

The integrated and socio-ecologically resilient
development of desakota in the context of shrinking
cities in Liaoning, China

Live in Between



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The integrated and socio-ecologically resilient development of desakota in the context of shrinking cities in Liaoning, China

P5 Report

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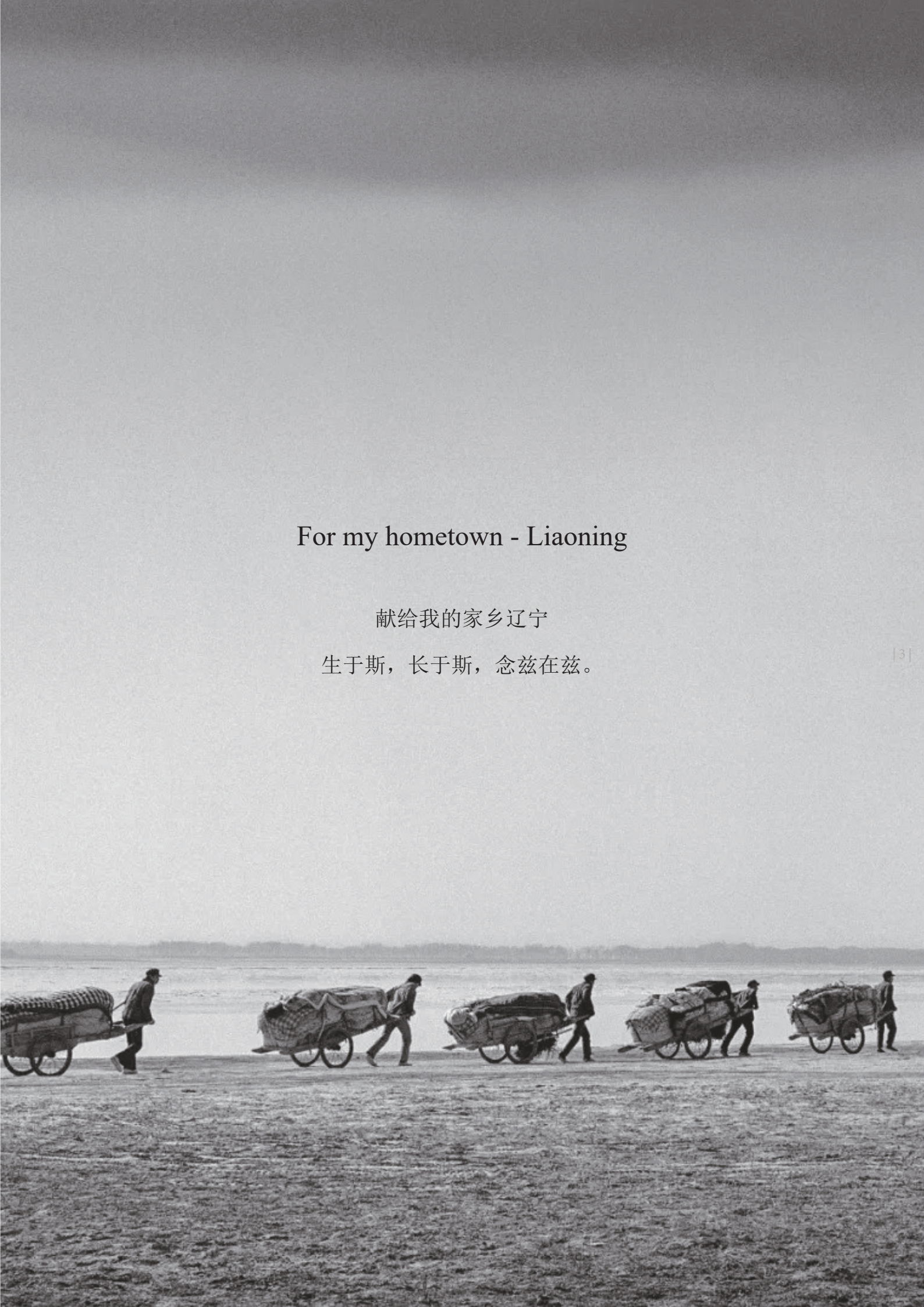
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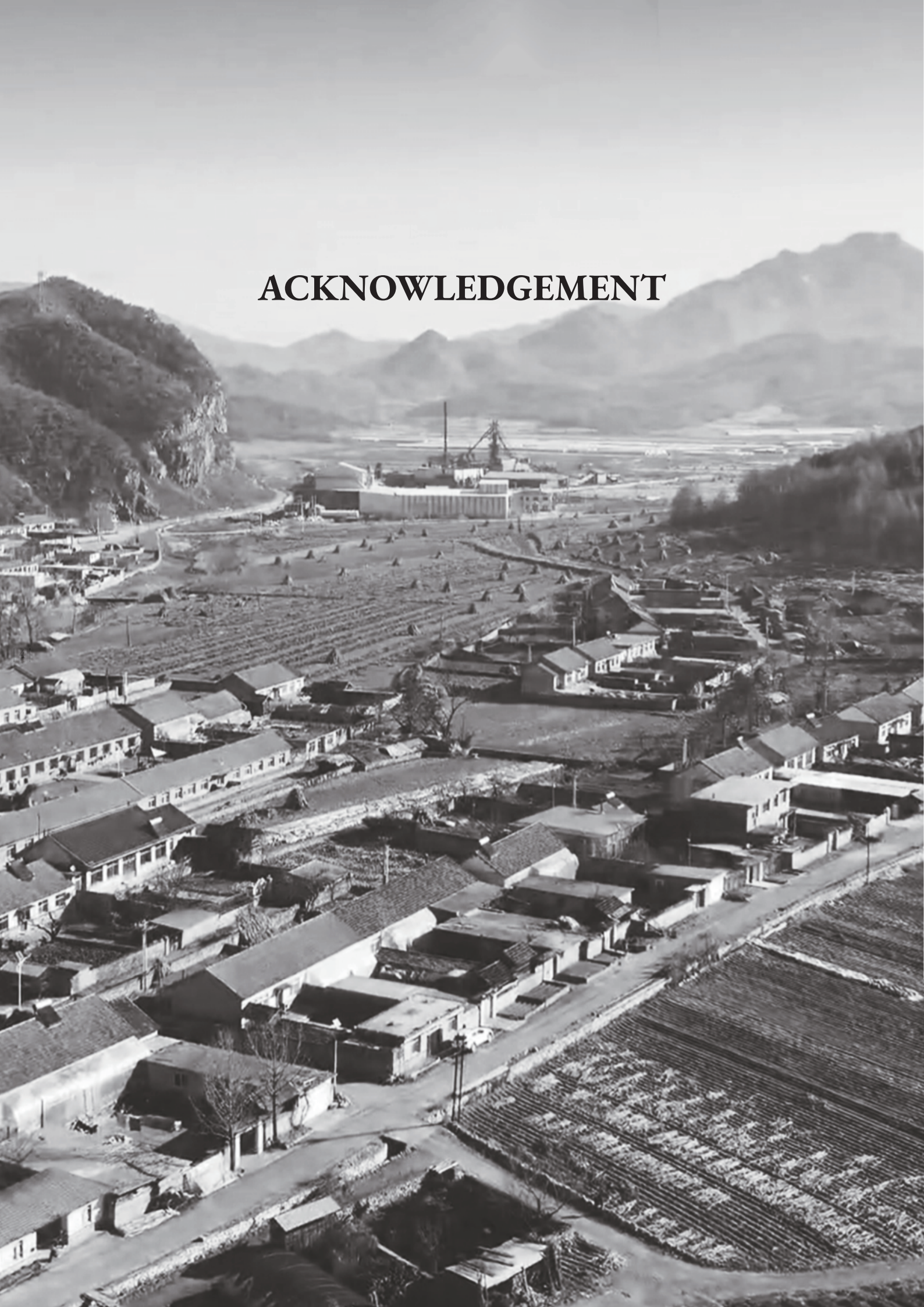
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For my hometown - Liaoning

献给我的家乡辽宁

生于斯，长于斯，念兹在兹。





ACKNOWLEDGEMENT

ACKNOWLEDGEMENT

As I write these words, it's drizzling outside. This is my second summer in the Netherlands.

In September last year, I finalized the topic of my graduation project as a study on the *desakota* in Liaoning. At first, I just thought that it was my hometown after all, and I would be more familiar with doing research there. One day when I was searching for data, looking at those familiar names, I suddenly thought of Shi Tiesheng's words: "Once I have to leave it for a long time, how will I miss it. How will I miss it and dream about it. How will I not dream of it because I don't dare miss it." At that moment along with the missing, there was an emotion called longing. I suddenly longed to know more about the decline of Liaoning, about the loneliness of the peri-urban, and about those who loved their hometown but had to leave it.

This project was accomplished thanks to the help of many people.

First of all, I would like to thank my mentor Lei. During the one-year study, she was never absent, and met me almost once a week. I don't think I'm a gifted person, so I couldn't figure out a lot of problems at once, but Lei always guided me patiently. I once told my friend that every time I get lost in this study, I felt like I was drowning, and Lei was the lifeguard. Her tireless teaching helped me to see the light when I was stuck and eased my anxiety. I would also like to thank Alex, my second mentor, for making the meetings relaxed and always encouraging me to express myself. His in-depth insights into the peri-urban area helped me immensely. I would also like to thank my uncle for connecting me with the planning institutions, governments, village committees, and factory owners, which made my interviews go incredibly smoothly.

In this early summer at the end of this project, I always think back to the winter a few months ago.

It was February when the fieldwork was conducted, and it was a cold winter in Dalian, with snow still melting in the ridges of the fields. My mom and dad drove me to the villages around Wafangdian, from Changxing Island to the South of Wafangdian, and from the south to the north, carrying a thick pile of questionnaires and gifts for the villagers. One day it was very windy. Mom was in the passenger seat and told me her knees were a little sore from the cold, then after a while she said: But why is a field trip with you so much fun? That day, my father climbed up a small hill to record a video for me. I couldn't find him and was a little impatient waiting for him in the cold wind. I clicked on that video two months later, and the unsteady picture was mixed with the sound of whistling wind and my dad's explanation with a slight accent. His tone was probably slightly smug, saying, "You can see almost all of the village from this hill."

This project has come to an end, but my curiosity and exploration of this field will not stop. Even though the future is still unknown, I will be excited to start again even if I fall down.

Outside the window, the rain has stopped, and occasionally there are a few birdsongs. This is my second summer in the Netherlands.

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Abstract

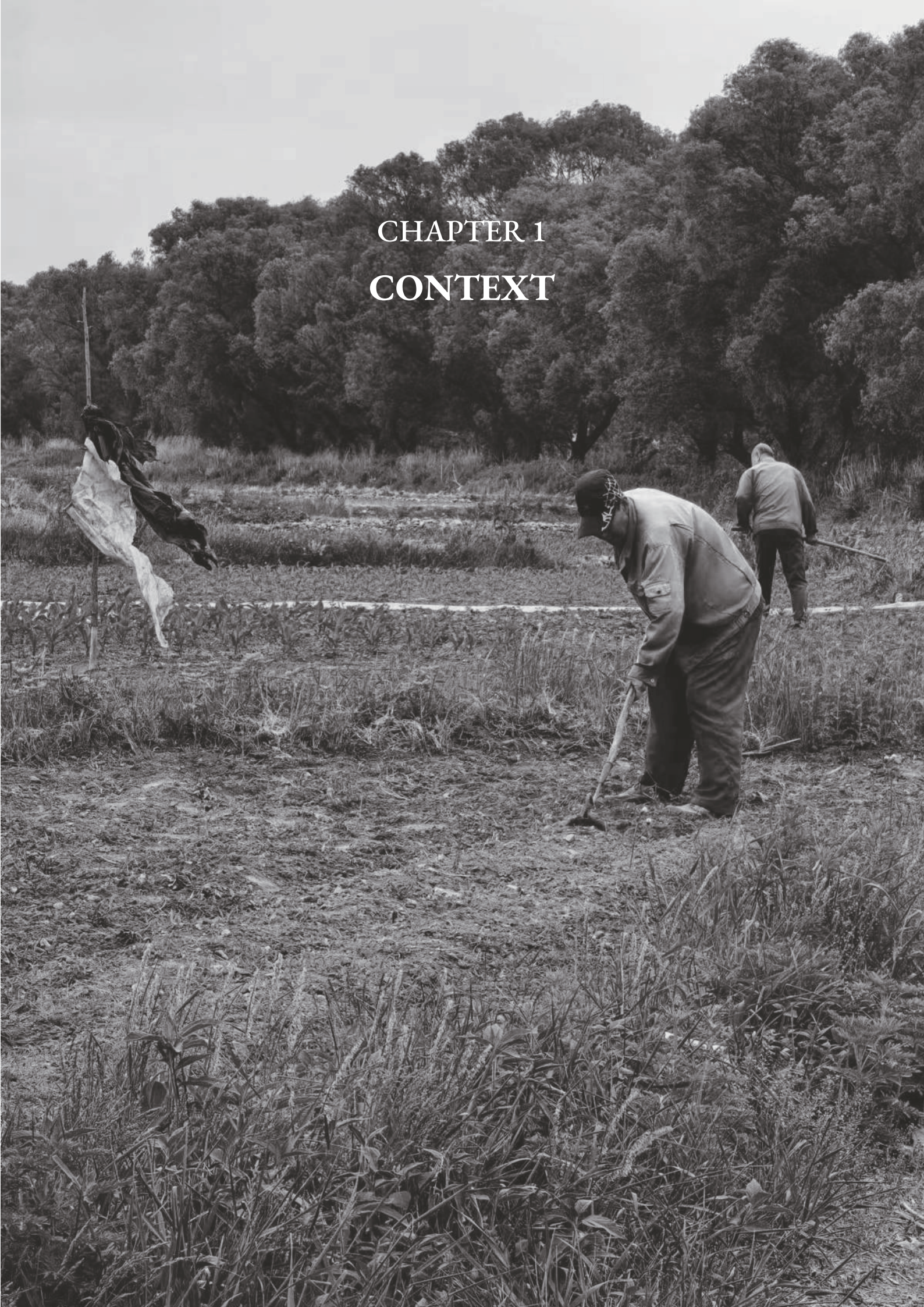
As a result of extended urbanization caused by the expansion of urban activities to the periphery and beyond and in-situ urbanization in rural areas, many peri-urban areas with a mix of agricultural and non-agricultural activities have emerged in Liaoning, which can be described as ‘desakota’. These widely distributed desakota are neglected in planning, leading to marginalization and socio-ecological degradation, and the socio-ecological systems of desakota are further affected by urban shrinkage. Therefore, desakota in Liaoning cannot innovate and transform into a desirable future in the shrinking context.

