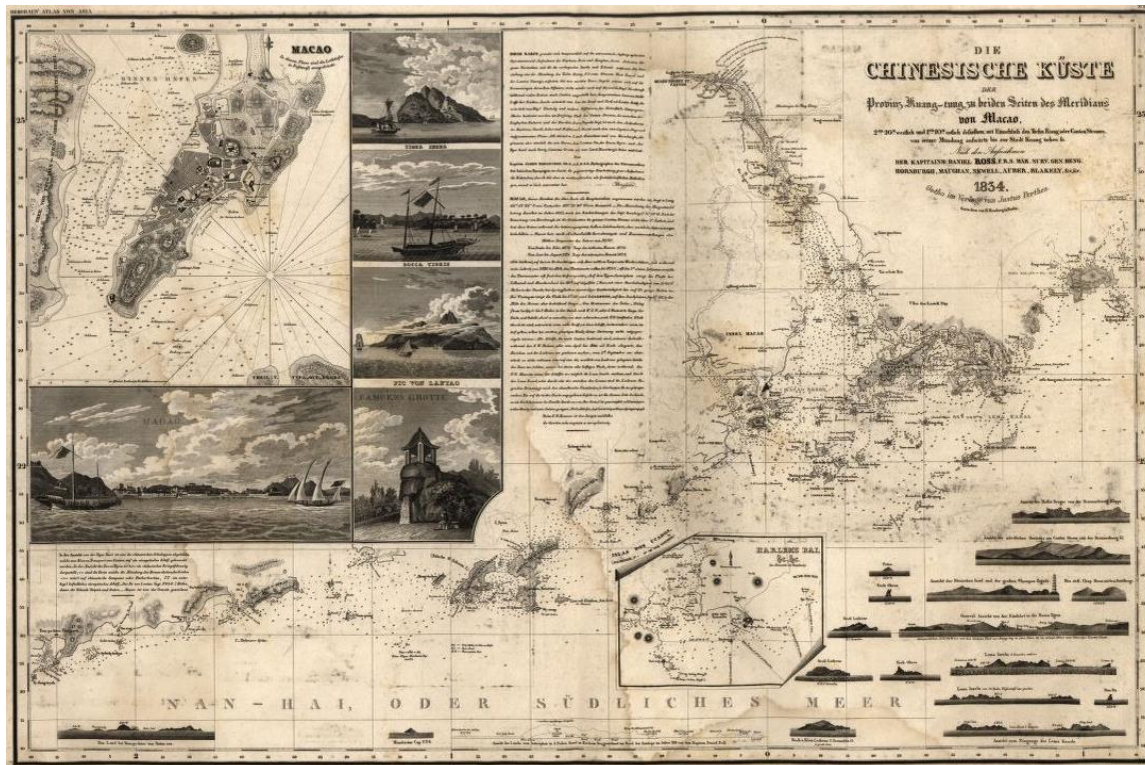


Figure 19: Berghaus, Heinrich Karl Wilhelm. *The Chinese coast: Guangdong Province, on both sides of the meridian of Macao*. Published: Gotha: Justus Perthes, 1834. (Source: Library of Congress Geography and Map Division Washington, D.C.)

After Hong Kong became a colony of the British Empire in 1843 and developed into a center of trade and commerce it was featured in an 1857 map along with Guangzhou and Macau as one of three urban centers of the trading system linking the Chinese Kingdom to Western European powers and eventually to the United States.³² This 1857 map entitled “Der Canton-Strom von Canton bis Macao und Hong Kong” (the Canton River from Guangzhou to Macau and Hong Kong) was detailed according to the standards of A. Peterson’s maps of

³² Peter C. Perdue. *Rise and Fall of The Canton Trade System-I: China in the World (1700-1860s)*. MIT Visualizing Cultures. 2009

the region from 1840 to 1857, coloring the three cities of Guangzhou, Macau, and Hong Kong with yellow and grey highlights. (Figure 1.20)

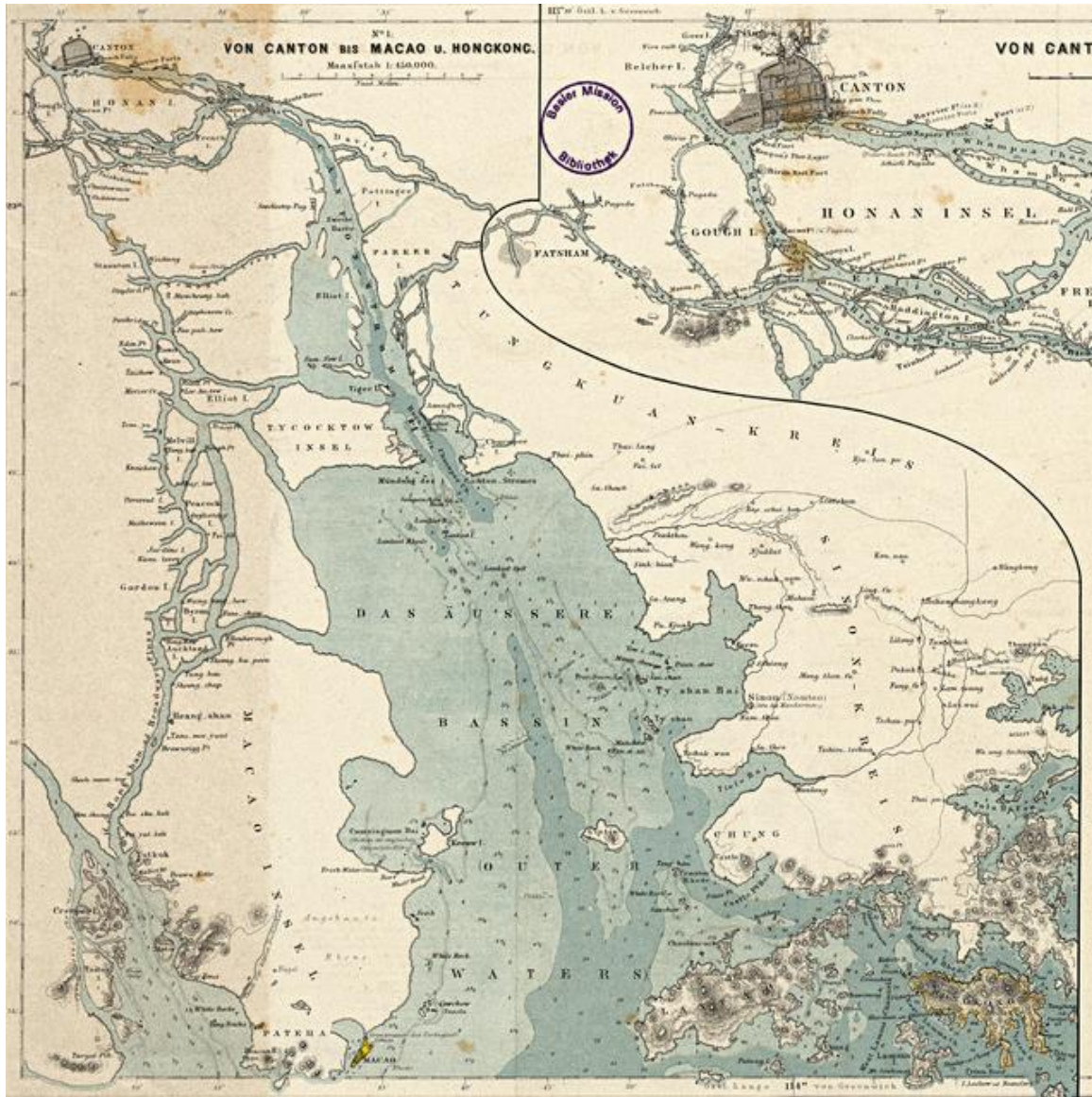


Figure 1.20: The Canton River from Guangzhou to Macau and Hong Kong. 1857. (Source: Basel Mission Archives)

This is the first map that identified the Pearl River Area as a geography anchored by three cities. Similarly, the chart of *De La Riviere De Canton* (from the river of Canton), produced by French cartographers in 1866, displayed the Pearl River from the mouth to Guangzhou with enlargements of Guangzhou (Canton), Humen (Boca Tigris), Macau, and Victoria Harbour, Hong Kong, indicating the overall area as one functional system. From the mid-nineteenth century to the early twentieth century, the many charts and maps produced in different languages indicated multi-national interests in the region, a region regarded as full of trade potentials and economic opportunities.

Besides all the maritime paths, in 1864 an ambitious ground-project was proposed by the renowned British railway engineer Rowland Stephenson in an attempt to strengthen the region's extensive trade network in favor of Hong Kong. The Kowloon-Canton Railway (KCR), an innovative and critical project for its time, conceived of the entire east side of the Pearl River Area as a whole. Due to difficult conditions at the time of its conception the project didn't come to serious consideration for the next 30 years. The idea later came into reality in the 1890s as a result of the various European powers competing to extend their influence in China.³³ The British Government was particularly concerned about competition from the French in southern China, and determined to promote the KCR project and suggested to construct it in two sections: a Chinese section designed by Jeme Tien Yow from Guangzhou to Shenzhen, and a British section designed by John Wolfe Barry with Graves William Eves. Based on the cost, timeframe, and anticipated traffic and development, the layout was

³³ Kowloon Canton Railway Corporation. *Building KCR 1864-1911*. 2016

concluded with a route parallel to the area's riparian trade routes with stations at Shipai, Shenzhen, Luohu, Tai Po, Hung Hom, Shatin, and Kowloon.³⁴ (Figure 1.21) The KCR became such an important project for the Pearl River Area in subsequent decades that its benefit was rarely doubted in historical records.

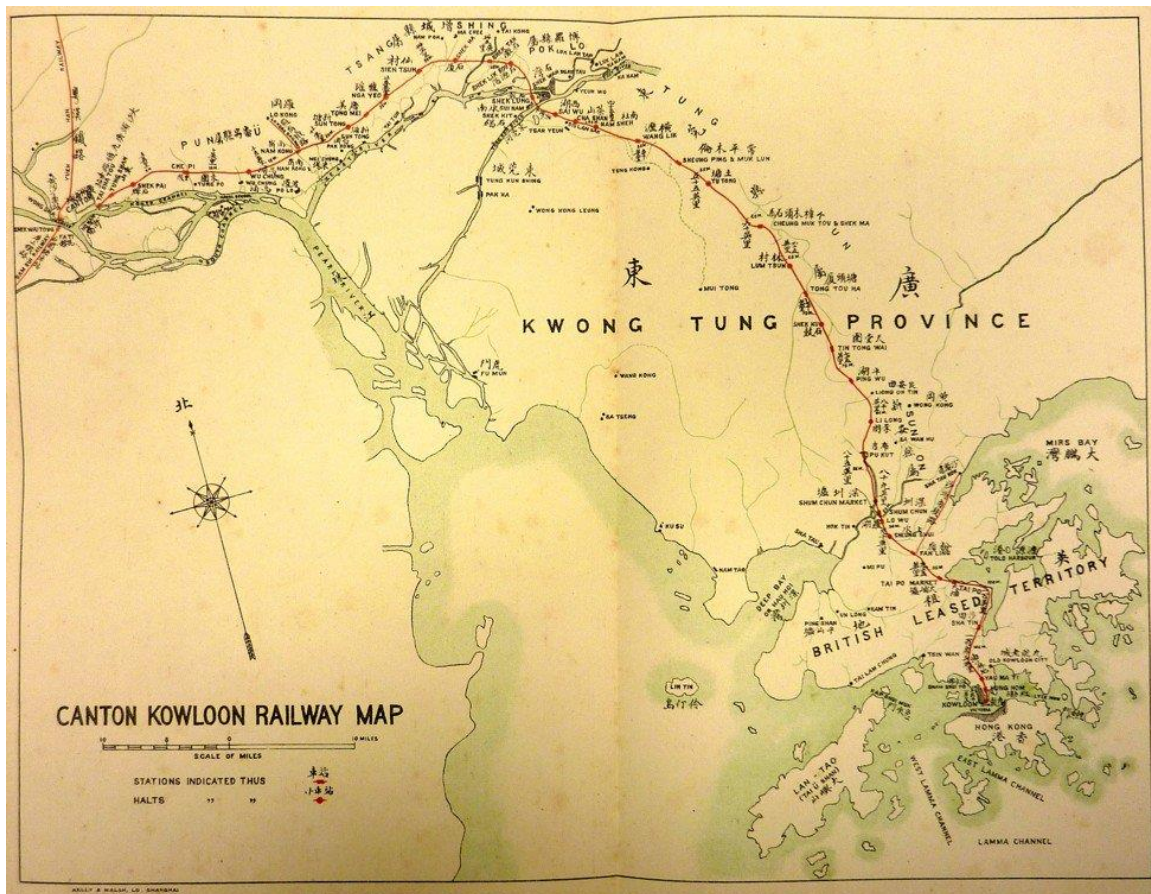


Figure 1.21: The full alignment of the Kowloon-Canton Railway. 1898. (Source: The Kowloon-Canton Railway Corporation)

³⁴ Kowloon-Canton Railway Corporation. "The Kowloon Canton Railway (British Section)". *The Industrial History of Hong Kong Group*. 2015

From the 1370s to the 1900s, the Pearl River Area developed into a geography of three cities which represented three distinct phases of Western commercial contact with China, and each city developed a special urban character. All three reflected the shift from strict Chinese control over foreign trade from the 16th through 18th centuries to the free trade era dominated by British colonialism in the mid-19th century. In many essential ways, the first and second Opium Wars were wars about the access to the trade. Portuguese Macau, the oldest Western settlement, retained a modest, charming, relaxed atmosphere dominated by its stunning beach, the fishing trade, the forts and churches. Guangzhou, already a giant city before the Westerners arrived, placed the new foreigners in a segregated quarter but actively mingled native Chinese and foreign cultures in the interest of profit. Hong Kong, the most Western dominated, became a British colonial possession, where Chinese flocked to take advantage of the opportunities offered by contact with a wider world and being under British Law.³⁵

³⁵ Ibid.

CHAPTER 2

DEVELOPING INTO **TERRITORIAL REGIONS** (1900s-1980s)

CHAPTER 2: DEVELOPING INTO TERRITORIAL REGIONS

(1900s-1980s)

The Pearl River Delta experienced a drastic transformation from a region of three cities into a constellation of territorial regions in this critical period from the early twentieth century through the 1980s. Although this same factors of industrialization and modernization led to this transformation, the individual urban entities continued to operate in different political and jurisdiction systems. In this chapter, the influences of urban planning and design and economic changes on the shaping of the urban spatial form of the Pearl River Delta are discussed along with critical historic events.

2.1 THE CAPITAL OF GUANGDONG PROVINCE

2.1.1 GUANGZHOU

After a series of failed revolts in the late nineteenth century, the Qing Dynasty was eventually overthrown by the Republics led by SUN Yat-sen through the *Xinhai Revolution* in 1911. Together with the common aspiration of the Chinese people, the Republic of China started an urban revitalization, soon followed by the reform of modern urbanization. In 1912, the Guangdong Military Government implemented the modernization of public works in Guangzhou and the city wall was dismantled for road construction.³⁶ In the same year, SUN Yat-sen published the project of *The International Development of China* with the

³⁶ 《广州城墙的沧桑史》, 2017-03-06

ambition of transforming Guangzhou into “the Greatest Southern Port”. In 1918, the Guangzhou Municipal Bureau issued the masterplan for the construction of the road network and parks with the intention of bringing modernization into the city.

The government of the Republic of China with SUN Yat-sen as president was built in Guangzhou on May 5, 1921. Within the same year, the Municipal Department of Guangzhou was eventually founded, and SUN Ke—the son of SUN Yat-sen—was appointed as the mayor of Guangzhou. SUN Ke studied in the United States; hence, eighty percent of the directors in the Municipal Department studied abroad as well, especially in the United States. The *Guangzhou Municipal Interim Regulations* drafted by this team with the leadership of SUN Ke radically adopted the commissioner form of the government from the United States and attempted to implement American theories of urban planning.³⁷ One principle raised in the regulations is “Traffic First”, and a number of roads were successively planned and constructed in the next two years.³⁸ American Architect Henry Murphy was invited to produce the initial plan for Guangzhou, however his beaux-arts styled 1921 Guangzhou Plan wasn’t implemented.³⁹ Confronted by the issues of population increase and resource

³⁷ Guangzhou Municipal People's Government Local Records Office. *Sun Ke presided over the municipal construction of Guangzhou*. September 19, 2014. (广州市人民政府地方志办公室。《孙科主持广州市政建设》)

³⁸ HAN, Yanjuan; PANG, Yue; JIAN, Xing. Guangzhou as livable city: Its origin, inheritance, and development. *International Planning History Society Proceedings*, [S.l.], v. 18, n. 1, p. 262-272, oct. 2018. ISSN 2468-6956.

³⁹ Zou, Dong. Review of the Urban Planning and Construction of Guangzhou during the Republic of China. *Planners*. 2017(1): 142-146. (邹东. 试论民国时期广州城市规划建设 [J]. 规划师)

allocation, a series of plans including the *City Region Expansion Plan* and *Baogang Development Plan* (1923), *Planning and construction of the whole Changzhou Island* (1927), and *Guangzhou Municipal Construction Plan* (1929) were produced by the Guangzhou Municipal Department with the intention to expand the city's area. In 1930, *The Implementation Plan for Guangzhou Civil Works* was announced by the director of the Works Bureau, CHENG Tiangu, a planner educated in California, the United States. (Figure 2.1) All these plans guided and influenced the urban development of Guangzhou to different extents.

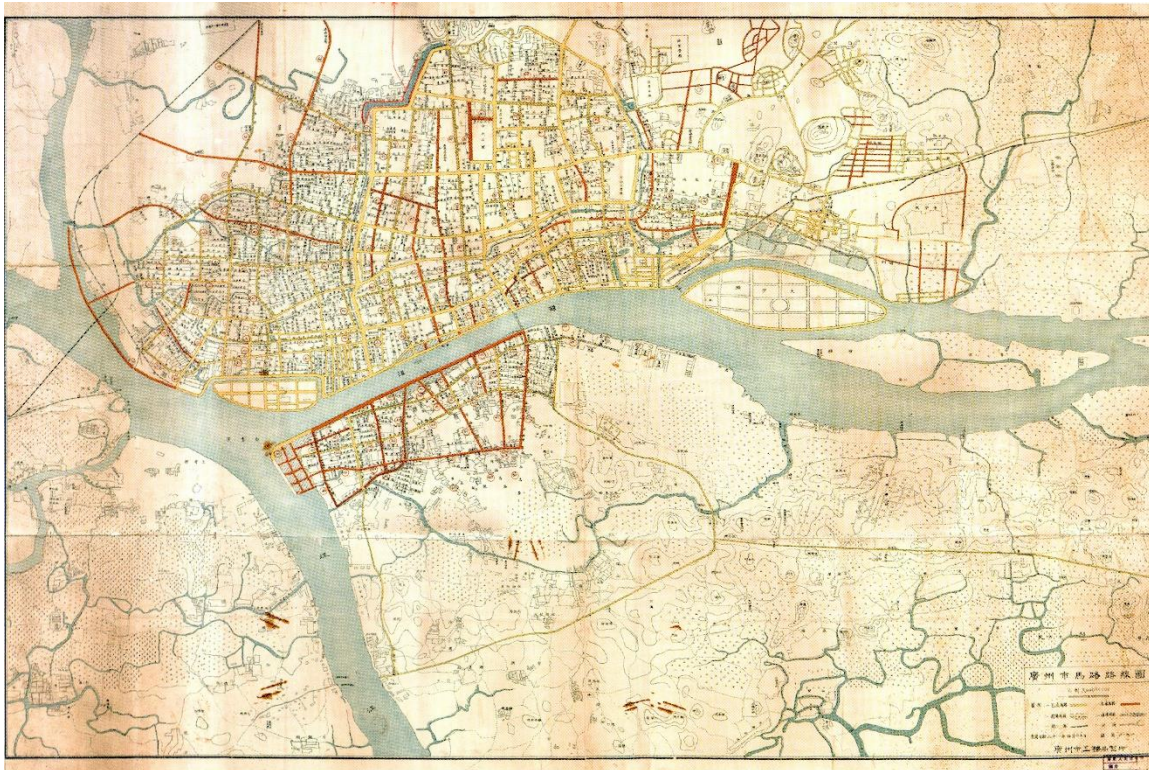


Figure 2.1: Implementation Plan for Guangzhou Civil Works, 1931. The plan depicted the main streets and roads in Guangzhou: the roads have been built were colored with yellow and unbuilt in red. The built roads were mainly concentrated in the old city; while the planned new roads were mainly in Dongshan (east of the mountain) and Henan (south of the river), which were the main development areas of Guangzhou in this period. (Source: Sun Yat-sen Library of Guangdong Province)

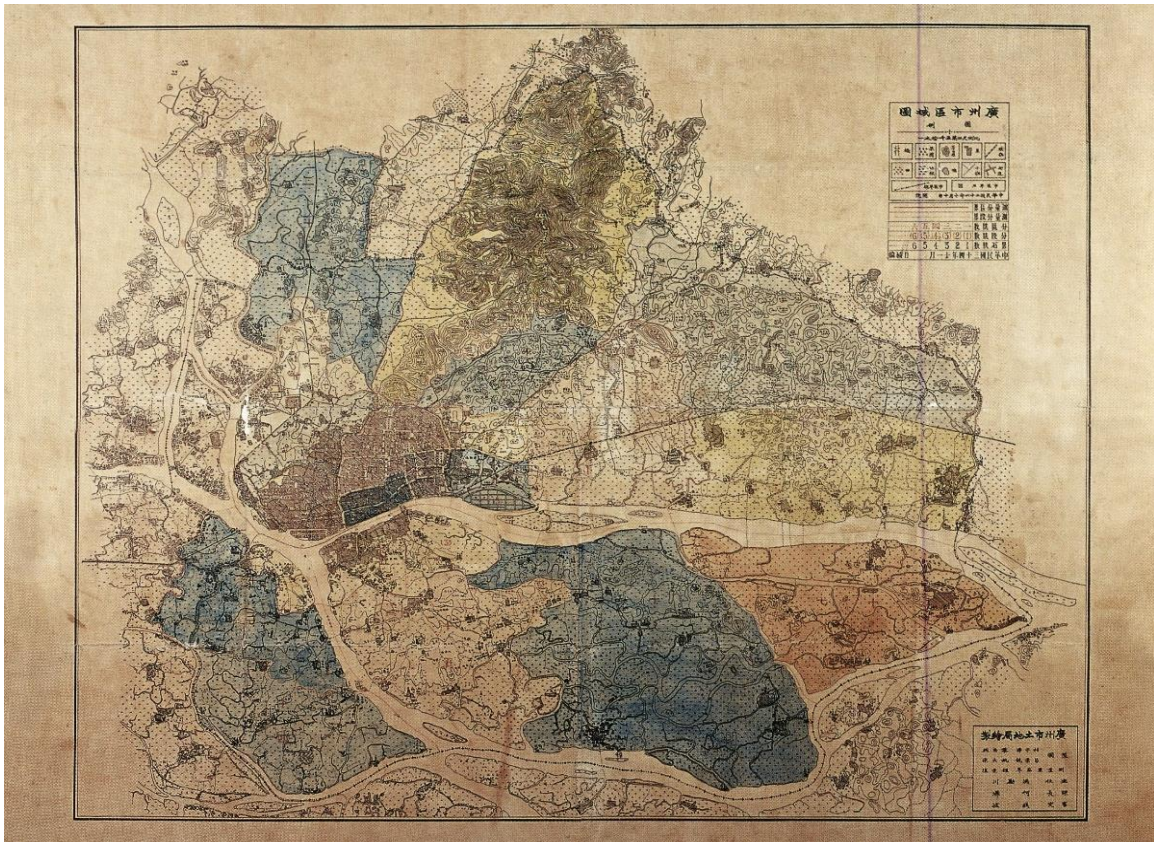


Figure 2.2: The City Design Outline of Guangzhou. The functional division plan, 1933. (Source: Guangzhou National Archives)

In August 1932, the *City Design Outline of Guangzhou* prepared by HUANG Qianyi with nine other planners was promulgated as the first modern comprehensive plan for the city. The plan introduced the concept of functional division and suggested to develop the whole area into four functional districts: the industrial districts across the river to the west, the residential districts, the commercial districts in the east side, and the mixed districts.⁴⁰

⁴⁰ B.H. Zheng, "On the Changes of Administrative Divisions in the Republic of China (1912–1949)," *Journal of Hubei University (Philosophy and Social Science)* 27: 2 (2000) 88–92.

(Figure 2.2) The new city boundary was affirmed, and the arrangement of the road infrastructure adopted two grid systems with different hierarchies: the square maxi-grid of one mile (1.61 kilometer) and the urban grid of 200 meters. (Figure 2.3) The implementation of the plan was interrupted by the war in 1937. The urban development was stopped, and the city was destroyed badly during the Japanese occupation.

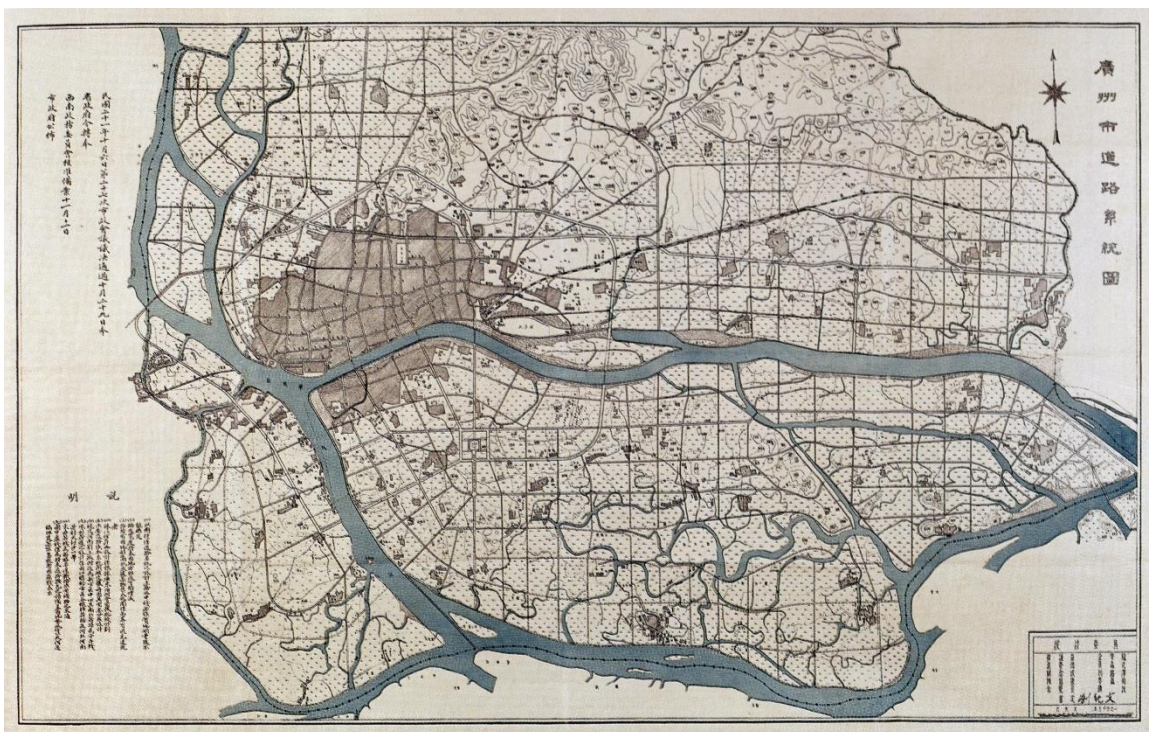


Figure 2.3: The City Design Outline of Guangzhou. Masterplan of the Road System, 1932. (Source: Guangzhou National Archives)

After the war, the Guangdong Provincial Government compiled the *Brief Plan for Construction of New City of Guangzhou* in 1945 and Guangzhou entered a phase of recovery from 1945–49.⁴¹

⁴¹ HUANG Li, Post-doctorate, Cities Centre University Of Toronto, Toronto, Canada, Associate Director of Faculty, Lecturer, School of Civil Engineering Architecture, Wuhan University of Technology, Wuhan,

(Figure 2.4) In face of Western pressure and isolation, the Central Government of the People's Republic of China chose a model of a centrally planned economy which strongly prioritized the development of heavy industry.⁴² Although Guangdong Province was not selected for any key industrial project in the *First Five-Year Plan* (1952–57), the industries of Guangzhou still developed quickly in this period.



Figure 2.4: The masterplan for Construction of New City of Guangzhou, 1947. (Source: Guangzhou National Archives)

P.R.China.Li Baihao, Dean, Professor, P.R.China.SUN Yingdan, Master, and P.R.China. "Study on History of Modern Urban Planning of Guangzhou." 城市规划(英文版), no. 2 (2010): 60-72.

⁴² L.H. Chao, "The Third-line Construction of the First-line of National Defense—a Study on the History of the Third-line Construction in Yunnan," *Academic Exploration*4 (2009) 103–108.

Thirteen masterplans were created in the pre-reform era from 1952 to 1978 with the common purpose of helping Guangzhou realize rapid industrialization.⁴³ The Guangzhou Urban Construction Committee prepared four masterplans in 1954 all devoted to address two fundamental questions: first, where the city center should be located, and second, in which direction the land for urban construction should extend to. Three alternatives were provided: 1) keeping the original city center or moving the city center eastwards to replace the former Tianhe Airport, 2) extending the city to the east to connect with the Huangpu Port, or 3) expanding the city centrifugally. The fourth masterplan, a partial conclusion of the previous three versions, determined to keep the location of city center and to develop the subcenters through constructing Fangcun, Huangpu, and Henan for a targeted population of two million. (Figure 2.5)

In 1956, the Soviet Union consultants believed a decentralization plan was a more pressing need for Guangzhou rather than a developmental plan. Hence, another three masterplans were conceived; these plans suggested to relocate the city center eastwards to the north of Meihuacun Village, to create ten new industrial districts in the suburbs, as well as to build the train station in Zoumagang at the south of Sanyuanli. (Figure 2.6) Since then, the city was generally conceptualized as a functional space that exclusively served the construction of industrial projects and workers' accommodations. This principle was applied to the eighth

⁴³ Deng, xingdong., and Yan, Yongtao. "The Evolution and Thinking of Guangzhou City Plans" (广州城市总体规划的演变与思考). *Urban Planning Forum*. no.3 (2017)

and ninth masterplans made in 1957, within which a typology of *Workers' New Villages* were designed to support the better functioning of the factories such as the Guangzhou iron and steel plant, the Guangzhou cement plant, and the Guangzhou chemical plant that were newly constructed in the rural and suburb areas following the previous masterplan. (Figure 2.7)



Figure 2.5: (Left) The fourth masterplan of Guangzhou, 1954 (Source: "Guangzhou Yearbook", Municipal Volume).



Figure 2.6: (Right) The seventh masterplan of Guangzhou, 1956 (Source: "Guangzhou Yearbook", Municipal Volume).



Figure 2.7: (Left) The ninth masterplan of Guangzhou, 1957 (Source: "Guangzhou Yearbook", Municipal Volume).



Figure 2.8: (Right) The eleventh masterplan of Guangzhou, 1961 (Source: "Guangzhou Yearbook", Municipal Volume).

The ideology that the cities function as industrial production sites had been strengthened during the period of the Great Leap Forward.⁴⁴ In 1958, Guangzhou was defined as the industrial base of South China and started to actively promote iron and steel as the core of its heavy industry through the practice of local publicly-owned industrial enterprises.⁴⁵ During the period of constructing *People's Communes*, the tenth masterplan created in 1959 proposed to enlarge the scale of land for industry development by 35% compared to the previous plan. This masterplan was so impractical that it made Guangzhou counter the destructive impact of an excessive focus on heavy industrialization. The eleventh masterplan in 1961 was produced to replace it and reduce the scale of construction following the adjusted state policies. (Figure 2.8) Guangzhou's urban growth was dramatically interrupted in 1966 by the Cultural Revolution, which led to a country-wide reorientation of construction and industrial development from cities to remote mountainous areas.⁴⁶

Approaching the end of the Cultural Revolution, the twelfth masterplan was created in 1972 based on a detailed review of all the previous plans. It stimulated new thoughts of Guangzhou's urban development and abandoned the notion that production was the only

⁴⁴ Xue, Desheng, Huang, Gengzhi, Guan, Jingwen, Lin, and Jiarong. "Changing Concepts of City and Urban Planning Practices in Guangzhou (1949-2010): An Approach to Sustainable Urban Development." *中国地理科学: 英文版*, no. 05 (2014): 607-19.

⁴⁵ L.L. Xia, Study on the Spatial and Temporal Evolvment of Industrialization in Pearl River Delta since Reform and Opening up (Guangzhou: Sun Yat-Sen University doctoral dissertation, 2007)

⁴⁶ P. Lu and Z.Y. Xu, *Guangdong Industry at the Turn of the Century* (Guangzhou: Guangdong Higher Education Press, 1999)

function of city. The acknowledgement of diverse functions of the city was reflected in the thirteenth plan enacted in 1977, consisting of six themes: industry, roads, port, storehouses, living infrastructure, and greening and farmland protection.⁴⁷ Due to the transitional period, the last two masterplans were not implemented and remained only on paper. After the two decades of the Great Leap Forward and the Cultural Revolution, the industrial structure and urban development of Guangzhou were weakened. Nevertheless, the city of Guangzhou, with a solid urban core and population of five million, was prepared to enter its new chapter, and a large and significant reform was waiting behind the curtain of upcoming history.

(Figure 2.9)



Figure 2.9: Aerial image of Guangzhou on the Pearl River. 1970 (Source: Guangzhou National Archives)

⁴⁷ Xue, Desheng, Huang, Gengzhi, Guan, Jingwen, Lin, and Jiarong. "Changing Concepts of City and Urban Planning Practices in Guangzhou (1949-2010) : An Approach to Sustainable Urban Development." 中国地理科学: 英文版, no. 05 (2014): 607-19.

2.2 COLONIAL CITIES

In the twentieth century, Hong Kong and Macau, colonial cities under the administrations of the British and the Portuguese respectively, were the first cities to complete the industrialization and modernization process in the Pearl River Delta area. Post-war city planning and urban development in Hong Kong and Macau were confronted with similar challenges: insufficient land resources in the city. Planning for institutional and commercial uses and industrial and housing areas was mainly aimed at coordinating with the development of core districts. These were formulated according to the respective geographical conditions of each district so that they each could fully realize their potential and fit in with the overall development of the city, as well as to reinforce the post-war strategy of developing manufacturing industries with immediate impacts.

2.2.1 HONG KONG

After the land north of Boundary Street and south of the Shenzhen River—approximately 1,040 km²—was leased to the British in 1898 for a period of 99 years, urban planning in New Kowloon was initiated to manage rapid population growth in Hong Kong. Kowloon–Canton Railway started operation in 1910; however, only a small amount of cargo was delivered by rail, and the majority of Hong Kong’s enterprises and commercial activities remained located along both sides of Victoria Harbor. The extension of Nathan Road northwards in the 1920s initiated the skeleton of Kowloon Peninsula’s urbanization process and attracted

commercial activities to gradually expand from Hong Kong Island to the Kowloon Peninsula.⁴⁸

The Town Planning Committee in Hong Kong was established in 1922. Its promulgation of *the Town Planning Ordinance* in 1939 enabled the formulation of the long-term development of Hong Kong.⁴⁹ Meanwhile, the Housing Commission was founded in 1935 and led by Wilfred Herbert Owen from the Public Works Department, whose *Report on Town Planning and Housing* in 1940 advocated a decentralization proposal to clean the slums and resettle the dispossessed residents to possible sites in the New Territories such as Shatin and Tsuen Wan. He also suggested to combine the functions of housing and town planning into a permanent organization for surveying, preparing planning schemes, and in general preparing the ground for future action.⁵⁰ The plans and advice of Owen's were accepted but not actually carried out.

Hong Kong began as a trading port for tea and opium, and the settlement's early physical, economic, and social configuration was determined by its port—one of the most dynamic urban forces.⁵¹ In January 1941, David J. Owen, a former general manager of the Port of

⁴⁸ He, Peiran. *Ways to Urbanisation: Post-war Road Development in Hong Kong*. Hong Kong: Hong Kong University Press, 2008.

⁴⁹ He, Peiran. *Making Hong Kong: A History of Its Urban Development*. Cheltenham, UK; Northampton, MA, USA: Edward Elgar Publishing, 2018.

⁵⁰ Owen, *Report of the Housing Commission 1935* (Hong Kong: Hong Kong Government, 1938).

⁵¹ Frank Broeze, ed., *Brides of the Sea: Port Cities of Asia from 16th–20th Centuries* (Honolulu: University of Hawaii Press, 1989), 939

London Authority, provided the plan *Future Control and Development of the Port of Hong Kong*, which proposed developments at Tsun Wan, Sham Shui Po, Yau Ma Tei, Kowloon City, and Tsim Sha Tsui, all in Kowloon.⁵² (Figure 2.10) This plan was initially rejected by the Hong Kong Government.

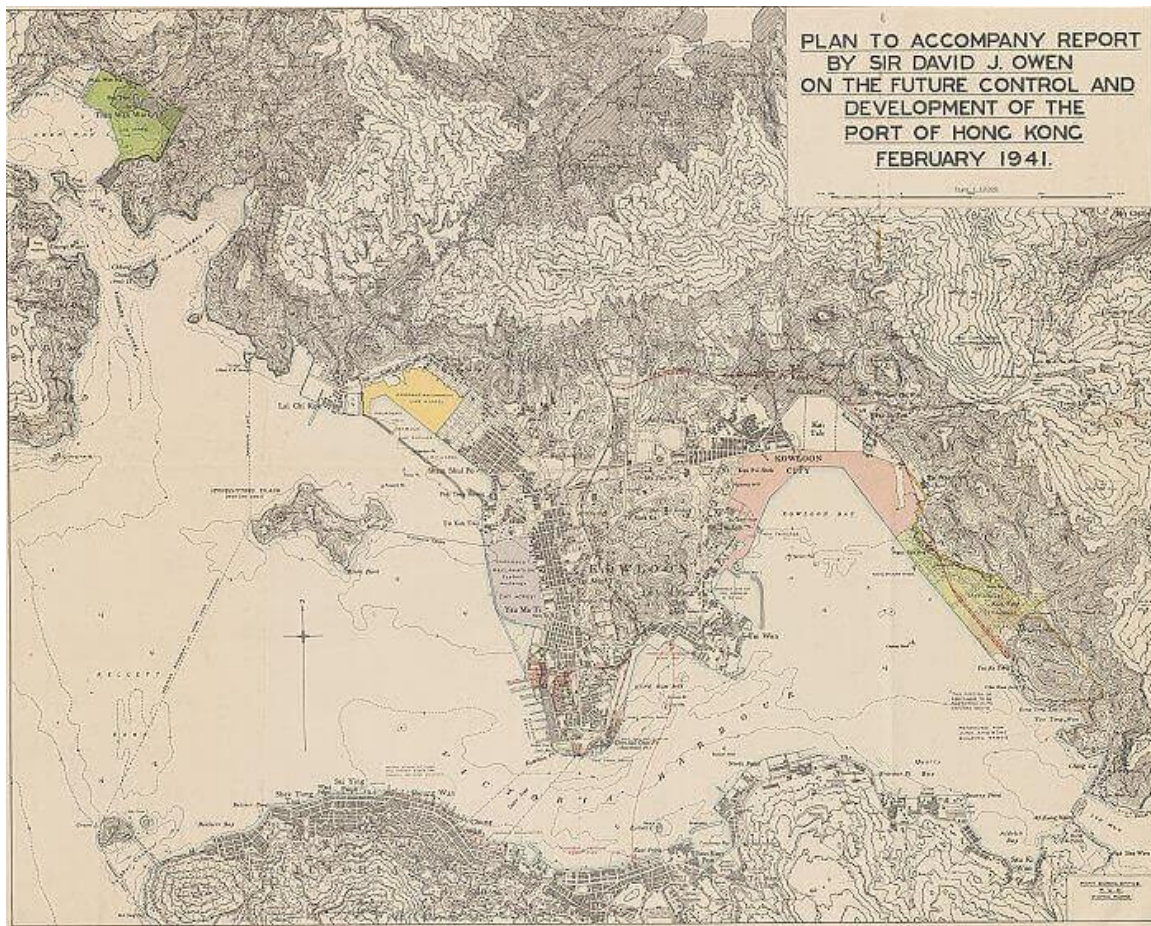


Figure 2.10: Plan to accompany report by Sir David J. Owen on the future control and development of the port of Hong Kong, February 1941. Port Works Office, P.W.D., Hong Kong (Source: Hong Kong Public Records Office)

⁵² Owen, *Letter to the Colonial Secretary*, Hong Kong: Public Record Office, 11 October 1946.

The Japanese army invaded Hong Kong in December 8, 1941, and occupied Hong Kong from December 25 for three years and eight months. The abrupt Japanese invasion in World War II (WWII) ended one hundred years of continuous and systematic urban development in the city, as Hong Kong became a resource port for the Japanese military. The Japanese surrendered and retreated from Hong Kong on August 15, 1945, after the United States dropped an atomic bomb on Hiroshima; thus, British rule in Hong Kong was restored, and the dominant status of the harbor in Hong Kong remained unchallenged in the post-war period. After the war in 1946, David J. Owen's plan was reconsidered by a new Port Administration Inquiry Committee, and most of the proposals were eventually realized in the 1980s. In other words, his vision for port development in fact contributed to the contemporary urban development of Hong Kong on both sides of the Victoria Harbor, but especially on the Kowloon Peninsula.⁵³ Besides, during the returned administration's preparation for Hong Kong's post-war urban development, Wilfred Herbert Owen was again consulted to help prepare the recovery plan, within which he reasserted the importance of public housing and new town planning. Owen's *Development Ordinance* drafted in 1947 received strong support from Sir Patrick Abercrombie, who suggested it as a basis to draw up a Hong Kong's blueprint in the *Preliminary Planning Report* (1948) after Abercrombie's 37 day visit in Hong Kong.⁵⁴ (Figure 2.11)

⁵³ Charlie Q.L. Xue, Han Zou, Baihao Li & Ka Chuen Hui (2012) The shaping of early Hong Kong: transplantation and adaptation by the British professionals, 1841–1941, *Planning Perspectives*, 27:4, 549–568

⁵⁴ Abercrombie, *Hong Kong Preliminary Planning Report* (Hong Kong: Government Printer, 1948), Para 4.

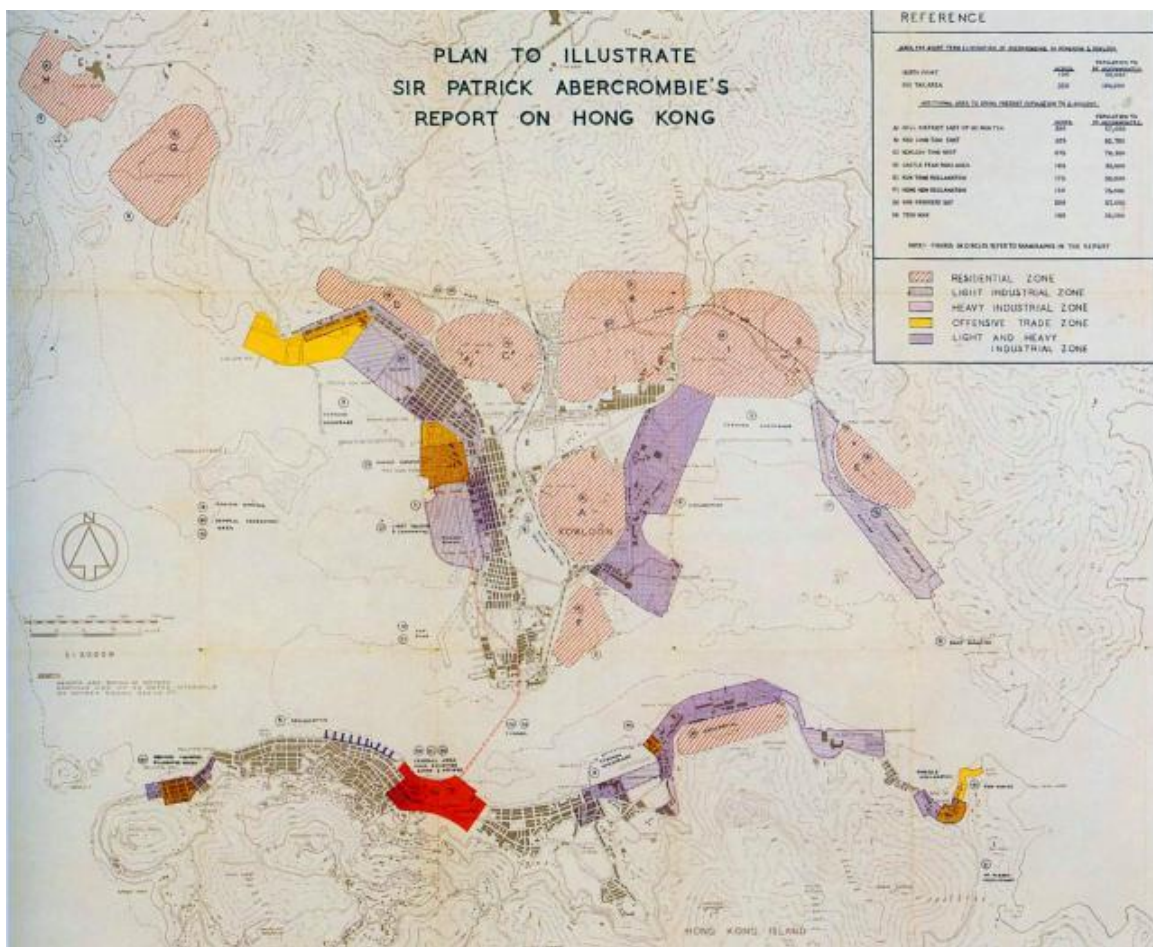


Figure 2.11: Plan to illustrate Sir Patrick Abercrombie's Report on Hong Kong.1948 (Source: Abercrombie, Hong Kong Preliminary Planning Report (Hong Kong: Government Printer, 1948)

In the early 1950s, the Korean War and the economic blockade imposed by the United Nations sharply decreased the volume of Hong Kong's entrepôt trade.⁵⁵ The city's population was bolstered by refugees throughout the turbulent years of the mid-20th century, mostly from China, and the arrival of immigrants in large numbers during China's civil war and communist revolution helped support Hong Kong's economic revival. The

⁵⁵ Z.H. Xu, Y.J. Pan and X.S. Cao, "Hong Kong Port and Urban Development," Urban Insight 1 (2012) 59–67.

labor-intensive manufacturing industry developed quickly, and Hong Kong started to enjoy unprecedented growth with rapid industrialization. The shift of its economic structure from entrepôt trade to light industry that began in 1950s after the war was the turning point of Hong Kong's economy. The textile and processing industries made it a major manufacturing hub in 1970s, and also brought economically stimulating energy and enterprise to the city's character. (Figure 2.12)



Figure 2.12: HT Wong. *Hong Kong in 1969*.

During the late 1960s, Hong Kong was undergoing a transition to a “great manufacturing city with an important seaport and business side”.⁵⁶ By the 1970s, Hong Kong's development benefited from the promotion of light industry and the city's economic

⁵⁶ Leeming, Frank. *Street studies in Hong Kong: localities in a Chinese city*. Oxford University Press, 1977.

importance in the world was greatly enhanced. The prosperity of the labor-intensive manufacturing economy brought with it the issues of pollution and over-population, and the Hong Kong government could no longer adhere to old practices and to merely improve the existing system. Instead, new measures had to be taken to improve public facilities to meet the needs of a rapidly growing population and turn this population into a productive labor force, as well as to solve the problems of critical land shortage and high population density in urban areas to improve people's living condition.⁵⁷ With the strategic thinking over the future development prospects for the whole of Hong Kong, *the Colony Outline Plan* (1970) was announced, in which a new urban form concept was introduced and new towns were expected to take a primary role in urbanization.⁵⁸ New Town as a term in urban planning and city design was officially adopted in Hong Kong and unveiled in 1973's *New Town Programme* as a major planning practice in the New Territories. The Ten-Year Housing Target Program to alleviate housing problems was introduced by Governor Crawford Murray MacLehose, who during his term (1971-1982) introduced a wide range of reforms in housing, welfare, and infrastructure that laid the foundation of modern Hong Kong. Tsuen Wan, Shan Tin, and Tuen Mun were the first three built new towns following the principle of theoretically independent, self-contained, and balanced settlements. (Figure 2.13) They were selected not only because of the availability of large amounts of new land, but also

⁵⁷ Pui-yin, Ho. *Ways to Urbanisation: Post-War Road Development in Hong Kong*. Hong Kong University Press, 2008. <http://www.jstor.org/stable/j.ctt2jc51z>.

⁵⁸ Bristow, M. Roger. *Hong Kong's New Towns : A Selective Review*. Hong Kong ; New York: Oxford University Press, 1989.

due to the proximity of suitable nucleuses of existing population for making the new settlements, as well as their adjacency and good communication with the harbors.

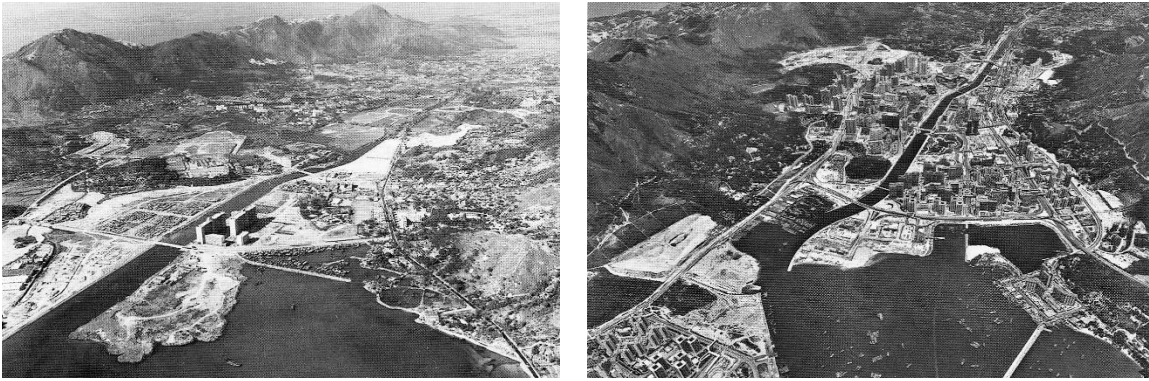


Figure 2.13: Tuen Mun reclamation stage in 1971 (left) and Tuen Mun New Town in 1986 (Right). (Source: Hong Kong Government Information Service)

Besides the issue of housing, efficient transportation was necessary for a city that had four million inhabitants, particularly one with an overall density of 6,300 per square kilometer.

The government of Hong Kong recognized this urgent need to accommodate increasing traffic flows as the economy continued to hover in 1960s. The Mass Transit Railway (MTR) opened in 1979 was brilliantly conceived since 1967 as the primary urban strategy to address this issue. The initial proposal produced by the British transportation consultants Freeman, Fox, Wilbur Smith & Associates suggested four rail lines to be completed between 1973 and 1984 to support Hong Kong's rapid urban expansion, allowing over 70 percent of the journeys in Hong Kong to be made by public transport by the end of 1980s.

The MTR Corporation took an actual development position in the area around the key stations, making the MTR also a development oriented transit (DOT). Surrounding this large public transit network, an exciting urban experience was constructed over the past fifty years through an impressively widespread three-dimensional pedestrian infrastructure in the form of elevated walkways and underground tunnels. This infrastructure has gradually developed across Hong Kong both formally and informally, linking people to the city's wide array of public transit.⁵⁹ It demonstrates that when political willingness is allied with architectural imagination, a project can come along that truly makes a difference to the urban landscape of a city.⁶⁰ The public satisfaction with the infrastructure of Hong Kong started growing after the Cross-Harbor Tunnel was eventually opened in 1972, a year which also marked the beginning of the revitalization of residential neighborhoods and commercial districts in Central, the central business district of Hong Kong.

The Hong Kong Outline Plan in 1979 laid out a basic framework for future physical development in Hong Kong, and the planning of another three new towns, Yuen Long, Tai

⁵⁹ Frampton, Adam., Clara Wong, and Jonathan Solomon. *Cities without Ground : A Hong Kong Guidebook*. Rafael, California: Oro Editions, 2012.

⁶⁰ RMJM. *Hong Kong: The Road to Urban Transformation*. 2016

Po, and Fanling/Sheung Shui, were commenced.⁶¹ Within this plan, a coordinated land use and transport planning strategy was incorporated into the new town development. Up to the late 1990s, nine new towns of three phases in total had been constructed and about half of the Hong Kong population resided in these newly developed areas, which remarked shifts of the center gravity of the population from the Hong Kong Island to Kowloon, and then to the New Territories.⁶² (Figure 2.14)

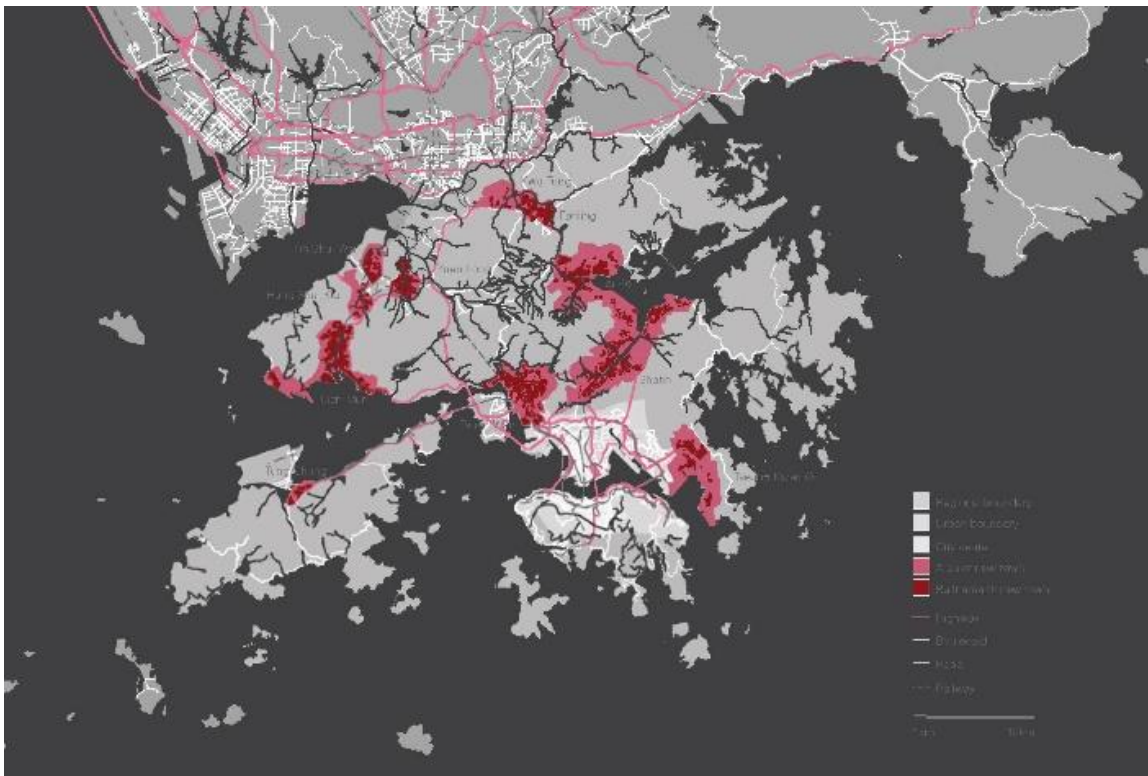


Figure 2.14: The distribution of Hong Kong New Towns. 2018

⁶¹ K. K. Ling. *Strategic Planning in the Making: Legacy and Vision for Hong Kong*. The Hong Kong Institute of Surveyors Planning & Development Conference 2016 "Planning and Development, Past Present & Future".

⁶² Pun Chung Chan. New towns in Hong Kong Planning for the next generation. CTBUH 2001 6th World Congress, Melbourne.

By the end of the 1970s, the limits to its space and a constant rise in the costs of its labor force began to impede Hong Kong's industrial development.⁶³ Hong Kong's planning in 1979 was initially a response to leverage the reform and opening-up policy in China, transferring Hong Kong's manufacturing industry into mainland China, specifically to Shenzhen, thus adjusting its economic structure from manufacturing industries to the enhancement of trading and financial services. The relationship between Hong Kong and Shenzhen materially influenced the development of the Pearl River Delta, which will be explained in the next chapter.

2.2.2 MACAU

The *Planta de Macau por Deliberação do Leal Senado* in 1905 laid out the city's expansion into the farming lands to the north. After the Portas do Cerco and Ilha Verde reclamations were completed in 1920, as well as those in Areia Preta Hipódromo and Canídro, great urban transformations occurred in the north. Avenue Almeida Ribeiro was upgraded, diagonally crossing the city and providing easy access between the Inner and Outer Harbors, as did the new urban axis of the Rua Horta e Costa.⁶⁴ The new ports including Patane Port and Outer Harbor were completed in the mid-1920s, and immediately after these the land

⁶³ S.Y. Liu, *A Brief History of Hong Kong* (Wuhan: New Edition, Hong Kong: Joint Publishing Co., Ltd., 2009

⁶⁴ Silveira, Luís, and Portugal. Junta De Investigações Do Ultramar. *Ensaio De Iconografia Das Cidades Portuguesas Do Ultramar*. Lisboa, 1955.

reclamation project—Zona de Aterros do Porto Exterior (ZAPE)—was inaugurated. (Figure 2.15) Due to the lack of space for Macau's expansion, the role of ZAPE became prominent during this phase as the basis for urban development. These projects were represented in the 1927 *General plan of the City and the new Macau Harbor*. (Figure 2.16) The new district was designed to incorporate a mix of building typologies, including Portuguese mansions, Lisbon-style modern institutional buildings, casinos, and residences.

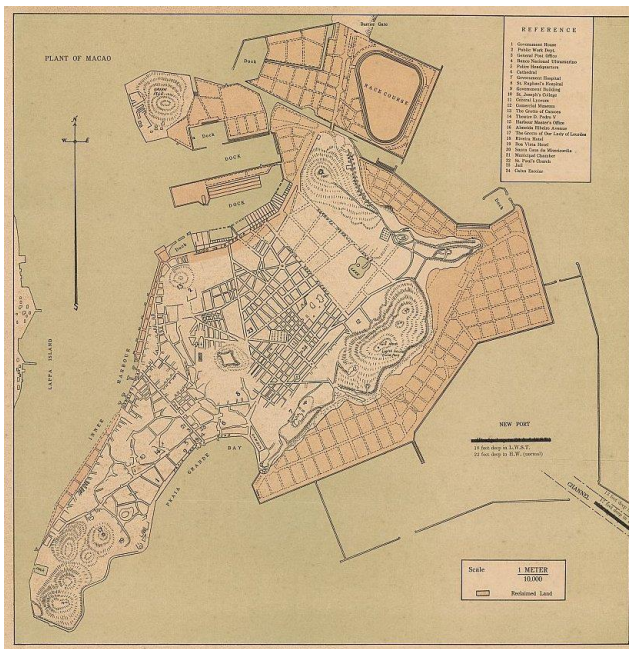


Figure 2.15: One of a series of plans produced by the Harbour Authority, Macau, to promote the major reclamation planned for the Outer Harbour. The reclaimed land area was highlighted in darker yellow area. 1922. (Source: National Library of Australia)



Figure 2.16: General plan of the city and new port of Macao published by the Port Authority of Macao. 1927 (Source: Macao Port Works Department)

Macau's status as a colonial city remained unaffected through the Republic revolutions in Portugal in 1910 and the Xinhai Revolution in China in 1911. Portuguese jurisdiction in

Macau was reaffirmed in 1928 by the Republic of China through the renegotiated Sino-Portuguese Treaty of Friendship and Trade.⁶⁷ Macau's determination to modernize was manifested through the landfill in Bahia Praia Grande between 1931 and 1939, which cut the Ruada Praia Grande between São Francisco Garden on the east and the government offices toward the west off from the sea.⁶⁸ (Figure 2.17)



Figure 2.17: Macau in 1947. (Source: ELITE LIFE)

Macau's neutral status not only enabled it to enjoy a brief period of economic prosperity as the only neutral port in South China, but also made it a place of refuge during WWII, which

⁶⁷ Chan, Ming K. (2003). "Different Roads to Home: The retrocession of Hong Kong and Macau to Chinese sovereignty" (PDF). *Journal of Contemporary China*. 12 (36): 493–518. doi:10.1080/10670560305473.

⁶⁸ Rowe, Peter and Har Ye Kan. *Macau and Its Borders*. 2014

caused its population to fluctuate within a row of a few years.⁶⁹ Following the war, manufacturing and various small-scale factories were introduced to Macau in the mid-1950s. The modernizing impulse brought changes to Macau, whose industry was nurtured to reduce or even replace its dependence on trade. By the late 1950s and early 1960s, the wool textile industry began to set up production plants and so did the garment factories, replacing traditional cottage industries. Substantial economies of scale in manufacturing were realized; productivity rose, as did the yield.⁷⁰ Macau's economic growth and the expansion of its clothing and textiles manufacturing industries largely benefited through its access to a large workforce. Similar to Hong Kong, the workforce was significantly aided by immigration from mainland China during WWII and the Chinese Civil War.

Macau became an overseas province in 1951 and a duty-free port-zone to the other Portuguese territories by 1957, and in 1961 Macau was declared as a tourist center with full authority to establish gambling under a monopolistic syndicate. The gambling industry soon became the major driver of its urban expansion, leading to the construction of casinos occupying a large part of reclaimed land in the ZAPE and adjacent to Avenida da Amizade.⁷¹ Under the supervision of the local architects Eduardo Lima Soares and Jon Prescott,⁷² the

⁶⁹ Statistics and Census Service Department of Macau. Macau's population changed from 280,000 in 1935, to 248,000 in 1940, then to 260,000 in 1945 and to 323,000 in 1950

⁷⁰ D.B. Su, *Sharing Value: Macao's Export-oriented Economy and Regional Cooperation of Pan-Pearl River Delta* (Macao: Macao Institute of Technology, 2004)

⁷¹ Shipp, Steve. *Macau, China : A Political History of the Portuguese Colony's Transition to Chinese Rule* = [Ao-men Chung-kuo]. Jefferson, N.C.: McFarland, 1997.

⁷² Interview with Jon Prescott. *Arquitectura Macau*, no. 4 (July/ August 1992), pp. 30-35.

ZAPE project was redrawn according to a different concept, more related with tourism and gambling and less about commerce, production, or residence. The construction of new buildings began to transform the quaint cultural and architectural character of the city. The ZAPE expansion was punctuated conspicuously by the Casino Lisboa of 1970—a flagship casino invested in by casino mogul Stanley Ho—which led to the conversion of more reclaimed land areas to casino towers in the 1970s. (Figure 2.18) The ZAPE was eventually developed into a hodgepodge appearance of buildings with visual disorder, in an urban form which was reinforced by the diversity of architectural expression. The typology of casino, synonymous with the city’s image of gaming tourism, extended Macau’s business district from Largo do Senado along Avenida de Almeida Ribeiro toward the southeast corner of the peninsula.⁷³



Figure 2.18: Landfill Zone of Porto Exterior seen from Taipa. Hotel Presidente and Hotel Lisboa located on the right side of the Governador Nobre de Carvalho Bridge, 1976 (Source: Vanessa Seed and Manuel Noronha)

⁷³ Lee, Christopher C. M. *Macau : Cross-border City*. Common Frameworks (Harvard University Graduate School of Design) ; Pt. 2. Cambridge, MA: Harvard University Graduate School of Design, 2014.

By the 1960s, Macau was a city constituted by two distinct parts: the old Portuguese center (now a UNESCO heritage site) and the former Chinese villages of Barra and Mong Há, which were mainly built from 1557 to 1794; and the casino areas of ZAPE that were planned and constructed from 1912 to 1957.⁷⁴ Taipa Island started to lose its rural character after the Taipa–Coloane Causeway (now Estrada do Istmo) was completed in 1968, linking Taipa and Coloane Islands, and the Governador Nobre de Carvalho Bridge was completed in 1974, linking Taipa Island to the Macau peninsula. The construction of the two important bridges also marked Macau's entrance into a new period of urban expansion in the 1980s, with a new master plan for the city prepared by the planning firms of John Prescott and Palmer & Turner in 1979.

