TOWARDS A TRANSITION TERRITORY

Planning and design strategies to improve social and ecological conditions in the peri-urban area of Shanghai

Graduation Studio Report

Metropolitan Ecology of Places Series

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CONTENTS

Preface

The site chosen for this thesis is overlapping with the site of the urban master planning and rural planning course I undertook during my undergraduate studies. At that time, in my project, the classification of the area was divided simply into urban and rural, and the in-between areas were ignored. During my master's studies in Delft, I became aware of a third transitional landscape beyond the urban-rural dichotomy - the peri-urban area - and was inspired by Allen's (2003) concept of 'peri-urban area is characterized by a heterogeneous mosaic landscape with three intertwined ecosystems'. Revisiting the area with this new understanding, I gained a deeper insight into the value of the area and the evolution of the overall urban spatial pattern of Shanghai.

With the rapid urbanization in China, there has been an increase in research on peri-urban areas in the last decade or so, but existing urban planning in China is still characterized as 'urban-oriented', with relatively weak planning approaches and concepts for peri-urban areas. By studying the spatial and temporal evolution of urbanization in Shanghai and the characteristics of peri-urban areas, this thesis proposes complementary planning strategies for the Jiading-Taicang area based on the Shanghai Master Plan.

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Chapter 1
Introduction

1.1 Peri-urban Areas Around the World

The peri-urban areas are areas where the forces of globalization and localization interact. This has become a global phenomenon (Chen et al., 2020). Many similar terms such as 'in-between area', 'desakota', 'urban fringe', and 'urban rural interface' are used for its study. Due to geographical conditions, legal and institutional frameworks, spatio-temporal dynamics, and socioeconomic and environmental characteristics, the patterns of peri-urban transformations differ across countries (Sajjad et al., 2023). This sub-chapter explains some typical types of peri-urban areas around the world.

EUROPE

Since the middle of last century, with the growth of population, European people chose to move out of inner cities to suburban and peri-urban areas (hybrid areas of fragmented urban and rural characteristics), which resulted in the divide between urban and rural areas becoming increasingly blurred (EUROSTAT, 2016). In addition, Le Galès and Zagrodzki (2010; 2011) summarize the characteristics of European cities as not being large, but having a large number of small and medium-sized cities near each other. Therefore, much of the territory in Europe is neither distinctly urban nor rural but something 'in-between' (Ulied et al., 2010). In this 'in-between' category, which covers 38.7% of Europe's land surface and 35.3% of the EU population live in these areas (Wandl, 2020). Its urban pattern is mixed open and urban land of varying density, intersected by infrastructure including public transport. (Le Galès, 2010; Zagrodzki, 2011).

a

b

Figure 1.1 a. Swiss Limmat valley b. Suburban of the Hague
Source: https://en.wikipedia.org/wiki/Peri-urbanisation, Google Earth

UNITED STATES

The creation of peri-urban areas in the United States is closely linked to the phenomenon of urban sprawl, which is widely considered a negative phenomenon of unplanned, uncontrolled, and market-driven development that creates environmental problems. It has its origins in the flight to

the suburbs that began in the 1950s (Resnik, 2010). , and resulted in a landscape of 'vacant strips alongside roadways, seas of parking lots, unused land, surfaces awaiting development, dumping grounds, warehouse districts, a seemingly endless stretch of setbacks and perimeters framing housing communities' (Berger,2006). Le Galès(2010) and Zagrodzki (2011) point out that until recently, suburbs grew in the US, while city centres lost inhabitants.

Figure 1.2 Low density housing between large farms in a suburban Tennessee community
Source: https://en.wikipedia.org/wiki/Urban_sprawl#/media/File:Bean_Station_neighborhoods_1.jpg

CHINA

The rapid urbanization that has taken place in Southeast Asia since 1970 has exhibited a process different from that of developed countries in the West (Tian et al., 2017). Research suggests that peri-urban areas may be the most rapidly growing and dynamic type of region in East Asian countries (Chen et al., 2020). Webster(2002) believes that in East Asia, the magnitude and impact of the phenomenon is, and will be, more important than in any other world region. He also points out that Chinese peri-urbanization has many commonalities with Southeast Asia countries but also differs from them in a variety of fundamental ways. Within China, the extent of its peri-urbanization also varies considerably, with the more economically developed cities in the coastal areas often developing suburban areas forerunners. The peri-urban area pattern in China is explained in detail in sub-chapter 1.3, using coastal city, Shanghai as an example.

Figure 1.3 Jiading Satellite City in China
Source: https://www.archdaily.cn/cn/950808/jia-ding-wei-xing-jie-qu-chang-guan-yu-sheng-huo-kong-jian-de-tan-suo-fei-chang-jian-zhu

1.2 The Heterogeneous Mosaic Landscape

DEFINITION OF PERI-URBANIZATION

There is no concrete definition of the concept of ‘peri-urbanization’. It can generally be understood as a ‘status’ or ‘process’ according to academics. According to McGee (1991, 2009), Webster (2002), and Chen et al. ’s (2020) study on peri-urbanization in East Asia, China, and Shanghai, ‘peri-urbanization’ can be defined as a decentralized, progressive process of rapid and strong growth of labor-intensive industries, services, and other non-agricultural industries in the former rural areas and the gradual economic, social, and spatial transformation of the former rural areas into cities, with a strong interaction with the cities. The peri-urban areas resulting from this outcome are spatially represented as a transitional territorial type.

CHARACTERISTICS OF THE PERI-URBAN AREA

The peri-urban area has a complex and diverse nature, Allen (2003) points out that the peri-urban interface can be characterized as a heterogeneous mosaic of ‘natural’ ecosystems, ‘productive’ or ‘agro-’ ecosystems, and ‘urban’ ecosystems.

Figure 1.4 shows a peri-urban area of Jiading-Taicang area as an example of a landscape typology with three ecosystems, distinguished by the red (urban), yellow (productive), and blue-green (natural) palettes. The layout of urban housing and services is more clustered and developed along the transport infrastructure, with production systems (farmland and villages) interwoven with natural systems (waterways and green spaces) and small industrial elements scattered throughout. In addition to the elements mentioned above, the peri-urban area is also enriched with historical and cultural sites, recreational and tourist facilities, and other features, as shown in Figure 1.5.

Figure 1.4 Diagram of the peri-urban area landscape
Source: Author’s own based on ESRI Satellite Image

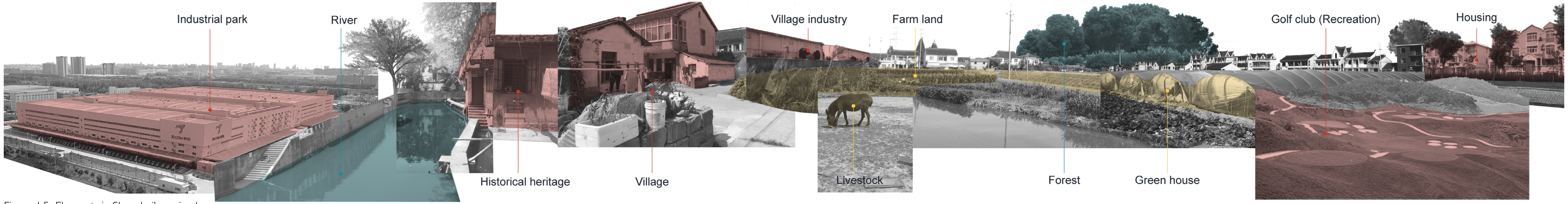


Figure 1.5 Elements in Shanghai’s peri-urban area
Source: Author’s own based on image from: https://699pic.com/tupian-501043882.html, https://www.baigolf.com/course.php?id=579&date=2023-04-12, author’s collection

1.3 Drivers of Peri-urbanization in Shanghai, China

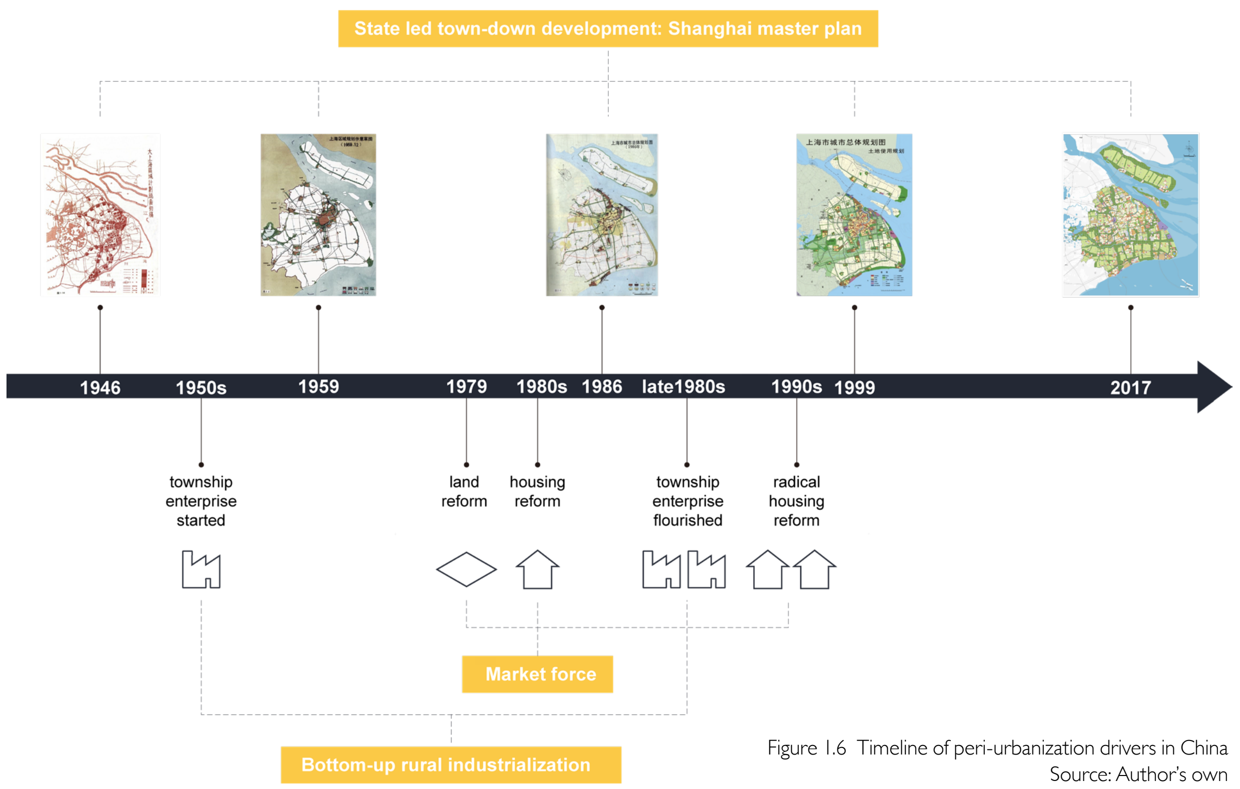


Figure 1.6 Timeline of peri-urbanization drivers in China
Source: Author's own

According to Tian et al. (2017), He (2015), and Webster's(2002) research, three main drivers contribute to the peri-urbanization in China. They are state-led top-down development, which is often facilitated by way of a master plan and public policy, market forces, and bottom-up township-village development. Typically, these three forces are often intermingled with one another. In the case of Shanghai, foreign direct investment due to market forces is the trigger that sets off peri-urbanization, and the impact of bottom-up rural industrialization on land use change has been less significant than state-led growth.

In this sub-chapter, the impact of each driver on the (peri-)urbanization process is explored in detail, and the spatial and temporal changes in urban development are investigated using Shanghai as an example.

1.3.1 State-led top down development

State-led top-down development corresponds to a certain extent to the master plan. After World War Two, there were five versions of the Shanghai master plan (1946, 1959, 1986, 1999, and 2017).

SHANGHAI MASTER PLAN 1946

The 1946 Shanghai Metropolitan Plan aimed to rebuild and revitalize post-war Shanghai, ensuring its position as the country's industrial and commercial center and coping with future population growth.

The plan proposed the rebuilding of the central city while creating 11 separate new municipal units in the suburbs for organic population dispersion. The units were separated from each other by green areas that could be used for parks, sports fields, or agricultural production, and they were closely linked by fast arterial roads.

This plan was the first modern master plan drawn up by a major Chinese city and used several European and American modernist urban planning concepts, such as functional zoning, satellite towns, and green belts. Although it was not put into practice due to the civil war, it had a profound impact on the future urban planning and construction of Shanghai.

SHANGHAI MASTER PLAN 1959

After the establishment of the PRC, the socialist ideology and planned economic system dominated, and in 1959, the central government proposed a policy of 'parallel development of central and local industries'. In this context, Shanghai's urban function changed from that of a multi-functional outward-oriented economic center to that of a single-functional inward-oriented production center, gradually becoming an important industrial base and financial pillar for China.

The plan proposed to compress the old urban areas, create spare suburban industrial sites, control its population size, and increase the number of satellite towns to 16 based on the 1946 master plan, with the satellite towns serving as industrial parks and workers' communities to accommodate the population and industries evacuated from the city center; to improve living (housing) conditions by renovating old houses and shacks in the central city and building new housing projects on the city fringe or in satellite towns; ecologically, the plan is to strengthen the greening of the city center's transport infrastructure, to build green belts on the edge of the city and to lay out more green spaces in satellite towns to achieve gardening.

In the early years after the release of the 1959 Shanghai master plan, it was difficult to move forward due to natural disasters and political factors. After more than 20 years of construction, the old urban areas were transformed and 10 suburban industrial areas and seven satellite towns took shape. However, the satellite towns have been in decline since the 1980s due to a lack of funds for long-term maintenance, over-reliance on industrial development, and poor infrastructure development, leading to deteriorating living conditions and thus the population decline.

SHANGHAI MASTER PLAN 1986

The 1986 edition of the Master Plan was developed in the context of the reform and opening-up policy. After the 1980s, Shanghai's socio-economic development took "adjusting the economic structure and revitalizing the Shanghai economy" as the main theme, promoting the recovery of the city's economic growth and gradually developing from an industry-oriented production center to a multi-functional externally-oriented economic center. The urban pattern shows the basic characteristics of a monocentric ring expansion with the central city as the core. The focus of urban construction is on infrastructure and housing to improve the long-established problems of chaotic urban layout, incomplete infrastructure, traffic congestion, and housing shortage.

The plan proposes the establishment of a four-tier urban structure of the central city-suburban industrial towns and satellite cities - small suburban towns - small rural market towns; comprehensive zoning of the central city and suburban areas to form a multi-level, sequential, multi-core, and complementary system of public activity centers; reducing the number of satellite cities, emphasizing their integrity in terms of urban functions, establishing a better production and living environment and having integrated urban functions; promoting the development of Pudong District to stimulate Shanghai's economic development and re-centre urban development from the west side to the east side of Huangpu River (He, 2015). In terms of ecology, the plan proposes the construction of 200,000 hectares of agricultural protection and the construction of environmental protection control zones around the central city to protect the ecological balance.

Figure 1.7 Shanghai master plan 1946, 1959, and 1986
Source: https://www.supdri.com/2035/

This is the first urban master plan with legal effect approved by the state in Shanghai. The implementation of this master plan lays the foundation for the morphological development and functional development of the city.

CONCLUSION MASTER PLAN 1946-1986

All In summary, all three master plans reflect the national drive for the development of the Shanghai periphery, although the strategies and emphasis are different. He (2020) summarizes the three editions of the Shanghai Master Plan as proposing several spatial strategies for peri-urban development (e.g. Figure 1.8): Infrastructure development, including the construction of fast arterial roads and railways (1946, 1959); Industry-led development, closely linked to the development of peri-urban industrial parks and satellite towns (1946, 1959, 1986); Improved housing conditions and the integrated development of living and production in satellite towns (1959, 1986); The development of the Pudong district (1986); The establishment of a four-tier urban structure (1986).

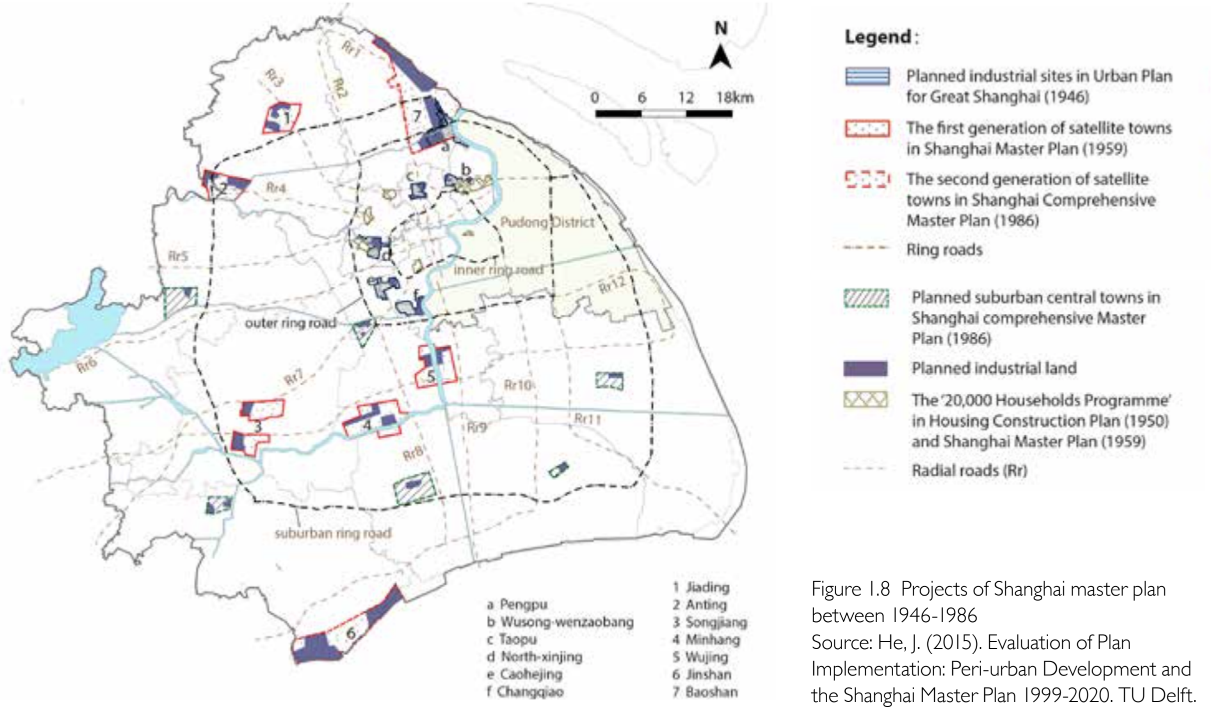


Figure 1.8 Projects of Shanghai master plan between 1946-1986
Source: He, J. (2015). Evaluation of Plan Implementation: Peri-urban Development and the Shanghai Master Plan 1999-2020. TU Delft.

SHANGHAI MASTER PLAN 1999

The development and opening up of Pudong in 1990 marked the beginning of Shanghai's industrial adjustment, which gradually transformed into a situation where economic growth was driven by a combination of "two and three sectors", with foreign investment becoming the main driving force behind the strategic adjustment of Shanghai's industrial structure and peri-urban development. The urban pattern was characterized by a parallel expansion of the central city and urbanization of the suburbs. Shanghai is established as an important national economic center and shipping center, and will gradually be built into a modern socialist metropolis.

The plan proposes the formation of a multi-axis, multi-level, and multi-core urban spatial layout structure, and the establishment of a four-tier town system of "central city - new city - central town - general town". Among them, the new cities are the medium-sized cities developed by major industries and important urban infrastructure or where local municipal governments are located, which are the main focus of this master plan. In terms of ecology, by the principle of harmonious coexistence between the urban and nature, the wedge-shaped green areas between the inner and outer rings will be increased and the suburbs will be forested on a large scale.

However, in the actual development process, market forces have created uncertainty in planning practice, as shown in Figure 1.10, with population growth and land development in the suburbs far exceeding expectations, resulting in severe shortages of housing and infrastructure, and a pattern of urban sprawl (He, 2015).

Figure 1.9 Shanghai master plan 1999
Source: https://www.supdri.com/2035/

	Land development		
(Unit: km2)	Reality 1997	Plan 1999 for 2020	Reality 2009
Central city within the outer ring road (663.7)	446.2	575.5	543.6 (2006)
Suburbs beyond the outer ring road	626.9	1723.9	1536.7 (2006)
			> 2196.3 (2009)
Total amount	1073.1 (1997)	2299.5	2080.3 (2006)
	1529.43 (2000)		2860 (2009)
Proportion of urban land in Shanghai	15.5% (1997)	33.2%	40.68% (2009)
	22.69% (2000)		
Total territory	6740.44 (2000)	6926.2 (2020)	7030.43 (2009)

Figure 1.10 Land development in the Plan 1999 and in reality from 1997 to 2009
Source: He, J. (2015). Evaluation of Plan Implementation: Peri-urban Development and the Shanghai Master Plan 1999-2020. TU Delft.

SHANGHAI MASTER PLAN 2017-2035

In the 21st century, after nearly 20 years of rapid development, Shanghai has become the core city of a world-class city cluster in the Yangtze River Delta, an international economic, financial, trade, shipping, science, and technology innovation center, a cultural metropolis, a national historical and cultural city, and strives to become a global city of excellence and a modern socialist cosmopolitan with world influence. However, the pressure on Shanghai in terms of the transformation of urban functions, continuous population growth, and environmental and resource constraints is also becoming increasingly evident. To promote the healthy and sustainable development of Shanghai, it is necessary to explore a high-density path of mega-city development. This version of the Master Plan proposes to establish a grid-based, multi-center spatial system and strictly control the total population and the scale of construction land. In the context of Shanghai leading the synergistic development of the Yangtze River Delta city cluster, the plan builds a four-tier urban-rural system of "main urban area - new city - new town - village" based on the transportation network and promotes integrated urban-rural development with town circles. The Jiading-Taicang area, which is the main focus of the thesis, is defined as a new city-led integrated development town circle. The planning strategy is to strengthen the allocation of public services and resources, promote the integration of industries and cities, promote the integration of industries and cities, and guide the population to concentrate in new cities and new towns with a better development base; for towns with a lower level of urbanization, strengthen their coordinating role for rural areas, highlight the functions of modern agriculture and ecological protection, meet the basic public service and employment needs of the surrounding urban and rural residents, and guide rural residents to live nearby. With the introduction of the concept of "building an ecological civilization" in 2012, the government has taken an active role in improving the ecological environment. There are plans to draw ecological protection red lines, protect and restore ecological reserves on the outskirts of the city, curb urban sprawl with green belts around the central city, promote circular development based on the construction of ecological corridors along rivers, and improve the utilization of resources and energy.

Figure 1.11 Shanghai master plan 2017-2035 (land use)
Source: https://www.shanghai.gov.cn/newshanghai/xxgkfj/2035001.pdf

1.3.2 Market force

Foreign investment is significant in China's urban transition (Wu, 2008). Owing to its good location close to the central city but with much lower land costs, the peri-urban area has become the optimal choice for many foreign investors to set up factories and enterprises. In 2000, 770 foreign-invested enterprises were set up in the peri-urban area of Shanghai, and this number increased by 51% in 2008 (Tian et al., 2017). This sub-chapter introduces land reform(1979) and housing reform that attract the important market force, the foreign investment to the peri-urban development.

Figure 1.12 Tesla's factory in Shanghai Lingang New Town
Source: Xinmin Evening News reporter Chen Mengze

LAND REFORM IN 1979

Before the 1979 land reform, state-owned land in China's cities and towns was subject to a single administrative allocation system, whereby the state provided land use rights to land users for free and indefinitely, which led to a waste of land resources. The 1979 land reform established a land lease system, which separated the ownership of land from the right to use it. The ownership of urban land still belonged to the state, but the right to use land was given the attributes of a commodity and entered the market. The state, while retaining the ownership of land, offered the right to use the land to users at a certain price, for a certain period, and for a certain purpose through auctions, tenders, and agreements, and the land could then be transferred, leased, and mortgaged.

This land reform produced many positive effects. It attracted a large amount of foreign development investments (FDI) and created significant amounts of municipal revenue through land leasing. Moreover, land has become a powerful tool in accelerating urban development and urban regeneration (He,2015). However, the initial unregulated rental market and lack of planning led to urban sprawl in Shanghai and the loss of a large amount of arable land.

HOUSING REFORM

Housing policy reform began in 1982 and entered a radical phase after 1998. The state separated housing from productive activities and increased the supply of commercial housing (State Council, 1991). As a result, housing has been spatially separated from industrial land, creating mixed communities. Local and foreign private investment was involved in real estate investment, which triggered a construction boom in Shanghai after 1993 (He, 2015). At the beginning of the 21st century, as the population grew and housing prices in the city center of Shanghai increased at an explosive rate (Tian et al., 2017), more people began to buy houses in the suburbs, and due to their lower land prices became a popular choice for investors. The huge demand for housing, public facilities such as schools, hospitals, transportation, and services, as shown in Figure 1.14, has contributed to the expansion of non-agricultural land in Shanghai's suburban areas (Tian et al., 2017). Although housing reforms have led to significant improvements in overall living conditions in Shanghai, some informal dwellings in poor housing conditions have clustered in peri-urbanized areas (Chen, 2020), causing problems such as loss of farmland and environmental pollution.

Figure 1.13 Housing in Shanghai peri-urban area
Source: Author's own collection from Tongji University Master Planning Course Group

Year	1997 (km^2)	2009 (km^2)	Annual growth rate
Industrial land	120.25(73.09%)*	477.46(54.95%)	25%
Residential land	32.55(19.78%)	248.14(28.56%)	55%
Land for public and service facilities	7.81(4.75%)	114.20(13.14%)	114%
Land for transportation facilities	0.51(0.31%)	5.41(0.62%)	80%
Land for utilities	3.40(2.07%)	23.66(2.72%)	50%

Figure 1.14 Change of land use structure in Shanghai peri-urban areas
Source: Tian, L., Ge, B., & Li, Y. (2017). Impacts of state-led and bottom-up urbanization on land use change in the peri-urban areas of Shanghai: Planned growth or uncontrolled sprawl? Cities, 60, 476–486. https://doi.org/10.1016/j.cities.2016.01.002

1.3.3 Bottom up township development

In addition to large industrial parks, another feature of rural industrialization is the large number of small-scale and spatially dispersed township enterprises (Tian et al., 2017). Township enterprises is a collective term for cooperative and individual enterprises of multiple forms, levels, categories, and channels in China's township areas, i.e. rural collective economic organizations or private investments by farmers. The township enterprises in Shanghai's suburbs began in the 1950s and flourished in the mid-to-late 1980s, changing the single industrial structure of the rural areas, which was dominated by agriculture, and gradually becoming the mainstay of the rural economy. It supported urban transformation and industrial development, greatly contributing to bottom-up rural urbanization and providing employment opportunities, but scattered township and village-level industrial zones led to inefficient land use and environmental pollution (Tian et al., 2017).

Figure 1.15 Township enterprises in the peri-urban area of Shanghai
Source: Author's own collection from Tongji University Master Planning Course Group

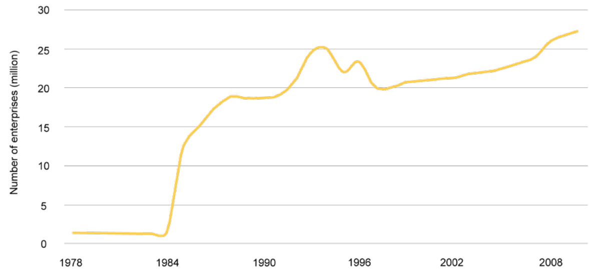


Figure 1.16 Number of rural enterprises in China
Source: http://archive.cikd.org/chinese/detail?leafid=216&docid=1610

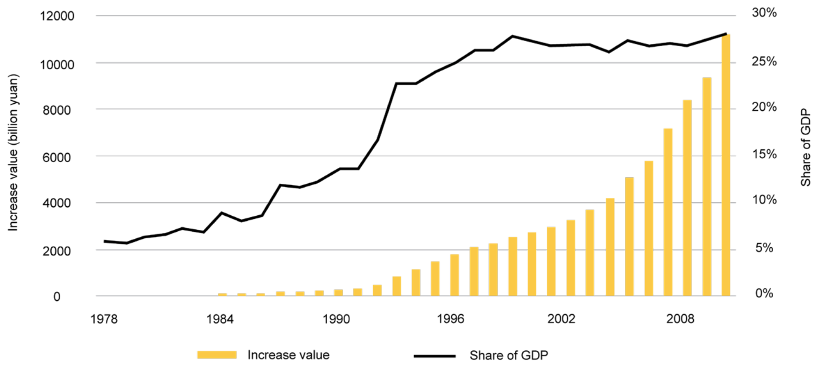


Figure 1.17 Share of township enterprises in GDP
Source: http://archive.cikd.org/chinese/detail?leafid=216&docid=1610

1.4 Conclusions

URBAN GROWTH IN SHANGHAI

Shanghai's peri-urban areas are playing an increasingly important role in the city's urban development (He, 2015) and their development is driven by three main factors discussed in Chapter 1.3. Top-down state-led growth is mainly reflected in the construction of industrial parks, satellite towns, functional areas (e.g. university towns), and transport infrastructure in the peri-urban areas. In contrast, bottom-up township development has had a less significant impact on land use change (Tian et al., 2017). The introduction of market factors from the 1980s onwards greatly accelerated suburban development and led to urban sprawl. Figure 1.19 depicts the urban spatial development of Shanghai in the last 20 years. The rapid economic development and the spreading of construction land were accompanied by the massive loss of agricultural land, land fragmentation, inefficient land use, and environmental pollution problems (Tian et al., 2017). In recent years, the government has recognized the dangers of sprawl and moved towards a more sustainable, inclusive, and environmentally friendly growth paradigm. In the latest 2017 edition of the Shanghai Urban Master Plan, the size of the population and construction land are strictly controlled.

Figure 1.18 Comparison of the Bund at Lujiazui before and after the opening of Pudong
Source: https://www.whb.cn/zhuzhan/xinwen/20211112/434120. photo by Lujie

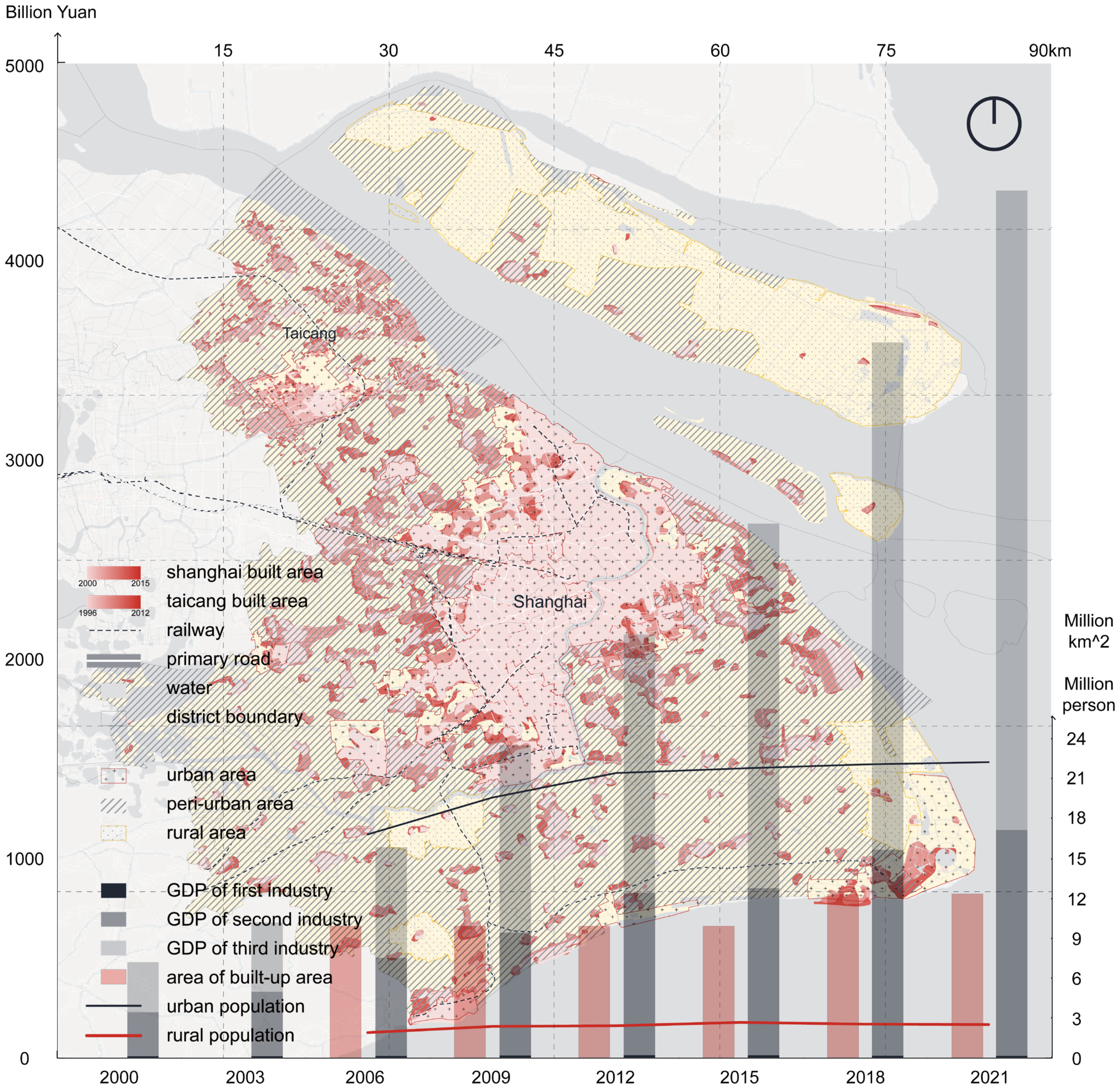


Figure 1.19 Urbanization Process in Shanghai
Source: Author's own based on data from Chen(2020), Tian et al. (2017), https://lbsyun.baidu.com/, National Bureau of Statistics of China

ECOLOGICAL RESOURCE IN SHANGHAI

Research on 'green space' in the Chinese context often refers to the term 'ecological space' (Wang et al., 2017). Ecological space refers to national land space with natural attributes and the main function of providing ecological services or ecological products, including forests, grasslands, wetlands, rivers, lakes, mudflats, shorelines, seas, wastelands, deserts, Gobi, glaciers, alpine tundra, uninhabited islands, etc. (中共中央办公厅 国务院办公厅印发《关于划定并严守生态保护红线的若干意见》, 2017) Due to the high level of urbanization and the limited area of Shanghai, cropland and other agricultural land, such as forest and garden land, together play a role in ensuring ecological security and limiting urban sprawl, and are therefore included in the statistics (Jin, 2020).