Socio-ecological systems are dynamic and unpredictable (Berkes, 2017). Traditional planning can only partially cope with it (Balducci et al, 2011) while adaptive planning provides more flexibility and adaptivity. Adaptive planning can enhance socio-ecological resilience in desakota from both spatial and institutional dimensions. Building on socio-ecological resilience, these areas increase the potential to provide socio-ecological values to the megaregion.

Therefore, in the context of shrinkage, this study aims to investigate how socio-ecological resilience can be built in peri-urban areas through adaptive planning, with attention to spatial and institutional dimensions, to counter socio-ecological degradation and achieve integrated development.

Keywords:

Desakota, Socio-ecological resilience, Adaptive planning, Urban shrinkage, Intergrated development



CHAPTER 1

CONTEXT

This chapter is centered around the context.

Firstly, it introduces the background of this thesis, there are many small-scale and neglected desakota scattered in China's megaregions. These areas suffer from many problems but are neglected by planning. In addition, existing studies on desakota do not focus on Liaoning, so this study is about Liaoning's desakota.

Subsequently, the basic situation of Liaoning was introduced, as well as the causes and circumstances of urban shrinkage in Liaoning. It was found that the shrinkage of Liaoning mainly occurred in the desakota areas and rural areas around cities.

The history of Liaoning's development was then analyzed.

Based on the historical analysis, the development of desakota was finally summarized into four main stages and a dual-track process.

1.1 Motivation

As a result of urban expansion and rural transformation, a large number of small-scale, dispersed desakota have emerged in China's megaregions. These areas are characterized by intensive land use with a combination of agricultural and industrial land. And there's an integration of agricultural and non-agricultural activities in desakota. As an intermediate zone between urban and rural areas, the desakota has a landscape and structure that are different from both.

The desakota is usually close to big cities and as an appendage of the urban area, it has been producing what the city wants and accommodating what the city does not want. As a result, desakota has suffered more negative externalities than the benefits it receives from the metropolis (Endemann, 2019), leading to high levels of pollution, population loss and other problems.

Despite many problems, these areas have been neglected in the planning process. With the Chinese government's increasing focus on non-urban areas, many planning projects are being implemented in villages with favorable

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landscapes ('beautiful countryside construction') or in ancient towns with historical heritage ('historic towns conservation'). In contrast, there is no specific planning policy for the very common mixed industrial-agricultural desakota, which makes the revitalization of desakota almost hopeless.

As more and more scholars take notice of these neglected areas, many desakota-related studies have been conducted. However, most of these studies have focused on thriving megaregions such as the Yangtze River Delta, the Greater Bay Area, and Jing-jin-ji Megaregion. Megaregions like Liaoning, which are suffering from urban shrinkage, have gone unnoticed. Yet the problems faced by desakota in this context are even more severe. Therefore, this study will focus on desakota in Liaoning.



Fig.1 Farmer works in desakota

Source see Appendix

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Fig.2 Big factories in desakota, Beiwang Village

Photographed by author



Fig.3 Abandoned buildings in desakota

Photographed by author



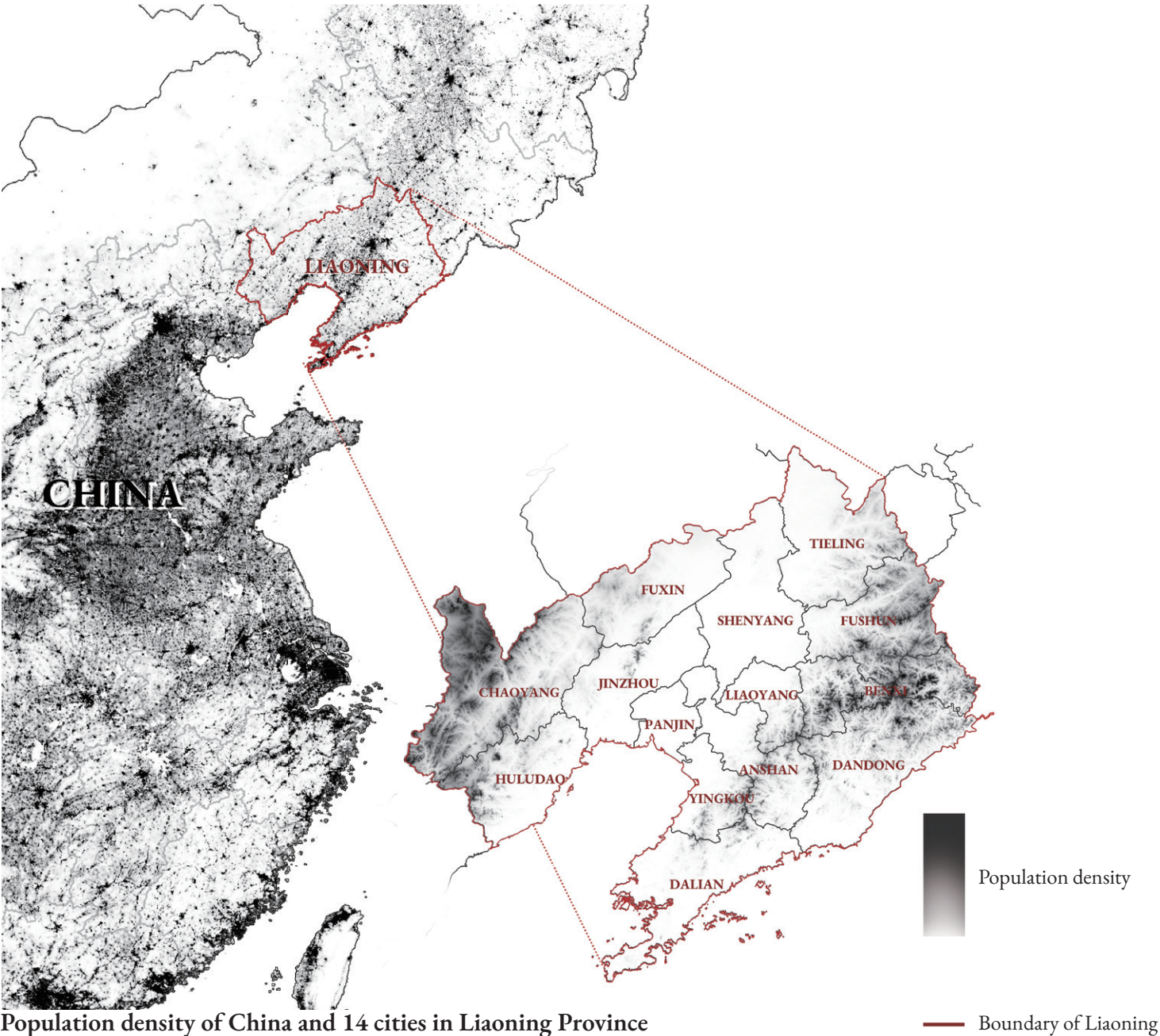
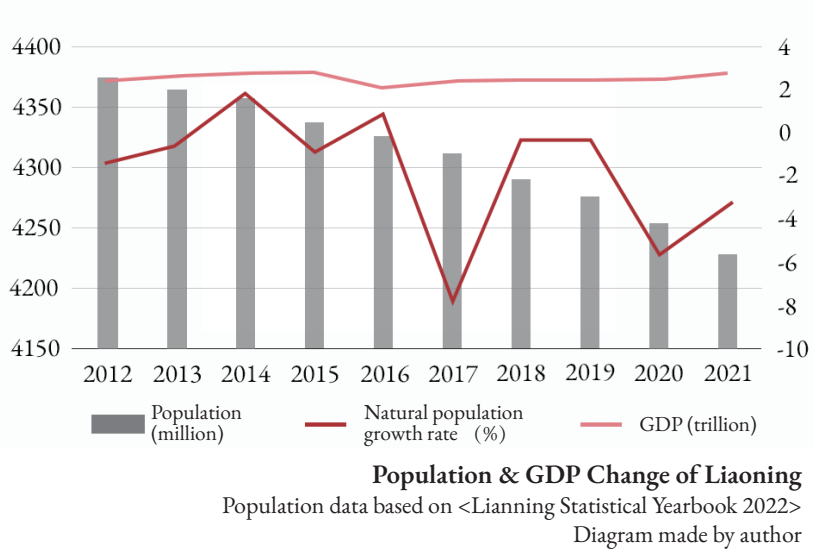
Fig.4 Low environmental quality of desakota

Photographed by author

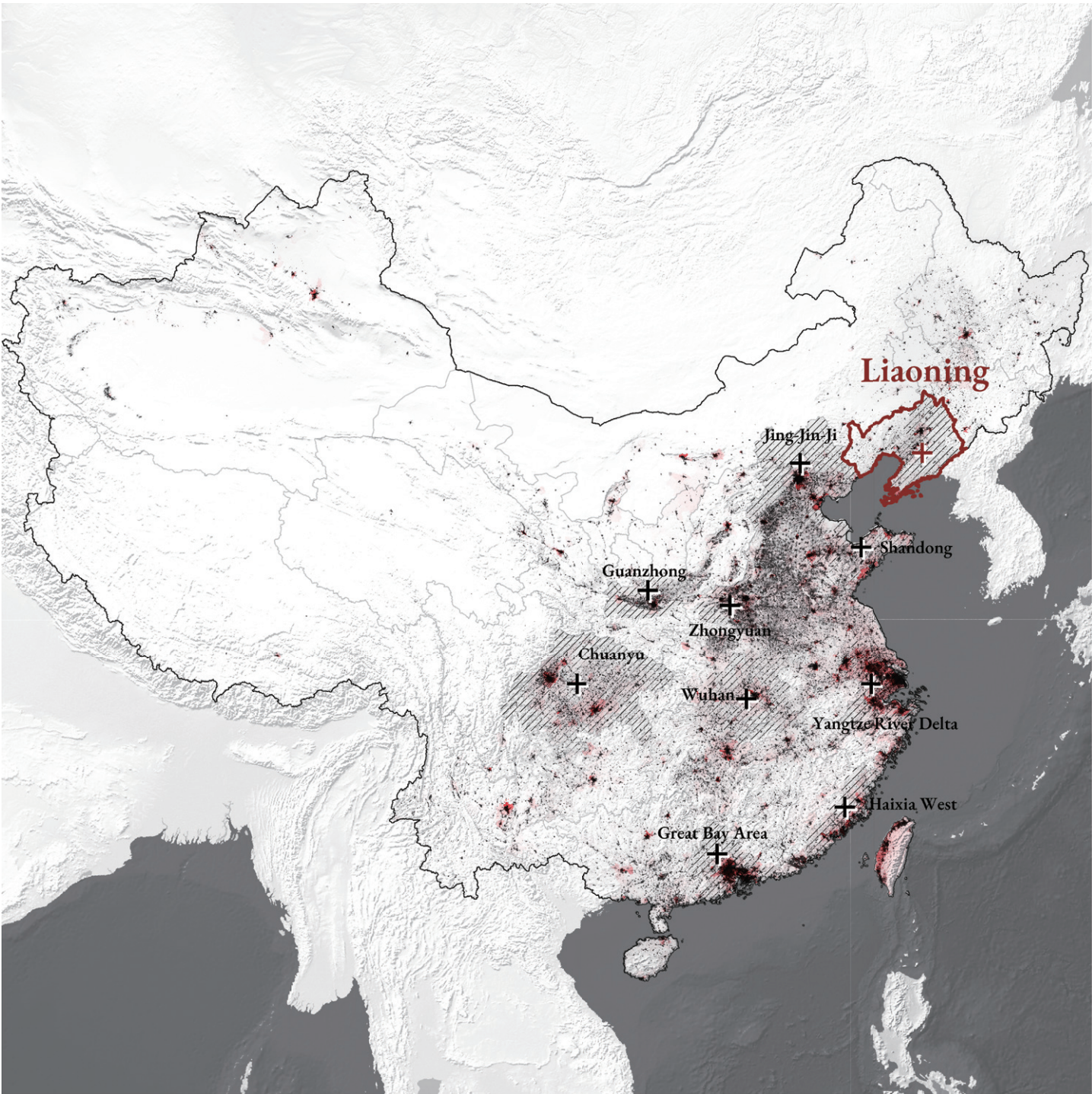
1.2 The Introductin of Liaoning Megaregion

Liaoning is a province in the north east of China with 41.97 million people. There are 14 cities in Liaoning with a total area of 148,600 square kilometers. The pillar industries of Liaoning are: chemical, non-ferrous metal, ship, machinery, and electric power.

Liaoning's population has continued to decline over the last 10 years, with GDP declining in 2015 and remaining relatively flat with no significant growth. This is mainly due to the fact that Liaoning, as a heavy industrial city, has undergone structural economic reforms that have led to the decline of the secondary industry(Ma & Chen, 2016).