2.3 SPECIAL ECONOMIC ZONES

In December 1978, the Third Plenary Session of the Eleventh Central Committee of the Chinese Communist Party established the foundations for the overhaul of the centralized planned economy, and broke China's economic isolation from the rest of the world. As part of China's economic reforms policies to rebuild economic connections, known as the Open-Up or Open Door Policy, the concept of Special Export Zone was raised by DENG Xiaoping in April 1979 and confirmed as Special Economic Zone (SEZ) in March 1980. As the frontier of China's economic development, Guangdong Province enjoyed the freedom of being allowed

⁷⁴ Ibid.

to often move one step ahead of other provinces.⁷⁵ Shenzhen and Zhuhai were two of the first four established SEZs in 1979 with the deliberate intention to attract capital from Hong Kong and Macau and drive the transfer of the manufacturing industry into the mainland of the Pearl River Delta. From the 1980s, Shenzhen and Zhuhai acted as catalysts and played instrumental roles in the integration of China to the global economy, and China's subsequent economic and urban development created a solid foundation for the growth of these two future metropolises that emerged from the rural landscape.

2.3.1 SHENZHEN

Different from Guangzhou, Hong Kong, or Macau, where a long urban history has defined these anchor cities of the Pearl River Delta, Shenzhen is described in almost all literature, be it official, international, or popular dialogues, by a common rhetoric of “a city without history” or an “instant city”. It transformed from a sleeping fishing village “overnight”—in only three decades—into a modern metropolis through a scope, speed, and scale of urban transformation that was unprecedented in human history. Historically called Bao'an, Shenzhen's explosive growth was largely fueled by Deng Xiaoping's designation of the area as China's first Special Economic Zone in August 1979, which gave preferential treatment to foreign direct investments. Bao'an County was elevated to Shenzhen Municipality in March of the same year, an experimental urban practice parallel with the designation of Shekou (by China Merchants Group) and Shatoujiao (by Hong Kong), which were two other early

⁷⁵ E.F. Vogel, *One Step Ahead in China: Guangdong under Reform*. Guangzhou: Guangdong People Publishing House, 2008.

developmental zones that were established with a great extent of administrative autonomy.⁷⁶

The initial area set for Shenzhen was only 10.65km², in which 3.3km² were zoned for residential with the projection of a future population of 200,000 to 300,000 by the end of twentieth century. In 1980, an 84.5-kilometer administrative boundary, known as the Second Line, divided the municipality into the Shenzhen Special Economic Zone, which occupied 327.5 km² of the municipality, and the rest. This division culminated in the promulgation of the 1982 *Plan for the Shenzhen SEZ*.⁷⁷ (Figure 2.19) Spatially, the Shenzhen SEZ was designed in a multicenter-cluster-belt urban structure, composed of three clusters, Nantou, Luohu-Shangbu, and Shatoujiao, which were connected by a major trunk road, Shennan Road, from west to east. Following this plan, the structure of the city began to develop towards a multi-centric pattern, which became a rudiment of today's structure.⁷⁸

⁷⁶ Gu, Huida. Retrospect and Prospect of City Planning in Shenzhen. Shenzhen: Shenzhen Urban Planning and Design Institute. 1997. (顾汇达.深圳城市规划的回顾与展望.深圳: 深圳市城市规划设计研究院.1997)

⁷⁷ O'Donnell, Mary Ann, Wong, Winnie Won Yin, and Bach, Jonathan P. G. *Learning from Shenzhen : China's Post-Mao Experiment from Special Zone to Model City*. Chicago: University of Chicago Press, 2017.

⁷⁸ Mao, J.X., Yan, X.P. et al.(2008) "The Effect of Urban Planning Control upon Land Use in Shenzhen", ACTA Geographica Sinica, Vol.63(3), pp. 311-320.

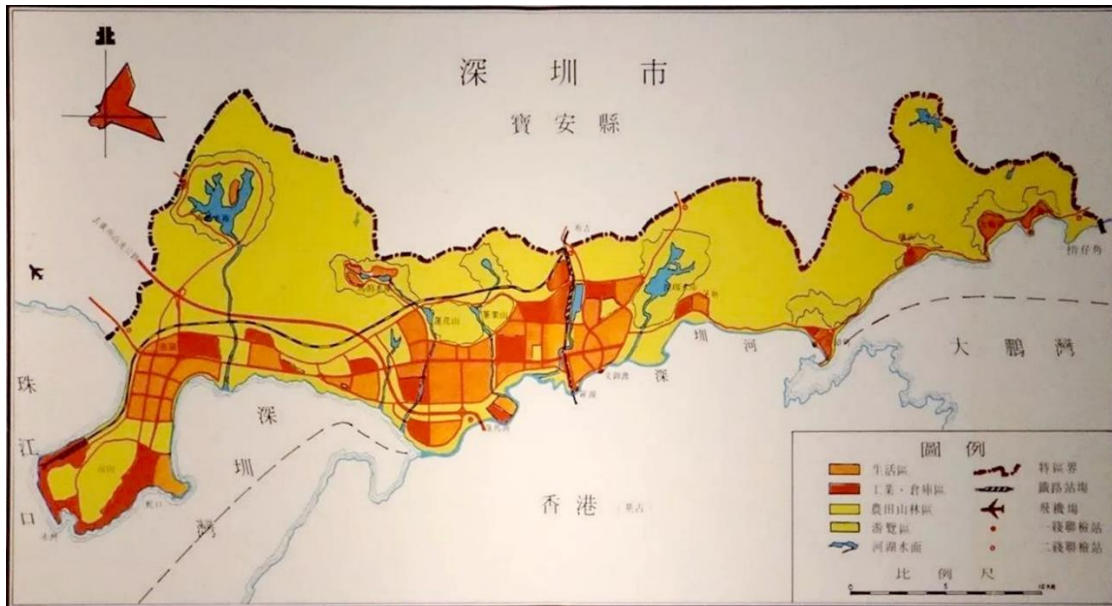


Figure 2.19: The masterplan for Shenzhen. 1982. (Source: Shenzhen Museum)

The Luohu-Shangbu cluster was the main developmental area initially, with a geo-locational advantage at the center of the SEZ and at the border with Hong Kong. Luohu was the only land customs port to Hong Kong, where most investment came from.⁷⁹ So it was intended to be developed into a commercial center to facilitate cross-border trading. No sooner was the Luohu commercial area oriented to large-scale, high-rise, and high-density development reminiscent of Hong Kong, it began to become over-congested and the planning bureau quickly decided to limit the development scale by reducing the number of high-rises from 80-90 meters to 40-50 meters in height in this small area of only 80 hectares.⁸⁰ Dongmen,

⁷⁹ Luxin Huang, Yongqing Xie. *The Plan-led Urban Form: A Case Study of Shenzhen*. 48th ISOCARP Congress. 2012

⁸⁰ Ibid.

the traditional market area that had grown up around the Luohu Train Station, turned into the commercial center of the nascent city.

From the historic experience, the urban planning practices of the Shenzhen SEZ played a significant role in city making, but they were not the first effort to reform and reconfigure the area; the China Merchants' Shekou Industrial Zone preceded the SEZ by several months. In the second half of 1978, YUAN Geng, the executive deputy chairman of China Merchants from Hong Kong, proposed to the State Council to build a processing trade zone in Shenzhen Nanshan Peninsula (inside the Nantou cluster), which later became the Shekou Industrial Zone. (Figure 2.20 and 2.21)



Figure 2.20: YUAN Gen presented the masterplan for Shekou Industrial Zone to DENG Xiaoping, 1984. (Source: China Merchant)

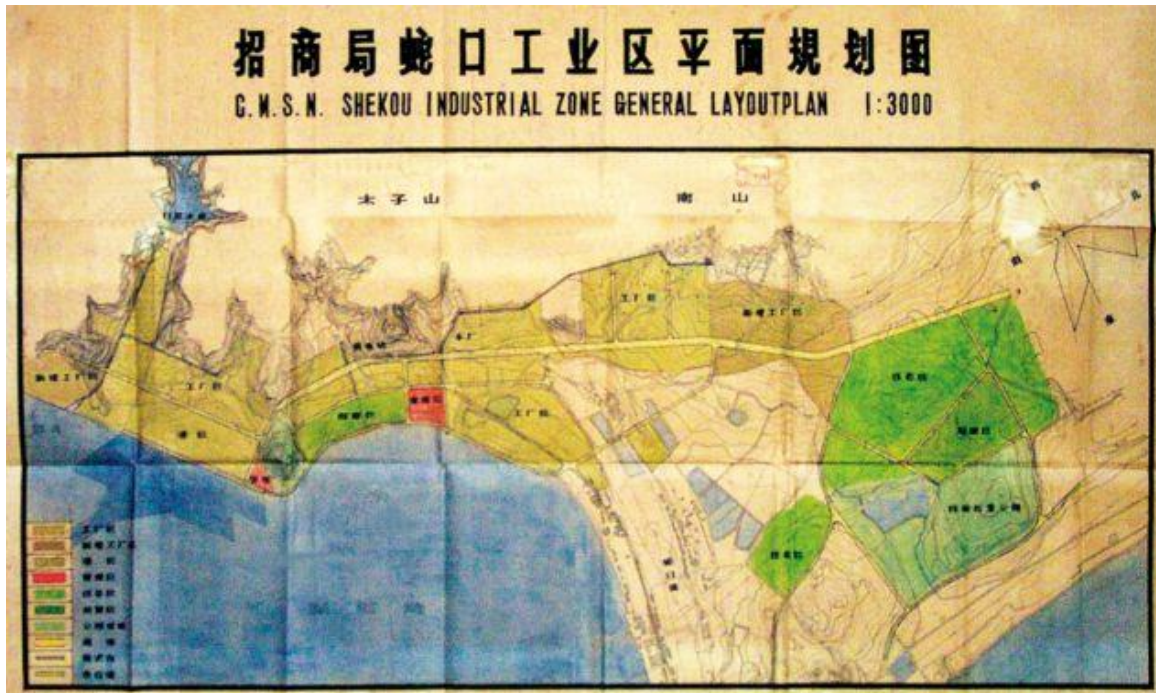


Figure 2.21: Shekou Industrial Zone General Layout Plan. 1980. (Source: China Merchants Shekou Industrial Zone)

The establishment of Shekou conformed structurally and historically to that of compounds, reforming the state apparatus through the redeployment of resources toward particular goals rather than through the actual re-designation of rural areas as “non-rural” or urban.⁸¹ This was later known as the “Shekou Model”, and as a prototype or template it had a profound and exemplary meaning to coastal cities and the Open-Up and Reform policies of SEZs. The method invented by YUAN Geng in his petition to the Central Government was Port-Park-City (PPC)—meaning in the layout of this district, front is the port, middle is the industrial park, and back is the city. Following this spatial pattern, since July 1979, Shekou was efficiently and successfully developed into a 10 km² non-rural compound of an

⁸¹ Mary Ann O'Donnell. Utopian Shenzhen, 1978-1982. *Shenzhen Noted*. 2011-27

industrial zone and concomitant shipping industry that operated with a high level of independence largely outside the control of top-down master planning due to its special relationship with Hong Kong.⁸² (Figure 2.22)



Figure 2.22: Shekou Bay in 1979 vs 1986 (Source: Shekou Museum of Reform and Opening)

In parallel with the “Shekou Model” is “Shenzhen Speed”. Upon the foundation of the Shenzhen SEZ, the municipal authority recognized that the lack of infrastructure was the primary obstacle to the success of urban development. After the road network masterplan was prepared, the project of “seven accesses and site leveling” immediately started and completed in only two years largely because the infrastructure provision was one of the predominant concerns of Shenzhen’s urban development in the early 1980s. The 1982 Overall Plan adopted the cluster-strip structure as the basic urban layout and framework for the Shenzhen SEZ, a city with a population of 250,000 by 1985. The plan clearly divided Shenzhen into two contradictions: the urban SEZ (1980) and rural New Bao’an County

⁸² Liu, Tianfu. “The development of Shekou and the early period’s construction of the Shenzhen Special Economic Zone.” *News of the Communist Party of China*.

(1981), with the purpose of building a city as soon as possible, even adopting the slogan “Time is money, efficiency is life”. The People’s Liberation Army (PLA) Engineering Corps followed the 1982 plan, building the Shenzhen SEZ from north to south along the Kowloon-Canton Railway tracks and then east to west from the Wenjindu Border Checkpoint to the site of the Shanghai Hotel. The construction of the highest building in China—the Shenzhen International Trade Center—followed a speed of “three days – 1 floor” and marked the upsurge of Shenzhen’s construction of that time.

2.3.2 ZHUHAI

Zhuhai was established as a municipality in 1979, after 25 years of being a small county from 1953. As one of the original Special Economic Zones, Zhuhai SEZ was designated in 1980 and planned with an area of merely 6.8km². (Figure. 2.23) Its first masterplan was very conservative in terms of development and placed a greater emphasis on environmental protection, with the aim of constructing a Coastal Garden City.

In 1983 the state rescaled the Zhuhai SEZ and expanded its area to 15.16km², with a planned flower-shape layout along the coast. The five “petals” were Xiangzhou, Gongbei, Jida, Qianshan, and Nanping districts.⁸³ The masterplan of 1985 reoriented the city into an industrial city and expanded the urban area to 50.15km². (Figure 2.24)

⁸³ Zhang, Zhengtao and Chen Deji. “Zhuhai City’s Urban Design Process and Implementation Approaches”. *Planners*. 2018(3): 40-46.



Figure 2.23: (Left) Masterplan for Zhuhai Special Economic Zone. 1980. (Source: Zhuhai Municipal Archives)

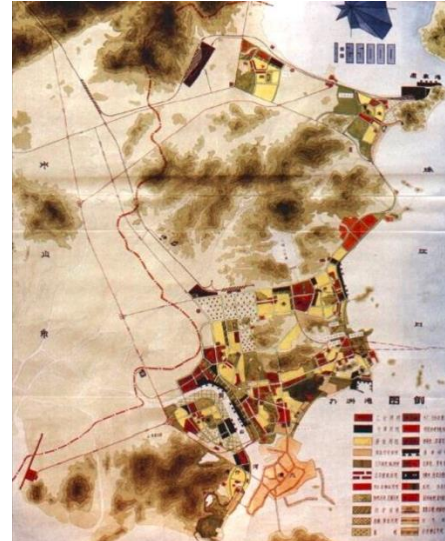


Figure 2.24: (Right) Masterplan for Zhuhai Special Economic Zone (1985-2000). 1986. (Source: Zhuhai Planning Bureau)

The updated layout of the city was in a pattern of belts and groups: four clusters surrounding the Banzhang Mountain were planned as an administrative and cultural zone (Xiangzhou), commercial districts (Gongbei, Qianshan), and a tourism district (Jida); the northeastern belt was planned for industry (Tangjia) and port (Xiashan); and the southwestern belt was planned for agricultural production (Nanping) and residences (Wanzai). The area of each cluster ranged from 350 to 1200 hectares, and each cluster was planned to accommodate populations ranging from 30,000 to 100,000.⁸⁴ Gongbei, the customs station and checkpoint towards Macau, gathered a number of developments quickly during the 1980s, and Zhuhai High-Tech Industrial Development Zone, located in the northeastern belt, was designated as an important project to accommodate manufacturing

⁸⁴ 珠海规划局. 《珠海规划发展历程》

industries supported by foreign direct investment. Zhuhai experienced a modest urban growth during the early 1980s when compared with Shenzhen, and landscape remained an important element during the city's development.

2.4 CITIES DEVELOPED FROM MANUFACTURING COUNTIES AND TOWNS

Besides the cities, counties and towns in the Pearl River Delta were also very important urban agglomerations. These include historically important ports, such as Humen (Bocca Tigris) Town of Dongguan and the former Xiangshan County of Zhongshan, but more important were the counties and towns that grew into industrial and manufacturing nodes after the periods of the People's Communes and the Great Leap Forward (1958 to 1961) when industrial resources were diverted into the rural areas. The Commune and Brigade Enterprises from the early 1960s were later developed into Township and Village Enterprises (TVEs) in the late 1970s. This transition followed the reforms of the "Pearl River Model" by FEI Xiaotong, one of the most famous sociologists in China, a model which largely contributed to the development of towns and counties through export-oriented rapid industrial economic development led by local government.⁸⁵ In the article "Recognition of the Pearl River mode", FEI described this phenomenon as "a borrowed boat from the other may serve to sail to the respective advantage for their mutual benefit."⁸⁶

⁸⁵ 费孝通.《中国城镇化道路》.内蒙古人民出版社.2010

⁸⁶ 费孝通.珠江模式的再认识

In the decade following the opening-up of China in 1978, Nanhai, Dongguan, Zhongshan, and Shunde counties leveraged the incentives of the state and provincial policies and took advantage of foreign direct investment and private or collective capitals, and changed their focus from agricultural counties into manufacturing hubs with average annual economic growth rates of up to 18%. Their developmental pace was significantly faster than the other urban entities in Guangdong Province, which awarded them the fame of “Guangdong Four Little Tigers”.⁸⁷ In the late 1980s, Dongguan and Zhongshan were administratively upgraded into municipalities while Nanhai and Shunde were incorporated into the city of Foshan. The urban developments in these manufacturing county/town-formed cities were less planned or designed and more spontaneous and oriented to industrial and commodity economies.

2.4.1 DONGGUAN

The urbanization of Dongguan has its own character. It appeared as a result of its extensive export-oriented industrialization, as a city without a strong center but in the form of a “city as town, town as city” in the 1990s.⁸⁸ The milestone and the divide of Dongguan’s transformation in the 20th century was 1985, when Dongguan became a city. From 1978–1984, the factories of Dongguan were all small-scale “workshops” that processed low-end products. Investments in the city were mostly made from Hong Kong due to the investors’ nostalgia to their hometown, and in small amounts with a tentative mentality. One of the

⁸⁷ 王志纲, 田炳信. 《珠江三角洲启示录》. 《粤港信息报》. 1991

⁸⁸ “莞味”城镇化路线图. 《南方日报》. 2014 年 04 月 29 日

most well-known stories is of Hong Kong businessman ZHANG Zimi's Taiping Handbag Factory. Nevertheless, it was these small factories of processing industry concentrated in Guancheng Town, with a total 51.75 million dollars investment, that started the industrialization pace of Dongguan. By 1984 the city accumulated an original wealth of 1.044 billion dollars GDP, and the success of the factories helped Dongguan earn a status of a municipality.⁸⁹ Hong Kong businessmen started crowding into the Dongguan ten days after the confirmation of Dongguan becoming one of the coastal economic open areas in 1985, which provided not only the land and labor resources as before but also the tax incentives. It also attracted large foreign corporations, including twelve of the Fortune Global 100, to set up Sino-foreign joint enterprises in different towns across the whole territory of Dongguan. (Figure 2.25)

Until 1979, at the turning point of Chinese society, Dongguan was a largely rural county with only three towns of modest scale: Guancheng Town in the middle, Taiping Town in the west, and Shilong Town in the east, three towns whose total combined population was 142,328, only about 12.35% of the overall population in Dongguan. Nevertheless, the average medium age of population in Dongguan in 1979 was only 23.9, among the youngest areas in China, which was at the time a significant unrealized advantage for Dongguan's

⁸⁹ 东莞市地方志编纂委员会. 《东莞市志 (1979-2000)》. 广东人民出版社. 2013 (Dongguan Shi Di Fang Zhi Bian Zuan Wei Yuan Hui. *Dongguan Shi Zhi (1979-2000)*. 第 1 版. ed. Guangdong Sheng Di Fang Zhi Cong Shu. Guangzhou: Guangdong Ren Min Chu Ban She, 2013.

unprecedented-scale industrialization in the next decades.⁹⁰ The economy of the county center, Guangcheng Town, was based on industry and commerce, with 8 state-owned, 29 collective-owned, and 19 town-owned industrial enterprises in 1979. The Open-Up Policy introduced new opportunities for urbanization in Dongguan: the city attracted foreign direct investment to build factories, helping to industrialize and even urbanize the county at a fast pace. After the first Enterprise of Three Import and Compensation Trade—Guangcheng Garment Factory—was built in 1979, a series of industrial campuses such as Fengwei Industrial District, Tianbao Industrial District, and the 1138-acre Guancheng Science and Technology Park were successively established, following the first urban masterplan of Dongguan conceived by Guangdong Urban Planning and Design Institute in 1985. (Figure 2.26) This large-scale land transformation resulted in the disappearance of agriculture in Guancheng Town by 1992.

Besides Guancheng Town, Taiping Town (now Humen Town) faces Humen, the city also known as Bocca Tigris or the Gate of Tigers. It was historically a crucial military point due to its strategic location as the naval gateway to the city of Guangzhou, where conflicts in the First Opium War (1839–1842) occurred at Chuenpi (Chuanbi) and Anunghoy (Weiyuan). It was also an important commodity port which declined during the early 20th century but was reopened as Taiping Port in 1953. The approval from the State Council on Taiping Port as an Open Port to Vessels of Foreign Nationalities in 1983 helped bring technologies and investment to Humen. Quickly, garment manufacturing became the major supporting

⁹⁰ *ibid*

industry of the town and thousands of clothing factories drastically reconfigured the urban layout of Humen Town.

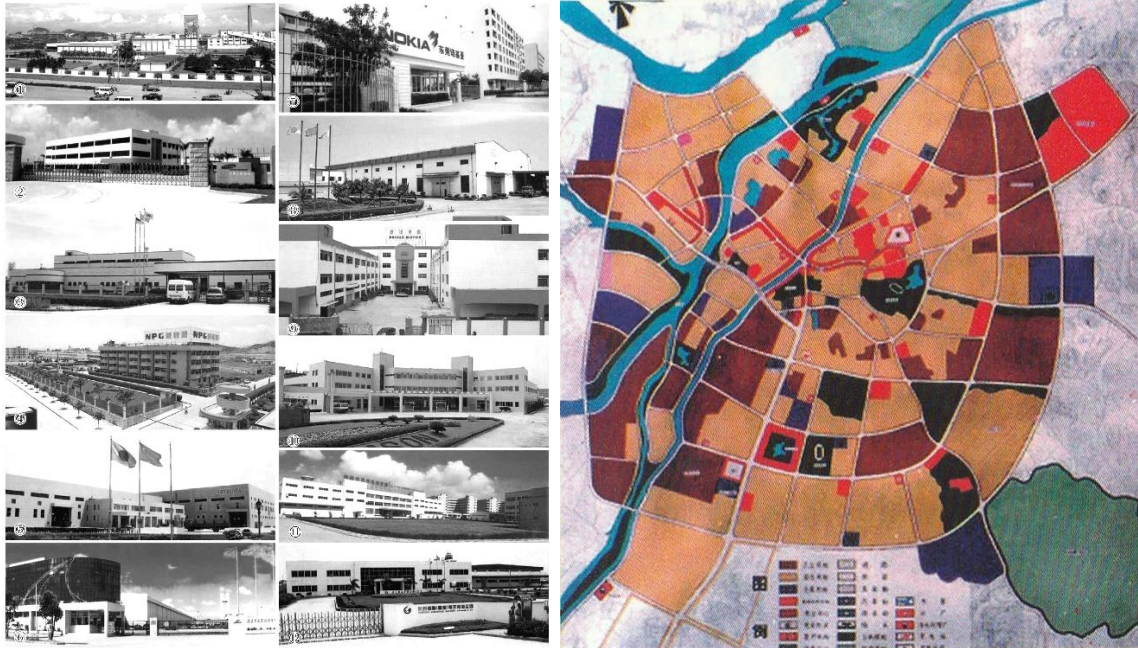


Figure 2.25 (Left): Twelve of the Fortune Global 100 Cooperations' factories in Dongguan after 1985 (From 1-12: Nescafe, Samsung, Dow Chemical Company, Nidec, Nippon Steel, Hitachi, Nokia, Sumitomo Metal, General Motors, Thomson, Phillips, and SONY) (Source: The Chronicles of Dongguan)

Figure 2.26 (Right): The landuse plan of urban masterplan for Dongguan (1985-2000), 1985. (Source: Guangdong Urban Planning and Design Institute)

2.4.2 FOSHAN

Foshan Municipality is today composed of two overlapping urban artifacts originating from different points in history: the Foshan Special District and Foshan Town. Despite its long history, Foshan was officially recognized as a town in the first year of the Republic of China (1912) when it undertook the role of the capital of Nanhai County. After the founding of the People's Republic of China in 1949, Foshan Town was assigned city status while a parallel

concept was created—“Foshan Special District”—in 1952. The administrative region of Foshan Special District was later reduced from the whole territory on the west side of the Pearl River Estuary, including 24 counties and three cities, to ten counties and two cities in 1980. Its designation was eventually cancelled in June 1983 and four counties governed by Foshan Special District merged into Foshan City. As a result, the urban form of Foshan today can be read as a municipality of five counties: Foshan, Sanshui, Nanhai, Shunde, and Gaoming.

The private enterprises are not only the supportive force in Foshan's economy, but also the distinguishing feature of Foshan when compared to Dongguan and Zhongshan, the other two manufacturing hubs in the Pearl River Delta. This is due to profound historic reasons: Foshan had a long tradition of handcraft industry, and there were a large amount of wealthy overseas Chinese from Foshan. Thus, a number of those patriotic overseas Chinese businessmen returned to Foshan in the late 19th century to set up a modern industry in the spirit of resuscitating the nation by industrialization, which made Foshan one of the important birthplaces of China's modern national capitalist industry. During the Republic of China period, Foshan's modern industry, especially the handicraft industry, developed rapidly with the support of private enterprises and reached its apex between 1922 and 1926. There were 135 large-scale steam-powered silk reeling companies in Shunde, 58 in Nanhai, and two in Sanshui, making Foshan the center of both the silk industry and the distribution of silk and textiles of Guangdong Province. Since then, the linkage between Foshan's city development and privately owned industrial and commercial enterprises had strongly

formed.⁹¹ Despite of the interruptions caused by the movements of the People's Commune and the Great Leap Forward, the private economy recovered and then developed quickly after 1984 when Foshan was identified as the pilot zone of the Economic System Reform, one of the Pearl River Delta Economic Open Zones whose policy decontrolled prices, opened the market, and allowed the market to guide production. Under these circumstances, industrial enterprises gained the freedom to seek funds in the open market and operate independently. Therefore, the individual and private economy quickly reached 41.8% of Foshan's overall GDP.

According to the principle of "special policies, flexible tactics", the city of Foshan issued bonds to the public to raise funds to build roads and bridges including the important Foshan Bridge in the 1980s which, with the permission from the state, created a precedent for the use of private capital for civil infrastructure constructions in China. In just over a decade from 1979 to the late 1980s, Foshan completed its upgrade from a handicraft town to a robust city with a complete industrial system and a large manufacturing scale. Later, a series of new actions were conducted by Foshan to actively attract investment from abroad and introduce advanced technology and equipment, which again transformed the city into an emerging electronics industry base by the late 1980s. A group of newly-established successful Chinese home appliance manufacturing companies in Foshan such as Midea and Hisense Kelon produced 14% of the entire provincial output of the electronics industry by

⁹¹ 《佛山市志 1979-2002》

1987. Their vast factory compounds and campuses directly contributed to the urbanization of Foshan.

2.4.3 ZHONGSHAN

Zhongshan was developed from the original Xiangshan County, one of the few designated large agricultural counties in Guangdong Province dating to the Qing Dynasty when the Jiaqing Emperor was in the throne, around 1800. However, in terms of urbanistic influence it remained as “an unknown small town in the corner of Lingnan” until three decades ago.⁹² Things started to change since the Xinhai Revolution of 1911 led by SUN Yat-sen and his men from the United League of China. The Revolution’s first uprising in Guangdong was conducted in Xiangshan on November 6, 1911 and resulted in Xiangshan becoming the third liberated county in China. As Sun Yat-sen’s county of birth, Xiangshan was renamed to Zhongshan⁹³ by the Army and Navy Marshal Stronghold of the Republic of China to memorialize Sun Yat-sen after his death in 1925.

After experiencing the Japanese occupation during WWII from 1940-1945 and the civil war from 1945-1949, Zhongshan’s development resumed with a rapid growth in agriculture. Rooted in its agricultural background, Zhongshan is not simply understood as a consolidated

⁹² General Office of Zhongshan Municipal Government. *The History of Xiangshan*. 2008

⁹³ Zhongshan is the spelling in Pinyin, an official romanization system for Standard Chinese, Mandarin; Yat-sen is the spelling in Wade-Giles System for Cantonese. Both of them respond to the same Chinese Characters “中山”.

county, but rather more as a region that is structured in the pattern of a constellation of towns in different developmental stages and urban scales.

The city of Zhongshan originates from Shiqi Town (today the central district of Zhongshan Municipality), the first designated district-level town in Zhongshan established in January 1951 and gained a city status for a short period between 1953 and 1959. After the land reform of 1953, which was also known as the “agricultural cooperative movement for the socialist transformation of rural areas and agriculture from private rural land ownership to collective-owned”, three new district-level towns—Xiaolan Town, Huangpu Town, and Dagang Town—were established inside Zhongshan County. These three towns later became industrial nodes of utmost importance. Within the same period, Zhuhai County was established and became administratively independent from Zhongshan. In August 1958, with the introduction of the new idea of agricultural collectivization, existing agricultural production cooperatives were combined into a new type of organizational unit that integrated governmental, political, and economic functions in rural areas: the Rural People’s Commune. Thus, the structure of Zhongshan was reshuffled into seven Rural People’s Communes that governed 34 farming areas.⁹⁴ However, due to the egalitarian distribution system of the commune and a series of natural disasters, productivity was reduced and the government was forced to suspend the development of rural communes, and eventually replace them with 27 towns and townships in November 1983 after the economic reform.

⁹⁴ 中山市地方志编纂委员会编：《中山市志》，广东人民出版社，1997年4月

The major economic unit of the communes—Commune and Brigade Enterprises—transformed into the Township Village Enterprises (TVEs), which helped Zhongshan achieve its epoch-making progression through manufacturing industry.⁹⁵

Leveraging the policy dividend, the TVEs in Zhongshan acted as an intermediary for introducing foreign capital and establishing lateral connections with domestic enterprises since 1984. By the end of 1987 there were 22,662 TVEs distributed in 24 different towns, each focused on manufacturing a different and specific product such as clothing, electronics, appliances, and toys. Thus a complementary network of specialized towns emerged with individual populations beyond 100,000 and a gross industrial output value of 4.1 billion yuan, occupying more than 43.6 percent of Zhongshan's GDP.⁹⁶ The shareholding cooperation system in rural land management played a key role in promoting the formation of the regional economy of "one town specialized on one product". Since then Zhongshan stepped into a course of municipal economic development in which the towns worked together and achieved rapid development in the tide of reform and opening. On the basis that its indexes of economy achieved the first tier of Guangdong Province, Zhongshan was upgraded into a municipality in December of 1983 and further a prefecture-level city in January of 1988.

⁹⁵ 中山市地方志编纂委员会编：《中山市志 1979-2005》，广东人民出版社，2011 年 12 月

⁹⁶ Ibid.

2.5 A REGION WITH TERRITORIAL ADJACENCY

The name of Pearl River Delta was defined firstly as a geographical concept in the 1920s. The 1915 floods of the Canton River wrought extensive damage throughout the region and resulted in a destruction of property, crops, and the loss of life. The Government of the Republic was obliged to take the initiative in preventing the recurrence of such a disaster. Repairs to dikes and embankments and the construction of new water management projects were undertaken in many places, coordinated by the Board of Conservancy Works of Canton under the direction of General TAN Hsueh Hong with his chief engineer G.W. Olivecrona from the Swedish Army.⁹⁷ Olivecrona was invited by SUN Ke, by then the commander-in-chief of the River Conservancy, to design the new sluice at Lubao Town in Sanshui District to prevent the floods of the North and South Rivers. Olivecrona led a comprehensive topographic and hydrographic survey of the river systems of the area in 1917, establishing a continuous sequence of levels from inland to the sea with 120 benchmarks along the river proper. After his visit and review of the systematic survey, Olivecrona came up with a hypothesis that the region used to be a gulf, and generally formed from the deposition of sediment carried by a West, East, and North Pearl Rivers. Therefore the region should be considered as a river delta, hence naming it “Guangzhou Delta”.⁹⁸

⁹⁷ Boerschmann, Ernst, and Kögel, Eduard. *Hongkong, Macau Und Kanton: Eine Forschungsreise Im Perfluss-Delta 1933*. Boston: De Gruyter, 2015.

⁹⁸ Mao, Shuai. “Trace the Origin of the Pearl River Delta” (溯源珠江三角洲的形成历史), *Chinese Journal of Social Science*, 2018.5.4

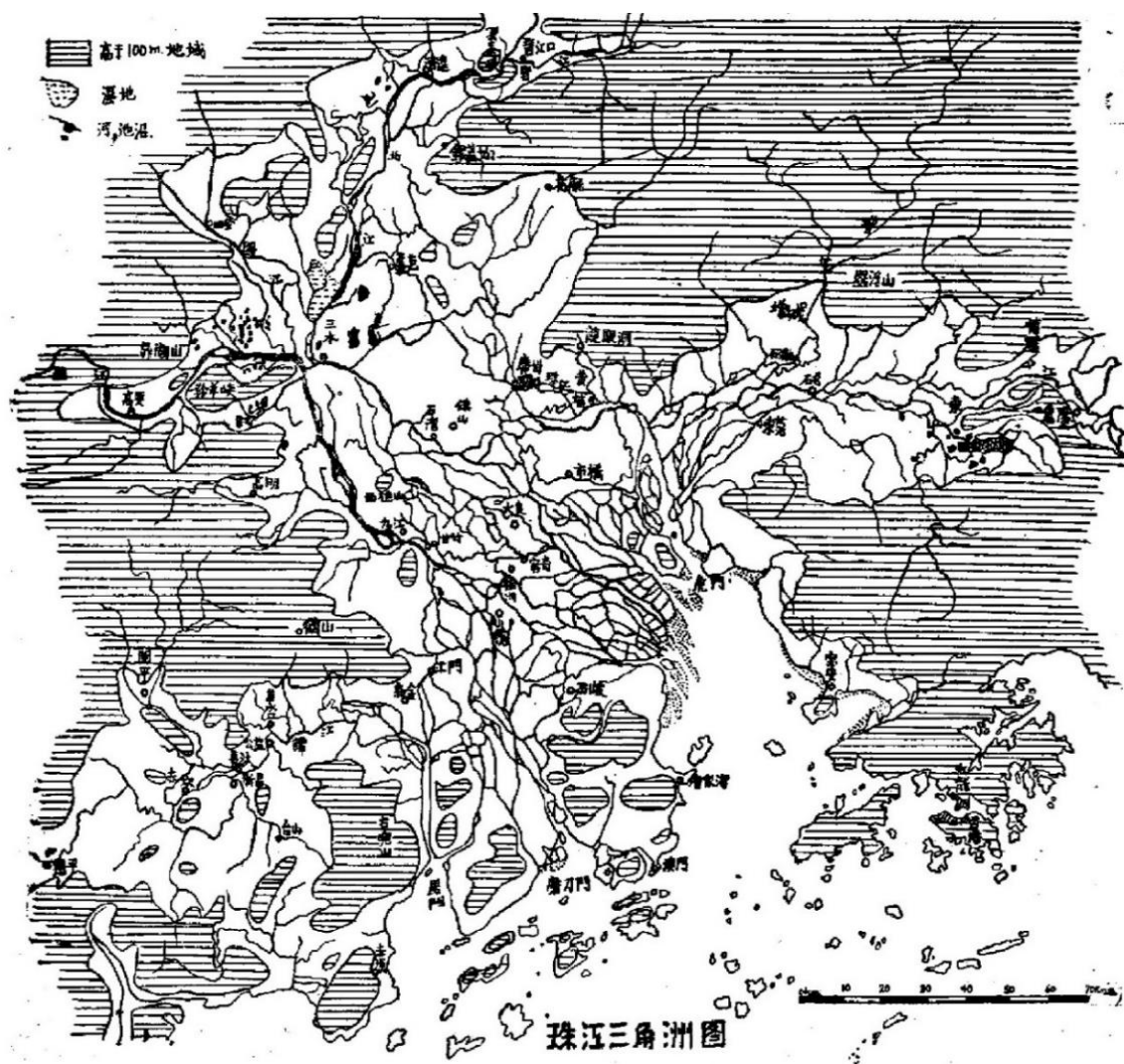


Figure 2.27: The Pearl River Delta ” (珠江三角洲). 1947. (Source: Wu, Shang Shih and Ceng, Zhaoxuan. “The Pearl River Delta ” (珠江三角洲). *Lingnan Journal* 1947, 8(1): 105- 122.)

Despite the disagreements of calling it a delta that were voiced by Arnold Heim and Karl Krejci-Graf since 1930,⁹⁹ WU Shang Shih and CENG Zhaoxuan from Sun Yat-sen University in 1947 published a milestone paper *The Pearl River Delta* which defined it as a physical and

⁹⁹ Heim, Arnold, Krejci-Graf, Karl, and Lee, Cheng-san. *Geology of Canton, with General Geological Map 1:500,000*. Special Publication (Kwangtung Province (China) Ti-Chih Tiao-Cha-So) ; No. 7. Canton, China, 1930.

affirmative geographical concept of bay-head delta with a clear definition of its territory, topography, elevation, hydrology, agriculture, economy, and urban settlements.¹⁰⁰ It contained urban settlements of three cities, Guangzhou, Hong Kong, and Macau, as well as the small counties Huaxian, Conghua, Panyu, Zengceng, Boluo (now Guangzhou), Sanshui, Nanhai, Shunde, Gaoming (now Foshan), Dongguan, Bao'an (now Shenzhen) and Zhongshan, and defined a territory of about 6,000 km². (Figure 2.27)

The topography is decisive for the character of urbanization in the Pearl River Delta. Centered on Lingdingyang Bay and surrounded by mountains, the low-lying land and shoals in between are dominated by fine sediments, which provide a good base for constructions. With a length of 70 kilometers and a width of four to 58 kilometers, the Lingdingyang Bay is the largest estuary of the Pearl River.¹⁰¹ Its average water depth is 4.8 meters;¹⁰² the northern part of the upper bay is narrow and shallow with a depth of 2.8 meters, but it widens and deepens towards the south to a depth of 20 meters at the bay mouth.¹⁰³ (Figure 2.28) The mean tidal range is 1.4 meters; although the tide may reach 3.1 to 3.7 meters at

¹⁰⁰ Wu, Shang Shih and Ceng, Zhaoxuan. "The Pearl River Delta" (珠江三角洲). *Lingnan Journal* 1947, 8(1): 105- 122.

¹⁰¹ Chen, G.N.; Zhang, K., and He, X.K., 1994. Paleo-geographic evolution of the Pearl River Delta since the late Pleistocene. *Quaternary Sciences*, 1, 67-74.

¹⁰² Dong, L.; Su, J.; Ah Wong, L.; Cao, Z., and Chen, J.-C., 2004. Seasonal variation and dynamics of the Pearl River plume, Pearl River Estuary Study. *Continental Shelf Research*, 24(16), 1761-1777.

¹⁰³ Xia, Z., 2005. Characters of underwater topography and geomorphology in inner Lingdingyang firth of the Pearl River (Zhujiang River) estuary. *Marine Geology & Quaternary Geology*, 25(1), 19-24.

the east coast, a shield of 197 islands including Lema and Lantau Islands makes the waterbody quite stable most of the time.¹⁰⁴ Generally wave heights within the inner estuary are less than 0.2 meter,¹⁰⁵ and the stability of the water provides great conditions and opportunities for anthropogenic activities around the estuary.¹⁰⁶ Due to the conditions of the water and the high topographical constraints around its perimeter, the cities and urban agglomerations of the Pearl River Delta are largely built on low-lying land adjacent to the water.

The locational characteristics of every part of the Pearl River Delta has contributed to define the urban spatial form of the region. For instance, the mountains on the east side of Lingdingyang Bay are closer than on the west. This dissymmetry in flat-land availability resulted in different urban patterns, as more consolidated cities appeared on the east side compared to more spread counties and towns on the west.

¹⁰⁴ Xia, Zhen & Jia, Peihong & Ma, Shengzhong & Liang, Kai & Shi, Yaohong & Waniek, Joanna. (2013). Sedimentation in the Lingdingyang Bay, Pearl River Estuary, Southern China. *Journal of Coastal Research*. 66. 12-24.

¹⁰⁵ Yan, G.; Li, C.; Lo, Z., and Ying, Z., 1994. *Studies on Hydrodynamic Geomorphology and their Application to Harbour Construction in South China*. Guangzhou: Zhongshan University Press, 313p

¹⁰⁶ Zhao, H., 1990. *The Evolution of Pearl River Estuary*. Beijing: Ocean Press, 357p.

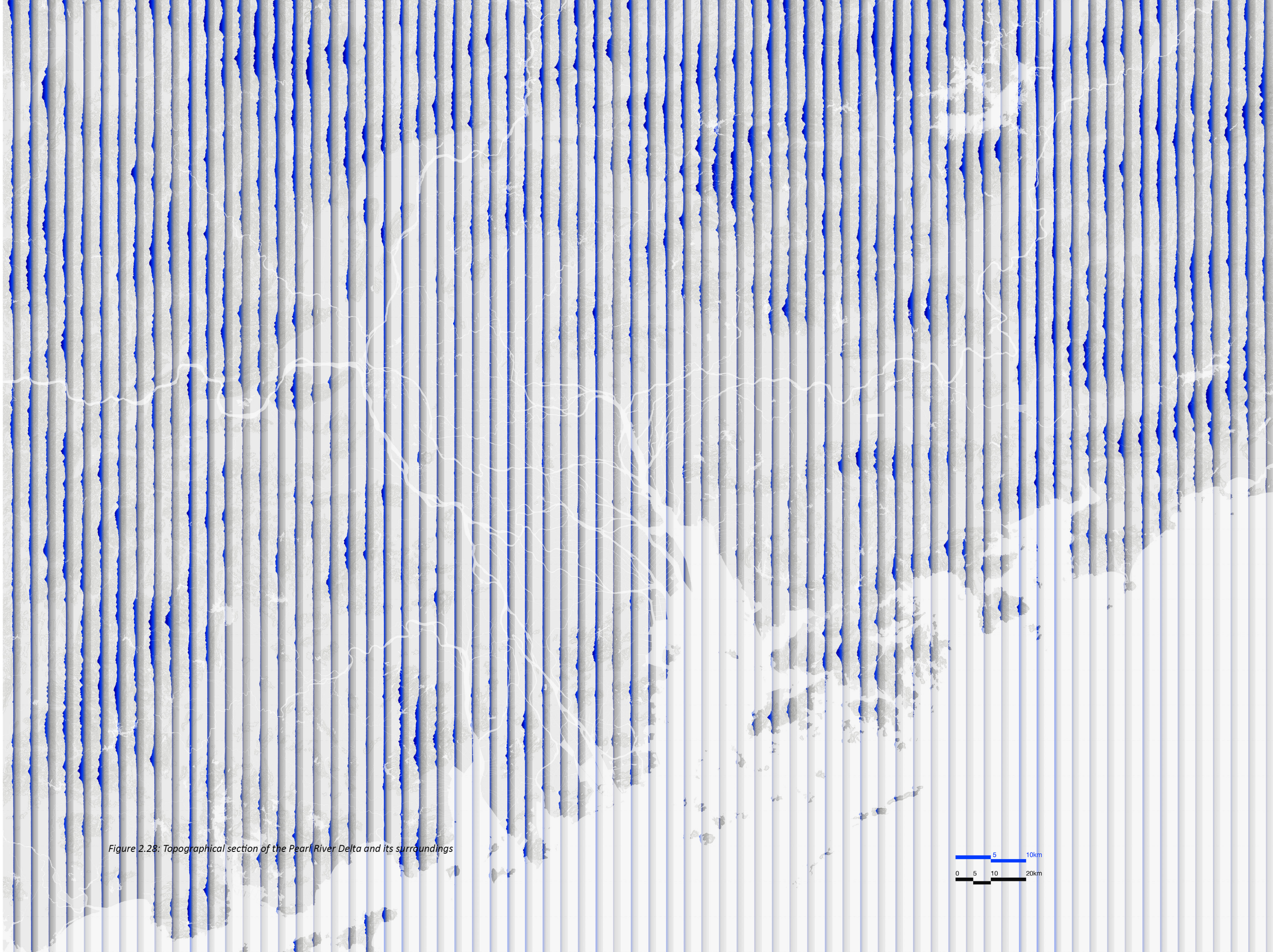


Figure 2.28: Topographical section of the Pearl River Delta and its surroundings

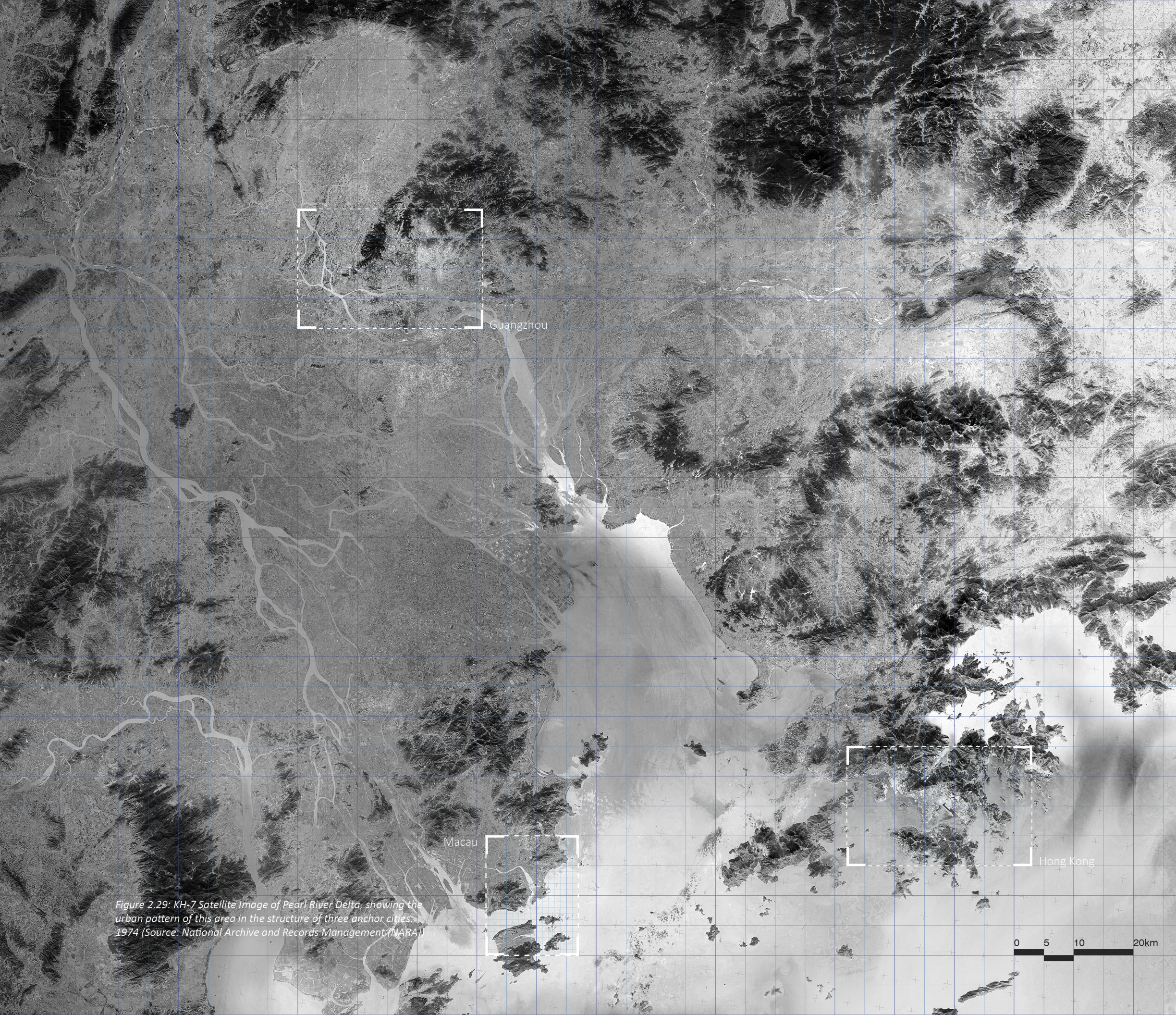
At the start of the 20th century, the Pearl River Delta was a distinct geography of urban settlements anchored by the three cities of Guangzhou, Macau, and Hong Kong, which were always in a pattern of competition and achieved much in their urban construction and extension under different political and economic circumstances. Physically the cities existed with relatively limited land connections, mainly relying on the inland waterway transportation network and the four river systems of the Pearl River that developed through their shared history. Guangzhou and Hong Kong, the two larger poles within this triangular spatial structure of the Pearl River Delta, were once connected by a rail-project constructed in the early twentieth century: the Kowloon-Canton Railway (KCR) opened in 1911. The commodity and passenger flows in between Guangzhou and Hong Kong built up over the years. However, by the 1920s still only half of the passengers on the railway were headed to the mainland and the rest took the train to stations in Hong Kong.¹⁰⁷ The operation of the Kowloon-Canton Railway was stopped in 1939 due to the invasion of the Japanese Army during WWII. After the war, the founding of the People's Republic of China (PRC) in 1949 essentially cut the economic connection between mainland China on the one hand and British-run Hong Kong and Portuguese-run Macau on the other,¹⁰⁸ and their economic developments and urbanization patterns began to diverge. As a result, the Pearl River Delta returned to a geography of three independent cities. An analysis of the declassified 1974 aerial image of the Pearl River Delta from the U.S. military satellite system Keyhole (KH-7)

¹⁰⁷ Dewolf, Christopher. *Hong Kong's Train to China: A Brief History of the Kowloon-Canton Railway*. 2018

¹⁰⁸ Bie, Jiangbo, Martin De Jong, and Ben Derudder. "Greater Pearl River Delta: Historical Evolution towards a Global City-Region." *Journal of Urban Technology* 22, no. 2 (2015): 1-21.

demonstrates that this urban phenomenon continued into the 1970s. (Figure 2.29, 2.30, 2.31 and 2.32)

China's Open-Up policy led to the rebuilding of communications between mainland China and Hong Kong and Macau from the late 1970s. Topography constituted a constraint and an opportunity in defining mutual comparative advantages of different places within the Pearl River Delta. This point has been profoundly understood by the different levels of government, who then applied these discoveries to the planning process. The strategies of establishing Special Economic Zones and the Pearl River Delta Economic Open Zones identified sharply and correctly each place's regional comparative advantage and made each settlement in the region maximize their own prosperity, and as a result realized fast urban development. By the end of 1980s, different pieces of urban entities including Guangzhou, Hong Kong, Macau, Shenzhen, Zhuhai, Foshan, Zhongshan, and Dongguan were evident in satellite photos of the Pearl River Delta. (Figure 2.33) Through they began to have plenty of communications and exchanges among them, physically these urban entities were not well connected. In this sense, the Pearl River Delta could be understood an urban region composed of territorial adjacencies that remained separated by topographical constraints and administrative borders.



Guangzhou

Macau

Hong Kong

Figure 2.29: KH-7 Satellite Image of Pearl River Delta, showing the urban pattern of this area in the structure of three anchor cities. 1974 (Source: National Archive and Records Management (NARA))

0 5 10 20km



Figure 2.30: Zoomed-in KH-7 Satellite image of Guangzhou, showing the dense urban development in between the mountain and the river, 1974 (Source: National Archive and Records Management (NARA))

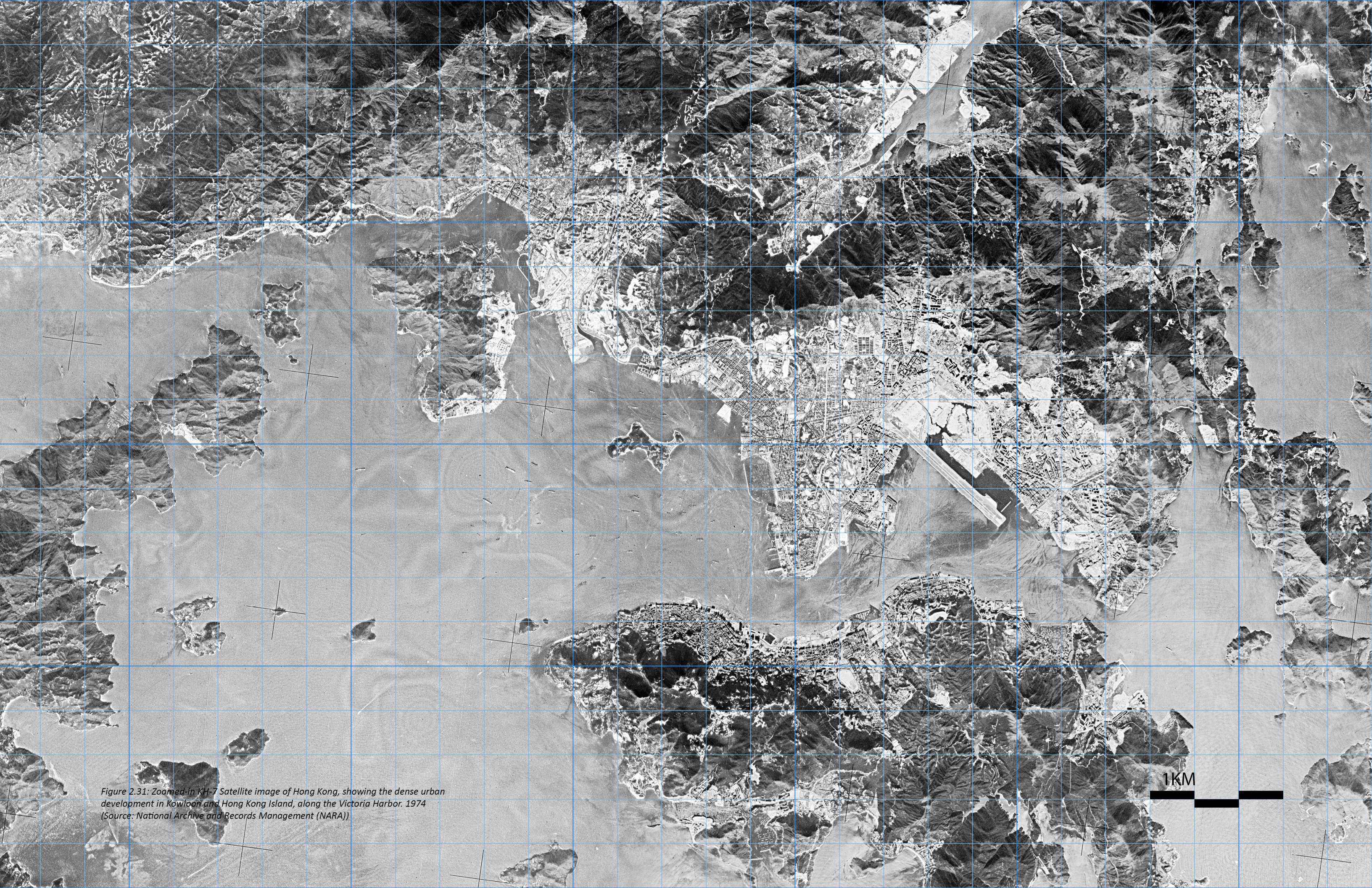


Figure 2.31: Zoomed-In KH-7 Satellite image of Hong Kong, showing the dense urban development in Kowloon and Hong Kong Island, along the Victoria Harbor. 1974 (Source: National Archive and Records Management (NARA))

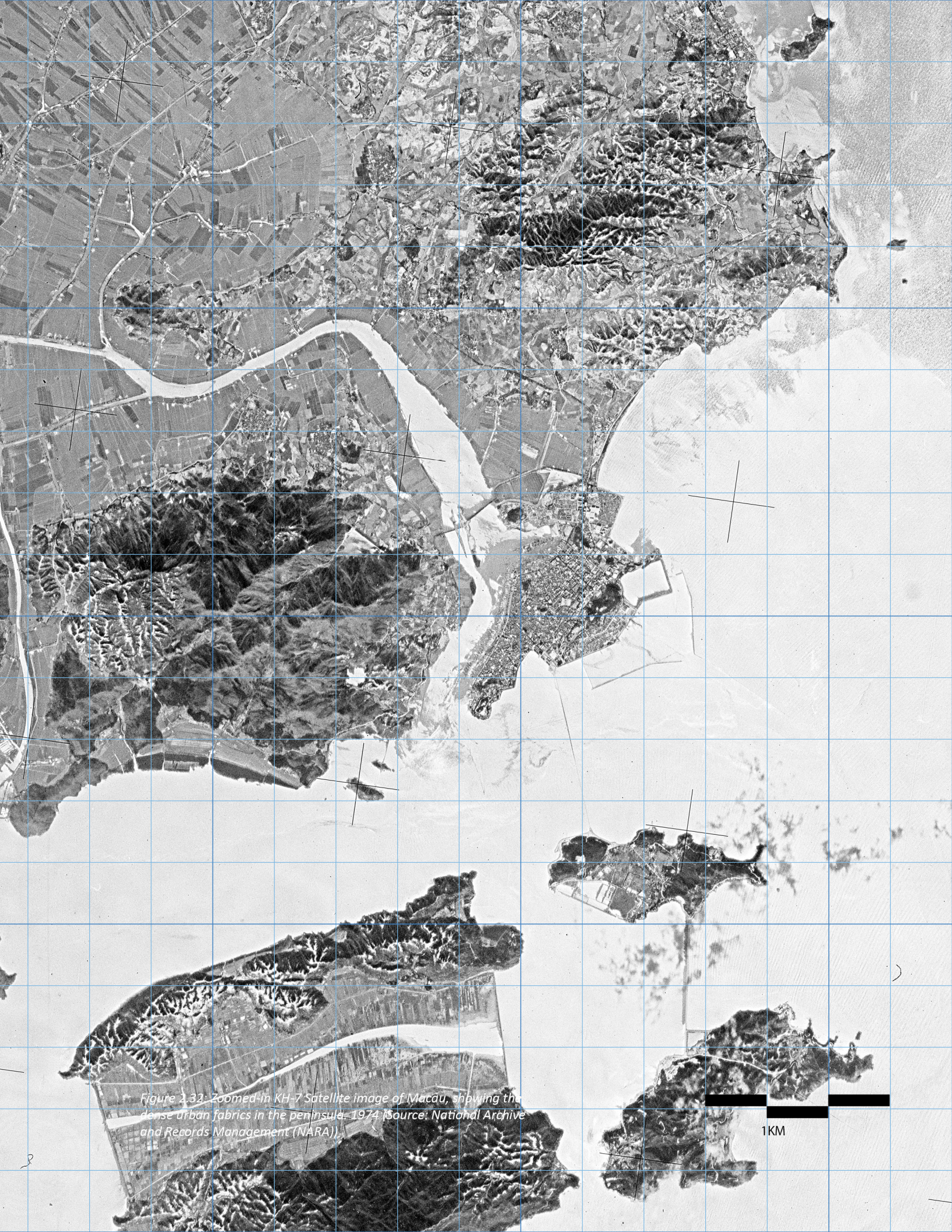


Figure 2.32. Zoomed-in KH-7 Satellite image of Macau, showing the dense urban fabrics in the peninsula. 1974 (Source: National Archive and Records Management (NARA))

1KM



Figure 2.33: Google Satellite Image of Pearl River Delta, showing the adjacent territorial regions, reflecting a new urban network of this area. 1988 (Source: Google Earth)

0 5 10 20km

CHAPTER 3

CONSTRUCTING **A TERRITORIAL CHAIN OF TWIN-CITIES** (1980s – 2000s)

CHAPTER 3: CONSTRUCTING A TERRITORIAL CHAIN OF TWIN-CITIES (1980s-2000s)

Since the 1980s, the successful economic reform in China benefitted not only the mainland but also Hong Kong and Macau. The increasing interaction among the cities in the Pearl River Delta after the ratification of the socialist market economy as the economic development system of China at 14th National Congress of the Communist Party of China in 1992 further helped the mainland cities in the Pearl River Delta realize their rapid urbanization, and Hong Kong and Macau completed their industrial upgrades. This chapter explores the drastic urban transformations and expansions of the Pearl River Delta during the last two decades of the 20th century through the lens of a twin-cities model. This special model is strongly identified during the research as a latent logic that guided the region's development, increased the regional competitiveness, and made the place a well-acknowledged global city-region. Specifically, the chapter discusses how twin-cities developed both as twins in the interconnections of collaboration and competition and as individuals in city-making. The urban pattern of the region evolved after the historic milestones of the sovereign transfer of Hong Kong and Macau in 1997 and 1999 respectively.

3.1 COUNTERPART TWINS

As colonial cities, Hong Kong and Macau benefited from access to knowledge and global markets and had completed their industrialization process before the 1980s, which laid strong foundations to transfer their manufacturing to mainland China and transform

themselves from cities of production to cities of services during the 1980s and early 1990s. The designation of Shenzhen and Zhuhai as Special Economic Zones was a strategic move to act as “overflows” for businesses in Hong Kong and Macau, and their impact on the Pearl River Delta was profound and immediate. A number of factors helped contribute to the meteoric rise of Hong Kong–Shenzhen and Macau–Zhuhai: a robust financial sector and a world-class seaport on one side, and a large and inexpensive labor pool, cheap and abundant land, and few regulatory impediments to rapidly growing companies on the other side.¹⁰⁹ These factors could be synthesized as mutual competitive advantages generated from the difference in economic and developmental levels between the two adjacent cities and the incentives from urban and economic policies, which provided fertile soil to grow the seed of twin interconnections. There is no doubt that collaboration is the largest feature of the twin-cities model. However, competition is also evident in this collaboration between twins not only because the twins were in different economic and political systems but because of the need to draw attention to oneself as a unique and valued individual city. In this sense, Hong Kong–Shenzhen and Macau–Zhuhai could be understood as two pairs of counterpart twins whose developments correspond to one another, where competition became enlarged after both sides of each pair reached a certain level of prosperity in the 21st century.

This relationship of twin-cities started with a practice of constructing *Enterprises of Three Import and Compensation Trade* (ETICT), which is a shorthand for enterprises established in

¹⁰⁹ Routley, Nick. Megacity 2020: The Pearl River Delta’s Astonishing Growth. *Visual Capitalist*. August 3, 2018

the Pearl River Delta on mainland China side that process imported raw materials, manufacture products according to imported samples, assemble imported parts, and those that repay loans for imported equipment and technologies from Hong Kong or Macau with products.¹¹⁰ This is a form of enterprise organization that was tentatively created in the early days of China's economic reform, using investment from overseas Chinese in Hong Kong and Macau to develop foreign trade—the general form of China's opening up to the outside world—and so forth accelerate urbanization.

The collaboration between the two sides was widened since 1992 when foreign-invested enterprises were introduced into China after DENG Xiaoping's much-publicized visit to the Special Economic Zones. There DENG announced that economic reform and the Open-Door Policy remained top priorities for the country, and dispelled the doubt about the commitment of the Chinese leadership to economic reform.¹¹¹ Foreign-invested enterprises, including Sino-foreign joint ventures, Sino-foreign cooperative businesses, and exclusively foreign-owned enterprises, are economic entities that are responsible for their own profits and losses but also enjoy certain freedoms allowed by state policy, freedoms which enabled them to flourish as media accommodating the interactions between capital and production.

¹¹⁰ Shi, Guangsheng. *China's Foreign Economic and Trade Reform and Development History*. Beijing: People's Publishing House, 2013. (石广声, 《中国对外经济贸易改革和发展史》, 人民出版社, 2013年。“三来一补”指来料加工、来样加工、来件装配和补偿贸易, 这是中国内地在改革开放初期尝试性地创立的一种利用港澳侨投资, 发展对外贸易的企业组织形式)

¹¹¹ Perry, Elizabeth. "China in 1992: An Experiment in Neo-Authoritarianism." *Asian Survey* 33, no. 1 (1993): 12-21.

Sino-Hong Kong and Sino-Macau enterprises played an irreplaceable role in building a wide-scale collaboration between the twin cities.

3.1.1 HONG KONG – SHENZHEN

Shenzhen was established as one of the earliest four Special Economic Zones along the coast—the experimental field—with much privilege from the state policy and as one of the most important zones for foreign investment. While overseas companies and corporations still held a wait-and-see attitude toward China, Shenzhen attracted much of its attention from Chinese businesspeople in Hong Kong and raised an upsurge of investment. Even before the SEZs were designated, many Hong Kong entrepreneurs had already intended to set up factories in Guangdong Province. In the 1980s, Hong Kong had capital, technology, and talent, meanwhile Shenzhen had available land and cheap labor. In this circumstance, Hong Kong companies and the Shenzhen Government agreed on the complementary collaboration method after a few successful explorative collaborations. More than 50,000 manufacturing campuses and production factories, which we classify as urban emergent, have been built in the towns—now suburbs and exurbs—of Shenzhen, like Henggang and Bantian, through financial support from Hong Kong investments, and one of the two most influential enterprises, China Resources, remains very active in city making and urban construction in the Pearl River Delta area today. A great extent of the explosive urbanization in Shenzhen is a direct result of the ETICTs, which replaced a large proportion of the rural township landscape with factories. Thus, the industrialization of the township happened very quickly.