Figures 1.20 and 1.22 show the changes in ecological land in Shanghai over the last 30 years and the current spatial distribution. With the expansion of urban space in recent years, ecological space has become scarce, and environmental quality has declined (Jin, 2020), it displays a scattered and fragmented pattern, with about 70.5% distributed in peri-urban areas. The three main types of ecological resources are cropland, river water, and forests. cropland, which was lost during the period of rapid urban expansion, has stabilized in recent years; river water and forests are growing slowly; green areas, which are mainly located in urban areas, are growing rapidly with the expansion of built-up areas, and wetlands, which are concentrated in the northern suburbs, are on a continuous decline. The latest version of the master plan aims to build a more sustainable and resilient ecological city, improve environmental quality, optimize the spatial pattern of agriculture, and expand ecological areas.

Year	1990	1995	2000	2005	2010	2015
Total cropland (ha.)	324013	293844	290862	245744	206804	191665

Year	1994	2000	2003	2006
Urban green (ha.)	4128	6660	12442	13421
Water (ha.)	76800	83445	88228	90667
Forest (ha.)	8463	9795	13047	11749
Reed marsh (ha.)	4409	2030	4604	2182

Figure 1.20 Changes in Shanghai's ecological space
Source: Author's own based on data from Chen(2020), Wu (2008), Shi et al. (2012)

Figure 1.21 Jiangtan wetland park in Taicang
Source: http://tour.jschina.com.cn/ztk/2020mryj/tpzs/202203/t20220304_2956679.shtml

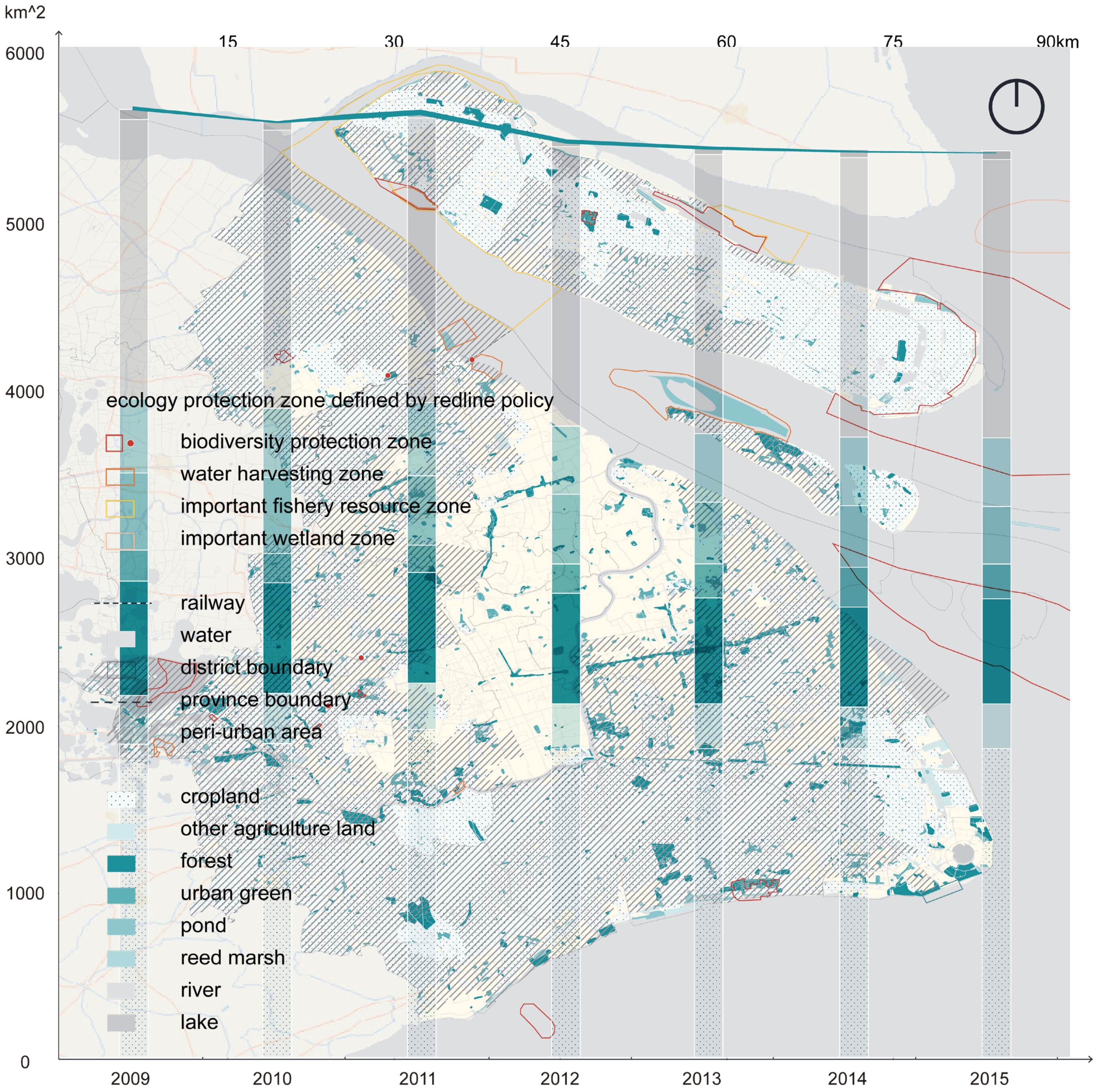
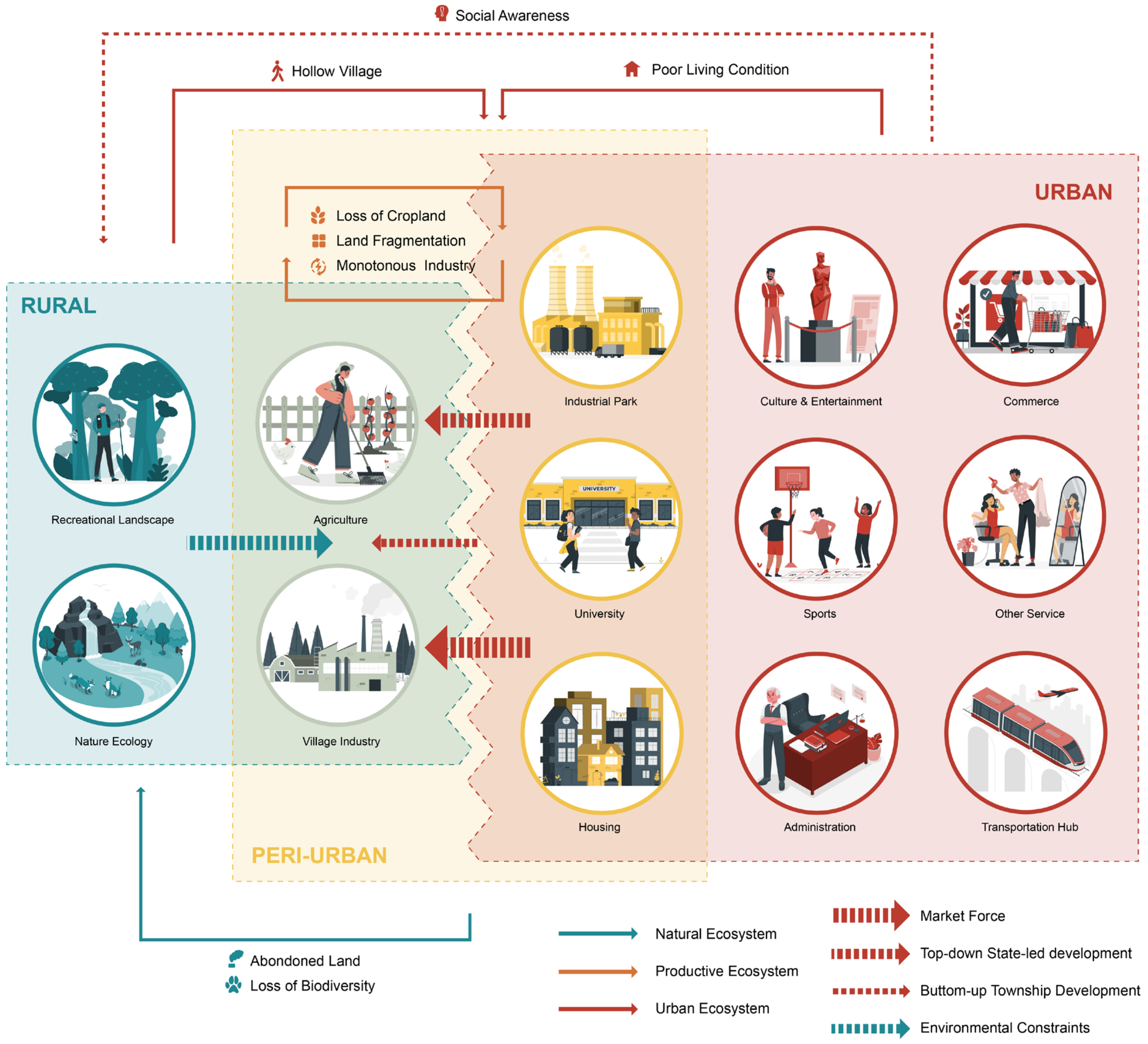


Figure 1.22 Ecology resources in Shanghai
Source: Author's own based on data from Shi et al. (2012), Jin (2020), https://lbsyun.baidu.com/, Shanghai Ecological Protection Red Line Policy


Source: Author's own

Chapter 2 Methodology

2.1 Problematization



PROBLEM STATEMENT

Urbanization is a global trend, and China's Yangtze River Delta region has experienced rapid urbanization over the past 30 years, showing a compact development pattern that urban development happened around a relatively small mature center (Shanghai Central City) (Webster, 2002), which top-down state-led development and bottom-up township development drove peri-urbanization in the suburbs, a process exacerbated by the involvement of market forces, and the 1999 Shanghai's master plan could not cope with uncertainty and lost control over the scale of population and construction land, resulting in urban sprawl, land fragmentation, inefficient land use, and serious environmental pollution. Peri-urban areas have become areas where low-quality housing and foreign populations congregate (Chen, 2020) and living conditions are poor.

In the face of increasing pressure on environmental resources, the new urban master plan proposes to build the infrastructure of new towns and improve the environment for residents; relocate villages and guide rural residents to centralized living; and consolidate land and improve the efficiency of land use. These measures have improved the living environment on the outskirts of towns to a certain extent, but there is still a large amount of land to be reclaimed. Meanwhile, the phenomenon of gentrification is very serious, with a large number of villages being transformed into B&Bs, with a monotonous industry and a lack of attractiveness. In addition, the focus of planning is still on socio-economic development, although there have been certain initiatives to protect the environment, the overall awareness of society on environmental protection still needs to be strengthened. Peri-urban landscapes have their unique value, and while building new towns, attention should be paid to the protection of rural areas and historical towns, and industrial restructuring through cooperation between the government and market forces to attract the rural population back to the countryside. In addition, peri-urban areas need to make the best possible preparations for future uncertainties and create a resilient region for sustainable development.

Figure 2.1 Ruins in the peri-urban area
Source: Author's own collection from Tongji University Master Planning Course Group

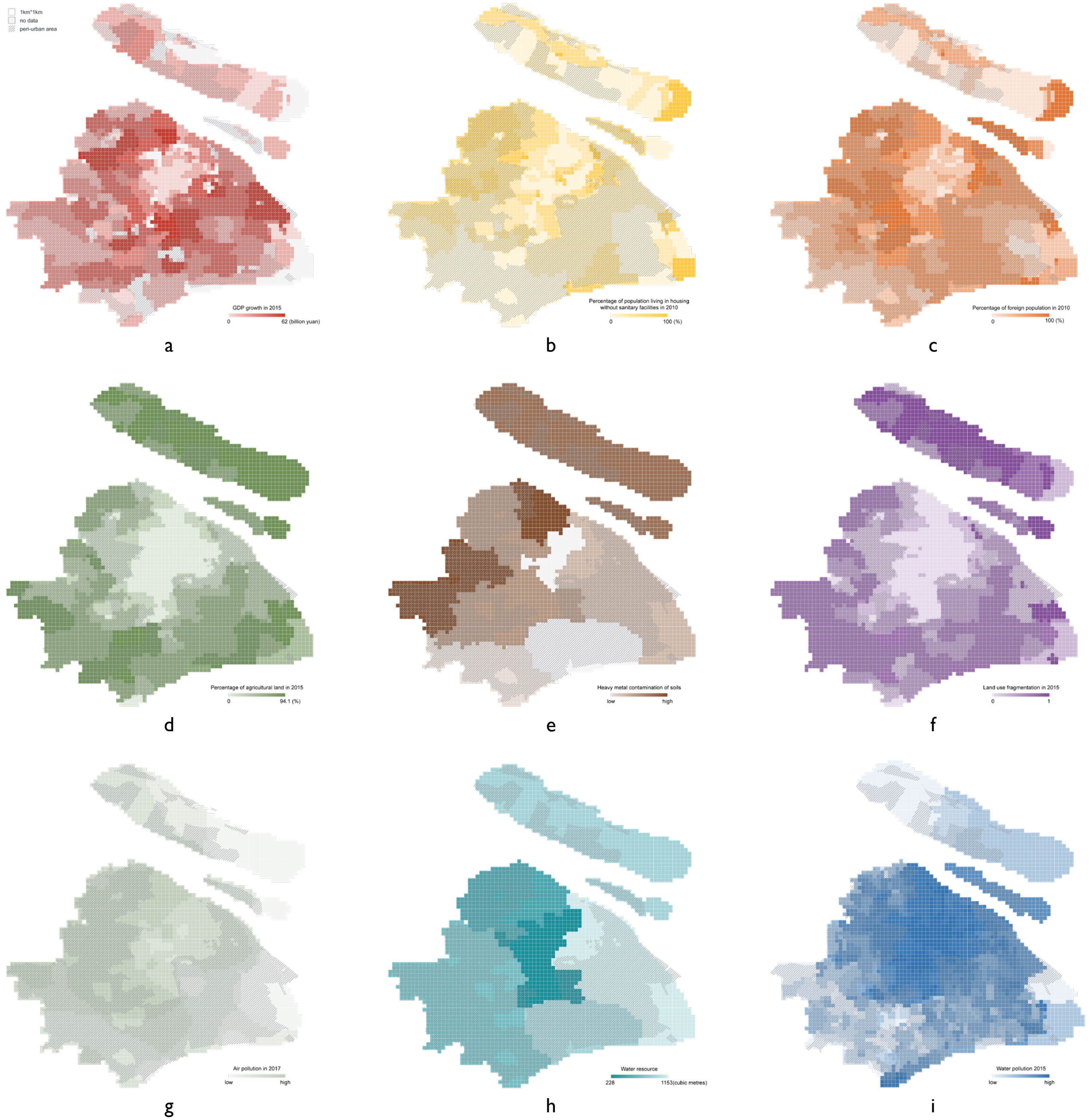


Figure 2.2 Social-ecological conditions of Shanghai
Source: Author's own based on data from: CHEN (2020), Yuan (2017), Li (2018), 2017 Shanghai Environmental Bulletin, 2021 Shanghai Water Resources Bulletin

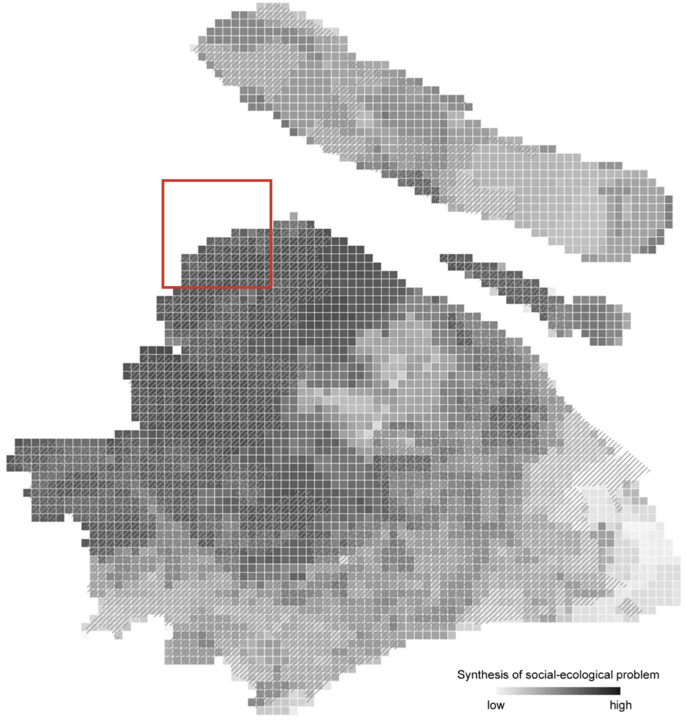


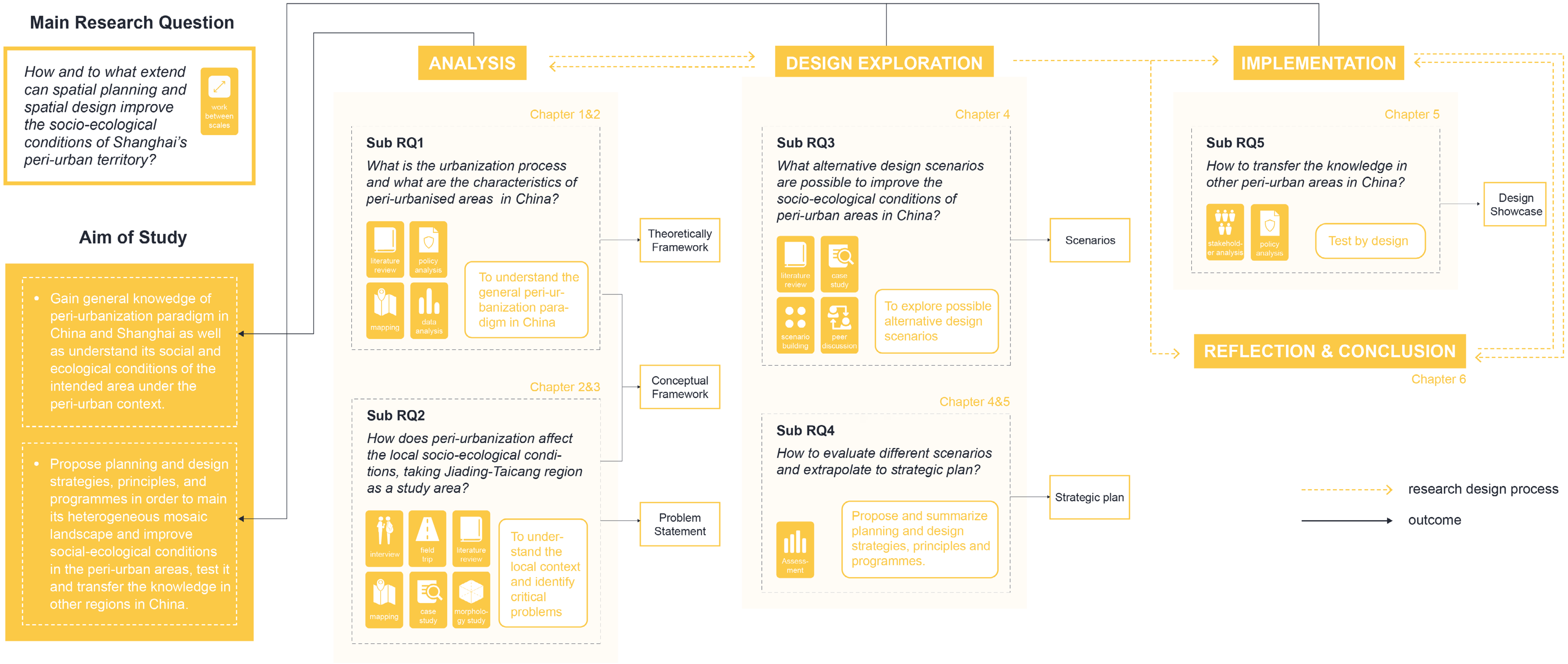
Figure 2.3 Social-ecological critical areas of Shanghai
Source: Author's own

CRITICAL AREA

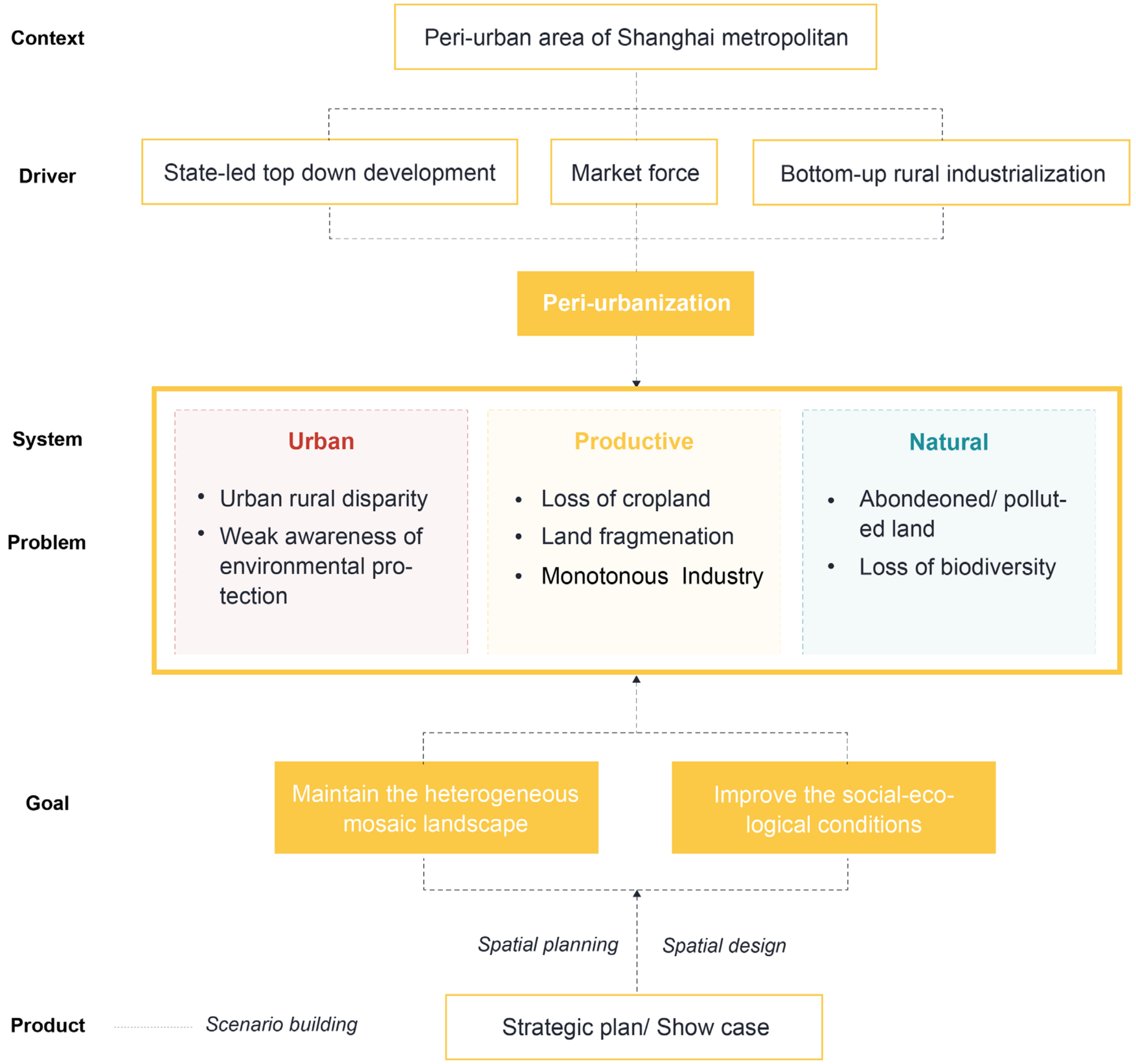
Figure 2.2 illustrates a set of data on the socio-ecological environment in Shanghai. The diagonal line is defined as the peri-urban area of Shanghai, which will be explained in section 2.5.1. As can be seen from the figure, the peri-urban areas of Shanghai have a higher proportion of agricultural land (d) and GDP growth rate (a), but the socio-economic environment lags behind that of the central city, for example with more unsanitary housing (b), a higher proportion of the foreign population (c), more heavy metal contamination of the soil (e) and a higher degree of land fragmentation. In terms of ecology, the peri-urban areas in the north-west of Shanghai have higher levels of air pollution (g), the central city has fewer water resources (h), but the peri-urban areas require more water for irrigation of farmland, and water pollution is more severe in the central and northern peri-urban areas.

Overlaying the eight sets of data, except for GDP growth, gives a composite socio-ecological picture of Shanghai as shown in Figure 2.3. Overall, the combined social-ecological situation in peri-urban areas of Shanghai is inferior to that of urban and rural areas, with the most serious situation in the northwest of the city. The urban expansion shown in Figure 1.19 indicates that urbanization is more intense in the north of Shanghai. Therefore, the 15km*15km area in the red box in Figure 2.3 was chosen as the main study area for this thesis.

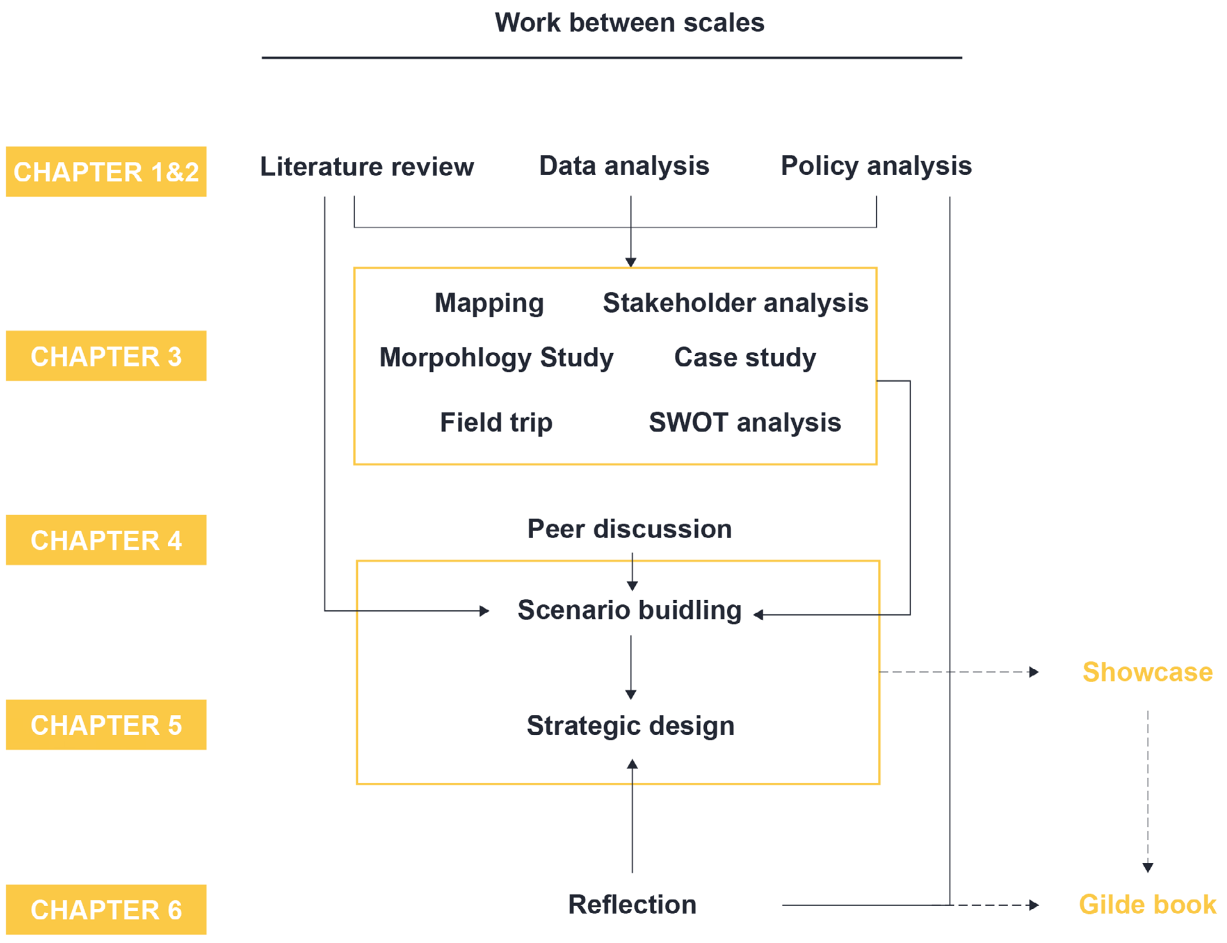
2.2 Research Design Framework



2.3 Conceptual Framework



2.4 Methods



WORK BETWEEN SCALES

Multiple research methods involve working between scales, analyzing the context from the national level to the building blocks to ensure consistency of analysis from the macro to the micro level.

LITERATURE REVIEW

Academic theses and publications are used for theoretical research and to support contextual analysis; institutional reports, news stories, and extensive online articles are used to draw on a wide range of perspectives.

POLICY ANALYSIS

Review of national documents on social, economic, and environmental related documents, master plans, and related interpretative articles can help to understand the inherent logic and future plans of the city development.

MAPPING

GIS and raster mapping are used to define territories and to analyze the temporal-spatial processes of a site. A better understanding of the interrelationships within and among the urban ecosystems is achieved using layer decomposition. Data used are from Google Earth, academic literature, https://lbsyun.baidu.com/, and https://landscan.ornl.gov/.

DATA ANALYSIS

The data used are mainly from China's National Bureau of Statistics, government reports, and academic literature for contextual social, economic, environmental, and spatial analysis.

FIELD TRIP

The field trip takes place during the summer holiday after P2, which is the most direct way to obtain accurate site information, and interviews with local residents will be conducted at the same time.

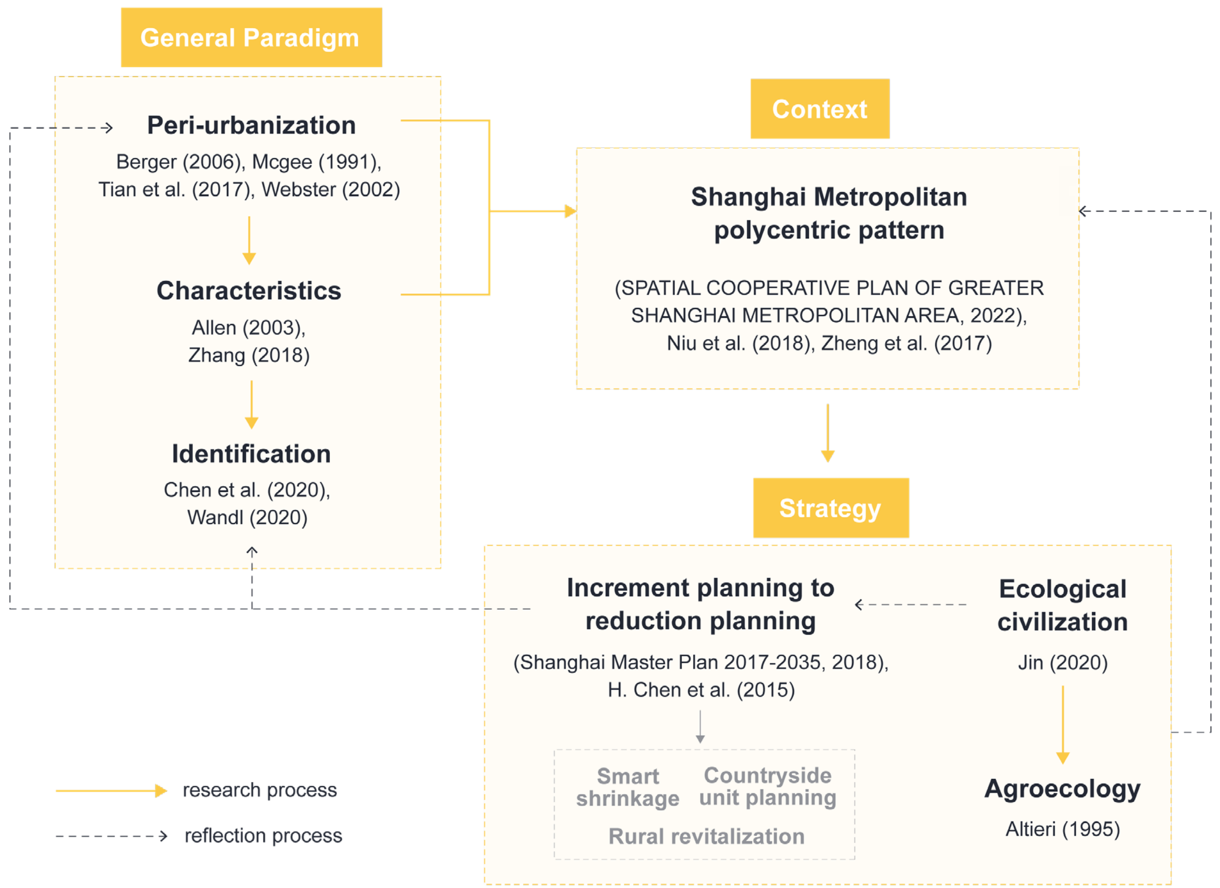
PEER DISCUSSION

Discussions with peers and contacts help with initial exploration and stage reflections and receive spiritual encouragement.

SCENARIO BUILDING

Scenario building is used to explore future possibilities under different development paths to cope with uncertainty. This thesis demonstrates four future scenarios with their advantages and disadvantages. The short-term strategic planning and demonstration cases are flexible and can move toward any scenario based on future trends.

2.5 Theoretically Underpinning



The theoretical underpinning is conducted in three parts. First, investigate theories on the general paradigm of peri-urbanization, characteristics, and identification of peri-urban. Second, applied the knowledge in the contextualization of the Jiading-Taicang area, Shanghai, and research on theories about its polycentric pattern to further improve the understanding of its peri-urban area.