Population density of China and 14 cities in Liaoning Province
Data based on Worldpop, made by author



Liaoning, as a megaregion, has a lower population density and GDP compared to other megaregions in China, meaning that Liaoning is less competitive compared to other megaregions. According to the Liaoning Statistical Yearbook for 2022, in recent years, the proportion of migrant workers from Liaoning working in other provinces has fluctuated, but it has increased compared to ten years ago. This is one of the reasons why the population of Liaoning has been decreasing.



Population density & GDP distribution in China
Made by author

1.3 Urban Shrinkage in Liaoning

The concept of shrinking cities was first introduced in 1988 by Häußermann and W. Siebel to describe cities that are hollowing out due to population loss. SCIRN1 defines a shrinking city as one that (1) has a total population of 10,000 or more. (2) has been losing population for more than two years. (3) is experiencing a structural economic crisis. A city that meets all three of these conditions is a shrinking city (Long & Gao, 2019).

According to Wang et al. (2022), there are four main reasons for urban shrinkage globally, which are (1) industrial decline (which is also the most common reason). Although industrialization has led to the urbanization of many cities around the world, these cities are gradually losing their competitiveness and eventually going into decline due to homogenization of the industrial structure and de-industrialization. (2) Low land utilization has led to housing vacancy and hence the phenomenon of land finance2. (3) The construction of modern infrastructure facilitates the inflow and outflow of population. (4) Passive siphoning in small and medium-sized cities. The concentration of infrastructure and intangible assets in large cities causes a massive loss of population from surrounding small cities (Wang et al., 2022). Fan (2019) indicates that urban shrinkage in Northeast China is mainly due to the decline of the secondary industry as a result of 'de-industrialization' from 2000-2010. This is the most important reason why Liaoning started its urban shrinkage.

Ma & Chen (2016) studied the population loss of cities (including county cities) at all levels in Liaoning Province from 2010-2014 and found that the main shrinkage in Liaoning was in county-level cities3 (i.e. xianjishi) and counties, and most of the shrinking population was the rural population in the urban areas. The main reasons for the urban shrinkage of Liaoning cities include (1) demographic changes. Liaoning has shown low fertility rates and low fertility intentions in recent years, which, together with a net outflow of population (Ma & Chen, 2016), has exacerbated urban

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shrinkage. (2) Regional economic changes. Population movement in Liaoning is dominated by intra-provincial migration. Guan et al.'s (2020) study also indicates that young laborers from rural areas in Liaoning province migrate to nearby small and medium-sized cities, and then, together with the residents of these cities, move into the Shenyang Economic Zone or the Liaoning Coastal Economic Belt, no longer returning home for agricultural activities. However, due to the weakening competitiveness of the middle and southern parts of Liaoning (i.e. Liaozhongnan), the growth rate of the floating population has slowed down (Ma & Chen, 2016). (3) Changes in industrial structure. Although the decline of the second industry4 due to de-industrialization was an important reason why Liaoning began to shrinkage, in recent years Liaoning's urban shrinkage has been mainly due to population loss from the decline of the third industry5 (Ma & Chen, 2016). (4) Changes in the economic environment. The global financial crisis in 2008 caused the decline of Liaoning's export processing industry, which led to a massive decrease in industry-related personnel. In addition, the large number of bankruptcies of private enterprises also led to the population loss in Liaoning (Ma & Chen, 2016).

In summary, the causes of urban shrinkage in Liaoning are multifactorial. Population loss occurs mainly in county-level cities or counties near the cities and is manifested in the loss of rural population. This suggests that the desakota of Liaoning is suffering from population loss. The specific effects of urban shrinkage on desakota will be elaborated in Chapter 2.

1. SCIRN refers to Shrinking Cities International Research Network.

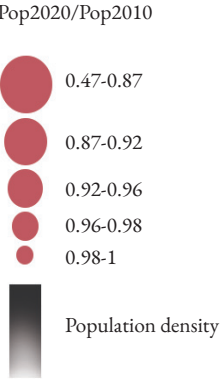
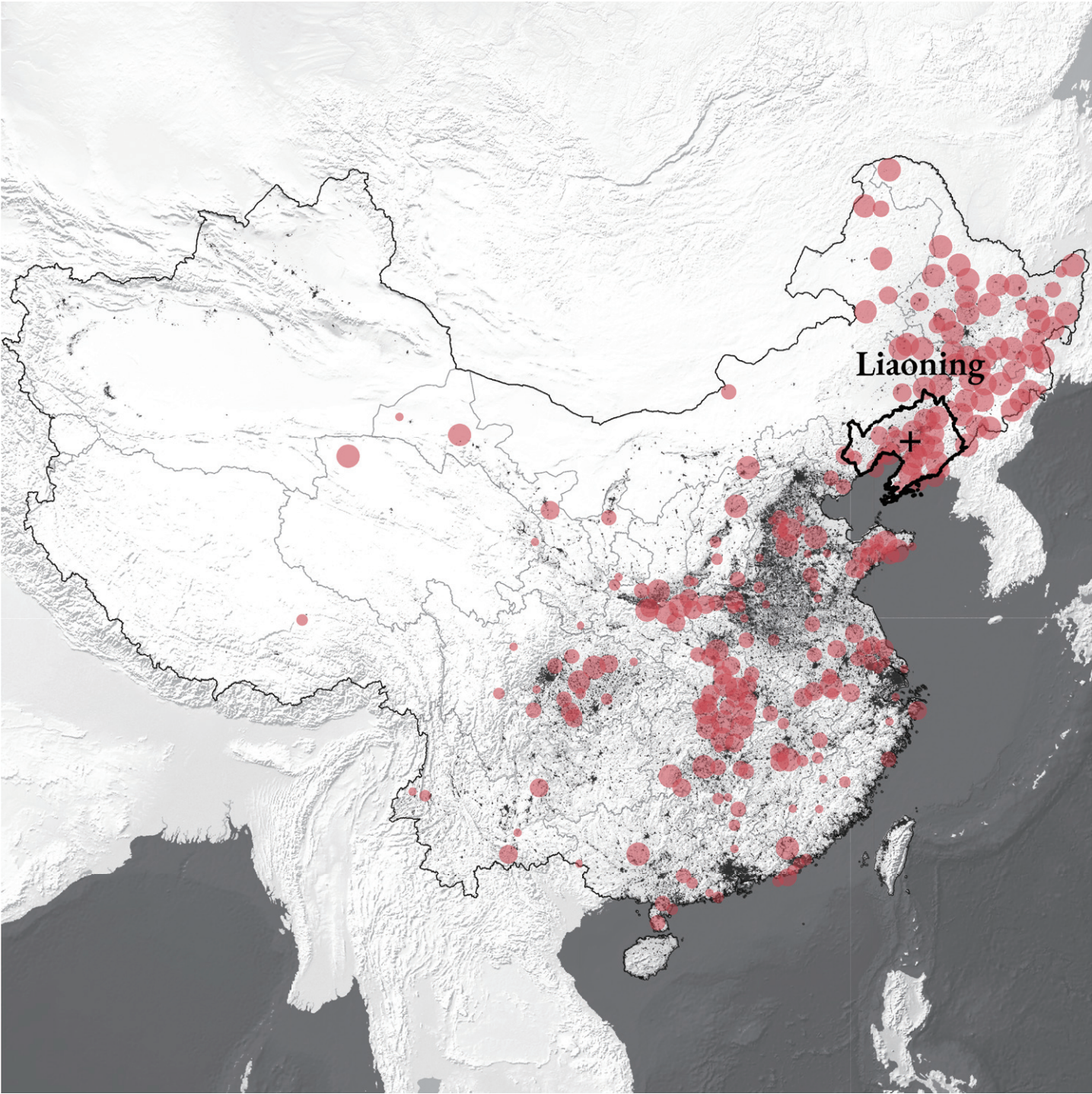
2. Land finance refers to the fact that some local governments in China rely on revenues from land use rights concessions to maintain local financial expenditures.

3. County-level city is one of the administrative division units in China, and is a county-level administrative district.

4. The second industry refers to sectors for reprocessing primary products, like manufacturing, etc.

5. The third industry refers to sectors providing various services for production and consumption.

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1.4 Historical Analysis of Liaoning

The development of Liaoning can be summarized in six main periods, each of which was greatly influenced by national policies. The structural transformation of the economy has taken Liaoning from a thriving city of heavy industry of national importance to a province experiencing shrinkage today. See the Appendix for detailed explanation of each stage.



1840-1948

The Colonial Period

1949-1957

The Planned Economy Period

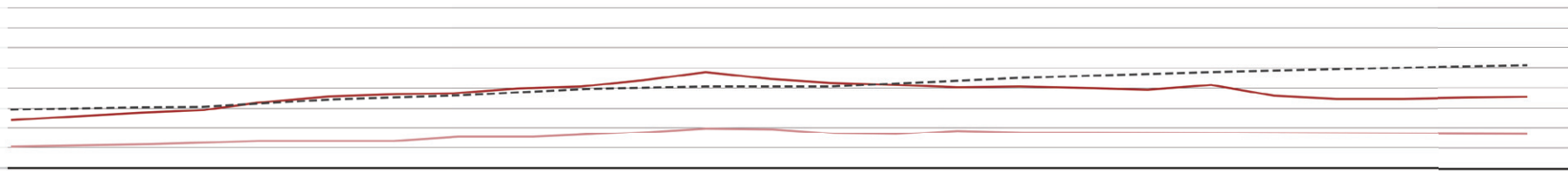
1958-1977

The Turbulent Period

Urbanization Rate/%

80
70
60
50
40
30
20
10
0

— Urbanization rate of Liaoning
— Urbanization rate of China
- - - Population of Liaoning



1978-1990

The Boom Period

1991-2010

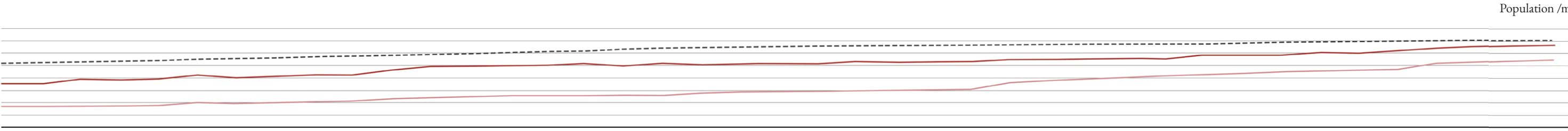
The Growth-oriented Period

2010-?

Nowadays

Population /million

5000
4000
3000
2000
1000
0



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1.5 The Development of Desakota in Liaoning

Based on the above historical analysis, the development of desakota can be summarised in four main stages and a dual-track process.

1.5.1 Four Stages in the Development of Desakota

The Initial Stage is the beginning of rural industrialization. As a result of the implementation of the ‘hukou’ system¹ in 1958, the urban population was vigorously compressed and part of the urban residents were sent back to the rural areas (Lu, 2006), resulting in a significant increase in surplus rural labor, which could not be accommodated by the side industries in rural areas (Zhang et al., 2016; Tian & Guo, 2019). During this period, the government encouraged the establishment of communes² and collectively managed industries in rural areas to alleviate the surplus rural labor force. The development of rural industries, infrastructure, and public services added a layer of industrialization to the structure of the agricultural economy (Q. Zhang, 2023). However, rural industries at this time were small-scale communal industries that were not competitive and had low economic contributions. Nonetheless, this period can be seen as the beginning of rural industrialization which laid the foundation for the explosion of non-agricultural activities in the 1980s and

1990s (Friedmann, 2005; Zhu, 1999) and the subsequent transformation of the rural areas into semi-industrial and semi-agricultural desakota.

The Development Stage can be seen as the process of in-situ urbanization of rural areas. Reform and Opening Up³ liberated rural productivity and promoted the development of the rural economy (Lu, 2006). The relaxation of control over the rural economy led to the flourishing of township and village enterprises⁵ (TVE) in rural areas. These TVEs were formerly communal industries, and they accommodated a large number of rural agricultural laborers (Q. Zhang, 2023). The prosperous development of TVEs adjusted the industrial structure of rural areas, leading to the emergence of plenty of semi-industrial and semi-agricultural rural areas. Q. Zhang (2023) states that the development of TVEs also led to a change in the rural landscape. As the income of the rural population increased, the demand for diversified food increased.

1. Hukou is a system of household registration used in mainland China. It was divided into agricultural hukou and non-agricultural hukou. It was launched to control the urban population.

2. The communes had governmental, political, and economic functions and was commonly known for collectivizing living and working practices.

3. Reform and Opening Up is China's policy of reforming internally and opening up to the outside world that was implemented in 1978. It consists of the implementation of the 'household contract responsibility system' in rural areas and the implementation of a planned economy.

The traditional paddy fields were partly replaced by orchards, fishponds, and vegetable fields. Overall, during this period, rural areas began in-situ urbanization as a result of the intensive development of TVEs, creating a large number of semi-agricultural and semi-industrial desakota, which changed the traditional texture and landscape of the rural areas. This process can be viewed as active.