By taking a processing fee the ETICTs became a major force in the processing trade, which forms a large proportion of the country's total trade volume. They played a key role in fostering the development of China's trade during the 1980s and 1990s and their production was exported abroad through Hong Kong. In October 1986, the “Regulations on Encouraging Foreign Investment” promulgated by the State Council improved the production and operation environment of foreign-funded enterprises. Many small-scale Hong Kong manufacturing enterprises moved labor-intensive production to Shenzhen on a large scale. Two-thirds of exports from the Pearl River Delta area had direct contact with Hong Kong companies. A spatial pattern of twin-cities, known as “front store and back factory”, was formed.¹¹² A direct reflection of this spatial pattern’s urban morphology was seen in the boom of production and factory campuses in Shenzhen and the construction of convention centers and financial service clusters in Hong Kong. The industrial park became the major means of urbanization in Shenzhen during the 1980s, and occupied more than one-third of the overall land. In Hong Kong, new high-rise buildings constructed for corporation headquarters occupied the front line facing Victoria Harbor. In this way, Hong Kong gradually moved its manufacturing industries to Shenzhen, and by doing this it not only boosted the economic growth of the Shenzhen and the Pearl River Delta, but also promoted its own economic and urban development, highlighted by the Bank of China Tower designed by I.M. Pei during 1985 to 1990.

¹¹² Li, S. “Pearl Riversville: a survey of urbanization in the Pearl River Delta”. Zheng.Yushuo. (Ed.) *The Guangdong development model and its challenges*, Hong Kong: City University of Hong Kong Press, 1998. pp. 81-109

Hong Kong's transformation at the end of 20th century into a global hub for commerce and finance was largely influenced by the series of reforms China undertook on state-owned enterprises (SOEs), as the real economy of China was expanded from 1992 to 1997.¹¹³ Before 1992, China's economy was mainly state-owned; in order to transform China's oversized state-owned enterprises into modernized corporations and open up new financing channels, the premier ZHU Rongji accepted the proposal from Charles Lee Yeh-kwong, the Chairman of the Hong Kong Stock Exchange, in 1993 to list selected state-owned enterprises on the overseas stock markets of Hong Kong. No more than one year after it first successfully raised 100 million dollars for Tsingtao Brewery in 1993, the Hong Kong Stock Exchange listed nine more SOEs and raised a total of 1.26 billion US dollars (9.792 billion Hong Kong dollars), accounting for 57% of the amount of funds raised by all newly listed companies.¹¹⁴ This action entered a climax in 1997 when Hong Kong was returned to China. In this way, from a small regional exchange center Hong Kong suddenly became a giant in the secondary market within a decade. During this process, Hong Kong continuously enlarged its capacity as a transfer hub, helping mainland China absorb foreign investment, introduce foreign advanced technologies and management know-how, as well as expand exports. This change brought confidence to the general overseas investors; hence, foreign direct investment in China also gained an unprecedented development, growing from 4.3

¹¹³ Chen, Xiangming. "A tale of two regions in China: rapid economic development and slow industrial upgrading in the Pearl River and the Yangtze River Deltas". *International Journal of Comparative Sociology*, 48 (2-3) (2007), pp. 167-201

¹¹⁴ Walter, Carl E., and Fraser J. T. Howie. *Red Capitalism: The Fragile Financial Foundation of China's Extraordinary Rise*. Newark: Wiley, 2011.

billion dollars in 1992 to 45.3 billion in 1997. Shenzhen, the closest city to Hong Kong, became the first and largest beneficiary of this growth. This collaboration was further expanded after the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA) was signed in 2003.

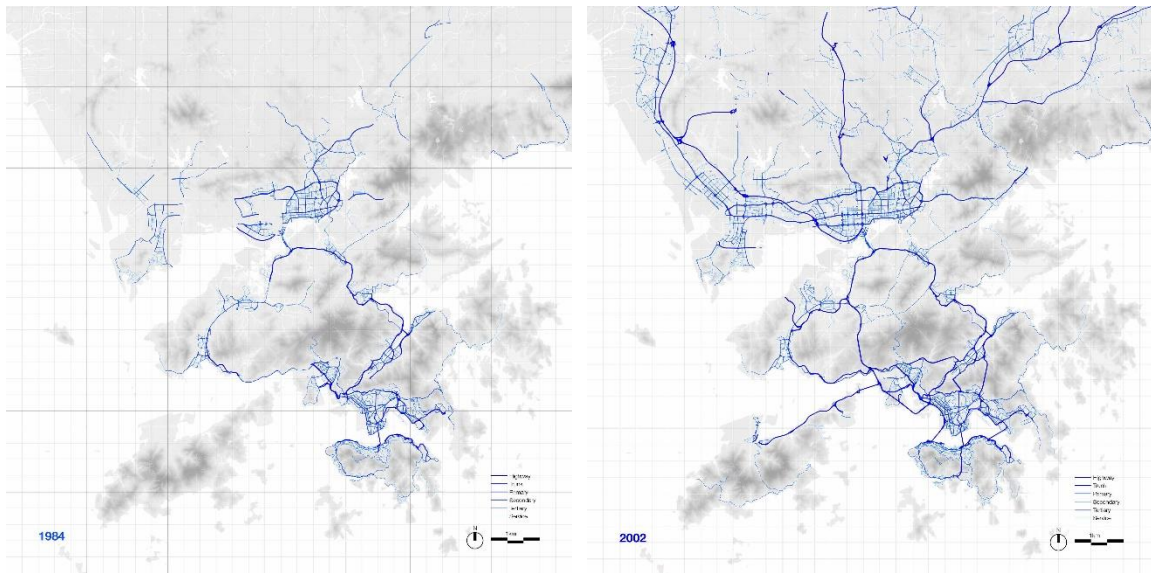


Figure 3.1: The growth of road network in between Hong Kong and Shenzhen (1984 vs 2002)

Although the model of “front store and back factory” brought Shenzhen and Hong Kong virtually and physically more connected than ever, as demonstrated in the great amount of infrastructure constructed during this period (Figure 3.1), given their different backgrounds the twin-cities still endeavored to distinguish themselves from one another spatially. A large belt-shaped natural space along the border between the two on the Hong Kong side, historically established to prevent illegal immigration from Shenzhen, has been maintained as a closed frontier area, clearly dividing the high-density developed twins. (Figure 3.2)

Besides, since the 1990s the planners and designers in Shenzhen have actively promoted a project of making its own city center—the Futian Central Business District—the representative feature of Shenzhen, similar to Victoria of Hong Kong. (Figure 3.3 and 3.4)

Before the 21st century, the twining of Hong Kong and Shenzhen could be generally characterized as the elder brother helping the younger one; the latter was imitating the former. Competition between the cities emerged when the economic environment in Shenzhen transformed in the mid-2000s, especially as the price of land and cost of labor drastically rose in Shenzhen. By 2013, the ETICTs faded away from the stage of the Pearl River Delta's history, and the former campuses entered regeneration procedures into new urban districts. As a result, the twin-cities relationship entered into a new pattern of collaboration: “the integration of shop and factory”. Some of Hong Kong's financial, logistics, and various commercial institutions started to move into Shenzhen, allowing the supportive processes of the manufacturing industry, along with the industries of financial services, research, and hi-tech to grow in Shenzhen.¹¹⁵ Despite the increased competition between them, by the end of the 2000s the interconnections of the twin-cities were tightened closer than ever when they were confronted by the issues of sustainability and pollution.

¹¹⁵ Development Research Center of the State Council of China. *Shenzhen-Hong Kong New Urbanization Strategy Research Project Report*. 2014.11. pp.6 (国务院发展研究中心“深港新型同城化战略研究”课题组,《深港新型同城化战略研究课题报告》)

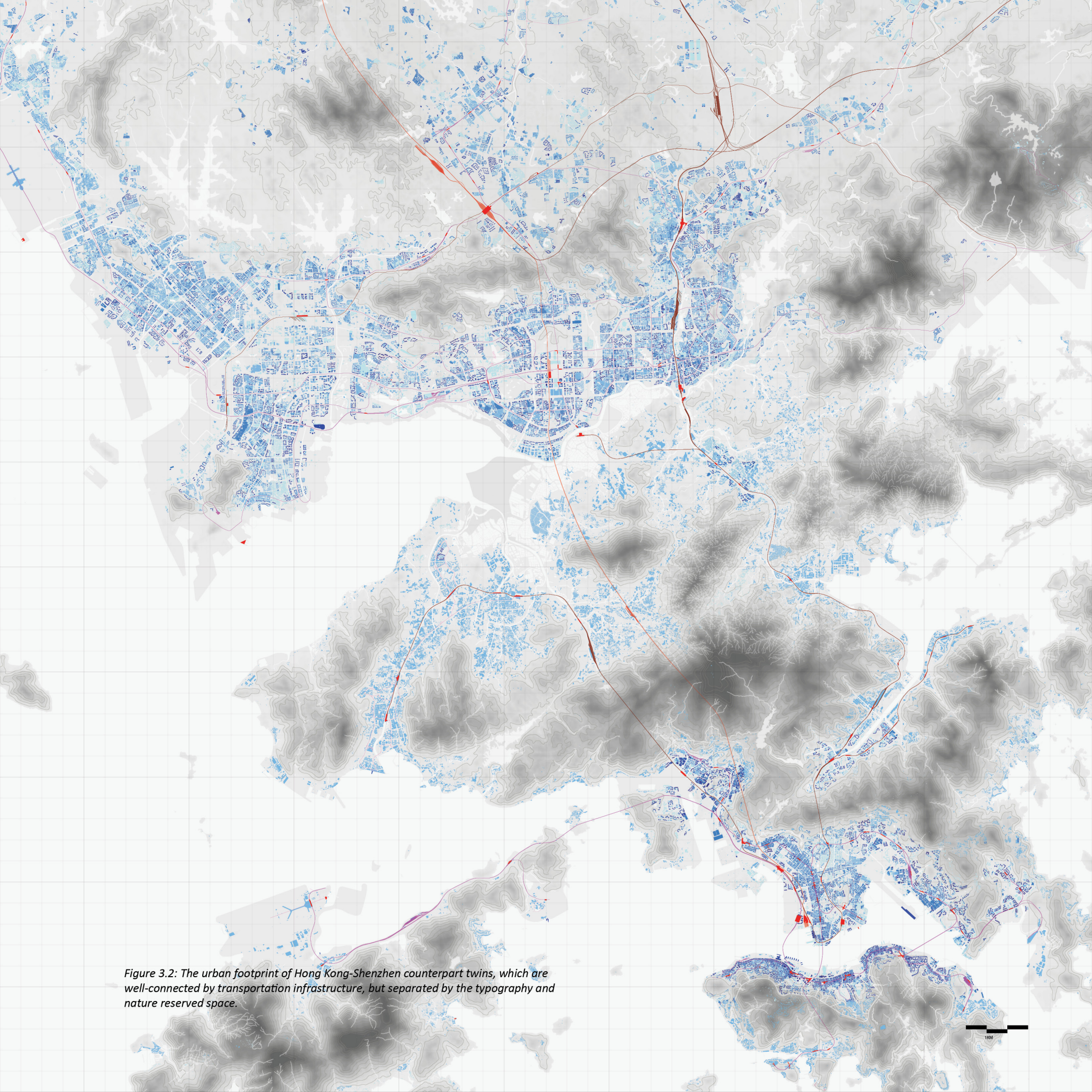


Figure 3.2: The urban footprint of Hong Kong-Shenzhen counterpart twins, which are well-connected by transportation infrastructure, but separated by the topography and nature reserved space.

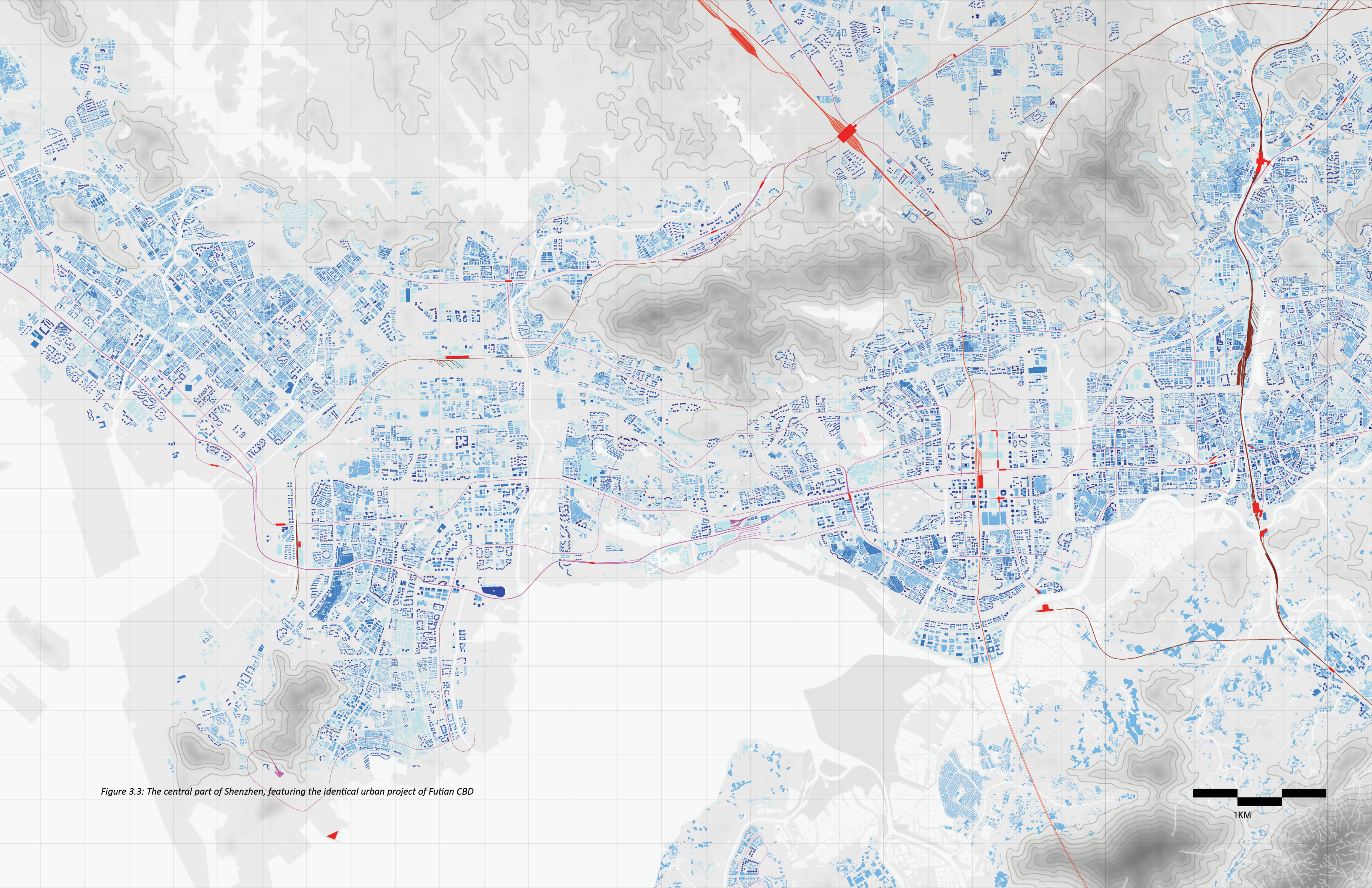


Figure 3.3: The central part of Shenzhen, featuring the identical urban project of Futian CBD



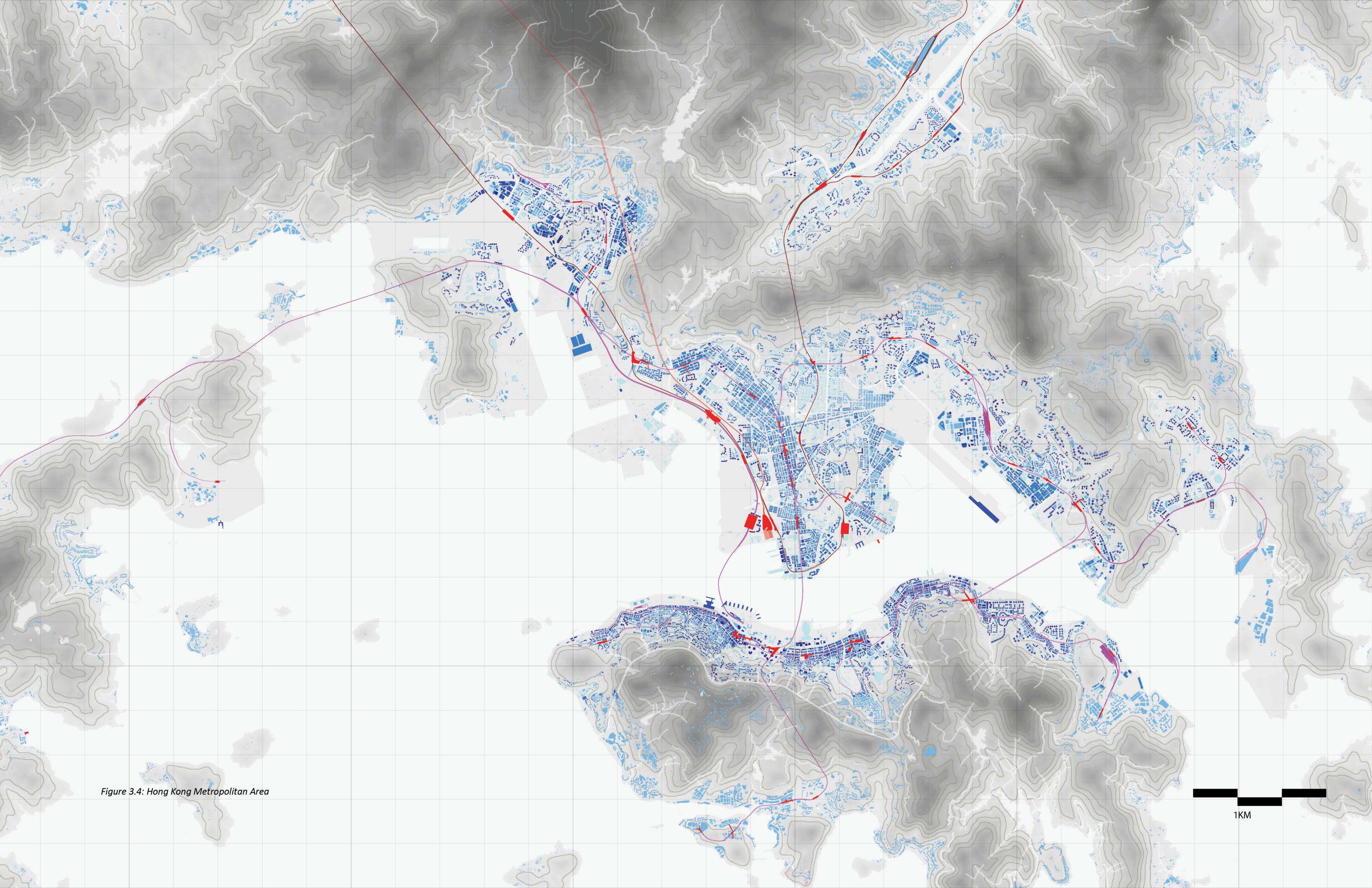


Figure 3.4: Hong Kong Metropolitan Area



Entering the new century, a new spatial idea of Hong Kong and Shenzhen emerged: The Work-Living Circle, which represents the potential of a future conurbation in which people can work in Hong Kong but live in Shenzhen, or even vice versa. The statistical data from 2011 reflected that among the 175,100 Hong Kong residents who traveled to Shenzhen in December, 57,000 of them were living in Shenzhen.¹¹⁶ This proportion is close to one-third, demonstrating the real possibility of this future movement between the twin-cities.

3.1.2 HONG KONG

During the 1980s, a free-trade economic system propelled Hong Kong to become an international financial center and one of the 'Four Asian Tigers', gaining other regions' recognition of Hong Kong's economic stature.¹¹⁷ The urban development in Hong Kong, whose pace was closely related to the pace of economic growth in the 1980s and 1990s, also gained tremendous achievements. Property development by the private sector manifested itself in the form of high-rise modern commercial office buildings and private housing around Victoria Harbor, which changed the urban feature of Hong Kong. (Figure 3.5) In the public sector, public housing and new town programs were actively pursued, which shifted the long-established concentration of urban development from around Victoria Harbor—notably Kowloon, New Kowloon, and Hong Kong Island—into a larger territorial

¹¹⁶ Census and Statistics Department of Hong Kong. *Social Information Collected from the General Household Survey: Special Report - Report No. 57: Hong Kong Residents Working in Mainland China*. 2011.10. pp.21 (香港特别行政区政府政府统计处《从综合住户统计调查搜集所得的社会资料：专题报告书- 第五十七号报告书：在中国内地工作的香港居民》)

¹¹⁷ Pui-Yin Ho. *Making Hong Kong: A History of Its Urban Development*. Edward Elgar Publishing, 2018.

spatial pattern. Hence, the Urban Area Development Organization was established and placed more attention on territorial and sub-regional planning.¹¹⁸



Figure 3.5: The panoramic views comparison of Hong Kong Center around Victoria Harbor from the Peak between year 1972, 1988, and 2010, indicating the private developments in the form of highrises that represented the urban feature of Hong Kong. (Source: Survey and Mapping Office, Lands Department of Hong Kong, Matthew Laird Acred and Claire Froome)

¹¹⁸ Lai, Lawrence Wai-chung. *Town Planning in Hong Kong: A Review of Planning Appeal Decisions*. Hong Kong [China]: Hong Kong University Press, 2012.

The Territorial Development Strategy (TDS) was formulated in 1984 as a more comprehensive forward planning mechanism for Hong Kong in and beyond the 1990s to replace previous piecemeal planning.¹¹⁹ It recognized the lack of coordination between urban development and the provision of transportation infrastructure especially in the new towns, where transportation was still inadequate, and proposed an integrated land-use and transport planning framework for the territory within which a hierarchical and multi-modal transportation framework was embedded. Inside the TDS, the Land-Use Transport Optimization (LUTO)—a computer-based data-driven mathematical model—was adopted to choose from a set of maximum potential development areas and transport networks, the optimal land-use pattern and transport networks for the future additional population and employment under a set of objectives and development constraints.¹²⁰ Hong Kong was divided into five different development sub-regions, and each was provided with a complete development strategy planning proposal across territorial, district, and local scales.¹²¹

The location of a new international airport was crucial in determining the future pattern of Hong Kong. But this discussion was complicated by the uncertainty of Hong Kong's political future after the lease would expire in 1997. As Britain's hope for the right to rule in exchange for sovereignty did not come to fruition, the colonial government promptly

¹¹⁹ Gar-On Yeh, Anthony. "Planning for Uncertainty: Hong Kong's Urban Development in the 1990s." *Built Environment* 11, no. 4 (1985): 252-267.

¹²⁰ Ibid.

¹²¹ Town Planning Division Lands Department. *Town Planning in Hong Kong*, 1984

cancelled plans to build a new airport and opted instead to expand Kai Tak Airport to address short-term needs.¹²² Various city design alternatives were conceived for different patterns of the growth based on the existing airport. They shared common ideas about the further development of existing urban areas through land reclamation, including West Kowloon for public housing projects, Hung Hom Bay and Wanchai for private development, and Central for the expansion of business and cultural activities. (Figure 3.6)

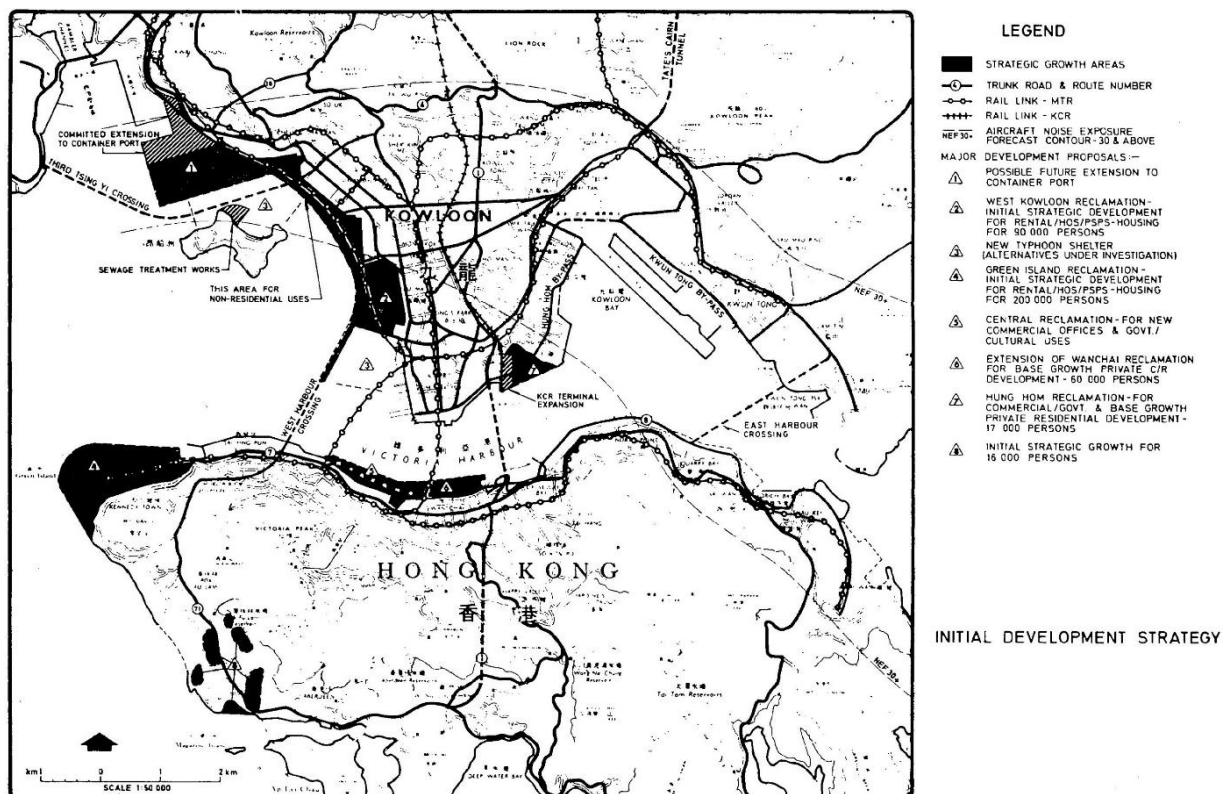


Figure 3.6: Initial Development of the Territorial Development Strategy – Development Area and Land Reclamation in the main urban area. (Source: Choi, Y.L. *The LUTO model and its applications in Hong Kong. Planning and Development (Journal of the Hong Kong Institute of Planners)*, 1(1), pp.21-31)

¹²² He, Peiran. *Making Hong Kong: A History of Its Urban Development*. Cheltenham, UK ; Northampton, MA, USA: Edward Elgar Publishing, 2018.

Hence, after completing of the new town program in the New Territories in the 1990s, the Territorial Development Strategy set the general direction of Hong Kong's city making to be reverted to these main urban areas. Following *the Territorial Development Strategy Review* with further in-depth discussion on the Metro Area's development in 1988, the Hong Kong Government published *Metroplan: The Aims*, which served as the blueprint for the city's top ten infrastructure projects for the long term, including the great extension of the MTR system to enhance the "outstanding center for Asia's World City".¹²³

Although much of the political uncertainty and anxiety of the political fate of Hong Kong was settled by *the Sino-British Joint Declaration* in 1984, the democracy movement incidents in May and June of 1989 in China made Hong Kong's economy plunge and affected the development of Hong Kong in the early 1990s. The government hence conceived the Port and Airport Development Strategy (Figure 3.7) and launched the 200 billion Hong Kong dollar Airport Core Program "Rose Garden Project" to boost the economy.¹²⁴ With a sizeable transportation network, the city was again able to expand considerably. Particularly, the project gave priority to the west with the expansion of the city to East Lantau and the westward extension of the city's core districts, which would expand the structure of Hong Kong and raise the reputation of the international metropolis with important projects including Chek Lap Kok Airport, Tung Chung New Town, and West Kowloon District. The new

¹²³ He, Peiran. *Ways to Urbanization: Post-war Road Development in Hong Kong*. Hong Kong: Hong Kong University Press, 2008.

¹²⁴ Government Secretariat Lands and Works Branch. *Port and Airport Development Strategy Final Report*. December 1989.

Hong Kong International Airport and Tung Chung New Town, commenced in 1998, extended Hong Kong's compact, high-density, and transit-led city form to the Pearl River Estuary in the far west.

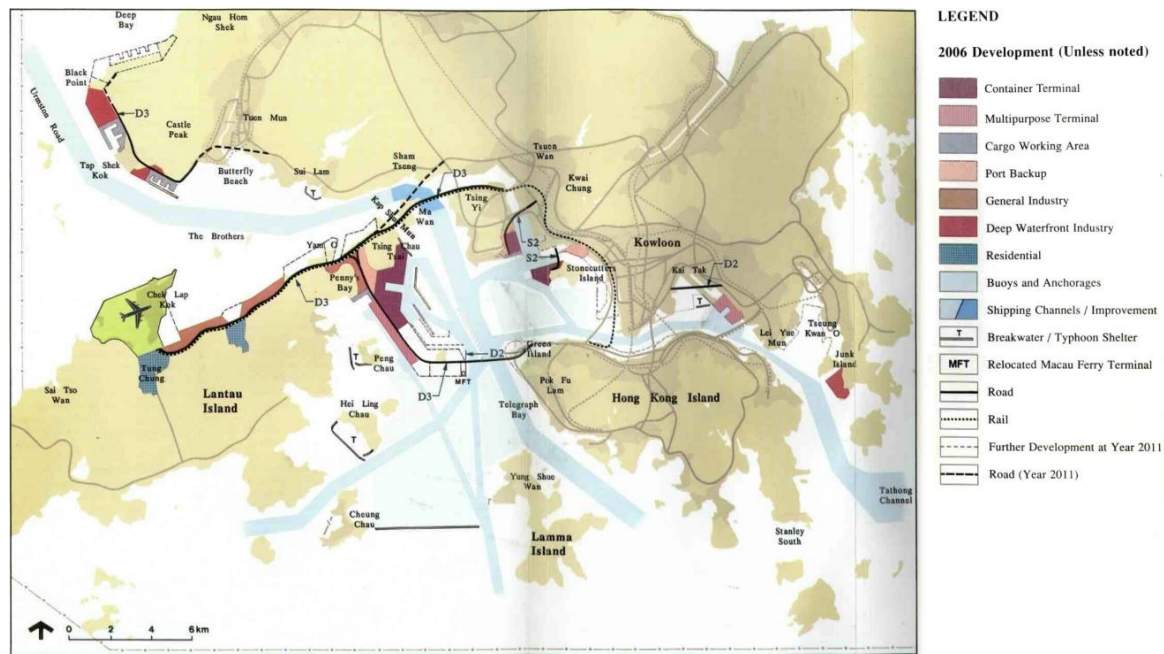


Figure 3.7: Selected Strategy for Airport Core Program, 1989 (Source: Port & Airport Development Strategy Final Report)

After its sovereignty was handed over to China on July 1, 1997, Hong Kong was established as a Special Administrative Region (SAR) under the system of “One Country, Two Systems”, which granted Hong Kong a high degree of autonomy in domestic affairs. It allowed Hong Kong's urban expansion and development to follow an independent urban consciousness and plan. Since 1997, the direction of urban planning and city design has been continuously adjusted and adapted. In the early years, the administration continued the practice of government-led formulations of blueprints for the future with economic development as its

focus, including the “85,000 Policy” as its Long Term Housing Strategy, which stated in the Policy Address by the first Chief Executive of Hong Kong SAR—Tung Chee-hwa—that no less than 85,000 public and private flats on average (including 50,000 public housing units) would be built annually starting in 1999. It aimed at boosting economic stability and development with a stable housing supply. Asian financial turmoil hit Hong Kong three months after the reunification and caused a deflationary period that spanned 6 years; as a result, the urban policy attempt of increasing the supply of residential housing was reduced to passive actions.

Confronting economic and political difficulties at the turn of the new millennium, especially after the financial crisis quietly scrapped Hong Kong’s housing policy, public confidence in the property market continued to fall and caused a substantial drop in the market. This would eventually impede the steady growth of Hong Kong’s economy, considering that historically it had always depended on the real estate sector since the first land auction in 1841.¹²⁵ Whenever there is economic recession, the government unveils stimulus measures featuring major infrastructure projects. Nine rail-transit projects including new MTR lines and extensions, 15 highways, and 15 reclamation projects were proposed to be completed in three different phases, by 2006, 2011, and 2016. (Figure 3.8) The Land Use–Transport Framework as a supplement to the Metroplan 2001 regulated the use and densities of the newly reclaimed area in order to make sure the new developments followed the urban language and the mixture of programs of Victoria Harbor. (Figure 3.9)

¹²⁵ Making Hong Kong.

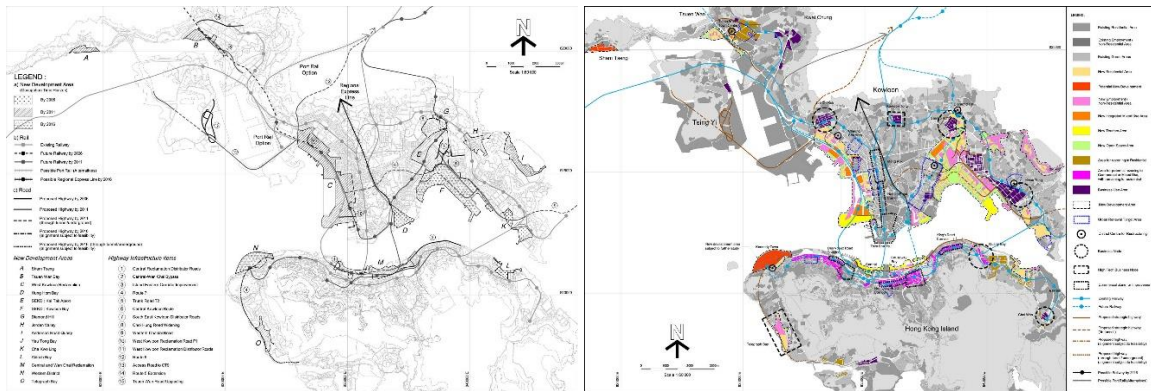


Figure 3.8: Sequence of Major Works in Metroplan, showing New Development Areas, Highway Infrastructure Items existing and proposed railway alignments and proposed highway alignments. 2002 (Source: Planning Department, Hong Kong)

Figure 3.9: Land Use-Transport Framework, showing 1992 (Source: Planning Department, Hong Kong)

In the decade since Hong Kong's return, public participation in urban planning became far more enthusiastic, and specifically raised the conservation of historic buildings to an unprecedented importance for the purpose of the preservation of collective memories and the inheritance of cultural values. Adopting a more modern ideology and democracy, the government was inspired to maintain historical buildings during the urban development and renewal, becoming more proactive in promoting heritage conservation. Since 2006, *Outline Zoning Plans* and conditions of sale were used by the city as primary means of controlling building heights and density on both sides of Victoria Harbor to protect the classical scenery. A series projects such as the Central Police Station Compound and Tamar Development (Central Government Offices) were carried out continuously, and a policy was produced and subscribed in *Hong Kong 2030: Planning Vision and Strategy*, the masterplan issued by the planning department in 2007. Besides stressing the protection, conservation, and revitalization of projects related to historical and heritage sites, this 2007 masterplan of

Hong Kong tackled the aspects of a good-quality living environment, an adequate provision of land and infrastructure, as well as sustainable growth.¹²⁶ It also positioned Hong Kong within the regional development of the Pearl River Delta and envisioned a new round of a rail-based development pattern, facilitating not only the spatial but also the socio-economic integration with the mainland. (Figure 3.10)

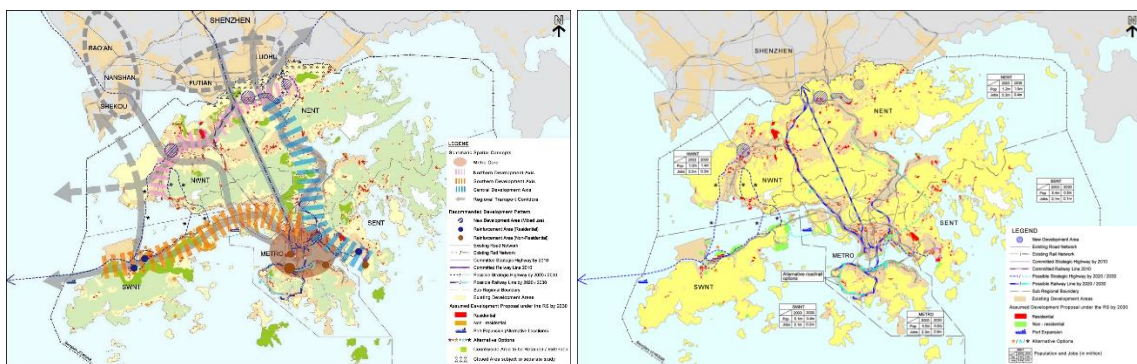


Figure 3.10: Hong Kong 2030: Planning Vision and Strategy, Recommended development pattern (Left) and Preferred development option for Hong Kong (Right). (Source: Hong Kong Planning Department)

3.1.3 SHENZHEN

Shenzhen's urban development in the last two decades of the 20th century was phenomenal, as it became the most successful Special Economic Zone in China. Initiated as the productive hinterland for Hong Kong, Shenzhen provided cheaper labor and land to accommodate the expansion of the private sector business operations from Hong Kong. At the beginning of the 1980s, the construction of industrial parks was the major method of urbanization, conducted by individual companies to build the necessary infrastructure, factories, and

¹²⁶ Hong Kong Planning Department. *Hong Kong 2030: Planning Vision and Strategy: Inception Report*. 2001

housing following the experience of Shekou. During the middle of the 1980s, the industrial park occupied 31.3 percent of the SEZ's land, among which Shekou, Overseas Chinese Town (OCT), and Nanyou were the most paradigmatic developments.¹²⁷ A land-leasing model was adopted by the government to extract revenue for building large infrastructures to accommodate the rapid urban growth of the 1990s, which allowed real estate developments to soar in the process of city making in Shenzhen. In the 2000s, the boom of modern service industries, especially information technology, in Shenzhen led the industrial restructuring which caused large-scale post-industrial redevelopment and urban densification. (Figure 3.11)

Through strong planning and infrastructural development Shenzhen saw an average annual population growth of around 30%. In 2007, it had a GDP of almost 100 billion dollars, ranking it fourth among all Chinese cities, and Shenzhen's GDP per capita surpassed 10,000 dollars, the first Chinese city to do so.¹²⁸ For a city that experienced this type of rapid growth, forward-thinking planning and design was necessary to transform Shenzhen's economic success into good city-making practices, given that an insightful plan reflects the values and the new shape of culture. Four important masterplans were implemented within the span of 25 years, and each provided profound thinking and a general direction for Shenzhen's urban growth.

¹²⁷ Li, Jiang. 园区整合：产业空间重构的必然选择. *Economic Geography*. 2008.7

¹²⁸ Shenzhen Shi Di Fang Zhi Bian Zuan Wei Yuan Hui. *深圳市志 Shenzhen Shi Zhi*. 第 1 版. ed. Beijing Shi: Fang Zhi Chu Ban She, 2004.



Figure 3.11: The transformation of Shenzhen Nanshan District from 1985 to 1995, 2005 to 2010. (Source: CHEN Zonghao)

The 1986 masterplan enhanced the existing urban structure of Shenzhen that was framed by the initial 1982 masterplan, and provided more views on land use and industrial development. (Figure 3.12) The belt-shape spatial layout of Shenzhen was embedded with three more clusters in between the existing three clusters and divided and distinguished the clusters with the natural landscape and green corridors. (Figure 3.13) From west to east, each of the six clusters that concentrate growth and infrastructure along three highways was planned to perform different roles: Qianhai Bay was planned for the port function; Nantou Cluster, anchored by Shekou Industrial Zone, aimed to develop commercial and

industrial functions; Overseas Chinese Town (OCT) Cluster in Shahe accommodated comprehensive land uses ranging from industry, tourism, real estate, and commerce; Futian Cluster was designated to become the new identifiable city center with administrative and commercial functions; Luohu retained its function for commercial and residential use; and Shatoujiao Cluster on the far east was to be developed into a major industrial area of processing and manufacturing with port.¹²⁹ Within the plan, 15 industrial zones in various sizes were designated to facilitate the technology and capital-intensive enterprises, and 179 residential areas were planned to provide sufficient living space for the anticipated influx of population. The planning area of the 1986 masterplan was confined within the Second Line, and the plan intensified the accelerated urban expansion largely along Shenzhen's central spine—Shennan Avenue.

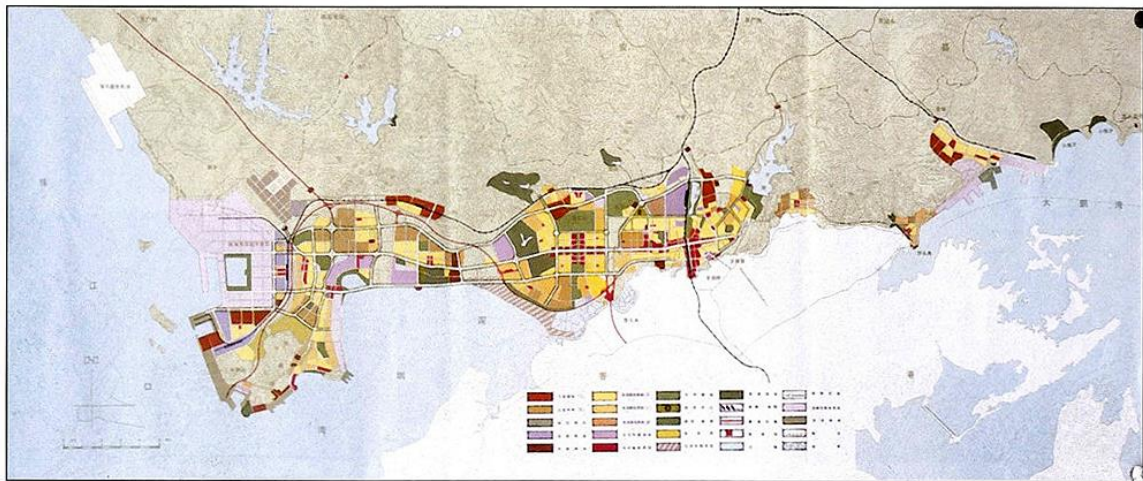


Figure 3.12: Comprehensive Masterplan for Shenzhen Special Economic Zone (1986-2000). 1984. (Source: China Academy of Urban Planning and Design)

¹²⁹ Shenzhen Bureau of Construction and China Academy of Urban Planning & Design, *Comprehensive Masterplan for Shenzhen Special Economic Zone*. 1986.

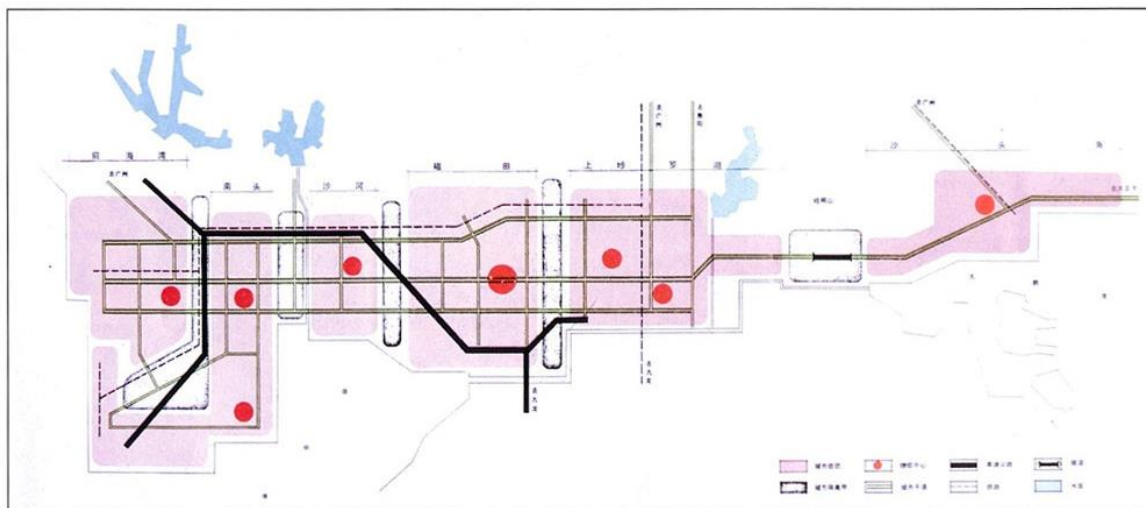


Figure 3.13: Urban Structure Plan for Shenzhen Special Economic Zone (1986-2000). 1984. (Source: China Academy of Urban Planning and Design)

In the early 1990s, under the circumstance of lacking direct financial support from the central government, Shenzhen fully leveraged the new urban land policy and promulgated the “Regulation on Shenzhen SEZ Land Administration” in 1987 for generating adequate revenue from “land-use fees” to raise funds for urban infrastructure and continuous urban development. Before this policy, the land in Shenzhen was developed through administrative allocation by the SEZ authority; the new policy facilitated the coexistence of the land market and administrative control through transfer of land-use right by agreements, tenders, or auctions.¹³⁰ This new land-centered urban policy was later identified as one of the most important driving forces operating behind the intensive land development and spectacular expansion of Shenzhen. Afterward, the urban growth of Shenzhen outpaced the overall masterplan, especially in developments in Bao’an County,

¹³⁰ Luxin Huang, Yongqing Xie and China Academy of Urban Planning & Design, China. *The Plan-led Urban Form: A Case Study of Shenzhen*. 48th ISOCARP Congress. 2012

which became an out-of-control situation due to a lack of an adequate monitoring system in rural areas. The unprecedented growth and lack of zoning controls lead to major urban sprawl in Shenzhen, which urged the government to modify the planning scale to address all district, city, and metropolitan scales.



Figure 3.14: The Central Sub-Territorial Plan of Shenzhen, 1989. (Source: Urban Planning and Design Institute of Shenzhen)

Learning from Hong Kong, Shenzhen established a statutory planning system and created the Shenzhen Strategic Planning in 1989. Like the Territorial Development Strategy of Hong Kong, the plan targeted the whole Shenzhen-Bao'an territory, within which the SEZ was treated as the city center rather than the city. The specific Central Sub-Territorial Plan of 1989 (Figure 3.14) gathered the labor-intensive industries within non-SEZ districts in the northeast outside the Second Line and consolidated them around Longhua, Guanlan, Buji, and Henggang, four towns forming “periphery growth clusters”, in order to solve two issues:

the apparent land scarcity in the SEZ that became a bottleneck for accommodating new development, and the largely scattered and chaotic development outside the SEZ.

The masterplan of Shenzhen 1996-2010 (Figure 3.15) envisioned the future of the city at the scale of the whole administrative territory of 2,020 km² with the spatial structure of three vertical axes, three rings, and 17 functional urban clusters including nine development clusters and six independent towns. (Figure 3.16) The spatial layout of the city was organized in two systems: the urban development space, which formed a “W” shape, and the environmentally sensitive area protected as natural conservation space, which formed an “M” shape, providing a macro-scale picture of the new Shenzhen.¹³¹ The original six urban clusters inside the SEZ were regrouped into three, which became the beginning points of the three urban axes. In late 1990s and early 2000s, most of the structures being built in overall Shenzhen were low-density manufacturing and housing units. City officials feared that the low-density spread would eventually cause Shenzhen to run out of space, and the economic engine of Shenzhen would come to a halt. Hence, an idea of “urban regeneration area” in the city center was conceived by the planners to clear dilapidated low-density buildings and properties to build newer, higher-density facilities. This tactic was reinforced by stricter building codes that encouraged higher-density industries and residential buildings. During the tenth five-year plan period (2001–2005), 33 billion RMB was invested by the city for urban regeneration in Luohu District, the first constructed urban

¹³¹ ibid

cluster in Shenzhen, and the district achieved the urban success of creating a real downtown for Shenzhen.

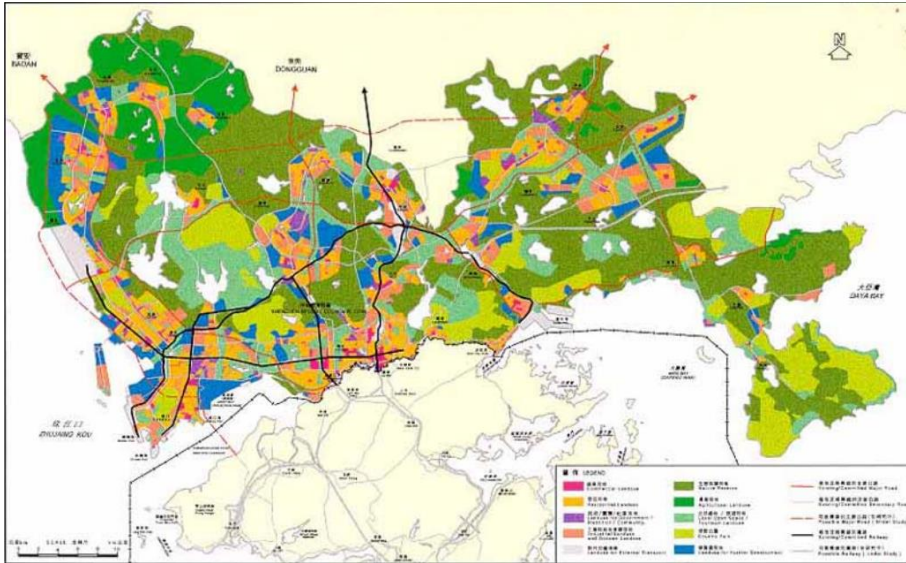


Figure 3.15: Shenzhen Comprehensive Plan (1996-2010) (Source: Urban Planning & Design Institute of Shenzhen)

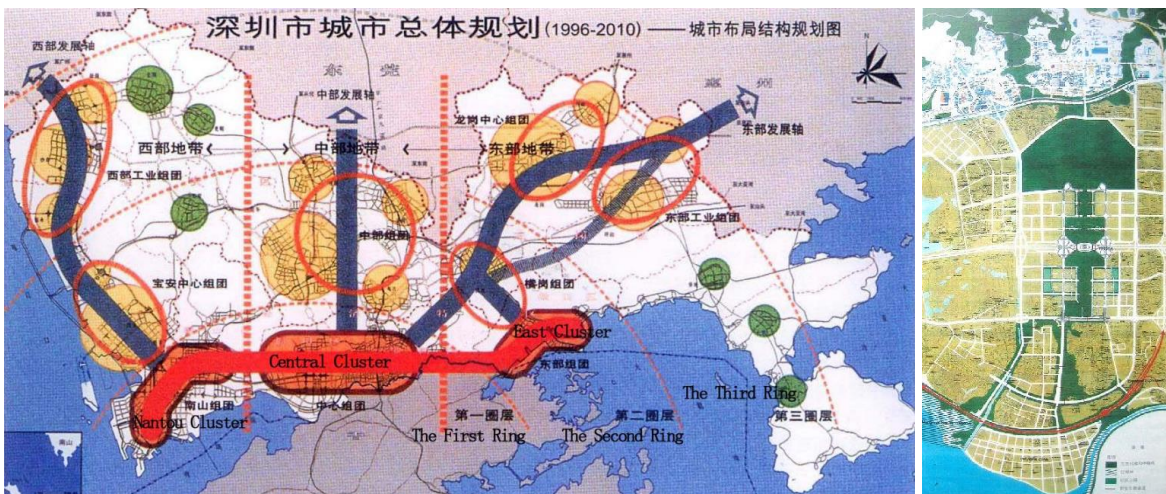


Figure 3.16: (Left) The Urban Structure of Shenzhen, Shenzhen Comprehensive Plan (1996-2010) (Source: Urban Planning & Design Institute of Shenzhen)

Figure 3.17: (Right) Futian Center / Futian Central District was strategically located at the cross of the two axes of Shenzhen, 1990. (Source: Chen, Yixin. The Historic Research on 30-year urban planning and construction of Futian Central District)

After 2000, many areas were constructed which had a significant impact on the urban structure. After many years of effort in designing and constructing a “postcard destination” for Shenzhen since 1999, the 6 km² Futian Center had been generally completed, offering a concentration of civil amenities and public urban facilities designed by world renowned architects including Rem Koolhaas, Arata Isozaki, and Coop Himmelblau, as well as extensive commercial and office high-rises designed by American firms including KPF and SOM. Futian Center was a political, strategic, and urbanistic project to meet the demand of an emerging metropolis with a population of over ten million. It was designated at a strategic location, situated at the cross of Shenzhen’s metropolitan vertical and horizontal axes. (Figure 3.17)

The center of the project was planned as a 600 by 600 meter park, also known as Crystal Island. (Figure 3.18) The winning proposal for the 1998 international urban design competition by Lee Timchula Architects followed a gridiron, composed by multilayered grids consisting of 16 roads, two expressways, four metro lines, and the Guangzhou–Hong Kong high-speed rail.¹³² (Figure 3.19) The existing Shennan Avenue with its 132 meter-width cut the district into north and south sectors, with civic programs on the north and offices gathered in the south, and the residential buildings were allocated in four corners. Kisho Kurokawa, Obermeyer, and SOM further developed detailed schemes for properly organizing the pedestrian and public space, urban traffic, and the underground space to connect the whole district. The construction of the Futian Center was based on these

¹³² Shenzhen planning and land Resource Bureau. *The international urban design consultation for core areas of Shenzhen central district*. Beijing: China Architecture & Building Press, 2002:13-20.

collective efforts that were synthesized into a final masterplan by the Urban Planning and Design Institute of Shenzhen in 2004. (Figure 3.20)

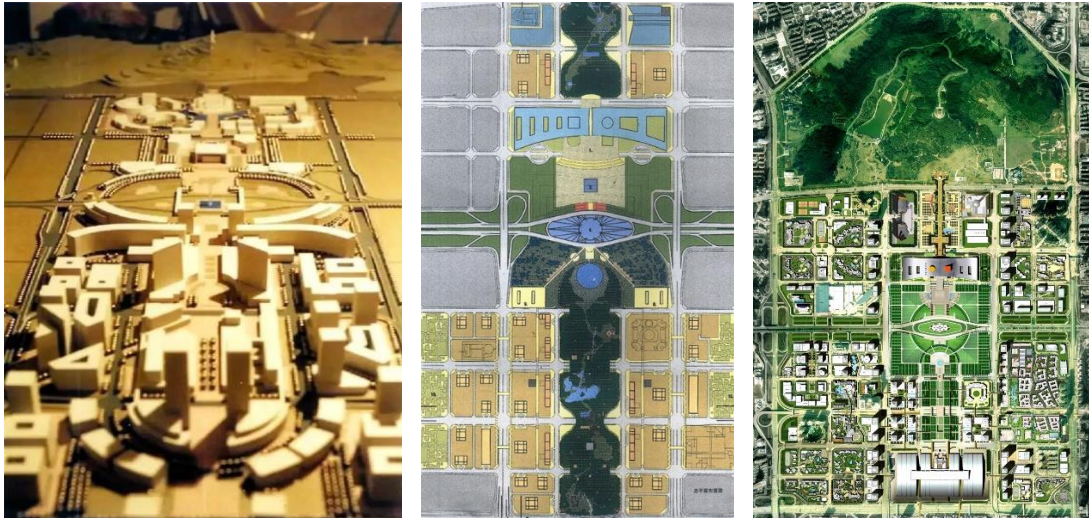


Figure 3.18: (Left) The physical model of the initial planning proposal for Futian Center by China Academy of Urban Planning and Design, 1992

Figure 3.19: (Middle) The winning proposal of the international urban design competition for Futian CBD by Lee Timchula Architects, 1998

Figure 3.20: (Right) The final masterplan by Urban Planning and Design Institute of Shenzhen, 2004.

The construction area in the area of Shenzhen outside the SEZ further expanded at this stage. The new central axis that extended from Futian Center up to Longhua and Guanlan gathered major areas for real estate development and a high-tech campus. The eastern axis, led by Longgang Industrial Area, transformed into logistic parks and transportation. With this masterplan-led approach of urban development, Shenzhen gradually grew into an urban entity with a relatively clear metropolitan structure.

Although the urban planning and design strategies were effective in city-making in Shenzhen, which could be seen from its current urban form, it is often accompanied by great uncertainties because no matter how bold and predictive the plans were, they always were slower compared with the real development process. For instance, “urban villages” as the major place to accommodate millions of migrants popped up illegally on previously bypassed construction sites around designated growth boundaries of urban clusters. As the spatial outcome of certain urban development processes, the urban villages became a quite unique and challenging urban phenomenon in Shenzhen’s physical environment. In order to address this issue, the masterplan prepared in 2006 paid much attention to the enhancement of the urban structure proposed in the 1996 masterplan and emphasized the intensification of the existing urban clusters.

3.1.4 MACAU – ZHUHAI

As a replica of the Hong Kong–Shenzhen twins in a smaller scale, Macau–Zhuhai is another pair formed with the intention of the central government of China at the very beginning of the Open-up Policy. Zhuhai was established as a Special Economic Zone to leverage its geolocational adjacency with Macau, another globally important free port in the Pearl River Delta, so that it could better absorb international capital and technologies through Macau. Also supported by the state and provincial policies, a large amount of investment entered Zhuhai and several ETICTs were built, which in return stimulated the economic development and urbanization in both Macau and Zhuhai. By 2009, there was a total of 4,306 factories

established by Macau's 1.9 billion dollars investment, which occupied 39.83 percent of overall foreign investment in Zhuhai.

The twin-cities experienced two stages of cooperation, the first from 1978–1999 and the second from 2000 to the present, with the dividing line the handover of Macau to China from the Portuguese Government. The first period started with the signing of the trade agreement between CAO Guangbiao's Xiangzhou Wool Textile Factory and the Zhuhai County Revolutionary Committee immediately after the announcement of "Proposal for conducting external processing and assembly business" by the State Council.¹³³ Xiangzhou Wool Textile Factory imported modern technology and oversea materials into Zhuhai and the production was sold to Hong Kong and Macau, and the plants and factory invested by CAO Guangbiao belonged to the Zhuhai Government. Before the end of 1979, eight processing factories were built: Dahuanshan, Qianshan, Lunpu-Village, and Baishi wool textile factories, Xiangzhou and Gongbei glove factories, as well as Qianshan Handbag factory. Within the same year, the first Sino-foreign cooperative passenger car company in Zhuhai was invested by WU Guiying and BAO Gen from Macau, breaking the old system in which the government managed all passenger cars, and introducing the taxi-system into the city. In 1980, HE Xian, the president of Macau Gongbei Tourism Development Co. Ltd., in collaboration with Zhuhai Tourism Company, developed 3,300 m² Gongbei Hotel. Within the same year, Macau Xinlian Real Estate Cooperation invested 21.48 million dollars, and along

¹³³ 1978 年 7 月 18 日，国务院颁布《开展对外加工装配业务试行办法》打破我国以商品买卖为主的单调的对外经贸形式。

with the Special District Development built the first Sino-Foreign real estate development project in Zhuhai: Yin Hai New Village. These two projects initiated an era of Macau developers working hand-in-hand with government-backed enterprises in Zhuhai to construct large urban developmental projects. Until 1981, 162 ETICTs were established on the outskirts of the Zhuhai SAR, surrounding the mountain, and this number continued to increase until it reached 902 in 1990, when Macau and Zhuhai's interconnection reached its peak and they were physically connected in March by the Gongbei Yingbin Avenue project.

While actively introducing foreign capital, Zhuhai also paid attention to expanding outward and investing in Macau. In 1982, Zhuhai set up its first overseas enterprise—Macau Pearlescent Company—in Macau. By the end of 1993, Zhuhai had established 25 enterprises in Macau. The development of these enterprises not only played a role as a bridge for Zhuhai to expand its external connections, but they also effectively ensured a supply of raw materials to Zhuhai and trained a large number of talents to adapt to the development of an export-oriented economy, making the whole economy of Zhuhai become more systematic. Although Zhuhai's role in Macau's diversification into a service economy was relatively limited when compared with the contribution of Macau on Zhuhai, it was effective.

Following 1999, the cooperation between the twin-cities took a giant stride forward in their second stage. The investment of Macau capital in Zhuhai was reoriented from manufacturing to service industries, and the area of service industries in the general economy has gradually expanded. Since 1999, leveraging its advantage as the only place where

gambling is legal in China, Macau's economy has soared, and its average annual growth rate from 1999 to 2017 has been an incredible 12%, peaking at 27% in 2010. The boom of the gambling industry in Macau drove the development of tourism in Zhuhai. Hence, the mechanism of the twins has been promoted to a multi-level, widespread, and all-round cooperation, and gradually formed a cross-city economic pattern with mutual dependence, prosperity, and cooperation. The increasing exchange of economic activities contributed to the densification of urban development at the border, which made the twins spatially more connected. (Figure 3.23) Cross-border urban projects started to emerge, such as Zhuhai-Macau Cross-Border Industrial Zone or *Zona Industrial Transfronteiriça de Zhuhai-Macau*, constructed on a reclaimed island in between Zhuhai Gongbei and Macau's Ilha Verde. The 0.4 km² project is divided by a 15-meter wide canal into two campuses, the 0.29 km² Zhuhai Campus and the 0.11 km² Macau Campus. The overall masterplan is consistent in the formation of building blocks, though the administration of the zone is divided. (Figure 3.22) The major program is textile and garment production, but it is also supported by other programs including pharmacy, precision machinery, food processing, warehousing and logistics. The concept of this collaboration zone was initially raised by businesspeople in the garment industry in Macau to prepare for the impact of the upcoming cancellation of "the global quota system for textiles and clothing" on Macau in 2005. In August 2002, the Macau SAR Chief Executive Edmund HO Hau Wah proposed this project to the political leaders of Guangdong Province and received the confirmation of the state council in December 2003. This cross-border industrial zone is intended to boost Zhuhai's industrial strategy of extending westward, leading to the optimization and upgrading of Zhuhai's industrial

structure and technology; for Macau, it is intended to help expand the development space of Macau enterprises and promote the development of secondary industries in Macau. This is crucial to Macau as it endeavors to revitalize the textile and garment industry, which will eventually optimize an industrial structure that is currently dominated by the gaming industry.