According to the problem identified through research, namely urban sprawl and environmental constraints, corresponding strategies related theories, and practices are investigated. Reflection is conducted during the research to ensure the coherence between the theories and verify the conclusions that have been made.

2.5.1 Spatial identification of peri-urban areas

The large majority of current peri-urban literature either completely avoids the question of spatial demarcation of peri-urban areas or subsumes all kinds of spaces around the city as peri-urban areas (Sajjad et al., 2023). This ambiguity undermines both spatial planning policy and the empirical research that underpins it (Wandl, 2020).

Currently, there is no uniform method of identifying peri-urban areas worldwide. Existing studies have highlighted that their demarcation should be based on land-use change data, incorporation of environmental parameters, socioeconomic data, information on migration and number of daily commuters (including travel times), housing conditions and affordability, and related cultural attributes (Sajjad et al., 2023). However, there are significant differences in urban growth patterns between regions, the usual peri-urban demarcation methodologies in one area cannot be simply replicated elsewhere. With the advent of remote sensing and GIS technology, a range of quantitative, qualitative, and mixed methods have been used to delineate peri-urban areas around the globe with a distinct regional character(Sajjad et al., 2023).

This sub-hapter reviews the two scholars' approach to identifying peri-urban areas in Shanghai and Europe and on this basis defines the peri-urban areas in the study area of this thesis.

IDENTIFICATION OF SHANGHAI

Chen (2020) used a quantitative approach to identify peri-urban areas in Shanghai in 2015 via two indicators, fragmentation degree and proportion of agricultural land, using township streets as the unit of analysis (e.g. Figure 2.4). The findings were used for the Shanghai-scale mapping in this thesis.

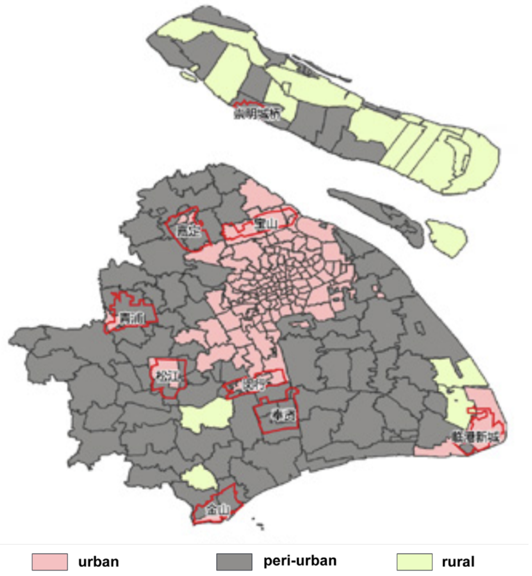


Figure 2.4 Identification of Shanghai's peri-urban in 2015
Source: Chen(2020)

The specific calculation of the two indicators is shown in Figure 2.5: fragmentation is based on the land use raster data obtained from remote sensing identification, seven indicators are calculated separately using fragstats 4.0, and the results are integrated through principal component analysis to obtain a comprehensive fragmentation index for each township, which is standardized to the (0, 1) interval. The proportion of agricultural land was defined as the area of agricultural land (cropland + forest land + grassland) / (area of agricultural land + area of construction land). Peri-urban areas are defined by setting a threshold: i.e. areas with a fragmentation level ≥ 0.1 and 0.1 ≤ proportion of agricultural land ≤ 0.85.

This method identifies peri-urban areas through land use data, and by calculating the data for different years, the evolution of the spatial and temporal patterns of peri-urban areas in Shanghai can be analyzed. However, Shanghai is very unique in its high urbanization rate, thus this approach might not be applicable in other cities. In addition, the method requires a certain degree of accuracy in remote sensing identification, and the calculation of the township as a unit makes the results very rough at the local scale while reducing the unit scale would incur a huge amount of computation.

LANDSCAPE PATTERN INDICATOR

TYPE	INDICATOR	CORRELATION
Dispersion	Patch density	Positive
	Effective mesh size	Negative
	Splitting index	Positive
	Division	Positive
Aggregation	Aggregation indes	Negative
	Patch cohesion index	Negative
Shape	Shape by area-weighted mean	Positive

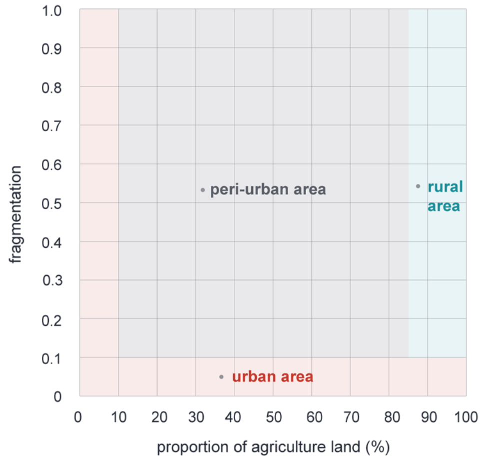


Figure 2.5 Indicator used for the peri-urban area identification
Source: Author's adapted from Chen(2020)

IDENTIFICATION OF EUROPE

Wandl(2020) proposes an alternative classification of territory, which is precise enough to represent the complex (socio-) spatial configuration of territories-in-between and distinguish them from urban and rural areas. The method can be summarized in the following steps (see Figure 2.6):

(1). Divide the area of interest into 500m*500m grid cells;

(2). Select those grid cells with a maximum population (inhabitant population+working population) density that is characteristic for territories-in-between, which is between 38 to 1250 persons/grid. The density lower than 38 is defined as rural, and above as urban.

(3). Add those grid cells with rural characteristics that spatially overlap with typical infrastructures and services; (those typical infrastructures are chosen according to the site).

(4). Subtract those grid cells with a territories-in-between corresponding that are not characterized by the intermingling of built and open landscape pattern, the grid cells that are primarily covered with continuous urban fabric (>80% impervious land cover) are excluded from the selection.

This approach provides a more accurate classification at the local scale and takes into account the characteristics of local urbanization, but detailed data on the maximum population density in China are difficult to obtain.

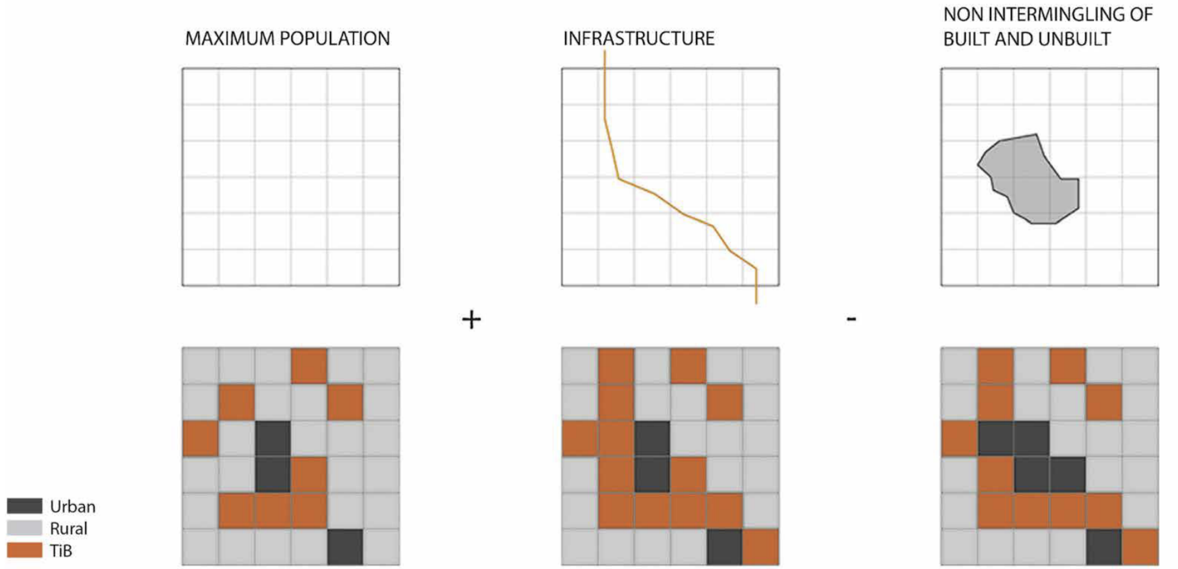


Figure 2.6 Spatial Classification of peri-urban area by Alexander Wandl
Source: https://doi.org/10.7480/abe.2019.14.4340

DEFINE PERI-URBAN AREAS IN TAICANG-JIADING REGION

Considering the above two approaches collectively, I defined the peri-urban area of the Jiading-Taicang region through the following steps: (see Figure 2.7): (1). Divide the area of interest into 500m*500m grid cells; (2). classify those grid cells by the proportion of agricultural land as urban < 10% < peri-urban < 80% < rural (3). change rural grids with major transportation infrastructure passing by to peri-urban grids; change urban grids with industry+storage+transportation+unused function area > 80% to peri-urban grids. (The infrastructures and functions were selected based on the discussion in Chapter 1)

Comparing the result with the current situation and the plan, the three are in agreement. It can be seen from the graph that the vast majority of the Jiading-Taicang region is defined as a peri-urban area, with some areas initially defined as suburbs ending up as peri-urban areas due to infrastructure such as railways passing through.

Figure 2.7 Peri-urban area in Taicang-Jiading region
Source: Author's own

2.5.2 Polycentric pattern of the Shanghai metropolitan

The Shanghai Urban Master Plan 2017-2035 proposes to 'give full play to Shanghai's role as a central city, strengthen the division of responsibilities and collaboration with neighboring cities, and build the Shanghai metropolitan area'. At present, Shanghai and eight neighboring cities have gradually formed a polycentric pattern of competing development (SPATIAL COOPERATIVE PLAN OF GREATER SHANGHAI METROPOLITAN AREA, 2022). Based on Zheng et al. (2017) and Niu et al. (2018), the polycentric model of the Shanghai metropolitan area encompasses the following three models (see Figure 2.8): incorporation polycentric mode, functional circle mode, and two-way exchange mode.

INCORPORATION POLYCENTRIC MODE

As mentioned in section 1.3.1, Shanghai has gone through a process of development from a monocentric to a polycentric city. Niu et al. (2018) argue that Shanghai's development path is in line with the incorporation mode proposed by Champion (2001): Large cities form self-sufficient centers in the surrounding areas and combine with peripheral centers to form a polycentric model. (Shanghai is the gateway city to the Yangtze River Delta and the core city of the region, and new suburban cities within the city and neighboring cities outside the city are forming new central cities in the region.)

FUNCTIONAL CIRCLE MODE

The reorganization of economic structure and the evolution of spatial structure develop simultaneously. As the metropolitan area matures, the central cities tend to realize the transformation from production centers to service centers, and the production functions move outward to drive the adjustment and upgrading of the functional spatial organization of the whole metropolitan area through the diffusion of the circle (Zheng et al., 2017). The Shanghai metropolitan area shows the characteristics of the circle layout of functional clustering and diffusion (chapter 1.3.1), and various functions show a grid organization. The Shanghai metropolitan area becomes a regional spatial complex that carries Shanghai's global city functions and undertakes the overflow of Shanghai's non-core functions(Zheng et al., 2017). He divided the Shanghai metropolitan area into four circles: The core circle (0-15km), carries the core functions of the global city; the near-city circle (15-30km), focuses on specialized functions and forms several sub-cities; the suburban circle (30-60km), focuses on manufacturing and R&D functions and forms new industrial and technological cities; and the peripheral circle (60-120km), focuses on comprehensive functions and distributes independent cities.

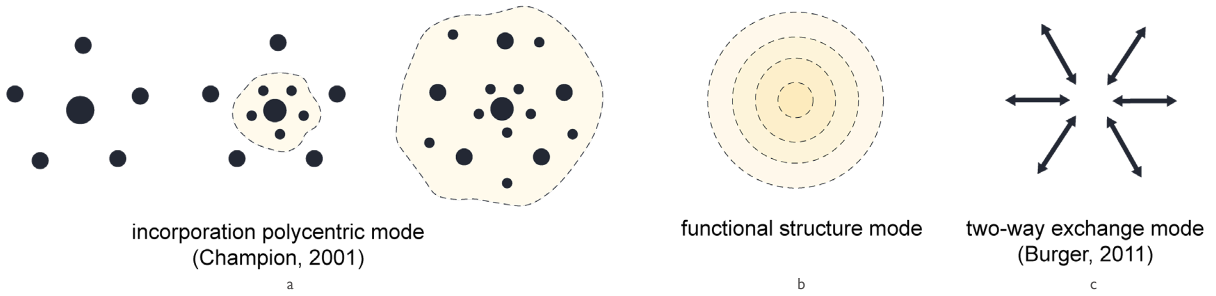


Figure 2.8 Basic mode of Shanghai's urban structure
Source: Author's own if not mentioned

TWO-WAY EXCHANGE MODE

In addition to the circle structure, another understanding of the functional linkages of the Shanghai metropolitan area is the two-way commuting characteristics. Balanced distribution is the difference between functional polycentricity and functional monocentricity, and a central city can be considered as functional polycentric if it has significantly balanced two-way commuting links with neighboring cities (Laan, 1998; Burger et al., 2011). Niu et al. (2018) The central city of Shanghai has significant two-way commuting with both new cities within the city and peripheral cities outside the city, in line with the internal and external interactive polycentric model proposed by Berger (2011).

Figure 2.10 shows a spatial representation of the polycentric pattern of the Shanghai metropolitan area, with the main study area of this thesis in the second and third circles.

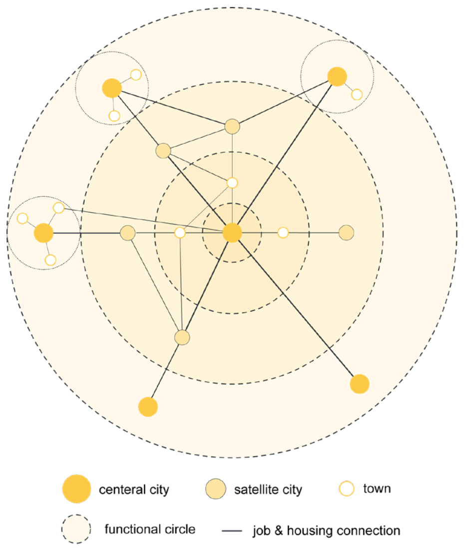


Figure 2.9 Polycenteric mode
Source: Author adapted from Zheng, 2019

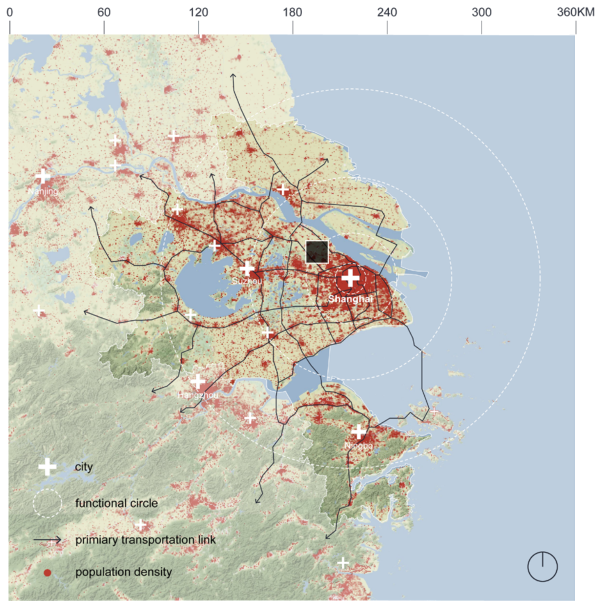


Figure 2.10 Polycenteric structure of Shanghai metropolitan
Source: Author's own

2.5.3 Agroecology

Agroecology is an environmentally and socially sensitive approach to agriculture, one that focuses not only on production but also on the ecological sustainability of the production system (Altieri, 1995). The underlying principle is that farming should enhance natural systems while maximizing species diversity. Since the concept of agroecology was created in the 1920s, agroecology has evolved from a scientific discipline to a set of practices and social movements (see Figure 2.11) working towards sustainable and resilient food systems (Cheng et al., 2022). It is considered to be an interdisciplinary, participatory, and action-oriented approach (Méndez et al., 2012) and has demonstrated its importance in terms of agricultural improvement, ecosystem services, and economic or social value (Cheng et al., 2022). Figure 2.12 depicts the lifecycle of innovation through agroecology to improve socioeconomic synergies and agricultural sustainability.

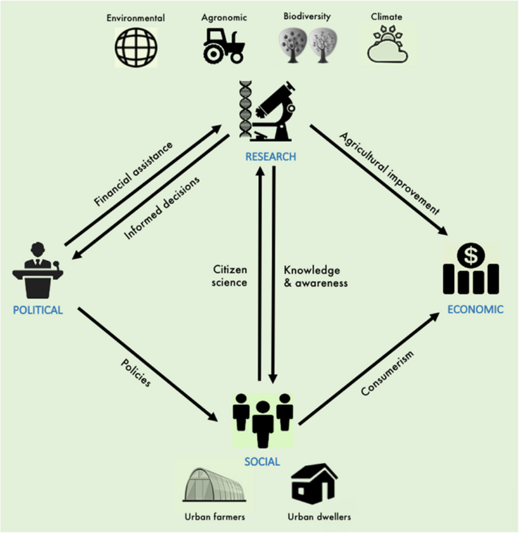


Figure 2.12 Establishment of agroecology lifecycle
Source: Cheng et al. (2022)

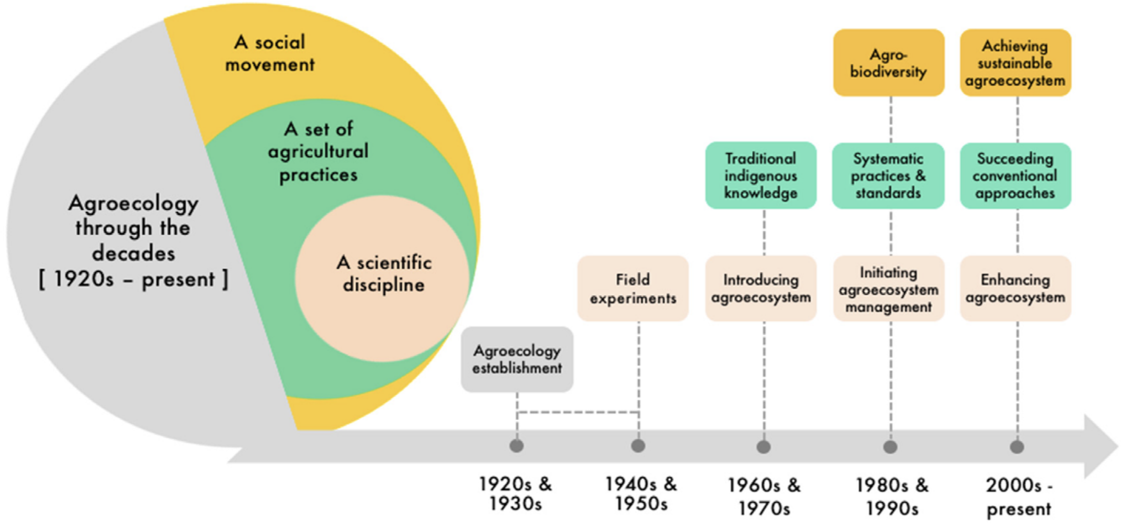


Figure 2.11 Timeline of agroecology transformation from a scientific discipline to a "science for and with society" approach
Source: Cheng et al. (2022)

2.5.4 From increment planning to reduction planning

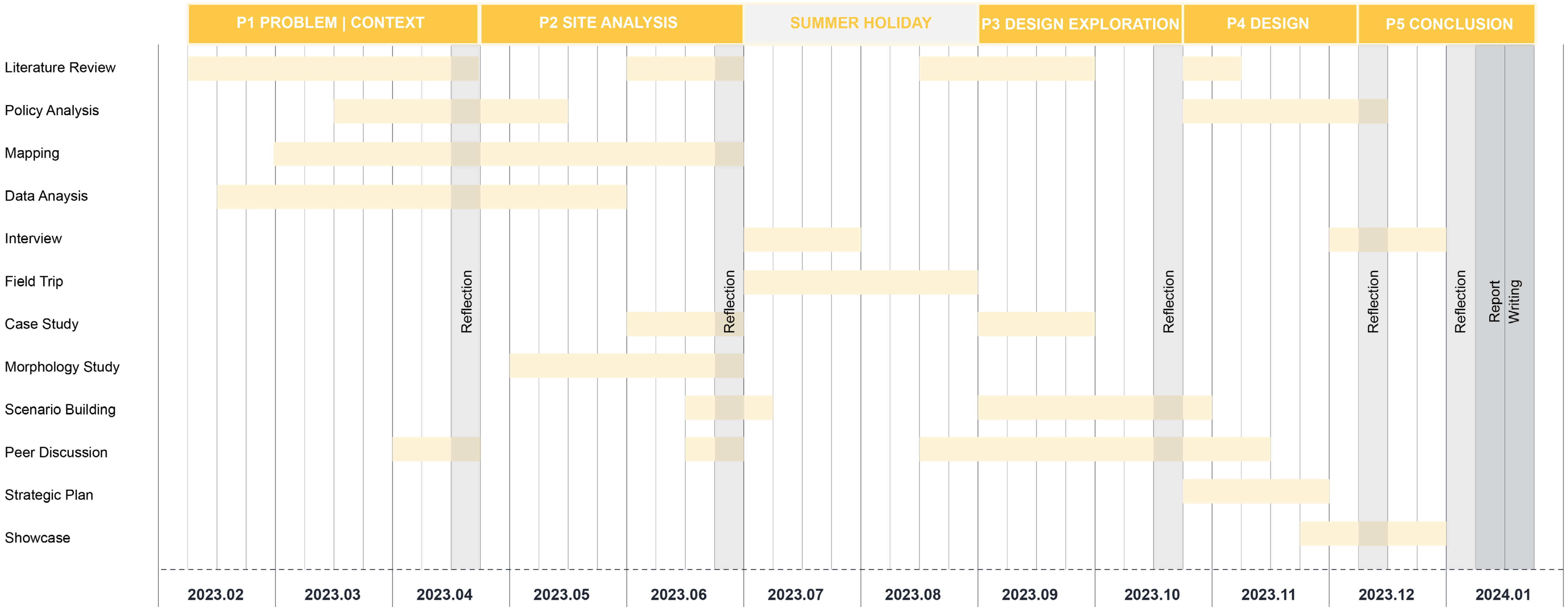
China has experienced rapid urbanization over the last forty years, with incremental planning being the prevailing approach. The process of urbanization in China varies widely and the trend of expansive development will continue in most cities, but in areas with higher levels of urbanization, such as the Yangtze River Delta region, the expansion of population and land use has led to resource constraints and the failure to control construction behavior, forcing the urban planning system to move towards inventory planning and reduction planning. (H. Chen et al., 2015; 'Reduction Development Review and Reflection,' 2021). The principle of "reduction planning" of construction land was first proposed by the Shenzhen government in 2009, and inventory development and reduction planning are also mentioned in the Shanghai Master Plan 2017-2035.

H. Chen et al. (2015) summarized the difference between the three types of planning (see Figure 2.13). Inventory planning is used for the transformation and upgrading of cities and is aimed at the internal exploitation of the potential of existing building sites, such as 'urban regeneration' and 'transformation of old areas', to consolidate land and transform them into high-value-added or socially beneficial functional land. The concept of reduction planning is similar to the Western concept of 'smart shrinkage', in that it reduces the scale of towns and cities and increases the use of infrastructure to achieve agglomeration and improve the development efficiency of towns and cities. The difference is that in China the population and economic decline occurs mainly in small towns and rural areas. In Shanghai, for example, the current reduction planning mostly targets collective construction land outside the planned built-up areas, including inefficient industrial land, inventory of industrial storage land, and rural residential areas. At the same time, an increase/decrease related model is adopted, whereby the increase in urban construction land is associated with a decrease in rural construction land ('Reduction Development Review and Reflection,' 2021).

Planning type	Population	Urban area	Public infrastructure	Economic structure	Environment consideration
Increment planning	Increase	Expand and merge	Territory-wide expansion	Diversified scale effect	Little limitations on industries
Inventory planning	Slowly increase and restructure	Expand on a small scale	Local renovation and maintenance	Industrial upgrading and innovation stimulus	High demands on industry
Reduction planning	Decrease	Shrink	Reduction and optimization of the network	Finding new economic growth points	Emphasis on environmental management

Figure 2.13 Variation in urban development factors for different planning types
Source: H. Chen et al. (2015)

2.6 Thesis Plan



Source: https://dp.pconline.com.cn/photo/list_5123498.html

Chapter 3 Analysis

3.1 Locations and Context

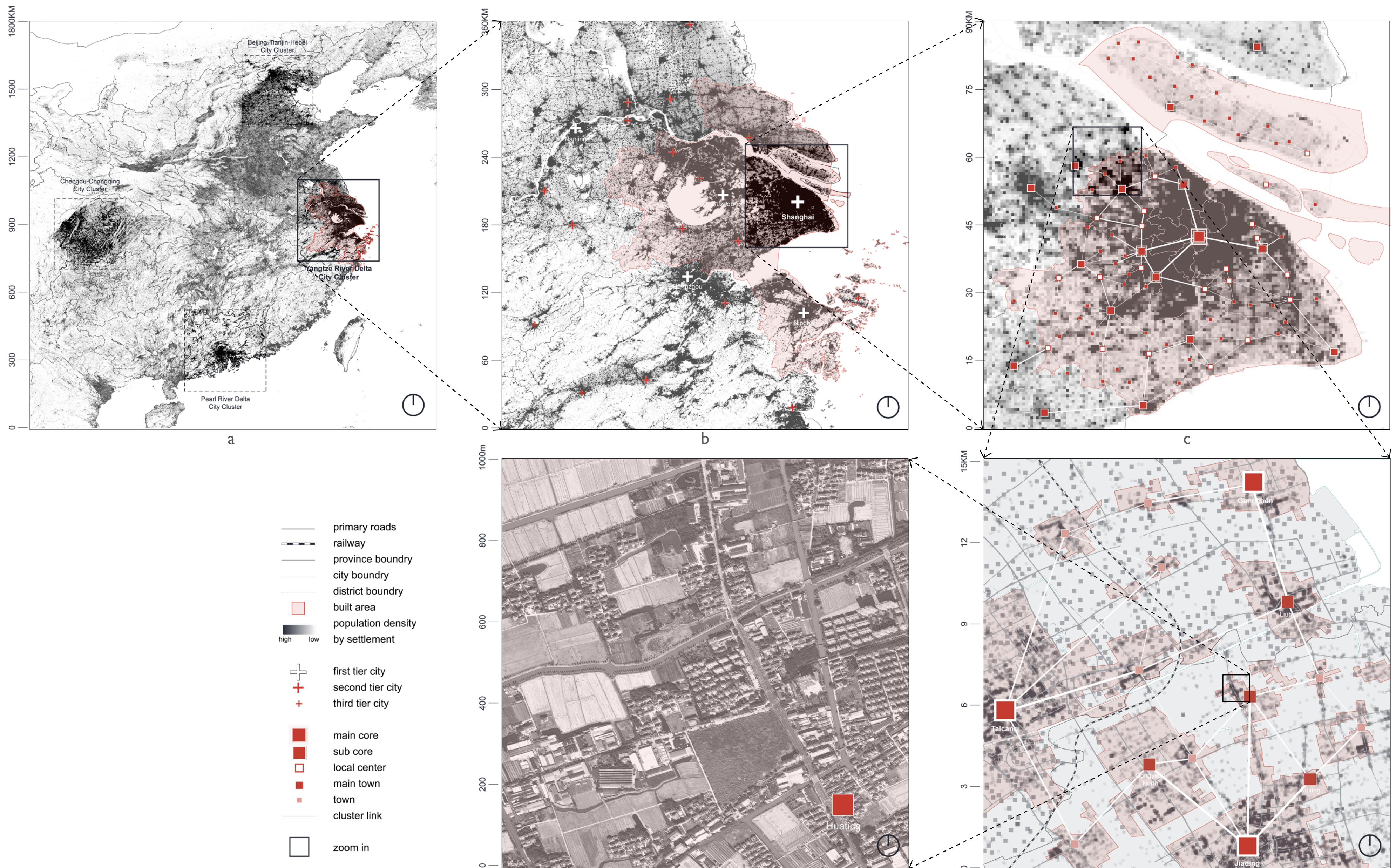


Figure 3.1 Location
Source: Author's own based on data from: https://landscan.ornl.gov/, https://lbs.amap.com

This paper analyses the site at several scales. Figure 3.1.a shows the national level, while Chapters 1 and 2 focus on the regional level shown in Figures 3.1.b and 3.1.c. The Yangtze River Delta region is one of the most economically active, open, and innovative regions in China, with an urbanization rate of over 60% and a dense population (Outline of the Yangtze River Delta Regional Integrated Development Plan, 2019). The cities in this region displayed a compact centralized form with rapid expansion around a relatively small mature central urban area (Tian and Guo, 2019). As a mature central city, Shanghai, together with eight neighboring cities, forms the Shanghai metropolitan area, a polycentric urban region (SPATIAL COOPERATIVE PLAN OF GREATER SHANGHAI METROPOLITAN AREA, 2022), with its central city having strong links to the surrounding towns.

This chapter further comprehends the context from a meso scale. The 15km*15km Jiading-Taicang area shown in Figure 3.1.d will be the main scale of study for this thesis, with a population density of approximately 1904/km2 extrapolated from data from the National Bureau of Statistics of China. Jiading-Taicang belongs to Shanghai and Suzhou, Jiangsu Province respectively, and is located in the middle of the two major cities, with a mix of industrial, agricultural, and urban land use, and can be defined as a peri-urban area in a broad sense, which is a key area for building a new urban-rural system in the Shanghai metropolitan area.

The zoomed-in area shown in Figure 3.1.e will be used as a typical example to illustrate the temporal and spatial changes in the peri-urbanization process of the area, and this chapter will also address the community and architectural scales to better demonstrate the values and issues of the area.

3.2 Development in Peri-urban Areas

As a result of peri-urbanization, the formerly predominantly agricultural suburbs have been gradually transformed into areas with mixed functions, Figure 3.2 shows the changes in land use within a 1 km² area of Huating Town over approximately 40 years.

In 1984, the area was dominated by villages and agricultural land, with a small amount of industrial land with urbanized residential areas and service facilities concentrated on both sides of the main traffic roads. A few industrial parks and small township factories adjacent to villages were being built. Over the next 20 years, a large amount of agricultural land was quickly converted to built-up areas, mostly for industrial parks, and a small amount of commercial housing and service facilities began to be built, generally following the pattern of development along the main transportation routes.

The industrial land was predominant in 1997 and then gradually declined but remains the largest non-agricultural land type (Tian et al., 2017), with some industrial parks being dismantled and some small rural enterprises disappearing. Agricultural land was further reduced, greenhouses were gradually spread and some villages shrank in size. High-rise housing estates and more diverse facilities such as commercial, administrative, and schools were built on former industrial sites and a small amount of agricultural land, while new branch roads were built to reach these residential areas and facilities. In addition to the massive loss of agricultural land, the construction of the past 30 years has caused some ecological damage. It is clear from the map that some of the water systems are heavily silted up and some ponds and tributaries have disappeared. With the introduction of the concept of 'building an ecological civilization' in 2012, the government became more aware of environmental protection, and in 2018 the main river channels were widened and straightened, and greenery was planted on both sides. Some industrial and agricultural land has been transformed into forest and green parks.

Figure 3.2 Peri-urban development in time
Source: Author's own based on Google Earth image

3.3 Land Use and Fragmentation

What accompanies the expansion of diversified non-agricultural functions is land fragmentation (Tian et al., 2016). The black-and-white plots in Figure 3.4 show the built-up and non-built-up areas in the Jiading-Taicang area, respectively. It can be seen that several large urban areas and some small towns have been formed along the main road, and there are many fragmented built-up areas scattered in the farmland. The northwest and southeast corners of the area are even more fragmented. The north-south Hutong Railway divides a large area of farmland, and there are clear buffer zones on both sides of the railroad and the main road.