This was followed by the Transitional Stage, a process of passive in-situ urbanization. During this period, China began to focus on cities as centers of development, and development and industrial zones⁵ (i.e. kaifaqu) dependent on global investment and targeting global markets were built in large numbers (Q. Zhang, 2023). Due to factors such as short industrial chains and less investment, many TVEs could not compete with the industrial zones and eventually closed. At the same time, the rapid development of cities attracted the rural population to re-enter urban areas, and the rural population shrank. To absorb more residents, cities began to expand to the urban fringe and periphery. Rural areas began to passively carry the spillover functions of the cities, and a large number of industrial zones and high-rise residential buildings appeared around rural areas, which to a certain extent changed the original texture and structure of

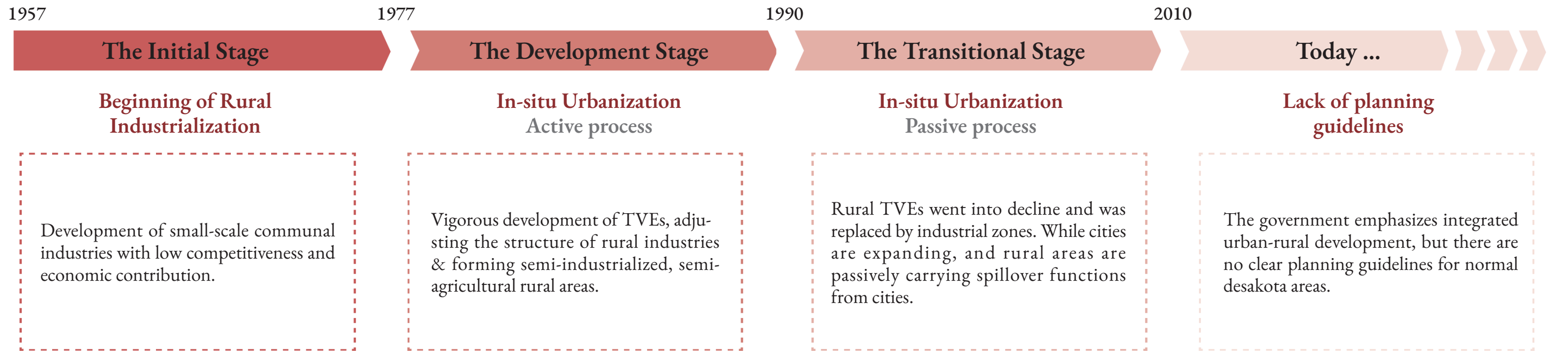
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rural areas (Endemann, 2019).

Nowadays, desakota, as very common and ordinary in-between areas with neither favorable landscape conditions nor historical monuments, are often neglected in the planning process. Despite the government's emphasis on integrated urban-rural development, the guiding principles for desakota development remain very vague in the policy documents. Therefore, change is imminent if the revitalization of desakota is to be realized.

4. Township and village enterprises refers to collective, cooperative and individual enterprises organised by farmers.

5. Development and industrial zones known as (开发区)in Chinese refers to development areas approved by the government to be established within urban planning zones to implement specific national preferential policies.



Four stages of the development of desakota
Made by author

1.5.2 The Dual-track Process

The formation of desakota is driven by a combination of external and internal factors, and its development can be viewed as a dual-track process (Endemann, 2019).

In the context of rapid industrialization and economic development, the quest for economies of scale and agglomeration has led to the development of megaregions in China, which continue to attract migrants and factories. However, they cannot be accommodated by the urban areas, ultimately leading to the expansion of urban activities to the periphery or beyond (Endemann, 2019). This process has led to a great deal of extended urbanization throughout the country, as it has in Liaoning. The rural areas in Liaoning are surrounded by industrial zones and high-rise housing, and their landscape and fabric are different from the traditional rural areas.

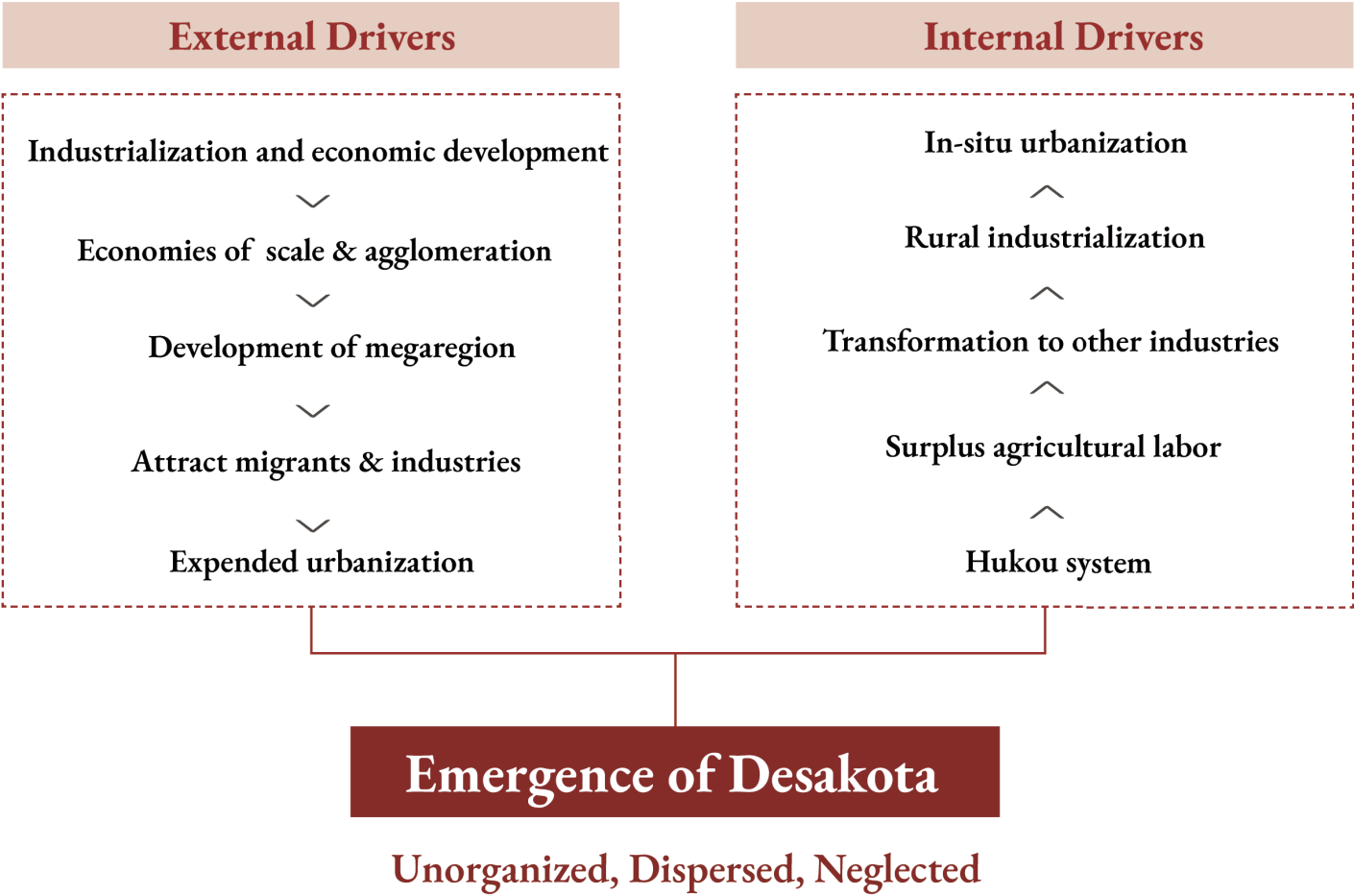
At the same time, due to the implementation of policies such as Land Reform, the Hukou System, and Reform and Opening Up, the

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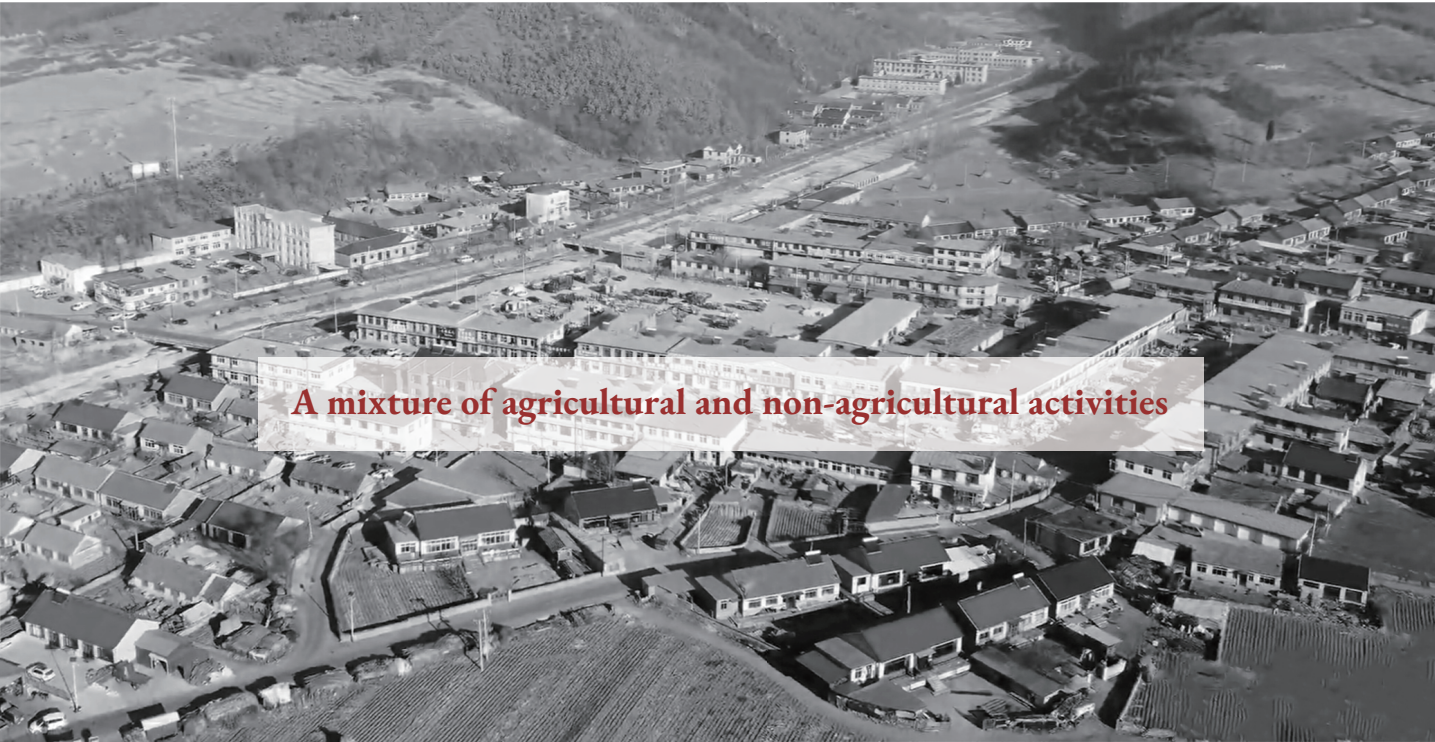
rural areas of Liaoning began to undergo a bottom-up transformation. In order to relieve surplus agricultural labor, rural areas began to industrialize. This process led to the creation of a large number of small-scale, decentralized township and village enterprises in rural areas. These enterprises absorbed the surplus agricultural labor in rural areas, changed the rural texture and landscape (Q. Zhang, 2023), and created a large number of semi-agricultural, semi-industrial desakota. This process is the in-situ urbanization of rural areas, which is also the internal driving force for the formation of desakota.

The two processes mentioned above, as both external and internal forces, have together led to the peri-urbanization of the rural areas in Liaoning and the formation of widely spread, unorganized, and dispersed desakota in the megaregion.

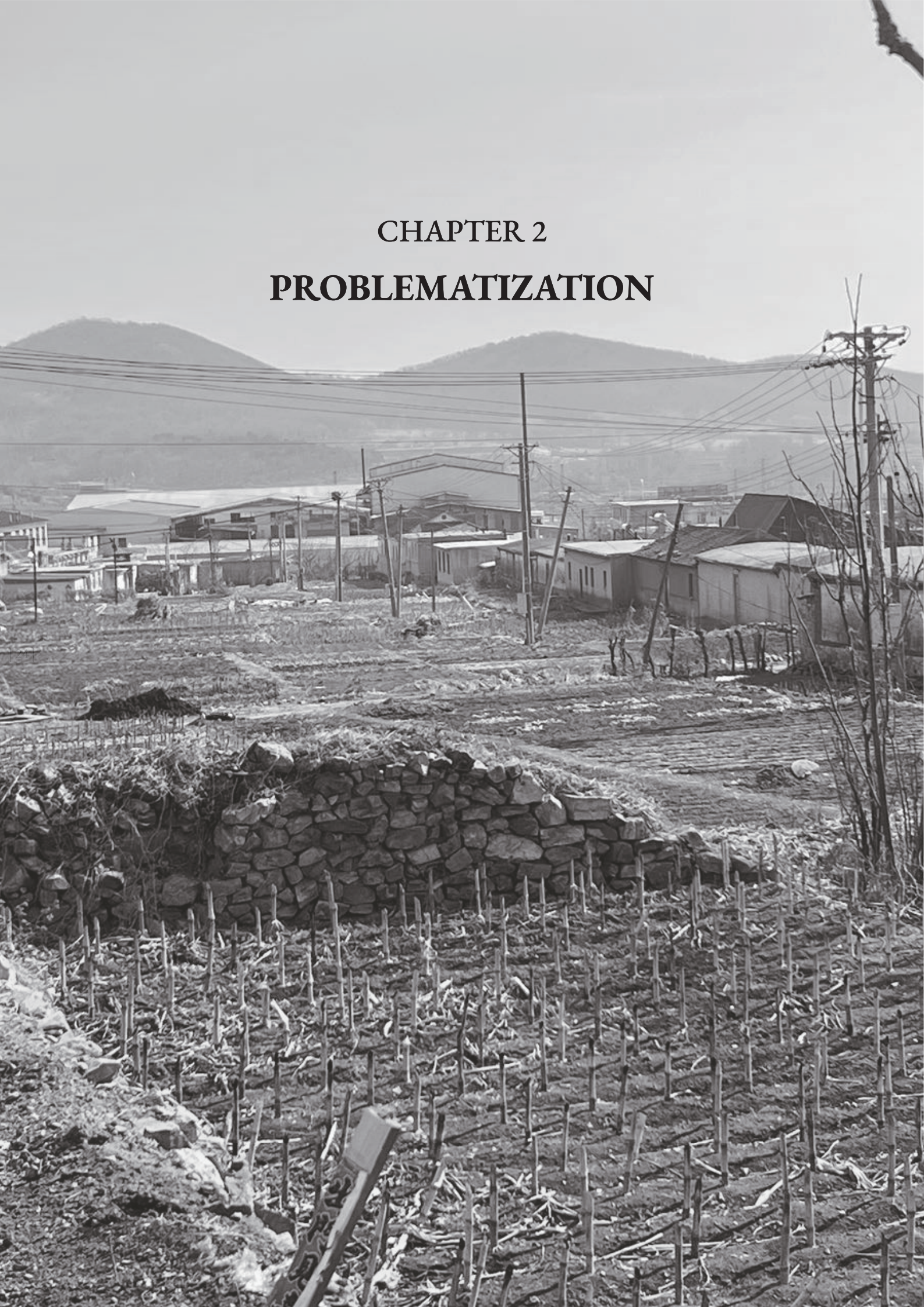
CONTEXT



Dual-track process of the formation of desakota
Source: See Appendix. Made by author



Desakota in Liaoning,
Source: Quan, 2023



CHAPTER 2

PROBLEMATIZATION

This chapter focuses on the problematization of desakota.