Figure 3.21: Zhuhai-Macau Cross-Border Industrial Zone or Zona Industrial Transfronteira de Zhuhai-Macau

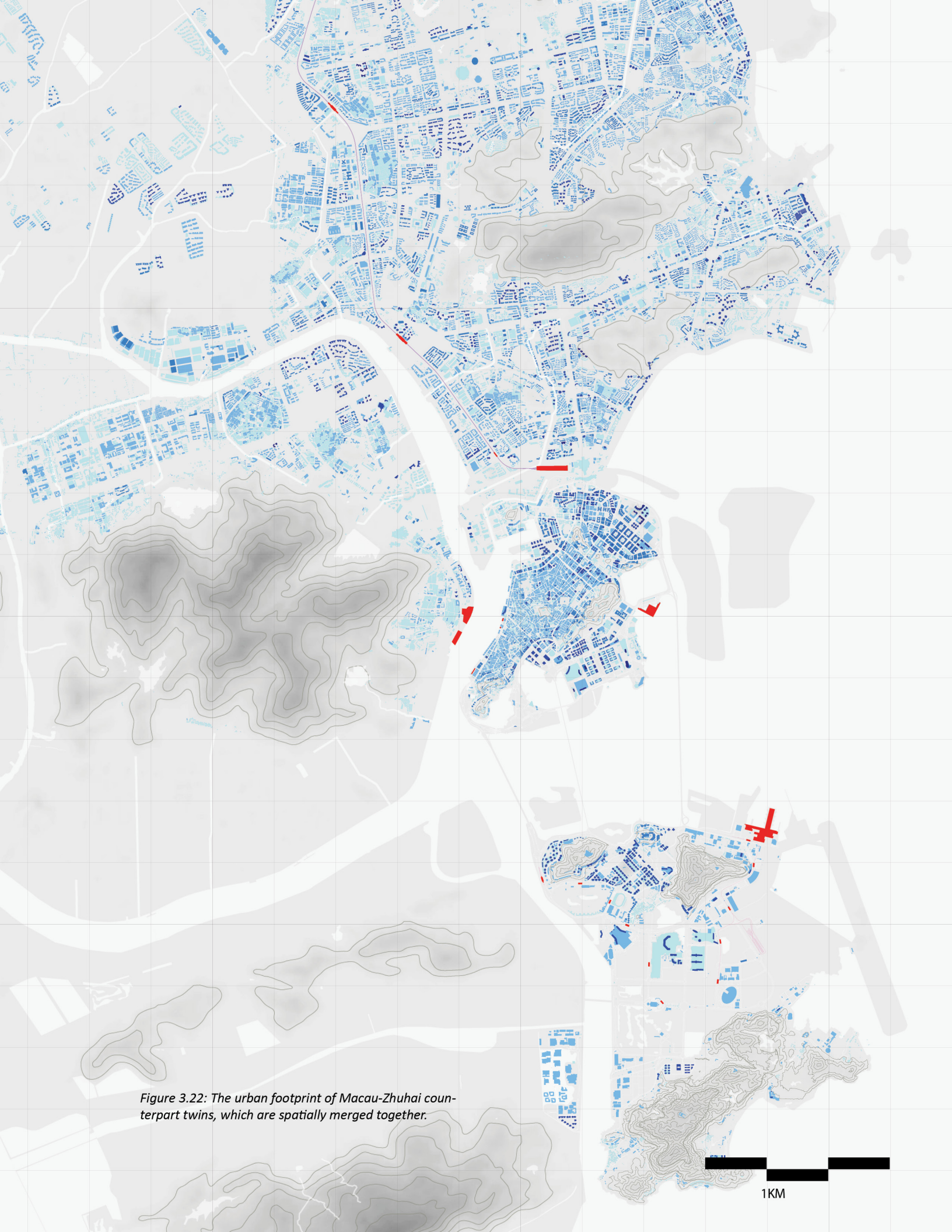


Figure 3.22: The urban footprint of Macau-Zhuhai counterpart twins, which are spatially merged together.

3.1.5 MACAU

At the beginning of the 1980s, the district of Areia Preta in the upper part of Macau was predominated by light industry, and was characterized by low-cost housing and some high-rise buildings. The relaxing of border controls with China along with considerable development planning and construction in the contiguous Zhuhai Special Economic Zone has had a dramatic effect on the modern urban landscape of this area of the upper peninsula.



Figure 3.23: Map of Macau 1980 with white area shows the NAPE and affordable housing project area (Source: The Library of Congress)

Figure 3.24: Model of the plan for urban planning strategy for Macau, showing comprehensive regional development planning study for Areia Preta and the NAPE. (Source: Palmer and Turner, Gabinete de Arquitectura e Planeamento, Macau.)

As a reaction to the opportunities and challenges raised by the adjacent development of Zhuhai, the Macau government in 1982 announced an urban planning strategy that focused city extension across newly reclaimed land at the Outer Harbour to create a modern service

industry district of casinos, hotels, and shopping centers; this included the Novos Aterros do Porto Exterior (NAPE) and low-cost residential areas in Macau's north.¹³⁴ (Figure 3.24 and Figure 3.25) The main purpose designated to the project was to provide real estate development in an organized and balanced way to liberate the old part of the city from all-pervading speculative forces, which were inexorably reducing old Macau to the limited urban norm. Due to an acute awareness of the architectural heritage that was fast disappearing, the Macau Government intended to slow down the rate of change in the old city, and sought a reprieve by declaring a moratorium on high-rise building in the older, more sensitive areas while it established a basis for future planning to preserve discrete parts of the city's historical center.¹³⁵ From 1982-1988, Álvaro Siza Vieira and Fernando Távora participated the NAPE project, designing a layout in the shape of a regular grid, with the length of a block (north-south) twice as the width (east-west) and strict height control of 22 meters, well integrating residential areas with social and public facilities. (Figure 3.26) Blocks would be leased to private developers and could be developed separately but in a high degree of visual coherence. The central promenade was designed as a continuation of the one in ZAPE. Unlike the plan for the ZAPE reclamation in the 1920s, the plan for NAPE was officially recorded in the Boletim Oficial and supported by regulations and laws, which meant architects who designed buildings in NAPE would have strictly limited scope for individual expressions.

¹³⁴ Hendrik Tieben. "Urban Image Construction in Macau in the First Decade after the "Handover", 1999-2008." *Journal of Current Chinese Affairs* 38, no. 1 (2009): 49-72.

¹³⁵ Duncan, Craig. "Macau." *Cities* 3, no. 1 (1986): 2-11.

But the building regulations of NAPE were unfortunately violated in order to cope with the rapid tourism development and urgent demand for hotels and casinos. After the Joint Sino-Portuguese Declaration in 1987, tourism and gambling continued to provide the largest share of Macau's revenue (more than one-third), and continued to greatly expand.¹³⁶ The development of casino clusters consumed spaces previously designated for schools, universities, gardens, and parks.¹³⁷ Eventually, NAPE's initial detailed urban design regulations were abandoned and the priority of the land was given to the gaming and hotel industries.

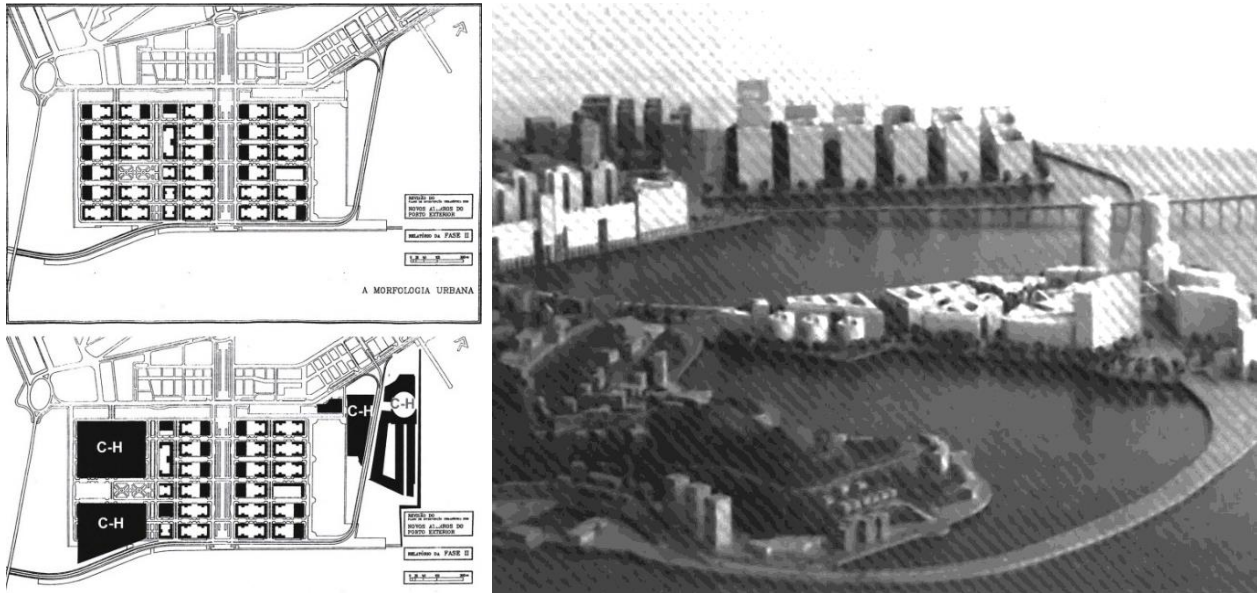


Figure 3.25: The plan of NAPE the original plan (above) and the post-liberation plan with larger footprints for new casinos and hotels. (Source: Pinheiro, Francisco Vizeu. *Macau's Urban Transformations Lisbon to Las Vegas.*)

Figure 3.26: The physical model of Nam Van Project looking northeast towards the NAPE project (Source: Sociedade de Empreendimentos Nam Van S.A.R.L. 1982)

¹³⁶ Porter, Jonathan. "The Transformation of Macau." *Pacific Affairs* 66, no. 1 (1993): 7-20. doi:10.2307/2760013.

¹³⁷ Vizeu Pinheiro, Francisco, and Penny Wan. *Urban planning practices and scenarios for Macao development: Case Studies of Macao's Urban Sustainable Development*. The 12th Real Estate Society Annual Conference. July 9-12, 2007.

Another major multi-use reclamation project that transformed Macau is the Nam Van or Praia Grande development, designed by local architect Manuel Vicente since 1990. The 130-hectare project was roughly triangular in shape and represented a morphology of the historical pattern in the heart of the city. It centered around two lakes created through the enclosure of the Baia da Praia Grande. (Figure 3.27) The whole site was divided into two zones: Zone A represented an extension of the existing central business district, extending along Avenida Doutor Mario Soares from near the Lisboa Hotel to the Rua da Praia Grande itself; Zone B was visually connected to and morphologically in harmony with NAPE. The entire project was the responsibility of one company, the Nam Van Development Company headed by tycoon Stanley Ho Hung-sun.

Two major infrastructure projects for Macau were introduced in early 1990s: the International Airport at the seafront of eastern Taipa and the 4.7-kilometer Amizade Bridge or New Macau-Taipa Bridge crossing Praia Grande bay and connecting Macau Peninsula at the newly relocated Outer Harbor Ferry Terminal and Taipa Island. After the two projects were consecutively completed in 1994 and 1995, a notable population flow was brought south to Taipa and Coloane. In between Taipa and Coloane Islands, the Cotai City project was conceived through the reclamation of 5.2 km² land, undoubtedly one of the most audacious additions to the city. (Figure 3.28) Initially planned in 1992, Cotai was designated to provide housing for 180,000 residents to ease the housing crisis and severe congestion on

the peninsula.¹³⁸ It was then presented in the last years of the Portuguese administration as the area for city expansion and economic growth for the next decades. The 1999 plan of Cotai placed emphasis on residential development and civic amenities including the new campus of the University of Macau, while tourism and convention areas were marginal. (Figure 3.29)

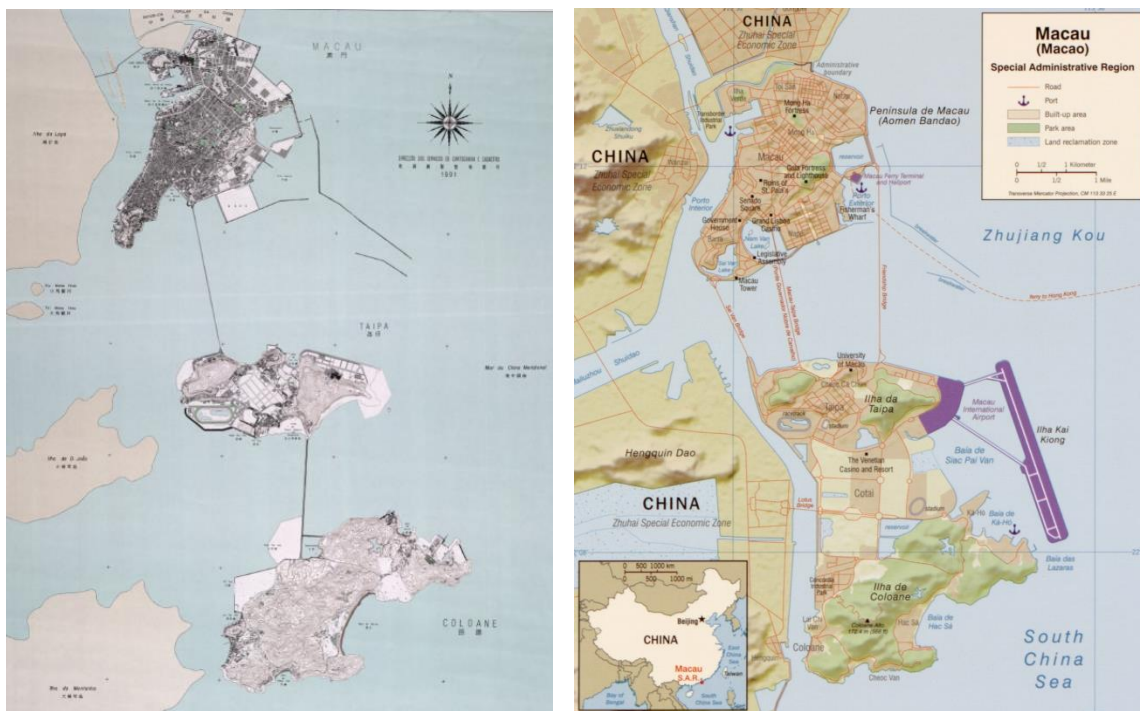


Figure 3.27: The Cotai reclamation and Macau International Airport projects, indicated through the comparison between 1991 and 2005 maps of Macau. (Source: The Congress Library)

After the administration handover to China, Macau as a Special Administration Zone started to be defined by its relation to and comparative difference from mainland China—it offered

¹³⁸ Ting, Suen. Macau (1999-2009) / Urban Planning of Cotai 2: Land use tension between casinos and the public. *Asian Cities Research*. Hong Kong University. 2016

access to services that were unavailable and often prohibited on the mainland, notably gambling. It has secured its place as China's capital of gambling and, in fact, remains the only city in China to permit gambling. Since its reunification with China on December 20, 1999, within less than a year its population jumped from 431,000 to 520,113 due to a large influx of immigrant workers from the mainland who worked primarily for the construction and gaming industries.¹³⁹ Macau experienced a drastic increase in the number of tourists, with about one million tourists arriving in less than a year, and 2.162 million tourists in 2000. Facing the increasing number of visitors and population growth, the Macau government decided to overturn the land-use of Cotai in the pursuit of greater financial income, designating it as a gambling area to host mega-casinos and their accompanying conventions and entertainments. Subsequently, the liberation of Macau's gambling regulatory framework ended Stanley Ho's monopoly and opened the gaming market to two new license holders in 2001, including Sheldon Adelson's Las Vegas Sands Corporation from the United States. Adelson provided a vision that corresponded with the government's to make a wholesale replica of the Las Vegas Strip. This concept led the new plan of Cotai in 2002, which amalgamated small blocks delineated by the 1999 plan that followed the Portuguese planning tradition toward the creation of a series of mega-blocks of critical mass along the primary boulevard—the "Cotai Strip". (Figure 3.30) The new plan introduced larger parcellation and greater autonomy to design introverted mega-casino-blocks that were

¹³⁹ Taylor, Bruce. Planning for High Concentration Development: Reclamation Areas in Macau. In D.Y. Yuan et al (eds), *Population and Development in Macau. Macau: University of Macau, 1994.*

juxtaposed to one another along the Cotai Strip, an urban form characterized by a strong segmentation in a disunified whole.



Figure 3.28: (Left) The physical model of 1999 Cotai plan, using small urban block to accommodate the residence and civic facilities. (Source: Vizeu Pinheiro, Francisco, and Penny Wan. *Urban planning practices and scenarios for Macao development: Case Studies of Macao's Urban Sustainable Development*. The 12th Real Estate Society Annual Conference. July 9-12, 2007)

Figure 3.29: (Right) The physical model of 2006 Cotai masterplan, featuring the massive "Cotai Strip" of mega-casinos and resorts. (Source: Jamie Hinks)

After making itself "the Las Vegas of Asia", Macau has experienced its most significant and rapid economic growth. In less than a decade, it was transformed into the largest gambling hub in the world, with revenues six times greater than Las Vegas.¹⁴⁰ Since 2000, Macau's mono-programmatic urban developments have become synonymous with the gambling industry. The expansion of Macau's gambling-led economy also strengthened the city's

¹⁴⁰ Lee, Christopher C. M., and Harvard University. Graduate School of Design, Issuing Body. *Common Frameworks: Rethinking the Developmental City in China*. Harvard Design Studies. Cambridge, MA: Harvard University Graduate School of Design, 2016.

global position as an entertainment destination in the new urban economy of tourism.¹⁴¹

Although the casino industry has an enormous contribution to Macau's economic success, with a disproportionately high 45.9 percent of the economy in 2010, it exerted a strong effect on Macau's development which became more hectic and eventually problematic with regard to the scale of social and urban transformations it has entailed in its course. In a relatively short span of time, through the transplantation of the Las Vegas model the casino industry spatially affected the physical transformations of the city's urban feature and structure.

3.1.6 ZHUHAI

Similar to Shenzhen, the formation of Zhuhai's physical environment can be regarded as the spatial outcome of certain urban development processes under the manipulation of urban policies that favored economic growth. The two decades' economic success through its export-oriented economy brought the first wave of urban construction. Realizing that urban growth was beyond the previous masterplan, in 1992 the *Zhuhai Urban Planning Ordinance* was published, which clarified that the areas above the 25-meter contour lines in the hills and within the 50-meter range of the coastal line were prohibited from new construction.¹⁴² This ordinance set the boundary of the growth at an opportune time; it protected the natural landscape and largely determined the urban structure of Zhuhai.

¹⁴¹ See, Hannigan, J. *Fantasy City. Pleasure and Profit in the postmodern metropolis*. London and New York: Routledge. 1998.

¹⁴² 珠海市人民政府. 《珠海市城市规划条例》1992

The administration boundary adjustment for Zhuhai Municipality in 1988 doubled the size of the city up to 121km², following the political ambition to make Zhuhai not only a scenic and tourism city but also a key port city and a regional hub for logistics.¹⁴³ Hence, Zhuhai Port (now Gaolan Port) and vast land across Qianshan Waterway were incorporated into Zhuhai. After the 1992 ordinance strictly constrained the developable area, constructions started to relocate their concentration toward the north and west outside the original Zhuhai SEZ. The city commissioned the Zhuhai Institute of Urban Planning and Design in collaboration with the Sichuan Provincial Institute of Planning and Design for two separate strategic plans for the east and west districts: West Zhuhai used the port as the economic engine and planned large-scale heavy industry facilities like energy and petrochemical plants around it; Qi'ao Island, North Xiangzhou, Hongwan, and Hengqin Island, four newly designated urban clusters, were added to East Zhuhai and adhered to the pattern of the previous masterplan from 1986. The two plans were compiled into the Zhuhai Masterplan 1995-2000, designing a spatial structure of “main body plus two wings”. (Figure 3.31) This pattern was facilitated by the 1.2km tunnel across the Banzhang Mountain, which was assertively proposed in the late 1980s by the mayor LIANG Guangda to extend Yingbin Boulevard—the south to north corridor—to connect two of the earliest urban clusters of Zhuhai, Gongbei and Xiangzhou.¹⁴⁴

¹⁴³ 珠海市规划设计研究院. 《珠海城市总体规划（1995-2020）》.1992

¹⁴⁴ Shi, Ce and Hu Jingdong. “Zhuhai Chronicles”. *Southern Daily*. 2015



Figure 3.30: Masterplan for Zhuhai Special Economic Zone (1990-2000). 1991. (Source:Zhuhai Planning Bureau)

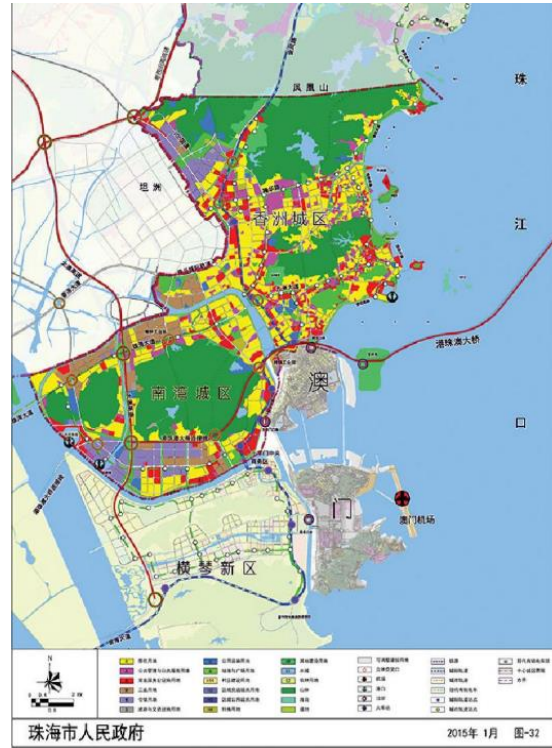


Figure 3.31: Masterplan for Zhuhai (2001-2020). 2001. (Source: Zhuhai Municipal Government)

Provincial and even national policy prioritized Zhuhai when entering 21st century after it was designated as the central city in the western Pearl River Delta, which brought Zhuhai much opportunity. A new masterplan was provided in 2001 with another round of administrative boundary adjustments to incorporate Doumen and Jinwan counties into Zhuhai's municipal area. The new masterplan indicated two intentions: first was the functional approach for the development of the west area through infrastructure development to create a logistic hub as the city's new economic booster, gathering a series of important infrastructure projects such as Gaolan Port, Railway Station, and Zhuhai Airport; second was the urbanistic approach to systematically review the existing urban clusters and then improve the quality of urban space

through landscape interventions. (Figure 3.32) Immediately, Zhuhai started to enjoy a period of urban amelioration faster in speed and larger in scale than ever.⁴³ Twenty-four large urban projects were announced, among which the Zhuhai North Station Area, the Xianglu and Xiangzhou Bay Areas along the Lover's Road, and the Gongbei Checkpoint Area were the most critical projects.¹⁴⁵

Xianglu Bay and Xiangzhou Bay were separated by Yeli Island but connected by the eight-kilometer long Lover's Road, a coastal boulevard built in 1997. As the origin of Zhuhai, this area has one of the best locations directly facing the Pearl River Estuary. During the construction of the Lover's Road, the beaches and wetlands were replaced by the containing walls. The reconfiguration of this whole area since 1999 provided a new coastal façade for Zhuhai and reinforced the perception of Zhuhai as a city in the landscape. The project could be understood in three segments: the first was the rehabilitation along Lover's Road; (Figure 3.33) the second was the calibration of Xiangzhou Port from a functional passenger ferry terminal into a well-programmed public space; and the third was the construction of the Opera House District on Yeli Island. In contrast to other projects relying on market speculation as its *modus operandi*, the design of this area maintained the resistance for over-densification and emphasized the usage of landscape as a salient, irreplaceable, and proliferating element in improving the quality of critical urban space.

¹⁴⁵ 章征涛, 陈德绩. 珠海城市设计历程与实施途径. [J]. 规划师, 2018(3): 40-46.



Figure 3.32: The Lover's Road during the construction in 1990 (Left), as a coastal boulevard in 1995 (Middle), and with rehabilitated frontier in 2004 (Right). (Source: Liu, Huajing)

The design by Peter Calthorpe for Zhuhai North Station Area held the approach of American New Urbanism and applied a transit-oriented development model, which proposed narrower roads in a denser grid network and reasonably-scaled blocks around the new high-speed railway station, with consideration for efficient management of spaces for work and living. Gongbei was the checkpoint on the border with Macau and involved millions of travelers annually, but the political and technological changes since the advent of the 21st century made the form and function of the border crossing in Gongbei outdated. The upgrading of the Gongbei Checkpoint Area included three key parts: the introduction of the new railway station, which began construction in 2009; the construction of a new plaza in between the existing port-of-entry building and the station and an extensive underground shopping mall under the plaza; as well as the reconfiguration of the waterfront along Gongbei Bay. As a new face of Zhuhai, Gongbei turned out to be a space of partnership and coexistence and became technically much more complicated after the emergence of the idea of the Hong Kong–Zhuhai–Macau Bridge.

3.2 CONJOINED TWINS

Different from the counterpart twins of Hong Kong–Shenzhen and Macau–Zhuhai, which are defined by a border dividing a previously British or Portuguese city from a newly designated urban zone, Guangzhou and Foshan are two major urban agglomerations with long urban traditions that share the same cultural background of Lingnan culture. The two cities historically had much connection and exchange in commercial and cultural activities. They share a boundary of more than 200 kilometers and the distance between their centers is merely 20 kilometers. (Figure 3.33)

From 1950 to 1980, Guangzhou and Foshan experienced two different paths to realize their industrialization. In Guangzhou, the political center of the Pearl River Delta, production was organized by the state through State Owned Enterprises; (Figure 3.34) meanwhile in Foshan, a county, development was greatly supported by private or collective enterprises such as TVEs. (Figure 3.35) Different from the counterpart twins, whose formations were mainly influenced by top-down policies, Guangzhou and Foshan are “conjoined twins” whose integration has been substantially promoted through bottom-up procedures, and that contain the potential to integrate into one urban conglomeration.

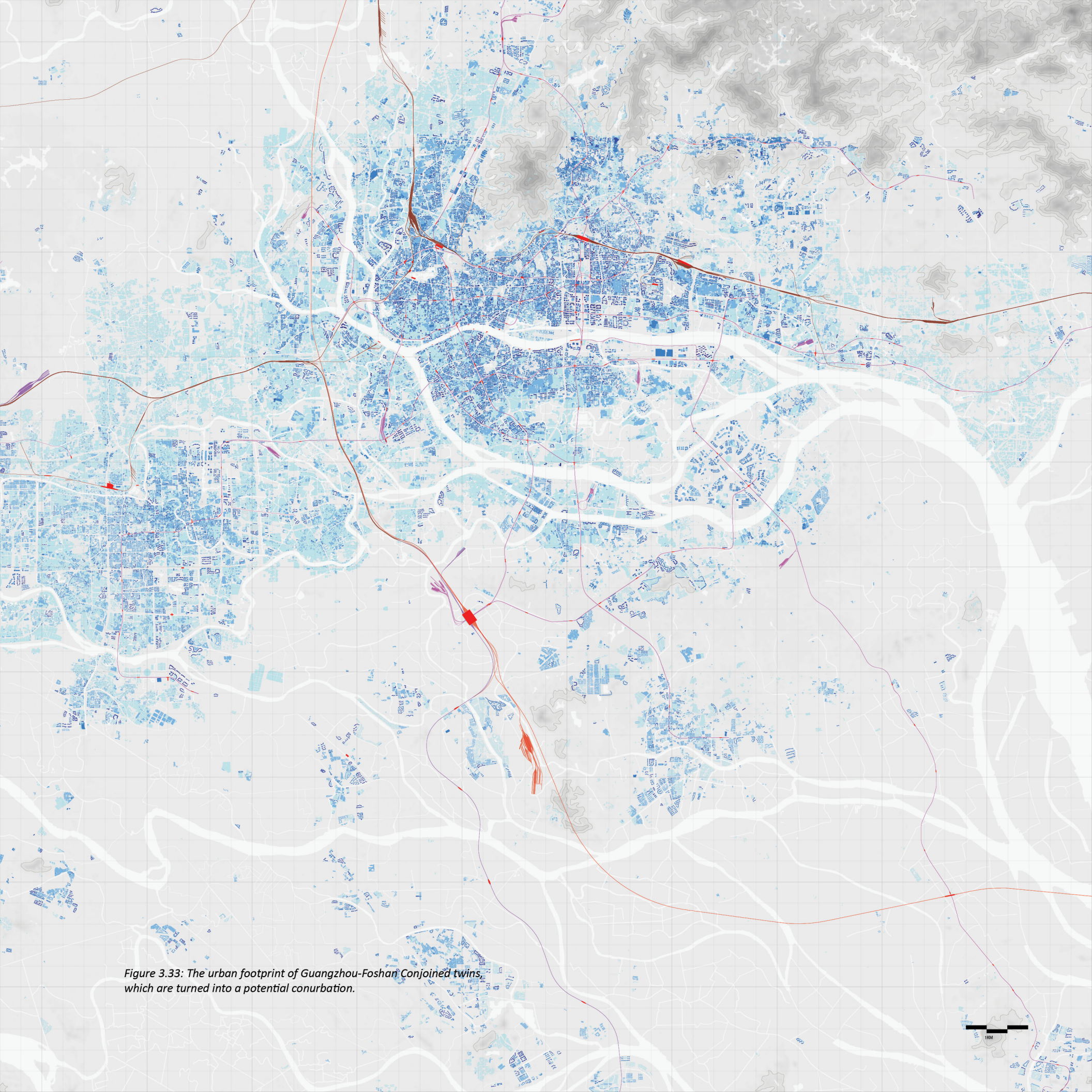


Figure 3.33: The urban footprint of Guangzhou-Foshan Conjoined twins which are turned into a potential conurbation.



Figure 3.34: Urban Footprints of Guangzhou Central

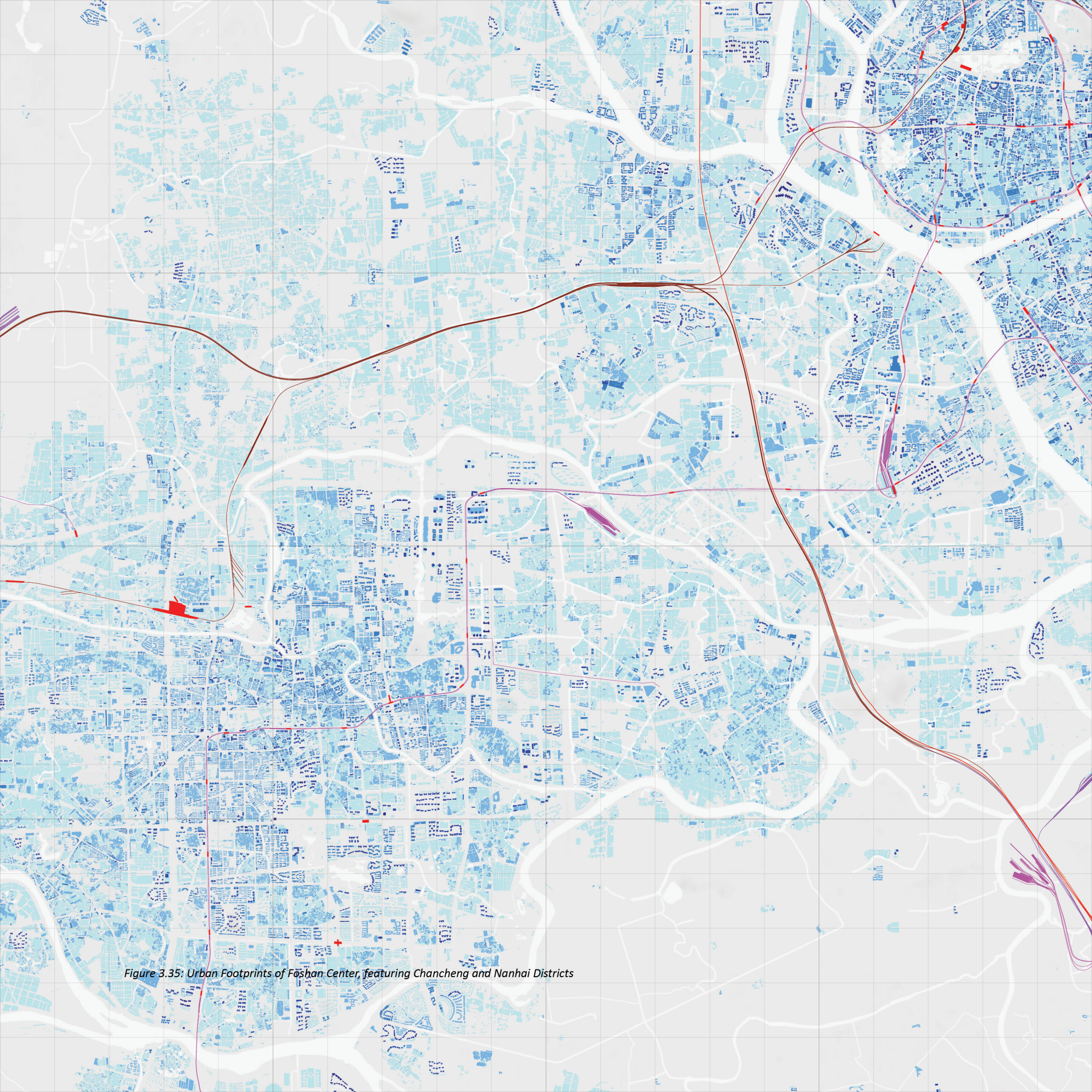


Figure 3.35: Urban Footprints of Foshan Center, featuring Chancheng and Nanhai Districts

After the economic reform, Foshan enjoyed much flexibility and freedom in structural transformation due to its smaller industrial scale, while in contrast Guangzhou had a much larger production scale which made its institutional adjustment slower and harder, despite being the earliest city in Guangdong Province to begin its reform. Before the completion of the transition from an egalitarian system to distribution on the basis of production in SOEs during the early 1980s, hundreds of engineers in Guangzhou went to the factories in Foshan, using their knowledge to help increase the capacity of the TVEs' manufacturing production there and earn extra incomes in return. This was the story of the "Saturday Engineers": the engineers rode their bikes on weekends from Guangzhou to the private factories in Foshan to work there, as a result contributing to the development and prosperity of the manufacturing industries of Foshan.¹⁴⁶ This interaction between "high-technology" and "low-cost" created strong urban dynamics between Guangzhou and Foshan, and evolved into a matured mechanism for the integration of the two cities; this raised crucial academic discussions in 2003 and caught the attention of the government, which effectively conceived masterplans for the integration of Guangzhou-Foshan.

3.2.1 GUANGZHOU – FOSHAN

In fact, the concept of this conjoined twin has a historical background. In early history, the two urban settlements were governed by one administration called "Nan-Pan-Shun". During his reign, Sun Yat-sen, in his publication *The International Development of China* in 1919,

¹⁴⁶ 刘婉玲.《从“星期六工程师”引出的》，《羊城晚报》，1985 年

planned to build a new South-Port City with a business district in Guangzhou and an industrial district in Foshan. Currently the most urbanized districts of Foshan, Nanhai and Shunde Districts, are right at the edge between the two cities, adjacent to Liwan District, one of the four oldest districts in Guangzhou.

Though the official announcement of the integration between the two cities wasn't made until December 2008 in the *Outline of the reform and development plan of the Pearl River Delta region*, the "market" has contributed to the spatial integration of the cities since the 1990s when some functions in Guangzhou began to extend beyond the administrative boundary and spread to the surrounding areas. The spillover of trade and wholesale industry followed by real estate development gradually spread to Foshan's Nanhai District, in Huangqi and Yanbu towns along the Guangzhou–Foshan Expressway.

The concept of *Guangzhou–Foshan Metropolis Circle* was raised in 2003 after the Nanhai District of Foshan independently opened its turnpikes, water supply, and telecommunication market to Guangzhou without tolls, which forced the Guangdong Provincial Government to coordinate the integration of the twins from a higher administrative level. In March 2009, the mayors of the twin-cities signed the agreement on *The Guangzhou Foshan City Urban Integration Construction Cooperation Framework* that inaugurated the construction of an intercity metro line—the subway line 1 of Foshan, also known as Guang-Fo Metro. This line was opened to the public right before the Guangzhou Asian Olympic Games in 2010, making the people's new life-style of "living in Foshan and

working in Guangzhou” feasible, stimulating the integration process. The average daily passengers of Guang-Fo Metro are 294,000 with the peak of 399,000 in 2017.¹⁴⁷ The extension project connects Foshan to Guangzhou South Station and Pearl River New City, strengthening the existing connection. The ring-highway wrapping the city centers links multiple industrial districts in both cities, and gradually builds the spatial development pattern of "Core-Edge".

In these twins, Guangzhou gathers nearly 70% of universities and 44 provincial research and development institutions in Guangdong Province, and 97% of national key disciplinary laboratories, which become valuable resources for innovation by 2008.¹⁴⁸ The Guangzhou University City–South China Intelligence Core is located in Panyu District of Guangzhou, next to Shunde District of Foshan. Foshan has a developed private economy and strong manufacturing strength but has a great demand for industrial innovation. These complementary circumstances created a big advantage for the exchanges between the two cities, forming a new pattern of cross-city-metropolitan space: “Guangzhou as the innovation brain and Foshan as the transformation center”, which could be understood as a 21st century version of the “Saturday Engineer Model” with plans and incentives from the provincial government. Acknowledging this, Guangzhou and Foshan officially signed the *Cooperation Framework Agreement on Deepening Innovation-driven Development Strategy*, laying out three strategic projects of cooperation including the Guang-Fo Science and

¹⁴⁷ 广州日报数据和数字化研究院.《广佛同城发展报告（2018）》. 2018.2.2

¹⁴⁸ 广东省统计局.《广东统计年鉴》2008.

Technology Innovation Industry Demonstration Zone, the Pearl River West Channel Innovation Belt, and the Guangzhou Higher Education Mega Center–International Science and Technology Innovation City.

The 153.5 km² Guang-Fo Science and Technology Innovation Industry Demonstration Zone consists of a 36km² campus in the Guangzhou South Railway Station Area, the 17km² Liwan International Science and Technology Innovation Industrial Zone, the 7.5 km² Dongsha District, and the 93 km² Foshan Sanlong Bay High-End Innovation Agglomeration Zone.¹⁴⁹ (Figure 3.33) The first campus leveraging the hyper-accessibility of the largest high-speed railway station in Southern China, Guang-Fo gathers different types of smaller research campuses, like South China University of Technology, National University Science and Technology Park, and Shunde Innovation Park. The Liwan Campus contains the headquarters of industry-leading companies and the 3D Printing Industry Park. The Dongsha District adjacent to the Sanshan New City of the Nanhai District will become Foshan's Pazhou International Convention and Exhibition District—a new CBD. At the confluence of Chancheng, Nanhai, and Shunde, three central districts of Foshan, the Sanlong Bay demonstration zone is intended to link the existing districts to a series of existing important innovation parks in Foshan including the Sino-Singapore Guangzhou Knowledge City, the Pazhou Internet Innovation Cluster, and the Southern Intelligence Valley. When completed, a belt-shaped nodal Guangzhou–Foshan Innovation Corridor will be built along the Pearl River with an urban spine strengthened by the subway line 7, another new Guang-Fo Metro.

¹⁴⁹ 《广佛同城化“十三五”发展规划（2016—2020 年）》2016 年 9 月 28 日

3.2.2 GUANGZHOU

Guangzhou, the administration center for Guangdong Province, became one of the first cities earmarked for open market reforms under DENG Xiaoping's economic reform policies, and experienced a transition from state-led extensive industrialization to urban-based intensive urbanization.¹⁵⁰ Its three-decade drastic urban development made it one of China's most prosperous and thriving cities with 1,000-km² built area and a population of 12 million in 2010.

Within the context of economic reform, the function of cities began to transform from production to living, service-trade centers, and logistic hubs. China's National Urban Planning Conference, held in 1980, emphasized the influence of the masterplan on guiding urban constructions. The 14th masterplan of Guangzhou, approved by the state council in 1984, provided a new spatial framework of three nuclei supported by new modern infrastructures including ports and cross-river bridges to allow its urban development to embrace a great extension eastwards.¹⁵¹ (Figure 3.36) The three nuclei were the traditional city, Tianhe District, and Huangpu District around the port. The masterplan was promoted by the construction of a highway across the intervening agricultural belt between the three

¹⁵⁰ Fulong Wu, Jiang Xu, and Anthony Gar-On Yeh. *Urban Development in Post-Reform China: State, Market, and Space*. Taylor and Francis, 2006.

¹⁵¹ 邓兴栋 闫永涛 曾堃《广州城市总体规划的演变与思考》. 2017 年第 3 期

clusters and linking the built-up area in the west to the new leapfrog development of the planned growth pole in the east.¹⁵²

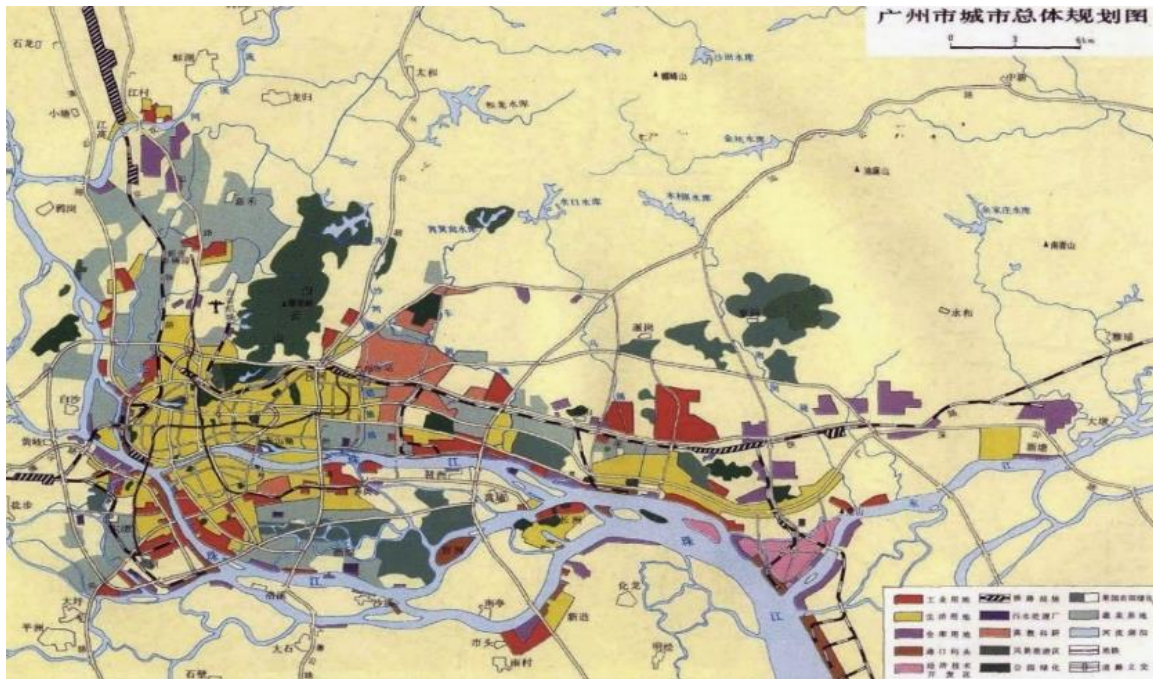


Figure 3.36: Masterplan for Guangzhou, featuring traditional city of yellow area on the left, the Tianhe district of orange area in the middle and Huangpu district around the port on the right. 1984 (Source: Guangzhou Planning Bureau)

At the beginning of the 1980s Guangzhou's economic system was still largely based on public (state) sector production, though it started to evolve with the transition from a planned system to a market-oriented economy. Until 1984, the year that Guangzhou was listed as an Open Coastal City, with the inclination of new policies and the influx of foreign direct investment, hundreds of light-industrial companies with thousands of young talents

¹⁵² Lo, C.P. "ECONOMIC REFORMS AND SOCIALIST CITY STRUCTURE: A CASE STUDY OF GUANGZHOU, CHINA." *Urban Geography* 15, no. 2 (1994): 128-49.

flooded into Guangzhou. Within the same year, the Guangzhou Economic and Technology Development District (GETDD) was established about 30 kilometers to the east of the city center. Initially planned for an area of 58 km² (Figure 3.37), the district was eventually refined as a 9.6 km² zone (Figure 3.38 and 3.39), leveraging the new Huangpu Port—a deepwater port facility. Through this project, Guangzhou was attempting not only to accommodate industries both relocated from the city center and developed by foreign investments, but also to develop an export-oriented economy.¹⁵³ Within a decade of creating the Guangzhou Economic and Technology Development Zone, the Guangzhou High and New Technology Development Zone, Guangzhou Tax Free Zone, and Guangzhou Export Processing Zone were consecutively established within the initial boundary of the 58 km² GETDD, developments that were continuously fueled by foreign direct investment induced by government incentives.¹⁵⁴ The whole area soon became one of the major economic engines of Guangzhou and later combined and reunited to form one administration, the Guangzhou Development District (GDD) in 2002.

The accelerated urban growth in the city center was still affected by the increasing pressure of population growth, with a large amount construction of new high-rises, retails, offices, and entertainment facilities. In order to prepare the 6th National Games of China in 1987, the Tianhe District was designated as a cultural and research nexus. Sports complexes, R&D

¹⁵³ Lu, Lachang, and Linda McCarthy. "Spatial Restructuring in Urban China amid Globalization and Economic Reform: The Case of Guangzhou." *Built Environment* (1978-) 34, no. 4 (2008): 444-63.

¹⁵⁴ Xu, J. and Yeh, A.G.O. (2003) Guangzhou. *Cities*, 20, pp.925-937.

facilities, along with housing projects successfully transformed the place to another urban centrality of Guangzhou.



Figure 3.37: The Guangzhou Economic and Technology Development District (GETDD). 1984 (Source: Guangzhou Development District Government)

Figure 3.38: Overall plan of the Guangzhou Economic and Technology Development Zone (GETDZ). 1984 (Source: Guangzhou Development District Government)

Figure 3.39: The aerial image of the site, took during trip of site visiting accompanying GU Mu, then Party Sectary of Guangdong Province, June 1984 (Source: Guangzhou Development District Government)

At the end of the 1980s, the city witnessed an unexpected explosive growth and unplanned consumption of agricultural land. The unregulated land conversion to unplanned commercial and industrial developments and even peripheral residential communities went beyond the vision of the existing masterplan, which conceived Guangzhou as a compact city.¹⁵⁵ Spectacular eastern growth in the Guangzhou Development District around Huangpu Port, drastic redevelopment of the old city area, as well as the newly planned and unplanned development in surrounding districts largely reconfigured the spatial structure of Guangzhou. Besides, the land reform in 1987 adopted a new land leasing system allowing the paid transfer of land-use rights, the housing reform in 1988 fostered the privatization

¹⁵⁵ Ibid.

and commercialization of housing, and much of the stock of rental housing was sold to employees of public enterprises at low prices.¹⁵⁶ These two reforms had a dramatic and rapid effect fueling further changes in the urban development of Guangzhou, giving rise to major redevelopments in the urban core and massive developments outside the contiguous built-up area. One thing that deserves to be mentioned is that although the land-leasing system provided a significant revenue source, it locked the city fiscally into a cycle of development and redevelopment as never before. *“By leasing more land, the city could generate more revenue, and undertake more infrastructure and other projects, which in turn helped fuel demand for more new land that the city could lease.”*¹⁵⁷ This is one of the latent reasons why the city experienced explosive outwards urban growth. From 1992 to 1999, almost 94 percent of new land leased in Guangzhou was outside the city center.¹⁵⁸

Confronted by these challenges, the 15th masterplan of Guangzhou was prepared from 1991 to 1996 with multiple rounds of modifications and revisions. Upon promulgation it envisioned a 200 km² metropolis in a structure of three clusters anchored by the enlarged central core embracing the historic center and Tianhe District, the east core comprising Huangpu and the Development District, and the north core designated as a residential and

¹⁵⁶ Man, Joyce Y., and Joyce. Yanyun Man. *China's Housing Reform and Outcomes*. Cambridge, Mass.: Lincoln Institute of Land Policy, 2011.

¹⁵⁷ Lu, Lachang, and Linda McCarthy. "Spatial Restructuring in Urban China amid Globalization and Economic Reform: The Case of Guangzhou." *Built Environment* (1978-) 34, no. 4 (2008): 444-63.

¹⁵⁸ WANG Guan-xian, WEI Qing-quan. The effects of land supply on the expansion of urban form in Guangzhou. *Tropical Geography*. 2002-01

non-polluting industry zone.¹⁵⁹ (Figure 3.40) Within the masterplan, Guangzhou Municipal Government was also planning to build a subway system and proposed to build a new city center—the Pearl River New City—to solve the funding issue for subway construction through leasing out the land to generate revenues.¹⁶⁰ In 1993, a 6.2 km² was designated in between the old city and Huangpu District with a planned gross floor area of 13 million square meters. An international competition was held to design this new urban district, and the winning proposal from Thomas Planning Services, Inc. from Boston laid out a grid project with an asymmetric vertical central axis. (Figure 3.41)

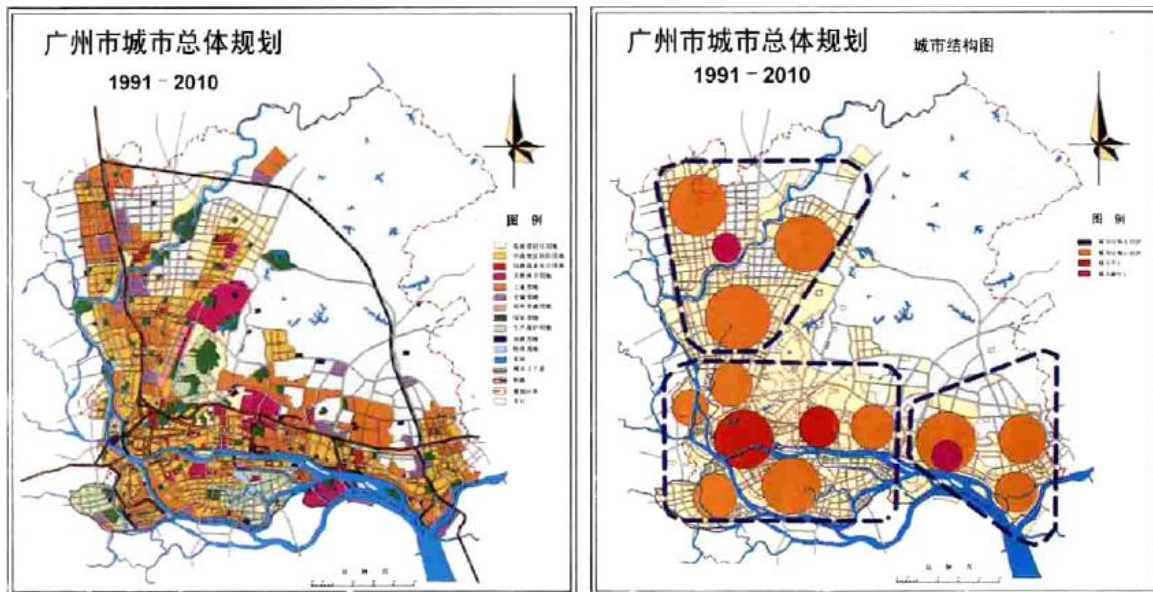


Figure 3.40: Guangzhou Overall Masterplan (left) and Guangzhou Urban Structure Plan (right). 1996 (Source: Guangzhou Municipal Government)

¹⁵⁹ Guangzhou Urban Planning Development Review Compilation and Editing Committee. *Guangzhou Urban Planning Development Review 1949-2005* (广州城市规划发展回顾1949-2005). Guangzhou, China: Guangdong Science and Technology Press, 2006

¹⁶⁰ YUAN, Qifeng. *Pearl River New Town, the CBD of Canton*. CTBUH 2016 International Conference, Cities to megacities, shaping dense vertical urbanism. Guangzhou: 2016

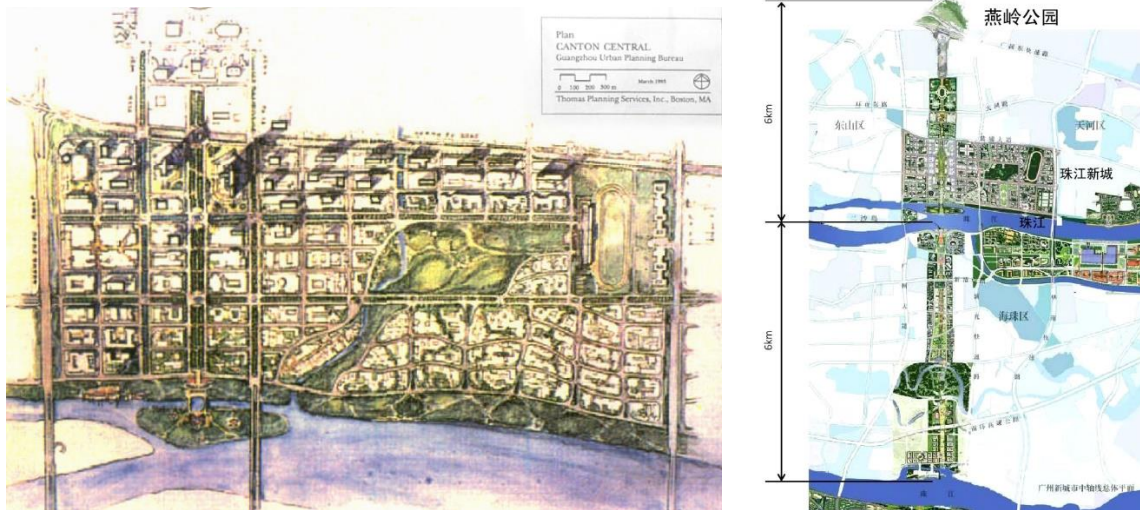


Figure 3.41: (Left) The plan of Pearl River New City. 1993 (Source: Thomas Planning Services, Inc.)

Figure 3.42: (Right) Guangzhou New Urban Axis. 1999 (Source: Shanghai Tongji Urban Planning and Design Institute Co., Ltd)

During the 1990s, the annual average growth rate of Guangzhou's floating population was about 23 percent; by 2000, the floating population had grown to more than 4.2 million.¹⁶¹ In order to relieve the pressure on the shortage of constructible land, the administrative boundary of Guangzhou was adjusted in 2000; Panyu and Huadu—previously counties—were amalgamated into Guangzhou as new districts. Immediately, the Pearl River New City's location became the geographical center of Guangzhou; it was redefined as Guangzhou's central business district and its axis was extended southwards across Henan Island in Haizhu District. (Figure 3.42) The adjusted scheme from Tongji Urban Planning and Design Institute redefined the importance of the project and concentrated all future municipal facilities within its scope. Enormous efforts have been put into the project since 2000, and the

¹⁶¹ Lu, Lachang, and Linda McCarthy. "Spatial Restructuring in Urban China amid Globalization and Economic Reform: The Case of Guangzhou." *Built Environment* (1978-) 34, no. 4 (2008): 444-63.

success of the brand-new city center of Guangzhou is today highlighted by the opera house designed by Zaha Hadid and the Canton Tower by Mark Hemel and Barbara Kuit. (Figure 3.43)



Figure 3.43: Aerial Image of the site of Pearl River New City in 1993 versus 2009 (Source: YUAN Qifeng. Pearl River New Town, the CBD of Canton)

During the last decade of the twentieth century, the old city in Guangzhou transformed into a service-oriented economy whose percentage of secondary sector industry was decreased to 13 percent; and the Guangzhou Development District became the main center of foreign and domestic industry and witnessed 573 new manufacturing companies with GDP of 1.8

billion US dollars by 2000.¹⁶² The 16th masterplan of Guangzhou was announced in 2001 with the principle of “Optimization in the north, advancement in the east, linkage in the west, and expansion in the south”, and envisaged Guangzhou as a Multi-core Networked Metropolis.¹⁶³ Following this plan, Haizhu District emerged as a new urban center as its large amount of available land offered an opportunity for the concentration of important new urban projects including the University City, the International Bio-Island, and the Convention and Exhibition Center.

3.2.3 FOSHAN

The industrial park as the main feature of Foshan played a key role in its urbanization trajectory to become the third largest city in Guangdong Province. The first generation of the industrial park was in the form of village and township-level factories. These were generally replaced by provincial-level production campuses after 1984. Rationalized industrial parks with zoning plans were not developed until the 1990s. The boom of the automobile industry in Guangzhou since 2000 stimulated an enormous expansion of industrial parks in Foshan as the production bases for car components. In 2002, the vast industrial areas spread across the whole of Foshan were reorganized and consolidated into eight newly constructed industrial parks with 798 manufacturing companies and a total area

¹⁶² *ibid*

¹⁶³ 广州市政府. 《广州市城市总体规划文本 (2001-2010)》. 2001

of 288 km².¹⁶⁴ The consolidation process introduced opportunities for urban redevelopment on the sites of previous factories, which allowed new urban centers to be constructed and reconfigured Foshan, a city without an urban center. (Figure 3.44)



Figure 3.44: The aerial images of the city center in Foshan in 1984 versus 2002. (Source: Foshan Annals 1979-2002)

Eight industrial parks were almost equally distributed in four outside districts (previously counties). The Foshan Hi-Tech Industrial Development Zone, a national manufacturing hub, is the most important industrial park located in between the central districts of Foshan and Guangzhou.

¹⁶⁴ 雍玲玲. 佛山市八大重点工业园区分布图. 《佛山日报》2002-12-24

3.3 EMERGING TWINS

A twin is formed based on two factors: one, there exists a developmental-level gap in between the two geo-locational adjacent cities; second, the two cities have mutual comparative advantages.¹⁶⁵ The twin-cities model is transferrable once the relationship between the twin cities diverges and another pair appears to meet these requirements.

China's deeper integration into the world economy after joining the World Trade Organization (WTO) in 2001 gained Shenzhen and Guangzhou more attractiveness within the global market. The two cities were endowed with part of the function as gateways toward the global economy, which used to be a privilege of Hong Kong and Macau. The previous approach of "front shop, back factory" began to reoccur in new emerging twins like Shenzhen–Dongguan.

3.3.1 SHENZHEN - DONGGUAN

In the 1980s, the developments of Shenzhen and Dongguan, though different in scale, both benefitted from the same type of ETICTs which absorbed investment from Hong Kong. The trajectories of the two cities then diverged after 1988. Taking advantage of its closer relationship and physical proximity with Hong Kong, Shenzhen was able to continue its original path and expanded its pattern with foreign direct investment, while Dongguan's trajectory was reoriented to another pattern with the influx of investment from Taiwan.

¹⁶⁵ Alain Bertaud. *Spatial Structure of the Pearl River Delta Metropolitan Region: A study proposal*. 2001

From October 1987, people living in Taiwan were allowed to visit their relatives in Mainland China after 38 years of the cold relationship between the two sides. The official support from the State Council and the promulgation of “The rules about encouraging Taiwan compatriots to invest in Mainland China” further promoted the first wave of Taiwan investment in the mainland. The Asian financial crisis in 1998 once again squeeze the economy in Taiwan, whose electronics and IT industries transferred and settled in Dongguan. This second wave of Taiwan investment in Dongguan made the latter reach the peak of the “aggregation effect” in manufacturing industries. By 2000, about one-ninth of Taiwan’s business in China was directly related with Dongguan.¹⁶⁶

The booming manufacturing industry made Dongguan into the world’s factory in the 2000s. However, with the rise in raw material prices, labor costs, land rents, and the increasingly strict environmental protection policy, the golden period of the ETICT-model in Dongguan came to an end after the global financial crisis in 2008. The processing and production enterprises in Dongguan gradually moved to the central and western regions of China and Southeast Asia, and the remaining companies are currently seeking exits. Industrial pollution has prompted Dongguan’s industrial transformation and upgrading, and its strict environmental protection policy requires urban planning and design to become more involved in the rebuilding of former factories and industrial zones to help direct Dongguan’s city-making in a more sustainable way. The GDP increase of Dongguan had slowed down from 2009–2014.

¹⁶⁶ 中共东莞市委党史研究室编写的《东莞改革开放三十年大事记（1978-2008）》

On the other hand, the proportion of Shenzhen's tertiary industry exceeded 60 percent for the first time in 2016, which was the outcome of Shenzhen's decade-long effort to upgrade its manufacturing industries.¹⁶⁷ Leveraging state policy that encourages creativity, Shenzhen has accumulated a series of competitive internet and innovation corporations as well as hi-tech companies, some of which are known as the unicorns of the global market such as DJI, Huawei, and Tencent. Furthermore, Shenzhen is expanding the current University City District into a 57.1 km² Xili Lake International Science and Education City, which has been designated as the spatial carrier for innovation and targeted to become a world-class university city and national center for basic science and applied basic research. Currently seven universities including Peking University have built their subsidiary research campus there as well as two provincial laboratories. The survey of the real economy in Shenzhen in 2016 claims the inventory of the city's existing industrial land was very limited and fragmented, making the city unable to meet the needs of enterprises to expand their production scales.¹⁶⁸

As a result, Shenzhen's high-tech industry, especially the production campuses, started to expand and relocate to surrounding cities, especially toward Dongguan due to its spatial adjacency. Following hi-tech companies, Shenzhen's traditional industries are also gradually transferring to Dongguan. For instance, DJI built their research and production center in

¹⁶⁷ 深圳市统计局的数据显示，2016 年深圳第三产业比重就首次超过六成，二三产占比为 38.6:61.4。深圳三产比重升高的背后，是当地制造业的规划升级。

¹⁶⁸ 深圳市政协今年 7 月发布关于实体经济的调研报告

Dongguan in 2013, the CET moved their production base to the Heyuan Area of Dongguan in 2014, BYD invested in the construction of a new energy vehicle manufacturing campus in 2015, and Huawei transferred their mobile device manufacturing campus to Songshan Lake National Hi-tech Development Zone. Inside the PRD, a re-division of industry and labor is happening while the pattern of "Shenzhen headquarters plus research and Dongguan production plus manufacture" is becoming the norm. Shenzhen is focused on developing its design and innovation-based industries and is in search of a place to transfer its production industries; Dongguan contains a high-capacity of productivity but is looking for new types of needs to help its economy transform into an intelligent manufacturing-based production with concentrations in high-tech robots and automation equipment. Hence a new potential twin emerges: Shenzhen and Dongguan.

Songshan Lake National Hi-tech Development Zone at the boundary in Dongguan is the main collaboration hub of Shenzhen and Dongguan. It is expected to produce the scientific innovation corridor and production base that transforms the research outcome from Shenzhen into products. Different from the previous industrial zones in the PRD that were built without a masterplan from planners and architects, Songshan Lake Technology Industrial Park underwent several rounds of urban design competitions from 2001–2004 in search of a proposal to balance sustainability and manufacturing, production and living. The final proposal was in the form of an archipelago, with each different production cluster in a compact form and distributed into the landscape. (Figure 3.45) This morphological approach was intended to maximize the ecological effect and reduce pollution. (Figure 3.46)



Figure 3.45: (Left) The masterplan for Songshan Lake high tech Industrial Development Zone. 2004 (Source: China Academy of Urban Planning and Design)

Figure 3.46: (Right) The aerial image of Huawei Research and Design Campus in Songshan Lake, representing a morphology of urban archipelago much different from the industrial campus in previous generations. 2016 (Source: Songshan Lake (Ecological Park) Management Committee)

3.4 A METROPOLITAN CHAIN OF TWIN-CITIES

It took almost half of a century for the Pearl River Delta to be recognized as an urban notion after it was well defined as a geographical concept in the mid-twentieth century. The “Pearl River Delta Economic Zone” as a regional planning idea was firstly raised by Guangdong Province in August 1983 but remained withheld until the province was granted expanded powers to set its own economic direction and was designated a “comprehensive economic reform area” in 1988. The “Pearl River Delta Economic Zone” was established and clearly stated in the Third Plenum of the 7th Communist Party of Guangdong Province on October 8, 1994. It embraced Guangzhou, Shenzhen, Foshan, Dongguan, Zhongshan, Zhuhai, Jiangmen, Zhaoqing, and Huizhou, in total nine cities with a combined population of 20.65 million and

a total area of 41,596km² in 1993.¹⁶⁹ Since then, a series of plans have been drafted and projects conducted to implement this urban concept into an urban reality. Further, after more than a decade of theoretical discussions, the urban concept of the PRD was expanded in 2009 with the National Development and Reform Commission's release of *the Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020)*, which officially included two Special Administrative Regions: Hong Kong and Macau.

Defining the Pearl River Delta as an economic notion was in the background when the whole of China was a developmental state, taking economic development as the central task.

Manuel Castells described this condition: “it establishes as its principle of legitimacy its ability to promote and sustain development, understanding by development the combination of steady high rates of economic growth and structural change in the productive system, both domestically and in its relationship to the international economy.”¹⁷⁰ This condition was driven by two ideas: first, the state prioritizes the transformation of economic conditions above everything else; and second, economic development is elevated to a high status both due to its larger goals and as an end in itself.

From the 1980s to the 2000s, arguably the most drastically transformative period for the economic development of the Pearl River Delta, one crucial model could be identified: the

¹⁶⁹ Ng, Mee Kam., and Tang, Wing-shing. *The Pearl River Delta Urban System Plan: An Analysis. Occasional Paper* (Hong Kong Institute of Asia-Pacific Studies); No. 71. Shatin, New Territories, Hong Kong: Hong Kong Institute of Asia-Pacific Studies, Chinese University of Hong Kong, 1997.

¹⁷⁰ Castells, Maneul. *Four Asian Tigers with A Dragon Head: A Comparative Analysis Of The State, Economy, And Society In The Asian Pacific Rim. States And Development In The Asian Pacific Rim*, ed. Richard P. Appelbaum and Jeffery Henderson. Newbury Park: Sage. 1992.

twin-cities. More importantly, this model had become the latent logic for urban growth in the region.