Figure 3.3 Mixed function in Taicang-jiading area
Source: Author's own collection from Tongji University Master Planning Course Group

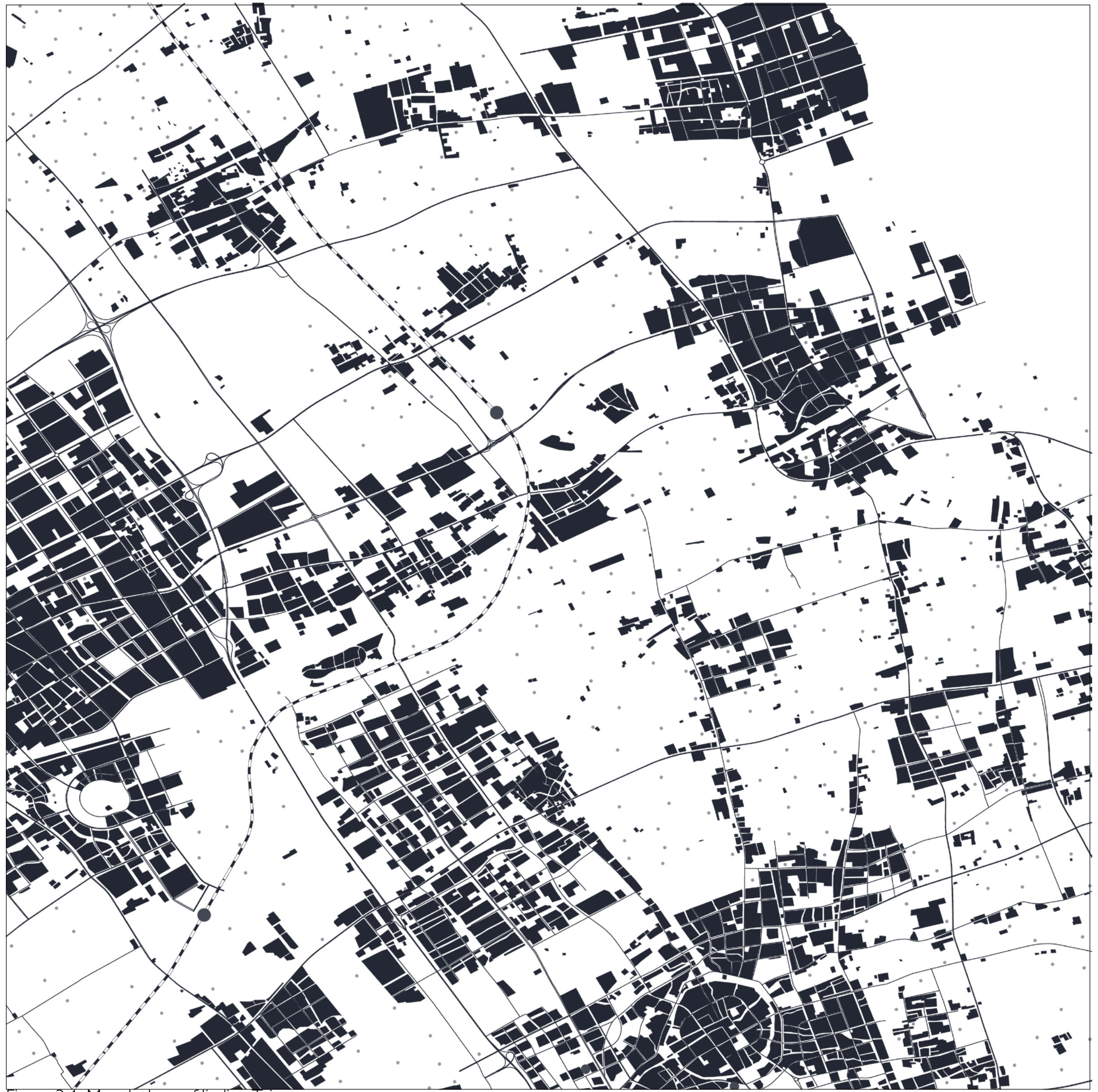


Figure 3.4 Morphology of Jiading-Taicang area
Source: Author's own

Figure 3.5 shows more specifically the land use and elevation of the area. The general topography of the area is gently sloping, with a pattern of highs in the south and lows in the north, and an inlet to the sea in the northeast. The built-up area is slightly higher in elevation than the agricultural and ecological land use. Agricultural land is dominant, followed by residential and industrial land in an aggregated distribution. The southern side near Shanghai Jiading has a high degree of land fragmentation, with water systems, roads, many small-scale industries, storage facilities, and towns interspersed with agricultural land, making it a semi-industrial/half-agricultural mixed-function area. In addition, the northern side of the area is rich in ecological resources, and there are large wetland parks of high ecological value along the coastal area to the east and north of Taicang City.

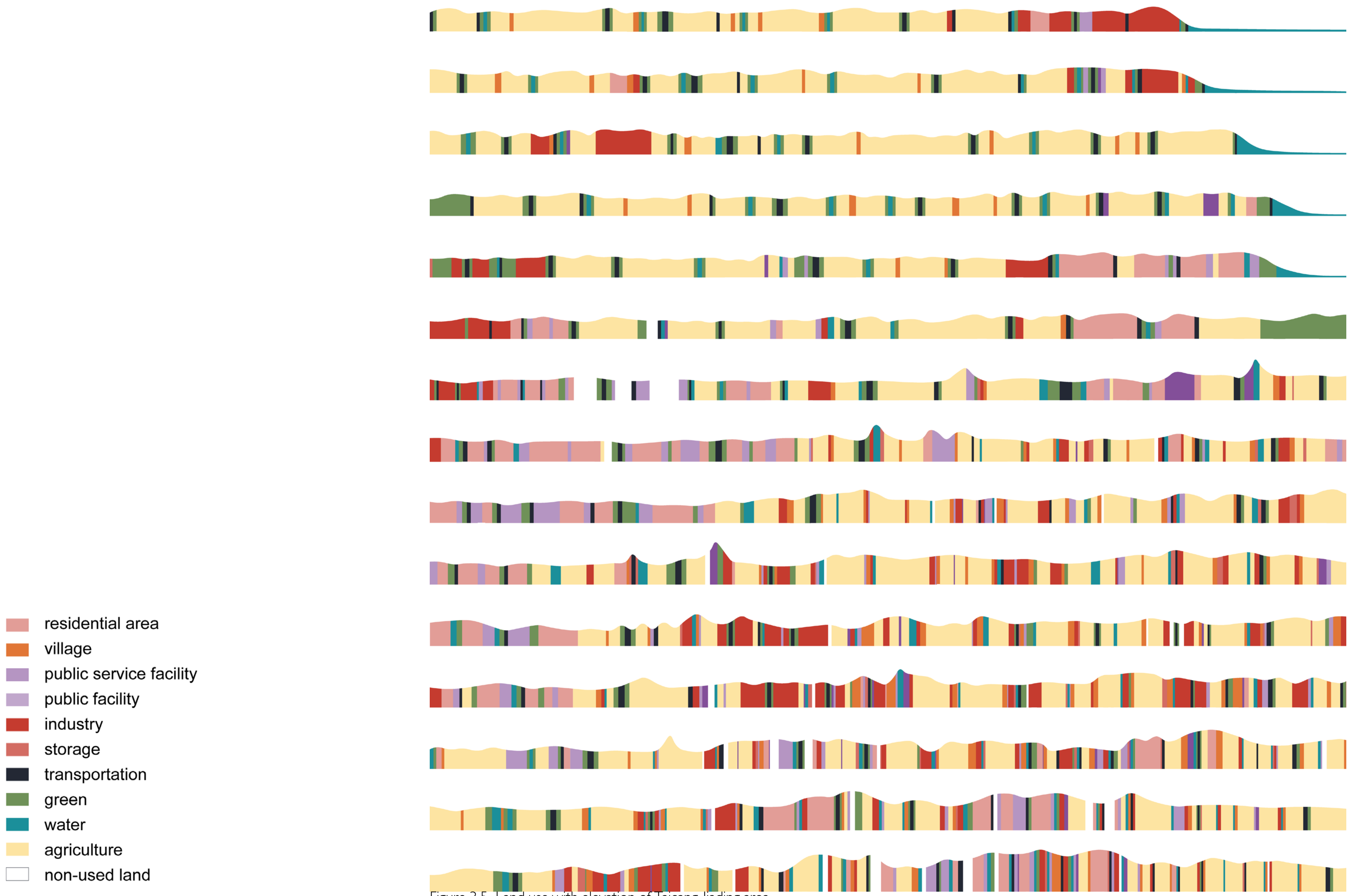


Figure 3.5 Land use with elevation of Taicang-Jiading area
Source: Author's own

3.4 Peri-urban Ecosystems

3.4.1 Urban ecosystem

The Jiading-Taicang region has a diverse urban agglomeration of naturally forming villages and ancient towns with a rich history, as well as modern new towns and cities that have developed rapidly in recent decades, together painting a picture of ancient and modern ‘Gangnam‘ landscape. Large settlements gather a huge part of the infrastructure, urban clusters are connected by a grid of roads and spread along the main transport facilities, while some smaller settlements are less well equipped.

Figure 3.6 Liuhe Town by Shen Zhiming
Source: http://www.cpanet.cn/detail_picdetail_127584.html

EVOLUTION OF RURAL CLUSTERS

During the agrarian civilization, urban-rural relations were binary and isolated. Villages were self-sufficient and closed, with villages as the core and farming radius as the space for economic activity, showing a homogeneous spatial distribution and functional homogeneity. In the era of industrial civilization, with the development of rural enterprises, rural settlements have gradually changed from a single agricultural production and housing function to a multi-functional complex integrating production, processing, trade and commerce, ecological conservation, tourism, and leisure. However, the long-established urban-rural dichotomy has led to low rural productivity and a massive labor exodus, with many declining villages becoming ‘hollow villages’. In the post-industrial era, with an increased understanding of rural value and a shift towards integrated urban-rural development, villages are becoming increasingly diverse and are beginning to take on some urban functions. The homogeneity and homogeneity of villages have diminished, establishing a more complex and homogeneous pattern, and the rural population and industries have gradually concentrated in towns and central villages. (Han and Cai, 2011) (Figure 3.7)

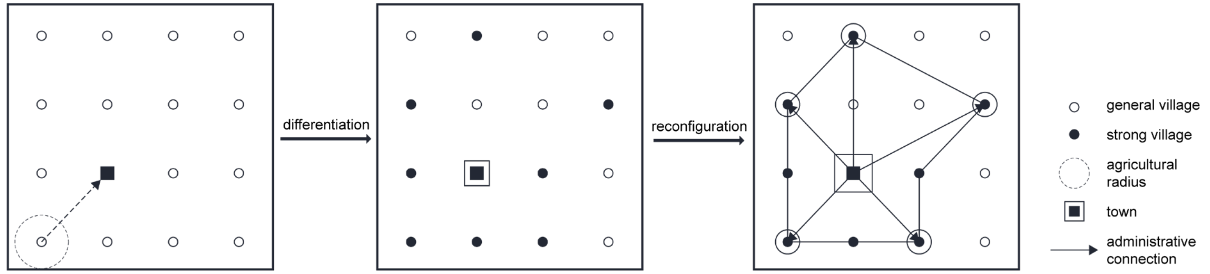


Figure 3.7 Evolution of spatial structure of village system
Source: Han and Cai (2011)

RECONSTRUCTION OF RURAL SETTLEMENTS

To improve the rural living environment, restore the natural ecological environment, and promote the revitalization of the countryside, the management of rural settlements is an important tool for planning in China. Villages are divided into three types. Large villages with historical heritage, distinctive style, and good industrial development are preserved and protected; villages with a poor environment, small scale, and scattered distribution are removed and farmers are centrally rehoused; and large villages close to built-up urban areas and dominated by non-agricultural industries are urbanized in the site. Over the past decade, the most common of these is the abolition of villages and the centralization of settlements, as can be seen in Figure 3.9, where villages have all but disappeared in some rural areas close to large towns. On this basis, more than two-thirds of the remaining villages in Jiading District and about one-third of the remaining villages in Taicang are also to be annexed according to the latest master plan.

There are usually two types of centralized resettlement. One is the single-family villa residential area, as shown in Figure 3.9.c, the Liuxin Garden, which is a large and expanding residential area that has been created by the merger of several different villages. The residential area has a beautiful setting, but is surrounded by farmland, making it inconvenient to access the neighboring towns by car for all necessities and recreational activities, and is populated by retired elderly people. There is only one small supermarket in the area, and the owner of the supermarket, a former villager, and her son and daughter-in-law chose another type of centralized settlement, high-rise apartments in the town, as shown in Fig. 3.9.d, which is more convenient for both work and life. After being resettled, these villagers stopped farming and contracted their land to the government or a large company, but the income from renting out the land was small and they needed to find work in the town.

Figure 3.8 Banquets in Liuxin Garden
Source: Author’s own

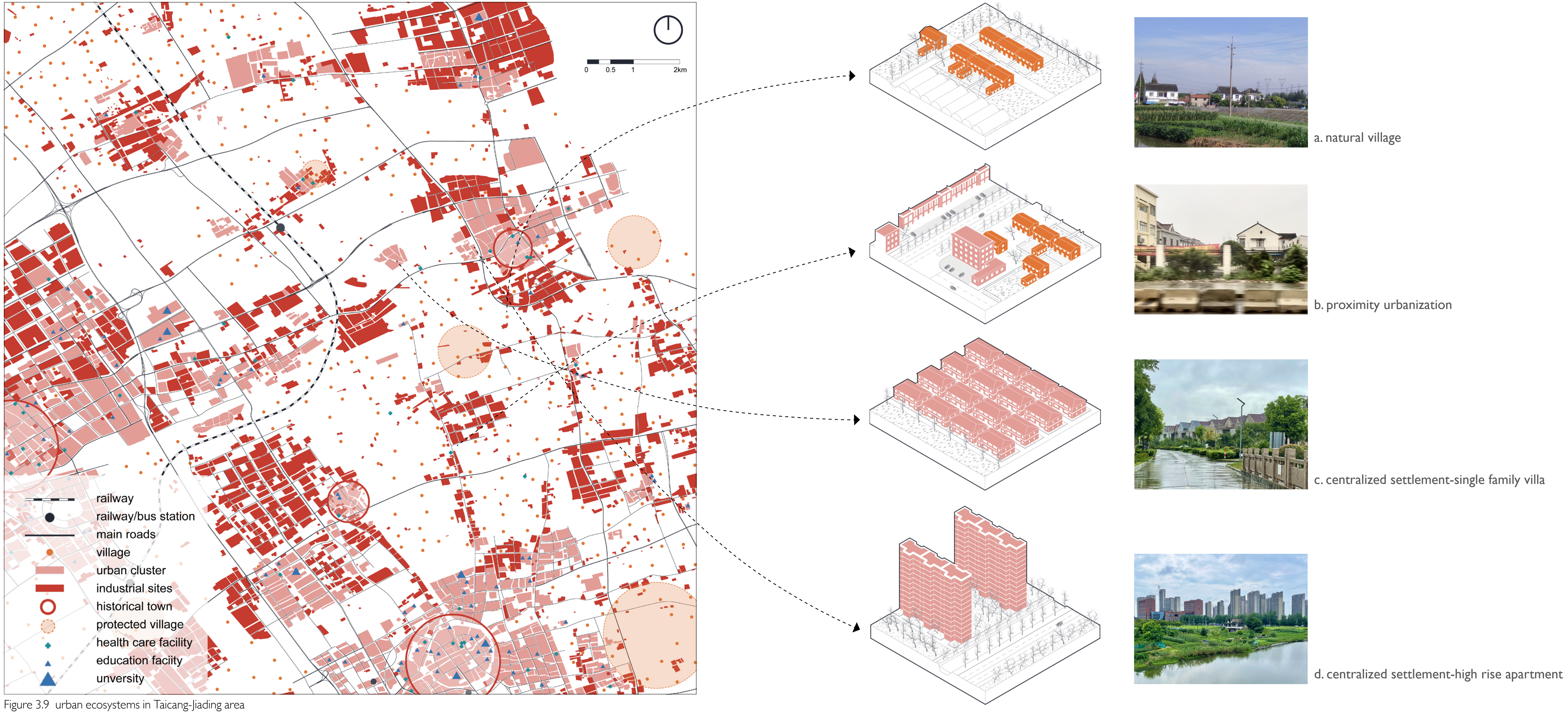


Figure 3.9 urban ecosystems in Taicang-Jiading area
Source: Author's own

3.4.2 Productive ecosystem

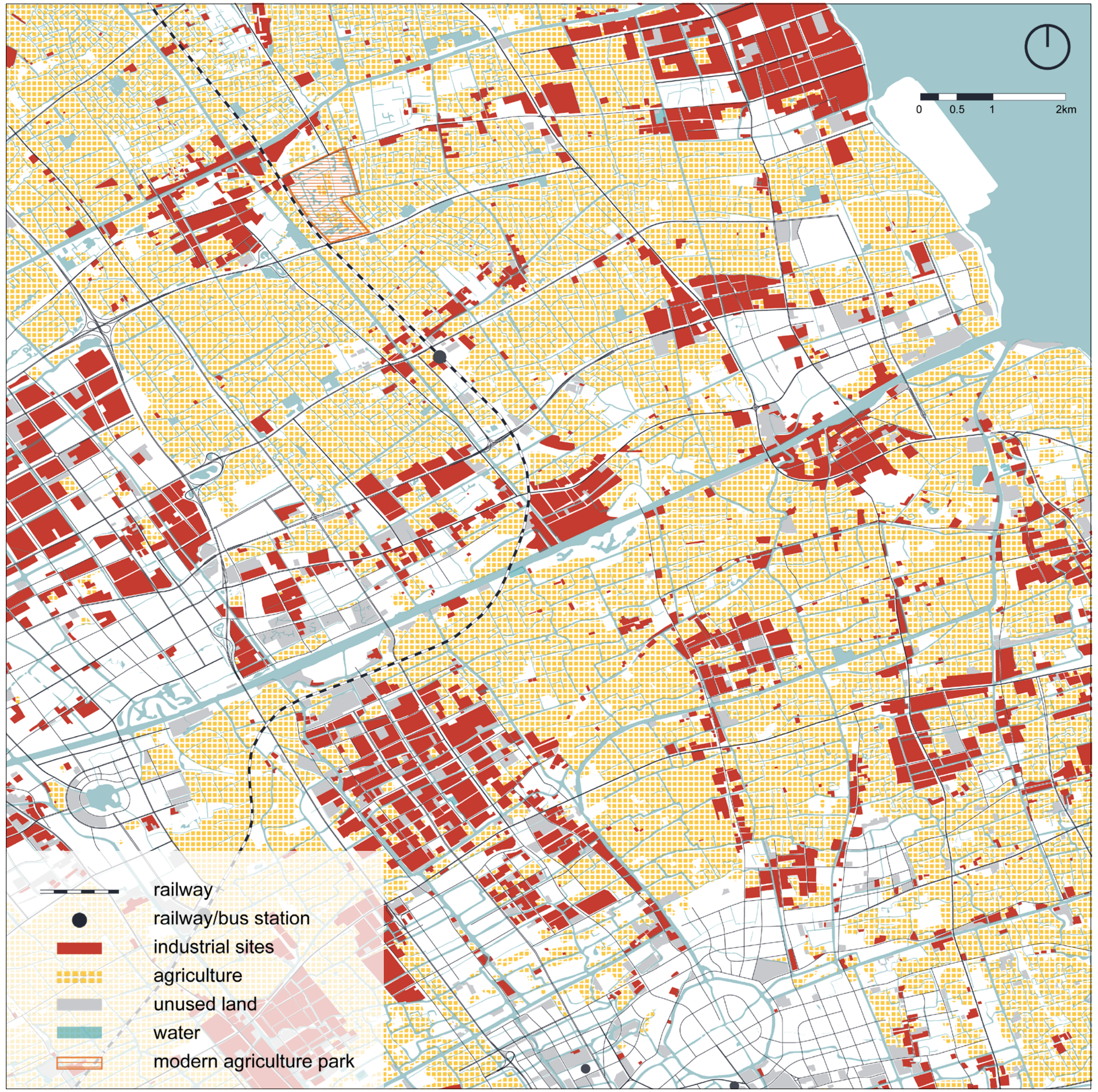


Figure 3.10 productive ecosystems in Taicang-Jiading area
Source: Author's own

The Jiading region of Taicang is rich in products and agriculture, and is a famous rice-producing area (Institute of Geographic Sciences and Resources, Chinese Academy of Sciences, Yangtze River Delta ----, n.d.), with "paddy fields" being the most dominant type of agriculture in the region. The region also has several large industrial parks, dominated by automobile manufacturing and electronic information industries. The unutilized land left behind after the relocation of some polluting enterprises accounts for a large part of the land use in the region, and effective reclaiming of this unutilized land is an urgent issue.

Figure 3.11 manufacturing companies
Source: Author's own

Figure 3.12 paddy field
Source: Author's own

Figure 3.13 demolished industrial sites
Source: Author's own collection from Tongji University Master Planning Course Group

DESTRUCTION OF CROPLAND

The loss of cropland, especially "paddy fields", has been particularly severe during the urbanization process. The destruction of cropland can be divided into three categories. The first category is top-down, state-led expropriation of cropland for urban expansion and other urban construction projects (e.g., factories or housing), which is the main cause of cropland loss. The second is the bottom-up "de-fooding" of cropland. To pursue higher economic benefits, farmers build greenhouses on paddy fields to grow other cash crops, and excavate fish ponds for aquaculture and other agricultural activities; in addition, the exodus of rural populations has led to the abandonment of some cropland because no one is cultivating it; and, with the emphasis placed on ecological preservation, contradictions have arisen between cropland and green space. Some cropland has been transformed into green belts on main roads or artificial wetlands, losing its original function of food production. In 2020, China enacted a new Land Management Law, which clarifies the protection of cropland from a legal perspective.

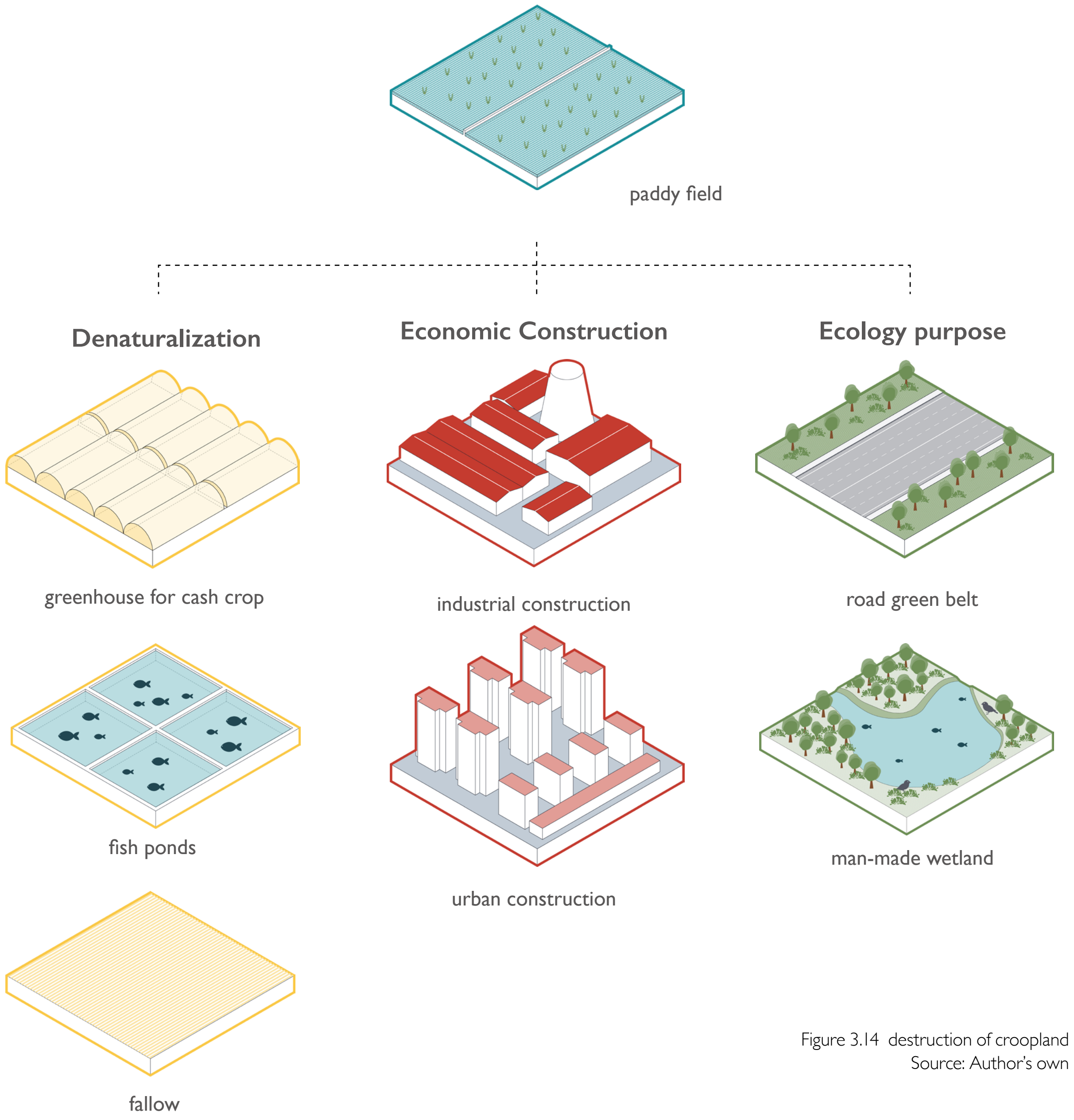


Figure 3.14 destruction of croopland
Source: Author's own

UNITARY INDUSTRY

The modernization of agriculture is developing rapidly and combining with tourism to develop several special agro-tourism industries. For example, the government-owned Taicang Modern Agricultural Park, shown in Figure 3.15, is a permanent agricultural development zone integrating high-efficiency facility agriculture, ecological leisure tourism, innovative agricultural industry incubation, and agro-related processing and trading. As shown in Figure 3.16 is a private manor that covers an area of about 3,000 acres, the land is contracted to the government, and the manor provides a variety of activities such as lodging, catering, picking, fishing, and animal sightseeing, etc. In addition, there are more than one hundred stores in the urban area that specialize in the sale of fruits and vegetables produced by the manor. There are also several village fairs held from time to time to showcase various agricultural products. More activities are summarized in the Appendix 'various activities in the peri-urban area'.

However, the region has failed to make good use of its natural and historical resources and other industries such as automobiles, with a single industrial structure that lacks attractiveness and vitality. Several historical towns lack characteristics and have dilapidated facilities; the wetland parks are remotely located and there is a lack of recreational facilities in the parks. Many tourists say that the environment of the area is good but relatively uninteresting and there is no place worth staying; local businessmen also think that the development of the area is not intensive enough and hope to get more support from the government.

Figure 3.15 Taicang modern agriculture park
Source: http://www.agri.cn/V20/SC/ggfw/201212/t20121219_3110416.htm

Figure 3.16 Yunong manor
Source: Author's own

Figure 3.17 Countryside market
Source: Author's own

Figure 3.18 Empty historical town of Liuhe
Source: Author's own

3.4.3 Natural ecosystem

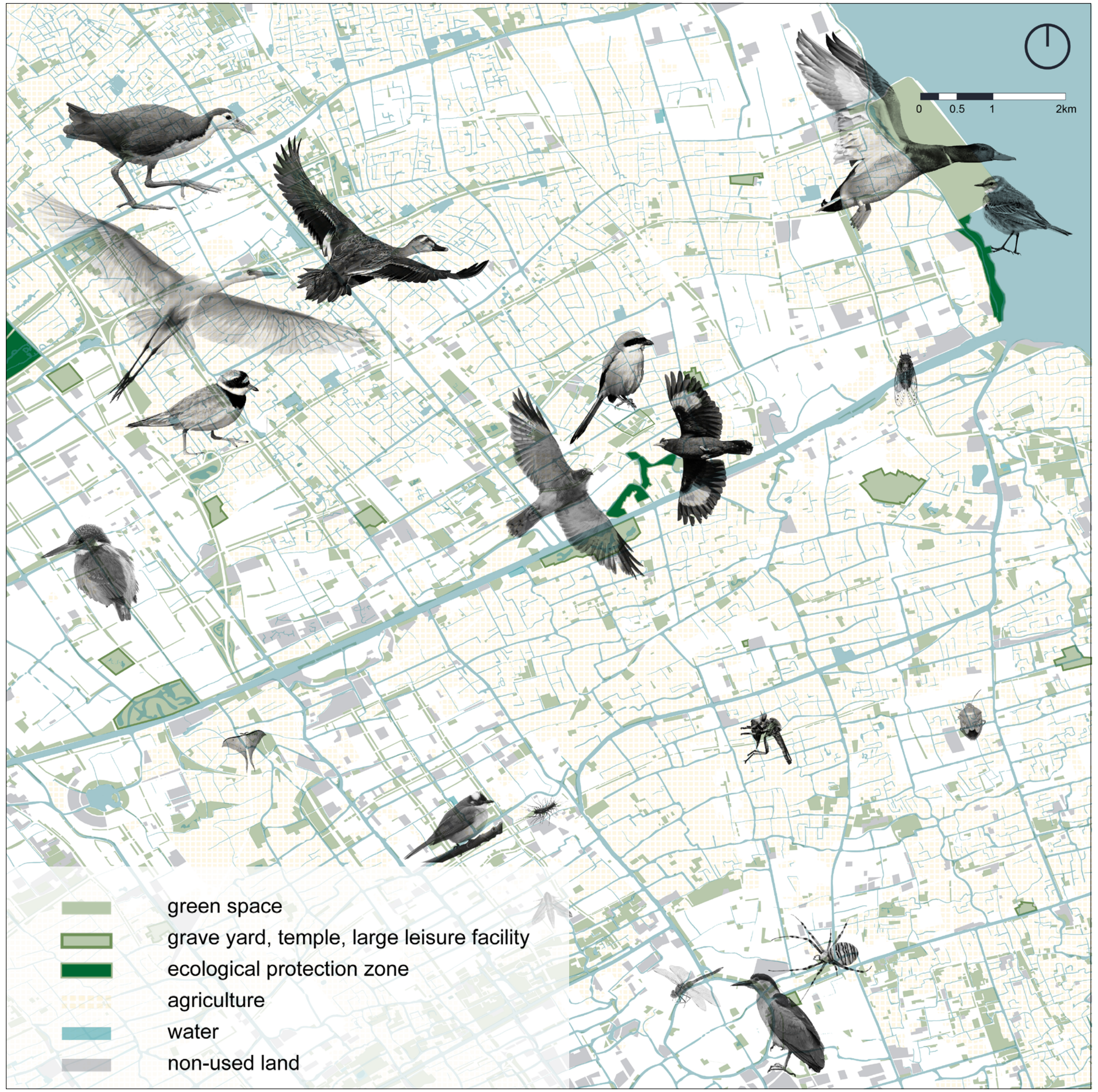


Figure 3.19 natural ecosystems in Taicang-Jiading area
Source: Author's own

The Jiading-Taicang area has a dense water network and abundant fishery resources, with a river and lake water surface ratio of 14.1%. Over thousands of years, people have been transforming the lowlands and competing for land with the lake, creating a characteristic 'polder landscape' in the delta. "A polder is a paddy field surrounded by an earthen embankment that prevents the intrusion of water from the outside and has a highly productive complex agricultural capacity, as well as a considerable ecological function that allows for the flexible deployment of water resources and acts as a secondary wetland, creating a complex and diverse ecosystem of land-water interaction (Hou & Guo, 2015). During the rapid urbanization phase, the water network was filled in and truncated in the land formation, and together with the new road system, large regular plots were divided (e.g. Fig. 3.21). These large-scale standardized and homogeneous land development patterns for the

Figure 3.20 Complex polder structure
Source: Hou and Guo (2015)

Figure 3.21 Water structure in 2009 (left) and in 2022 (right)
Source: Author's own

water system destroyed the productive and ecological functions of the polder, and the water network was only a limiting element in the division of the functional urban area (Xie et al., 2021).

In general, the area is rich in ecological resources, with green belts on both sides of major roads, small suburban forests, urban parks, recreational resorts with rich vegetation, a large amount of unused land left after the demolition of industrial and rural housing sites and three natural ecological reserves that provide habitats for waterfowl and other wildlife. At present, there is a conflict between the conservation of cropland and natural ecosystems in terms of land use. The use of paddy fields has proven to be sustainable through millennia, as long as the degree of intensification and fertilizer and pesticide use remains within limits (Verhoeven & Setter, 2009), the agroecology approach can be useful to improve traditional wetland agricultural systems.

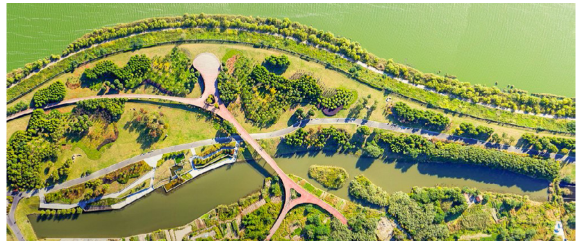


Figure 3.22 Jiangtan wetland park by Feng Xiaoying
Source: http://www.cpanet.cn/detail_picdetail_127584.html

3.4.4 Stakeholders' interviews

During the field trip, interviews with six groups of local stakeholders were conducted, mainly including tourists, local residents, local small businessmen, and migrant workers. From the interviews, it was found that these stakeholders generally agreed that the area has a good environment and is suitable for leisure and retirement, but agrotourism as a dominant industry lacks attractiveness and competitiveness, and public transportation and basic service facilities in rural areas still need to be strengthened.

In addition, the author conducted an in-depth interview with a planner experienced in rural regeneration projects to understand some emerging concepts of rural planning in China, prevailing planning practices, and her views on the future development trends of China's rural areas, details of which can be found in Appendix 'interview with an expert on rural planning'.

Type: Group of tourists from Shanghai

Activity: Having lunch

Location: Yunong villa

Comment: 'We learn about this place through social media and come here for lunch. The environment is quite nice as there are fewer people during weekdays. Probably because here is only accessible by car, and difficult to reach by public transportation.'

Type: A tourist couple from Shanghai

Activity: Walk in the park

Location: Liuhe wetland park

Comment: 'The park is very close to home, there are a lot of parking lots nearby, it's very convenient to drive over, and it's nice to take a walk for a rest, especially after the pandemic. as people are locked down inside for so long. However, Liuhe Ancient Town is relatively boring, there is not much to wander. Taicang is very modernized and has a good infrastructure. There are a lot of science and technology companies, relative to the Shanghai people a lot less, and we think settling in Taicang after retirement is a good choice.'

Type: Local citizens---a lady and teenage brothers

Activity: Walking the dog and Cycling for fun

Location: Liuhe historical town

Comment: 'The overall living environment of the ancient town is quite nice and relatively liveable. There are more tourists during weekends, on weekdays it is more quiet, not too much disturbance to the residents here. Most of the people living in the area are local, people that live nearby, sometimes come to the ancient town for fun.'

The interviews are done by the athour and graphics on this page comes from https://storyset.com

Type: Waiter at the Yunong villa

Activity: Working in the Yunong villa

Location: Yunong villa

Comment: 'I am not local, I come here to work and I live in a nearby staff quarter. The villa is over 3000 acres and belongs to one owner. The owner started building this villa a decade ago, he leased the land from the government and has good cooperation with it. The activities here include dining, picking fruits and vegetables, lodging, visiting the zoo, fishing, and many people coming on weekends. We also have more than 100 sales outlets, mainly in Jiading District, to sell the food grown in the villa.'

Type: Local residents and small business onwer

Activity: Resting and watching the store

Location: Liuhe historical town

Comment: 'This is my own house, I changed the front into the store, and my family lives in the back, most of the shop owners here are local people. I hope this town can be more prosper, right now the business is not so good. The government aims to develop local tourism, but actual policies and subsidies are not sufficient.'