It first analyses the problems faced by desakota in Liaoning. Due to the lack of planning, desakota is at risk of marginalization and socio-ecological degradation. In addition, urban shrinkage puts pressure on desakota's social-ecological system. This chapter demonstrates the problem of marginalization through empirical evidence in the form of low population density and GDP, low availability of public services, and low infrastructure accessibility. As well as the problem of socio-ecological degradation of desakota, which is reflected in air pollution, water pollution, and the abandonment of arable land. In addition, the urban shrinkage has also led to problems of the aging population, land and environmental degradation, and increasing urban-rural income and employment gap in desakota, which further affects desakota's socio-ecological system. Based on the above empirical analysis, the chapter then presents the Problem Statement. In the end, the existing knowledge gaps on desakota are analyzed through a literature review.

2.1 Problems Faced by Desakota in Liaoning

The desakota in Liaoning faces two main problems, one is neglected in planning and the other is affected by urban shrinkage. These two problems in turn lead to marginalization and socio-ecological degradation which are explained in detail in the following section.

2.1.1 Neglected in Planning

In recent years, the Chinese government has been paying more attention to non-urban areas and has introduced many relevant policies, such as ‘the construction of beautiful villages’ and ‘the preservation of historical towns’. However, these policies and planning projects mainly focus on villages with good landscape conditions or ancient towns with historical monuments. However, ordinary and featureless desakota with a mixture of industrial and agricultural activities are still neglected in planning.

In the "Liaoning Provincial Land Spatial Plan 2020-2035", it is not possible to find a clear related planning principle for desakota. The few descriptions of what is relevant in similar areas are also very vague. For example, when it comes to "promoting the optimization of agricultural layout", it mentions that it should "implement a classification guide for villages and enhance the development capacity of villages." The document divides villages into four categories based on population, location, and development trends. However, the unclear classification criteria and the lack of specific guidelines make the future development of desakota still ambiguous.

In “Liaoning Province's ‘14th Five-Year Plan’ for High-quality Development of Urban and Rural Construction (2021)”, it is proposed that infrastructure, public services, and the appearance of villages and towns should be improved. Despite the planning principles, there is still a lack of clarity on exactly how to implement them. It’s clear that the Liaoning government intends to focus on the development of non-urban areas, but the overall aim is still to develop the cities, and desakota has been neglected in the planning process.

Due to neglect in the planning process, desakota is facing marginalization and socio-ecological degradation.

4.2 促进农业布局优化

□ 实施乡村分类引导，提振乡村发展能力



集聚提升类
适度投放建设用地增量指标，引导人口产业集聚。



特色保护类
强化资源保护、设施配建，鼓励土地复合利用、存量盘活。



城郊融合类
强化城乡设施互联互通、共建共享。

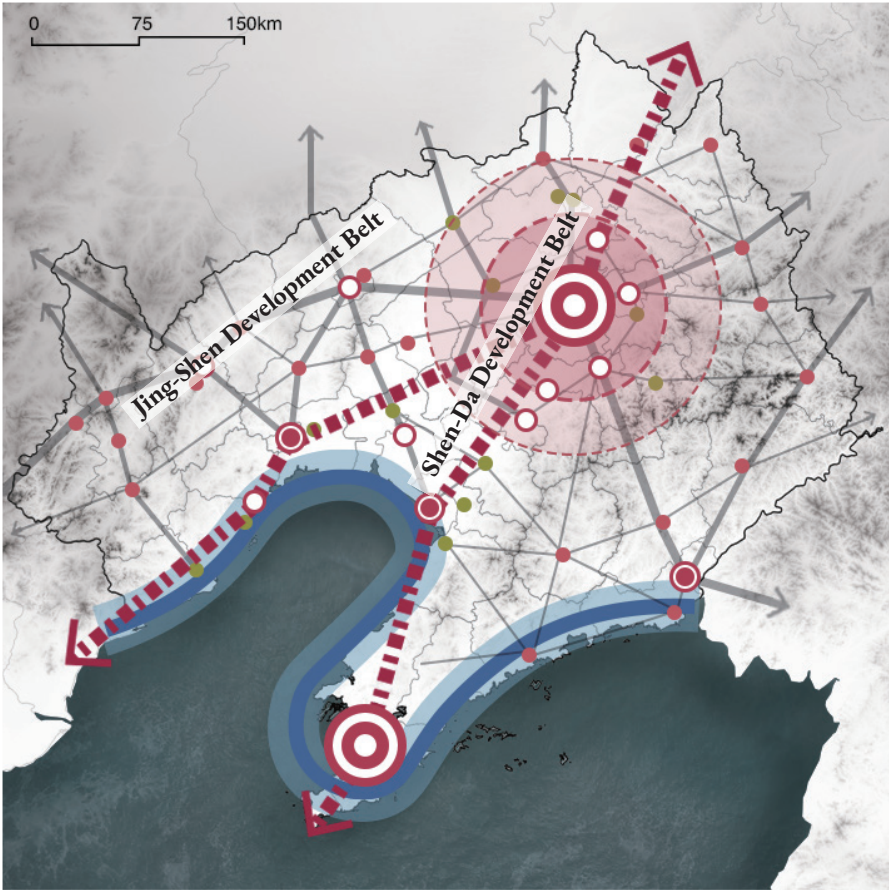


搬迁撤并类
保障基本生活，稳步推进撤并减量发展。

Division of 4 types of villages
Source: Liaoning Province Spatial Planning 2020-2035



Liaoning provincial spatial masterplan
Edited by author, based on Liaoning Province Spatial Planning 2020-2035



Spatial structure plan of towns in Liaoning province
Edited by author, based on Liaoning Province Spatial Planning 2020-2035

Marginalization

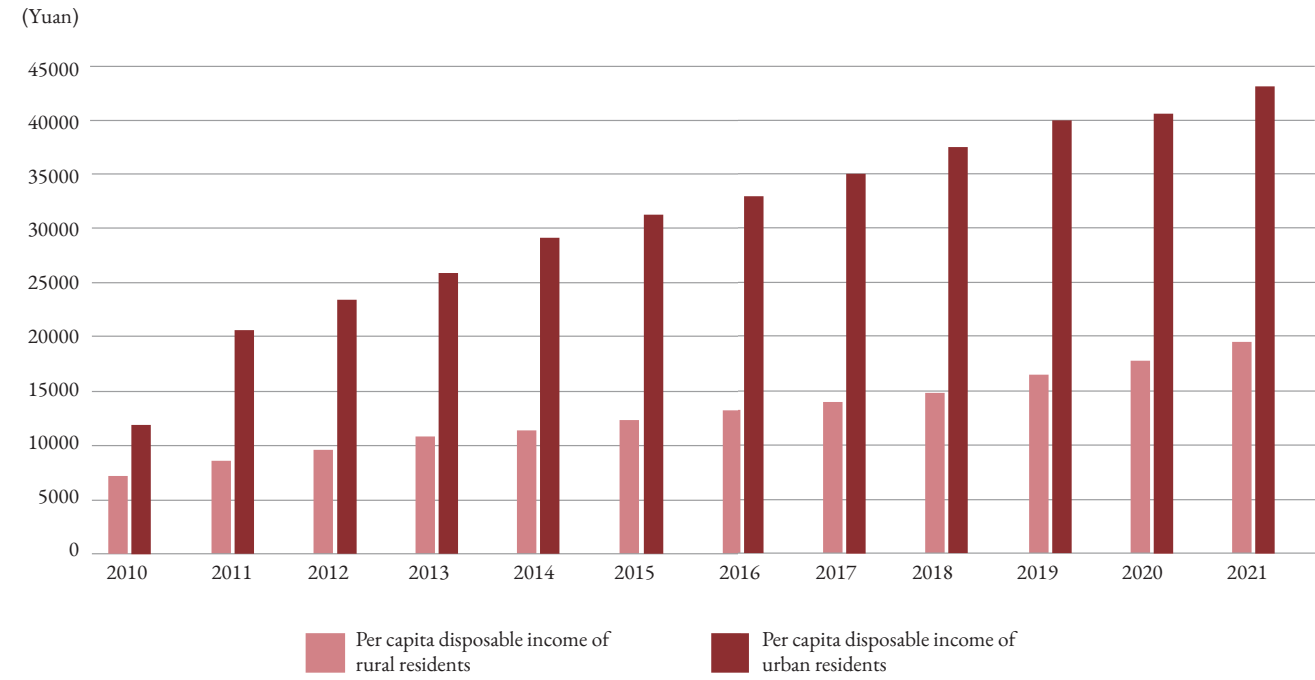
■ Low population density, GDP and employment

One manifestation of marginalization is that desakota exhibits low population density, low GDP contribution, and low employment. Because of very few job opportunities and low incomes in desakota, the population flows to relatively economically developed cities such as Shenyang and Dalian. This also exacerbates the gap between urban and rural incomes and employment.

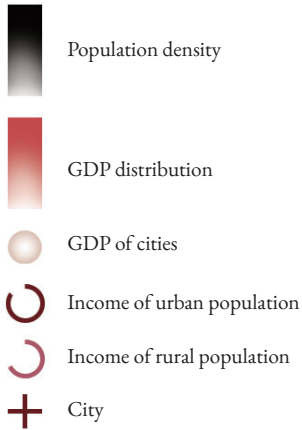
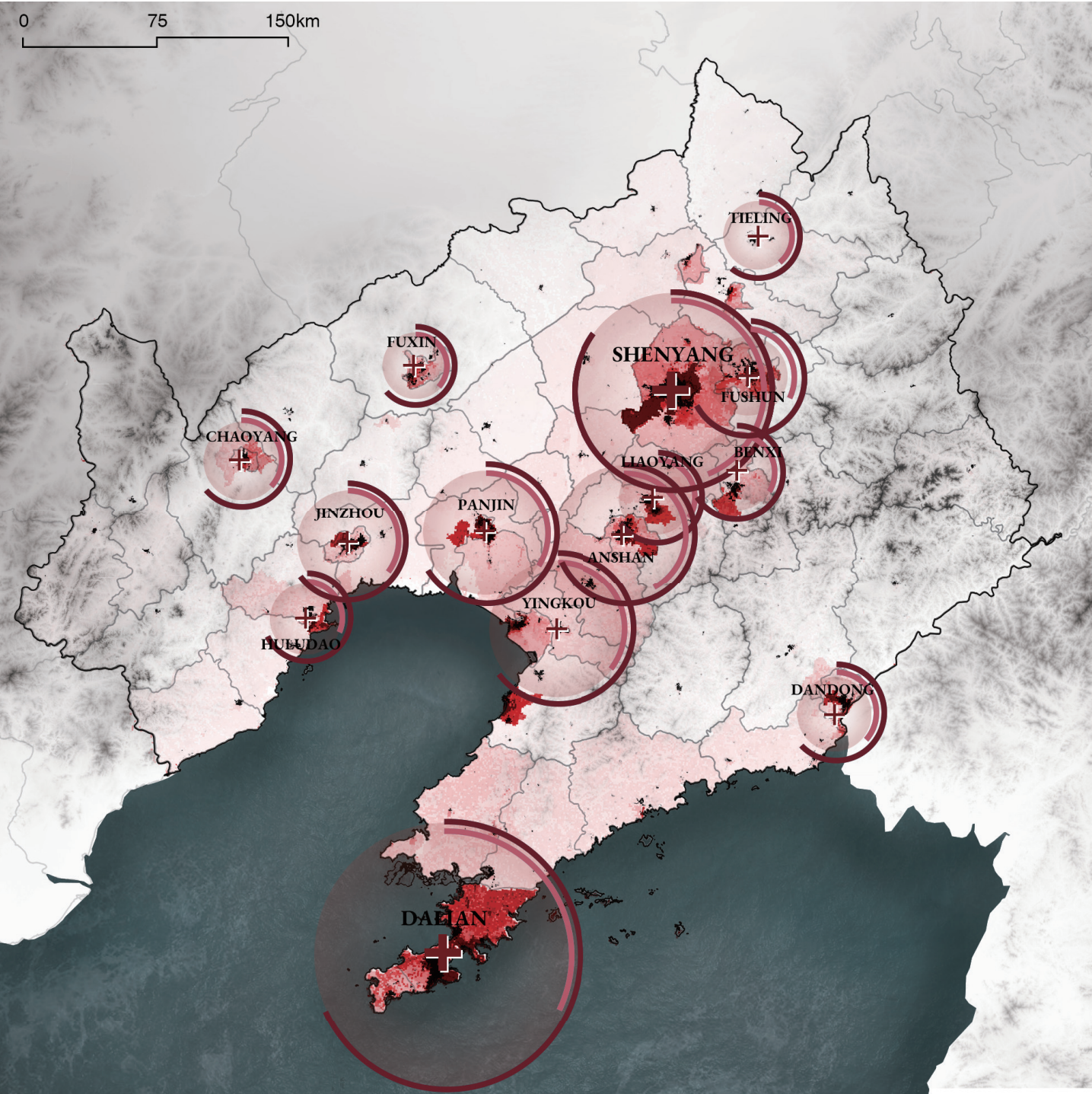
Although the income of the rural population in Liaoning Province has been increasing year by year, the income gap between urban and rural areas is still wide. As a result, the scale of rural labor migration has been expanding in recent years. Migrant workers¹ mainly choose to work close to their homes in the province as opposed to traveling out for work (Zhang,

2023). They are mainly engaged in manufacturing, construction, residential services, maintenance and other services, and wholesale and retail trade. They are mainly engaged in manufacturing, construction, maintenance and other services, and wholesale and retail trade.