The triangular spatial structure of the Pearl River Delta is anchored by three pairs of twins: Guangzhou–Foshan as conjoined twins located at the north, and Hong Kong–Shenzhen and Zhuhai–Macau as two counterpart twins on the east and the west. The recent decades of urbanization in the PRD indicates that this twin-cities model can always stimulate the communications and strengthen the connections between the twins, which produces an abundance of urban dynamics and mutual benefits. The twins are in a strategic alliance in which they complement one another while still competing. This type of collective impact is a growing trend across the whole Pearl River Delta to reshape the future of the region. With changes in the mutual conditions of adjacent cities caused by social-economic changes, new twins are continuously evolving such as Shenzhen–Dongguan or Guangzhou–Dongguan, which will eventually turn the Pearl River Delta into a chain of twin-cities. (Figure 3.47) This discovery contradicts with the government documentation and political blueprints trying to expand the twins outwards to incorporate cities like Zhaoqing, Huizhou, and Jiangmen, and transform the existing three pairs of twins into three groups of triplets or quadruplets: Guangzhou–Foshan–Zhaoqing, Macau–Zhuhai–Zhongshan–Jiangmen, and Hong Kong–Shenzhen–Dongguan–Huizhou.¹⁷¹ (Figure 3.48) However, without any doubt, the interconnected chain as an urbanization mechanism is a stronger and more reasonable

¹⁷¹ 2008 年，国务院发布《珠江三角洲地区改革发展规划纲要》，直接将珠三角一体化战略上升到国家层面，为珠三角地区未来的发展指明了方向。广东省紧接着出台了《关于贯彻实施〈纲要〉的决定》强调以广州、佛山同城化为示范，积极推动广佛肇、深莞惠、珠中江三大经济圈建设。

system that can make the region tightly function as a whole megalopolis, enabling it to cope with the new challenges of 21st century globalization in which cities need to group into mega-regions to become more competitive. Because cities started to acknowledge that even their best individual efforts cannot stack up against today's complex and interconnected problems, they must put aside self-interests and collaborate to build a new civic infrastructure to advance their shared objectives.¹⁷²

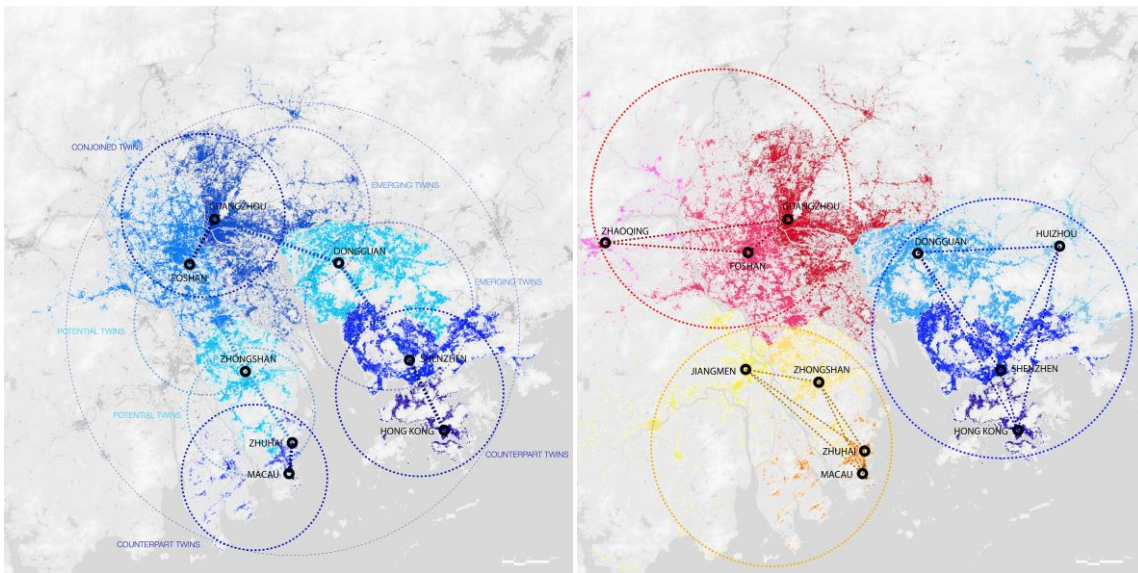


Figure 3.47: (Left) A potential megalopolitan chain of twins as the spatial structure of the Pearl River Delta based on the past and current experience of urban development

Figure 3.48: (Right) The regional structure of three expanded urban circles based on the current three existing pair of twin cities, proposed in *The Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020)* by the state, 2008

Within these strategic alliances of twins there is still unavoidable competition at a local level between twin-cities. Cities compete with each other in pursuit of unique urban features so

¹⁷² Hecht, Ben. Collaboration is the New Competition. *Harvard Business Review*. January 10, 2013

that one can differentiate from the other. This explains why during the late 1990s and early 2000s each city in the PRD dedicated effort into a project of making a characteristic and representative “city center”, namely the Futian Center of Shenzhen, West Kowloon of Hong Kong, Cotai of Macau, Gongbei of Zhuhai, and Pearl River New City of Guangzhou. Besides, the elder twins like Hong Kong, Macau, and Guangzhou are in a fight to continue to position themselves as more attractive than the younger twins like Shenzhen, Zhuhai, and Foshan, using branding and other mechanisms in order to attract more advanced industries, qualified professionals, as well as immigrants and visitors.

Besides the developmental phenomenon, we cannot ignore the power of the masterplans in the shaping of the cities and even the whole region. Compared with the plans from the 1980s which all aimed to cater to the needs of population and economic growth, the masterplans for the PRD cities from the 1990s were intended to remain active for a period of more than a decade, with focuses on the development of land, transportation, and housing, among other aspects. The masterplan had been used as a statutory device to outline the functions, goals, and structures of a city and guide the city’s growth with a general perspective. They were considered key to the take-off and rapid growth of the city’s economy, featuring the principles and development characteristics of the city and the territory.

CHAPTER 4

EXPERIMENTING WITH **NEW DISTRICTS** (2000s-2010s)

CHAPTER 4: EXPERIMENTING WITH **NEW DISTRICTS**

(2000s–2010s)

Rapid incremental urban expansion and the incorporation of Hong Kong and Macau into the “urban Pearl River Delta” restructured the region, whose center has been shifting southwards. Upon entering the 21st century and facing the changing dynamics among the PRD cities, all eight cities reoriented their new development focus toward the Lingdingyang Bay, the major water body of the Pearl River Estuary. Though based on different strategic purposes in favor of their own developmental needs, the cities consecutively conducted a common urban practice of building a new district at the edge of the estuary. This practice included the earliest and the largest new district, Guangzhou’s Nansha District, in 2000; Shenzhen’s Qianhai, Zhuhai’s Henqin, and Macu’s New Urban Districts around 2009; and continued more recently with Dongguan’s Binhai Bay, Zhongshan’s Cuiheng New District, and Hong Kong’s East Lantau Metropolis in the last two years. (Figure 4.1) These new districts could be understood as planned “experimental zones” with regard to the shaping the quality of living including facilitation of the economic development of the new century. For example, this is very manifest in the combination of programs in the place like Qianhai. This chapter explores the planning and design schemes of these new districts and their ongoing implementations. It also investigates the potential of the new urban form of this territory: creating an edge-center of the emerging Pearl River Delta Megalopolis through the concentration of the new developments around the estuary.

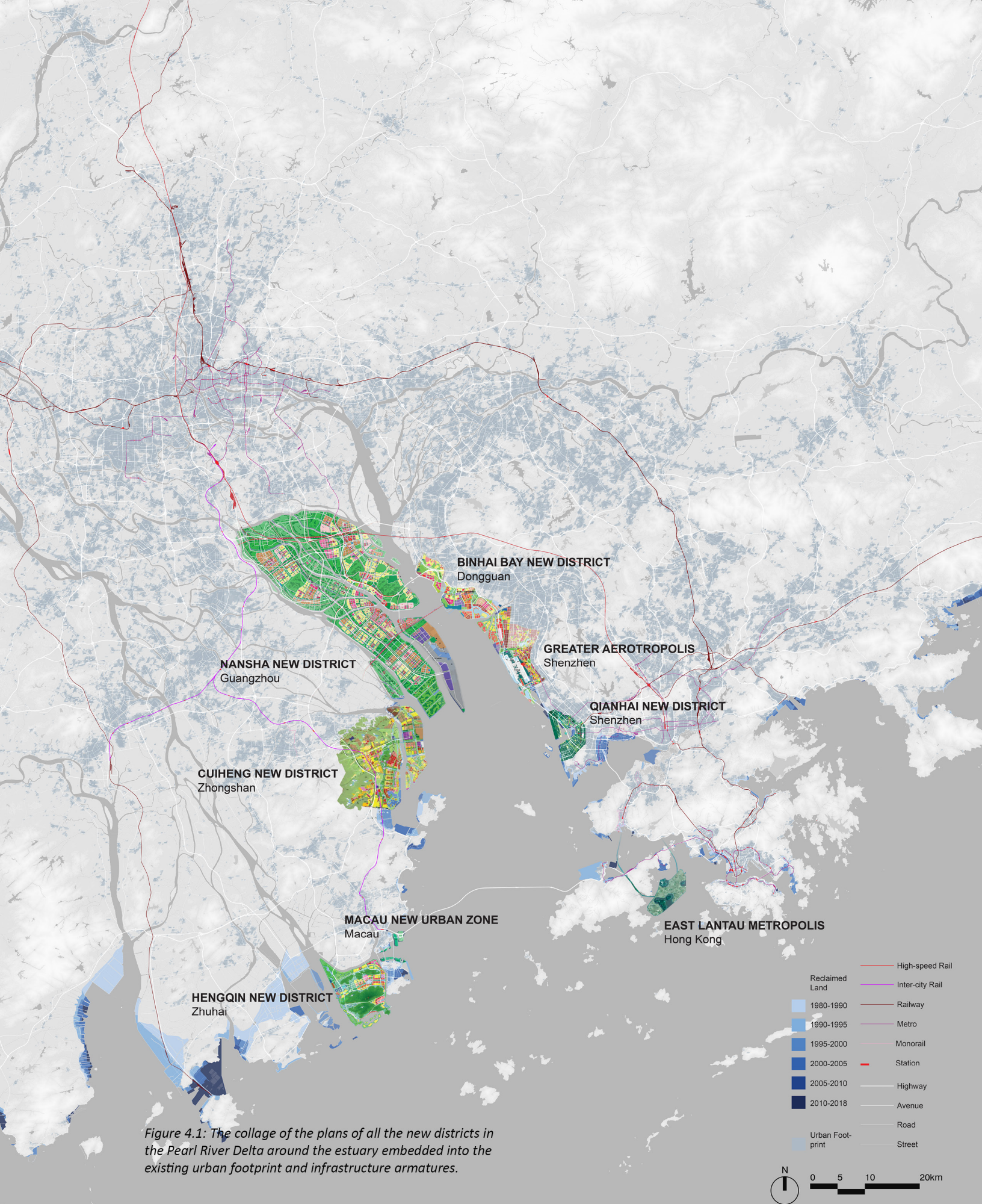


Figure 4.1: The collage of the plans of all the new districts in the Pearl River Delta around the estuary embedded into the existing urban footprint and infrastructure armatures.

4.1 NEW DISTRICTS IN DEVELOPMENT

4.1.1 NANSHA NEW DISTRICT

In 2000, the government of Guangzhou first raised a proposal that the Pearl River Delta should follow the precedent set by Tokyo Bay to become an urban-port belt. The powerful asset they had was Nansha New District. Even long before 2000, Guangzhou had a regional idea to develop the coastal industries of the Pearl River Delta on Nansha. The Nansha Waterway at the west of the Humen Waterway and the divergence of the Pearl River Estuary is the converging place of all three important rivers in the Pearl River Delta (West River, North River, and East River).

¹⁷³ Nansha has a unique geolocational advantage at the geographic and geometric center of the entire PRD, and its distances toward the city centers of the inner-ring PRD cities are all within a 60 km range. Realizing this advantage, the Guangzhou Government planned to develop Nansha into the pilot zone of the deepening opening-up reform and experiment and gained the state's approval to construct the Nansha Economic Development Zone in 1993, while its spatial plan for the core district was not published until 1997. A large amount of the port industry has been transferred from Huangpu Port to Nansha Port since the completion of Nansha Port's harbor facilities in 2004. It is a milestone that marks the upgrade of Guangzhou from a river-port city into a sea-port city. Its expanding port has not

¹⁷³ Berger, Berger, Alan, Crawford, Margaret, and Harvard University. Graduate School of Design. *Nansha Coastal City: Landscape and Urbanism in the Pearl River Delta*. Cambridge, MA: Harvard University, Graduate School of Design, 2006.

only made Nansha a manufacturing hub for cars, ships, and advanced equipment, but has also subsequently attracted a great amount of speculative development to the district.

After the initial decade of effort in constructing the new port, the Nansha Economic Development Zone was officially rescaled up to a 30,000-hectare “New District”, with the intention to change from a port district into a real urban district. Guangzhou Nansha New District—the sixth state-level new district—as a special metropolitan area for the free-trade experiment was officially established with the announcement of its masterplan in 2011. A series of conceptual competitions were held to collect ideas on figuring the vast district the following year, and in 2012, a detailed Development Plan was approved by the State Council. The masterplan claimed its aim was to build a vital transportation hub with an advanced comprehensive hub-harbor and become the gateway of southern China in a reformed spatial design paradigm and a different spatial control method.¹⁷⁴ However, despite the great opportunity provided by the scale of the project, there was not much innovation in terms of the planning and design of Nansha New District. The scheme was a very practical zoning and land-use oriented masterplan, which could be efficiently realized in four phases that corresponded to the division of four urban clusters. (Figure 4.2)

¹⁷⁴ Lin, Wenqi, Lu Qingqiang, Shang Yanran and Le Hoanghung. “New Urban District Design in a Transformation Time in China: The Case of Nansha New Urban District, Guangzhou.” *International Conference On Civil Engineering And Urban Planning*. 2012

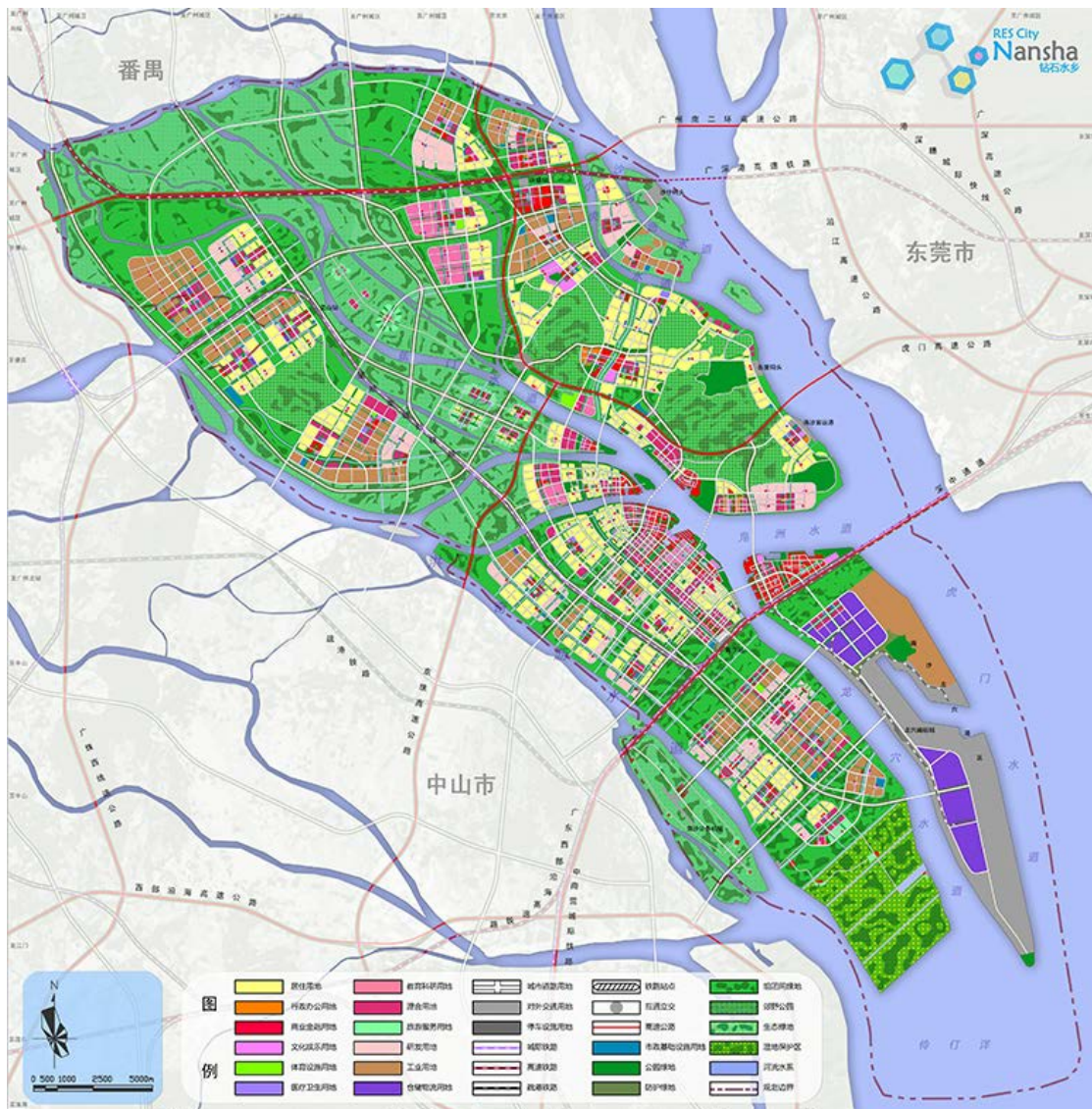


Figure 4.2: Masterplan for Nansha New District. Source: Tsinghua Tongheng Urban Planning and Design Institute.

According to the masterplan, four major clusters will constitute the new district, each organized around a specific industry. First, the port zone based on Nansha Port in the far south will focus on international shipping, port-trade transformation, and upgrading services; additionally, a 10 km² area in Wanqinsha Town was designated as a Free Trade Zone by the state in 2013. Second, the Pearl Bay Pioneering Zone will become the urban

heart of the overall district, and a trade business center leveraging the spillover of the harbor economy. Regional enterprise headquarters and cultural facilities are the two main programs in the Pearl Bay Pioneering Zone plan that was designed in 2014 by the Tsinghua Tongheng Urban Planning and Design Institute, the same agency that is responsible for the overall masterplan. The complexity of the hydraulic condition, with the convergence of four rivers and the existence of the two narrow islands, Hengli and Lingshan, brings great perspectives. (Figure 4.3) Third, the Dongyong Zone in the north of the new district and on the south bank of the Pearl River facing Huangpu Port is planned to be a manufacturing place cluster and the production and research base for the automobile industry. The fourth urban cluster will be composed of the Education and Healthcare Cooperation Experiment Zone and an ecological protected zone in the west. Compared to the banal overall urban design scheme of Nansha New District, the landscape plan is more attentive, with an emphasis on making soft edges between the urban blocks and water. (Figure 4.4)



Figure 4.3: The aerial view of Bay Pioneering Zone in construction, with the Lingshan Island as the future urban center. 2016. (Source: Sohu Images)

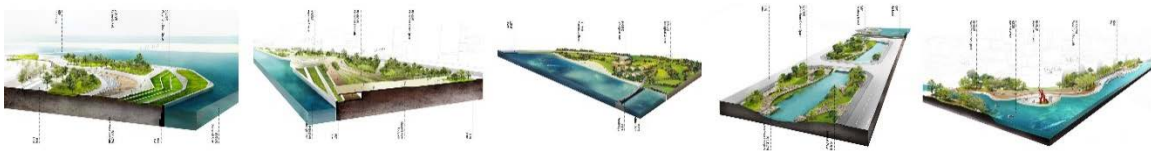


Figure 4.4: The perspective sections of the soft edges in the landscape masterplan. (Source: IAPA and SCUTDI)

The resident population of Nansha New District was 720,000 in 2017. With the increasing trend of new immigrants, the future potential population is anticipated to be around two million. The large amount of construction follows the provincial ambition to make Nansha New District into the second urban center of Guangzhou, which is in the process of restructuring into a “two-core” metropolis.

4.1.2 QIANHAI NEW DISTRICT

In 2008, the San Francisco Bay Area was mentioned as the reference for the Pearl River Delta to construct a bay area of high-tech industries, and in this proposal the Shenzhen Government had the grand ambition of making the city a global science and technology center of the future “Chinese Silicon Valley”. Two ambitious projects born out of this initiative were Shenzhen Bay Super City and Qianhai Shenzhen-Hong Kong Modern Service Industry Cooperation Zone, located at the west and east of Shekou respectively. The projects are also known as Houhai CBD and Qianhai New District due to their locations, as the word “houhai” in Chinese means back-bay and “qianhai” means seafront. The names of these two projects makes apparent the determination of Shenzhen to reorient its concentration from inwards to outwards toward the Lingdingyang Bay. While Houhai CBD may be characterized as a densification project that emphasizes the improvement of today’s city, Qianhai New District is an experimental field exploring the new paradigm of future city-making in Shenzhen.

The preliminary study for the Qianhai New District was conducted in 2008 by China Merchants Group and the planning institutes in Shenzhen, and focused on the potential of transforming Shekou into a future regional center of the Pearl River Delta. It categorized the history of Shekou in three stages: from 1978–1993 the building of an industrial park from the rural; from 1993–2003 the making of an urban district based on the industrial park plus port; and from 2004–2008 the creation of an urban center by transforming the port into a free-trade-zone; and then concluded that to prepare for the future it was necessary to expand Shekou by introducing a new district as an experimental zone, taking advantage of the policy bonus placed on Shenzhen—the “Closer Economic Partnership Arrangement” (CEPA) between Hong Kong and Mainland.¹⁷⁵ After the preliminary study and the feasibility study, Qianhai New District as a cooperation zone between Shenzhen and Hong Kong was officially established in August 2010 with the promulgation of an implementation plan and suggestions for Shenzhen Qianhai.

An international urban design competition for the Qianhai masterplan of 2010 was organized to find the best spatial proposal that could translate the aims of the district onto the 1500 hectares of reclaimed land. The top three finalist proposals by James Corner/Field Operations, Joan Busquets/BLAU, and Rem Koolhaas/OMA were selected from 61 entries from across the world and represented three different directions led by a landscape architect, urban designer, and architect respectively. Nevertheless, the three projects share

¹⁷⁵ Luo, Yan. Hu Jingdong. “The Past and Present of Qianhai”. China Academy of Urban Planning and Design, Shenzhen Branch. *Six Senses*. 2015

the same emphasis of “water” and the consideration of how to organize the new district first in relation to the recuperation of ecological functions and environmental sustainability.¹⁷⁶

The proposal entitled “Qianhai Water City” from James Corner Field Operations was awarded First Prize. The design envisions a district structured by “water fingers” which are extended from the existing rivers and channels. (Figure 4.5) Corner describes the function of the water fingers “as both innovative hydrological infrastructures and new public parkland. They process and remediate stormwater, while expanding the amount of development frontage onto public open spaces that structure and organize the larger city.”¹⁷⁷ As a real case following the principle of landscape urbanism, this scheme represents an ongoing investment in landscape ecology as a medium through which to articulate the development of a large district.¹⁷⁸ It gives shape and substance to a future urban field through the instruments of landscape infrastructure.

The Second Prize proposal from BLAU designed a non-stop-transformation city structured by multi-layer infrastructure systems. (Figure 4.6) After rationally positioning the project in a harmonious relation to the nature and overall urban morphology, the design scheme

¹⁷⁶ Doherty, Gareth, and Charles Waldheim. *Is Landscape ...? : Essays on the Identity of Landscape*. Abingdon, Oxon ; New York, NY: Routledge, 2016.

¹⁷⁷ 深圳市规划和国土资源委员会市海洋局. 《深圳竞赛--深圳城市\建筑设计国际竞赛(1994-2014)》. 上海同济大学出版社. 2017

¹⁷⁸ Girot, Christophe, and Dora Imhof. *Thinking the Contemporary Landscape*. New York: Princeton Architectural Press, 2016.

provides a mixture of diversified block morphologies to create a real “city” for 1.5 million people. To further ensure the dynamics of a vivid future city-district, a mechanism of evolutionary blocks is introduced to allow the formation and transformation of the urban blocks.

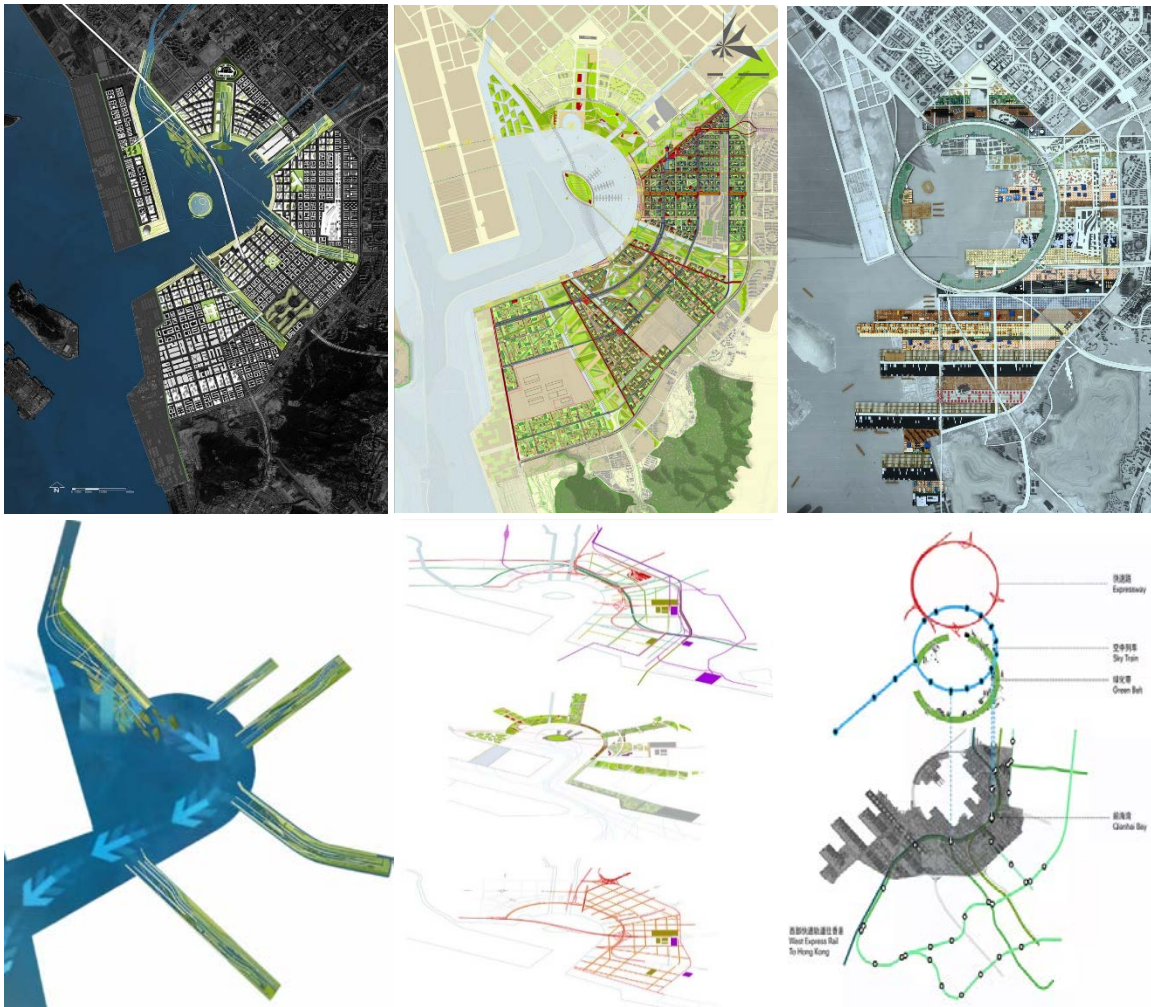


Figure 4.5: (Left) The masterplan and major design logic from James Corner/Field Operations' proposal (Source: James Corner Field Operations)

Figure 4.6: (Middle) The masterplan and major design logic from Joan Busquets/BLAU's proposal (Source: BLAU)

Figure 4.7: (Right) The masterplan and major design logic from Rem Koolhaas/OMA's proposal (Source: OMA)

The design proposal from OMA organizes the site in two layers. The base layer consists of a series of parallel bands running east to west, a stack of different and juxtaposed types of space, each varying in terms of architectural typology, density, and landscape.¹⁷⁹ On top of this layer, a circular loop of 3.4 km diameter is superimposed. (Figure 4.7) This loop is an integrated mega-infrastructure but more importantly an iconic superstructure that delimits the Qianhai Bay from Shenzhen's other urban districts. The superimposition of two layers indicates an essential logic for organizing large-scale urban space from OMA, a logic which was previously adopted in their Parc de la Villette project (1982).

The final masterplan for Qianhai New District is largely based on the winning proposal from James Corner Field Operations. This is a quite atypical Chinese way to finalize an urban design scheme or a masterplan, which often tend to be a hodgepodge of the highlights from the finalist proposals. The water fingers in Qianhai frame five distinct development sub-districts that are programed by the prioritized industries in the area's initial overall blueprint, including entrepreneur innovation, information technology, modern logistics, and cultural and artistic innovation. The first cluster that started construction was the "entrepreneur blocks" cluster. Qianhai Enterprise Dream Park was completed in 2014 with 58 office buildings and a multi-purpose building that could be used as a conference and exhibition hall and an exchange platform. (Figure 4.8) Qianhai Shenzhen-Hong Kong Youth Entrepreneur and Innovation Hub was built in 2015 as a community dedicated to the facilitation of startups for future industries in one of the most active economies in China.

¹⁷⁹ Koolhaas, Rem, David Gianotten and OMA. *Qianhai Port City*. 2010

(Figure 4.9 and 4.10) By May 2018 the cluster has incubated 304 startups, 158 of which are from Hong Kong or Macau. Half of these burgeoning teams have gained funding, with total investments exceeding 1.4 billion RMB.¹⁸⁰ The Qianhai Bay Free Trade Port Zone and the headquarter zone for IT companies were the second and third clusters to gain their physical shape and rise from the ground. (Figure 4.11) The overall district aims of Qianhai are presented successfully in a collection of different urban morphologies which vitally contribute to the urbanity of the place. Besides, the idea of evolutionary blocks proposed by Joan Busquets was adopted into the policy of land development that the lease of land would only last for 15 years, compared with the standard of 40 years elsewhere in China.



Figure 4.8: (Left) Qianhai Enterprise Dream Park. April 2016. (Source: LIANG Xu)

Figure 4.9: (Middle) Qianhai Shenzhen-Hong Kong Youth Entrepreneur Hub. 2016. (Source: LIANG Xu)

Figure 4.10: (Right) Qianhai Shenzhen-Hong Kong Youth Innovation Hub. 2016. (Source: DJI Community)

The planned intensification of infrastructure and the constructions throughout the Qianhai New District render inevitable its emergence as a new center. (Figure 4.12) Furthermore, Qianhai has implemented many novel practices including tax-free incentives to attract its

¹⁸⁰ Qianhai, incubator for HK firms. *Shenzhen Daily*. 2018-05-27

future population. Currently, the project is on the right track to become the new city center that could fulfill Shenzhen's coastal ambitions and establish a node for interaction between various components of the Pearl River Delta. It is arguably one of the most successful urban design projects in China not only in terms of the design itself but also the procedure of research, preparation, and implementation.



Figure 4.11: (Right) Aerial image of the headquarter zone of IT companies in Qianhai New District. 2018. (Source: LIANG Xiashun)

Figure 4.12: (Left) Aerial image of Qianhai New District in 2016, featured the construction of infrastructure systems including the cross-bay bridge, water-fingers, and the double-layered roads. (Source: QIU Maogen)

4.1.3 HENGQIN NEW DISTRICT

Hengqin Island (Ilha da Montanha in Portuguese), located at the southernmost tip of the Pearl River Delta and adjacent to both Macau and Zhuhai, became a focus point for development since the 1990s. The development of Hengqin could directly promote the moderately diversified economic development of Macau and allow Zhuhai to assist Macau's tourism, exhibition, and logistics supply industries.¹⁸¹ In the early 2000s, around the time

¹⁸¹ Zhuhai: China's frontier for connection and cooperation. *The Daily Telegraph*. 2018-10-26

that the first Qianhai New District concept was conceived by Shenzhen, the Zhuhai Government announced their plan of learning from San Diego Bay to create an environmental friendly and livable region. As a response to the actions of Guangzhou's Nansha and Shenzhen's Qianhai, Hengqin was selected to be the new Special Economic Zone of Zhuhai and a physical cooperation platform with Macau. However, due to the complexity of land ownership, a proper collaboration effort from Macau and Zhuhai to plan and develop the island did not take place until the state council announced the "Outline of the Plan for the Reform and Development of the Pearl River Delta (2008–2020)" in 2008, within which Hengqin was listed as a cooperation zone with favorable policies being formulated to encourage and support Macau-based enterprises in Hengqin.

Hengqin New District was officially established in 2009 after a site visit of Chairman Xi Jinping. The Overall Development Plan of Hengqin was carried out by the municipal government with the close consultancy of the Singaporean urban planner LIU Thai Ker. The urban design of the 100 km² Hengqin Island was the subject of an international design competition that was awarded to the French architecture firm AMA, led by Thierry Melot, whose core idea is to preserve the island's natural heritage and design the new district based on the "memory of water".¹⁸² Maximizing the reminiscence of the "water history" of Hengqin, AMA's scheme restores the network of agricultural canals and remakes it as an urban traffic and sanitation system. The developmental plots are concentrated in the lowland and the chain of parks in between the plots act as the linkage between the built

¹⁸² Guzzini, Giulia. "Planning the Hengqin New Area in Macao Zhuhai, China." *DOMUS*. 22 June 2010

environment and the mountain. (Figure 4.13) The masterplan is very literal in terms of translating its inspiration into the real form of the design.

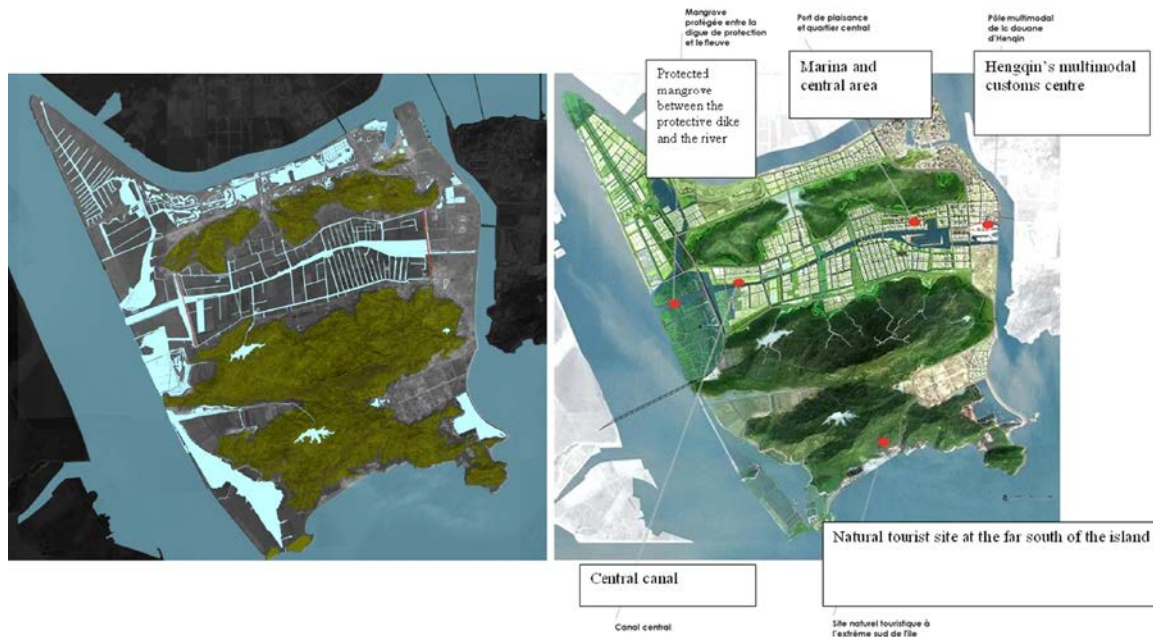


Figure 4.13: The water-system as the inspiration for the urban structure of Hengqin New District. (Source: AMA-Architecture)

The development area of Hengqin New District is divided into five clusters. First, the Zhuhai Cross-Gate Central Business District on the northeast tip of the Island is designated as the real urban center of the new district and will accommodate the Zhuhai International Conference Center, the International Expo Center, global collaboration office buildings, and all supporting facilities. Second, the Hengqin Finance Industry Service Base is composed of 18 office buildings, one finance street service center, and one catering center building in the form of low-rise/mid-density, as well as the new energy supply center in the middle of the cluster, conceived in the search for a new type of sustainable energy. Third, the

entertainment cluster is centered on two major projects, the Chimelong International Ocean Resort and Xiangzhou Culture Street for tourism and shopping. Fourth, the education zone includes over 15 international schools such as the new campus of the University of Macau. Fifth, the medical zone consists of the existing Guangdong-Macau Cooperative Traditional Chinese Medicine Science & Technology Industry Park and overseas branches of world-class medical institutes and hospitals like Massachusetts General Hospital (MGH).

The Cross-Gate CBD was the first phase of construction in the Hengqin New District, and its design scheme was detailed after another round of international competition that took place immediately after the announcement of AMA's masterplan. This competition was won by the team of HOK plus Aedas with a scheme of purely speculative high-rises. (Figure 4.15 and 4.16) Compared with the general scheme from AMA, it lacks a certain sensitivity about the local character of the site. The design is too dependent on the expression of individual buildings and ignores the overall concept of Hengqin's urban form. (Figure 4.14)



Figure 4.14: The aerial view looking towards northwest of the Cross-Gate CBD in construction. 2018. (Source: Kevin Zhen)



Figure 4.15: (Left) The physical model of the Cross-Gate CBD designed by HOK and Aedas.

Figure 4.16: (Right) The aerial view of Hengqin New District, featuring the Cross-Gate CBD site at the northeast tip in comparison with the grids of the other zones. 2018. (Source: Benny Chun)

4.1.4 MACAU NEW URBAN DISTRICT (NOVA ZONA URBANA DE MACAU)

In 2009, at the same time as the establishment of the Hengqin New District, Macau also entered a new phase in its history with the implementation of an ambitious land reclamation program that will add more than 12 percent to the city's land area and create much needed new directions for the economy. This project is Macau New Urban District (Novos Aterros Urbanos de Macau). Located in the Praia Grande Bay, this 730-hectare newly reclaimed urban district was aimed to improve the housing environment and the quality of life for Macau's citizens. The government's goal was to "create conditions for the

development of Macau as a global tourism and entertainment center”.¹⁸³ The masterplan studies were carried out by the China Academy of Urban Planning and Design from 2010 to 2012. The new district would be organized in A, B, C, D, and E clusters and have underground and over-ground light rail lines (LRT) connect them. (Figure 4.17)

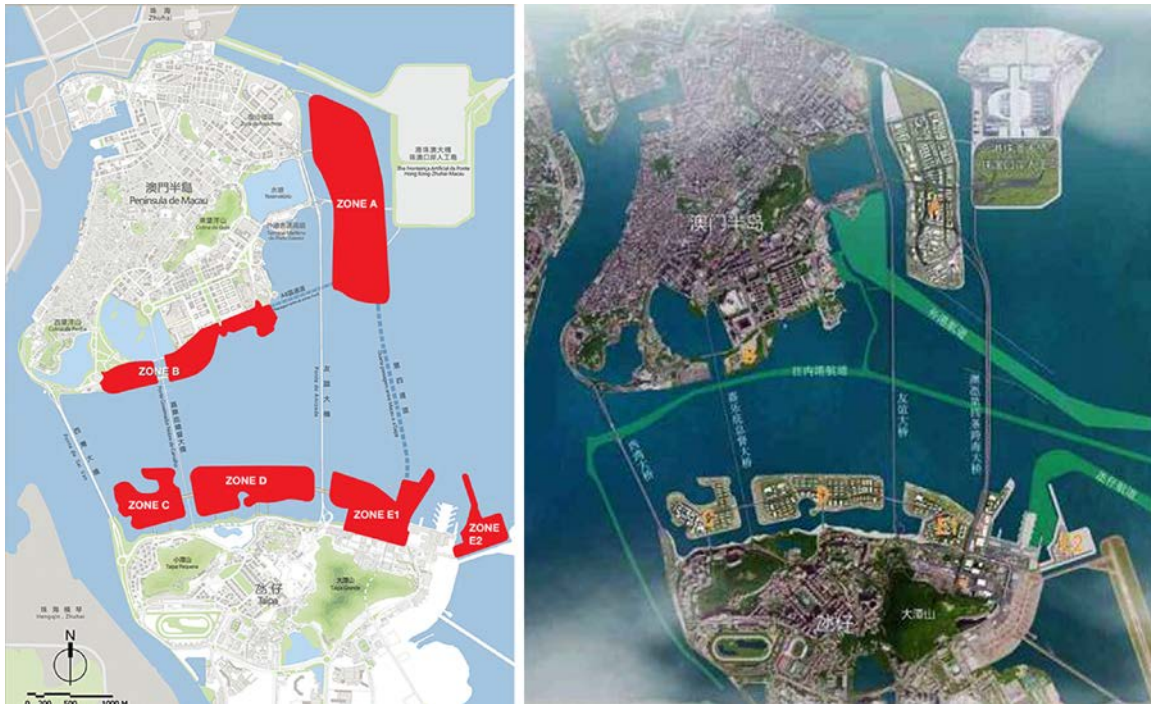


Figure 4.17: The divisions and masterplan for the Macau New Urban Zone. 2012. (Source: Infrastructure Development Office, the Government of the Macau Special Administrative Region of the People's Republic of China)

The overall masterplan envisaged different usages for each landfill cluster: the 138-hectare Cluster A, the largest of the five, located to the west of the maritime terminal, is to provide public housing for 57,000 people as well as building facilities for community recreation and

¹⁸³ Government of the Macau Special Administrative Region of the People's Republic of China. *The Exhibition of Masterplan for the New Town*. Macau International Environmental Cooperation Form & Exhibition. 2012

culture; the 47-hectare Cluster B is designed to accommodate judicial services and tourism in the form of a promenade area with gardens by the sea to harmonize with Macau's world heritage landscape; Cluster E is divided into two sub-clusters: E1 is to become a port-shopping-city close to the Pac On ferry terminal while E2, near Macau International Airport, is designated for municipal facilities where citizens and tourists can be in contact with water and enjoy leisure activities. (Figure 4.18)

The whole project will be accomplished in three phases. Zone B was completed in 2018; its urban fabric design is related to Macau's new light rail project that is currently under development to connect Macau Peninsula to Taipa Island and the airport, and its new buildings are integrated into this recent infrastructure process.¹⁸⁴ The land has already been reclaimed for Zones A and E, with projects expected to be built by 2022, and Zones C and D are now in the process of reclamation. According to the narrative of the blueprint, Zones C and D are the most ideal for the creation of a low carbon index pilot zone with areas solely reserved for housing and compared to the other zones they will be allocated a combination of commerce, housing, and green space. (Figure 4.19)

¹⁸⁴ Grande, Nuno and Jorge Figueira. Study New Subway and Expansion of Macau Casinos. *Ipsilon*. January 16, 2015.



Figure 4.18: (Left) The aerial render of the design for Macau New Urban District. (Source: The Exhibition of Masterplan for the New Town. Macau International Environmental Cooperation FOrym & Exhibition. 2012)

Figure 4.19: The aerial view of Macau New Urban District with the Hengqin New District below it, featuring the reclaimed land for Zone A, B and E. 2018. (Source: Benny Chun)

Compared with the previous three new districts, which are conceived as centrifugal projects with the ambition of extending the city's influence in the whole region, the Macau New Urban Zone is conceived at a much smaller scale and as a centripetal project that is more focused on improving local conditions.

4.2 NEW DISTRICTS IN PLANNING

Besides the new districts that already in construction, three other projects—Zhongshan's Cuiheng New District, Dongguan's Binhai Bay New District, and Hong Kong's East Lantau Metropolis (Lantau Tomorrow Vision)—have been consecutively planned and their processes have been accelerated after the "Framework Agreement on Deepening Guangdong–Hong Kong–Macao Cooperation in the Development of the Bay Area" was

signed in July 1, 2017, which promotes the Pearl River Delta to become one megalopolis: the Guangdong–Hong Kong–Macau Greater Bay Area.

Realizing the potential of Lingdingyang Bay to unite the cities of the Pearl River Delta together and stimulate their further collaboration and integration, the central government encouraged each of the PRD cities to construct new districts as an experimental practice. Dongguan and Zhongshan followed this logic and adopted and transformed previous urban expansion projects toward the sea into the schemes of their new districts. Dongguan's Binhai Bay New District, established in 2017, originated from its Chang'an Marina New District of Scientific Innovation, which was planned in 2012 as the advanced manufacturing place to lead the city's industrial transformation and upgrade. The Binhai Bay project combines Chang'an Marina New District with Shajiao Area and Weiyuan Island into a 6000-hectare new district. (Figure 4.20) It physically connects Shenzhen Qianhai and Guangzhou Nansha New Districts, and its plan intends to make Binhai Bay functionally complement Qianhai and Nansha and become a part of the Guangzhou–Shenzhen innovation corridor. In a similar context to Dongguan, Zhongshan enlarged its Torch Industrial Zone, planned in 2012, into the 8000-hectare Cuiheng New District in 2017. It is planned to be the future regional integrated transportation hub of the west bank of the Pearl River Estuary as part of its response to the upcoming Greater Bay Area. (Figure 4.21) The future Shenzhen–Zhongshan cross-estuary bridge will land on Ma'an Island, which is considered to be the future center of Cuiheng New District in the updated masterplan. In contrast to Dongguan and Zhongshan's intentions, which use their new districts mainly for industrial upgrades,

Hong Kong is using this opportunity to ease its housing woes and make a third urban centrality after Victoria Harbor and West Kowloon. Since the failure of the “85,000” Housing Plan, the Hong Kong Government has been keenly in search of alternatives, one of which is the Enhanced East Lantau Metropolis (EELM) raised in “Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030”, a vision-driven, pragmatic, and action-oriented strategic plan promulgated in 2007. This scheme was adapted into the Chief Executive’s 2018 Policy Address as the project of “Tomorrow Lantau”, Hong Kong’s New District. The 2,200-hectare reclamation project would directly solve the issue of land scarcity for the future development needs in Hong Kong, which was determined as a 1,200-hectare shortage.¹⁸⁵ (Figure 4.22) All three new districts remain in the masterplan stage.



Figure 4.20: (Left) The aerial render of Zhongshan Cuiheng New District. 2018. (Source: Tencent Images)

Figure 4.21: (Middle) The aerial render of Dongguan Binhai Bay New District.2019. (Source: IFADUR)

Figure 4.22: (Right) The aerial render of Lantau Tomorrow Vision. 2018. (Source: Hong Kong 2030+)

¹⁸⁵ Development Bureau and Planning Department of the Government of the Hong Kong Special Administrative Region of the People's Republic of China. *Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030*. 2007

4.3 TRANSFORMING THE EDGE INTO THE FUTURE CENTER

The New District as an experimental urban tactic is shared by all the coastal Pearl River Delta cities. This strategy is tightly linked with a practice of land reclamation, with every new district project dependent on artificial land at the shoreline. Land reclamation has been a conventional strategy for urban growth in the Pearl River Delta since the modernization of the region. In the past 50 years, dramatic economic expansion has brought the rapid growth of population, land reclamation, sand mining, and numerous construction projects around Lingdingyang Bay. Compared to the phenomenon before 1970 when natural sediment depositional processes were the important elements affecting shoreline changes, land reclamation has been the critical influence reconfiguring the coast since 1980. This increasing anthropogenic impact has dramatically changed the geomorphology and land-use around the estuary. The tracing according to the high-resolution geospatial database collected from remote sensing images demonstrates the land reclamation process since the 1970s, which in total generated 644.6 km² of new land. It indicates that severe reclamation for land has straightened the coastline along the Zhuhai coast, and narrowed the outlets of the Jiaomen, Hongqili, and Hengmen Rivers. In the eastern side of the bay, large areas of reclaimed land used for the construction of harbors and airports further congested Shenzhen Bay and Chiwan Bay. (Figure 4.23)

Although the shoreline of Lingdingyang Bay has kept changing with bathymetry and shoreline shifts since prehistoric time, its exposure to an unprecedented urban growth and increase in population, the expansion of major industries, and the extensive exploitation of

marine resources is exerting more and more pressure on the coastal environment.¹⁸⁶ Many hydraulic researchers and engineers have warned that if no strict plans are prepared and implemented, at the current rate of reclamation Lingdingyang Bay will eventually change into a river in twenty years.¹⁸⁷ This calls for the rethinking of the new district experiment from individual city efforts to a collective project that is able to cope with the sustainability challenges of the ecological and environmental impacts, which should be a prerequisite for any project around the estuary. Nowadays, the bay is an emblematic place, a factor of regional unity, as well as a strategic place for sustainable development. On account of this, it is necessary to propose that the bay should constitute a unifying framework for exemplary management to ensure the synergy between local project and regional strategy. Without a properly protected Pearl River Estuary with no allowance for unplanned development, there will be no future of the Pearl River Delta.

The land reclamation and construction of the new districts along the edge of the Pearl River Estuary is gradually changing the regional pattern from a megalopolitan chain of twin-cities into an emerging aggregation whose future center is focused on the estuary. This tendency of creating an edge-center is appearing more and more evident after the encouragement of the state council to construct coastal new districts for the development of the Guangdong–Hong Kong–Macau Greater Bay that is accorded the status of key strategic planning in the country's

¹⁸⁶ Jia, Peihong & Xia, Zhen & Yin, Yong & Xue, Qiao. (2016). Lingdingyang Bay, Pearl River Estuary (China): Geomorphological evolution and hydrodynamics. *Geological Society, London, Special Publications*. 429. 10.1144/SP429.14.

¹⁸⁷ Ying, Zhifu. "A Study on Notable Features of Sedimentary Dynamics in Lingdingyang Estuary of Zhujiang River." *Tropic Oceanology/Redai Haiyang*. Guangzhou 14, no. 2 (1995): 76-82.

development blueprint. After juxtaposing all the new districts and superimposing them onto the existing urban footprint of the Pearl River Delta, it turns out there is indeed a continuous “urban rim” along the estuary. (Figure 4.24) This future edge-center of the Greater Bay Area is doubtfully a purposeful planning result since it by far appears to be a “colosseum” in which each of the new districts is competing with one another by promoting its own propaganda with a different reference for its own developmental interest. Considering each city within the Pearl River Delta has a different pillar industry and character, it is possible to conceive of a regional plan that can rationally manage the dynamics between the competition and collaboration among the PRD cities and hence organize the new districts in a more complementary way, together as a potential cooperation platform.

The big idea from the central government is grand and beautiful. However, these experimental new districts are confronted by many challenges and concerns in the discussion of urbanism. For instance, which types of program could be placed to fill in such a vast land almost half the size of the existing urban area of the Pearl River Delta? And how to make the new districts of the different cities architecturally, or in terms of urban form retain their own urbanistic tradition, local features, and typical morphologies, when the maxi-grid is adopted as the major planning and design method?

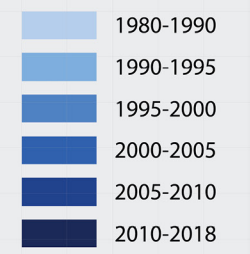
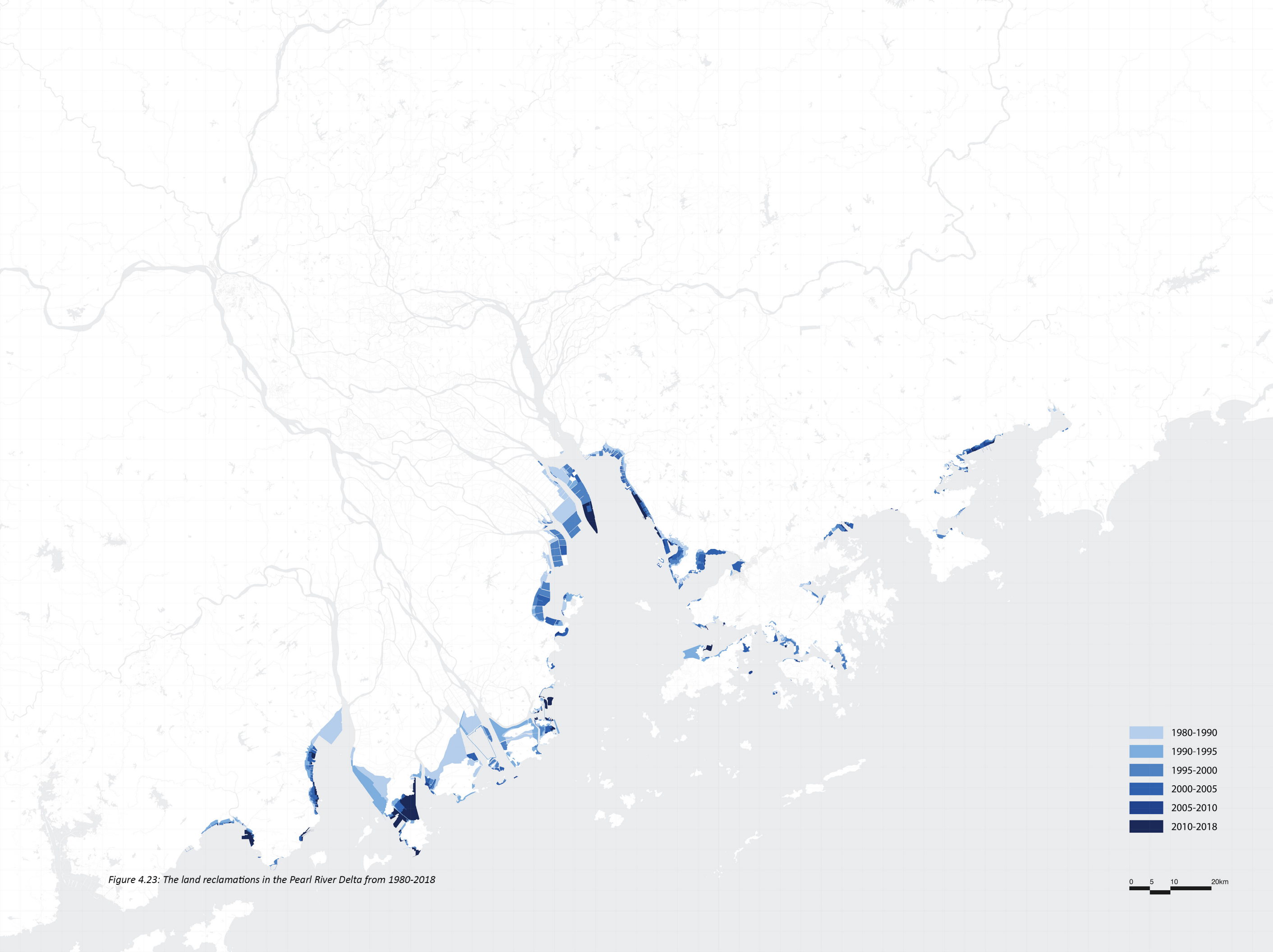


Figure 4.23: The land reclamations in the Pearl River Delta from 1980-2018

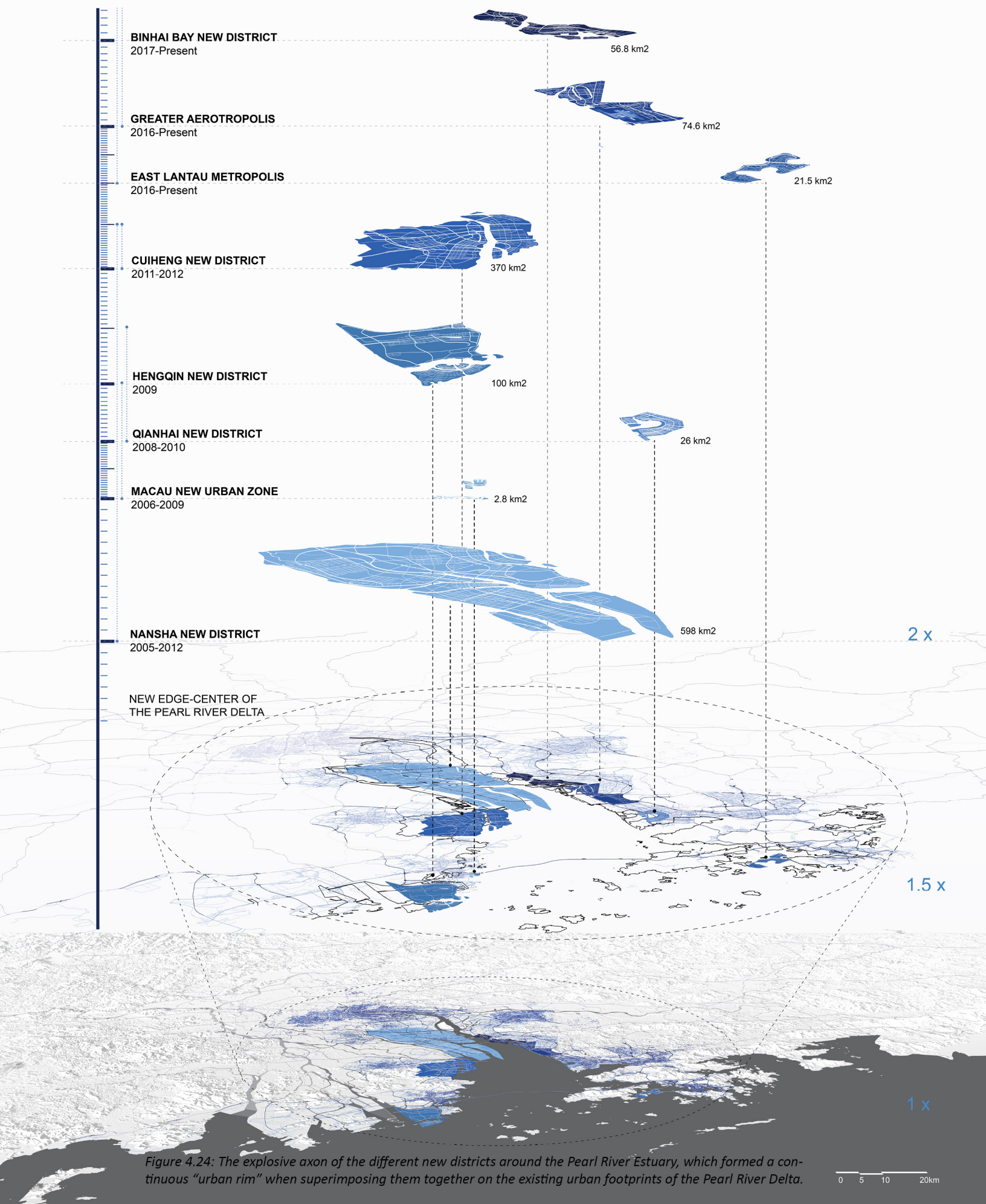


Figure 4.24: The explosive axon of the different new districts around the Pearl River Estuary, which formed a continuous "urban rim" when superimposing them together on the existing urban footprints of the Pearl River Delta.

CHAPTER 5

THE NEW INFRASTRUCTURE OF THE PEARL RIVER DELTA (2010s-Present)

CHAPTER 5: THE NEW INFRASTRUCTURE OF THE PEARL RIVER DELTA (2010–Present)

The Pearl River Delta has evolved from an agricultural backwater to a light manufacturing juggernaut with a steadily growing importance in service provision that contributes to its recognition today as an emerging global city-region.¹⁸⁸ During this procedure, the infrastructure system has undoubtedly performed a critical role in promoting its development. Initially, harbors provided a fundamentally identical built form for the cities of the Pearl River Delta, and in the 1980s expanded logistics functions brought the region into the global division of labor. Myriad expansions of the highway and railway networks facilitated the interconnection of the region in the 1990s and 2000s, as infrastructure acted as a guiding principle for the regional framework of the PRD. An observation of the explosive urban expansion of the cities and the new districts juxtaposed along the Pearl River Estuary leads to the interpretation of the region in the form of a potential megalopolis; however, the integration of and cooperation inside the region continue to be restrained due to the limited cross-bay infrastructural connections.

Starting in the 2000s, the Pearl River Delta moved to producing higher valued items but confronted problems such as rising labor costs and industry related environmental degradation. The region was hit even harder during the global financial crisis of 2008–2009

¹⁸⁸ M. Enright, J. Edith E. Scott and K. Chang, *Regional Powerhouse: The Greater Pearl River Delta and the Rise of China* (city: John Wiley & Sons (Asia) Inc., 2005

with shrinking external demand for its exports, leading several critics to cast doubts on its future. The analysis made by Bertaud highlights that the comparative spatial advantages of the various parts of the Pearl River Delta can be enhanced by improving the infrastructure network, and as a result avoid the duplication of major facilities whose economic cost is borne by the entire region.¹⁸⁹

Nevertheless, the Pearl River Delta is making a strong comeback from the global financial crisis. Backed by the central government in Beijing, the PRD is investing heavily in modern infrastructure to support the development of the region; it proposes to spend close to two trillion RMB on more than 150 major infrastructure improvements to forge a colossal network of transportation, water, energy supply, and telecommunication.¹⁹⁰ Once completed, the PRD will be arguably the most robust and fine-kit regional infrastructure network worldwide. Among these projects, a series of new instrumental mega-infrastructure projects will feature: three new high-speed railways, four new airports, and thousands of kilometers of new highways with sea-crossing bridges and tunnels. This comprehensive multimodal infrastructural system will provide the Pearl River Delta a “ground” of accessibility and conditions of flexibility that are anticipatory of the region’s future growth.

¹⁸⁹Bertaud, Alain. *Spatial Structure of the Pearl River Delta Metropolitan Region: A study proposal*. 2001

¹⁹⁰Cooper, Mark. China’s Pearl River Delta: Tying 11 Cities into a Megaregion. *Urban Land*. 2014 September 22.

With the postulate of an urbanism driven by infrastructure, specific attention is paid in this chapter to the design practice of new infrastructures constructed or planned from 2010–present as well as their role in the Pearl River Delta’s contemporary makeover into a megalopolis. (Figure 5.1) It is organized according to the following three aspects with pertinent case studies: railways and their stations, highway and bridges, and harbors and airports.

5.1 THE HIGH-SPEED AND INTER-CITY RAILS

For a long period, railway transit has been the most influential element in facilitating urban development and structuring the spatial pattern of the Pearl River Delta. (Figure 6.5)

Though its spatial outcome is similar to many other polycentric mega-city-regions, which reflects the form of beads-on-a-string following the railways and stations, the deep logic of rail-transit in the Pearl River Delta is different and even unique. Due to the fact that the financing of railway construction in the PRD usually comes from the revenues of land-leasing, railway construction and urbanization proceeds in a manner of “Development Oriented Transit”, almost opposite to the idea of “Transit Oriented Development” simultaneously and independently defined by Ralph Rookwood and Michael Breheny and the New Urbanist planner Peter Calthorpe in 1993. The emergence of the mega-region has been, from its very beginning, related to the question of efficient mobility. The extension of large cities toward each other has been conditioned by the introduction of new technologies of transportation and the immense activities that follow and surround them.