Type: Local residents and small business onwer

Activity: Resting and watching the store

Location: Liuxin neighbourhood

Comment: 'I used to be a villager, but after the village was merged, everyone stopped farming and contracted their land to the government. The centralized resettlement can be either high-rise apartments in town or country villas. My family chose high-rise apartments in town because my son and daughter have to work. Usually, it is the elderly who live in these centralized villa areas. The villa area has been built for some years and is still expanding, with other village names moving over. The environment of the villa area is good, much better than the previous villages, but it's not very convenient to go to the town to see a doctor or buy things, so I opened a small supermarket here to sell some groceries.'

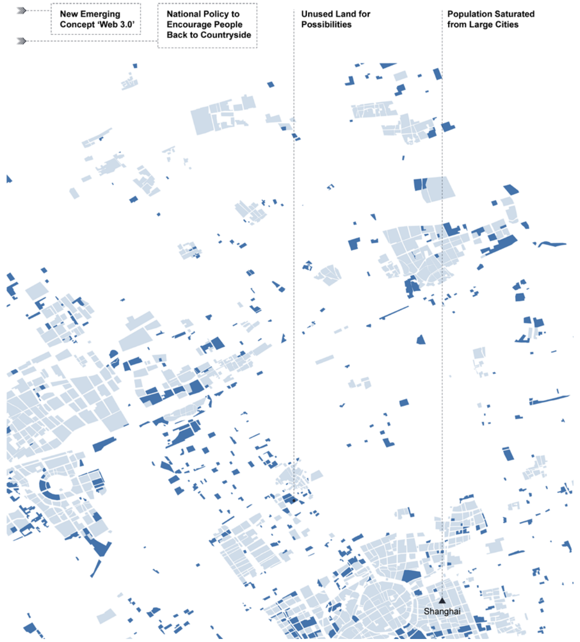
3.4.5 Conclusion

STRENGTH

The region's strengths include its natural environment and rich historical and cultural resources, developed agriculture and manufacturing industries; a well-developed transportation infrastructure that makes it easy to move goods; and the proximity of two large, developed cities, Shanghai and Suzhou, which make the region more desirable for talent and investment than other semi-urbanized areas.

WEAKNESS

Despite its abundant resources, the region's weakness lies in its failure to utilize and integrate these resources, and its unitary industrial structure, which makes the region unattractive and dynamic. In addition, the fragmentation of land caused by urban sprawl in the early years still exists, and the land left behind after the relocation of factories and villages needs to be reclaimed, so land organization is still an important issue for the region; In terms of awareness of environmental protection, there are still gaps from planning and policy making to the public.



OPPORTUNITY

The large amount of underutilized land is a vulnerability and a strong opportunity for the region, which means that there is enough room for development and construction, adding new possibilities to the region. With the neighboring big cities becoming saturated, the region can host the continued evacuation of population and gain access to more labor and investment; In addition, emerging concepts such as 'digital nomads', 'WFH', 'web 3.0' as well as the national policy of 'encouraging talents to return to their hometowns and build up' are adding new energy to the region.

THREAT

After the relocation of villages and factories, low-end labor positions disappeared, and many villagers needed to go to the towns and cities to look for jobs; the single industrial structure could not provide diversified positions, and it was difficult to absorb the large number of surplus rural population. In addition, long-term urban expansion has taken up a large amount of ecological resources, and due to the lack of awareness of environmental protection, the ecosystem has been seriously damaged and biodiversity has been drastically reduced.

3.5 Case Study: Randstad 2040 Strategic Vision

The Randstad region is a cluster of four major cities in the Netherlands and is the political, economic, and cultural center of the Netherlands and one of the most important urban clusters in Europe.

To enhance the international competitiveness and sustainability of the region as a whole, the Netherlands has proposed the Randstad 2040 Structural Vision, which outlines a spatial planning vision for the region in two dimensions: the 'blue-green structure' and the 'urban structure', and proposes two integrated spatial strategy: 1. to strengthen the links between the water system, natural resources and landscape of the Dutch Delta and the issues of climate change, economy, and urbanization; 2. to benefit from urban integration by linking the old and new infrastructure networks more effectively to the issues of urbanization.

The strategic decisions are based on four main principles and are implemented on a 'national and international' and 'regional' scale. The four guiding principles are 1: Living in a safe, climate-resilient green-blue delta; 2: Improving quality through deeper interaction between green, blue, and red; 3: Reinforcing existing international advantages; 4: Sustainable and strong urban and regional accessibility.

The implications of the vision for the integrated development of the Yangtze River Delta can be summarised as follows: 1. empowering synergistic management institutions to enhance the efficiency of integrated development; 2. focusing on the enhancement of the overall international competitiveness of the region; 3. focusing on the support of regional transport hubs and networks; 4. focusing on the balance between ecological protection and development; 5. setting out key tasks at different spatial scales (Chen, 2021).

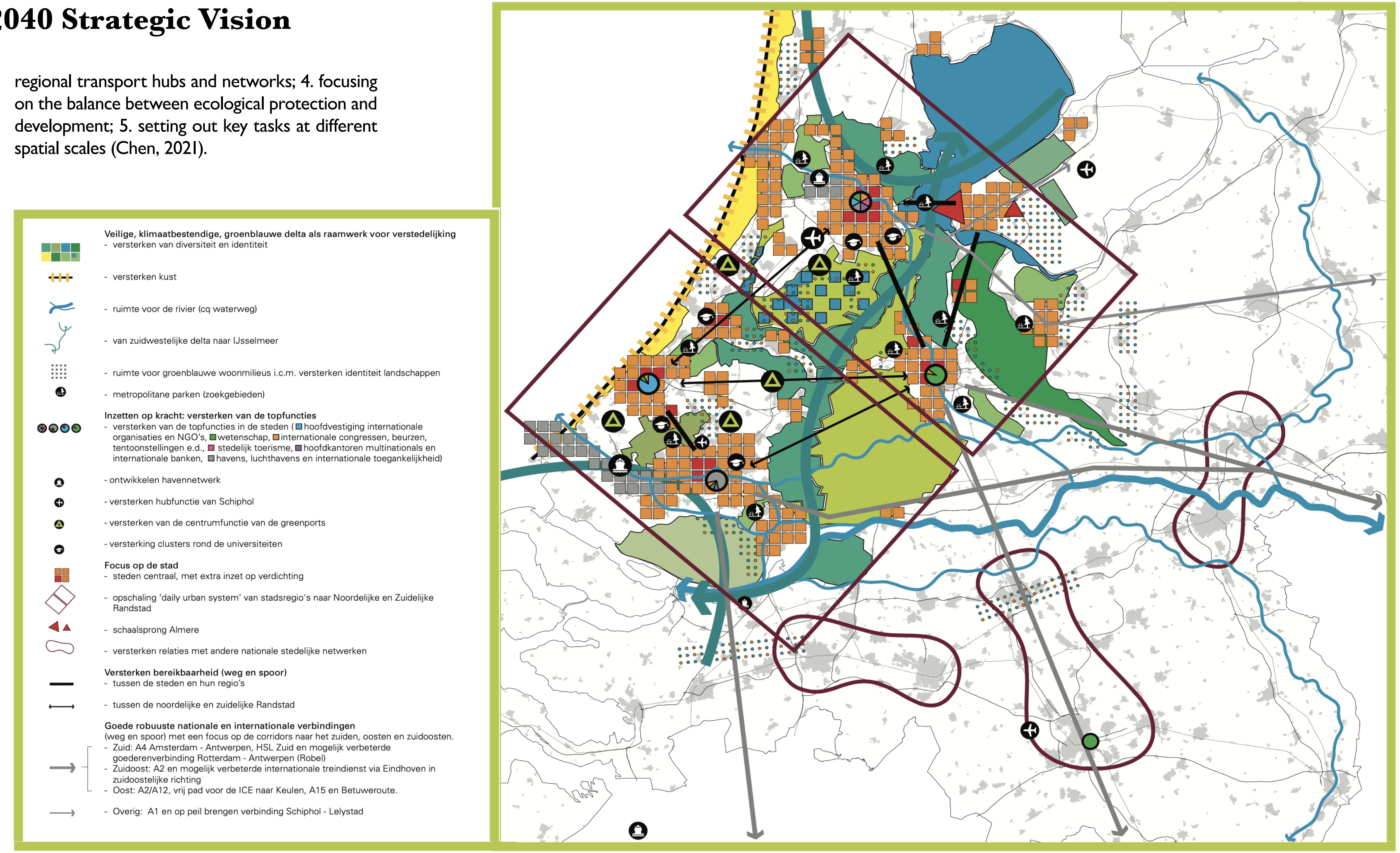


Figure 3.23 Spatial development perspective ofRandstad 2040 Strategic Vision
Source: International Planning Review Randstad 2040 Strategic Vision


Source: Author's own

Chapter 4
Scenario Building

4.1 Scenarios

Industrial reconstruction

Scenario I: Revived Village

Case Source: https://www.gooood.cn/shiziling-ideal-village-china-by-siadr.htm

Scenario 2: Creative Complex

Case Source: https://www.gooood.cn/common-ground-pastoral-demonstration-area-western-sichuan-china-by-syn-architects.htm

Counterurbanization

'Zwischenstadt'
(Growth of small cities and towns)

Scenario 3: Eco Village

Case Source: https://www.gooood.cn/rural-revitalization-of-gaohuai-village-in-deyang-l-j-design-limited.htm

Scenario 4: Garden City

Case Source: https://www.gooood.cn/jinyun-xibin-south-road-organic-renewal-and-historical-building-protection-project-by-i-studio.htm

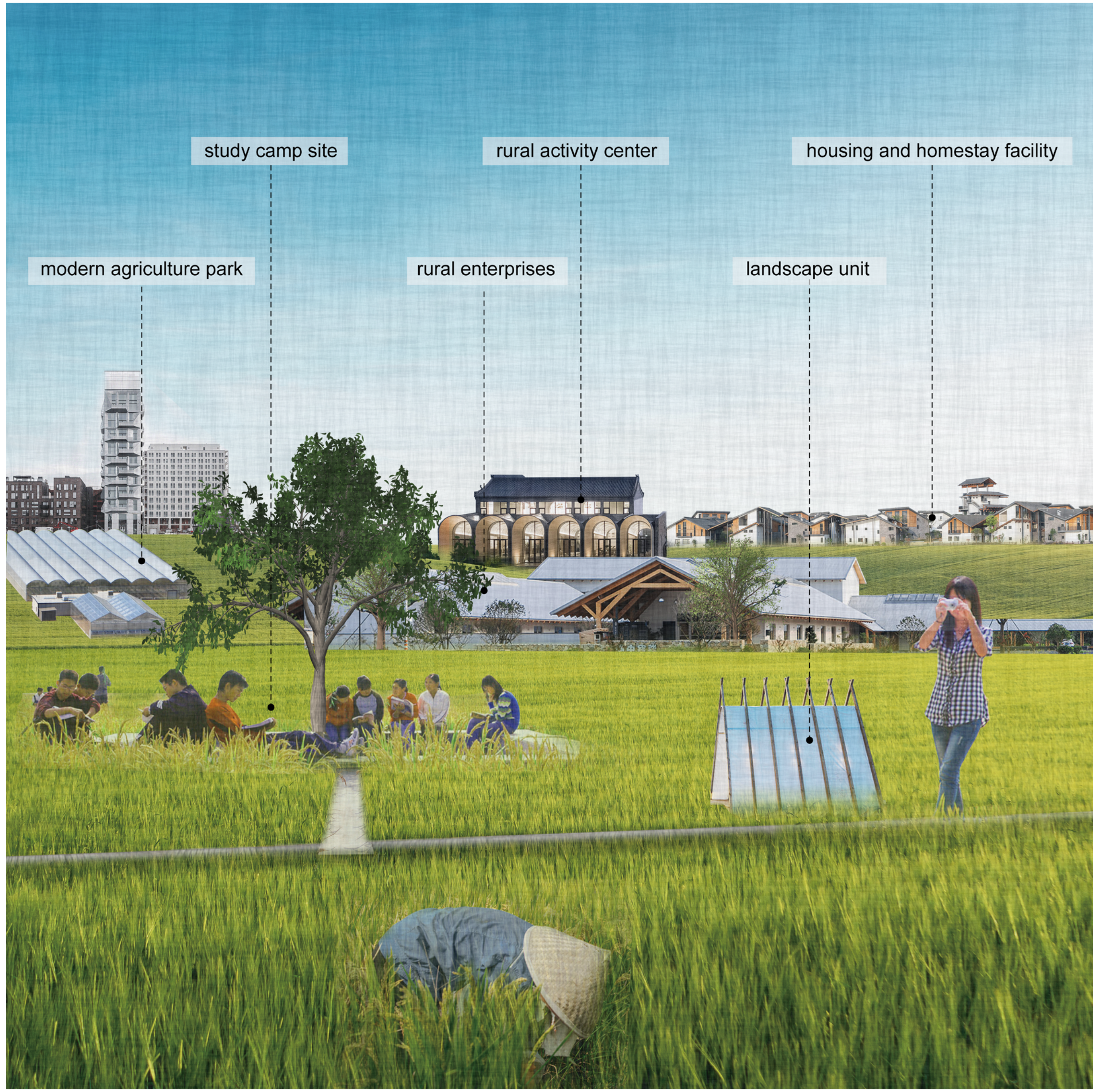
Environmental protection

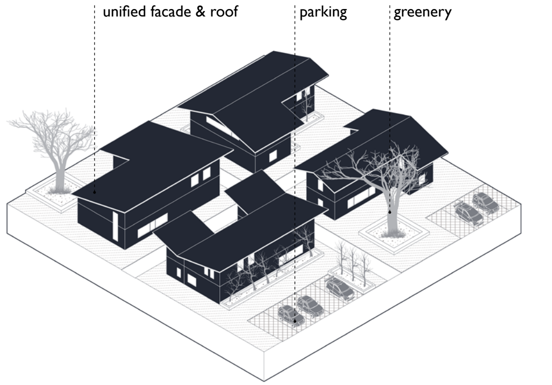
DIMENSION CHOICE

The scenarios were developed to demonstrate possibilities for dealing with future uncertainties. One of the uncertainties facing the region is the issue of growth. Over the years, the region has been on an urbanization trend with a continuous flow of large rural populations to the cities, but with the slowing down of urbanization and the trend of brain drain back to the rural areas, the flow of population between urban and rural areas may evolve and change. 'Reverse urbanization' refers to the process of population dispersal, i.e., the migration of the population from a concentrated area to a less populated area, which shifts the settlement system or urban area from a centralized state to a more dispersed one (Mitchell & Bryant, 2020), i.e., the village is the main vector of growth in the area. 'Zwischentadt' is a German phrase coined by Thomas Sieverts (2005) that describes a settlement structure that cannot be attributed to either urban or rural areas, and in the Chinese context of this paper, it refers to the urbanization of small and medium-sized towns. The other two dimensions show two important directions of development for the region to cope with the weaknesses and threats it faces. The industrial restructuring direction aims to make full use of local resources, build diversified industries, strengthen inter-industrial links, create a variety of jobs, and improve the local economy; and the ecological protection direction aims to renew abandoned land, rebuild blue-green space, protect arable land, raise the residents' awareness of environmental protection, and maintain local biodiversity.

The identification of the four dimensions leads to four possible scenarios. Scenario I is Revived Village, a case from Kakiziling, Shandong Province, China, where the village serves as the main settlement of the region, setting up a variety of industries such as lodging compounds, cultural and creative neighborhoods and public service centers in addition to residential houses, making it a rural cultural tourism business card for the region; Scenario 2 is Intelligent Complex, a case from Tianfu New Area, Sichuan Province, China, where urbanization is shown in the form of small towns and urban-rural life is connected through the rural-complexes; Scenario Scenario 3 is the Eco-Village, a case study from Deyang City, Sichuan Province, China, which enhances the quality of life of villagers and resonates with the local belongings of tourists by consolidating the foundation of natural ecology; Scenario 4 is the Vertical Garden City, a case study from Austin, U.S.A., in which the sky gardens enable green spaces to develop "upwards" in a sustainable way, integrating architecture and nature. The setup of each scenario for the locations discussed in this thesis is described in the following chapters. Each scenario has been developed by referring to some existing examples (see Appendix Scenario Reference Cases) to form three core strategies that act on each of the three ecosystems: urban (red), production (orange), and nature (green), and the strengths and weaknesses of each scenario have been evaluated and compared through a harmonized evaluation process.

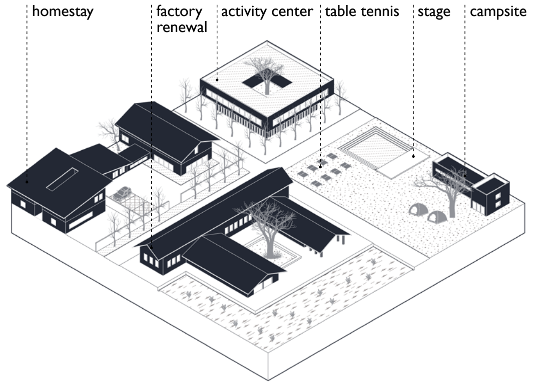
4.1.1 Scenario1: Revived Village





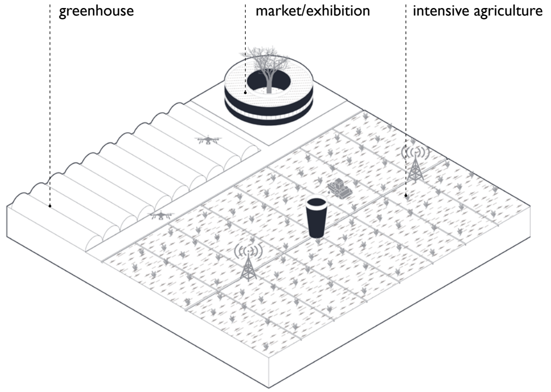
HOUSING RENEWAL

Larger natural settlements with good substrates will be the first to be renewed and upgraded to enhance the overall living environment of the settlement through regularization of road surfaces, redesign of facades and roof shapes, and adding parking space and greenery. Some rest and recreation and social functions can also be added through this process.



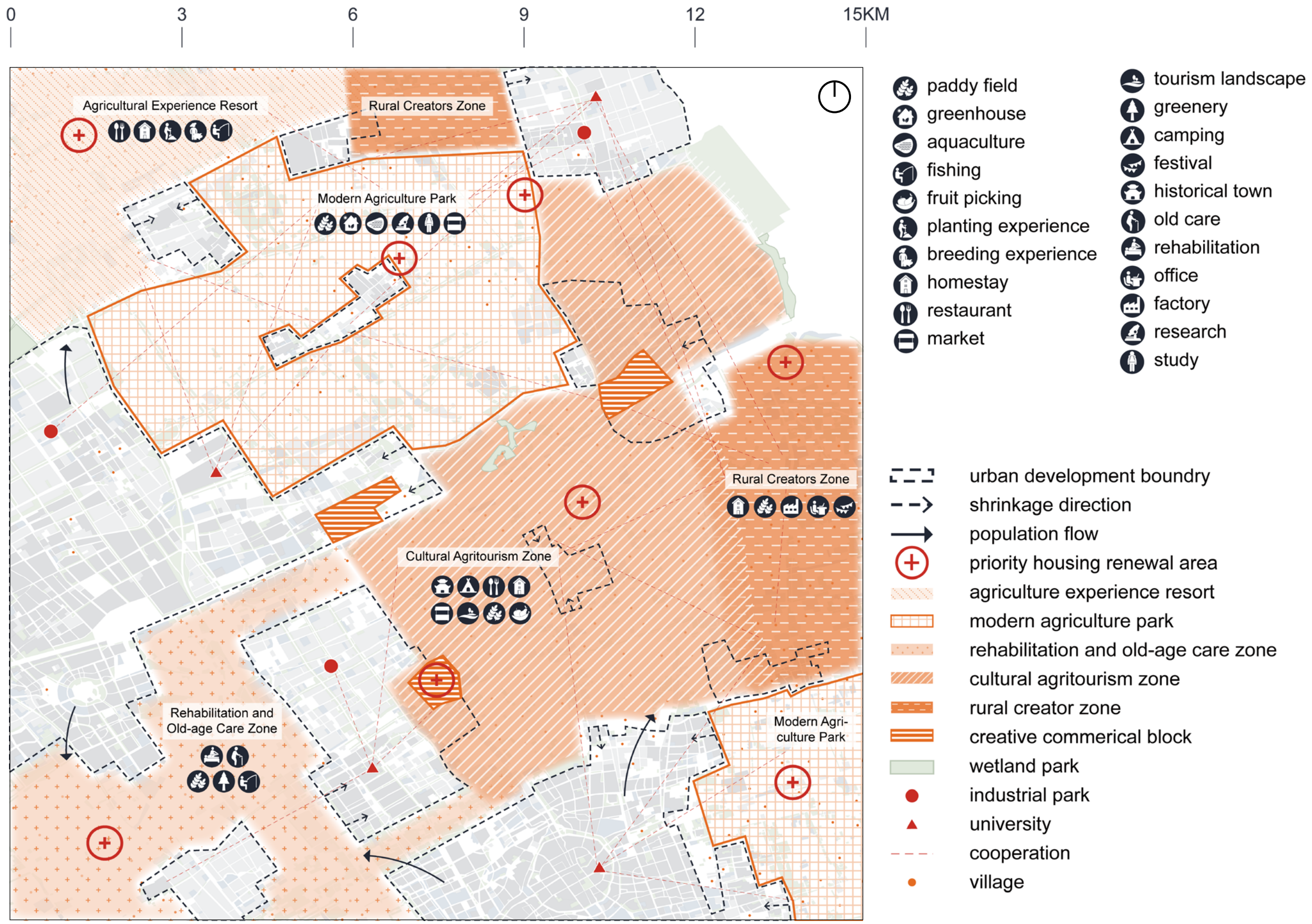
DIVERSIFIED INDUSTRY

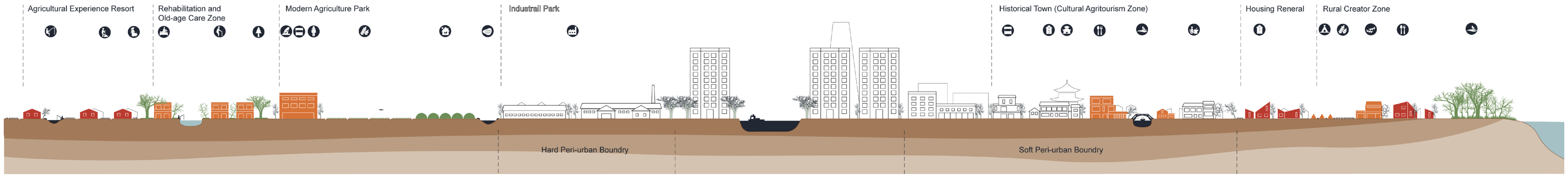
Renovate the original industrial factories and rural houses in some rural areas to add diversified social and commercial functions; add public activity facilities such as village stages and ping-pong tables, which can not only enrich the lives of local residents but also combine with rural landscapes to develop cultural and tourism industries to attract tourist.



MODERN AGRICULTURE

Equipping agriculture with modern technology and industry can greatly enhance the productivity of modern agriculture and reduce environmental pollution. Modern agricultural parks are comprehensive parks that, in addition to agricultural production, also include experimental research, agricultural product exhibition and marketing, sightseeing and tourism, rural excursions, and other functions.

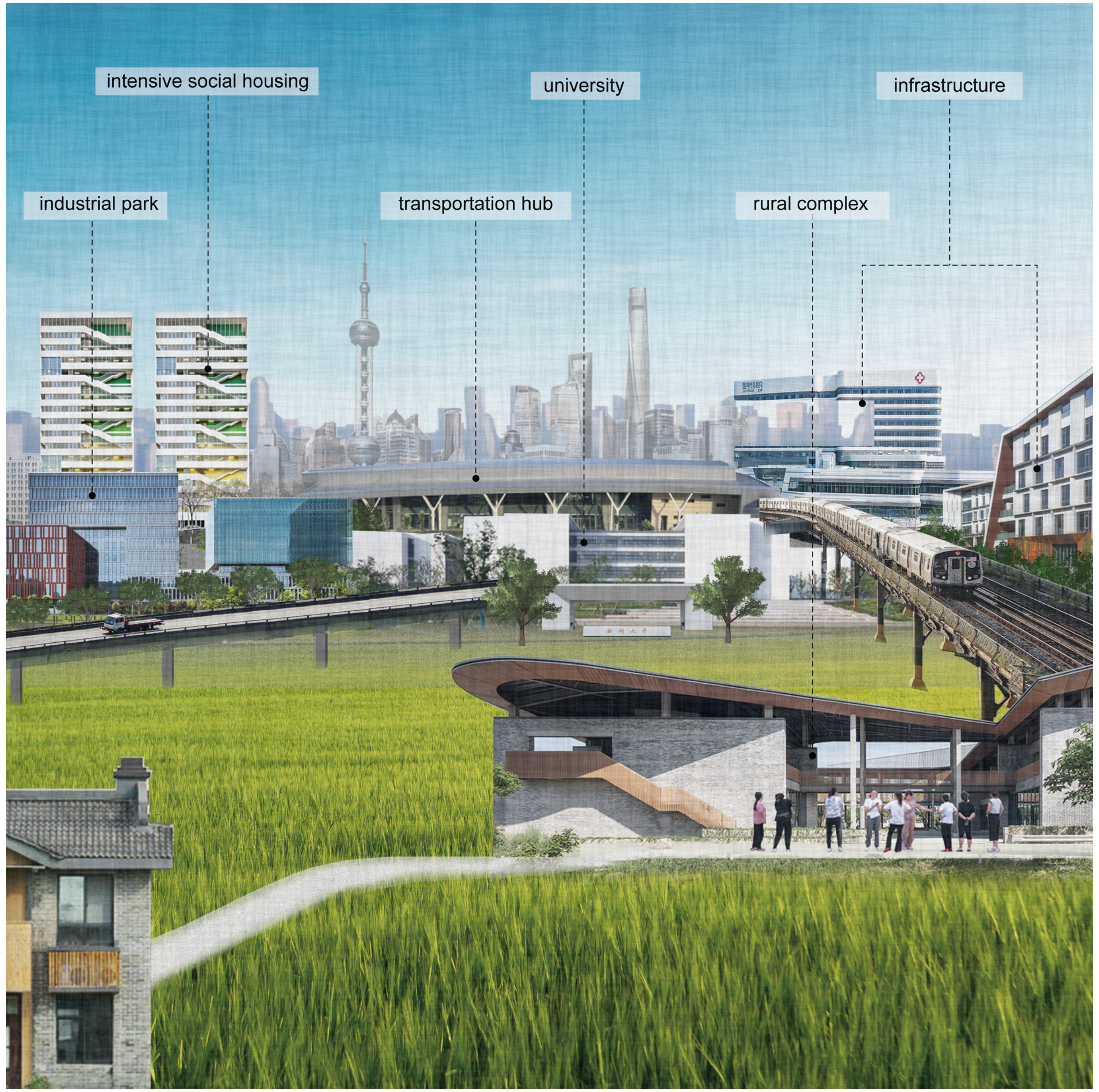


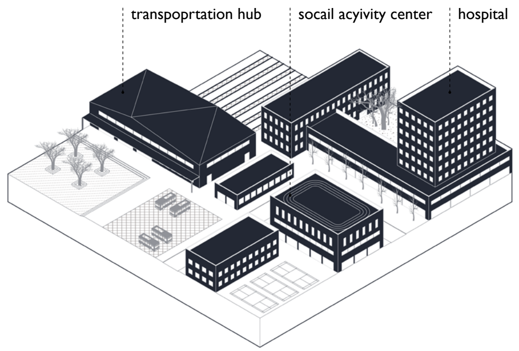


The rural areas in this scenario are the main drivers of regional development. The urban built-up areas are shrinking and the population is moving to the rural areas. Well-preserved large villages and old towns with historical value will be the first to be renewed and revitalized to enhance the living experience. Each region will carry out functional zoning of villages according to the actual situation and cooperate with industrial parks and universities to develop new rural businesses (Digital Village Construction Guide 1.0) and improve the risk-resistant capacity of regional industries.

Agricultural areas with a high distribution of villages in the northwest will continue to retain their original appearance and be utilized as agricultural experience zones. Through the adoption of urban residents and management by local farmers on their behalf, new agricultural experiences will be provided for urban residents and local incomes will also be raised. Areas with more integrated agricultural land will be developed as modern agricultural parks, where agricultural production will be carried out through modern technology and industry, and will also include diversified functions such as agricultural research, study tours, and leisure and recreation. The southwestern area has a good ecological base and is close to the urban areas of Taicang and Jiading, so it can be used as an ecological recreation area, which will provide some medical, rehabilitation, and pension services in combination with agricultural production. The eastern part of the city, where the land is relatively fragmented, can transform the existing factories and residences to provide young entrepreneurs with office and living space in a beautiful environment and at a suitable price, in line with the trend of 'digital nomads'. The cultural and tourism industry is also an important pillar industry in the region, giving full play to the advantages of the old town and the wetland park to create a cultural and agricultural tourism area, and improving the commercialization level of the area to attract tourists from the surrounding areas.

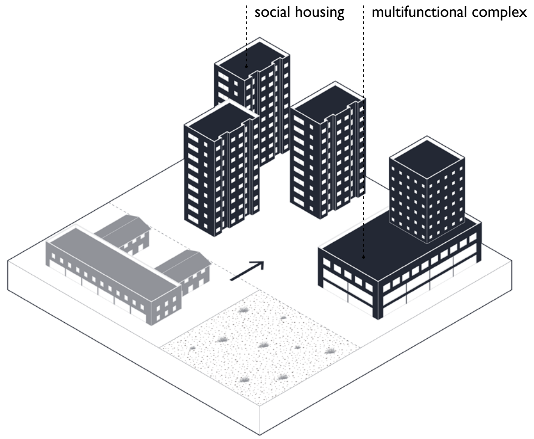
4.1.2 Scenario2: Creative Complex





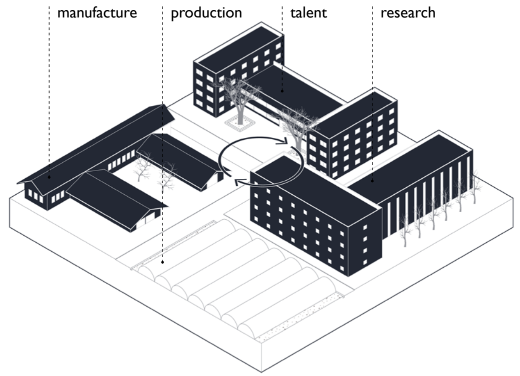
ACCESSIBLE INFRASTRUCTURE

The provision of good infrastructure is essential. Transportation hubs provide mainly intercity services, and facilities such as hospitals, gymnasiums, activity centers, and green spaces provide services to residents of the surrounding cities and villagers. As far as possible, these services should be accessible to all residents within a fifteen-minute walking distance.



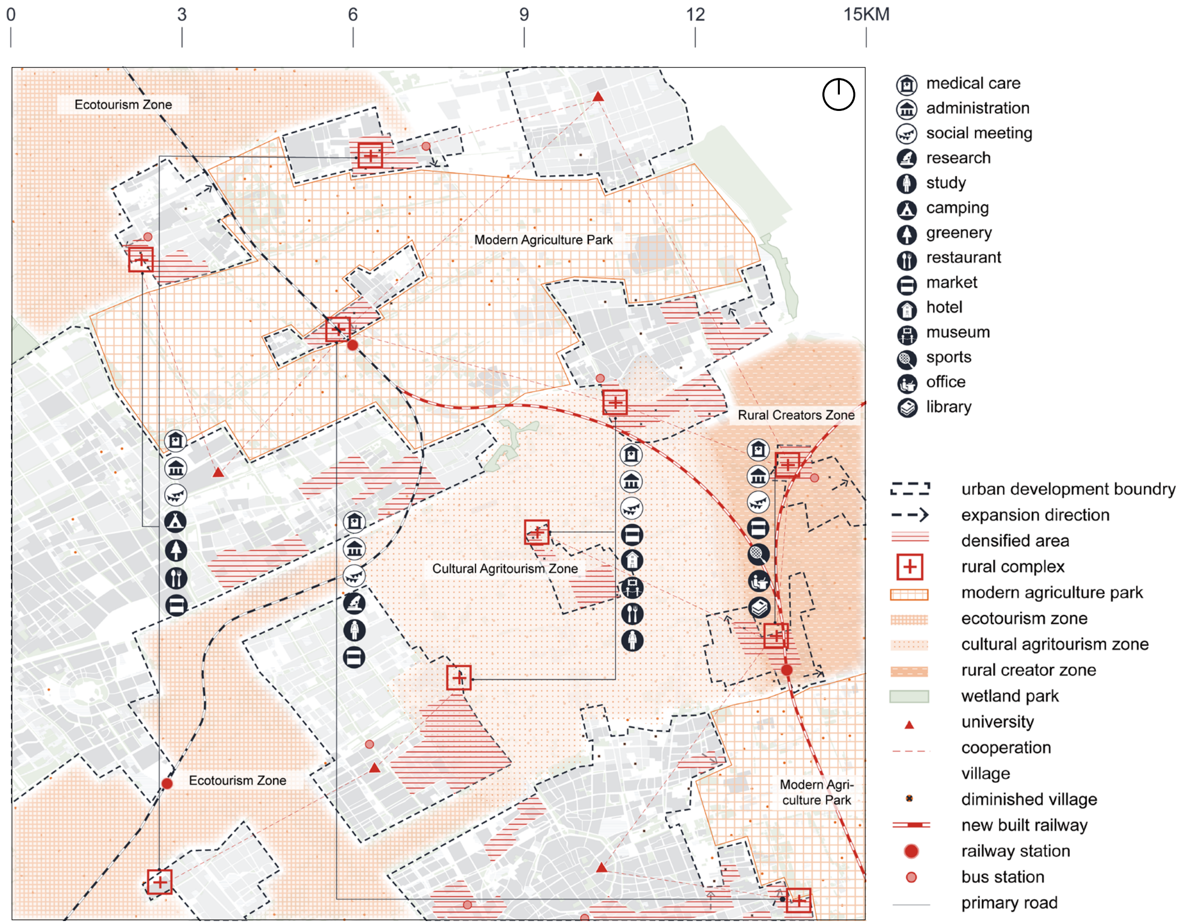
DENSIFICATION

In the face of the demands of urban growth, there is a need to densify unused land and low-density building sites in centralized construction zones for new social housing and multifunctional complexes.