1. Migrant workers refer to people with agricultural household registration who work in local township enterprises or go to the towns to work.



Comparison of disposable income of urban and rural residents in Liaoning 2010-2021
Made by author, data based on Liaoning Statistical Yearbook 2022



Population density and GDP of cities in Liaoning 2021
Made by author

Marginalization

■ Low availability of healthcare and schools, low accessibility to infrastructure.

Another manifestation of marginalization is the low availability of public services and low infrastructure accessibility in desakota. Healthcare and schools are mostly concentrated in the big cities, most of the healthcare facilities in desakota are clinics and small-scale hospitals, and the educational resources in desakota are poor, which are the reasons for the continuous flow of population from desakota to the neighboring big cities.

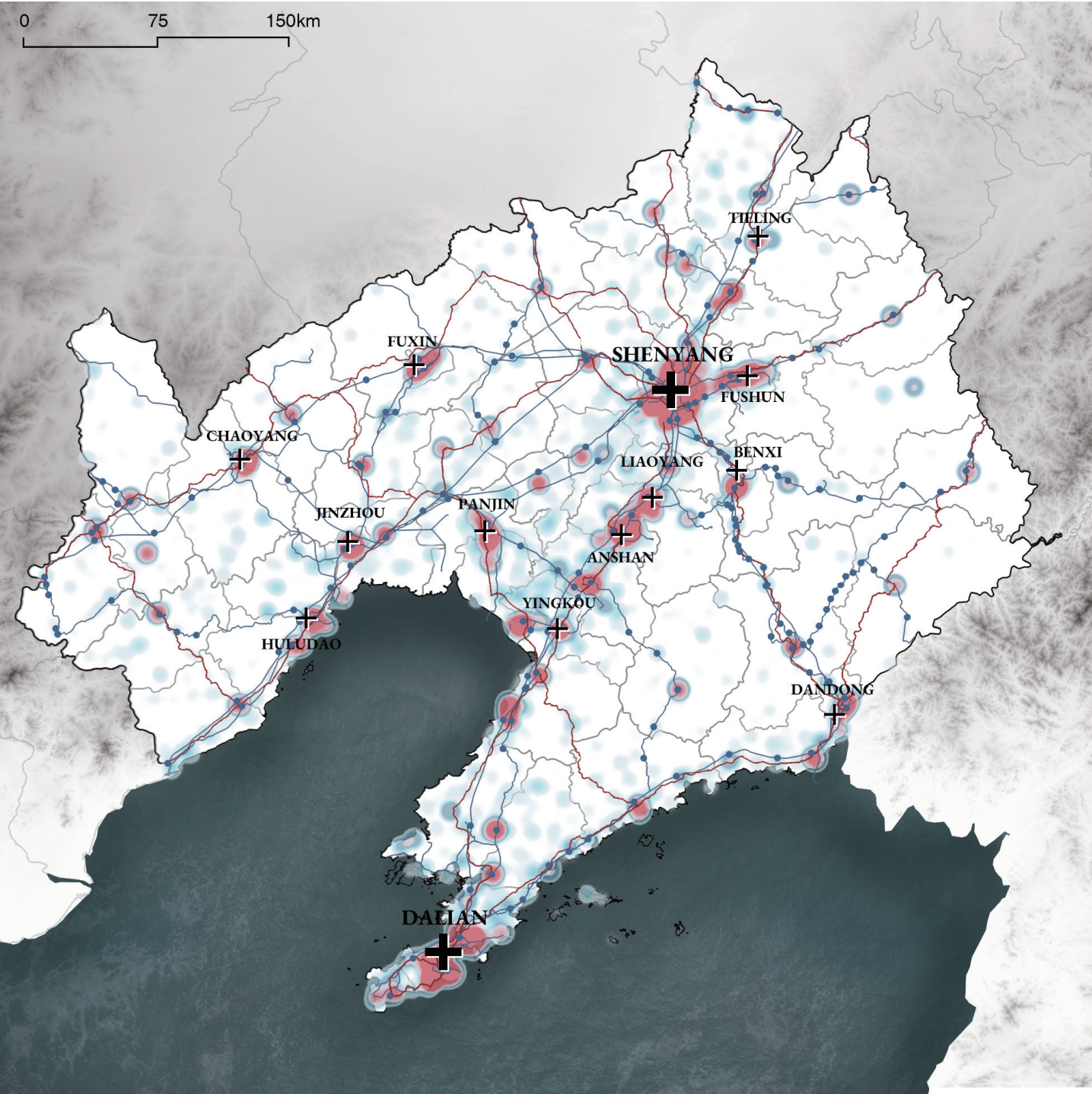
Besides, the low accessibility of the infrastructure makes desakota more difficult to reach. Low availability of public services and low accessibility to infrastructure makes desakota more marginalized in the megaregion, which is a vicious circle.



Fig.5 Low-quality healthcare in desakota in Fuxin
Source: Internet, See appendix



Fig.6 Low-quality middle school in desakota in Chaoyang
Source: Internet, See appendix



- National highway
- Train line
- Healthcare heat map
- School heat map
- Train station
- ✚ City

Healthcare and school heat map of Liaoning
Made by author

Socio-ecological degradation

Ecosystems are being degraded as a result of the excessive pursuit of economic efficiency in human activities at the expense of the environment. Degraded ecosystems are unable to provide diverse ecosystem services, which in turn affects social systems and creates problems. Social systems then put pressure on ecosystems, creating a vicious circle.

Air pollution

The main air pollutants in Liaoning are nitrogen oxides, carbons, and SO2, mainly from industrial processes, power generation and road transportation. Air pollution is mainly concentrated in urban and industrial areas, thus desakota with plenty of industries faces serious air pollution. In addition, due to the remoteness of the desakota which makes it difficult to regulate, many factories emit exhaust gases freely, which seriously affects

the air quality of desakota and reduces the availability of fresh air.

The eastern part of Liaoning Province has less air pollution, not only due to fewer factories and cities but also because of the ecosystem services² of regulating³ provided by the large forests in the east.

2. Ecosystem services are the direct and indirect contributions ecosystems (known as natural capital) provide for human wellbeing and quality of life. (NatureScot, 2023)

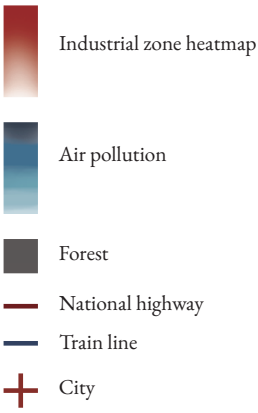
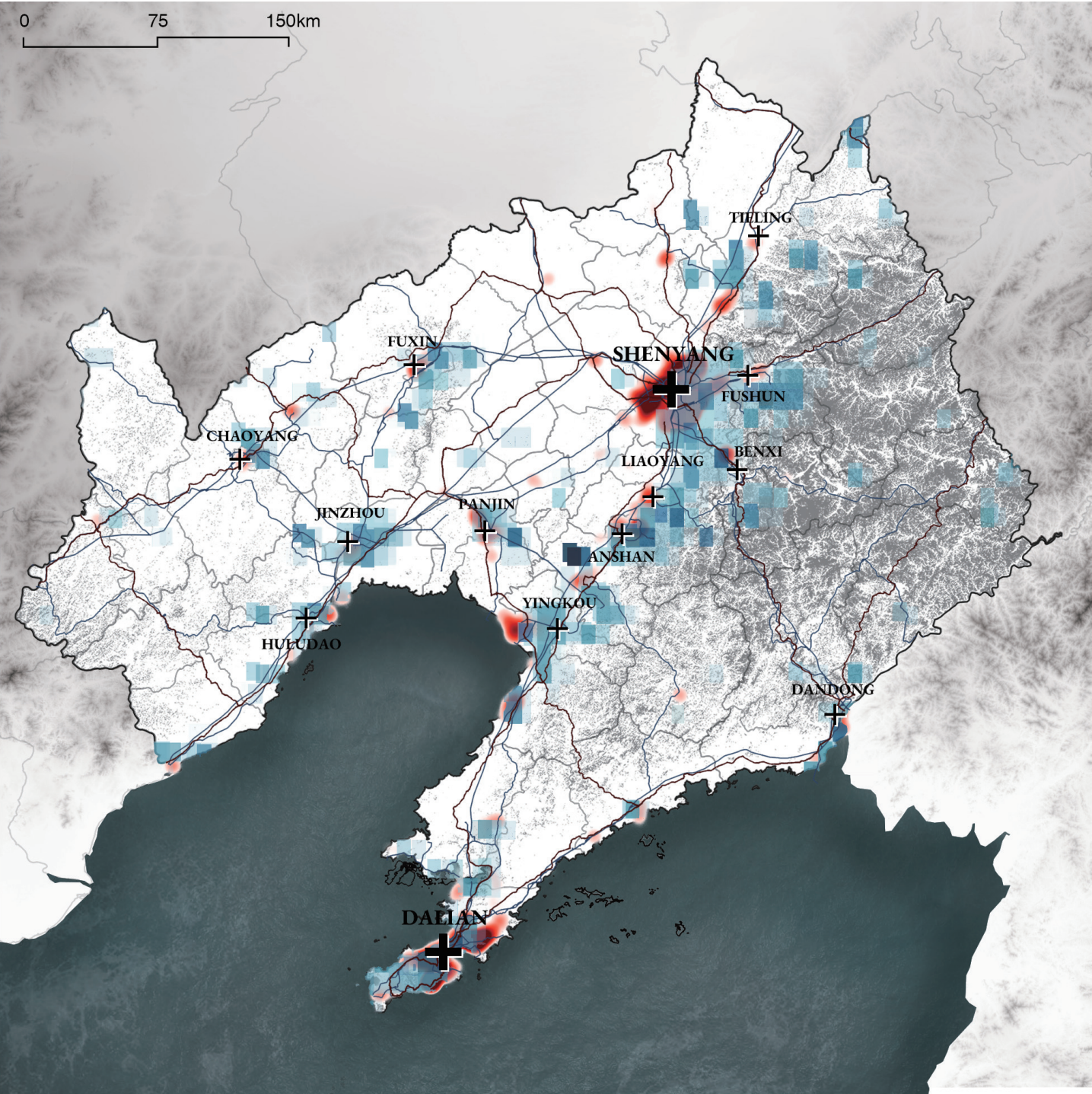
3. Regulating refers to the services nature provides that regulate the environment, such as air and water purification. (MEA, 2005)



Fig. 7 A mining factory in Chaoyang is working
Source: Internet, See appendix



Fig. 8 Air pollution from a rural factory in Chaoyang
Source: Internet, See appendix



Air pollution and industrial heat map of Liaoning 2018
Made by author

Socio-ecological degradation

Water pollution and water shortage

Another manifestation of socio-ecological degradation in Liaoning is water pollution and water shortage. Liaoning faces water pollution problems due to industrial, agricultural and domestic sewage discharges. One of the most polluted rivers is the Liao River Basin, mainly due to pollution from large agricultural lands and industrial areas along the river. Plastic pollution has also been detected in several river inlets, which harms the marine environment. Desakota, an area with a large mix of agricultural and industrial land, faces more serious water pollution problems than the city.