Airports

Streets, Boulevards and
Highways

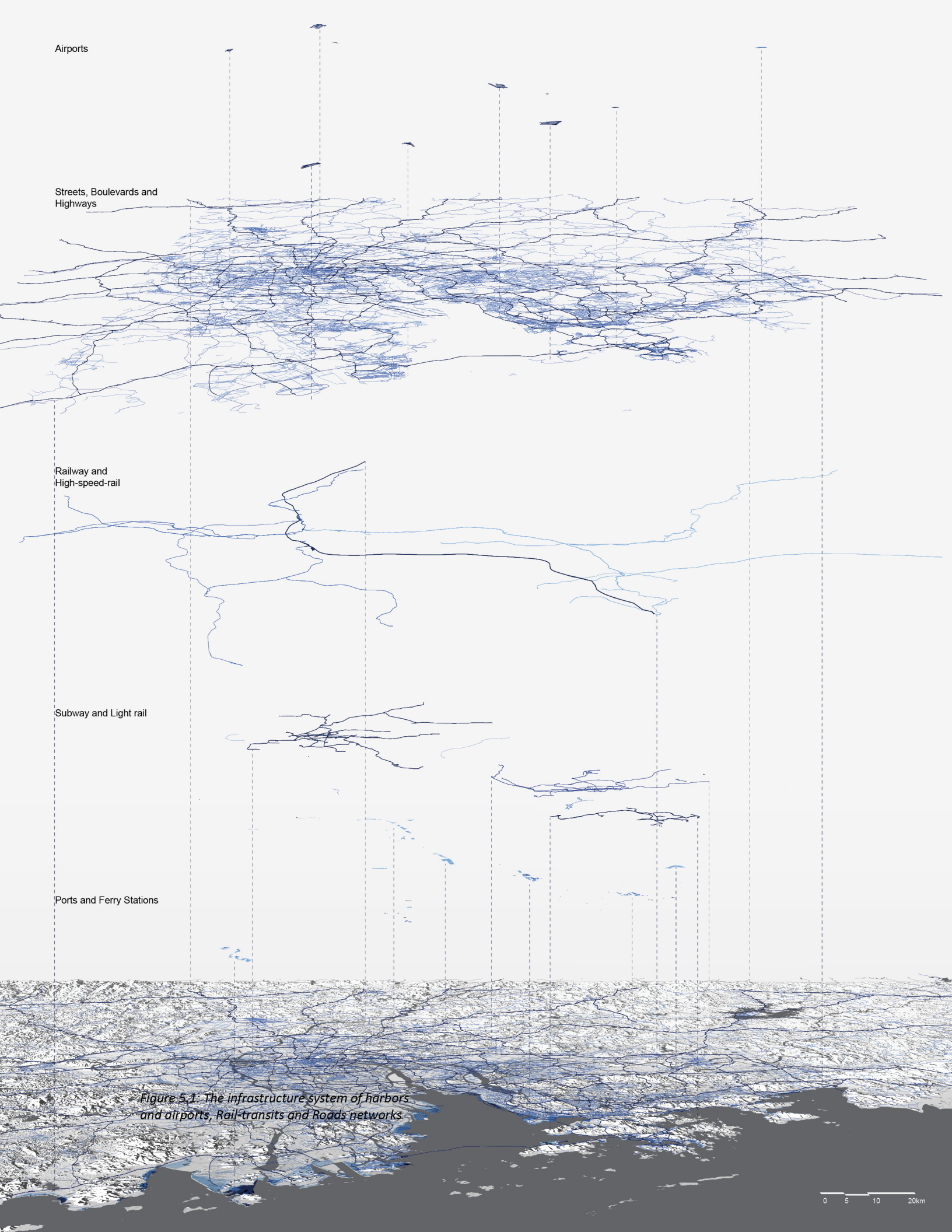
Railway and
High-speed-rail

Subway and Light rail

Ports and Ferry Stations

Figure 5.1: The infrastructure system of harbors
and airports, Rail-transits and Roads networks

0 5 10 20km



One of the elementary spatial issues of this process is “access”. The notion of accessibility has enlarged in its scale of application from the urban to the metropolitan to the regional, and so changed our living environment drastically. The advent of the wide coverage of the high-speed railway network across the Pearl River Delta brings to the region a condition of hyper-accessibility. Besides, the new level accessibility brought by the mega-infrastructure tightens further the market, the knowhow and the productions in order to stimulate more communications and flows that are essential for continuing the prosperity of the economy. According to Spiekermann and Wegener’s anamorphic mapping methodology, which measures space by travel time instead of distance,¹⁹¹ the high-speed rail “shrinks” the physical distances between existing cities inside the Pearl River Delta, transforming the region into a metropolitan circle of one-hour travel.

5.1.1 GUANGZHOU–SHENZHEN–HONG KONG EXPRESS RAIL LINK

The success of the Kowloon–Canton Railway in facilitating rapid urbanization adjacent to it was very evident after its restoration and resumption in 1979 and its modernization improvement in 1987, particularly the development of the Luohu area in the Shenzhen Special Economic Zone and the Hung Hom area in Hong Kong, as well as the industrial urbanization in Dongguan. It then inspired the Government of Hong Kong in 1994 to bring forward the proposal to construct another high-speed railway link from Guangzhou to Hong Kong for the purpose of regional prosperity and to address the growing demand for cross-

¹⁹¹Spiekermann, K., and M. Wegener. "The Shrinking Continent: New Time—Space Maps of Europe." *Environment and Planning B: Planning and Design* 21, no. 6 (1994): 653-73.

border passenger traffic. This proposal of the 1994 Regional Express Railway (RER) was the initial stage of the Guangzhou–Shenzhen–Hong Kong Express Rail Link. One year after the Return, the Hong Kong SAR Government commissioned a second round of the Railway Development study.¹⁹³ LIN Shusen, the mayor of Guangzhou, boldly pushed the proposal further by suggesting a maglev train instead of a railway. With the addition of the strong support of the Shenzhen Government in 2002, the triple effort eventually gained the nod of the Ministry of Railways. The saturation of the existing Kowloon–Canton Railway accelerated the project and its construction started in 2004. The 143-kilometer Guangzhou–Shenzhen–Hong Kong Express Rail Link (XLR) has only seven stops, each located at existing city centers or at new centralities currently under construction. With the mainland section completed in 2015 and the Hong Kong section in 2018, the traveling time between the two farthest stations is no more than 50 minutes. (Table 5.1)

Table 5.1: Table of travel time between the seven stations on the Guangzhou–Shenzhen–Hong Kong Express Rail Link

High Speed Rail		Guangzhou		Dongguan	Shenzhen			Hong Kong
		South Station	Nansha Qingsheng	Humen Station	Guangming City Station	North Station	Futian Station	West Kowloon Station
Guangzhou	South Station		5 Min 31km	10 Min 50 km	22 Min 86 km	30 Min 102 km	35 Min 115 km	50 Min 141 km
	Nansha Qingsheng	5 Min 31km		5 Min 19 km	17 Min 55 km	25 Min 71 km	30 Min 84 km	45 Min 110km
Dongguan	Humen Station	10 Min 50 km	5 Min 19 km		12 Min 36 km	20 Min 52 km	25 Min 65 km	40 Min 91km
Shenzhen	Guangming City Station	22 Min 86 km	17 Min 55 km	12 Min 36 km		8 Min 16 km	13 Min 29 km	28 Min 55km
	North Station	30 Min 102 km	25 Min 71 km	20 Min 52 km	8 Min 16 km		5 Kim 13 km	20 Min 39km
	Futian Station	35 Min 115 km	30 Min 84 km	25 Min 65 km	13 Min 29 km	5 Kim 13 km		15min 26km
Hong Kong	West Kowloon Station	50 Min 141 km	45 Min 110km	40 Min 91km	28 Min 55km	20 Min 39km	15min 26km	

¹⁹³香港交通事务委员会.《立法会参考资料摘要：铁路发展策略》. 2000-05-16



Figure 5.2: The Arial image of the Guangzhou South Station and the Expo Business Center (in construction, expected to be completed in 2021). 2018. (Source: Panyu District Government).



Figure 5.3: Aerial view of the West Kowloon Station Terminus and the Union City development on its left. 2018 (Source:Asean)

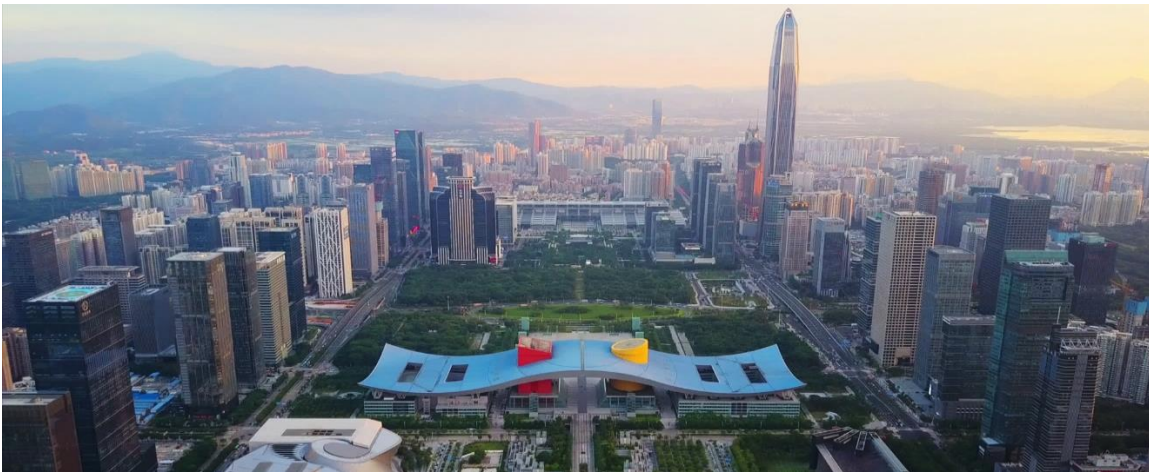


Figure 5.4: Aerial view of the Futian Center where the largest underground railway station beneath the green park.2018. (Source:People's Political Consultative Conference of Futian District, Shenzhen)

Through the stations of the XLR, the high-speed railway infrastructure is able to evolve from flux to *firmitas*.¹⁹⁴ In other words, the hyper-accessibility of these stations—highly active and powerful urban nodes—brings hyper-density, an extreme urban phenomenon which demonstrates the interwoven nature of infrastructure design and urbanism. Stations like Guangzhou South Station in Nansha, Shenzhen Futian Station, Shenzhen North Station in Longhua, and West Kowloon Terminus in Hong Kong are set within a frame of new development, steering urban morphology and reshaping the urbanization of the territory in a very concrete way. The introduction of these stations have led to projects including the EXPO business center in Nansha (designed by CallisonRTKL) (Figure 5.2), the re-densification of Futian Center (towers designed by SOM and KPF) (Figure 5.3), Longhua CBD (designed by Mecanoo), and Union City in West Kowloon (designed by Terry Ferrell). (Figure 5.4)

5.1.2 MULTI-SCALAR PEARL RIVER DELTA RAIL-TRANSIT NETWORK

The Guangzhu (Guangzhou–Zhuhai) Intercity Rail is the first high-speed railway completed within the Pearl River Delta Rapid Transit Network (PRDRTN). The intention of the network, which is still under construction, is to create a hyper-linked metropolitan future, a “one-hour-living zone” encompassing all eight cities in the Pearl River Delta. (Figure 5.5) If the Guangzhou–Shenzhen–Hong Kong Express Rail Link and the Canton–Kowloon Railway are the spines of the east side of the region, the Guangzhou–Foshan–Jiangmen–Zhuhai High-Speed Rail together with the Guangzhu Intercity Rail form the spines of the west side,

¹⁹⁴ Acker, Maarten Van. *From Flux to Frame: Designing Infrastructure and Shaping Urbanization in Belgium*. Leuven, Belgium: Leuven University Press, 2014.

connecting the metro-system of Guangzhou to Zhuhai's existing and Macau's future light-rail systems. Besides the “vertical” lines, two horizontal lines including the Foshan–Dongguan Intercity Rail and one circular line are also featured in the overall masterplan.



Figure 5.5: (Left) The plan of the Pearl River Delta Rapid Transit Network (PRDRTN)

Figure 5.6: (Right) The Railway-Transit Map of the Pearl River Delta, including all types of rails like high-speed, electronic, metro, light rail, and monorail.

This plan of regional rail-transit as a single layer detached from the overall masterplan coincidentally matched in style with Harry Beck’s 1931 diagram, famously simplifying the spiderweb-structure of the rail-transit lines. Although the PRDRTN plan is precise in spatial dimensions while Beck’s diagram is not, they both represent the rail-network as a precise topology of connections in which the destinations—the location of stations—become elements that are more critical from the urbanistic perspective than the trajectory of the lines. As Marc Auger argues, urban space is imprecise for the passengers on the rail, as

people begin to realize that they need not know exactly what streets they travelled.¹⁹⁵

When riding the train, it is more important to know which station people are traveling to instead of which path they are travelling. In this sense, the stations become the key urban factors for the plan of the railways in the larger context, and the areas surrounding the stations become cities-in-miniature—places of encounter and exchange between different people, cultures, goods, and even knowledge. Thus, the PRDRTN introduces multi-scalability into the mega-region, within which region and city share an essence as a polycentric urban entity. Cities become the urban centers of the region, and the region transforms into a new form of city. For instance, from an “up-scale” perspective the Pearl River Delta includes Guangzhou, Hong Kong, Shenzhen, Zhuhai, Macau, Foshan, Dongguan, and Zhongshan, and from a “down-scale” perspective Shenzhen includes Futian, Shekou, Shangbu, and Luohu. The “travel distance” between the centers in the up-scale and down-scale perspectives is almost the same if measured by time due to the different speed-capacities of their respective rail-types. Both scales form composite areas that are central to the cities they exist within, and are the focus of growth and development.¹⁹⁶ Therefore, the major high-speed railway stations become the mediators or transitional valves in between the regional and urban scales, and so tie the different scales together into a comprehensive multi-scalar Pearl River Delta rail-transit network consisting of all types of rail and metro-systems.

(Figure 5.6) It is then easy to conclude that the stations with hyper-accessibility—meaning

¹⁹⁵Ovenden, Mark. *Metro Maps of the World*. Middlesex (38 Long Elmes, Harrow Weald): Capital Transport Pub., 2003.

¹⁹⁶Christeense, Kees. *Access to Urbanity: Designing the City as a Resource*. 2015

multimodal transportation hubs such as Guangzhou South Station, Zhuhai North Station, Shenzhen Qianhai-Xili Station, Foshan Station, Dongguan Humen Station, and West Kowloon Terminus—are of primary concern as points of intervention for an urbanism of the regional dimension.

5.2 THE HIGHWAYS AND BRIDGES

Modern highway systems were developed in the 20th century as the automobile gained popularity and were first introduced to the PRD in 1986 with the construction of the Guangzhou–Foshan Highway. There is a proverb known in Chinese households: “To build a road to build wealth”, which implies the most typical Chinese “road-red” urban development model. This makes it easier to understand the phenomenon of the numerous roads and highways built to serve the purpose of economic development across the whole of the Pearl River Delta since the 1990s when the Open-up Policy achieved its initial success. This wave of highway construction in the last decade of the 20th century substantially increased transportation efficiency across the region.

Historically, cities are the result of flows of people, goods, and information. The faster and the larger the flows are, the quicker the cities develop. In order to reach this aim, infrastructure tends to be well connected in a loop manner to ensure continuous flow. The road network of the Pearl River Delta has been separated in two directions below its confluence in Guangzhou due to a significant geographical challenge: the Pearl River Estuary.

This is not only due to the estuary's average width of 400 meters, but also because it has one of the most complicated channel network systems in the world.¹⁹⁷ How to make roads across the estuary has been a salient and critical discussion topic among planning and engineering discourses for decades.

Until 2018, the only passage across the Pearl River has been the Humen Bridge at the mouth of Shiziyang Bay and at the north boundary of Lingdingyang Bay—the major water body of the Pearl River Estuary. It remained very difficult for Shenzhen or Hong Kong at the southeast of the bay to reach Macau or Zhuhai at the southwest side because cars have to travel north to Dongguan before using this bridge. The Lingdingyang Bridge was raised as an ultimate solution and eventually built in the form of the Hong Kong–Zhuhai–Macau Bridge after a half-century effort. This new mega-sea-crossing bridge completed the loop of the G94 Pearl River Delta Ring Expressway and realized the intention of making a loop that encircles the whole region to provide endless flows. The total distance of the highway network in the Pearl River Delta more than doubled from 4,100 kilometers in 2009 to 9,002 kilometers by the end of 2018. This extensive highway infrastructure became the determinative skeleton for the whole of the Pearl River Estuary and structured space.¹⁹⁸

¹⁹⁷Wu, C.; Wei, X.; Ren, J.; Bao, Y.; He, Z.; Lei, Y.; Shi, H., and Zhang, W., 2010. Morphodynamics of the rock-bound outlets of the Pearl River estuary, South China - A preliminary study. *Journal of Marine Systems*, 82, 17-27.

¹⁹⁸ Easterling, Keller. *Organization Space : Landscapes, Highways, and Houses in America*. Cambridge, Mass.: MIT Press, 1999.

5.2.1 HUMEN BRIDGES

As described before, the intention to build physical connections across the Pearl River Estuary is not new. Numerous efforts could be found through history, documented through plans and maps. The Humen is a narrow strait separating Shiziyang Bay and Lingdingyang Bay where the Pearl River discharges into the sea. Historically, it was identified as the best place to cross the estuary. As early as 1820, the British hydrographer Daniel Ross started to imagine building a channel on Humen to connect the Sampanchow (Sanbanzhou) Island of Guangzhou and the islands of Anunghoy (Weiyuan) in Dongguan. The modern plan of the Humen Bridge was initially carried out as part of the Guangzhou–Shenzhen–Zhuhai Highway in the early 1980s. In June 1981 the Guangdong Provincial Highway Construction Company and Hopewell Holdings from Hong Kong raised an ambitious infrastructure project that included three major segments: Lok Ma Chau Bridge linking Hong Kong and Shenzhen; Guangshen Highway and Humen Bridge connecting Guangzhou, Shenzhen, and Dongguan; and Guangzhu Highway tying together Guangzhou, Foshan, and Zhuhai.

After the car ferry system of Humen overreached its capacity in 1992, the necessity of building the Humen Bridge was more urgent than ever. A team of 22 bridge engineers and specialists led by LI Guohao and ZENG Wei Humen completed the design proposal in two years after receiving the commission by the Transportation Department of Guangdong Province. Human Bridge consists of two main spans: an 888-meter-long suspension bridge section and a 237-meter segmental concrete section. (Figure 5.7) Completed in 1997,

the 30-meter-wide, 8-lane new bridge's average daily traffic volume in the first year of its function went beyond 10,000 vehicles, and reached its peak at 67,890 in 2009.¹⁹⁹



Figure 5.7: Wu, Daniel Tung. Humen Bridge in Dongguan. 10 July 2010

A feasibility study for the second bridge across the Humen was conducted in 2009 for the consideration of reducing the serious traffic congestion on the Humen Bridge, and the proposal gained its permission from the National Development and Reform Commission four years later.²⁰⁰ Humen Second Bridge, also known as Nansha Bridge, started its construction in 2013 at a location ten-kilometers upstream from the Humen Bridge. The new bridge consists of two large spans supported by steel-box girders with a full width of

¹⁹⁹虎门大桥累矣,虎门二桥来也.《南方都市报》.2009年3月27日

²⁰⁰中华人民共和国国家发展和改革委员会.《广东省虎门二桥项目申请报告通过核准》.2013-06-21.

49.7 meters; a 1,688-meter span crosses the Meizhou Waterway and a 1,200-meter span crosses over the Dasha Waterway. It forms part of the new G9411 Dongguan–Foshan Expressway. The function of the previous car-ferry running between Humen and Nansha (Guangzhou) diminished after the functioning of the Humen Bridges, and eventually closed in May 2019.

The construction of the Humen Bridges shortened the travel distance between the east and west sides of the Pearl River Estuary by approximately 120 kilometers, and the two projects greatly contributed to the urbanization of the northern area of the Pearl River Delta, such as the urban growth of Nansha and Dongguan.

5.2.2 HONG KONG–ZHUHAI–MACAU BRIDGE

The long-term dream of connecting the two sides of the Pearl River Estuary was finally realized on October 24, 2018, after the nine-year construction of the Hong Kong–Zhuhai–Macau Bridge since December 15, 2009. Building infrastructure projects on the south end of the estuary is extremely challenging due to its width, the asymmetric hydrologic condition, and the complicated shipping routes. The eastern part of Lingdingyang Bay is deep in comparison to the shallow western part, and three important shoals and two channels are located in the middle of the bay.²⁰¹ With a maximum depth of 14-meters in its center, the Lingding Channel is formed by runoff and tidal movements and is used as the main sea

²⁰¹Gu, Q.; Rao, X., and Li, X., 1990. *Remote Sensing in Lingdingyang Estuary*. Beijing: Science Press, pp.83-90

This project experienced a long and complicated story because its meaning reached far beyond the purely technical level, and involved future opportunities of economic growth that are critical to the participating cities and their respective masterplans. The original concept of this cross-bay infrastructural link, the longest in the world, could be dated back to a half-century ago. It was raised as a utopian project in 1983 by Gordon Ying-sheung WU, a Hong Kong architect and developer, who proposed to construct a bay bridge that would connect Zhuhai and Hong Kong.²⁰³ This idea of a horizontal logistics corridor in the Pearl River Delta was presented in his proposal “Imagination of building the inner Lingdingyang Bridge”, which caught the attention of the Zhuhai Government in 1989; the Government was at that time collaborating with WU’s Hopewell Holdings in the Guangzhou–Shenzhen–Zhuhai Highway Project. During his tenure of 16 years as the mayor of Zhuhai, LIANG Guangda treated the bridge as a strategic project in the urban and regional plans of Zhuhai to open land transportation with Hong Kong, whose economic spillover effect was much stronger than Macau’s. In 1992, Zhuhai officially commissioned the China Communications and Highway Planning and Design Institute to prepare a “Feasibility Study on the Bay-crossing Project on the Lingdingyang”. Two design proposals were listed; the first was the South-line Scheme: a bridge would connect an artificial island in the sea between Zhuhai and Macao to the Lantau Island in Hong Kong, and then diverge into two routes, one to Zhuhai and the other to Macau. This was very similar to the Single-Y scheme we see today. (Figure 5.9) The second was the North-line Scheme: a bridge system would connect Zhuhai’s

²⁰³曾平标. 中国桥——港珠澳大桥兴建始末. 《中国作家》. 2018 纪实版第四期

Jinding District to the Black Point in Tuenmen, Hong Kong, across Qi'ao Island and Inner Lingding Island.²⁰⁴ (Figure 5.10) The second scheme was the shortest distance connecting Hong Kong and Zhuhai, which made the bridge more feasible and economical; it became the announced plan for the Lingdingyang Bridge, measuring a length of 23 kilometers and a width of 33 meters with a total of six lanes, three in both directions.

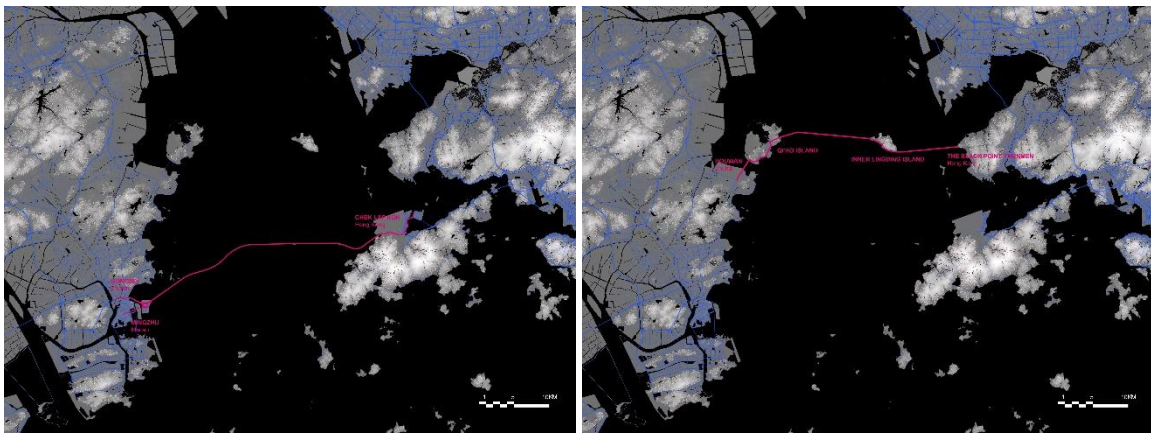


Figure 5.9: (Left) South-line Scheme. 1992

Figure 5.10: (Right) North-line Scheme, also the announced plan for Lingdingyang Bridge. 1992

On December 30, 1996, the State Council approved the construction of the Lingdingyang Bridge. However, the project was stopped a few months later due to disagreements from Hong Kong.²⁰⁵ The objection of Hong Kong's major developers including Li Ka-shing and HO Ming-sze mainly came from two aspects. The first was the low expected return on the investment of this infrastructure, insisting on the limited capacity of economic development

²⁰⁴ 中国交通公路规划设计院编制《伶仃洋跨海工程预可行性研究报告》1992年7月。

²⁰⁵ Sayer, Rosemary. *The Man Who Turned the Lights On: Gordon Wu*. Hong Kong: Chameleon Press. 2006

in Zhuhai and Macau. Second was the the ecological concern, claiming Lingdingyang Bay should be managed and protected continuously and based on a scientific framework; otherwise, it would become narrower and, perhaps, even eventually evolve into a river, which may result in serious future disasters through flooding and tides.²⁰⁶

After the transfer of sovereignty over Hong Kong in 1997 and Macau in 1999, signs of cooperation and interdependency among the cities among the Pearl River Delta became more and more evident. Hong Kong revisited the topic of the bridge in 2002 and proposed to the state council to reactivate the previous plan of the Lingdingyang Bridge for the sake of stimulating the regional economy after the financial crisis.

When the plans of the bridge were officially “on the table” again in 2003, it aroused fierce debate and competition from different cities. Each city held a different proposition with considerations based on their own interests, reflected in their opinions on the layout of the bridge. Hong Kong suggested to change the plan to the South-line Scheme, which would allow the new bridge to land near the new Hong Kong airport and link to the Tsing Ma Bridge. This layout would extensively benefit the airport and harbor to strengthen Hong Kong’s status as an international logistics hub. Macau was also in favor of the South-line Scheme; otherwise, it would be excluded from the project. Zhuhai had a consistent eagerness toward the bridge but insisted on the Dingdingyang Bridge North-line Scheme to

²⁰⁶PeihongJia, Zhen Xia, Yong Yin, QiaoXue, 2016. "Lingdingyang Bay, Pearl River Estuary (China): geomorphological evolution and hydrodynamics", *River-Dominated Shelf Sediments of East Asian Seas*, P. D. Clift, J. Harff, J. Wu, Y. Qui

ensure it would be the only landing point across the bay. This was due to its intention to absorb resources from Hong Kong that this physical linkage would enable, positioning its cheaper land and better environment as advantages over Shenzhen. Shenzhen enjoyed being the destination of the major business flow from Hong Kong; if the bridge was constructed as Zhuhai proposed in the 1990s, Shenzhen would lose its original geographical advantage. In this case, the Shenzhen Government provided a series of Double-Y schemes to ensure Shenzhen would be part of the project. The first one was to add two more “antennas”: one from Inner Lingding Island to Shekou, and another from Qi’ao Island to Zhongshan. (Figure 5.11) The second one was to add an exit bridge to the South-line Scheme. This additional bridge would cross Fanshi Channel to reach Shekou. (Figure 5.12) The third one combined the previous two ideas and drafted a new alignment with the main span of the connection that would start from an artificial island in between Zhuhai and Macau and end on the Inner Lingding Island. (Figure 5.13) Compared with the strong intentions of the previous four cities, Guangzhou and Dongguan didn’t express strong support of the bridge. Humen Bridge was by then the only connection between two sides, which made Nansha and Humen the geolocational center of the Pearl River Delta with much of the accessibility. However, once the new bridge was built, the center of the region would shift southwards, which was not an ideal outcome for Guangzhou.

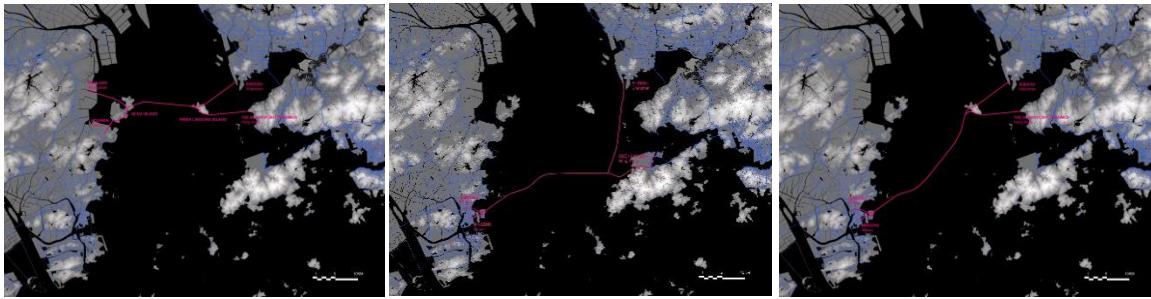


Figure 5.11: (Left) The first option of the Double-Y Scheme, as an alternative of the North-line Scheme. 2004

Figure 5.12: (Middle) The second option of the Double-Y Scheme, as an alternative of the South-line Scheme. 2004

Figure 5.13: (Right) The third option of the Double-Y Scheme, as a combination of the previous two options. 2004

In face of so many controversies, the final decision was made by the State Council and Communication Department in 2004 that the new bridge should be constructed following the alignment of the South-line Scheme and renamed “Hong Kong–Zhuhai–Macau Bridge”.²⁰⁷ (Figure 5.14) This decision was very practical for two reasons, the first of which was the relocation of Hong Kong’s airport. The South-line Scheme could connect the city centers of Zhuhai and Macau to the new Hong Kong International Airport, which could further stimulate the development of the all-around transportation hub for sea, land, and air logistics and, as a result, increase the global competitiveness of the whole region. Second, there exists multiple deep-water shipping channels in the strait on the west of Inner Lingding Island. Hence, either option of the Double-Y Scheme required two tunnels instead of bridges there, whose construction would largely affect the operation of the harbors in Qianhai.

²⁰⁷国务院已完成港珠澳大桥的技术研究，不考虑“双Y”型方案. 香港《文汇报》. 2004年11月29日



Figure 5.14: The aerial view of the completed Hong Kong-Zhuhai-Macau Bridge, looking towards east. 2016 (Source: Steve Arthur)

Though a private developer conceived the initial concept of the bridge, Beijing eventually determined the Hong Kong–Zhuhai–Macau Bridge to be a fully public funded project. The state supplied 5 billion RMB, Guangdong Province offered 7 billion, Hong Kong Government provided 6.75 billion, and Macau prepared 1.98 billion. In total, 15.73 billion RMB was used for the construction of the major body of the bridge in between the two checkpoints constructed on artificial islands. The remaining spans located inside the three cities were separately managed and financed by the respective municipal governments.²⁰⁸

²⁰⁸曾平标. 中国桥——港珠澳大桥兴建始末. 《中国作家》. 2018 纪实版第四期

The completion of the Hong Kong–Zhuhai–Macau Bridge significantly decreased the travel length between Hong Kong and Zhuhai or Macau from 200 to 50 kilometers and decreased the travel time from two and a half hours to 40 minutes. However, except for the shuttle buses that provide 24-hour service at a frequency of every five minutes, car use of the bridge is limited unless the driver has gained the necessary travel permits. The current strategy for most drivers of private vehicles is Park and Ride, where vehicles remain in the parking areas on the artificial checkpoint islands. Designed by Rogers Stirk Harbour + Partners (RSHP) and Aedas, Hong Kong’s boundary crossing facilities are sited on a 150-hectare artificial island to the northeast of the Hong Kong International Airport. (Figure 5.15)

Macau and Zhuhai share one 209-hectare checkpoint island reclaimed and designed by ECADI in between Zhuhai’s Jiuzhou Port and Macau’s Exterior Port. (Figure 5.16) Considering that the two massive artificial islands are constantly filled with movement (buses arriving and leaving, and cars and lorries waiting to be processed), both of their overall designs follow the clear organization of the circulation, whose legibility is enhanced by the shape of the buildings. These two artificial islands undertake crucial and complicated responsibilities including the security and transit hub, shopping center, and hotels. Besides, these two nodes are expected to be the catalysts for adjacent large-scale urban developments such as the Hong Kong East Lantau Metropolis and the Oriental Pearl City. In this sense, they are not just infrastructure that organize and manage complex systems of flow and exchange, but also urbanistic projects that function as gateways toward new urban centralities.



Figure 5.15: (Left) The aerial view of the border-crossing facilities on the new artificial island in Hong Kong, designed by Rogers Stirk Harbour + Partners (RSH) and Aedas. 2018 (Source: Government of Hong Kong)

Figure 5.16: (Right) The aerial view of the Zhuhai-Macau frontier port and border-crossing port on the artificial Island, designed by ECADI. 2018 (Source: Xinhua News)

5.2.3 FUTURE ESTUARY-CROSSING LINKAGES

After being excluded from the Hong Kong-Zhuhai-Macau Bridge, Shenzhen and Zhongshan immediately moved on to a back-up proposal—building a 24-kilometer sea-crossing link between them. This is the Shenzhong Corridor, also known as the Shenzhen–Zhongshan Link, which is designed to have eight lanes with the capacity to carry up to 90,000 cars a day and reduce the travel time between Shenzhen and Zhongshan from 120 to 30 minutes. The link will originate at the artificial island located south of the Shenzhen Bao'an International Airport and cross underneath the Fanshi Channel in the form of the world's longest immersed tunnel, measuring 5.25 kilometers long, before emerging at the west artificial island and passing into a bridge. (Figure 5.17) Danish architecture firm Dissing+Weitling is in charge of the overall project with technical support from COWI; interestingly this is different from the Hong Kong–Zhuhai–Macau Bridge, in which the main body of the project was overseen by engineers. In this sense, it is an exemplar of *infrastructural urbanism* as defined

by Stan Allen, who argued for architects to become involved into the instrumental development of the city and tackle questions of urban function, implementation, technique, finance, and material practice.²⁰⁹ The project started construction in 2017 and is expected to be completed in 2024.

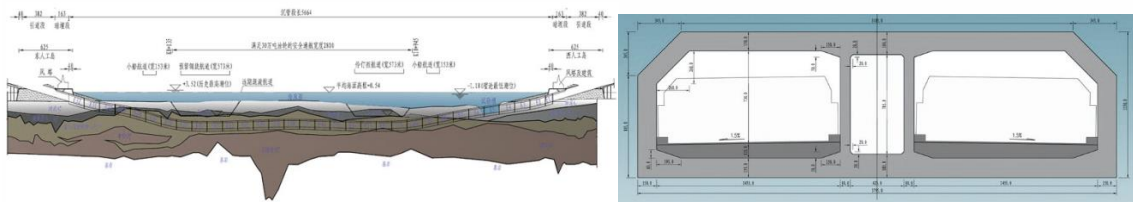


Figure 5.17: The longitudinal section (Left) and the cross section (Right) of the technical drawing for the 5.25-kilometer immersed tunnel in Shenzhen-Zhongshan Link. (Source: TunnelTalk)

The research investigates the question of why the State Council chose to build two mega-bridges instead of approving the Double-Y Scheme of the Hong Kong–Zhuhai–Macau Bridge as initially proposed by the Shenzhen Government. It turned out that the decision had nothing to do with the hypothesis discussed by Shenzhen citizens of a “conspiracy” by Hong Kong and Zhuhai, but a very practical calculation of cost. The implemented option saved two undersea tunnels and one bridge span compared to the Double-Y scheme, which would have cost several billion more RMB to be built. (Table 5.2)

²⁰⁹ Allen, Stan. *Points Lines: Diagrams and Projects for the City*. 1st ed. New York: Princeton Architectural Press, 1999.

Table 5.2: The projects calculation sheets on comparison between the Double-Y Scheme vs the two sea-crossing bridges scheme.

	Under sea Tunnel	Bridge Span	Tunnel Artificial Island	Checkpoint Artificial Island
Double Y Scheme, the Alternative of North-Line Scheme	4	5	4	2
Segment 1: Jinding (Zhuhai) to Qi'ao Island	0	1	0	0
Segment 2: Nanlang (Zhongshan) to Qi'ao Island	0	1	0	0
Segment 3: Qi'ao Island to Inner Lingding Island	1	1	2	0
Segment 4: Inner Lingding Island to Shekou	1	1	0.5	1
Segment 5: Inner Lingding Island to the Black Point, Tuenmen	1	1	0.5	1
Segment 6: Tuenmen to Chek Lap Kok Airport	1	0	1	0
Two Corridor Scheme, the Alternative of South-line Scheme	2	4	4	2
Segment 1: Zhuhai Gongbei to Checkpoint Artificial Island	0	1	0.5	0.5
Segment 2: Macau to Checkpoint Artificial Island	0	0	0.5	0.5
Segment 3: Checkpoint Artificial Island to Chek Lap Kok Airport	1	2	1	1
Segment 4: Shenzhen-Zhongshan Corridor	1	1	2	0

The Shenzhen–Zhongshan Link does not require checkpoints, which will make sea-crossing travel more efficient. There is news about Shenzhen, Dongguan, Guangzhou, and Zhongshan intending to expand its model and committing to persuade the provincial government to approve the building of the first railway link across the estuary, in between the Humen Bridge and Shenzhong Corridor. It is firmly believed that the integration of the Pearl River Delta will be significantly accelerated by these physical linkages, and by the 2020s the two sides of the Pearl River Estuary will be substantially well connected.

5.2.4 EXPRESSWAYS ENCIRCLING THE PEARL RIVER DELTA

The concept of the ring road system around the Pearl River Delta generally developed into two different kinds of understandings with the shifting of the regional center toward the

estuary. Before the 2000s, the ambition of Guangdong Province for the Pearl River Delta was to create a megalopolis with Guangzhou as the real center. Following this logic, the S81 Guangzhou Ring Road Expressway, the G1508 Guangzhou Second Ring Road Expressway, also known as the “Pearl River Delta Second Line”, and the G94 Pearl River Delta Ring Expressway were concentrically constructed in 2000, 2010, and 2018. (Figure 5.18) However with the growing integration of Hong Kong and Macau into the mainland after the 2000s, the center of the Pearl River Delta continued to move southwards, which resulted in the transformation of the spatial structure of the region into eight cities centered around the major water body of the Pearl River Estuary. This phenomenon is very evident in the description provided in Chapter Four. From this perspective, the concept of the ring road in the Pearl River Delta experienced a re-interpretation after 2010 and resulted in the construction of a new triangular ring road system whose alignments could be understood as offsets from the boundaries of the water body. A new inner ring consisting of the G0425 Guangzhou–Macau Expressway plus the S3 Guangzhou–Shenzhen Coastal Highway, and a middle ring road composed by the S43 Guangzhou–Zhuhai Expressway (West Line)—previously the West Bank Turnpike of the Pearl River Delta—and the G4 Guangzhou–Shenzhen–Hong Kong Expressway were completed in 2018. These two new expressways and the outer ring G94 Pearl River Delta Ring Expressway formed the new inner tangent triangular ring road system intersecting at the Hong Kong–Zhuhai–Macau Bridge. (Figure 5.19)

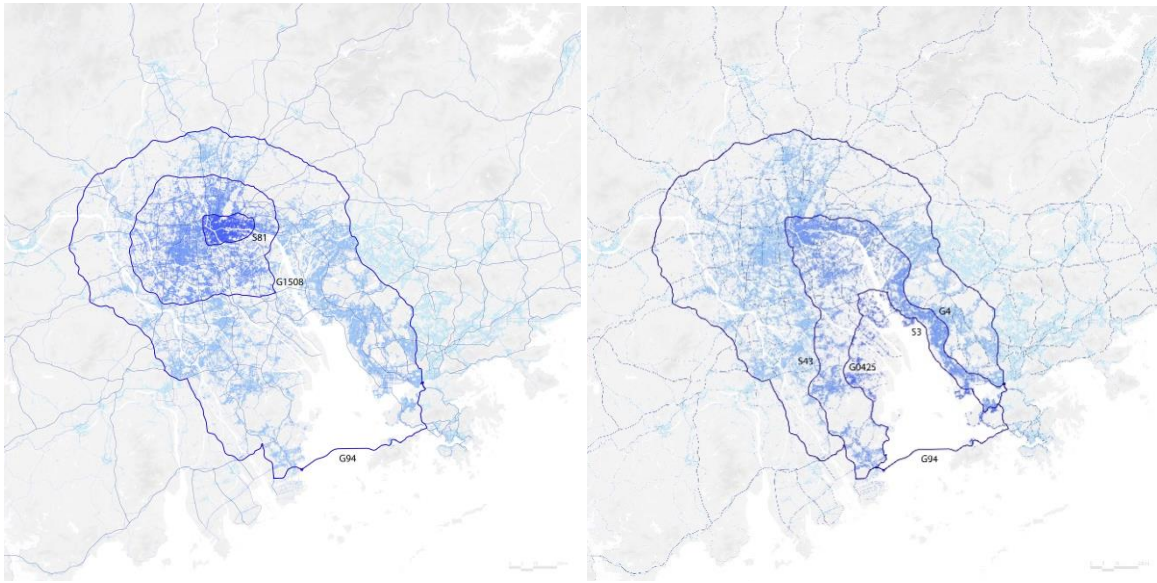


Figure 5.18: (Left) The concentric ring-road system centered at Guangzhou around 2000.

Figure 5.19: (Right) The internal tangent triangular ring-road system centered at the water after 2010.

When discussing the urban future of large infrastructures like ring-roads from an urbanistic perspective, many are inclined to reduce its physical appearance or impact. However, we shouldn't neglect the potential of the functional autonomy of this type of infrastructure to create new urban models. A comparison between the two concepts of the Pearl River Delta ring-road system demonstrates how planners and designers have successively tried to shape the growth of the region by organizing and reorganizing flows and the infrastructure that accommodates them. Thus, the adjustment of the highway infrastructure plans can give rise to a different vision of the urban form of the territory.²¹⁰

²¹⁰Neutelings, Willem-Jan. Ring Culture. From NeutelingsRiedijkArchitecten. *At Work: NeutelingsRiedijk Architects*. Rotterdam: Uitgeverij 010, 2003.

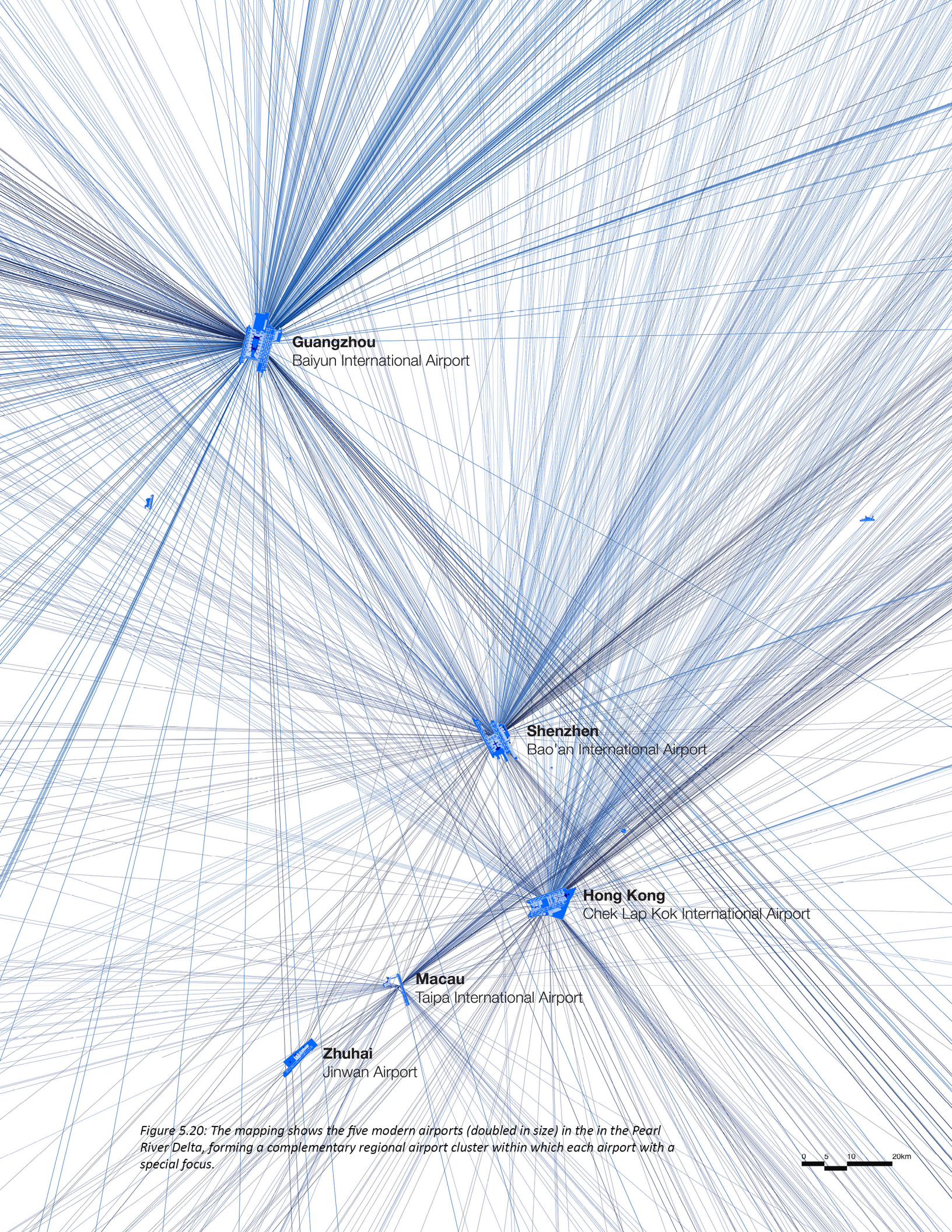
5.3 THE PORTS

As previously discussed, the Pearl River Delta is today known as an international mega-region, but one whose history is really a maritime tale defined by the harbors, enormous ports, and of course the surrounding waters. Ports are gateways and emporia responsible for the communication of the Pearl River Delta and by extension the whole of southern China with outside world. Through history, along with the continuous growth in shipping, related trades like shipping agents, bullion brokers, shipyards, insurance companies, and banks also flourished.²¹² It is fair to say the prosperity of the Pearl River Delta is inseparable from the development of its ports, and still today the ports are one of the most important pillar industries as well as unavoidable constituents to the economy and of the region.

A dramatic boom in the Pearl River Delta port system has emerged during the past two decades with the substantial expansion in containerization, transitioning from a situation where Hong Kong was the only gateway hub to the coexistence of three world-ranked container ports, namely Guangzhou, Shenzhen, and Hong Kong, and the regionalization with specialization that is currently underway.²¹³ (Figure 5.20) This phenomenon also happened in airports as they became a new layer of the port system; airports in the Pearl River Delta evolved from a situation where the Hong Kong airport dominated into a double-core airport cluster after the growth of Guangzhou Baiyun Airport. (Figure 5.21)

²¹² TING, Sun-Pao, Joseph. Part 1-Chapter 3.3 Rapid Development of Shipping and Entrepot Trade. *History of the Port of Hong Kong and Marine Department*. Hong Kong: Marine Department. 2017

²¹³ Liu, Wang, and Yip. "Development of a Container Port System in Pearl River Delta: Path to Multi-gateway Ports." *Journal of Transport Geography* 28, no. C (2013): 30-38.



Guangzhou
Baiyun International Airport

Shenzhen
Bao'an International Airport

Hong Kong
Chek Lap Kok International Airport

Macau
Taipa International Airport

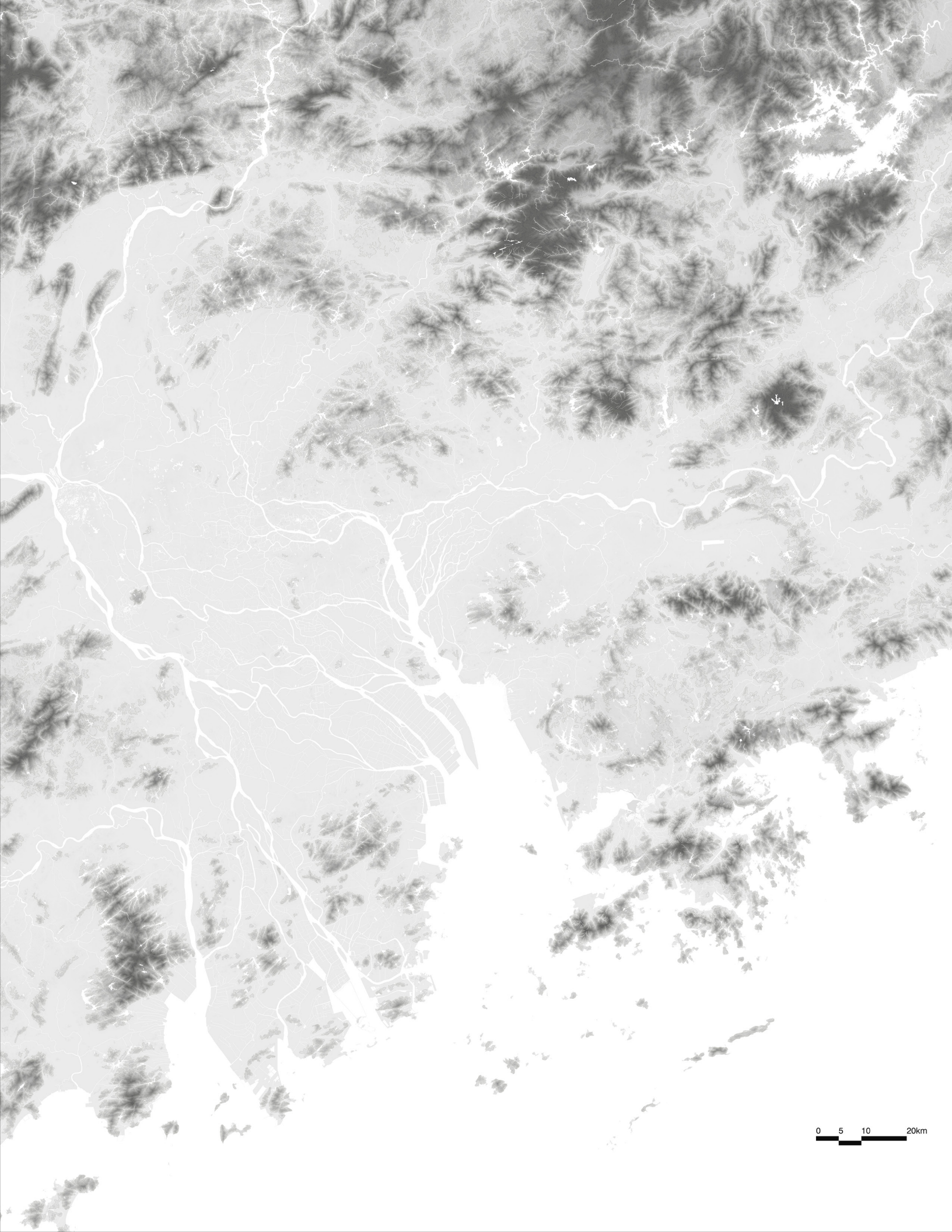
Zhuhai
Jinwan Airport

Figure 5.20: The mapping shows the five modern airports (doubled in size) in the in the Pearl River Delta, forming a complementary regional airport cluster within which each airport with a special focus.

0 5 10 20km



Figure 5.21: The mapping shows the five modern airports in the in the Pearl River Delta, forming a complementary regional airport cluster within which each airport with a special focus.



0 5 10 20km

5.3.1 THE HARBORS

The port of Hong Kong has been one of the busiest worldwide and has functioned as the core of the port-system in the Pearl River Delta due to its long-term gateway function in between China and the oversea market and its incomparable professionalism and efficiency. Previously, most ships had anchored in Victoria Harbor to the west of Kowloon Peninsula, which was the widest part of the harbor. The harbors and docklands in Tsim Sha Tsui, Yau Ma Tei, North Point, and Cheung Sha Wan occupied a substantial part of the western side of Kowloon Peninsula and remained as dockland areas for well over a century until new developments in the 1990s. Following the advance of the age of containerization, in order to avoid undermining Hong Kong's competitiveness in the maritime trade a series of specialized container terminals were built at Kwai Chung for processing goods brought by container ships.²¹⁶ Containerization reconfigured the Hong Kong harbors in two manners: first, it resulted in the consolidation of the existing harbors into the newly built container port in Kwai Chung and dock centers in the adjacent Tsing Yi Island, which were constructed on newly reclaimed land at the west boundary of Kowloon; (Figure 5.22) second, the docklands and shipyards at the previous harbors along Victoria Harbor were developed into new urban neighborhoods such as Whampoa Garden and Harbor City. (Figure 5.23 and 5.24) Hence, besides the logistics services, property development became essential for dockyard management.²¹⁷ The success of the container terminals was not only beneficial to the

²¹⁶ Carl Smith, 'Wan Chai: In Search of an Identity', in *A Sense of History: Studies in the Social and Urban History of Hong Kong* (Hong Kong: Hong Kong Educational Publishing Co., 1995).

²¹⁷ Ma Koon-yiu. Part 2-Chapter 1.5 The Rise of other Rivals. *History of the Port of Hong Kong and Marine Department*. Hong Kong: Marine Department. 2017

operating companies but also to the whole container-related industry, boosting the general competitiveness of Hong Kong's economy and the urban transformation of the city.



Figure 5.22: The aerial view of Kwai Tsing Container Terminals. (Source: Survey and Mapping Office, Lands Department. The Government of Hong Kong Special Administrative Region.)

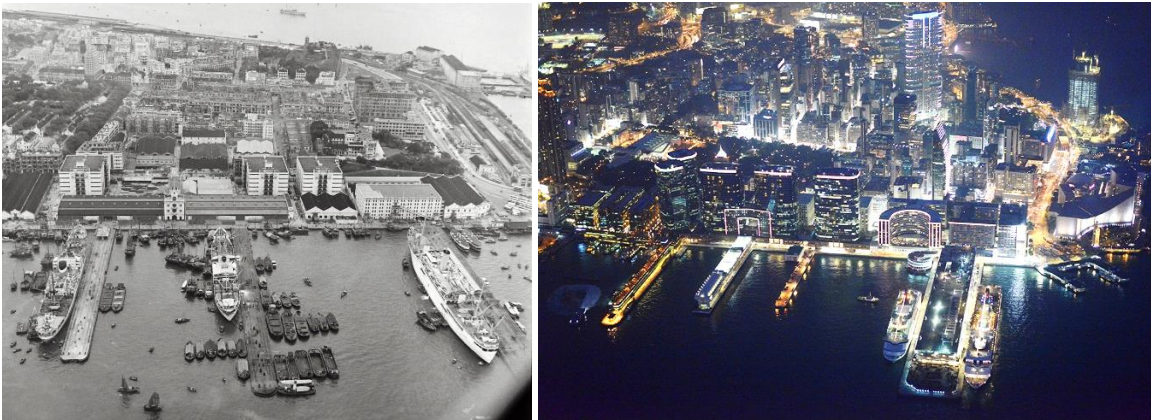


Figure 5.23: Aerial view of Kowloon Wharves where the standardized containers were only handled before the construction of the container terminals. 1962. (Source: Hong Kong: Marine Department)

Figure 5.24: Aerial view of the Harbor City, redeveloped on the previous site of Kowloon Wharves. 2018. (Source: Source: Survey and Mapping Office, Lands Department. The Government of Hong Kong Special Administrative Region.)

Jean Rodrigue defines a gateway port as a port of entry and exit where shipments are cleared through customs before reaching their final destination, and a hub port as a central point for the collection, distribution, and transshipment of goods.²²⁰ In the modern period, the Hong Kong Port is viewed as a gateway because it generally commands the entrance to and exit from China. Guangzhou has the largest comprehensive hub port in the PRD. The container terminals in Huangpu Harbor and Xinshe Harbor were opened in 1984 and 1994 respectively, making the Guangzhou Port a regional hub that prioritized domestic trade. Due to its distant geolocation from the Pearl River Estuary, Guangzhou started late in the international container market, only entering it when the Nansha Terminal became operational in 2006. Nansha Harbor was also planned as an urban catalyst and one of the vital economic engines for developing the Nansha New District.

Shenzhen Port comprises three groups: the Shekou and Chiwan Harbors in Shenzhen Bay, the Dachan Terminal in Qianhai Bay, and the Yantian Harbor in the far east. All three groups represent a similar paradigm of the integration between the city and port, which is an experience generated from the urban practice of Shekou Harbor. Since its invention, the harbor in Shekou was deeply connected with city making in its surrounding area following the “Port-Park-City” approach. (Figure 5.25) After Yantian Harbor began operations in 1993, the container throughput not only sharply increased, but the Yantian District also gained substantial development afterwards. (Figure 5.26) Qianhai, as the new district now under

²²⁰Rodrigue, Jean-Paul, Claude Comtois, and Brian Slack. *The Geography of Transport Systems*. Abingdon, Oxon, England ; New York ; London: Routledge, 2006.

construction whose overall development pattern and planning scheme follow the successful “Shekou Model”, intends to create a vibrant urban district centered at the free-port zone by the same logic. (Figure 5.27)



Figure 5.25: The Port-Park-City of Shekou, with Chiwan Harbor at the southwest, Danan Mountain and Hudi Park at the middle, Shekou urban district at the east. 2018 (Source:)



Figure 5.26: The Port-Park-City of Yantian, with Yantian Harbor at the east, Yantian District at the west and the Nanshan Mountain Park at their north. 2018 (Source: Yantian Port)



Figure 5.27: The Port-Park-City of Qianhai New District in construction, with Dachan Bay Harbor at the northwest, natural bay in the middle with “finger parks” extending into the urban district in the east. 2018 (Source: Visual China)

After about a decade’s operation, Shenzhen Port’s role as a gateway to the Pearl River Delta emerged since the early 2000s, which created intensive localized and regional competition with Hong Kong Port. With the operators of Hong Kong Port investing in terminals in Shenzhen, interesting dynamics appeared and the Pearl River Delta port system entered a

“two-port load center” stage.²²¹ However, the container flows were further diverted into a multiple-party competition after the rapid growth of Nansha Harbor and the construction of Ganlan Harbor in Zhuhai. (Table 5.3)

Table 5.3: Composition of container throughput generated in the Pearl River Delta by port. 2008 (Source: Data source: Hong Kong Shipping Statistics (2003–2009) and China Port Yearbook (2008))

	Total TEU	Domestic Trade	Import and Export	International Transshipment
Hong Kong Port	24,494	/	11,675	12,819
Shenzhen Port	21,417	975	16,529	3,913
Guangzhou Port	11,001	7,321	3,161	519
Zhuhai Port	9,044	4,713	3,911	420
Dongguan Port	5,128	2,017	3,111	/

The global shipping alliances after 2008 greatly altered the maritime market structure and reduced the dependence of shipping lines on particular ports. No single port has a lasting overwhelming superiority over other ports in a contestable hinterland any more.

Consequently, these changes aggravated the competition between regions rather than the internal competition within regions. For instance, the ports in the Pearl River Delta have been facing an increasing challenge from the Yangtze River Delta, which urges a reshaping of the landscape of the port system of the Pearl River Delta into a strategic collaboration between the ports of Hong Kong, Shenzhen, Guangzhou, and Zhuhai. The “Outline of the Plan for the Reform and Development of the Pearl River Delta” was issued by the Chinese National Development and Reform Commission in December 2008; it legislatively

²²¹Liu, Wang, and Yip. "Development of a Container Port System in Pearl River Delta: Path to Multi-gateway Ports." *Journal of Transport Geography* 28, no. C (2013): 30-38.

underlined the transportation network and emphasized that the ports are to make a collaboratively convenient, efficient, and competitive logistics center.²²² The port system has also been affected by shifts in economic developmental patterns within the region. The role of the PRD as a global manufacturing base now faces bottlenecks as a result of resource constraints and environmental concerns. The transition from a large amount production of low margin commodities to a higher value-added industrial system will certainly reduce the amount of export containers. This dilemma further required the ports of the Pearl River Delta to work together as a systematic rim port around the Pearl River Estuary and compete for the flows destined to Shanghai, Ningbo, and Singapore in order to avoid the potential of a fiercer inter-regional competition. The integration and regionalization of the ports in the Pearl River Delta is highly possible due to two major reasons. First is the great historical relationship between the ports, which was demonstrated during the period of political instability in the 1960s when trade between the ports in Hong Kong and Mainland China continued uninterrupted.²²³ Second, the port as a “monopolistic industry” is controlled by two players that have been collaborating for decades: the state-owned enterprises and Hong Kong’s harbor monopoly LI Ka-shing’s Hutchison Whampoa.

With the multiple factors of policy changes, regional plans, market access, and shifts in demands, the network strategy of the port system in the Pearl River Delta is proceeding in

²²² Zheng, Sixin. Has “The Outline of the Plan for the Reform and Development of the Pearl River Delta” Promoted to the Coordination of Guangdong-Hong Kong-Macao Greater Bay Area. *Modern Economy*. 10. 1348-1367. 10.4236/me.2019.104091.

²²³ T. N. Chiu, *The Port of Hong Kong*, (Hong Kong : Hong Kong University Press, 1973), pp. 101-102.

the direction of complementary regionalization with specialization. The changes lie in the specialization of container traffic flows and the formation of a regional-central network. Shenzhen Port will act as a load center with expansions in inland transportation connections to the new industrial areas and accelerate hinterland-networking activities such as rail–sea intermodal transport. Equipped with well-integrated connections to the inland transportation network, Guangzhou Port, as the largest comprehensive port in South China, has a dominant advantage in cargo collection and distribution from and to the hinterland. Hence it will function as an inland center for the Pearl River Delta port system. Hong Kong will expand its current strength in international transshipment as a vital international trade center and a global hub whose function will continue growth in the provision of high-end maritime services. The operation of the Hong Kong–Zhuhai–Macau Bridge allows the ports of Hong Kong and Zhuhai to work together in a manner in which the latter functions as the load and redistribution center of the western Pearl River Delta and as a great feeder port for the former.

Though neglected by many studies and research that are mainly focused on the maritime hub ports, the river ports have profound influence in the Pearl River Delta in a threefold manner: as the boosters that historically contributed to the development of cities; as feeder ports with a direct impact on the whole supply chain of the port system; and as irreplaceable elements in the urban system due to their urban-friendly scale and adjacencies with traditional city centers.

5.3.2 AIRPORTS

Civil airports came to the Pearl River Delta in 1930 in the form of a military-civil combination with the completion of Guangzhou Tianhe Airport and Hong Kong Kai Tak Airport. Both were later relocated to meet new airport requirements with the drastic increase in air travel and to release developable land in the city center. The Tianhe Airport was replaced by the Tianhe Stadium in 1984 and the Hong Kong International Airport was moved to Chek Lap Kok in 1998 and the Kai Tak Cruise Terminal was built on its site in 2013. Currently, with the exception of Dongguan, all eight cities in the Pearl River Delta have their own airports, among which five are equipped with modern facilities: Macau International Airport and Zhuhai Jinwan Airport, completed in 1995; Hong Kong International Airport, built in 1998; Guangzhou New Baiyun Airport, constructed in 2004; and Shenzhen Bao'an Airport, greatly expanded and upgraded in 2008. The annual passenger volume of the airports of the Pearl River Delta broke 180 million in 2016, a number which is expected to continue to grow.

The regionalization of the airports of the PRD is urged due their capacity shortfalls.

According to the International Air Transport Association (IATA) and the trade association of the world's airlines, air passenger demand in the Pearl River Delta will reach 387 million annually in 2030. However, the total passenger capacity of all the PRD airports is estimated to be below 240 million by 2030. This is an annual capacity shortfall of 147 million, even if all five airports deliver on their currently planned expansions.²²⁴ Further, the industrial upgrade

²²⁴ Hua, Chai and Luis Liu. Pearl River Delta Aviation surges, Hong Kong suffers airspace congestion. *Asia News Network*. 2017. September 8.

of the Pearl River Delta into high-tech industries for biomedicine, robotics, and smart chips demands additional switches in flows from sea to air transit. In this sense, the five airports must develop complementary operations to meet the demand for growth. The position and advantages of each airport can be understood clearly through a quantitative analysis of the air-flows. (Figure 5.28) It is important for each airport to specify and focus on their respective priorities. Hong Kong should strengthen its hub for international-to-international transfers, while Guangzhou and Shenzhen should prioritize international-to-domestic transfers and domestic air services. Zhuhai and Macau should focus on Southeast Asian and domestic services. A cooperation plan signed in mid-July 2017 between the civil aviation authorities of the Chinese mainland, Macau, and Hong Kong seeks to establish mechanisms for daily coordination.