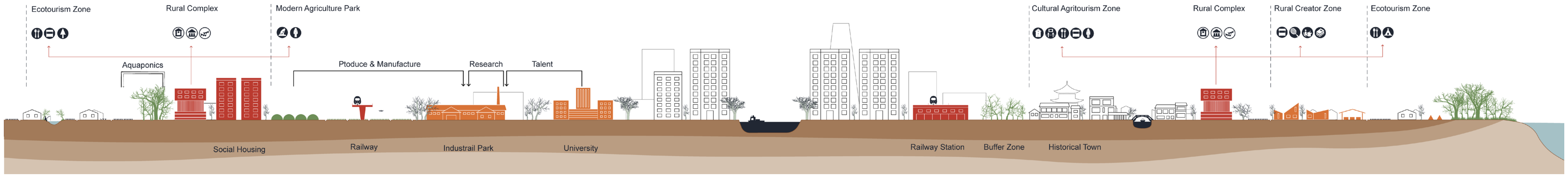
INDUSTRY COOPERATION

Comprehensively utilize the rich agricultural, industrial, educational, and research resources within the site to achieve complementary industrial advantages, realize synergistic development of regional industries, and enhance the competitiveness and resilience of regional industries.

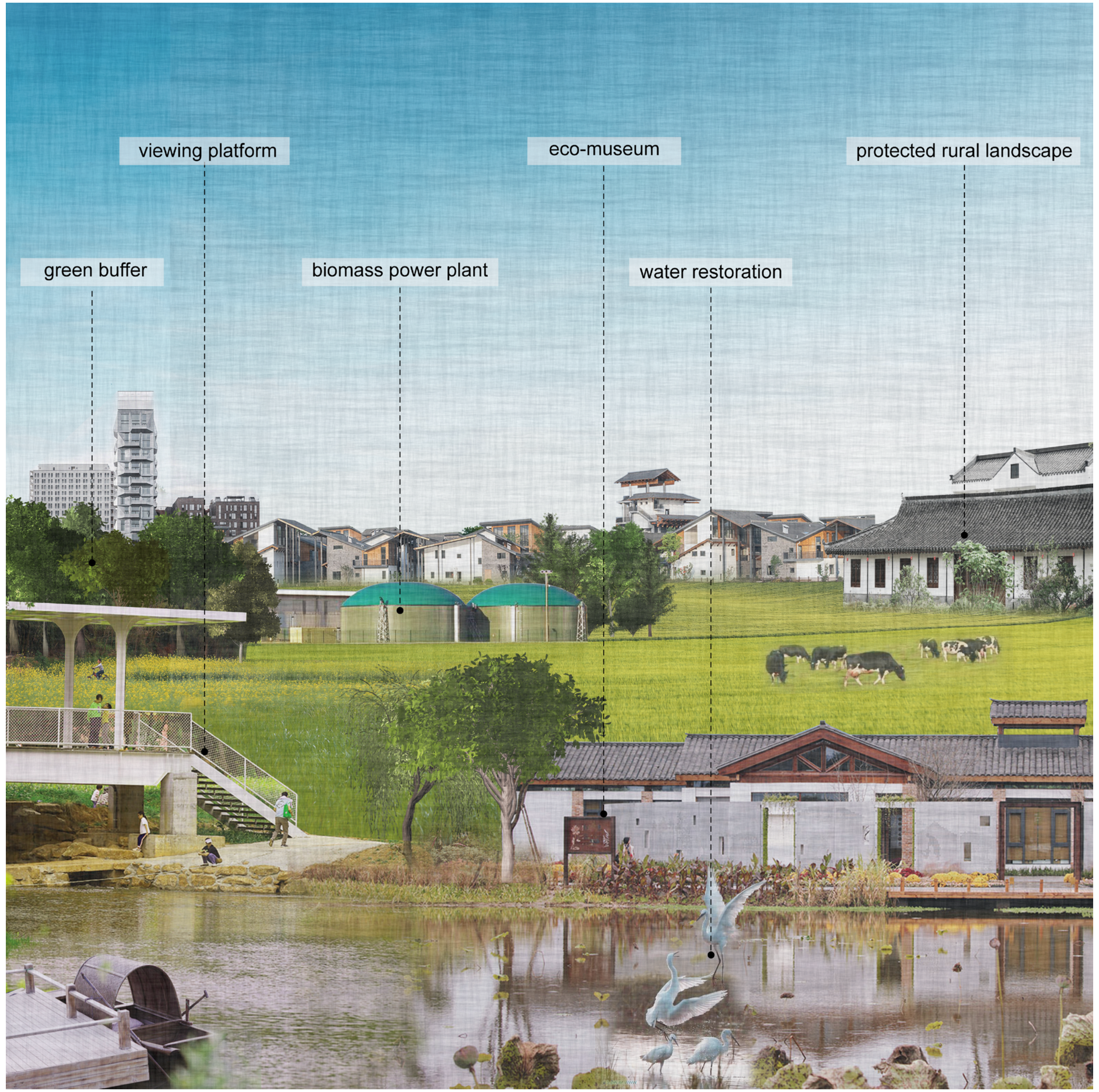


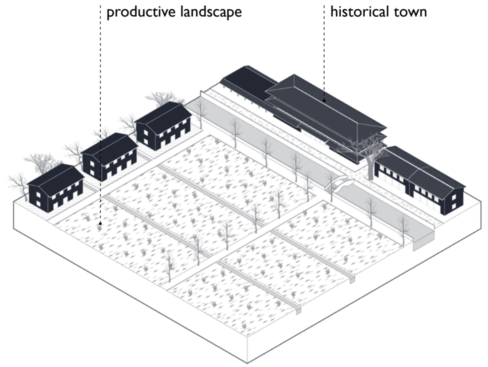
This scenario follows the trend of urbanization, where the population continues to concentrate in built-up areas, and main expansion happens in the area of small and medium-sized towns. Villages within and very close to the built-up areas are relocated. Unutilized and inefficient industrial land is transformed into residential and commercial land through renovation and densification. On the basis of the existing railroad facilities, new railroads connecting to the southeast were added, with routes chosen to avoid large tracts of intact agricultural land, and additional stops were made in small towns.

The rise of rural complexes in recent years is a new attempt to explore the integration of urban and rural areas, and has achieved a certain degree of success. Therefore, rural complexes are adopted in this program as a gateway connecting the countryside and the city. They are located at the edge of small and medium-sized towns, not only providing basic services for the vast rural areas, but also serving as a distribution center for all kinds of information and resources to enhance the cooperation between different industries. Its basic functions are administration, medical care and social gatherings, and other different functions can be added according to the positioning of the surrounding rural areas. Complexes in eco-tourism zones provide camping, catering and other leisure and commercial services; complexes in modern agricultural parks provide research, study and exhibitions; complexes in cultural agrotourism zones can be combined with art exhibitions, visitor centers and shopping complexes; and complexes in rural creative districts provide young people with places for sports, offices and entertainment. Rural complexes can also be combined with railway stations and public transportation hubs to form large hub-type buildings.



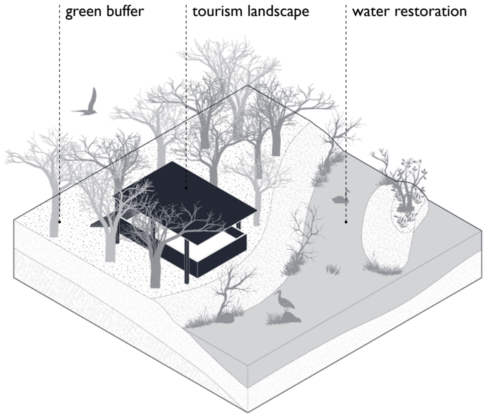
4.1.3 Scenario3: Eco Village





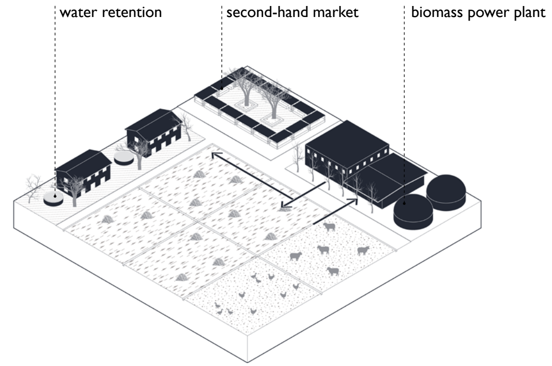
RURAL LANDSCAPE PRESERVATION

The region is rich in landscapes. The preservation of the polder landscape, with its productive and ecological value, and of the old towns, with their social and historical value, is essential for the maintenance of the peri-urban landscape of the area.



ECOSYSTEM RESTORATION

The region has a dense water network but is affected by industrial pollution and urbanization. Through the ecological restoration of the water system and plant system, the self-regulation and self-repair function of the ecosystem will be enhanced, the ecological balance will be maintained and an ecological landscape will be formed.



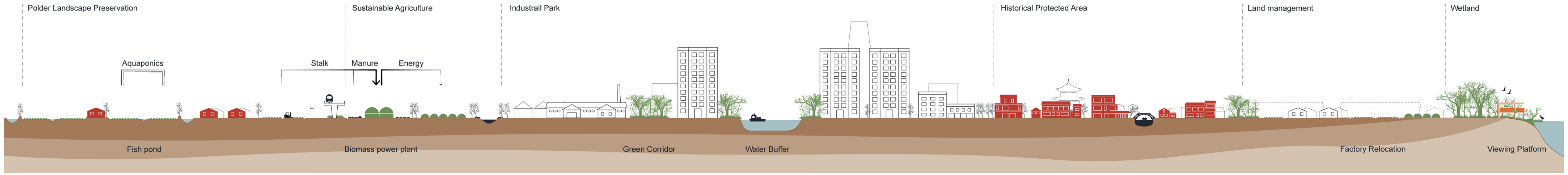
RESOURCE RECYCLING

The economical use of resources is one of the effective ways to protect the environment. Rainwater harvesting is used to cope with possible droughts; livestock manure and straw are fully utilized for soil enrichment and for generating electricity to supply greenhouses; and rural markets provide opportunities for the circulation of unused products.

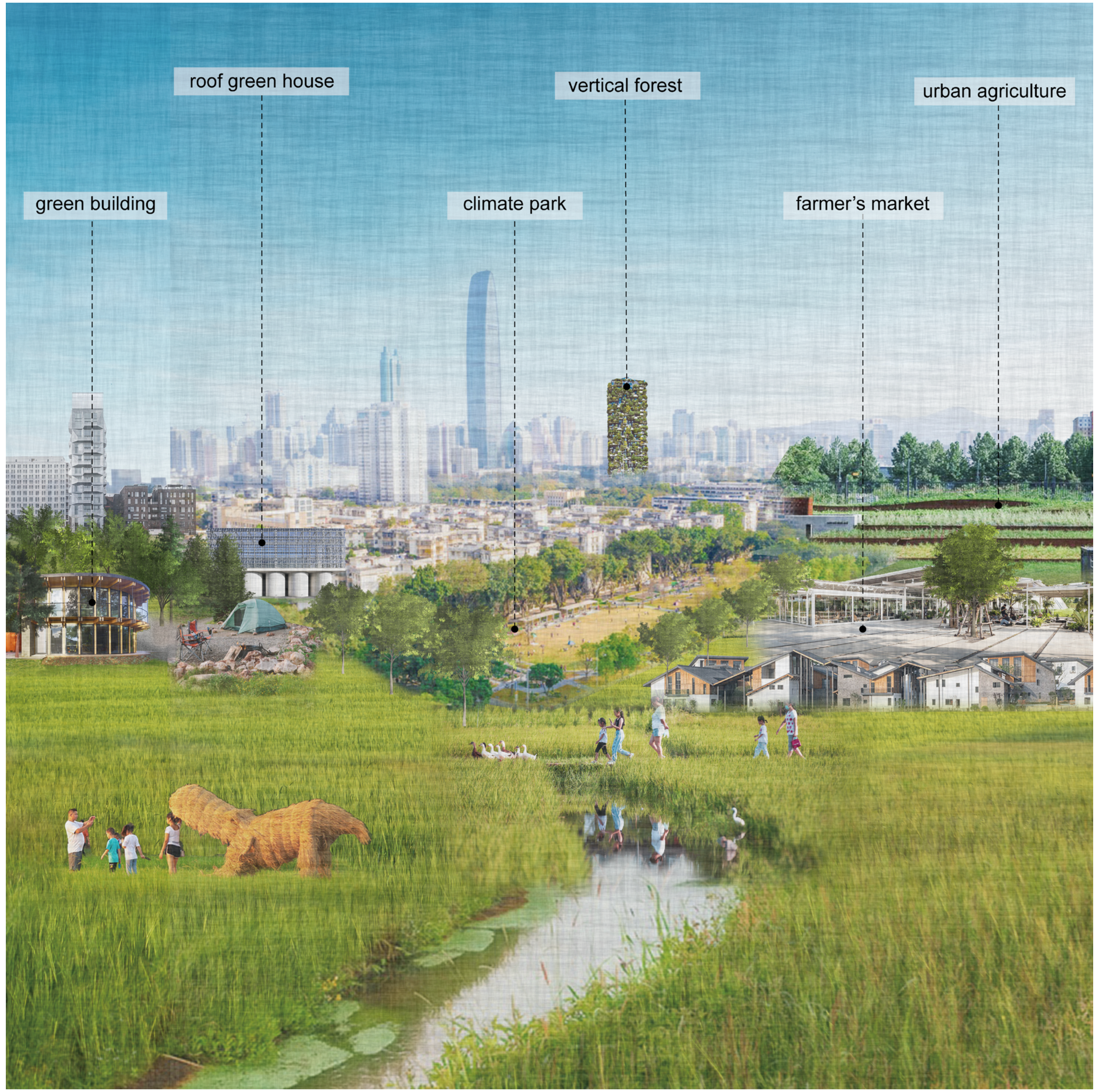
This scenario takes reference from the case of rural revitalization based on ecological restoration, which focuses on environmental protection in rural areas and uses this as a basis for improving the lives of villagers and enhancing economic vitality.

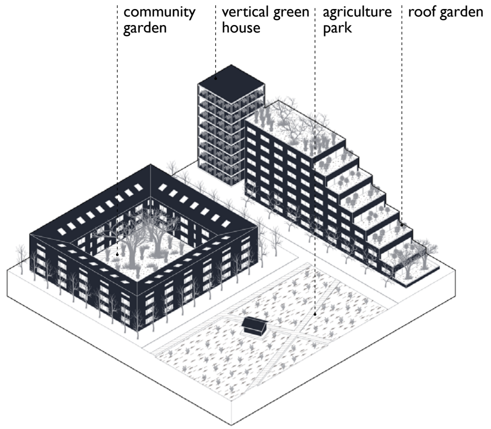
At the regional scale, the natural ecology of major water bodies such as the Liu River and the coastline is restored to form a buffer zone of the water network, and green corridors are arranged along major roads and railroads, connecting existing green space patches and wetland parks, which together form an integrated water and green corridor to protect the local biodiversity. Historic old towns and polder landscapes have rich social, productive and ecological values, and their tourism values can be developed through proper upgrading on the premise that their landscapes are not damaged. Regular agricultural land will be developed sustainably, using modern technology and industry to improve agricultural production efficiency and protect the environment, such as livestock manure to fertilize and adjust the soil, and biomass power generation to supply greenhouses. In the northeastern region, where the land is relatively fragmented, land consolidation will be carried out first, dismantling abandoned industrial plants and dilapidated villages, remedying soil pollution, and restoring the ecological environment before converting it into agricultural or ecological land.

Overall, the program aims to create a peri-urban landscape that is ecologically sound with a focus on agricultural production and agro-tourism, practicing the concept of human beings being as important as other living beings.



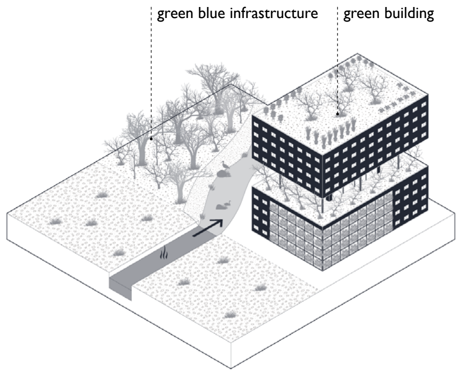
4.1.4 Scenario4: Garden City





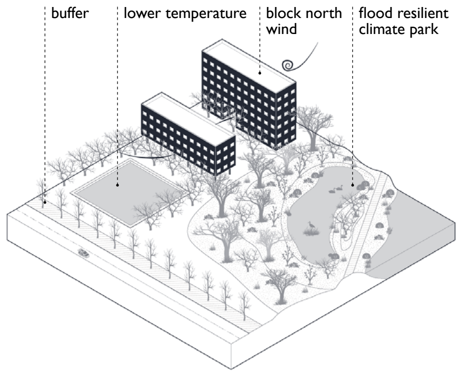
URBAN AGRICULTURE

Urban agriculture is an effective means of improving the resilience of urban food and the quality of the environment. Rooftop gardens and community gardens can be placed on existing residential and commercial buildings, abandoned factories can be converted into vertical greenhouses, and individual agricultural sites wrapped in the city can be transformed into agro-parks, which can serve both production and recreational tourism functions.



BROWNFIELD REGENERATION

Unused land converted from industrial land needs to be adjusted to soil pollution through ecological management, reshaping water bodies, and restoring water and green ecosystems; new buildings need to give full consideration to environmental protection and the rational use of resources and provide residents with green and efficient space.



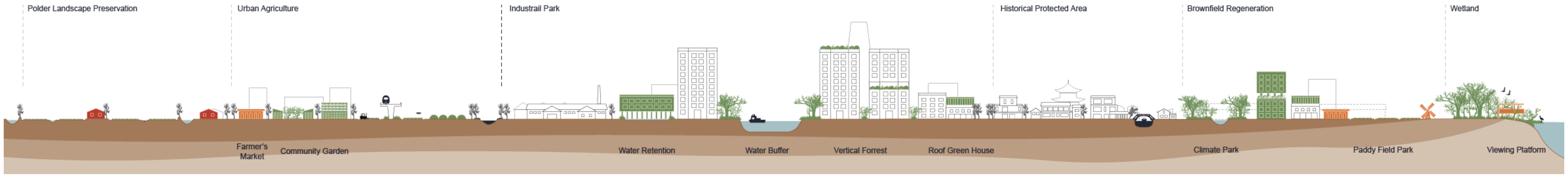
MICROCLIMATE REGULATION

In the face of the urban heat island effect, microclimate regulation can help improve the quality of life of urban residents. In addition to planting plants inside buildings, elevated ground floors and the addition of cisterns can reduce ambient temperatures and promote wind flow. Another initiative is to transform large green spaces into climate parks, creating a common open space for people and animals.

This scenario focuses on environmental protection in the context of urban expansion. On a regional scale, the existing polder landscape will be protected and fully utilized for its productive, ecological and tourist value. Buffer zones are constructed on both sides of major waterways and roads, connecting wetlands with large green space panels to form water and green corridors to protect the biodiversity of the region.

Other major initiatives are located in urban built-up areas, with reference to several examples of landscaping in high-density cities. Polluted unused land is ecologically remediated and transformed into ecological land or green residential and commercial land, and new buildings should be built with due consideration to the economical use of resources and environmental protection to provide green and efficient space for urban residents. Urban agriculture is applied to compensate for the reduction of agricultural land due to urban expansion by adding community gardens and rooftop gardens to suitable buildings, transforming abandoned buildings into vertical greenhouses, and retaining large-scale individual agricultural land in the city for transformation into agricultural parks so that it can be used as a place of rest for urban residents while retaining agricultural production. The heat island effect is a major problem facing cities today, so microclimate regulation is related to people's quality of life. In addition to adding greenery and cisterns, climate parks play a crucial role in redesigning existing large green spaces to become vibrant 'green lungs of the city' that can cope well with heavy rainfall.

At the social level, government-initiated programs are used to raise awareness of environmental protection and encourage resource conservation and recycling. Examples include the establishment of biomass power plants and the setting up of second-hand goods markets in various towns.



4.2 Assessment

Goal	Indicator	Current Official Planning	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Behavior change towards environmental protection	/	Average	Good	Average	Excellent	Excellent
Liveable community	number of increased social housing (set)	46200	35000	88200	10160	60480
	15-minute walkability of community services (%)	100	98	100	98	100
	5-minute walkability of public open space (%)	100	100	100	100	100
Enhancement of industry	potential local job opportunities (increased and improved second/third industry land use)(%)	20.7	23.4	25.2	12.3	17.7
Cropland preservation and management	Increased cropland area (square kilometers)	14.2	15.3	6.1	20.7	13.0
Regeneration of abondonded land	Ecological regenerated area (square kilometers)	13.1	12.5	5.5	21.3	12.3
Biodiversity preservation	Ecological area (square kilometers)	117.5	130.0	123.1	138.9	129.9
	Total length of green-blue corridor (kilometers)	94.7	107.5	107.5	142.4	/

Table 4.1 Assessment indicator and data of four scenarios
Source: Author's own

Based on the analysis of social, productive, and ecological systems in peri-urban areas in the previous chapters, six objectives were established according to the corresponding issues: behavior changes towards environmental protection, livable community, enhancement of industry, cropland preservation and management, regeneration of abandoned land, biodiversity preservation. Except for the first goal, which will be judged based on government decisions and people's actions, all the other goals will be quantified and calculated through several indicators. To better determine the corresponding indicators, this thesis selects the core indicators mentioned in the 2035 master plan of Jiading District, Shanghai. Considering the different sizes of the region, this thesis scales the values of the indicators in the official plan so that they can be compared with the four scenarios. It is worth noting that the values of these core indicators in the official plan only represent the vision of the official plan, which has its advantages and disadvantages and cannot be used as a judgmental standard.

For example, decisions and actions related to behavioral changes towards environmental protection are less mentioned in the plan; in terms of livable communities, the plan mentions the renovation of old towns, infrastructure construction and increasing social housing, which takes into account the large number of relocated villages and foreign populations in the plan, while the four scenarios have different needs for social housing according to the different development modes; in terms of industrial enhancement, the plan mainly emphasizes the transformation of industrial land and the development of modern service industries, and lacks consideration for modern agriculture; the replenishment of cropland is a binding target, which is smaller than the loss of cropland due to construction, which will result in further loss of agricultural land; with regard to ecological protection, the increase in ecological space is closely related to the reduction in the amount of land used for construction. Although the Government has realized the importance of environmental protection in recent years, economic development is still the main purpose of planning, and as a result, the ecologically related binding targets are still low.

Table 4.1 shows the calculated results, the conversion of the official metrics, and the detailed calculation process of the metrics for each scenario can be found in the Appendix 'scenario assessment', and Figure 4.2 shows the visual representation of the evaluation results for better comparison between scenarios.

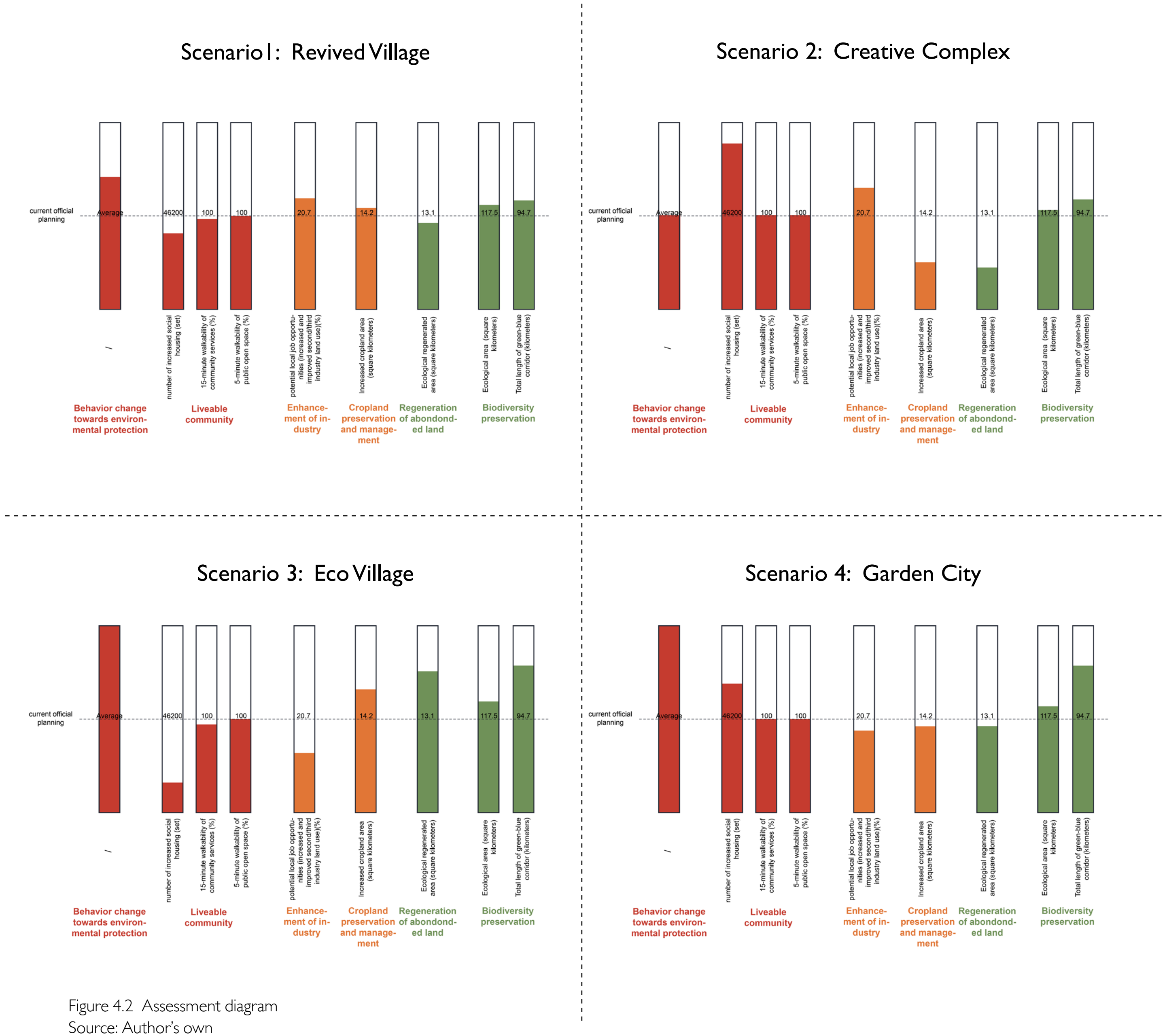


Figure 4.2 Assessment diagram
Source: Author's own

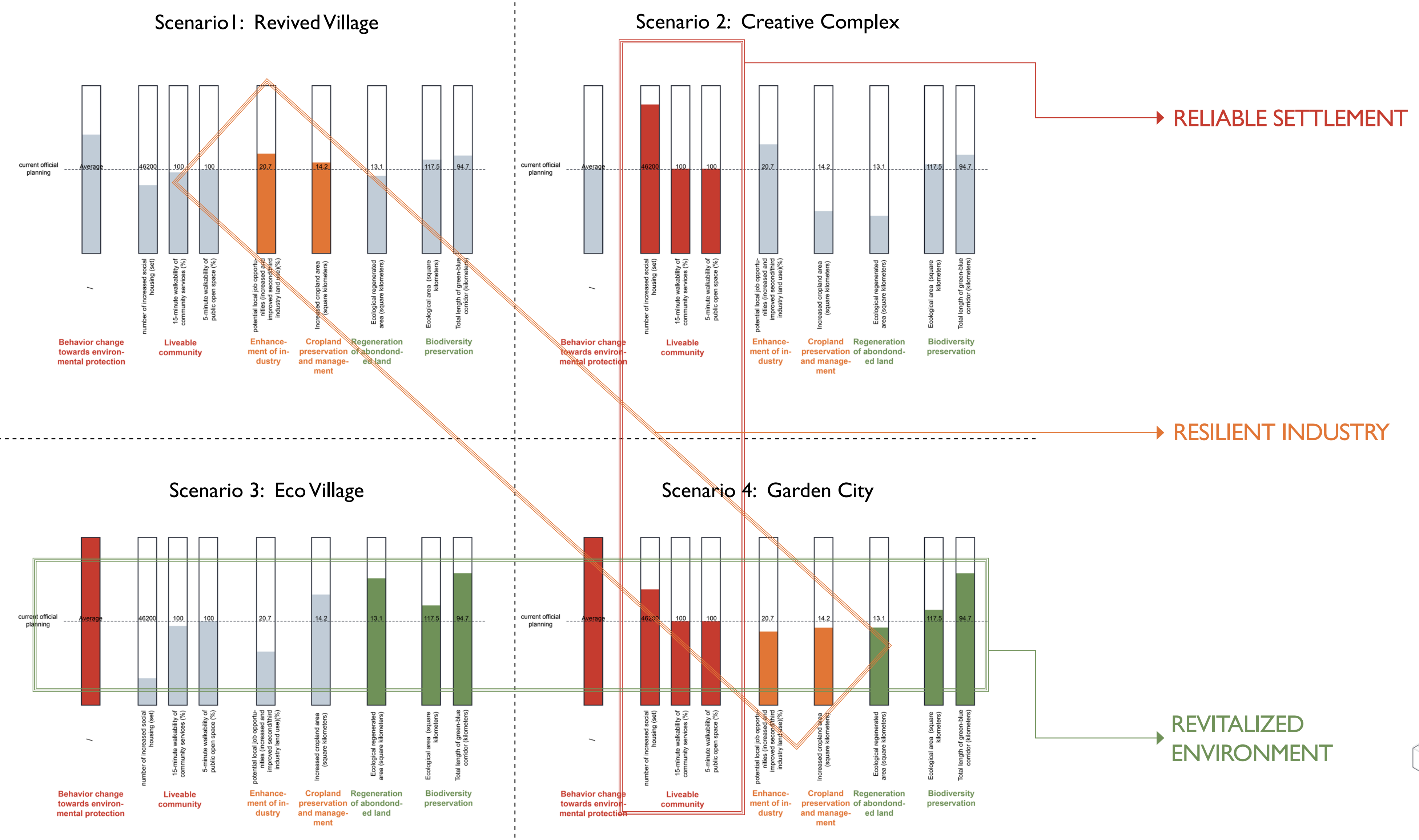
Based on the comparison of the assessment results, it can be concluded that Scenarios 1 and 4 are relatively average in terms of social, productive, and ecological systems, Scenario 2 has a great improvement in industry but lacks ecological protection, and Scenario 3 is far more environmentally friendly than other scenarios, but is at a disadvantage in terms of both the social and the productive systems. The value for social housing varies considerably, but all largely correspond to the needs of the scenario's development. From the classification of the axes, scenarios in the counter-urbanization direction have a clear advantage in replenishing cropland, but the accessibility of residential areas is reduced; scenarios in the ecological protection direction substantially increase ecological space, and are relatively insufficient for the enhancement of industry.

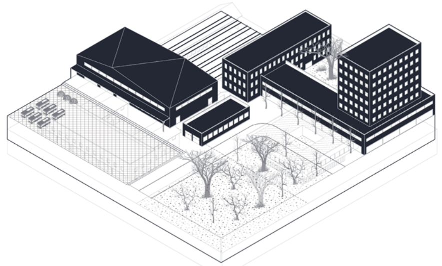
In summary, these four scenarios are ideal visions of the future under different trends and have their advantages and disadvantages. By comparing them with each other, this thesis summarizes the principles in the three directions of improving society, production, and ecological systems, and by applying these principles in an integrated manner and making spatial trade-offs, a strategic plan is derived to serve as a guide for action in the short term. Details are explained in the next chapter.