Fig.9 Rubbish piles up on the riverbanks in Jinzhou
Source: Internet, See appendix

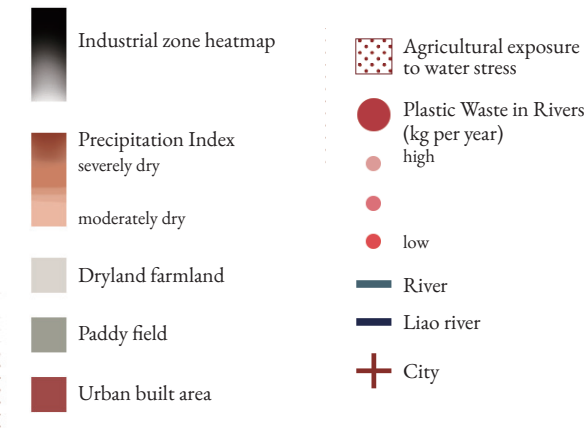
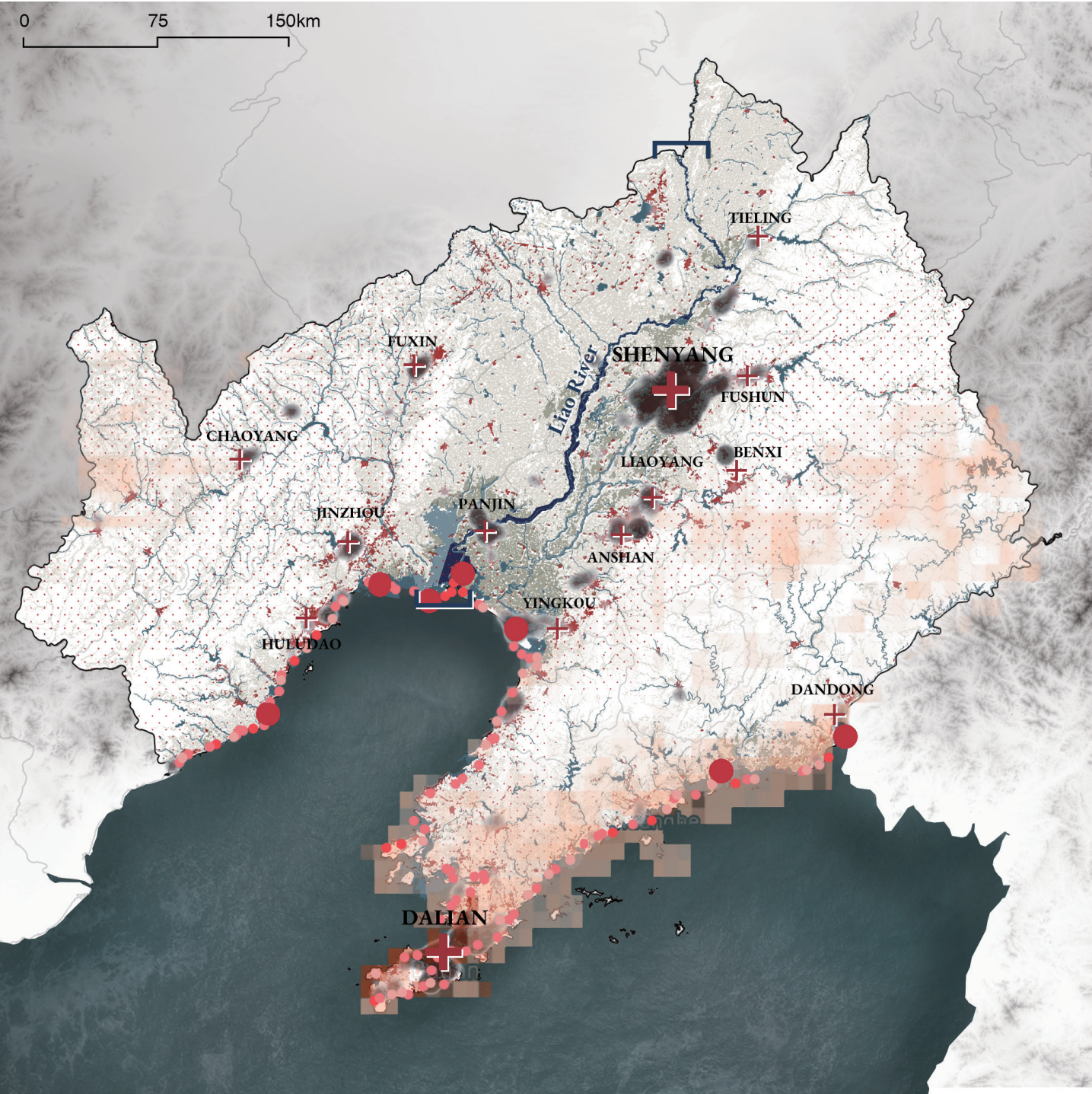


Fig.10 Water pollution from a rural factory in Chaoyang
Source: Internet, See appendix

Another problem is water scarcity. Agriculture in eastern and western Liaoning faces water stress due to uneven distribution of water resources and seasonal water shortages.

In summary, human activities stress the water system and restrain the ecosystem services of provisioning⁴ and regulating freshwater, leading to low availability of freshwater and negative impacts on social systems.

4. Provisioning refers to products humans obtain from ecosystems, such as freshwater, food and raw material, etc. (MEA, 2005)



Water pollution and water shortage in Liaoning
Made by author

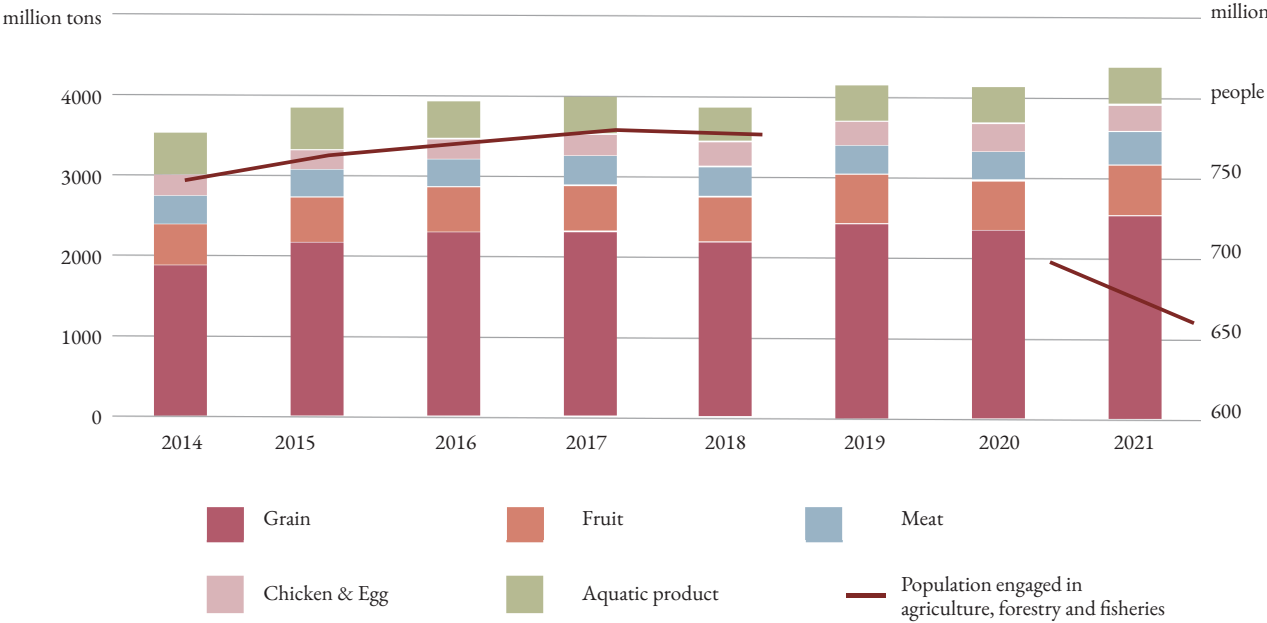
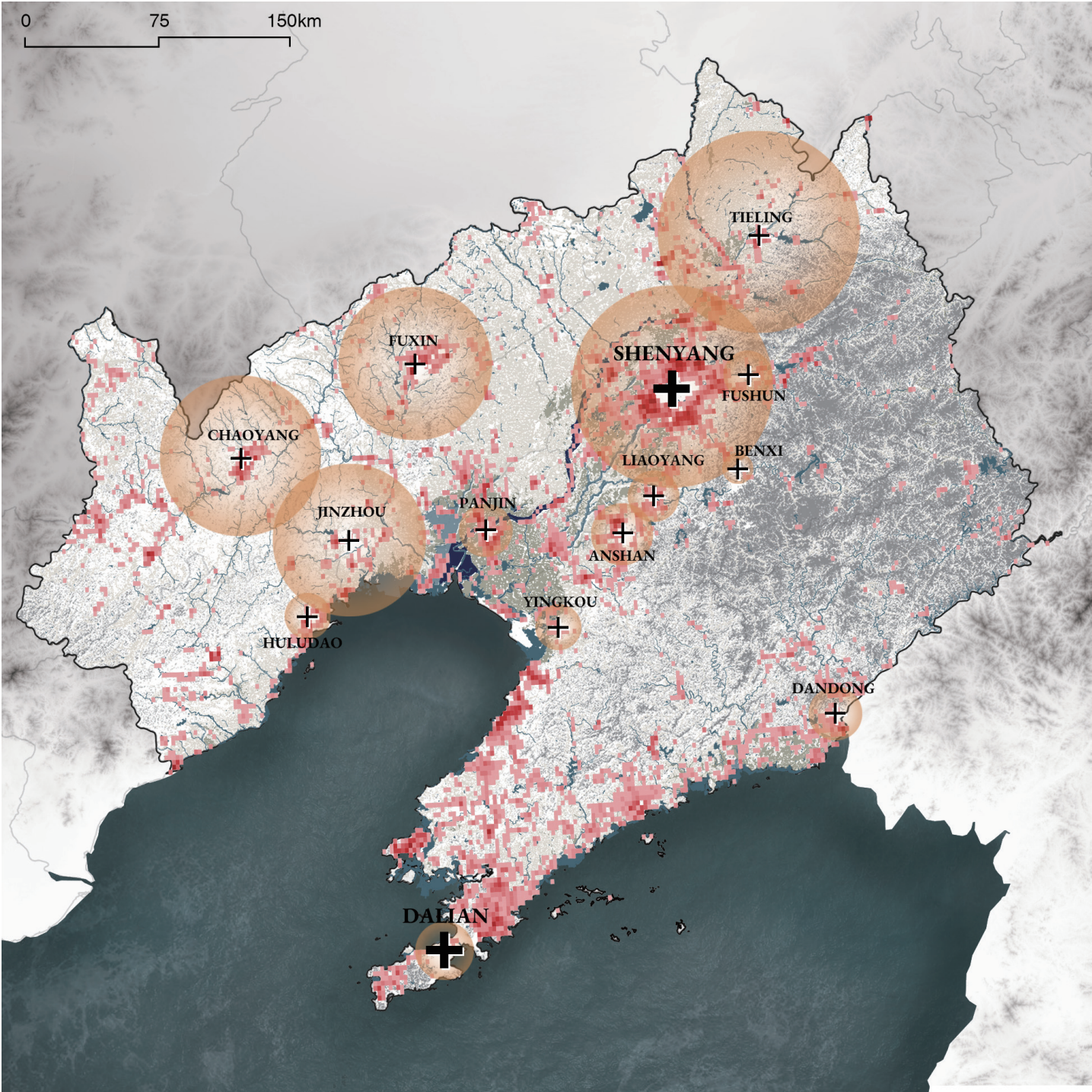
Socio-ecological degradation

■ Abandonment of agricultural land

The main food products in Liaoning Province are corn, rice, soya beans and peanuts, etc. In recent years, the food production in Liaoning has increased slightly, but the population engaged in agriculture, forestry and fisheries has decreased in the past three years, which is mainly due to the lower income from agriculture, and people have turned to other industries. However, the modernization of agriculture has increased, so food production has not been affected for the time being. In addition, due to soil erosion, some of the farmland in Liaoning has suffered from soil degradation and declining yields. In some areas, there has been subsidence of agricultural land due to industrial impacts such as mining,

leading to the abandonment of agricultural land.

In conclusion, due to population loss, soil degradation, and land subsidence, a large amount of farmland in desakota has been abandoned, which will affect the environment and food availability over time, and the ecosystem services of provisioning will also be restrained.



Food production of Liaoning 2014-2021
Made by author, data based on Liaoning Statistical Yearbook 2022

Cropland loss in 2003-2019 and food production in 2021
Made by author, data based on Liaoning Statistical Yearbook 2022

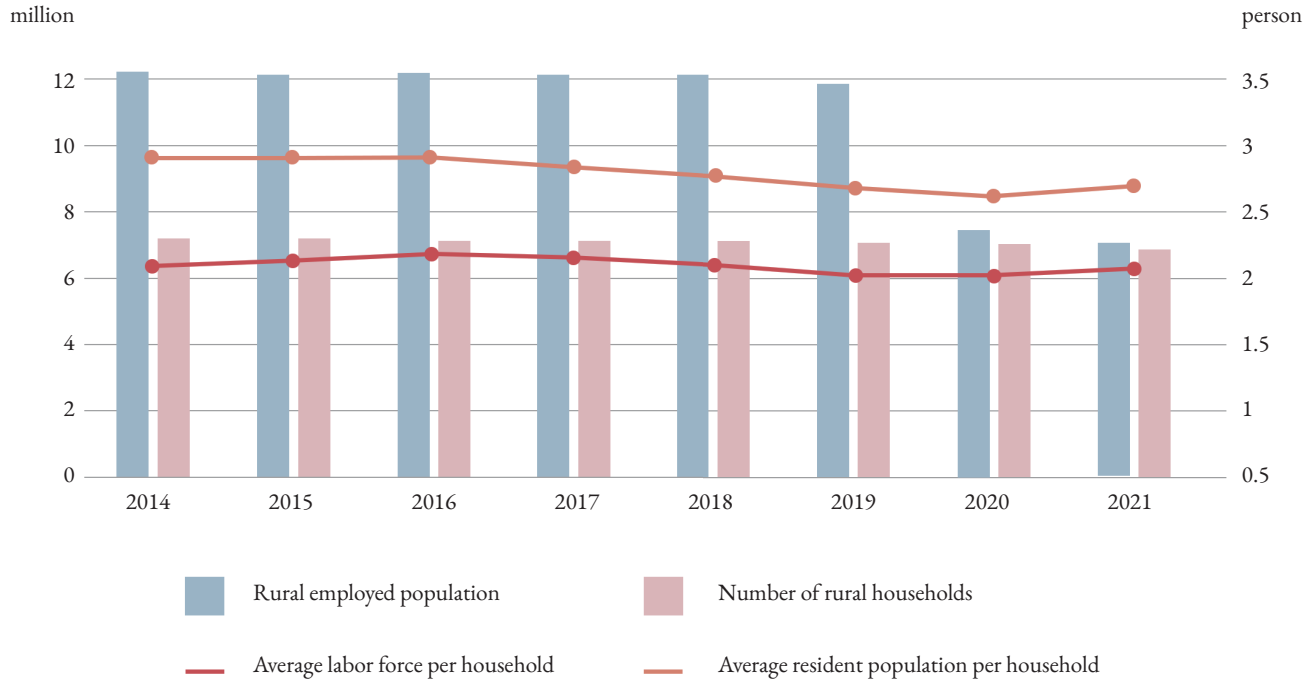
2.1.2 Influenced by Urban Shrinkage

The total population of Liaoning Province has been declining over the past decade, with an overall trend of shrinkage. Urban shrinkage occurs mainly in small cities (di ji shi), and due to the siphon effect, the population mainly flows to relatively economically developed cities such as Dalian and Shenyang. Specifically, population loss occurs mainly in exurban areas with monotonous economic structures, i.e., desakota and rural areas. Liaoning's urban shrinkage has exacerbated the population loss in desakota, exposing it to additional negative impacts. This is reflected in an aging population, land and environmental degradation, and increased urban-rural income and employment inequality. As a result, urban shrinkage has also had negative impacts on desakota's social-ecological system.