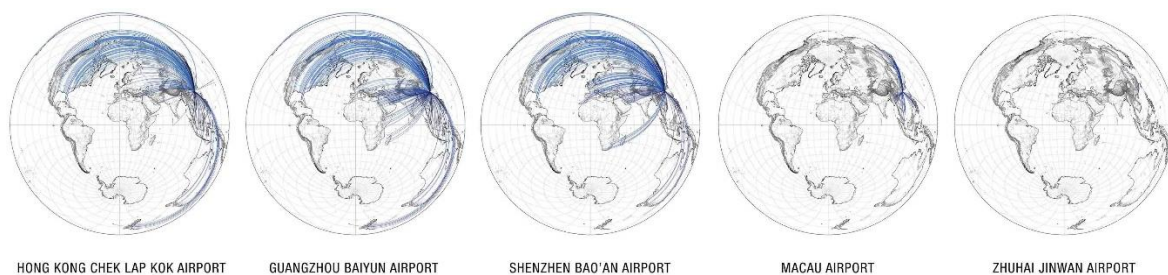


Figure 5.28: The air-traffic flows comparison between the five major airport in the Pearl River Delta

Airports have evolved from moving people and cargo to becoming connecting hubs for manufacturing and commerce. A new phenomenon is seen in the Pearl River Delta, especially around the Macau and Guangzhou airports, in which airports hybridize into more complex and fine-meshed systems through their interactions with other types of urban

activities. This could be understood as a certain type of potential “aerotropolis”, as argued by John Kasarda: a new urban form where cities are built around airports speedily connecting time-sensitive suppliers, manufacturers, distributors, and business people to distant customers, clients, and marketplaces.²²⁵ (Figure 5.29)



Figure 5.29: Aerial view of Hong Kong, Macau and Guangzhou Airports and their surrounding development and urban functions (from left to the right). (Source: Stanley Shin, Steve Arthur and Civil Aviation Administration of China Archive)

5.4 THE URBANISTIC VALUES OF THE NEW INFRASTRUCTURE

After investigating the co-relationship between the generative and structuring impact of the evolution of the dense infrastructure network and the urbanization patterns and process, the space-structuring potential of infrastructure is acknowledged. Infrastructure has been developed into the principal constituent of the masterplan, and one of the last instruments by which government is still able to intervene in the urbanized landscape at the regional

²²⁵ Kasarda, John D., and Greg Lindsay. *Aerotropolis: The Way We'll Live next*. 1st ed. New York: Farrar, Straus and Giroux, 2011.

scale.²²⁶ In this sense, a better urbanistic understanding of the structuring potential of infrastructure networks is crucial because infrastructure is not only the provision of services to support future programs, but also the armature for the form of the region. As Acker states, “Infrastructure is simultaneously conceived of as the main outline of spatial vision, as well as being the main instigator in the implementation of the overall regional plan”.²²⁷ The plan of infrastructure, mainly transportation infrastructure, as a discipline of regional spatial planning in the Pearl River Delta no longer aspires to define the future of an entire site or region with a uniform level of detail, nor to project a site’s development with absolute certainty. On the contrary, the design efforts behind the plan are strategic and concentrate on the major infrastructural armature, which acts as a framework of coherence instead of a concrete design for urbanization at the larger scale.

The morphology of the mobility infrastructure of the Pearl River Delta’s core is like a closed letter “A”, strengthened by railway, highway, and port systems. Besides their functional operations, urbanistically the harbor could exist as an intermediate public space and the railway could exist as an integrally designed urban spine. Compared with harbors and railways for steering characteristic urban projects, the highway infrastructure is more like a trigger or framework for generic urbanization patterns, including patches of homogeneous

²²⁶ Shannon, Kelly., and Marcel. Smets. *The Landscape of Contemporary Infrastructure*. Rotterdam: New York, NY: NAI Publishers; Available in North, South and Central America through D.A.P./Distributed Art Publishers, 2010.

²²⁷ Acker, Maarten Van. *From Flux to Frame: Designing Infrastructure and Shaping Urbanization in Belgium*. Leuven, Belgium: Leuven University Press, 2014.

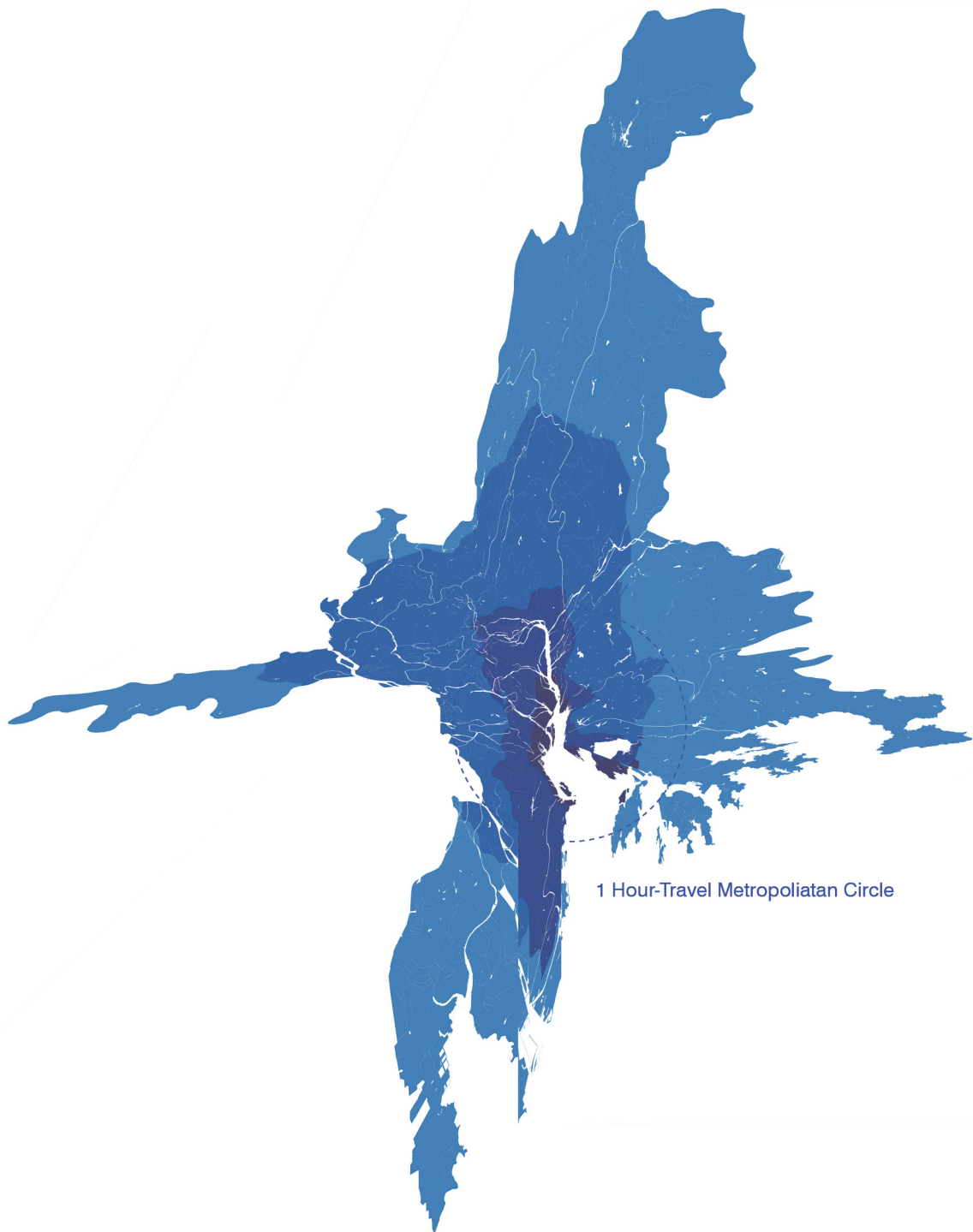
allotments and utilitarian architecture.²²⁸ Hence, for reasons beyond technical terms, public transits should be prioritized over private mobility.

Another important observation is that the capacity of the speed of transportation infrastructure in “space-shrinking” or “down-scaling” brings with it opportunities for urban design to intervene in regional planning. Currently, high-speed rail reduces the time required to overcome space to the extreme of existing available transport technologies. The time-space map of the influence of the high-speed railway network in the Pearl River Delta cartographically represents this interaction between space and time, indicating that the city and the region could exist in a similar scale with time as the measurement for the spatial dimension. (Figure 5.30) In this method, the infrastructural mesh dissects the network into compositional elements—“the nodal points”. Therefore, the nodal points are critical, considering they are the mediators where two parallel and similar-scale urban agglomerations in time-space—the region based on the high-speed rail and the city based on metro transits—overlaps in physical space. Though these “nodal points” usually differ in form, typology, density, and use, they are the multimodal hyper-station areas that become “prestige projects” to shape the core of new or existing centers. High-quality mobility infrastructure is vital for directing and concentrating flows of activity for the developments around the nodal points; in return, the nodes provide resources in the form of cultural or economic advantages. Hence, infrastructure is a lens through which many facets integral to

²²⁸ Koolhaas, Rem., Bruce. Mau, Jennifer. Sigler, Hans. Werlemann, and Office for Metropolitan Architecture. *Small, Medium, Large, Extra-large*. New York: Monacelli Press, 1995.

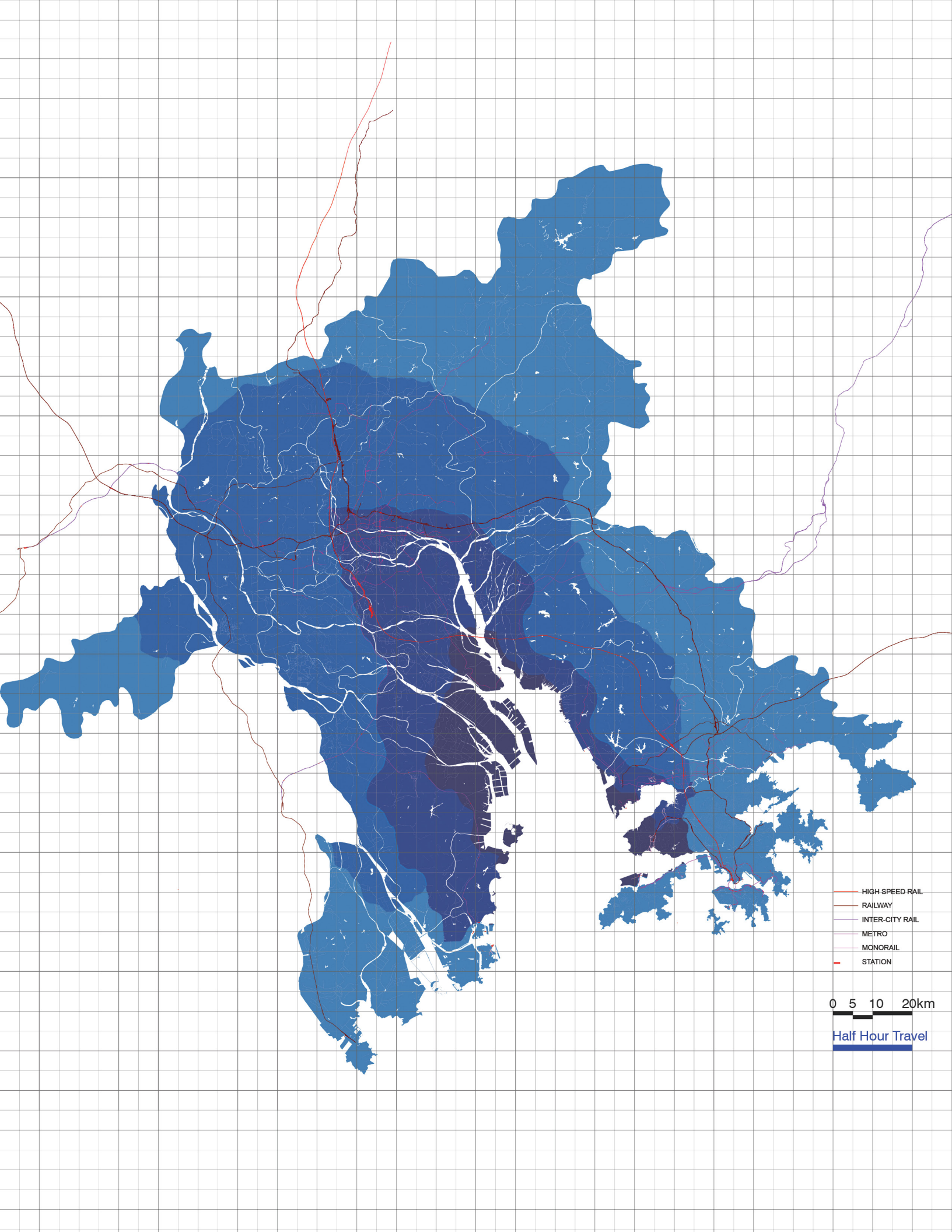
urban design can be viewed at the regional scale. The overall layout of the mobility infrastructure design needs to interweave infrastructure and the city, in a way that engages with the interconnection of mobility networks and hubs, the urban landscape, and the built environment for greater inclusion.²²⁹

²²⁹Christeense, Kees. Access to Urbanity: Designing the City as a Resource. 2015



Half Hour Travel

Figure 5.30: Time-space map of the Pearl River Delta, showing the 'shrinking' of space through the introduction of the high-speed railway network.



- HIGH SPEED RAIL
- RAILWAY
- INTER-CITY RAIL
- METRO
- MONORAIL
- STATION

0 5 10 20km

Half Hour Travel

CHAPTER 6

TOWARDS **A POLYCENTRIC MEGALOPOLIS**

CHAPTER 6: TOWARD A POLYCENTRIC MEGALOPOLIS

The maelstrom of modernization and urbanization in the Pearl River Delta caught the world's attention through its sheer size alone. In 2010, the United Nations Human Settlements Program (UN-HABITAT) published their biannual State of the World's Cities Report, which identified the trend of mega-cities merging to form vast mega-regions or megalopolises. The Pearl River Delta was particularly mentioned as a representative case, estimating its population at 60 million people and bound to grow further in the coming decades.²²⁹

However, the bigness is not the largest characteristic of the Pearl River Delta compared with the Yangtze River Delta and Jing-Jin-Ji —the other two candidate “megalopolises” in China or other global cases such as New York Metropolitan Area (NY-NJ-CT Region) and Grand Paris at the level of built-up space and population. Instead, “the extreme diversity” is more significant. The central finding of this reading on the Pearl River Delta is the presence of its sheer diversity issue regardless of infrastructure and other attempts to consolidate connectivity. It consists of a diverse set of parts, principally centered at Guangzhou, Hong Kong, Macau, Shenzhen, Zhuhai, Foshan, Dongguan, and Zhongshan.

²²⁹ "UN Report: World's Biggest Cities Merging into 'mega-regions'." *UNB - United News of Bangladesh*, 2010.

On July 1st, 2017, the Pearl River Delta was accorded the status of a key strategic planning area in the country's development blueprint. As mentioned earlier, the National Development and Reform Commission and the governments of Guangdong, Hong Kong, and Macau signed the “Framework Agreement on Deepening Guangdong–Hong Kong–Macau Cooperation in the Development of the Greater Bay Area”, which signifies the state’s determination to transform the Pearl River Delta from a pioneering urban economic zone into a consolidated singularity. In this chapter, the dissertation provides a critical review of the current scheme of the Greater Bay Area through six lenses including built-up area, population, economic pattern, accessibility, administrative complexity and cultural multitude to scan the “conditions” of the urban reality of the Pearl River Delta. The outcome indicates the importance of *vive-la-différence* that the Pearl River Delta as a polycentric megalopolitan aggregation should respect, nurture and when necessary even amplify the differences of the eight PRD cities in order to reach a long-term regional prosperity.

6.1 BUILT-UP SPACE

The exercise of mapping the transformation of the built-up space in the Pearl River Delta from 1980 to present indicates two critical findings. First, the scale of the Pearl River Delta as a urban agglomeration is very big (3856 km²) and the coverage of built-up space is quite high. Second, the built-up space turned out to be in different types of patterns and morphologies due to very different development trajectories and boom periods of different cities.

Based on this most basic common understanding of megalopolis, which implies a mega-continuous built-up space, three straightforward research methods have been applied to evaluate the built-up space within the Pearl River Delta despite the extreme complexity and sophistication of this mega-urban-entity. First is the night light data from DMSP/OLS NTL²³⁰ and also the 2012 and 2016 version of 'Black Marble' data, also known as 'Earth City Lights' map from NASA.²³¹ Second is the high-resolution satellite images indicating the urban construction process in the PRD, connected from declassified U.S. military Keyhole (KH) satellite systems KH-7 and KH-9 telescopically scanning the earth from 1963–1967, CORONA, ARGON, and LANYARD photographing the Earth's surface from 1960–1972, and the Keyhole (KH) satellite system KH-9 (Hexagon) operated from 1971–1984,²³² as well as the Landsat data from NASA and Google from 1990 to present. Third is the GIS mapping with the Built-up Grid and Settlement Grid data deprived from Global Human Settlement (GHS).²³³ The first two methods are qualitative analyses and the last one reaches a few quantitative outcomes through the Geospatial Information System (GIS).

²³⁰ Image and data processing by NOAA's National Geophysical Data Center. DMSP data collected by US Air Force Weather Agency. link located at: http://www.ngdc.noaa.gov/dmsp/tar_zip.html

²³¹ NASA Earth Observatory images by Joshua Stevens, using Suomi NPP VIIRS data from Miguel Román, NASA's Goddard Space Flight Center

²³² The file sources maintained by National Archives and Records Administration (NARA), and can be visualized through EarthExplorer.

²³³ Pesaresi, Martino; Ehrlich, Daniele; Florczyk, Aneta J.; Freire, Sergio; Julea, Andreea; Kemper, Thomas; Soille, Pierre; Syrris, Vasileios (2015): GHS built-up grid, derived from Landsat, multitemporal (GLS1975, GLS1990, GLS2000, and ad-hoc Landsat 8 collection 2013/2014). European Commission, Joint Research Centre (JRC) [Dataset] PID: http://data.europa.eu/89h/jrc-ghsl-ghs_built_ldsmt_globe_r2015b

The Defense Meteorological Satellite Program/Operational Linescan System (DMSP/OLS) stable night-time light (NTL) advances the night light data through aspects including the saturation of luminosity and the blooming effect to achieve a globally consistent series of NTL digital number (DN) values. This enables the night light mapping to scan the globe and reveal the spatial pattern of urban agglomerations and the process of urbanization across a variety of scales with historical records dating back to 1997.²³⁴ NTL mappings can correctly identify urbanization for pixels that contain urban-related features and activities on the ground. The mapping of NASA's black-marble data tells us that there are "super powerful large urban entities existing in the world", one of which is the Pearl River Delta. Within the world night light map, the Pearl River Delta is not the largest cluster of light aggregation, but certainly large enough to be identified among the first-tier of cities. (Figure 6.1 and 6.2)

Although the NTL series can be used to trace the urbanization process, due to the lack of accuracy on the features of the urban space that results from the fuzziness of the luminosity, the diagrams here are used more in the initial stage of the research, discovering and identifying the urban agglomerations.

²³⁴ Li, Xuecao, and Yuyu Zhou. "Urban Mapping Using DMSP/OLS Stable Night-time Light: A Review." *International Journal of Remote Sensing* 38, no. 21 (2017): 6030-046.



Figure 6.1: Night Light Map of the globe (Source: NASA Earth at Night 2016)



Figure 6.2: Night Light Map of the Pearl River Delta (Source: NASA Earth at Night)

The satellite imagery regarding global landcover facilitates analysis about the degree of urbanization at a territorial scale. More and more, the high-resolution images that provide clear views of buildings, roads, etc. have become a device utilized for urban-related applications like measuring urbanization.²³⁵ EarthExplorer is very helpful in providing declassified high-resolution images across the globe which helps the research break the limitation of the general image-sensor-data Global Land Cover Facility (GLCF), which only contains low and medium spatial resolutions. The first giga-regional satellite image of the PRD was assembled through the fragmental photos taken from the Keyhole (KH) system in 1964. It shows very clearly and in detail that the whole region was composed of vast zones of forests, fields, and crops, with the moderately sized cities of Guangzhou and Hong Kong. The assembled image of 1969 and 1975 shows certain developments in the PRD compared to 1964, however, no evident urban expansion happened within this decade. The chronological sequential images indicate that the urban growth started to be reflected spatially since 1992 and accelerated since 2003 when the cities started to expand into each other.

The evaluation of the satellite image is a qualitative analysis, from which we can see there is an evident pattern to the continuous urban mesh around the Pearl River Estuary where the built environment can be perceived covering more than 50 percent of the landscape in the

²³⁵ Malarvizhi, Kumar, and Porchelvan. "Use of High Resolution Google Earth Satellite Imagery in Landuse Map Preparation for Urban Related Applications." *Procedia Technology* 24 (2016): 1835-842.

given pixels. Another phenomenon discovered is that the urbanizing fringes are usually characterized by the spatial extension of urban development—new airports and related infrastructure, new university campuses and associated science parks, and large supermarkets. The so-called peri-urban areas are becoming an industrial landscape, with the transformation of farmland into industrial parks or export processing zones, accommodating labor-intensive assembly operations from already industrialized economies.²³⁶ The city centers within the urban agglomerations are increasingly being filled with high-rise commercial buildings hosting international business and producer service functions, similar to the definition of the global city-region claimed by Allen Scott.²³⁷

Mapping the urbanization of the Pearl River Delta can be done through different collections of Landsat image datasets such as MOD09A1 (MODIS Surface Reflectance 8 Day L3 Global 500M) products which allow assessment of the annual dynamics of impervious surface at city level in the PRD at the accuracy of a 500-meter grid.²³⁸ The GHS data is eventually selected in this research because it is the most precise data, with the accuracy of a 50-meter grid. The GHS data processed the Landsat images based on the definition raised by the European Union, the OECD, and the World Bank during the UN-Habitat III conference in October 2016 to define and index the Degree of Urbanization (DEGURBA), which classifies

²³⁶ Zhao, Simon X. B., and L. Zhang. "Foreign Direct Investment and the Formation of Global City-Regions in China." *Regional Studies* 41, no. 7 (2007): 979-94

²³⁷ Scott, Allen J. "Globalization and the Rise of City-regions." *European Planning Studies* 9, no. 7 (2001): 813-26.

²³⁸ Xu, Ru, Hongsheng Zhang, and Hui Lin. "Annual Dynamics of Impervious Surfaces at City Level of Pearl River Delta Metropolitan." *International Journal of Remote Sensing* 39, no. 11 (2018): 3537-555.

Local Administrative Units Level 2 (LAU2 or communes) into three types of areas: Cities (densely populated areas), Towns and suburbs (intermediate density areas), and Rural and wild areas (thinly populated areas).²³⁹ The former two are considered urban with the index above 0.5, while the latter is considered non-urban with the index below 0.5. Statistics by degree of urbanization provide an analytical and descriptive lens on urbanity, which can calculate the size of the urban area within a given territory. Given the need for more accuracy of distinguishing the Pearl River Delta's urban areas to the vegetated forests and orchards, the importance of multi-temporal imagery was confirmed by determining the transformed divergences for the Landsat dataset. Besides, it deserves to be mentioned that the Supervised Maximum Likelihood Classification (MLC) method is applied in processing the Landsat images for generating the index. The maximum likelihood algorithm is one of the most widely used in the classification of satellite imagery. The method is based on the likelihood that each pixel belongs to a particular class, meaning that it is based on the mean values and the standard deviations of the color tones of image pixels. The basic theory assumes that these likelihoods are equal for all classes and that input bands are uniformly distributed.²⁴⁰ Through the GIS platform, the visualization of the GHS data displays how the

²³⁹ Pesaresi, Martino; Ehrilch, Daniele; Florczyk, Aneta J.; Freire, Sergio; Julea, Andreea; Kemper, Thomas; Soille, Pierre; Syrris, Vasileios (2015): GHS built-up grid, derived from Landsat, multitemporal (GLS1975, GLS1990, GLS2000, and ad-hoc Landsat 8 collection 2013/2014). European Commission, Joint Research Centre (JRC) [Dataset] PID: http://data.europa.eu/89h/jrc-ghsl-ghs_built_ldsmt_globe_r2015b

²⁴⁰ Vorovencii, I., Muntean, M.D., 2013. Evaluation of Supervised Classification Algorithms for Landsat 5 TM Images, *RevCAD* 14/2013.

scattered cities in the PRD grow into a megalopolis and enables the calculation of the built-up area of the Pearl River Delta with a relatively accurate number: 3,856.05 km². (Table 6.1)

Table 6.1: The data of built-up space in the Pearl River Delta and PRD cities. (Source: The GHS dataset and the China Urban Construction Statistical 2016 Yearbook and Ministry of Housing and Construction Statistics of year 2015.

City	Built-up (Urban) Area (km ²)	Administrative Area (km ²)	Built Up Ratio
Guangzhou	1249.11	7434.4	0.17
Dongguan	958.86	2460.08	0.39
Shenzhen	923.25	1991.64	0.46
Hong Kong	276.75	1107	0.25
Foshan	158.05	3,797.72	0.04
Zhongshan	138.89	1,783.67	0.08
Zhuhai	123.64	1,736.46	0.07
Macau	27.5	32.9	0.84
Total	3856.05	20343.87	0.19

The mapping of the built-up space in 1980 shows the urban settlements existed in two contrasting morphologies: the compact densely organized space —the cities, and spread-out dots —the counties and towns. The 1995 mapping shows the great urban growth in the form of spread-out development (mainly industrial development), which resulted in the new types of cities as the constellation of towns and counties —Dongguan, Foshan and Zhongshan. The 2005 map indicates the consolidation of the development around Shenzhen, Foshan and Zhuhai, which started industrial upgrades from secondary to tertiary levels. The synthetic image of the PRD's urban growth clearly demonstrates the different clusters of different morphologies and patterns mainly because of their different urbanization trajectories. (Figure 6.3)

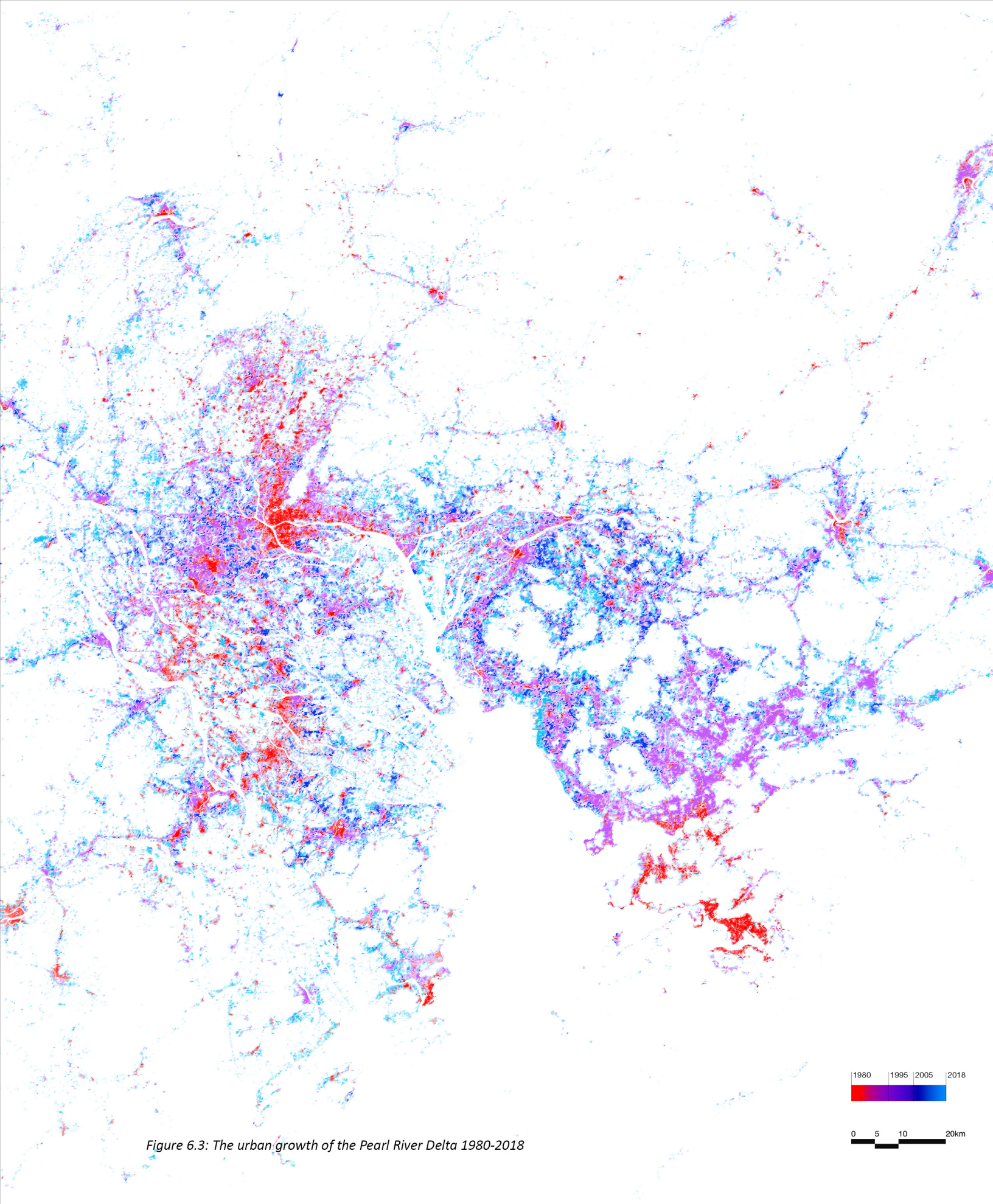


Figure 6.3: The urban growth of the Pearl River Delta 1980-2018

1978

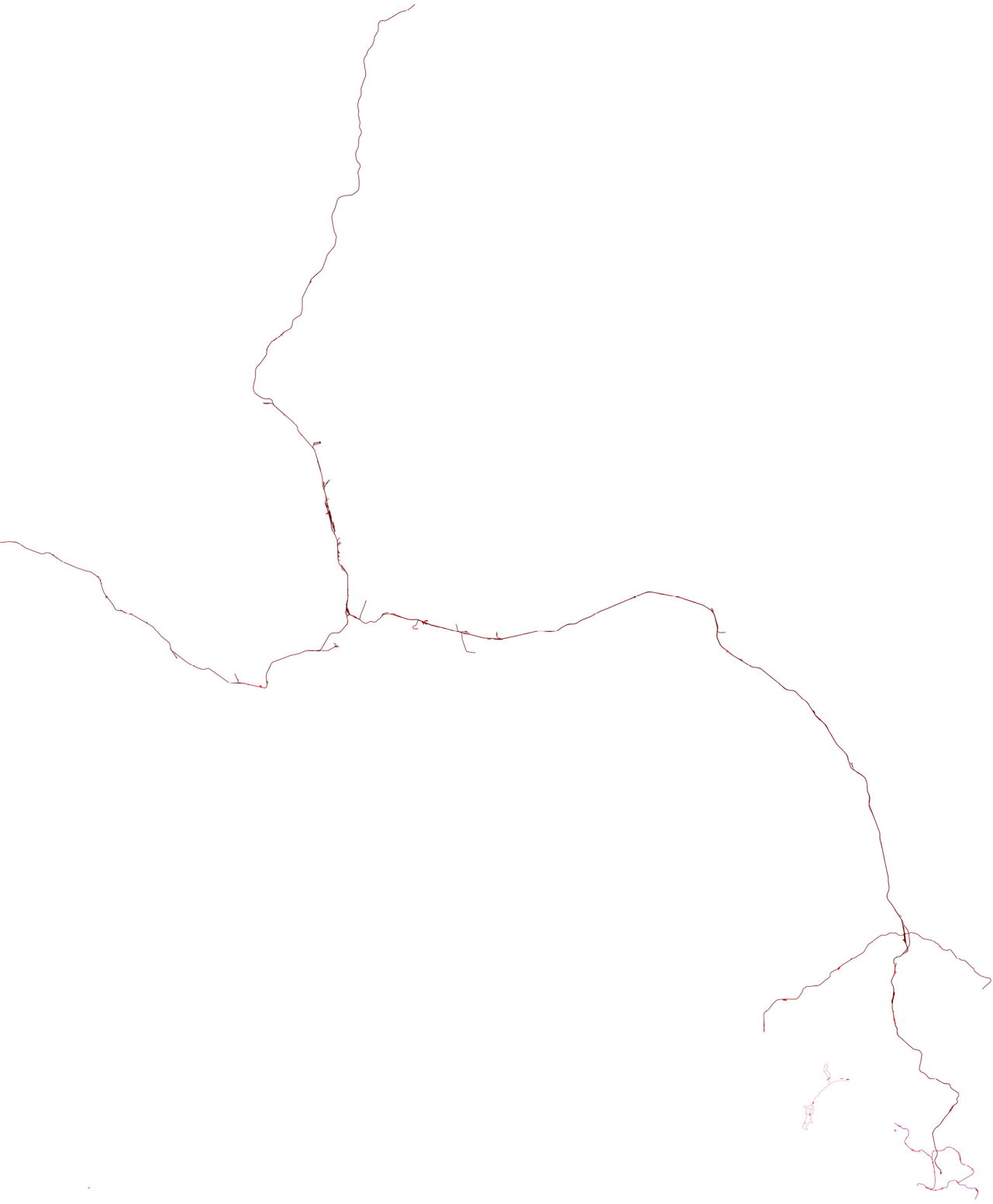


- RAILWAY
- INTER-CITY RAIL
- METRO
- MONORAIL
- STATION

0 5 10 20km

1980

1993

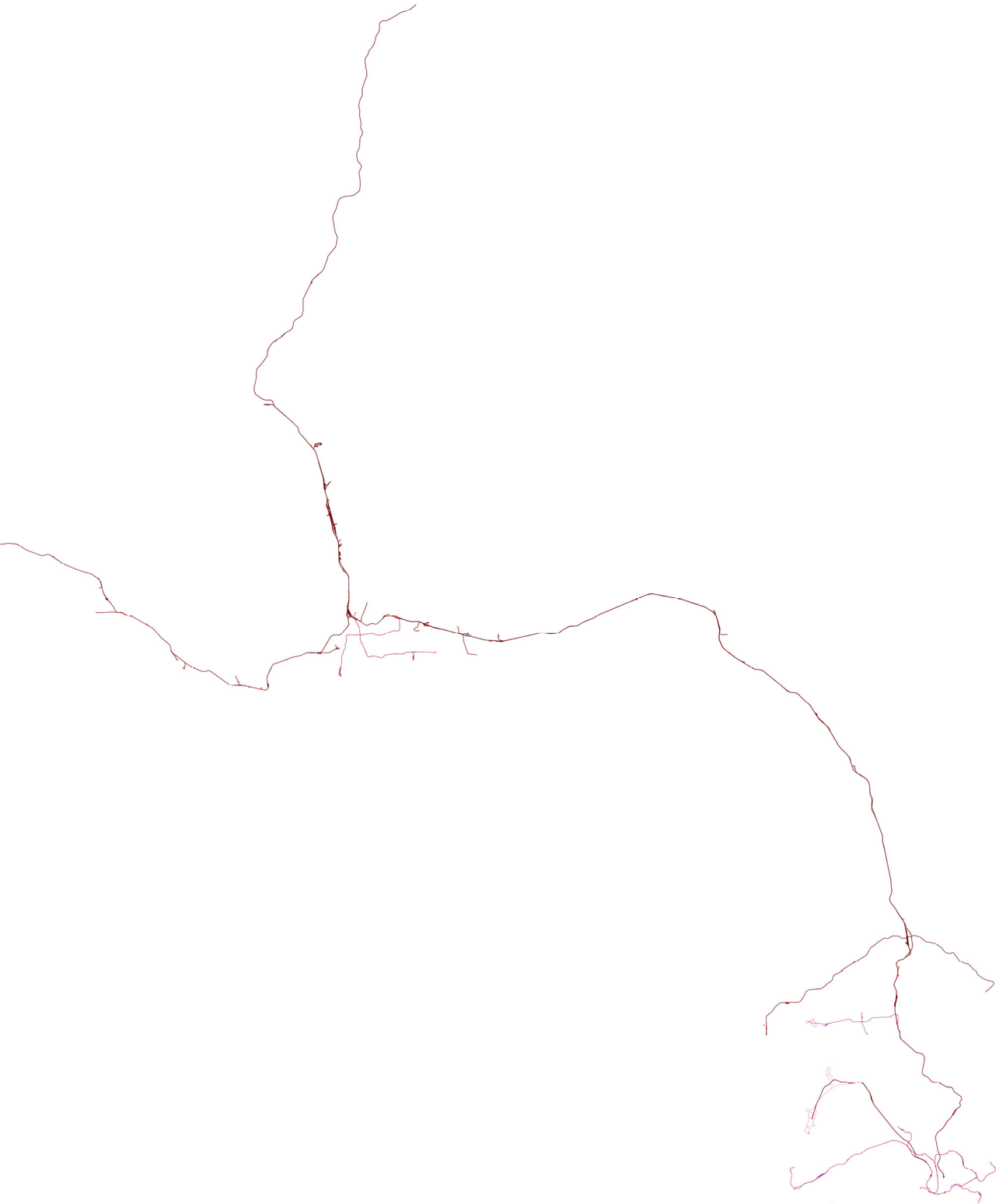


- RAILWAY
- INTER-CITY RAIL
- METRO
- MONORAIL
- STATION

0 5 10 20km

1995

2004

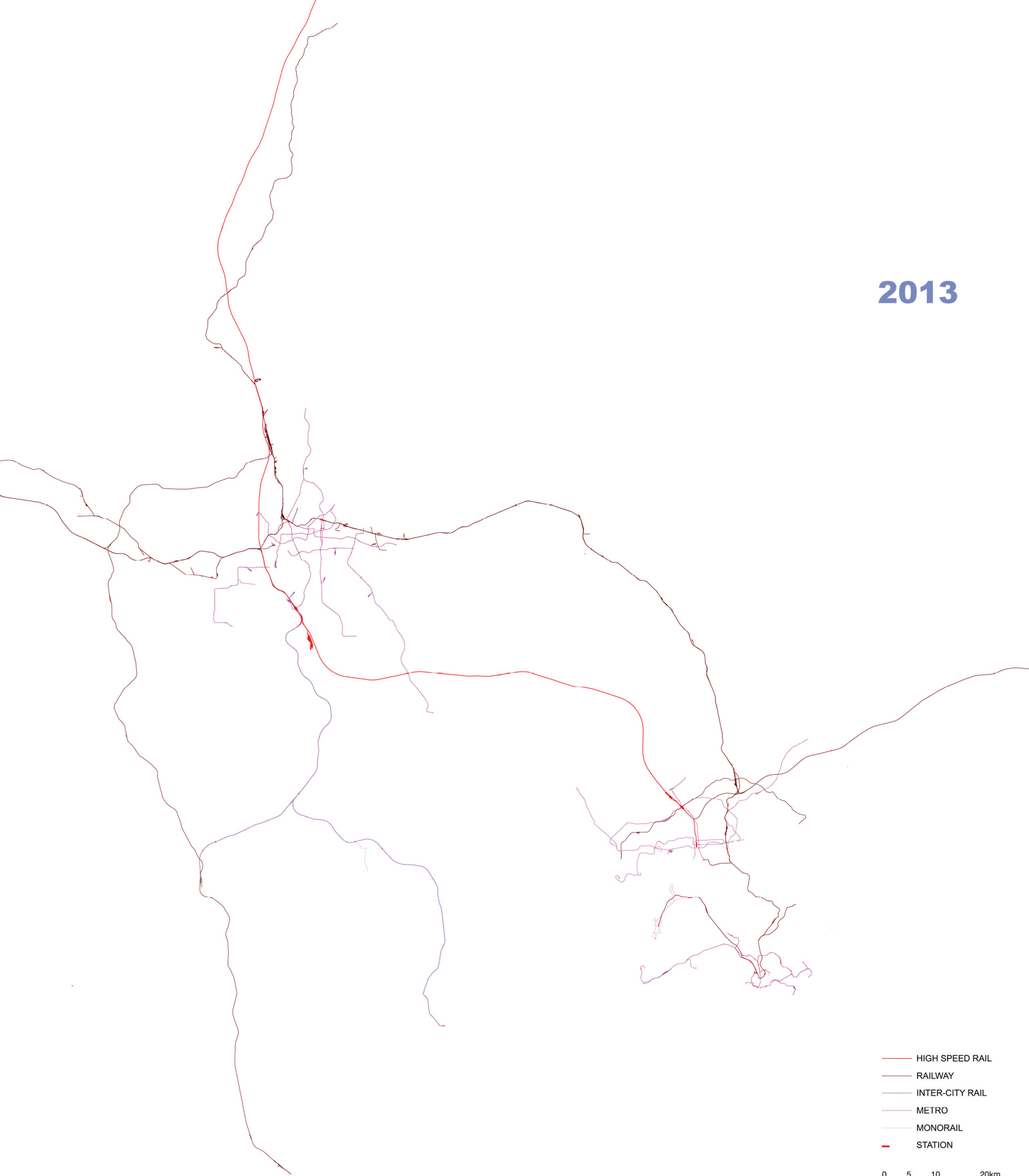


- RAILWAY
- INTER-CITY RAIL
- METRO
- MONORAIL
- STATION

0 5 10 20km

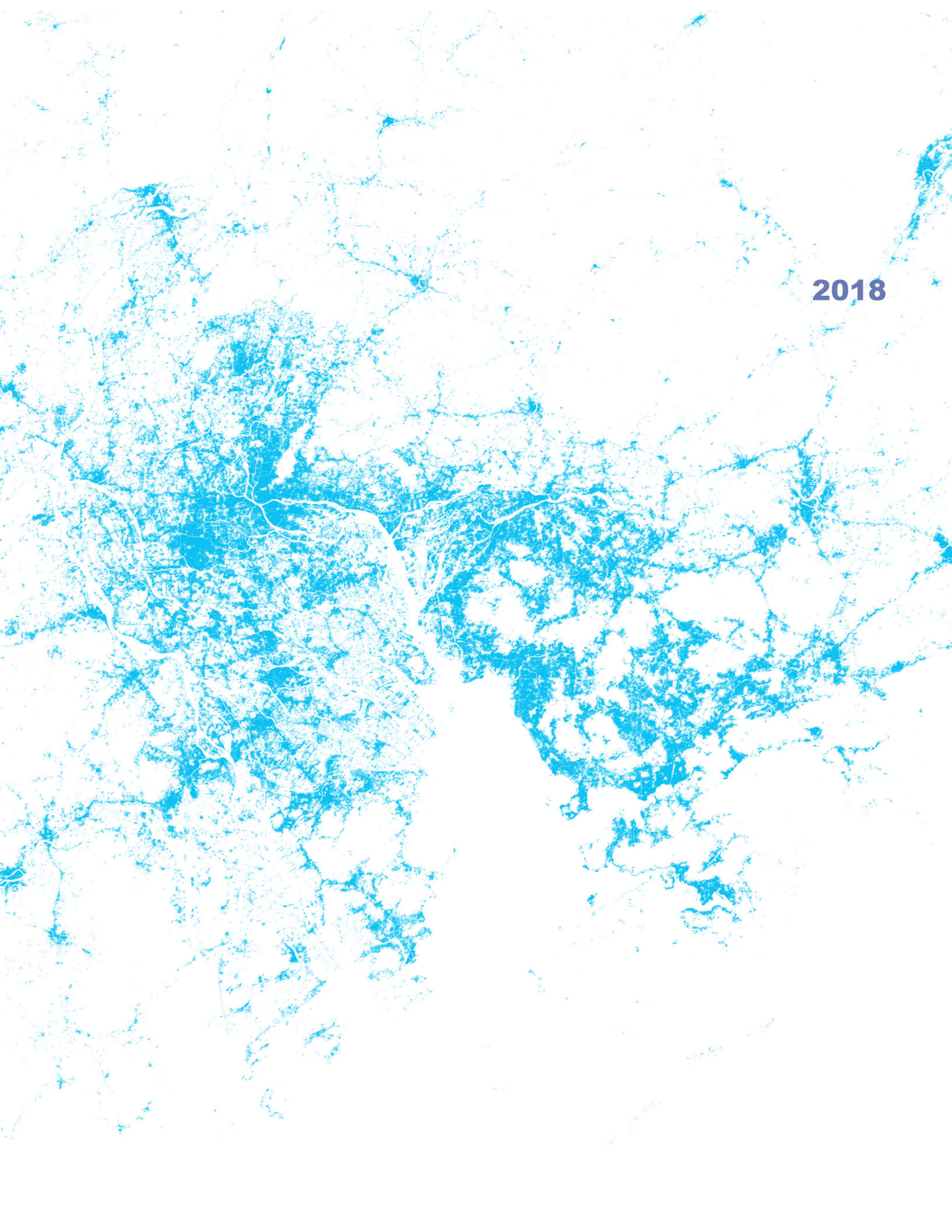
2005

2013



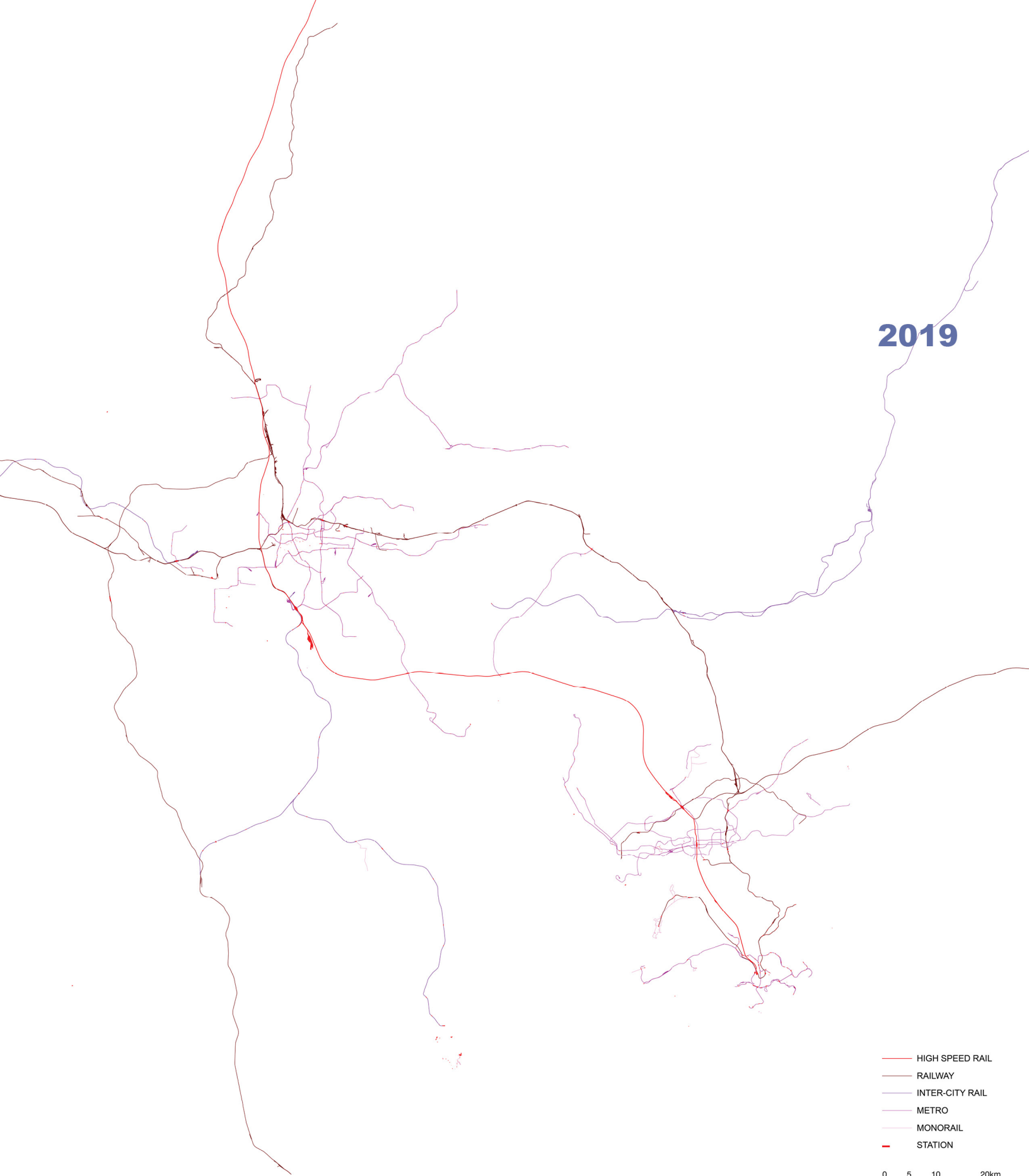
- HIGH SPEED RAIL
- RAILWAY
- INTER-CITY RAIL
- METRO
- MONORAIL
- STATION

0 5 10 20km

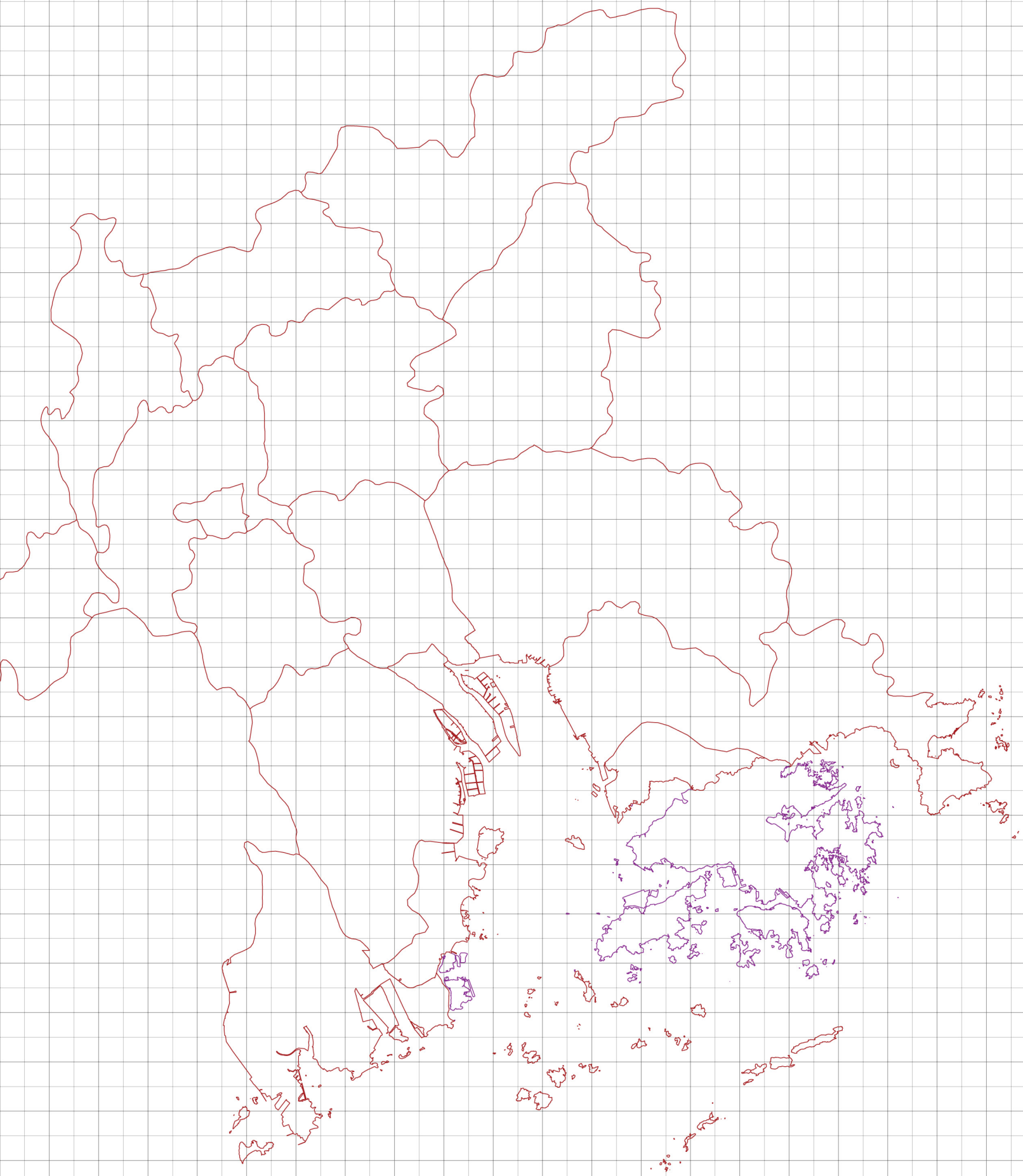


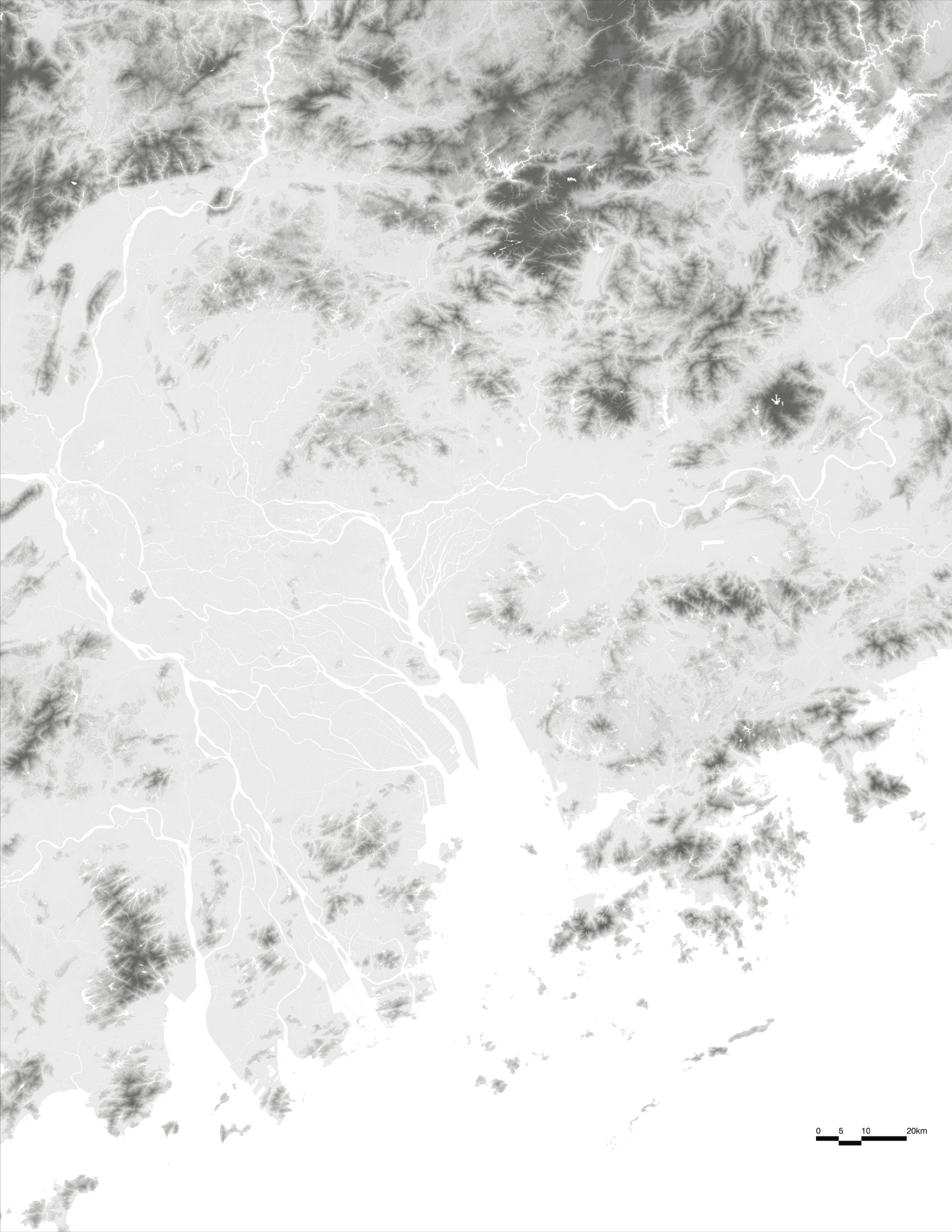
2018

2019



0 5 10 20km





0 5 10 20km

6.2 POPULATION AND POPULATION DENSITY

One of the prerequisites for defining the urban condition is that the enormously large built environment is constructed for serving the activities of urban life, which involves an urban population of millions. So another important dimension of reading the Pearl River Delta after the built-up space is population and urbanization rate. An urbanization rate that describes the percentage of the total population living in urban areas as defined by the country within a given territory is universally adopted as the main index for measuring the degree of urbanization worldwide.

The total population of the Pearl River Delta including eight cities researched in this dissertation is 56 million in 2018, whose scale number is about half of the Yangtze River Delta (105 million) and the two thirds of Jing-Jin-Ji Metropolitan Area (79 million).²⁴¹ Whilst the urbanization rate of the Pearl River Delta (84.12%) is higher than the other two regions. The urbanization rate of Yangtze River Delta is 76.2% and Jing-Jin-Ji Metropolitan Area is 70.5%.²⁴² This discrepancy may also be due to the initial base line of population which was comparatively low in the Pearl River Delta.

The statistics from the national censuses and Statistical Yearbooks of Guangdong Province provides the demarcation of population growth. (Table 6.2) Furthermore, the GHS population data at the accuracy of a 200-meter grid is used in the research and allows it to

²⁴¹ National Bureau of Statistics of China. Demographics of China, the first half of 2018.

²⁴² National Development and Reform Commission. China Demographic Yearbook. 2017

diagram and visualize the transformation of the Pearl River Delta's population from 1980 to present. The result indicated two findings. First, the intensity of the population has been increasing during the past decades. Second, the pattern of the population was diverse and dynamic, which gradually aggregated in the form of “islands” -relatively isolated/self-centered areas that have grown and changed significantly overtime.