Source: Author's own

Chapter 5 Design

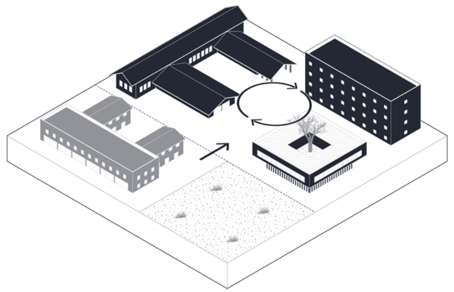
5.1 Principles



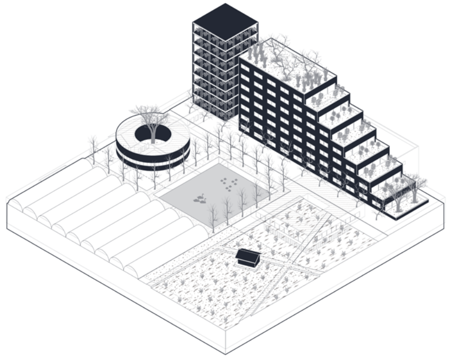


accessible infrastructure

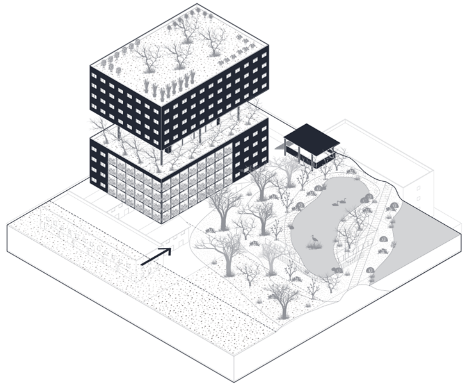
densification and renewal



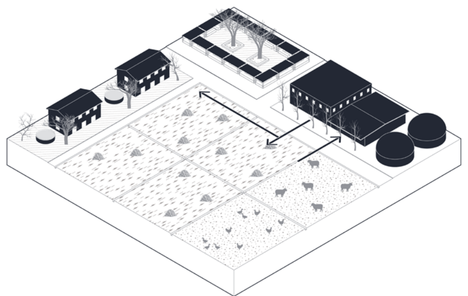
brownfield regeneration for diversified industry



modern and urban agriculture

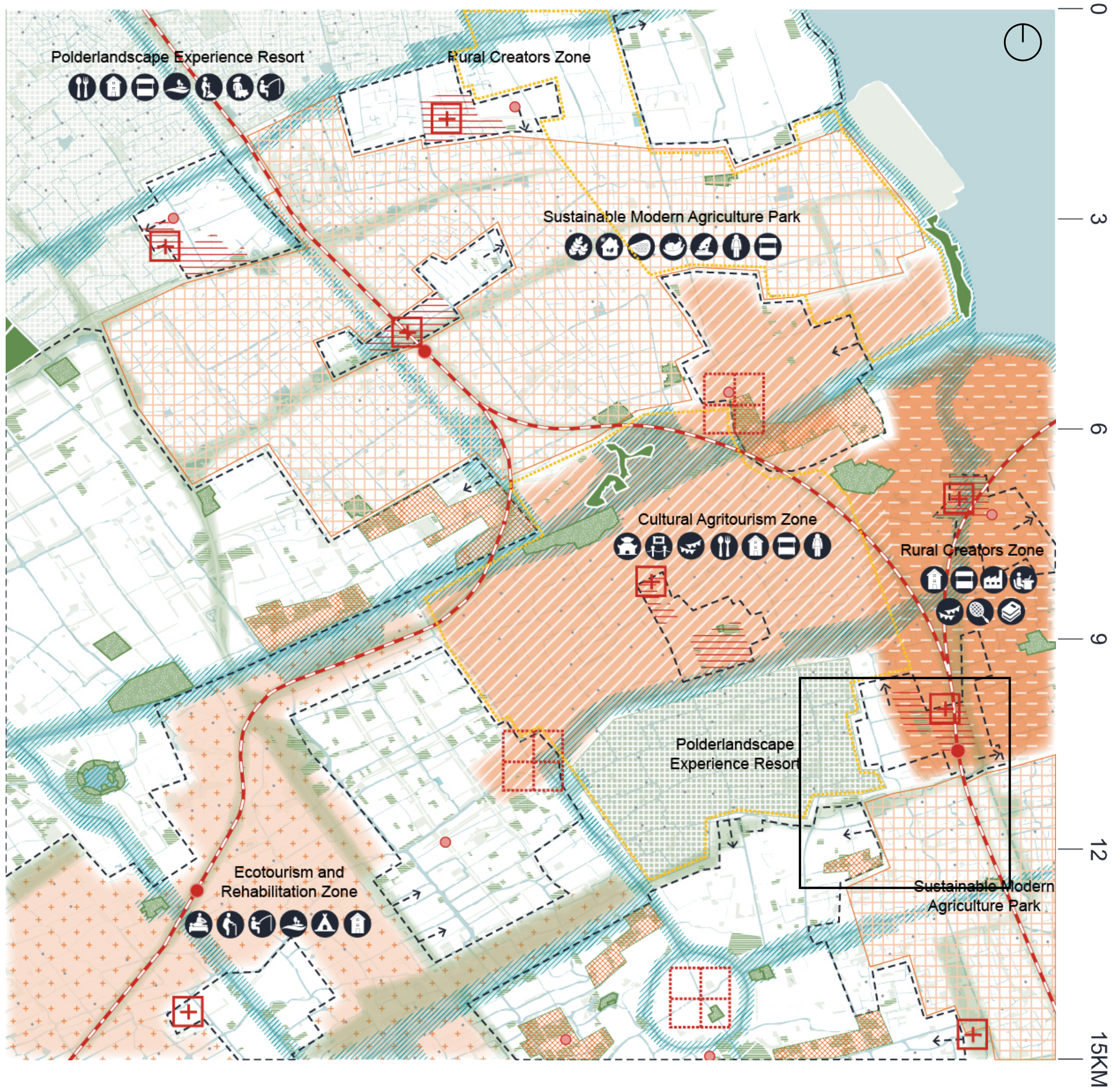


ecosystem restoration



resource recycling

5.2 Strategic Plan



- agriculture production
- greenhouse
- aquaculture
- fishing
- fruit picking
- planting experience
- breeding experience
- homestay
- restaurant
- market
- tourism landscape
- camping
- festival
- historical town
- museum
- old care
- rehabilitation
- office
- sports
- library
- factory
- research
- study

- urban development boundry
- expansion/shrinkage direction
- sustainable modern agriculture park
- ecotourism and rehabilitation zone
- cultural agritourism zone
- rural creator zone
- polder landscape experience resort
- densification area
- regeneration area
- urban agriculture
- climate park
- wetland park
- water buffer
- green corridor
- water
- historical town
- rural complex project
- railway
- railway station
- bus station
- village
- flexible zone for future possibilities

The strategic plan applies the '3R' principles derived from scenario building to provide integrated and comprehensive guidance for actions and programs towards 2050.

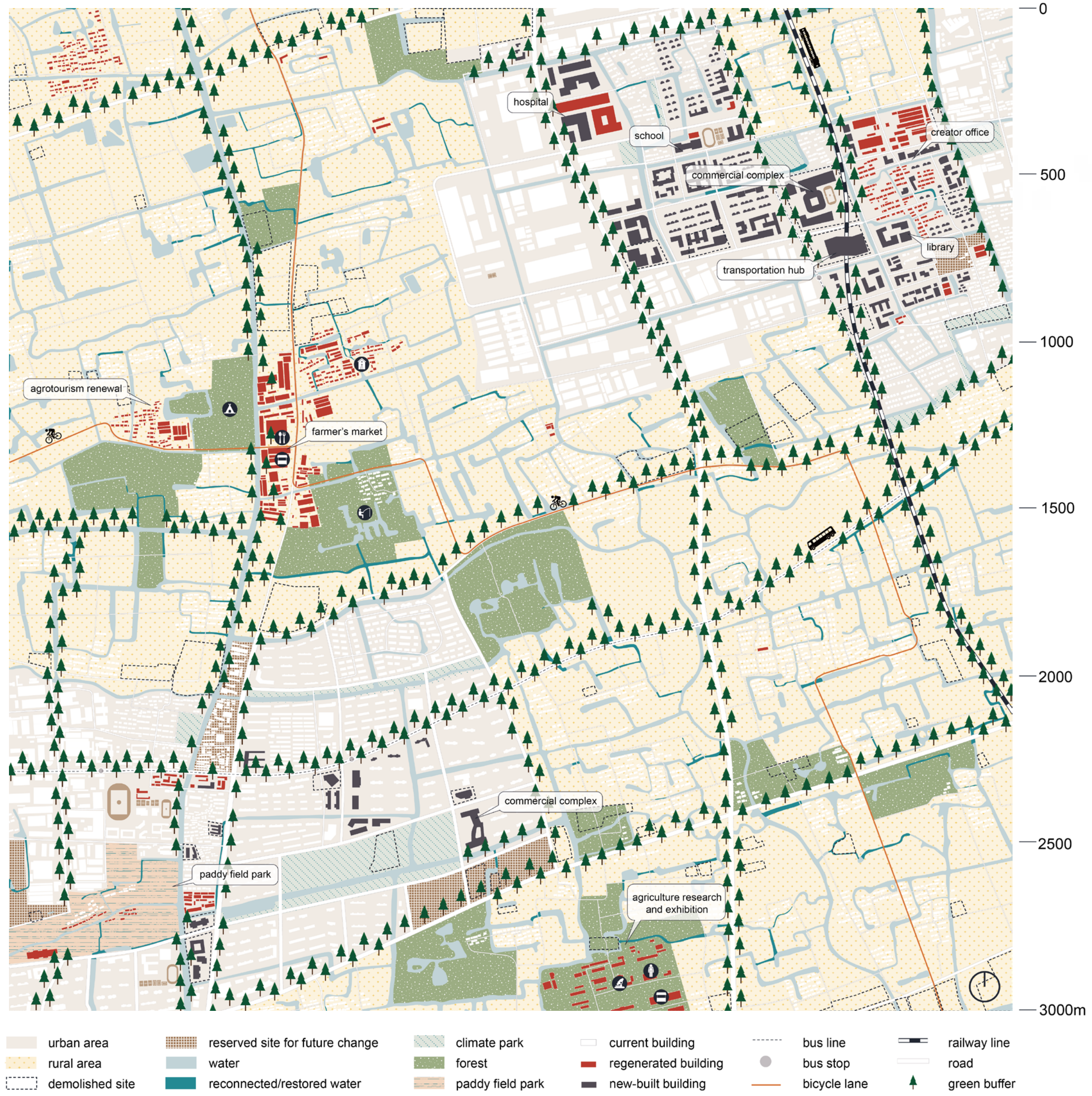
For the social system, the first principle, 'reliable settlement', aims to provide local and foreign populations with residential areas of high environmental quality and amenities. Additional rail links to the east and towns are equipped with public transportation hubs, making them more connected to each other. Small villages close to urban areas are relocated, and large villages take the lead in the housing renewal to improve the general living conditions. Rural complexes set up in towns radiate to a wide range of rural areas and provide the necessary services such as medical care, social gatherings, and administration services. Inefficient industrial and unused land is densified and regenerated through ecological restoration to provide affordable social housing for relocated villagers, migrant populations, and young entrepreneurs.

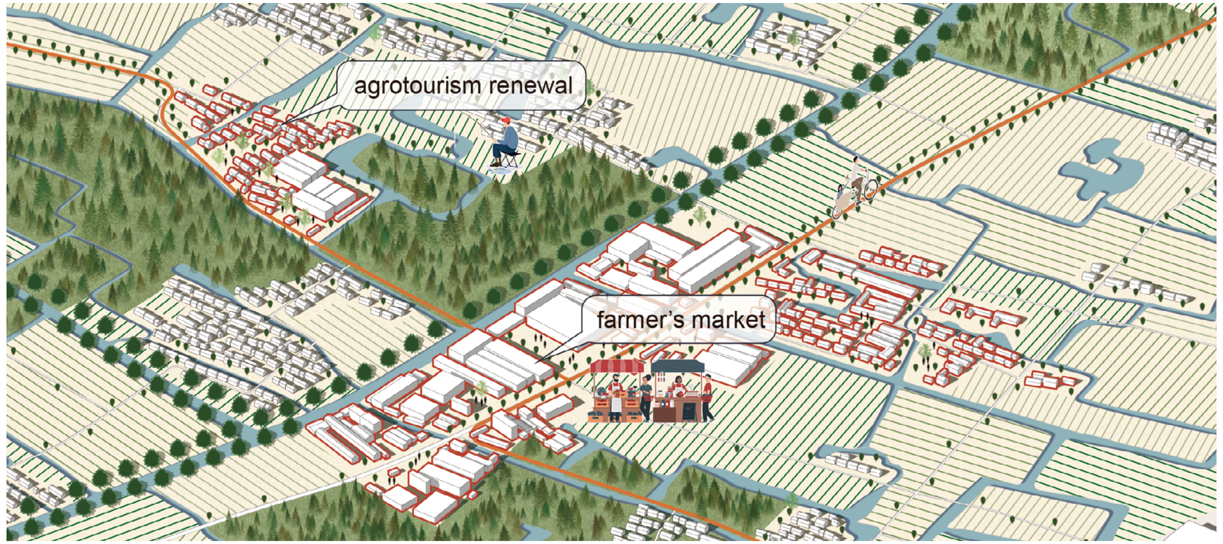
In terms of the production system, agriculture remains the mainstay of the region, with inefficient industries being replaced and urban agriculture being increased to make up for the loss of cropland due to construction. At the same time, relying on agriculture and good ecological and historical resources, the tertiary industry will be vigorously developed, with the establishment of polder landscape agricultural experience zones, modern sustainable agricultural parks, ecotourism and rehabilitation zones, cultural agrotourism zones and rural creator zones. While ensuring agricultural production, it will provide tourists with good landscape and leisure services, create job opportunities for local residents, and increase their income. In addition, cooperation among industries should be strengthened, making full use of existing educational, scientific research, and production resources for synergistic progress.

Restoration of ecosystems is also one of the key issues in the region. The establishment of buffer zones on both sides of major watercourses and roads, connecting the city's climate parks with existing wetlands and forests, together form regional blue-green corridors that provide habitats for a diversity of organisms. At the same time, the construction of a biomass power plant and a rainwater harvesting system will promote the economical use of resources and raise the overall environmental awareness of the population.

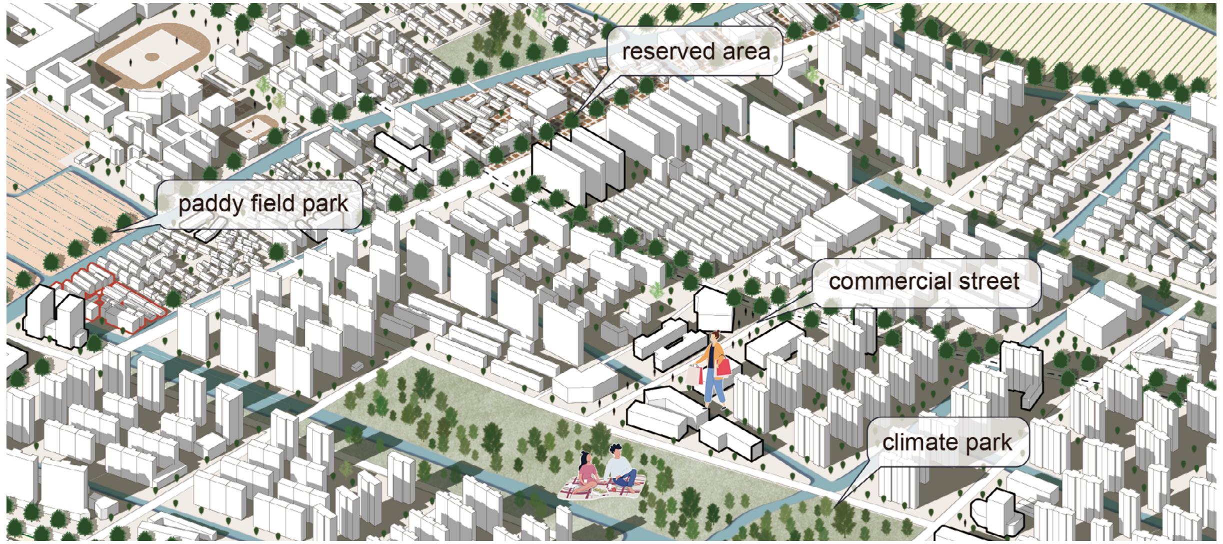
According to this strategic plan, major development and expansion are concentrated in small and medium-sized towns, with large cities contracting slowly. Several strategic white space areas have been retained, which can be adjusted according to future development trends. A 3km*3km showcase will be explained in detail in the following chapters.

5.3 Showcase: Xuxing Town Area

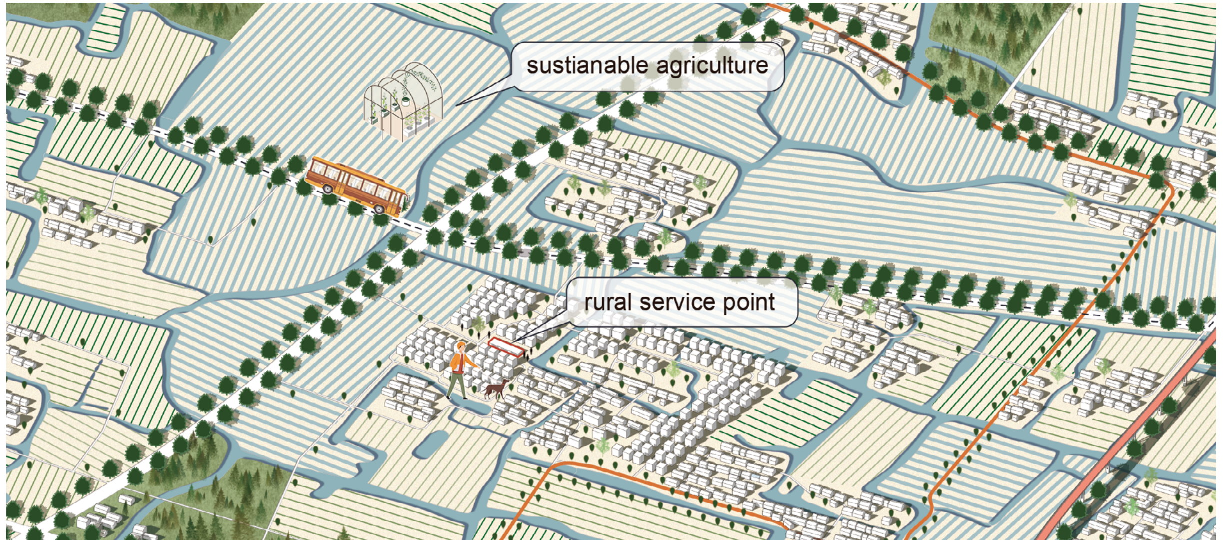




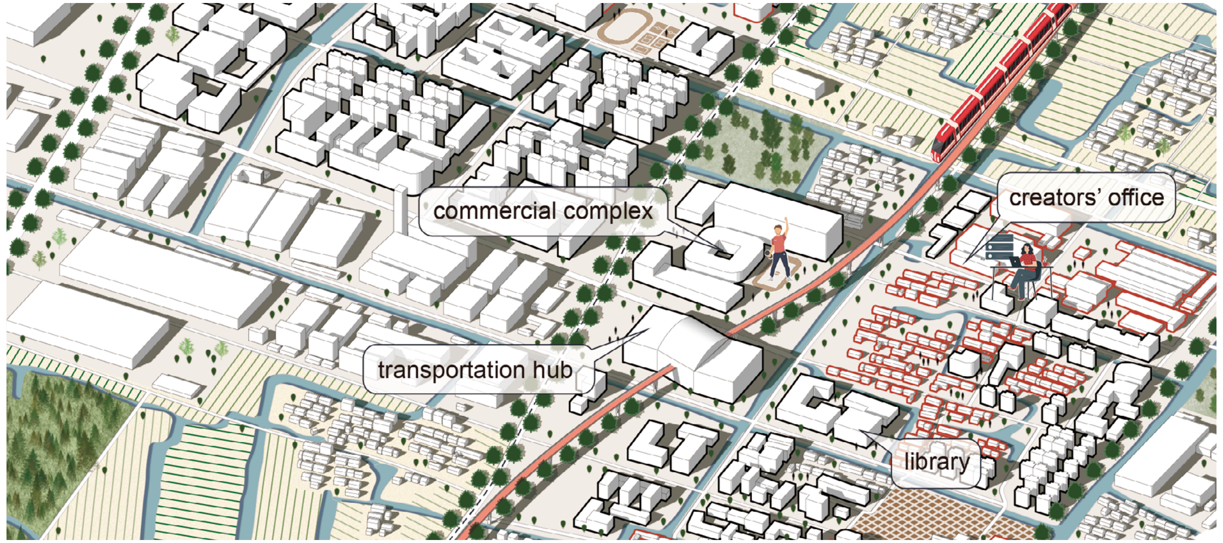
Polderlandscape Ecperience Resort



Jiading New City



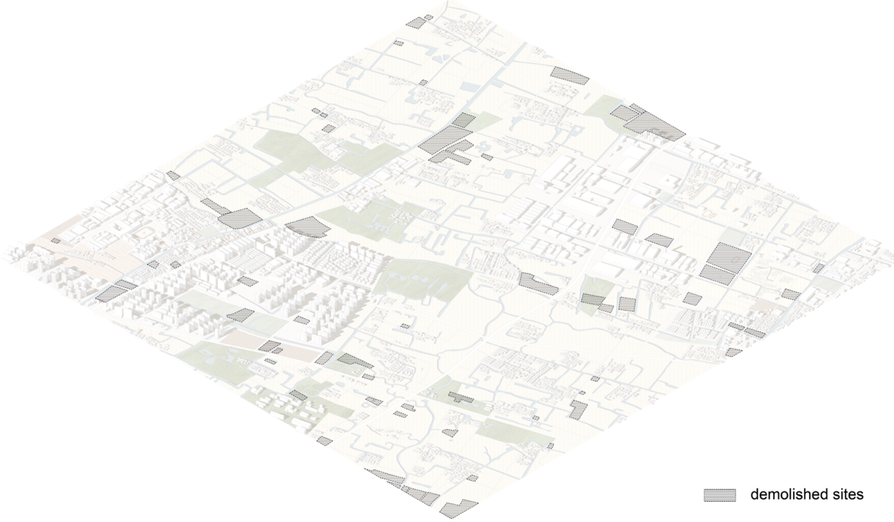
Sustainable Modern Agriculture Zone

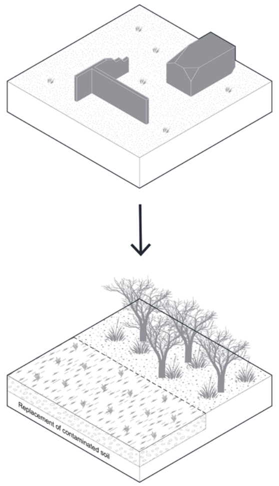


Xuxing Town

5.3.1 Phasing

PHASE 1: DEMOLISH AND REPLENISH

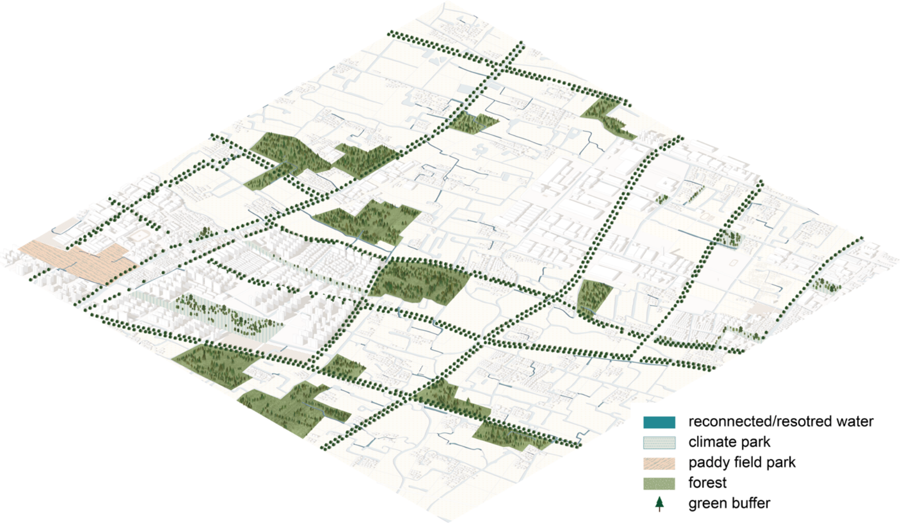


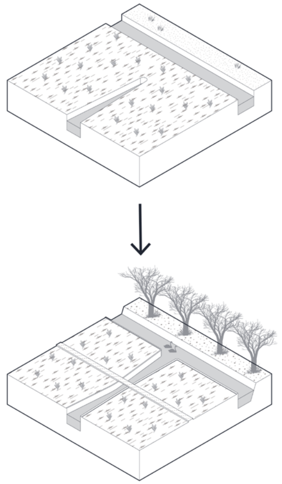


Stakeholder power/interest analysis

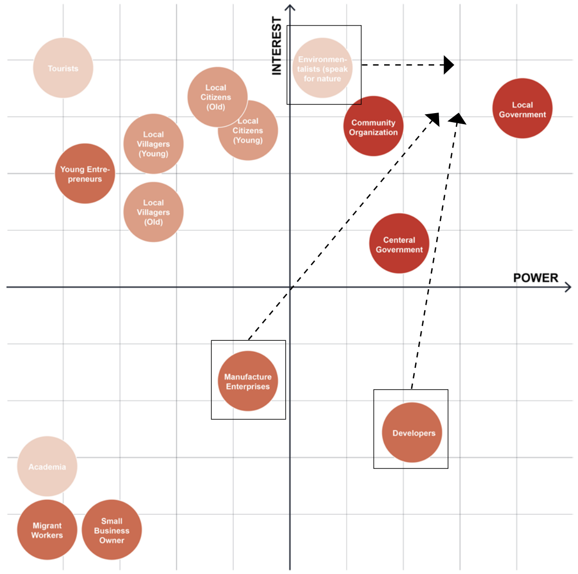
The first stage involves the destruction of abandoned and inefficient industrial land, the removal of soil pollution and its conversion into cropland, along with a small portion of ecological land and land for urban construction. Most of these abandoned lands are township enterprises, which are rural collective lands under the supervision of the local government. The government's policy of 'industrial land reduction' needs to take full account of the views of rural collective economic organizations and enhance the interest of local villagers through policies or incentives. Overall, this initiative is both effective in improving land utilization and beneficial to most stakeholders, but the time and money required to deal with contaminated soil are the main challenges.

PHASE 2: RESTORE THE ECOSYSTEM



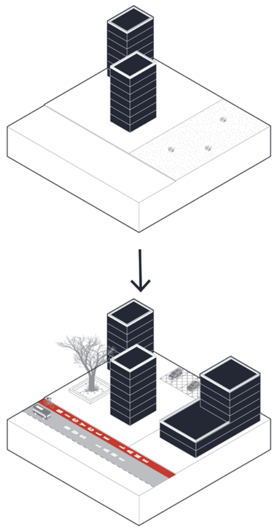


Stakeholder power/interest analysis

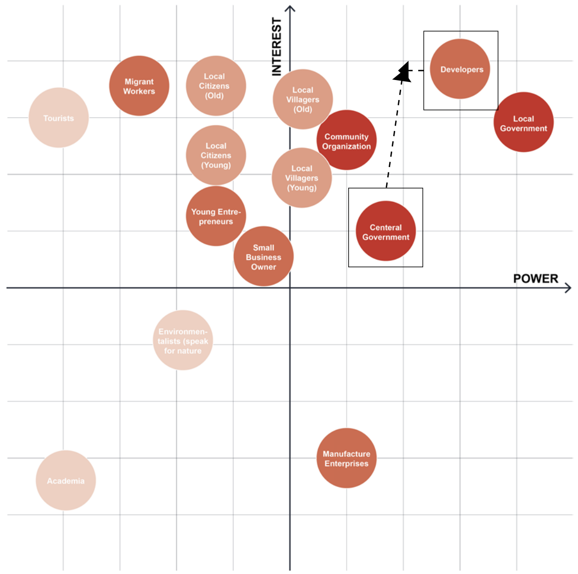


The second phase is to restore the ecosystem and build a water and green network by dredging clogged rivers, creating green buffer zones to connect green patches, and renovating climate parks and paddy field parks, in which environmentalists should play an important role. These initiatives help to improve environmental quality and are appealing to city residents and tourists alike, but they are often costly to build and maintain, and have no direct economic impact. Due to limited government investment, there is a need to increase the participation of businesses and developers in addition to top-down construction.

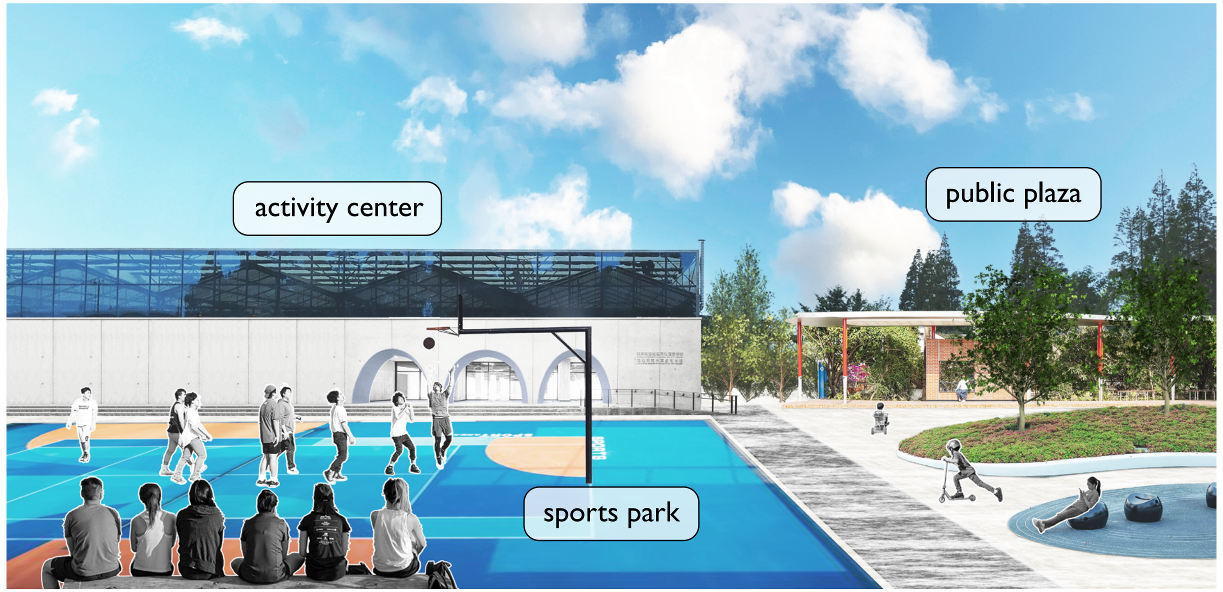
PHASE 3: IMPROVE INFRASTRUCTURE



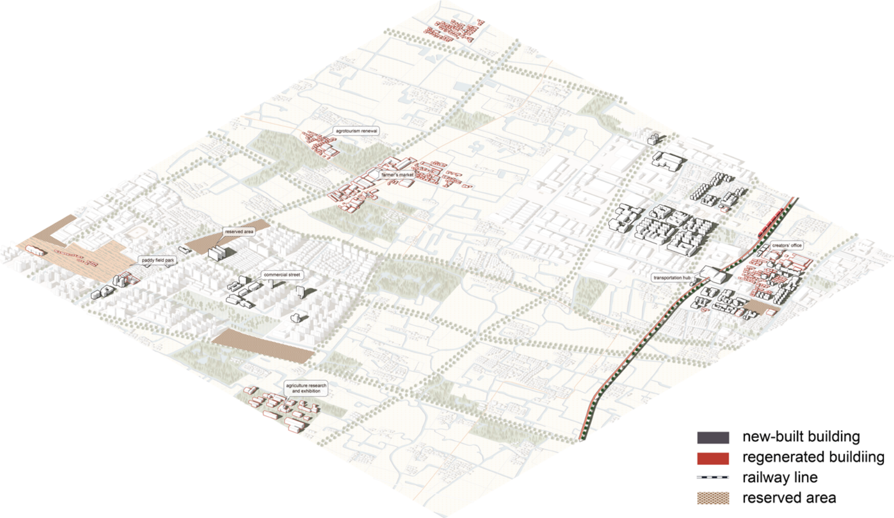
Stakeholder power/interest analysis

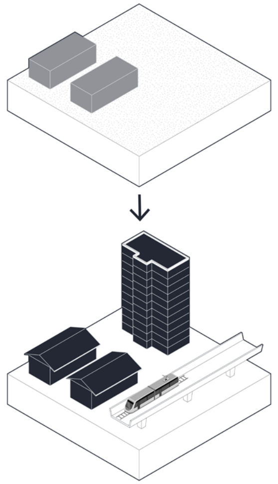


The third phase is aimed at upgrading infrastructure services. Examples include the provision of additional public transportation lines and cycling paths to serve residents, villagers and tourists who need to commute between towns; the allocation of schools, hospitals, shopping malls, libraries and other types of service facilities and complexes radiating from rural areas to new towns in conjunction with the abandoned industrial sites demolished in the first phase; and the renovation or construction of small-scale integrated service stations for large villages to meet the basic daily needs of villagers. These initiatives have helped to improve the living standards of residents, while the development of large-scale commercial projects has provided income for local governments, developers and merchants.