Table 6.2: The population demarcation data sheets of the cities in the Pearl River Delta

Year	Population							
	Guangzhou	Shenzhen	Dongguan	Foshan	Hong Kong	Zhongshan	Zhuhai	Macau
1979	4,815,417	329,759	1,120,417	2,352,431	4,668,000	1,008,700	125,535	235,198
1982	5,000,658	555,811	1,152,606	2,441,852	4,915,467	1,022,200	265,726	238,118
1985	5,431,487	687,772	1,386,344	2,546,901	5,337,622	1,035,881	393,206	283,581
1990	5,918,462	1,150,628	1,741,731	2,793,977	5,781,459	1,237,400	635,490	343,935
1995	6,433,241	1,677,800	2,505,350	3,110,642	6,140,101	1,252,000	/	385,686
2000	6,939,568	6,550,414	6,445,700	5,337,709	6,663,654	2,363,500	1,235,600	427,979
2005	9,487,500	8,409,066	6,560,700	5,800,300	6,827,761	2,434,600	1,415,700	482,559
2010	12,700,800	10,357,938	8,220,237	7,194,311	7,025,221	3,120,884	1,560,229	536,969
2015	13,501,100	11,275,391	8,254,100	7,340,600	7,245,701	3,209,600	1,634,100	600,942
2018	14,498,400	12,528,336	8,342,500	7,656,700	7,428,887	3,230,000	1,675,300	637,206

Before 1978, the population increase in the Pearl River Delta was almost purely natural growth; Guangzhou and Hong Kong were the two major urban nodes with populations of over four million, but the population density in Hong Kong was much higher than in Guangzhou. The urbanization rate of the Pearl River Delta in 1980 was merely 16.26% and the population was around 14.9 million. Populations were scattered between the medium-

sized rural counties on an interlacing network of rivers and streams; the rural counties like Dongguan, Foshan, and Zhongshan had populations above one million and Bao'an (the former name of Shenzhen) also had more than half a million. (Figure 6.4) From the Open-up Policy in 1978 until 1990, the increase and consolidation of population in the Shenzhen and Zhuhai SEZs was one of the most evident phenomena. Compared to the increase in cities, the population in the counties remained relatively stable. (Figure 6.5) The main source of population growth in the Pearl River Delta after 1990 has been through immigration due to the region's continuing economic prosperity. Until 2000, it indicates that the pattern of three zones (correspondent to the three twins as discussed in chapter three) were triple cores with a high attractiveness for the population. Due to the rapid development of TVEs, there was a big increase of population for the cities developed from manufacturing towns and counties; however, their population distribution was still in a scattered pattern without concentrations. Dongguan and Zhongshan were in a form of city without centers. The population pattern was demonstrated in a very polycentric form, as a constellation of three large "islands" and tens of smaller "islands". (Figure 6.6) Entering the new century, except for Macau, the population of all the cities was beyond one million. From 2010 to present, the structure from the population perspective did not change but intensified following the previous form of islands.²⁴³ (Figure 6.7)

²⁴³ Mei Weixia. The Past and Future of the Pearl River Delta Agglomerations. Urban Insight. 2009, No. 1 (梅伟霞, 珠江三角洲城市群的历史演进与整合前景, 《城市观察》2009 年第 1 期)

1980

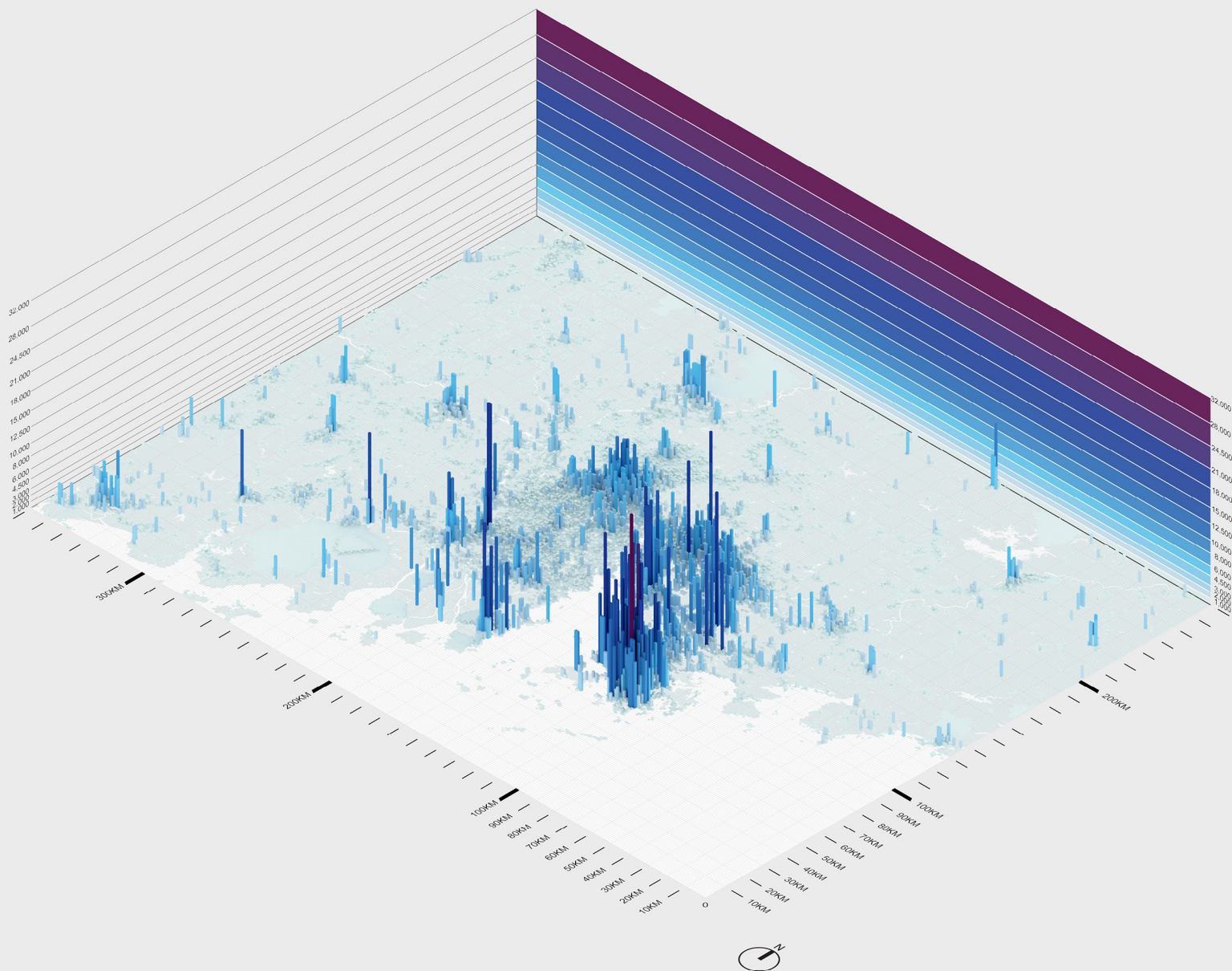


Figure 6.4: The population distribution of the Pearl River Delta in 1980

1990

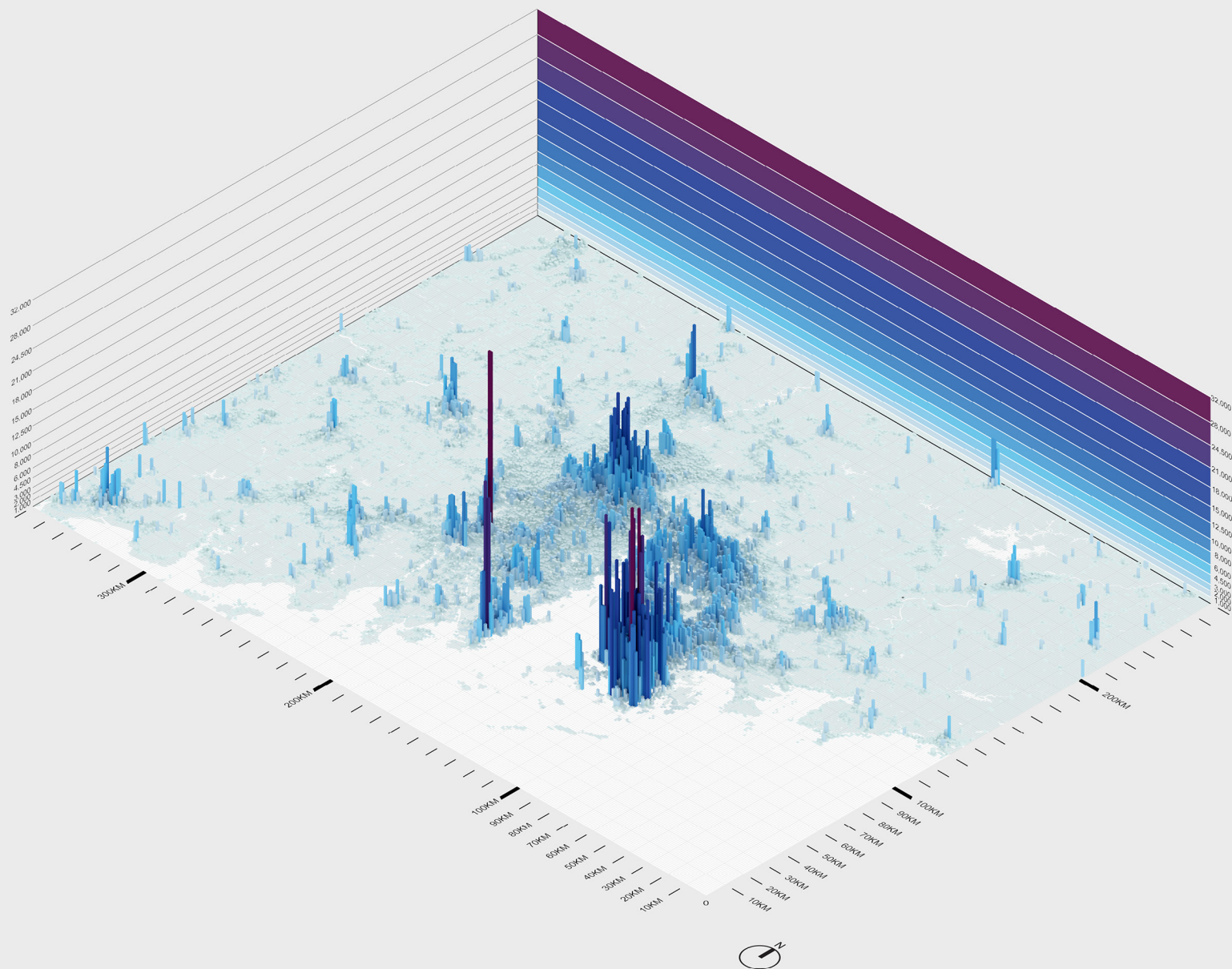


Figure 6.5: The population distribution of the Pearl River Delta in 1990

2000

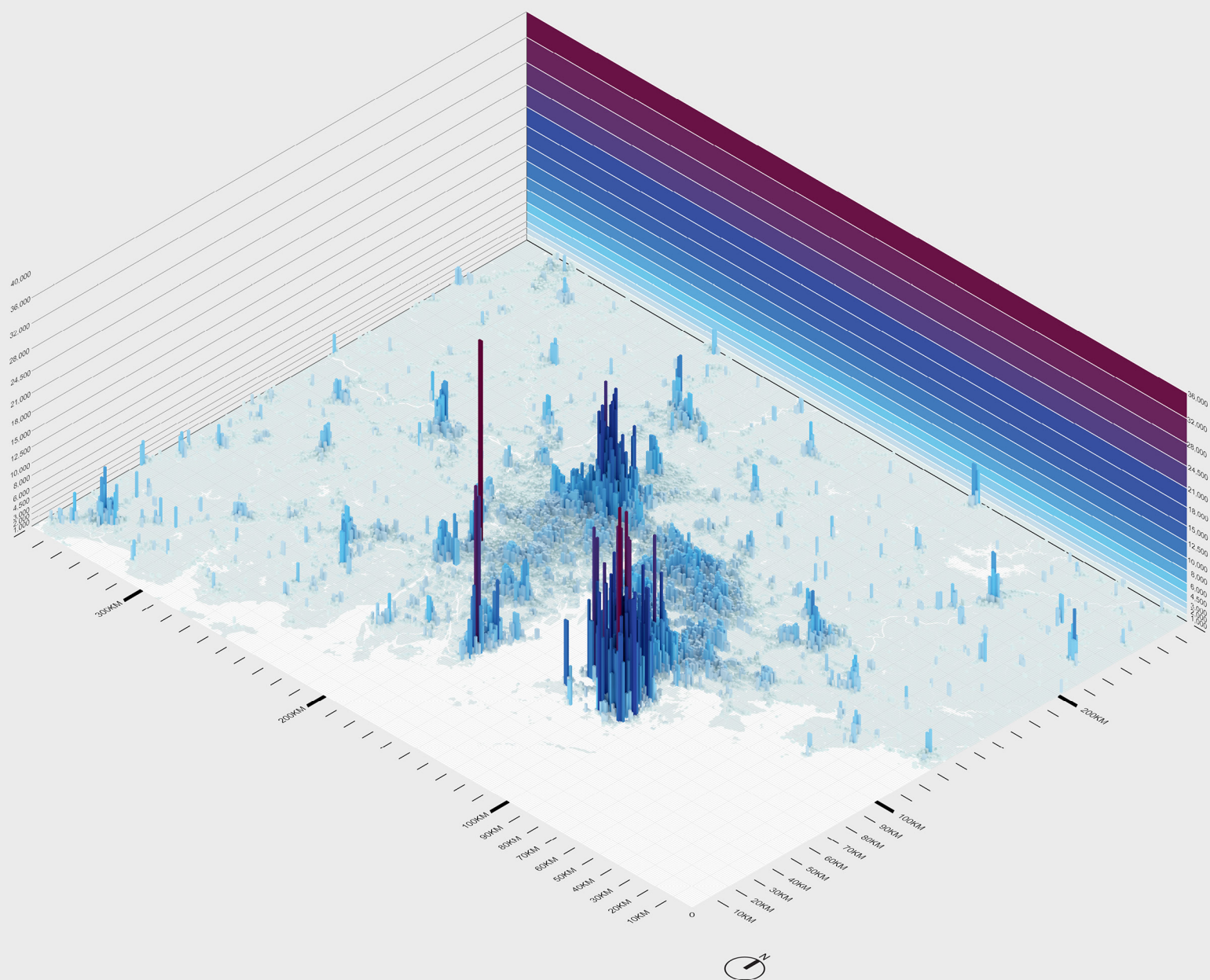


Figure 6.6: The population distribution of the Pearl River Delta in 2000

2018

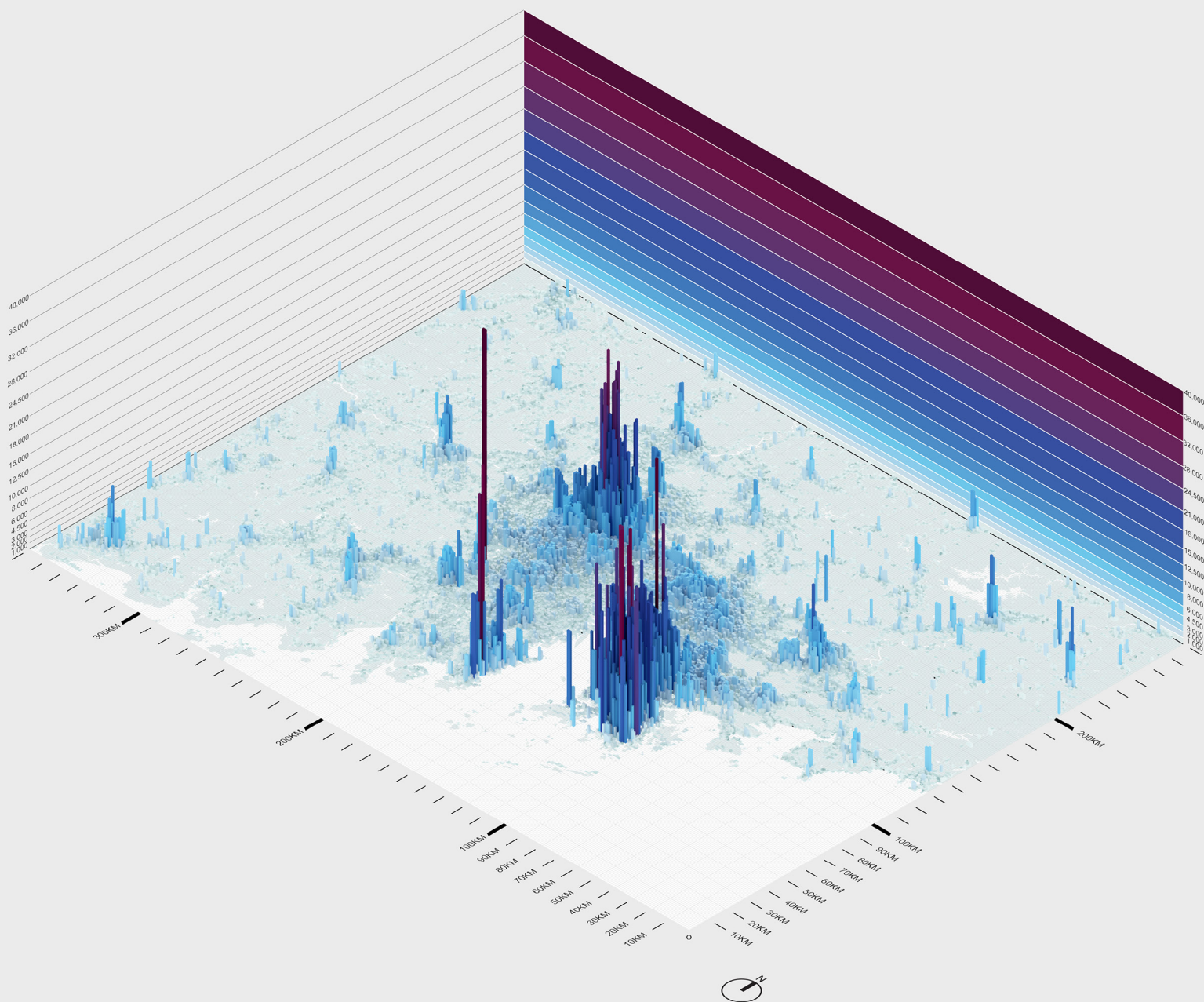


Figure 6.7: The population distribution of the Pearl River Delta in 2018

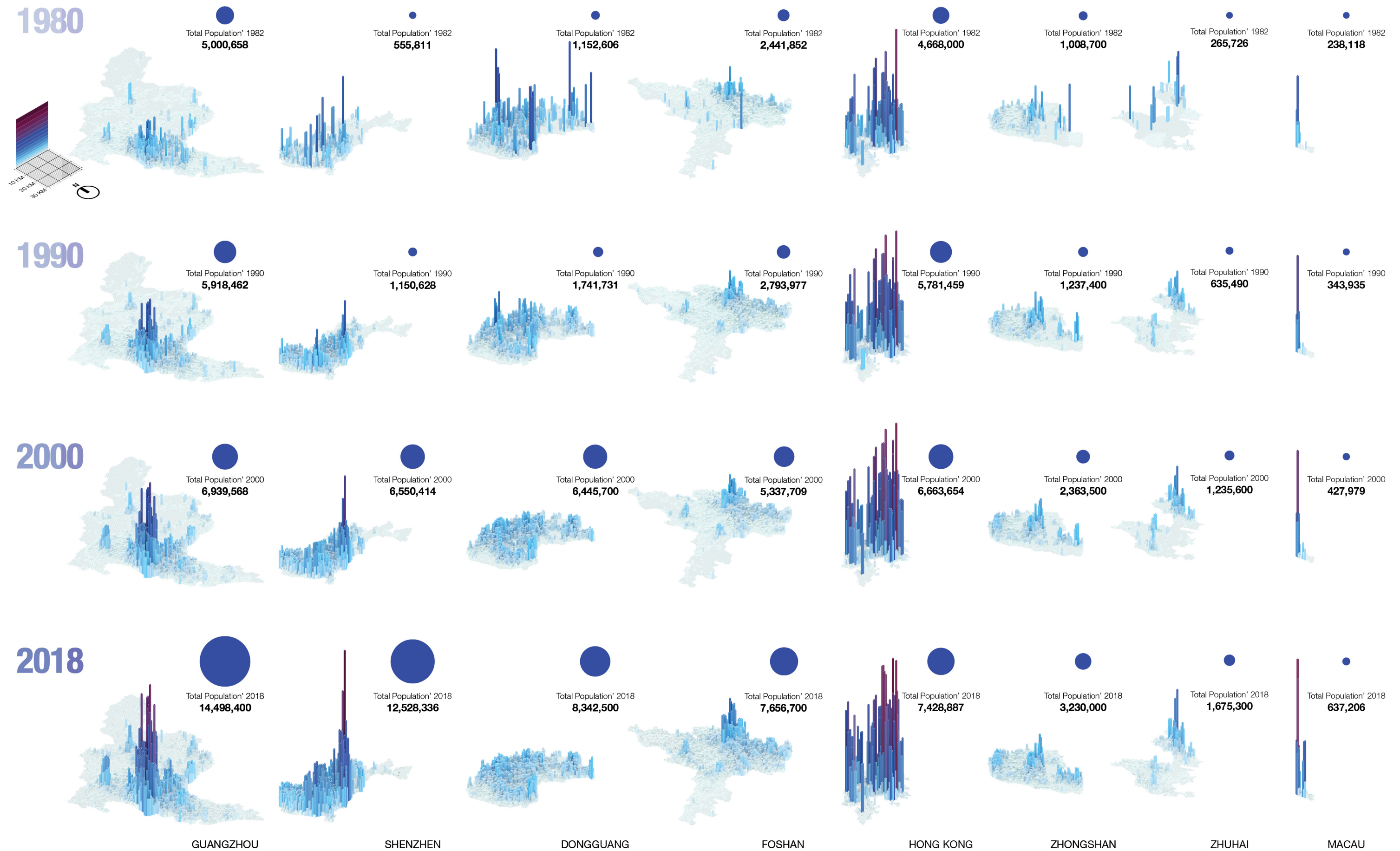


Figure 6.8: The population growth of the cities in the Pearl River Delta from 1982-2018

The aspect of population change in the cities among the Pearl River Delta shows more details in the population changes within the larger tendency during the past four decades.

The transformation of the population pattern in the PRD cities generally fall into three categories. Guangzhou, Hong Kong and Macau as three cities with longest urban history contains its population around its urban centers and maintained relatively same pattern with a steady increase of population. Shenzhen, Foshan and Zhuhai demonstrated a clear procedure of population aggregation, forming urban centers. Compared with the previous two types, Zhongshan and Dongguan experienced a decentralized process with population more evenly distributed into the territory. (Figure 6.8 and Table 6.3) The population density varies extremely locally and in result largely determined the population's pattern of islands in a larger picture.

Table 6.3: The demographic data, population density and urbanization rate sheets of the cities in the Pearl River Delta

	Guangzhou	Shenzhen	Dongguan	Foshan	Hong Kong	Zhongshan	Zhuhai	Macau
2018 Population	14,498,400	12,528,336	8,342,500	7,656,700	7,428,887	3,260,000	1,765,400	637,206
Urban Population	12,488,922	12,528,336	7,496,571	7,260,849	7,428,887	2,877,928	1,577,738	637,206
Urbanization Rate	86.14%	100%	89.86%	94.83%	100%	88.28%	89.37%	100%
Area (km ²)	7,434	1,991	2,465	3,875	1,104	1,711	1,711	30
Average Population Density (People/km ²)	1,950	6,292	3,384	1,976	6,729	1,888	979	21,240
Builtup Area(km ²)	1,249	923	959	158	277	139	124	28
Population Density in Urban Area (People/km ²)	11,607	13,570	8,700	48,445	26,843	23,472	14,279	23,171
Population with Household Registration	8,978,700	4,347,200	2,113,100	3,856,100	/	1,704,700	1,124,500	/
Average age (2018)	34.4	32.1	30.6	34.4	43.4	33.5	33.4	38.7

6.3 THE ECONOMIC PATTERN

The large urban agglomeration, as Richard Florida argues, that is the hub of production and innovation composed of several cities, and represents the new, natural economic unit.²⁴⁴

During contemporary times, adjacent cities economically collaborate together to compete with the other entities of the global economy on the contemporary world stage in order to sustain or enhance their competitive economic advantages. They thrive on the productivity and innovation enhancing effects of dense and multifaceted urban milieu that are simultaneously embedded in worldwide distribution networks.²⁴⁵

In this sense, the economic pattern is an important angle to examine the condition of the Pearl River Delta, a node in the current global economy. The research demonstrates that as a large economic body, the Pearl River Delta functions in a pattern of regionalization with very different specifications. The prosperity of economic success results from the different industrial emphasis of different PRD cities but also the co-existence of the two different economic systems – the capitalism in Hong Kong and Macau and the socialist market economic system in Mainland China. The two economic systems provide the capital and efficiency respectively to the economic development in the Pearl River Delta. Nevertheless, as much as the economic collaboration between the PRD cities, the competition is same evident among them.

²⁴⁴ Florida, Richard, Tim Gulden, and Charlotta Mellander. "The rise of the mega-region." *Cambridge Journal of Regions, Economy and Society* 1, no. 3 (2008): 459-476.

²⁴⁵ Scott, Scott, Allen John, and Porter, Michael E. *Global City-regions : Trends, Theory, Policy*. Cambridge, UK New York: Oxford University Press, 2001.

The economic and industrial structure of the Pearl River Delta is diversified. Hong Kong acts as the financial center and open market; Guangzhou, Shenzhen Foshan, Dongguan, and Zhongshan specialize in different type of productions; and Macau and Zhuhai provide services of various kinds. (Figure 6.9) Different emphases are quite evident in the regional land-use map. (Figure 6.10) As the SAR, Hong Kong has been the gateway in and out of China for a large portion of China's international trade. Hong Kong's outflow of investments helped China gain its footing on its path to rapid industrialization, which in return reinforced Hong Kong's status as one of the wealthiest and most cosmopolitan cities in the world. The economic success of Macau, another SAR, especially since the 21st century, is due to its massive and lucrative gambling industry, as it is the only place in China where gambling is legal, in addition to its longer term role as a unique tourist site.

Though the economic diversity objective of the Pearl River Delta is unanimous, some see it basically in terms of service development while others feel that industrial activity can, and must, have a prominent place. All the cities of the Pearl River Delta coincide in their desire to foster economic growth, but in aggregate most of their economy centered on the secondary sector, meaning industrial productions and manufacturing. This makes the internal competition among them unavoidable and the cities in a situation of competitive complementarity. Today, Guangzhou is an economic juggernaut and one of the primary manufacturing bases along with Shenzhen, Foshan, and Dongguan. Shenzhen is home to some of the largest mega-manufacturing campuses in the world, among which Foxconn Technology Group produces 40% of the world's consumer electronics. Dongguan is now China's fourth largest exporting city behind only

Shenzhen, Shanghai, and Suzhou. Much of Dongguan's urban and economic growth since 1978 has been driven by low-cost and labor-intensive manufacturing, which has produced much of the world's shoes, clothing, furniture, toys, and consumer electronics.²⁴⁶ For this reason, Dongguan is often referred to as the "World's Factory". Growing from a steel-industry-based city that was one of China's most productive, Foshan has a thriving economy and a diverse set of manufacturing capabilities at present. It has more than 30 “communes”, each specializing in producing certain products inclusive to air conditioners, furniture, and automobiles.²⁴⁷ With the emerging upgrade of industry in the overall Pearl River Delta, the internal economic competition of the Pearl River Delta will inevitably become more and more fierce.

It deserves to be applauded that since 1978, with China's outlook drastically improved after the economic reform, the Pearl River Delta has been transforming what was mostly agricultural land in 1979 into the manufacturing heartland of a global economic power today, as acknowledged by Manuel Castells in his 1996 book *Rise of the Network Society*.²⁴⁸ However the PRD's economic development within the recent years put too much focus on the efficiency of the plans and neglected the importance of nurturing the diversity of its economic pattern.

²⁴⁶ 周锐波.珠江三角洲经济发展模式评析.《中国发展》2004 年第 3 期

²⁴⁷ 丁俊, 王开泳. 珠江三角洲城市群工业生产空间格局、形态特征及影响因素, 《地理科学进展》2016, Vol. 35 » Issue (5) : 610- 621

²⁴⁸ Castells, Manuel. *The Rise of the Network Society*. 2nd Ed., with a New Pref. ed. Castells, Manuel, 1942-Information Age; v. 1. Chichester, West Sussex; Malden, MA: Wiley-Blackwell, 2010.

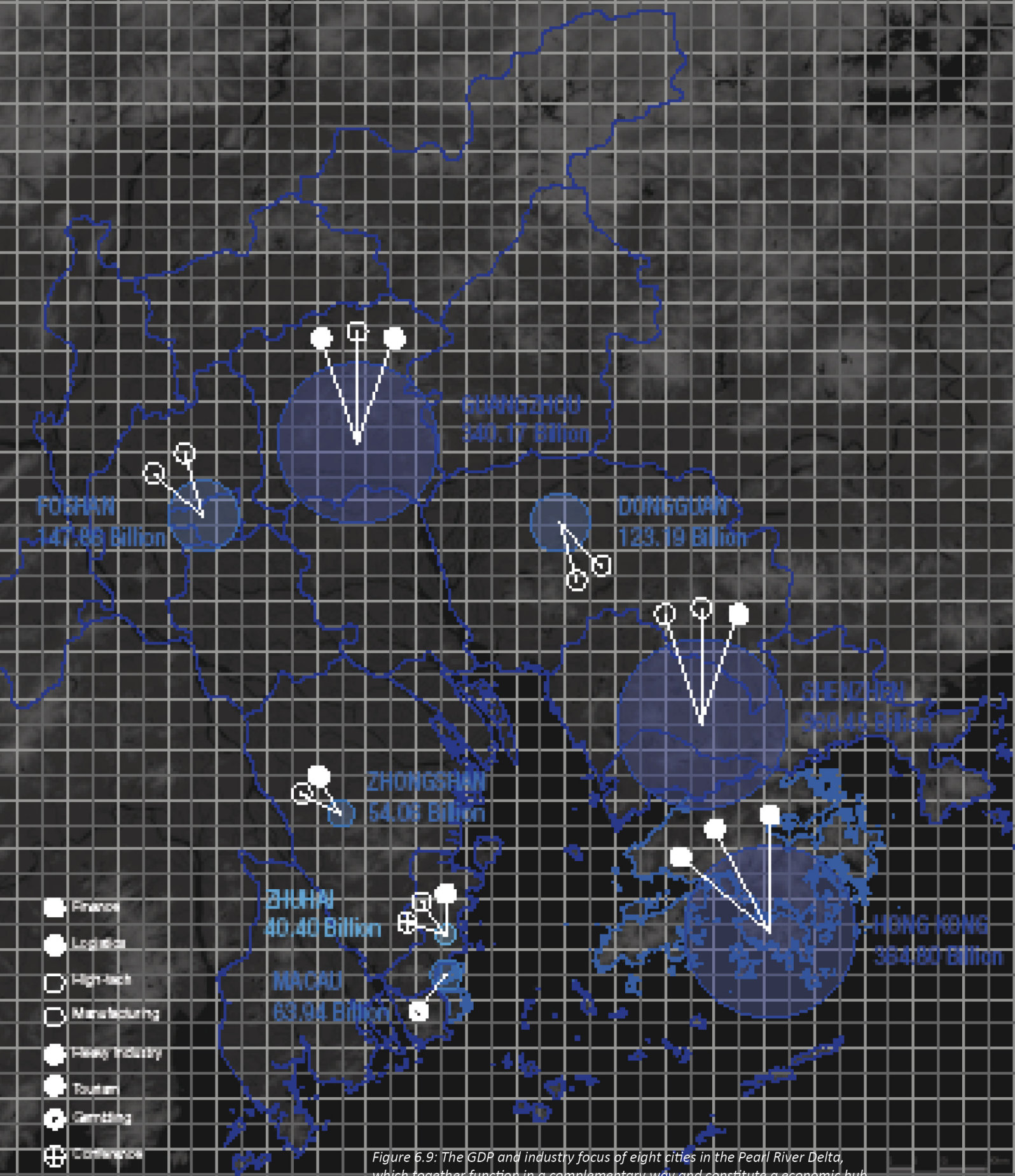


Figure 6.9: The GDP and industry focus of eight cities in the Pearl River Delta, which together function in a complementary way and constitute a economic hub with regional competitiveness in the global network.

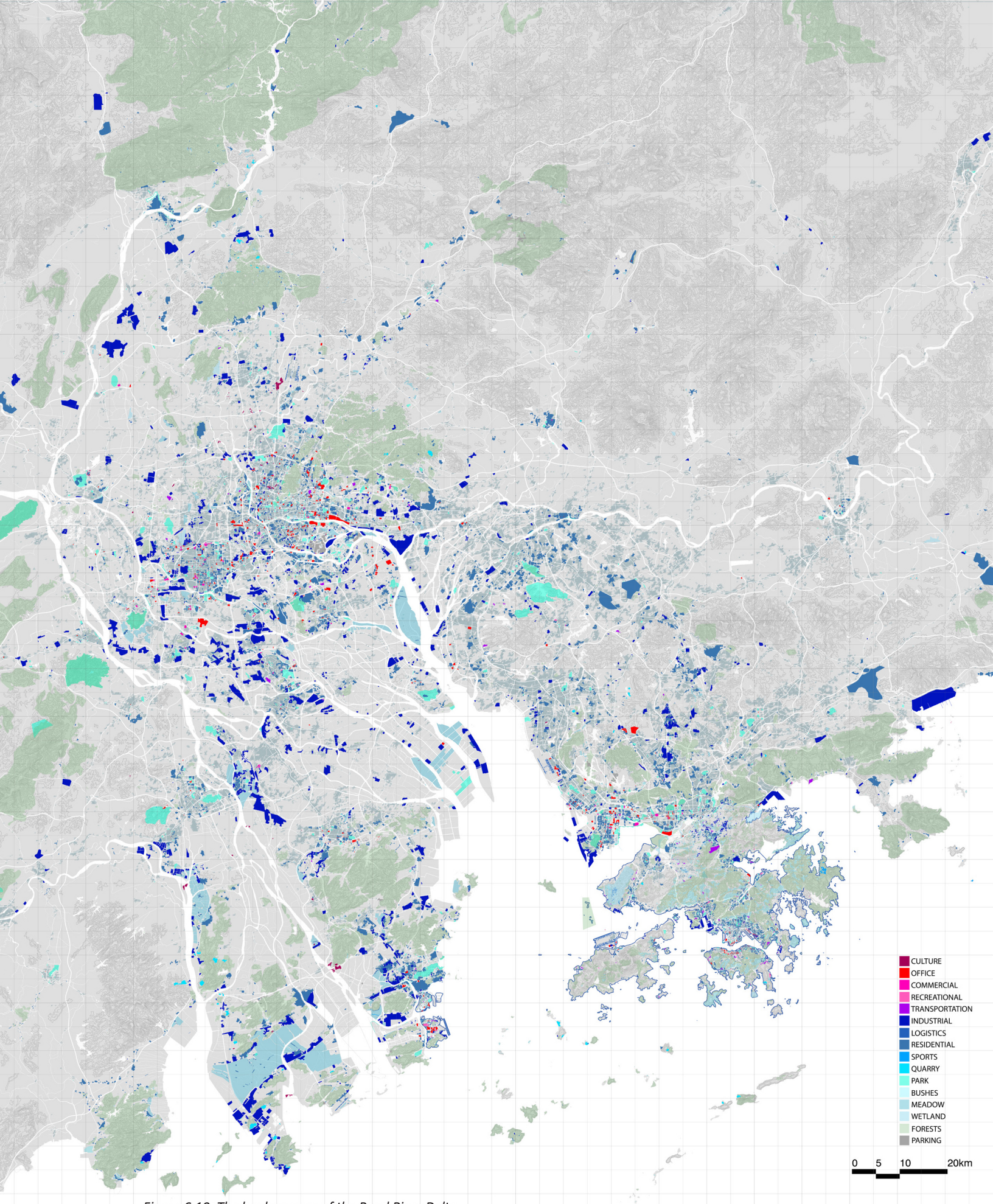


Figure 6.10: The landuse map of the Pearl River Delta

6.4 NETWORK AND FLOWS

The previous population study evokes another urban concept, the Metropolitan Statistical Area (MSA), which is defined by the United States Office of Management and Budget (OMB) for a metropolitan area that contains a core urban area of 50,000 or more population and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by work commute) with the urban core. A method for understanding the MSA is the measurement of the commuting pattern. This methodology has been adopted here to analyze the degree of integration and the spatial pattern between the cities inside the Pearl River Delta. Due to the limitation that most accurate transportation data is highly classified, the dissertation uses the general open data on railway commuting analysis, and Didi's GAIA Open Dataset²⁴⁹ to analyze the commuting pattern through Choropleth mapping and the Origin-Destination (O-D) Mapping.

For cross-city travels, rail is the most powerful and commonly used mobility device. The 141 km-long Guangzhou–Shenzhen–Hong Kong Express Rail along the east side of the bay connects Guangzhou and Hong Kong with an amazing 50-minute travel time. Since July 1st, 2015, there have been 110.5 pairs of trains running back and forth from Guangzhou to Shenzhen with an average of 113,000 passengers daily. Upon the grand opening of the portion of the line from Shenzhen to Hong Kong on September 23, 2018, the amount of

²⁴⁹ GAIA is a research Initiative based on the data collected by DiDi Brain Intelligent Driving Smart Transportation, China's largest leading mobile transportation platform

trains has been raised to 125.5 pairs per day, carrying 174,000 passengers. The research maps the patterns of rail travel in the Pearl River Delta. It shows a clear dissymmetry between the east and west. There is a remarkable density of travel within the east side of the estuary, between Guangzhou, Dongguan, Shenzhen, and Hong Kong, and the lower amount of flow in the west side of the estuary though this is rapidly improving due to the large amount of construction of railways in recent years. (Figure 6.11) This includes the 140 km-long Guangzhou–Zhuhai Intercity Rail, which runs across 27 stations and reduces the trip from Guangzhou South Station to Hengqin to 1 hour and 20 minutes. However, the daily ridership of this railway hasn’t reached to its capacity; 39,700 passengers from Zhuhai Station and 10,750 passengers from Zhuhai North Station travel to Guangzhou South Station daily, which together adds up to not even half the ridership of the Guangzhou–Shenzhen–Hong Kong Express Rail.

After almost five decades of construction of railways and stations (mainly the recent two decades), the overall territory of the PRD now contains a good coverage of rail. (Figure 6.13) However, the rail-accessibility map reflects the Pearl River Delta spatially still three zones which developed based on the logic of three twins. Besides, a scrutinization reveals inside these three zones, the space is also highly polycentric. (Figure 6.12)

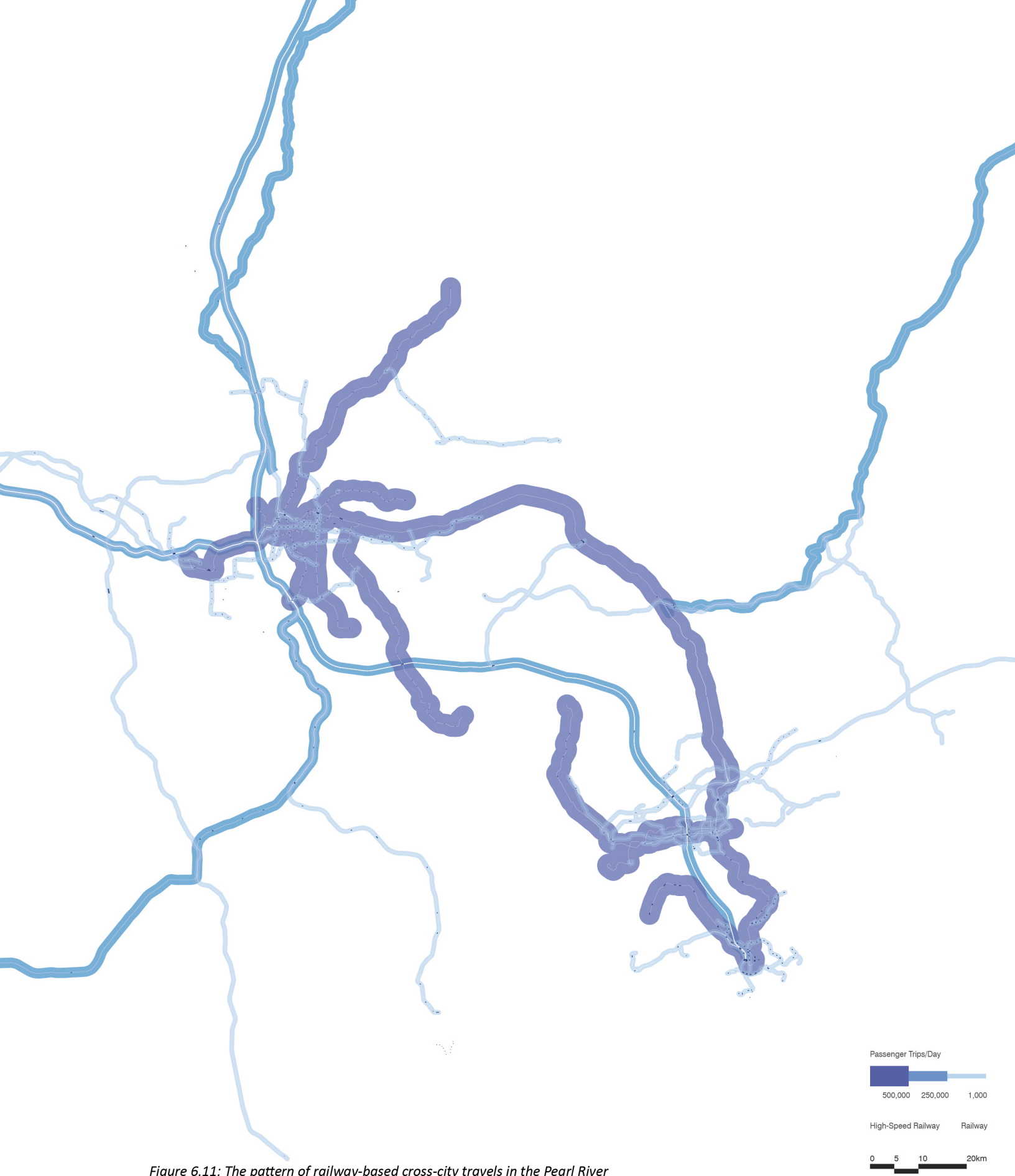


Figure 6.11: The pattern of railway-based cross-city travels in the Pearl River Delta, represented in the daily ridership of different inter-city railways.

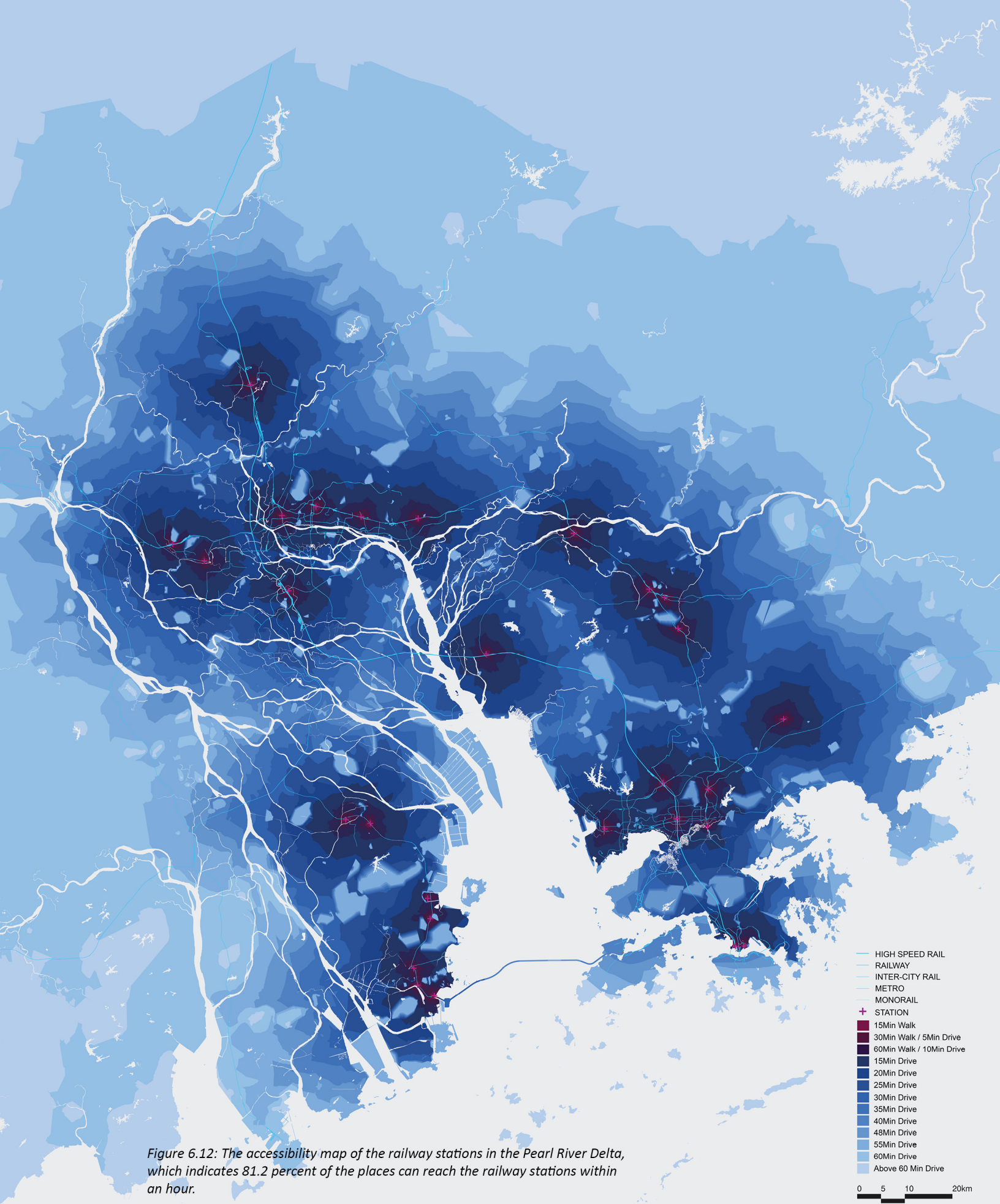


Figure 6.12: The accessibility map of the railway stations in the Pearl River Delta, which indicates 81.2 percent of the places can reach the railway stations within an hour.

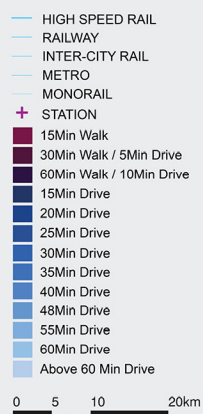




Figure 6.13: The rail-transit development chronic in each city of the Pearl River Delta 1970-2018

The Origin-Destination data, which involved about 700,000 requests of path-planning from Didi on January 23, 2018, reflects the path and flow amounts as well as the most popular places. The O-D map indicates the commuting pattern are diffused and varied with different centers. Taxi or car-sharing services are more often used inside a city; no strong cross-cities commuting patterns are illustrated. There is no evident difference between the east and west sides, which is more than obvious in the railway mapping. It represents the Pearl River Delta in a high-level polycentric form. Specifically, the most popular destinations in the O-D map correspond to the existing city centers in terms of building density. (Figure 6.14)

No flow mapping is conducted on air and water travels due to the fact that most of passengers make their travels in the Pearl River Delta on land. According to the documents on air and water travels, only two to four percent of the total cross-city travels were done by air and merely two to seven percent by ferry.²⁵⁰

The rail and automobile commuting maps show enough strong evidence that the Pearl River Delta functions in a polycentric manner – the commuting was conducted mainly around the local centers, rather than an integrated singularity which was aimed by the plan and construction of extensive transportation infrastructure in a mesh form.

²⁵⁰ He, Peiran. *Making Hong Kong : A History of Its Urban Development*. Cheltenham, UK ; Northampton, MA, USA: Edward Elgar Publishing, 2018.

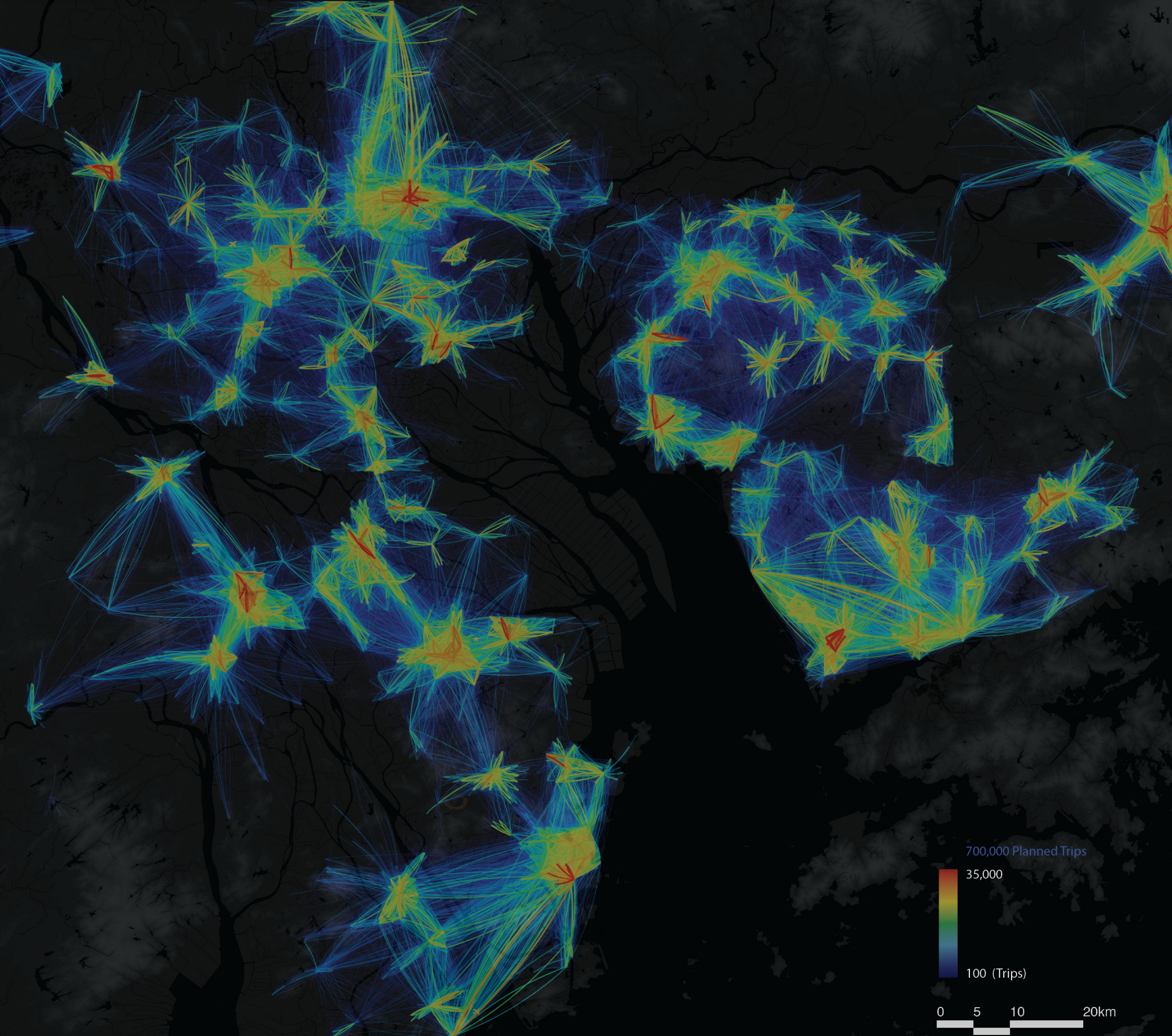


Figure 6.14: The Origin and Destination of map of the Pearl River Delta, showing the most popular centers determined by the flows of taxi or car-sharing services. 2018. (The data being visualized here comes from Didi's GAIA Open Dataset, not covering Hong Kong and Macau)

6.5 ADMINISTRATIVE COMPLEXITY

The polycentric pattern of the Pearl River Delta is not only present in its spatial form, but also in its system of administration which is far from politically “unified”.²⁵¹ The 20,343.87 km² region consists of eight cities—two sub-provincial division cities, Guangzhou and Shenzhen; two Special Administrative Regions, Hong Kong and Macau; and four prefecture-level cities, Zhuhai, Foshan, Dongguan, and Zhongshan, within which Shenzhen and Zhuhai are also two special economic zones—administering in total 29 districts, 28 subdistricts, 8 parishes, and 61 towns (Guangzhou has 11 districts, Shenzhen has ten districts, Foshan has five districts, Zhuhai has three districts and 15 towns, Dongguan has four sub-districts and 28 towns, Zhongshan has six sub-districts and 18 towns, Hong Kong has 18 subdistricts, and Macau has eight parishes). In this sense, the region is a model of multi-tiered urbanism because it is made up of diverse regulatory regimes: physically linked but acting almost like micro-states, to which could be added the semi-autonomous activities of central SOEs.²⁵² The eight cities in the Pearl River Delta came from different backgrounds and experienced different procedures to become what they are today, which produces their heterogeneous nature and different planning and sanctuary systems. (Figure 6.15) This also can be understood as one reason of the Pearl River Delta as an administratively highly fragmented region with complex to the extreme. The administrative unity seems difficult to achieve, other than a superficial top-down form.

²⁵¹ J.F. Shen, “Cross-border Urban Governance in Hong Kong: The Role of the State in a Globalizing Region,” *The Professional Geographer* 56: 4 (2004) 530–543.

²⁵² Jiangbo Bie, Martin de Jong & Ben Derudder (2015) Greater Pearl River Delta: Historical Evolution towards a Global City-Region, *Journal of Urban Technology*, 22:2, 103-123

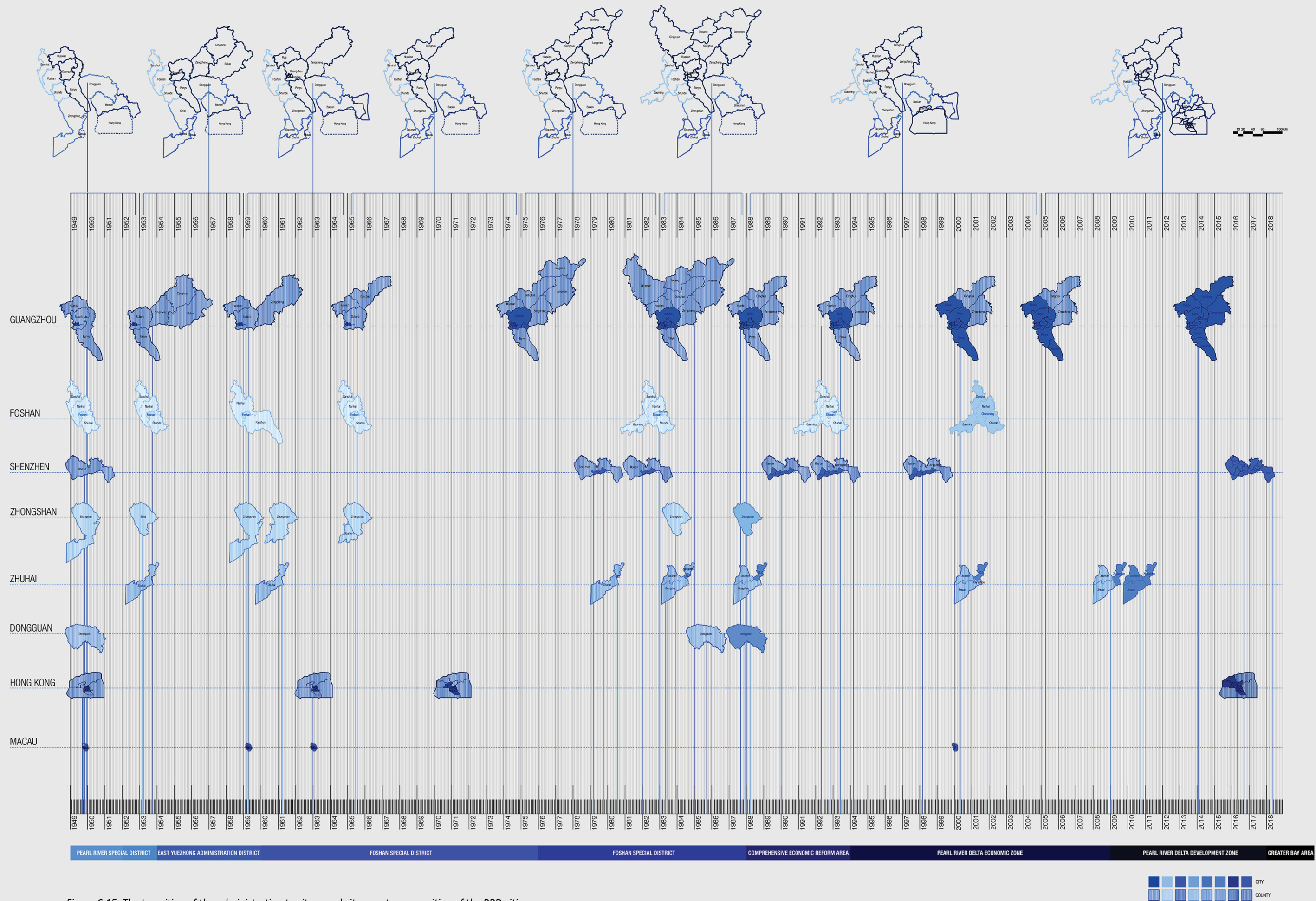


Figure 6.15: The transition of the administration territory and city-county composition of the PRD cities

Broadly, we can find three blocks with the most evident differences in administration today. Guangzhou, Shenzhen, and Zhuhai follow the administrative pattern of a typical municipality, which contains four vertical administrative structures of “City-District-Street/Town-Community/Village”. This structure, identified in 1998, is also known as “Two-level Government (City-District), Three-level Management (City-District-Street/Town), Four-level Network (City-District-Street/Town-Community/Village)”.²⁵³ Although the municipal government has actively explored different ways of decentralizing power, a large extent of administrative authority of key projects and municipal constructions is still firmly in the hands of municipal governments.

The current administrative system of Foshan, Dongguan, and Zhongshan, cities that are formed by separate counties, comes from the “bottom-up” decentralized administration pattern. This means that the districts (former counties) are quite powerful in their debates with the municipality. For instance, two of the three central districts of Foshan, Shunde and Nanhai, used to be economically developed counties, and always had more voice in the city’s management. Even in the 1990s, they directly jumped over Foshan to become a quasi-prefecture-level city similar to a “provincial county”. Even after Shunde and Nanhai were down-graded into districts in 2002, the Foshan Municipal Government did not appropriate the economic and planning management authority from Shunde and Nanhai but continued to adopt the original method and repeatedly delegated administrative authority to the

²⁵³ 张勇. 《新中国城市社区建设：回顾、反思与前瞻》，北京：中国社会科学出版社，2014

districts. It can be said that the administrative mode of Foshan is relatively flat between the three hierarchies of municipality, district, and town.

Hong Kong and Macau as special administrative regions possess their own governments, multi-party legislatures, legal systems, monetary systems, separate customs territory, and even substantial competence and cultural history in external relations that are different or independent from China.²⁵⁴ Under the legislation of “one country, two systems”, the city-making of these two cities are highly autonomous and even for the state council it is very hard to intervene.

The differences in the manifold administration systems created obstacles to cooperation across cities in the management of major regional projects. For instance, for the cities like Foshan that delegated the authority on urban constructions to the district and town-level governments, their major urban projects can be directly incorporated into the comprehensive masterplan of the city. The task of the municipal government is “supervision”. Nevertheless, the same type of large urbanistic project in cities like Guangzhou needs to be demonstrated in the zoning plan and the detailed regulatory plan stages, and then reported to the municipal-level masterplan. Collaborations on major cross-city projects need to always start the conversation with the masterplan stage, however, in these cases the district or town governments of Foshan and Dongguan don’t have the

²⁵⁴ Ghai, Yash P. *Autonomy and Ethnicity: Negotiating Competing Claims in Multi-ethnic States*. Cambridge Studies in Law and Society. Cambridge, UK; New York: Cambridge University Press, 2000.

authority to communicate straightforwardly to the municipal governments of Guangzhou, Shenzhen, Zhuhai, and Zhongshan, sometimes resulting in their inability to proceed on projects.²⁵⁵ (Figure 6.16) Projects involving in Macau and Hong Kong will have the same type of issues, but in a more sophisticated manner.

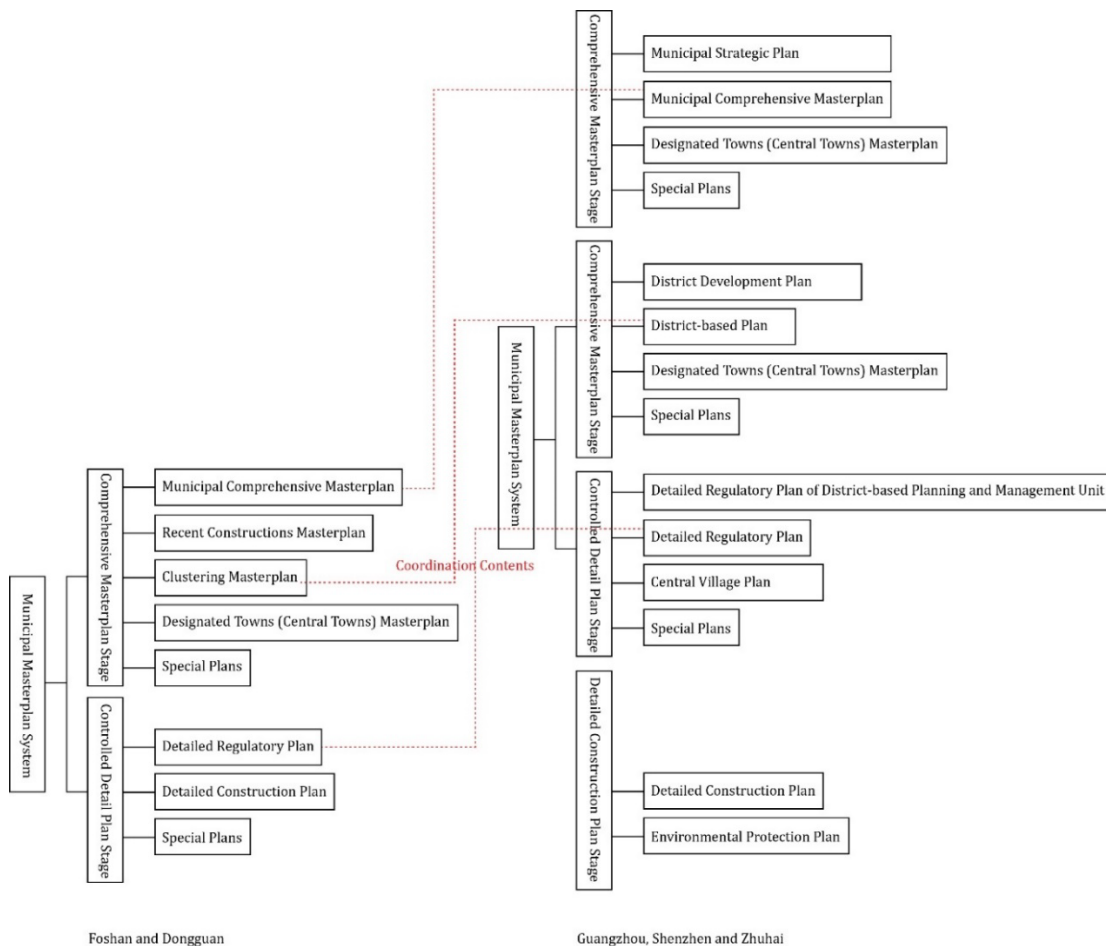


Figure 6.16: The mismatch in the planning system between the municipality and county-formed municipality in Mainland China.

²⁵⁵ 李郇, 吴翊拙, 吴蕊彤, and LI Xun1, WU Yi-fei2, WU Rui-tong3. "同城化治理研究——以广佛地区为例 - RESEARCH ON THE GOVERNANCE OF CITY INTEGRATION: A CASE OF GUANGZHOU- FOSHAN." 人文地理 31, no. 05 (2016): 1-6.

The polycentric pattern and the extreme complexity of administration make the regional plan difficult to coordinate, administer, and manage. It required the determination and the strong participation of the centralized state to draw up the plan, though its implementation proceeded at the territorial level. The regional plan of the Guangdong–Hong Kong–Macau Greater Bay Area is expected to be an instrument of governance which is shared by all land-use and regional development players. The central government treats the plan for the Greater Bay Area as a central state affair, with the hope that the collective construction of this regional project will allow it to contribute its strength and efficiency to other domestic projects. However, this not only leads the state to reserve the right to inspect the projects, but concedes authority to the state in interventions which are decisive for the region in the name of its national policies, even without sufficient agreement at the more local levels. On the other hand, the political and financial power of the cities in the Pearl River Delta leads them to request a certain autonomy in their development. The heterogeneous nature of different cities and their local conditions and requests makes the situation much more complex. This dilemma leads to the search for new negotiation frameworks to ensure that planning can keep its regulatory function without losing its strategic role.

6.6 THE MULTITUDE OF CULTURES

While the Pearl River Delta has been a hallmark example of booming urbanization over the past two decades, its eight different cities have risen to prominence in the global economy by moving along different pathways and by assuming different roles. This amplified the PRD culturally existing as a polycentric or even “fragmented” form which cities inside originated

from different cultural roots. In their historic development, Hong Kong and Macau have been deeply influenced by British and Portuguese cultures respectively; Guangzhou exists and grows in the traditional Cantonese culture; Foshan is an apparatus of the traditional Lingnan culture; in comparison, Shenzhen and Zhuhai are cities of “immigrants” whose cultural identities are relatively blurred. (Figure 6.17) Despite their different culture roots, the methods of how the cities evolved and developed also created different shared characteristics in social and urban cultural aspects. Foshan, Zhongshan, and Dongguan flourished due to the rapid growth of the TVEs whilst Guangzhou and Shenzhen developed mainly through SOEs, which led to two very different types of urban features and lifestyles. There is always a question about what the cultural identity of the Pearl River Delta is as a whole. Though “Cantonese-ness” could be used superficially to describe it, the explicit acknowledgement of the different cultures among the eight PRD cities means almost no answer can be reached.²⁵⁶ Paradoxically, its multitude of cultures is the cultural identity of the Pearl River Delta, which as a concept celebrates individuality and diversity in its cultural topography.

One of the defining qualities of a city within a megaregion is the way in which it defines its identity and competitiveness by exacerbating its difference in relation to other cities. In many respects, an effort to define oneself has been the persistent feature in the development of the PRD cities since their beginnings. This is why the shifting cultural images of contemporary Hong Kong and Macau, as their unique cultures increasingly blend into the

²⁵⁶ Matthew Turner. “Trading Places: Cultural Imaginaries of the Pearl River Delta”. Hong Kong, 2005.

flux of the Pearl River Delta as one entity, bring much anxiety to the local people. Besides, the co-existence of different cultures can collide into new innovations and urban spectacles which can benefit the whole region. In this sense, the masterplan and urbanistic project designs for the Pearl River Delta Greater Bay Area should always recognize and value this point, learn from the historic centers, dedicate to highlight the significance of diverging trajectories of different cities, and amplify the precious distinguished cultural characters among the PRD cities. Urban morphology and architecture as the manifestation of different cultures should be studied carefully during the regional plan for the overall Pearl River Delta.

Hong Kong, as a former British crown colonial city since 1843, is articulated by its international and contemporary styled buildings along the Victoria Harbor; Macau is the former Portuguese colony whose cultural image is historically represented by the Largo do Senado and the Ruins of St. Paul's with the Monte do Forte, while the casino is its contemporary face; Guangzhou, representing a Cantonese culture whose urban history is related with the port and river, is distinguished by the Front Bund and the Xiguan Vernacular Housing of Guangfu Culture; through its history, Foshan's architecture and cityscape was largely influenced by Taoism, constituting a typical "Lingnan Style"; and Shenzhen and Zhuhai are two special economic zones with relatively short periods of urban history, which are interestingly searching for and inventing their own traditional features.

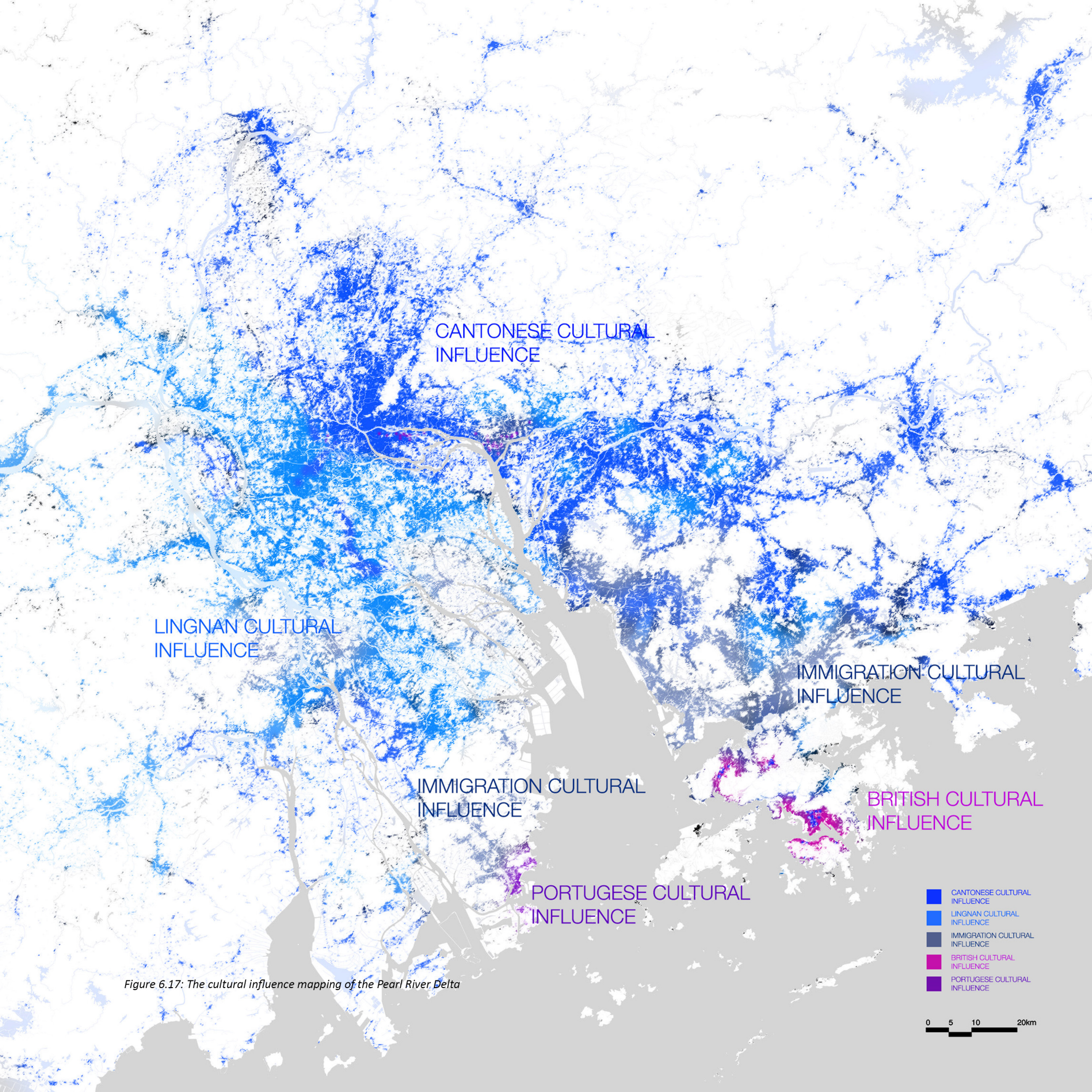


Figure 6.17: The cultural influence mapping of the Pearl River Delta

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