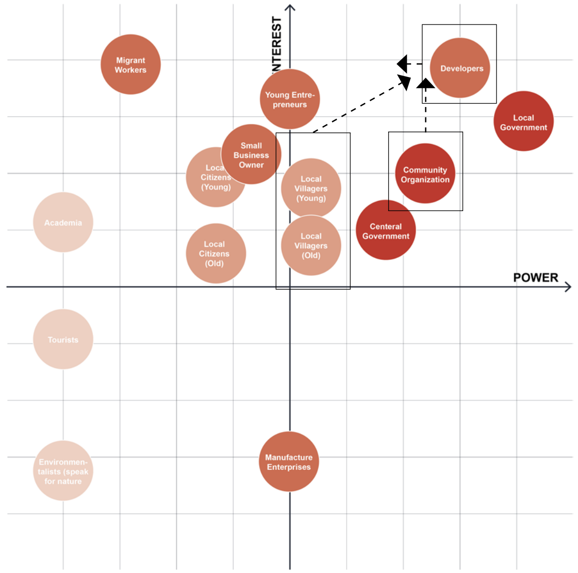


PHASE 4: REGENERATION

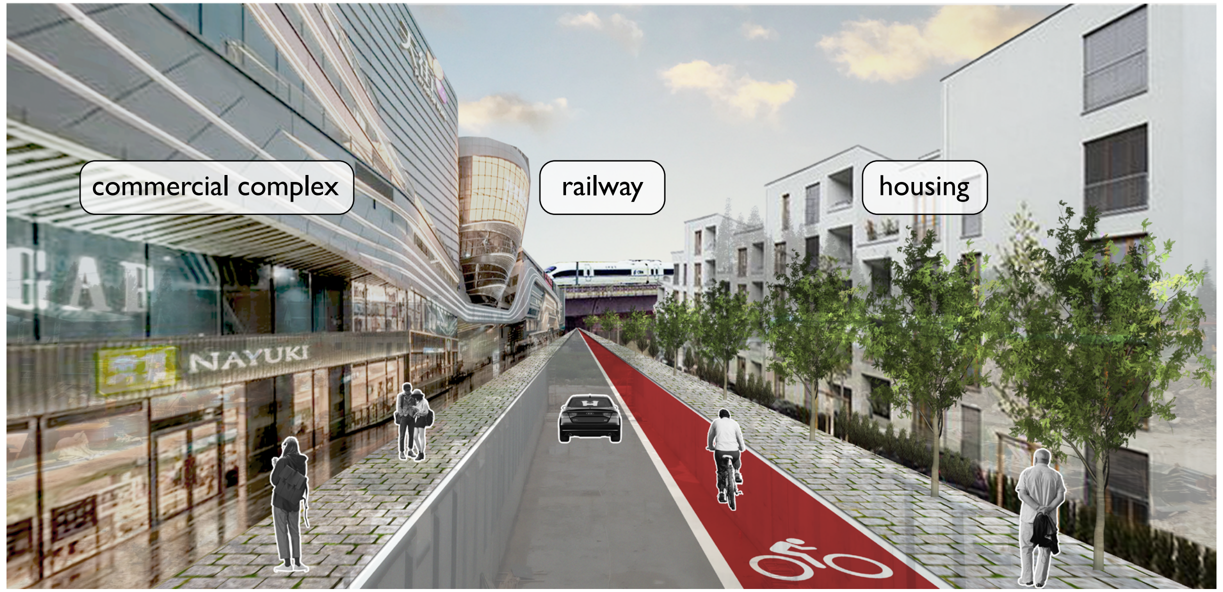




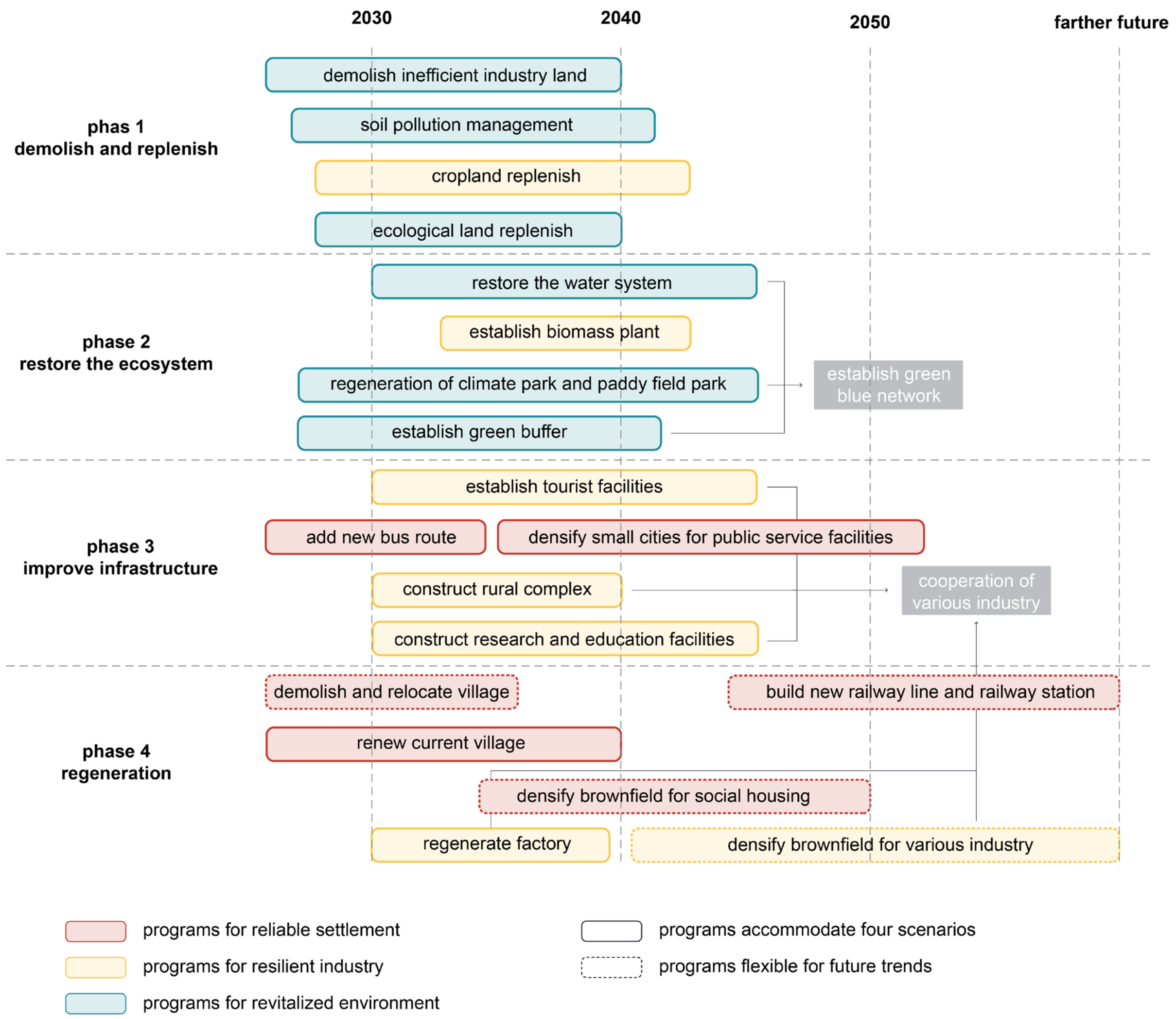
Stakeholder power/interest analysis



The last phase is regeneration, which is a flexible process that can be adjusted accordingly. Part of the site can be used as a strategic reserve to accommodate future trends; existing older villages and industrial areas can be regenerated and transformed into office buildings, agricultural resorts, and scientific research centers to enrich the region's industries; part of the unused land and demolished industrial land can be used for new residential, commercial and recreational facilities, and the need for additional railroads can be determined according to the population and scale of urban development. These initiatives will involve several stakeholders such as large enterprises, rural collective organizations, developers, etc. The government should take a guided approach to rural renewal and promote the completion of renewal from the bottom up.



5.3.2 Timeline



The transformation will start with the removal of abandoned sites and treatment of pollution, along with the replenishment of cropland and environmental restoration, as well as the addition of ecological space such as green buffer zones and climate parks, and by 2040 phases 1 and 2 will have been largely completed, with the construction of an integrated system of water and green ecological networks on a regional scale. Some villages and township enterprises will be relocated or upgraded according to the land consolidation in this time period.

By 2045, Phase 3 of the urban infrastructure upgrading will be basically completed, with the addition of public transportation routes, social housing, educational and commercial facilities. Good infrastructure and ecological environment will provide for the development of agro-tourism and promote cooperation among industries.

By 2050, the city will be densely regenerated in line with future trends, adding housing, transportation hubs and commercial facilities on reserved sites according to the population size and diversifying local industries.As a result, many uncertainties remain for Phase 4.


Source: Author's own

Chapter 6 Conclusion

6.1 Answer the Research Questions

1. What is the urbanization process and what are the characteristics of peri-urbanized areas in China?

Shanghai has been undergoing rapid urbanization since the 1980s and has been expanding into the suburbs. This process of expansion, in which previously agricultural land is constantly being transformed into industry, services and other industries, is known as peri-urbanization. There are three main drivers of Shanghai's peri-urbanization process: state-led top-down development, market forces and bottom-up rural industrialization. The state-led top-down development laid down the main structure of Shanghai's suburbs and was closely related to the city's industrial and economic development so that the newly established large industrial parks and satellite towns rose and fell with the restructuring of the industrial structure in the process of peri-urbanization. With the land and housing reforms, a large amount of capital, especially foreign capital, poured into Shanghai's peri-urbanized areas. Strong market forces accelerated the process of peri-urbanization, and the scale and speed of urban development far exceeded expectations, leaving behind many 'urban sprawl' problems. Bottom-up rural industrialization has had relatively little impact but has contributed to changes in the structure of the rural economy.

Shanghai's peri-urbanized areas are characterized by their rich heterogeneous mosaic landscapes with a mix of functions and fragmented land use. To better understand peri-urbanized areas, they can be broken down into three ecosystems: urban, productive, and natural. The urban ecosystem is dominated by villages, small towns that play an increasingly important role in the urban structure, interacting with both villages and cities, and historical towns that are particularly unique in their social value. In the production ecosystem, agriculture is still the dominant industry, with rice production being the most famous in the area around Shanghai, while electronics and manufacturing are the main types of industry, with service industries being relatively weak. In addition, the region has a good ecological base with a dense water network and several wetland parks.

2. How does peri-urbanization affect the local socio-ecological conditions, taking Jiading-Taicang region as a study area?

The process of peri-urbanization has transformed a large amount of agricultural land in the Jiading-Taicang region into urban and industrial land, which has had a great impact on its social and ecological situation.

Socially, the region has experienced rapid growth in urban population and economic output, but a slow decline in rural population and agricultural income. The influx of young rural laborers into the cities and towns has led to the phenomenon of hollow villages, and the large number of migrant workers has made urban management more difficult. In addition, during the period of rapid urban development, the lack of laws and regulations and the lack of governmental supervision have led to the existence of many unauthorized buildings and poor housing quality and living environment.

The process of peri-urbanization has had a great negative impact on the ecosystem of the region. The most intuitive impact is the fragmentation of land due to urban sprawl, where large amounts of agricultural and ecological land have been replaced by built-up land, the polder system has been broken up, and the water surface has been reduced, leading to a decline in biodiversity. In addition, industrial production and human activities have caused soil, air, and water pollution and increased resource depletion.

3. What alternative design scenarios are possible to improve the socio-ecological conditions of peri-urban areas in China?

Scenarios are built to deal with different future possibilities. Based on the SWOT analysis, four development directions were established: 'Zwischentadt' (growth of small and medium-sized towns), counter-urbanization, industrial redevelopment and environmental protection, and four scenarios were combined: revived village, creative complex, eco-village and garden city. Each scenario develops strategies for optimizing urban, productive and natural ecosystems according to the development model, resulting in integrated solutions. As a result, all four scenarios are optimal choices under different models and guide future development.

4. How to evaluate different scenarios and extrapolate to a strategic plan?

Based on the analysis of the problems of urban, productive, and natural ecosystems in the area, six design objectives were established: behavior changes towards environmental protection, livable community, enhancement of industry, cropland preservation and management, regeneration of abandoned land, and biodiversity preservation. preservation and management, regeneration of abandoned land, and biodiversity preservation. These six objectives were quantified and evaluated for each scenario concerning official planning indicators.

Based on the comparison between the different scenarios, the relevant strategies of the scenarios with excellent evaluation results in terms of urban, production and natural ecosystems were extracted to form three principles: reliable settlement, resilient industry and revitalized environment. The three principles have complementary and conflicting parts, and spatial choices were made to form a strategic plan for the near future. As a result, the plan presents initiatives that apply to all four scenarios and offers the possibility of flexibility.

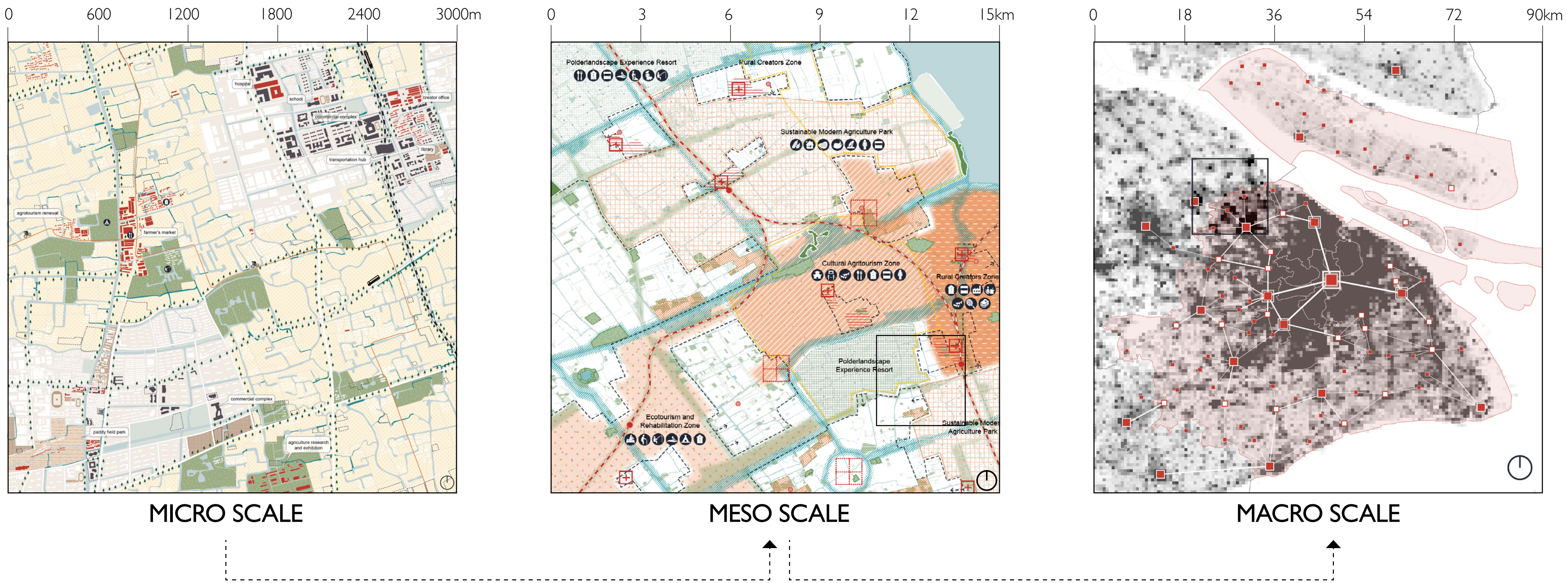
5. How to transfer the knowledge to other peri-urban areas in China?

This thesis works between different scales. The showcase, Xuxing Town in the Jiading-Taicang area, demonstrates the details of the design at the micro-scale, which includes four main phases: demolishing derelict and inefficient industrial land to replenish agricultural land; revitalizing the local water and green ecosystems; upgrading the infrastructure for transportation, healthcare, commerce, and social services; and improving the quality of the living environment and reconstructing the industries through urban regeneration.

Expanding to the meso-scale of Jiading-Taicang region, the first three phases of micro-design can be repeated, while the fourth phase of urban regeneration will be adjusted according to the population size and advantageous industries of different areas, and rationalized concerning the functional zoning of the meso-scale urban design. For example, the urban regeneration of rural creative districts focuses on social housing, office buildings and infrastructure, while the urban regeneration of agricultural experience districts focuses on village renewal and renovation for tourism.

Further expanding the scope, focusing on the whole Shanghai neighborhood and even the entire Yangtze River Delta, as the developed coastal areas are expected to have similar development trends, so the basic phases will be applicable when reconstructing the industry, it is necessary to fully study the local characteristics and strengths, and coordinate with the neighboring areas to complement each other, integrated development.

To summarize, this thesis provides a detailed case design at the micro-scale, a strategic plan for the meso-scale, and some outlooks and insights for the macro-scale.



6.2 Reflections

I have always been interested in exploring the relationship between human beings, cities and the natural environment, and I hope to contribute to the construction of my hometown as an urban planner, which is the reason why I chose the Metropolitan Ecology Studio and Urbanism program. Inspired by Allen's (2003) concept that 'peri-urban areas are characterized by heterogeneous mosaic landscapes with three intertwined ecosystems', in the past year, I have focused on studing the changes in urban, productive and natural ecosystems in the peripheral area of Shanghai under the influence of the peri-urbanization process, and proposing strategies to enhance the regional socio-ecological situation. Although the process has been tortuous, looking back on the whole project, I am happy to say that the final result is in line with my initial expectations.

SCIENTIFIC RELEVANCE

As China's urbanization process accelerates, research on peri-urban areas has been increasing over the past decade or so, but there is still a lack of a recognized definition of 'peri-urbanization' and a more general methodology for analyzing peri-urban areas. This thesis summarized the studies of McGee (1991, 2009), Webster (2002), and Chen et al. (2020) to explain the definition and differentiation of peri-urbanized areas in China; summarized the peri-urbanization process around Shanghai in terms of the drivers, and the peri-urbanized areas are analyzed in detail in terms of urban, production and natural ecosystems with reference to Allen's (2003) definition.

In addition, existing urban planning in China is still characterized by "urban orientation", relatively weak planning methods and concepts for peri-urban areas. This thesis begins with a reflection on official planning and offers insights into this gap through a design trajectory of scenario building-strategic plan-showcase. Scenarios were built to cope with the uncertainty of the future. Different development directions were identified through SWOT analysis, and comprehensive optimal solutions were proposed for each of the four different development modes, thus all four scenarios are ideal visions of the future. A strategic plan that can be applied to all four scenarios is necessary to better clarify near-term actions. By evaluating and extracting the best strategies from the four scenarios, three principles for urban, productive and natural ecosystems were integrated and spatial trade-offs were made to obtain the strategic plan. The showcase presented a more detailed description of the implementation process of the strategic plan, whose first three phases will be universally applicable to all visions, while the last phase is flexible and variable, allowing for convergence to any scenario as trends develop. This design trajectory thus proposed both solid near-term actions and guidance for future development, while making possible the application of the design strategy to a broader region.

SOCIETAL RELEVANCE

From a social perspective, peri-urbanized areas are key areas for future urban development. At present, the planning of China's large cities has gradually evolved from "incremental planning" to "stock planning" and "reduction planning". With the rise of the "digital nomad" and "web 3.0" concepts and the national policy of encouraging talented people to return to their hometowns, more and more urban populations will flock to peri-urbanized areas. At the same time, the problems of population loss and agricultural decline in the countryside are becoming increasingly serious. Therefore, the development of small and medium-sized cities in peri-urbanized areas, as a bridge between the countryside and the city, is urgent. The design solutions proposed in this thesis focused on small and medium-sized towns to reconstruct China's urban-rural system and enhance the overall social and ecological situation of peri-urbanized areas.

Moreover, urban development is often closely linked to the economy and comes at the cost of depleting ecological resources. Although environmental protection is repeatedly mentioned at the national policy level, it is rarely reflected in urban planning. The design solution proposed in this thesis sought to strike a balance between industrial development and ecological protection, and to guide people's behavioral changes towards environmental protection through governmental programs, so that human beings can live in harmony with nature. Environmental protection also includes the protection of polder landscapes and historical towns, landscapes with humanistic values that were well protected in the scheme of this thesis and were given an important role in revitalizing the industry.

ETHICAL CONSIDERATIONS AND LIMITATIONS

The outcome of this thesis is a 'practical' design proposed through research and analysis, with many limitations due to the many factors that were not taken into account in the process.

First, the completeness and accuracy of data acquisition needs to be further improved. Due to limited open-source data and statistical frequency, the data in this thesis come from official websites, research materials of other scholars and online information, so many data are not the most recent and accurate, and thus the judgment of current trends may be biased. Due to limited personal energy, the sample of interviews with relevant stakeholders is small, so the conclusions drawn may lack generalizability. Therefore, the arguments in this paper need to be supported by more sample data.

Secondly, due to geographical factors, a two-day field survey was conducted only after the research section and before the design section. Therefore, after conducting the field survey, it was found that the actual situation deviated from the preliminary analysis, resulting in many parts of the study that needed to be updated and modified. It was also difficult to obtain the specific information needed again at the later stage of the design.

Finally, the stakeholders are not directily involved in the design process. The analysis in the showcase was based on interviews of a small number of local stakeholders and experience of current practices. In reality, the complexity of rural land tenure and the large amount of funding required for the program make it questionable whether it can be implemented and replicated elsewhere.

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Appendix

VARIOUS ACTIVITIES IN THE PERI-URBAN AREA

Agricultural mechanization by Li Bing

Education by Zhu Jianfeng

Biking by Shen Jian

Fishing by Lv Peiji

Picking lotus roots by Jiang Huihua

Rituals by Geng Zhanchun

Source: http://www.cpanet.cn/detail_picdetail_127584.html

Q-Author
A-Shiyun Chen
Date: 2023.09.12

Q: What do planners in China see as the main problems in the countryside today? What are the social and environmental considerations for the countryside?

A: At present, China's countryside, especially in the Yangtze River Delta region, is seriously gentrified, and a large number of villages have been transformed into tourist lodgings, losing their original rural appearance. The planner mainly focuses on the industrial restructuring of the countryside and the cooperation mechanism between the government and market forces to make the rural industry more organic. There is less consideration of environmental factors, and in the more developed coastal areas, factories with higher levels of pollution will be relocated, but in most rural projects there is still more focus on economic growth.

Q: Does China currently have any policies for rural revitalization? What are some concrete examples of projects?

A: China has put forward the 'My Hometown, My Construction' policy, which aims to encourage highly educated and talented people to return to their hometowns, i.e., small and medium-sized towns and rural areas, in order to promote the construction and development of the countryside. At present, many rural construction projects in China are "driven by the talented", through which those educated people go back and become 'rural planner", to explore the characteristics of the countryside and create cultural and creative IPs, such as selling special agricultural products, organizing music festivals, and conducting study activities. In addition, there are also market forces, such as the concepts of 'digital nomads', 'Web 3.0', and 'work from home', which aim to attract home-based workers or young entrepreneurs to stay in villages with beautiful environments and rather cheap costs.

Q: Will there be any difference for rural revitalization in different areas?

A: In the Yangtze River Delta region, such as Shanghai, there are strong market forces and usually government-market cooperation; however, in the northern region, rural revitalization mainly relies on government guidance.

Q: Where do land and rural populations go after villages are relocated?

A; The relocation of villages and merging of sites, which was a relatively common practice a decade ago, is now less frequent as the urbanization process slows down. Few people with rural household registration in the YRD region continue to work in agriculture. They have contracted their land to the government or large agricultural companies. However, the income from this is very small, so they usually enter factories or towns to work. There are also some new concepts, such as leasing land to urban residents and managing it on their behalf.

Q: What do you think are the future trends in peri-urbanized areas?

A: The current urbanization process is slowing down, and big cities are becoming saturated, so in the future small and medium-sized towns will play a more and more important role in China's urban construction, he needs to ease the population of big cities, while providing supporting infrastructure for the vast countryside.

SCENARIO REFERENCE CASES

1.Digital Village Construction Guide 1.0

The document proposes a general reference architecture for the construction of digital villages in the context of rural revitalization as well as several referenceable application scenarios. It proposes the development of green agriculture, smart agriculture and new rural businesses. Rural new industries include smart rural tourism, smart adoption agriculture, etc., which are new industrial organization forms under the integrated development of rural agriculture, forestry, animal husbandry and fishery, tourism, culture, education, recreation and health care industries.

数字乡村建设指南 1.0

2021 年 7 月

Source: http://www.moa.gov.cn/hd/zqyj/202301/P020230104556857814615.pdf

2.8342 Yangtze River Delta Roadshow Center

This is a project to renovate and upgrade an abandoned industrial park. It is located in an ancient town at the junction of Shanghai and Zhejiang, with a cluttered surrounding landscape and a rich water network. Through a repeated demonstration of the overall identity and overall function of the building, it was given a function more conducive to the future - a roadshow center, and also as a start-up project for the development of the entire ancient town. The renovation utilizes local materials, preserves its historical characteristics and fully integrates it into the atmosphere of the ancient town, and 'repairs' the damage and pollution caused by industrial production to the water body through ecological landscaping and green architectural methods, with the appearance of a water town in the south of the Yangtze River.

Source: https://www.gooood.cn/8342-yangtze-river-delta-roadshow-center-and-studio.htm

3.'Tianfu Xinxing – Hesheng Pastoral Oriental' Pastoral Complex

The project is a spatial experiment based on the philosophy of neo-rusticism in the idyllic scene, aiming to create a new ecology of urban-rural integration in the countryside, encompassing a rural community and a rural enterprise cluster. In the residential community part, the designer continues the original spatial base of the project, takes the mechanism adjustment and settlement integration as the expression, organizes more space and area for villagers to use for living and production, and embeds the functions of commercial retailing, business exchange, cultural and art exhibitions through the renovation of the old buildings, to become the communication center for villagers. The Village Enterprise Cluster, on the other hand, attracts new farmers from local cultural, scientific, and agricultural enterprises with idyllic, low-density working and living environments, and provides them with intelligent and shared office environments.

Source: https://www.gooood.cn/common-ground-pastoral-demonstration-area-western-sichuan-china-by-syn-architects.htm

4.Roadside Station - Integrated Service Center

The project is the entrance building to a rural complex project on the site of a residential property to be demolished. In terms of function, it undertakes visitor center, citizen service and juvenile court instruction, and undertakes wedding, study, and salon activities to generate revenue. These complexes are characterized by low-cost and high effectiveness through acupuncture-style point renovation, successfully awakening the vitality and aesthetic enhancement of urban-rural return. Localized rural surrounded by urban become possible, and blurred urban township clusters may become one of the feasible exploration directions.

Source: https://www.gooood.cn/road-corridor-station-by-hangzhou-onedesign-architecture-landscape-design-office.htm

5.Revival of Village Vitality under the Second Activation – Rural Revitalization of Gaohuai Village in Deyang

This rural revitalization project is based on consolidating the natural ecology, upgrading the quality of life of villagers, stabilizing the rooting and residence of new farmers, and resonating with the rustic belonging of tourists. Through the restoration of aquatic systems and the establishment of native plant systems, the ecological resources of the countryside will be enhanced. The villagers' co-construction realizes low-cost landscape creation, such as the regularization of important traffic routes, the construction of village assembly plazas, the restoration of suspension bridges across the river, and the addition of a series of crop market trading points, etc., all of which are designed to serve the villagers' production and life. New waste decomposition technology is introduced to reduce environmental pollution, and high-quality bacterial fertilizer is produced for agricultural use to improve the soil, forming a resource cycle. On this basis, it introduces diversified industries such as fan production, ballad creation and plant dyeing to meet the needs of tourists for food, accommodation, tourism, education and other diversified rural experiences, forming a mutual support of commercial value.

photo taken in 2018

photo taken in 2022

Source: https://www.gooood.cn/8342-yangtze-river-delta-roadshow-center-and-studio.htm

6.Daoxiangyuan, Chang'an Park

The project is located in the urban area of Xi'an City, and most of the site is permanent basic farmland, which needs to maintain its food production attributes and functions. Therefore, it is created as a landscape of interactive experience of urban agriculture, maximizing the retention of the natural spatial pattern of urban development, which not only meets the needs of agricultural production, so that the residents can understand the whole process of agricultural production in the city, but also provides recreational and ecological value, and provides realistic experience in terms of the protection and use of cropland and the functional composite of urban public space.

Source: https://www.gooood.cn/daoxiangyuan-changan-park-china-by-shanghai-chidi-studio.htm

7.Landscape design of Shangbu Green Corridor Park (Rail transit greening restoration project in Futian)

The project is located in Futian District, Shenzhen, and the surrounding area is dominated by residential and amenity service facilities, with a lack of public space. The site is occupied by subway excavation and construction, and the surface habitat has been severely damaged. The design prioritizes ecology and improves the microclimate by restoring the surface habitat and preserving and replanting trees. The meandering ecological dry stream absorbs, purifies and stores rainwater, effectively controlling surface runoff. Based on interviews with neighboring residents, the need for a green ecological environment, public activity space, sports and fitness venues, and child-friendly facilities were established to weave together urban service functions. With an open and inclusive attitude, it creates a vibrant park belt for people to explore their ideal life.

Source: https://www.gooood.cn/landscape-design-of-shangbu-green-corridor-park-sutpc.htm

SCENARIO ASSEMENT

landuse of Jiading district

嘉定区土地使用现状结构表

用地分类	用地规模（公顷）(ha)	占比（%）
居住用地	3753.4	8.1
公共管理与公共服务设施	714.3	1.5
商业服务业设施用地	1439.7	3.1
工业用地	7276.8	15.7
仓储用地	848.7	1.8
道路用地	1237.4	2.7
对外交通用地	3339.4	7.2
市政设施用地	473.3	1.0
特殊用地（含军事）	29.8	0.1
绿地	1926.9	4.2
农用地	21934.6	47.4
在待建用地	3176.1	6.9
不确定用地	164.1	0.4
总计	46314.3	100.0

嘉定区建设用地情况对照表

	建设用地（平方公里）	集建区内建设用地（平方公里）	集建区外建设用地（平方公里）	城镇建设用地（平方公里）	农村居民点用地（平方公里）
2006版总规	225.0	105.0	120.0	216.0	9.0
2009年现状	251.6	159.3	92.3	212.0	39.6
2012年现状	271.8	184.1	87.7	223.4	48.4
2016年现状	280.8	191.8	89.0	241.8	39.0

第四节 核心指标

指标类别	序号	指标项	单位	类型	基准年	2035年
发展规模	1	常住人口规模*	万人	预期性	158	160
	2	建设用地总规模*	平方公里	约束性	280.8	266.6
	3	永久基本农田保护任务*	万亩	约束性	16.12	—
	4	耕地保有量*	万亩	约束性	16.12	8.0
空间分区管制	5	生态空间面积	平方公里	约束性	—	238.5
	6	城市开发边界面积	平方公里	约束性	—	224.7
	7	城市开发边界内新增建设用地	平方公里	约束性	—	18.5
	8	新增建设用地占用耕地	万亩	约束性	—	3.1
	9	战略留白空间规模*	平方公里	约束性	约19	约19
土地使用	10	人均城镇建设用地面积	平方米/人	约束性	178.9	156.3
	11	单位建设用地的地区生产总值（GDP）	亿元/平方公里	预期性	6.25	26.00
	12	职住平衡指数*	--	预期性	≥80	≥100
生态环境	13	生态用地占比	%	预期性	—	36.9
	14	河湖水面率*	%	约束性	8.03	10.0
	15	森林覆盖率*	%	约束性	13.3	≥25
	16	水环境功能区达标率	%	约束性	—	100
综合交通	17	公共交通占全方式出行比例	%	预期性	9.7	40左右
	18	轨道交通站点600米常住人口覆盖率*	%	预期性	—	中心城≥60、虹桥主城区≥40左右、嘉定新城≥30、中心镇镇区≥15
	19	全路网密度	公里／平方公里	约束性	3.2	8（主城区、新城和镇区）
产业发展	20	全社会研究与试验发展经费支出（R&D）占地区生产总值的比例	%	预期性	4.6	高于全市平均水平
	21	生产性服务业增加值占地区生产总值比重	%	预期性	41.4	50
住房和公共服务设施	22	新增城镇住房套数*	万套	预期性	—	33
	23	新增中小套型住房比重	%	约束性	—	70
	24	新增住房中政府及机构持有的租赁型住房比重	%	约束性	—	20
	25	社区综合服务设施（养老、文化、体育、医疗设施）15分钟步行可达率	%	约束性	—	100
土地整治和农用地保护	26	土地整治补充耕地面积	万亩	约束性	—	3.83
	27	现状建设用地减量化面积	平方公里	预期性	—	37.7
历史保护和总体城市设计	28	公共开放空间（400平方米以上的绿地和广场）5分钟步行可达率*	%	约束性	—	100
	29	历史文化风貌区面积	平方公里	约束性	8.32	8.32
	30	生态、生活岸线占比*	%	约束性	—	—
	31	骨干绿道总长度*	公里	约束性	—	195
	32	人均公园绿地面积*	%	约束性	8.5	≥15.0
市政公用设施	33	应急避难场所人均避难面积*	平方米/人	约束性	—	≥3
	34	原生垃圾填埋率	%	约束性	—	0
	35	城镇污水处理率	%	约束性	—	100
	36	生活垃圾无害化处理率	%	约束性	—	100

New table

	Jiading District	Site Current	Scenario 1	Scenario 2	Scenario 3	Scenario 4
population (million)	1.6	1.12	1.134	1.134	1.134	1.134
residential area (km^2)	37.53	16.81				
commercial and service area (km^2)	21.54	9.55				
industry and storage area (km^2)	81.26	27.85				
cropland area (km^2)	219.35	121.82	137.16	127.91	142.55	134.82
ecological area (km^2)	238.6	117.56	130	123.1	138.9	129.9
unused area (km^2)	33.4	8.12	3.81 19*8.12/33.4	4.45	3.81	4.45
total urban construction land (km^2)	241.8	84.25	69.5	81.1	69.5	81.1
total area (km^2)	463.14	225	225	225	225	225

New table

Goal	Indicator	current official planning	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Behavior change towards environmental protection	/	Average	Good	Average	Excellent	Excellent
Liveable community	number of increased social housing (set)	46200 20% * 330000 * 1.12/1.6	35000 7*3*50000*2/60	88200 5040000*0.5*0.35*6/60	10160 1270000*0.4*0.3*4/60	60480 5040000*0.4*0.3*6/60
	15-minute walkability of community services (%)	100	98	100	98	100
	5-minute walkability of public open space (%)	100	100	100	100	100
Enhancement of industry	potential local job opportunities (increased and improved second/third industry land use) (%)	20.7 (50-41.4) /41.4	23.4 ((5.24-3.81)*0.5+13.7*0.3+137.16*0.05-(84.25-69.5)*0.2)/37.4	25.2 ((5.3-4.45)*0.5+10*0.3+127.91*0.05-(84.25-81.1)*0.2+5.04*0.05)/37.4	12.3 ((5.24-3.81)*0.3+142.55*0.05-(84.25-69.5)*0.2)/37.4	17.7 ((5.3-4.45)*0.3+134.82*0.05-(84.25-81.1)*0.2+5.04*0.05)/37.4
Cropland preservation and management	Increased cropland area (square kilometers)	14.2 3.83*6.67*121.82/219.35	15.3 3.54+(84.25-69.5)*0.8	6.1 3.57+(84.25-81.1)*0.8	20.7 11.88+(84.25-69.5)*0.6	13.0 10.05+(84.25-81.1)*0.6+5.3*0.2
Regeneration of abandoned land	Ecological regenerated area (square kilometers)	13.1 37.7*84.25/241.8	12.5 (5.24-3.81)*0.1+(84.25-69.5)*0.6+3.54	5.5 (5.3-4.45)*0.1+(84.25-81.1)*0.6+3.57	21.3 (5.24-3.81)*0.4+(84.25-69.5)*0.6+11.88	12.3 (5.3-4.45)*0.4+(84.25-81.1)*0.6+10.05
Biodiversity preservation	Ecological area (square kilometers)	117.5 238.5/238.6*117.56	130.0	123.1	138.9	129.9
	Total length of green-blue corridor (kilometers)	94.7 195*225/463.14	107.5	107.5	142.4	142.4

5040000: densified area
1270000: current urban area in land management area
60: area per set
0.5/0.4: percentage of residential area
0.35/0.3: building density
6/4: building stoery

5.24/5.3: nonused land in urban development area
37.4: current commercial and industry area
13.7/10: commercial and industry area in rcz & caz & roz
0.5/0.3 percentage of second/third industry area
0.2: percentage of second/third industry area in shrinking area
0.05(first): percentage of increased second/third industry in cropland area
0.05(second): percentage of extra densification of second/third industry in densified area

3.54/3.57: non-used land and industry land in aez & maz
11.88/10.05: non-used land and industry land in p & s
0.8/0.6: percentage of cropland in shrinking area
5.3: urban agriculture
0.2: percentage of cropland area in urban agriculture

0.1/0.4: percentage of ecological area of urban non-used land
0.6: percentage of ecological area of shrinking area

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