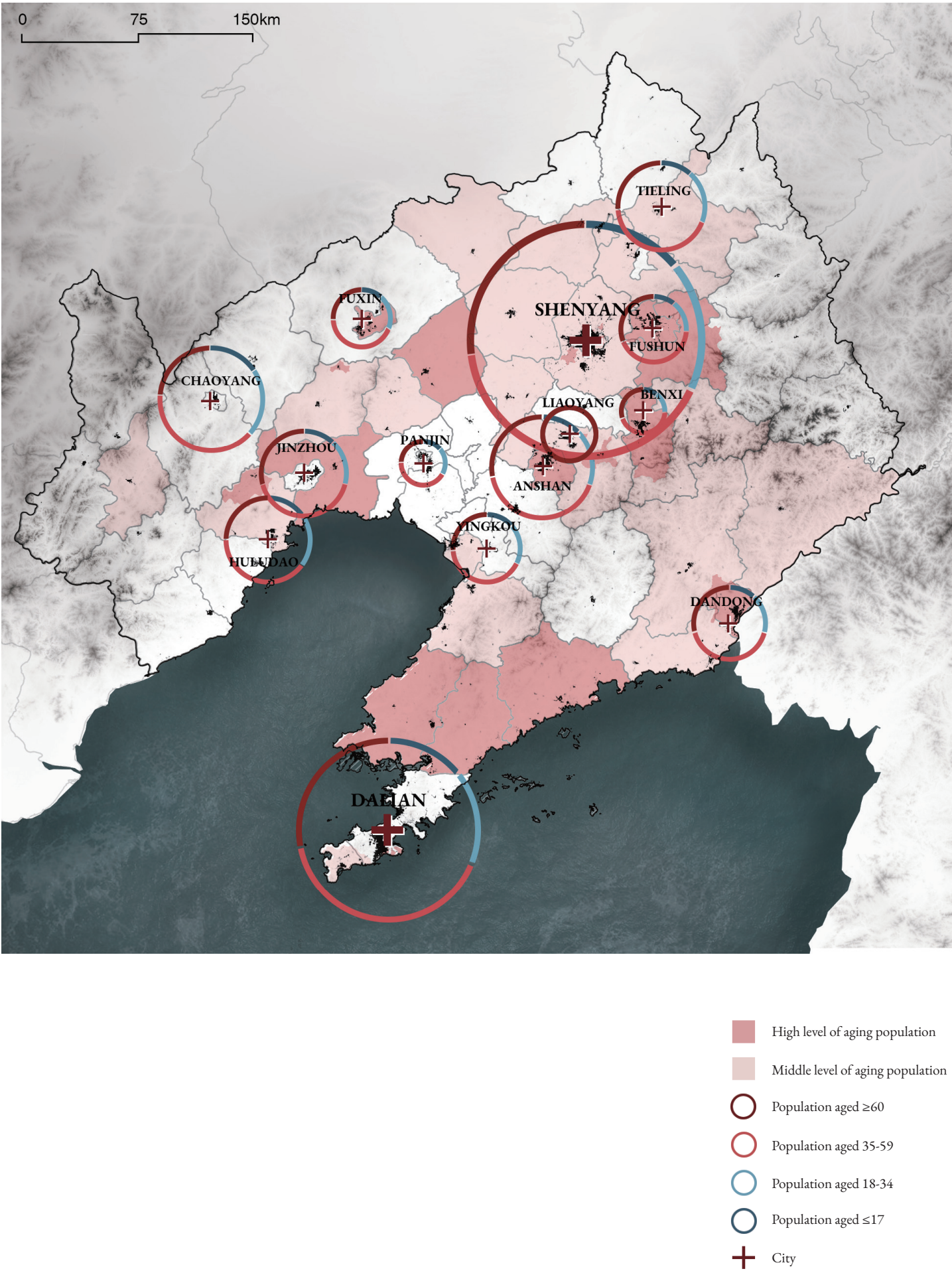
Aging population

Urban shrinkage has drained desakota of its young and middle-aged population, exacerbating the aging population. This is also reflected in the decline of the entire rural labor force. A study by Guan et al. shows that although the growth rate of the aging population in Liaoning has slowed down, the overall trend is still rising. By 2010, nearly 32% of districts and counties had a more serious aging problem, mainly in the inland counties of western, northern, and central Liaoning. Most urban areas in Liaoning have higher levels of aging population than rural areas. However, rural areas in western Liaoning, northern Liaoning, and several coastal cities

have higher levels of aging than urban areas, suggesting that the out-migration of the rural working-age population from these areas has exacerbated the aging process in rural areas (Guan et al., 2020). In addition, as can be seen from the map on the right, most of the counties with higher levels of aging are located around big cities, due in large part to the siphoning effect of big cities. These higher aging counties are distributed with a large number of desakota, which again proves that the desakota in Liaoning are experiencing aging problems caused by population loss.



Rural households, employed population and labor 2014-2021
Made by author, data based on Liaoning Statistical Yearbook 2022



Age structures of cities in 2021 in Liaoning
Made by author, data based on Liaoning Statistical Yearbook 2022 and Guan et al., 2020

Land and envirionmental degradation

Due to lack of capital, materials, and energy, some township and village enterprises (TVE) in desakota closed down and these abandoned factories have gradually turned into vacant land (Ma et al., 2018). Due to population loss, some houses have also been left vacant. In addition, because of soil erosion and degradation, many agricultural lands in desakota have also been abandoned. The above reasons have resulted in a large amount of wasteland in desakota, which further contributes to land and environmental degradation.



Fig.11 Vacant house in desakota in Dalian
Source: Internet, See appendix



Fig.12 Abandonment of large areas of arable land in Pulandian
Source: Internet, See appendix

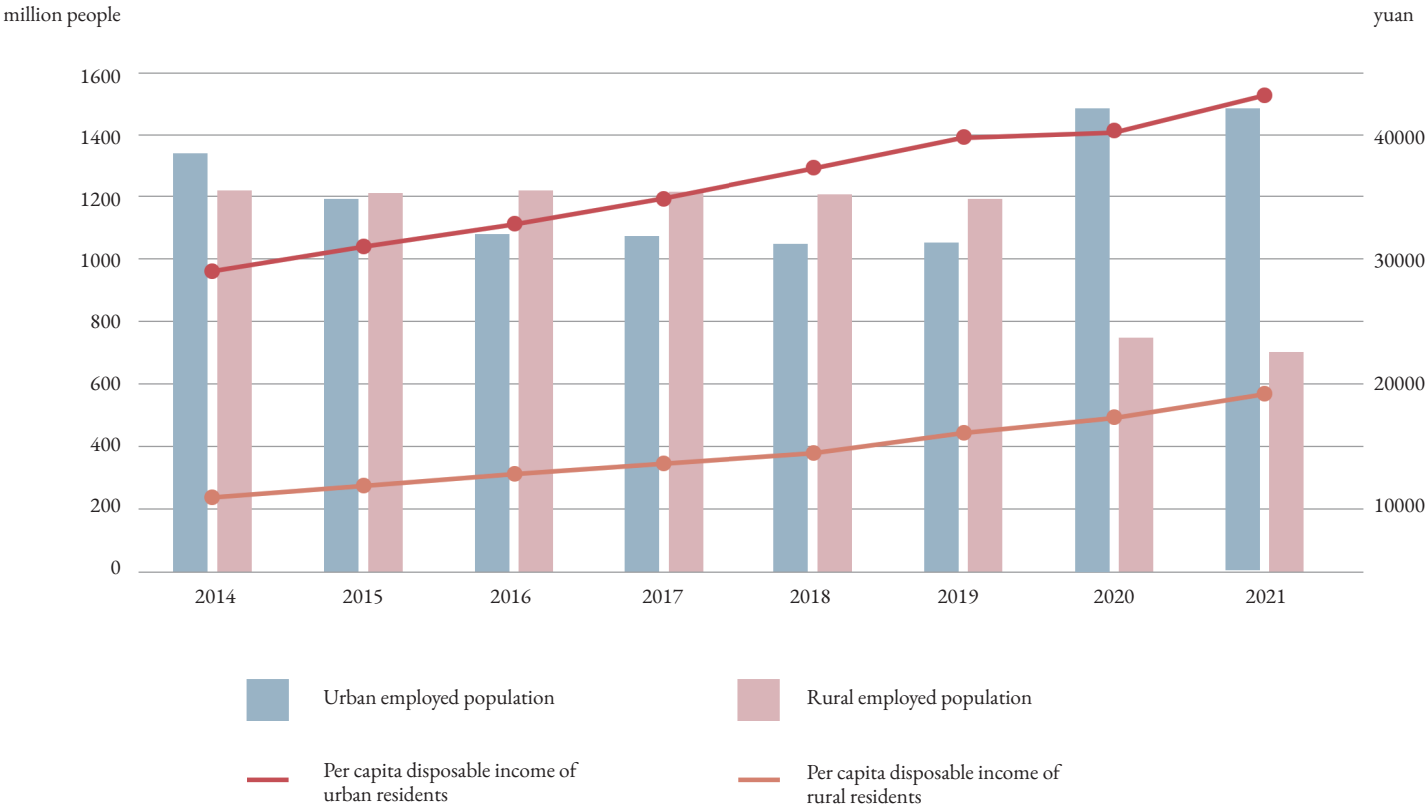


Fig.13 Abondonment of TVE in desakota in Shenyang
Source: Internet, See appendix

Increased gap of income and employment between urban and rural areas

As mentioned above, a large part of Liaoning's urban shrinkage comes from the loss of population in desakota, which indirectly leads to an increase in the income and employment gap between urban and rural areas. Despite the increase in disposable income per capita in both urban and rural Liaoning over the period 2014-2021, the gap remains significant. Due to overdependence on cities and lack of industrial support, desakota has become less functionally diverse, resulting in fewer employment

opportunities. Most of the labor is forced to move to cities in search of job opportunities, widening the inequality between urban and rural employment and income (Ma et al., 2018), which in turn strengthens the urban-rural dual economic structure and then hinders the development of residents' welfare (Ding et al., 2024).



Urban-rural employment and income gap in Liaoning 2014 -2021
Made by author, data based on Liaoning Statistical Yearbook 2022

2.2 Problem Statement

Desakota in Liaoning are suffering from **marginalization** and **socio-ecological degradation** due to **lack of planning** and **neglect of the importance of ecosystems**. Failing to rationalize its strengths and value, desakota lacks interaction with the rest of the megaregion. This results in the inability of desakota to integrate into the megaregion and develop together.

Human activities in pursuit of economic benefits have negatively impacted ecosystems. The capacity of ecosystems to provide ecosystem services is reduced and they are unable to meet human needs. To satisfy the demand, humans continue to cause harm to ecosystems. This leads to a **vicious loop** that exacerbates **socio-ecological degradation** of desakota. At the same time, **marginalization** and **urban shrinkage** are also **stressing the social-ecological system** of desakota.

Consequently, desakota in Liaoning cannot innovate and transform to a desirable future in a shrinking context. However, given their ecological and industrial adavantages and high connectivity to both urban and rural areas, desakota have the potential to **provide socio-ecological value** to the megaregion and and act as an interface to **facilitate intergrated development**.

2.3 Knowledge Gap & Relevance

Many scholars have noticed the in-between territories in Asia. McGee first introduced the concept of ‘Desakota’ in 1991. He described it as an area with a dense mixture of agricultural and non-agricultural activities, usually along the corridors of large cities, that once had large populations engaged in agriculture (McGee, 1991). Guldin pointed out that rural areas in China have undergone a transformation towards an urbanized lifestyle with the population shifting from agricultural to non-agricultural occupation (Guldin, 1996). Lin et al. examined the growth and spatiality of urbanism in peri-urban regions in southern China and identified emerging urbanization in these globalized regions (Lin et al., 2018).

In addition, there are many studies on the transformation of desakota in China. Xie et al. used landscape ecological metrics to analyze tempo-spatial patterns of desakota in the downstream area of the Yangtze River Delta (Xie et al., 2006). Chen et al. proposed that to achieve the transformation of desakota, traditional blueprint-led planning should be transformed into action-led planning (Chen et al., 2015). Endemann explored the possible transformation of desakota in the Jing-Jin-Ji megaregion to improve its performance in environmental and social sustainability (Endemann, 2020). Zhang used the elemental approach to explore the transformation of desakota in the Yangtze River Delta by the construction of utopia (Zhang, 2023).

However, existing research on desakota mainly focuses on prosperous megaregions like the Yangtze River Delta, the Great Bay Area, and the Jing-Jin-ji megaregion, with less attention paid to Liaoning, which is experiencing urban shrinkage. The problems faced by desakota in this context are more severe, so this study aims to fill this gap and draw the attention of other researchers to this type of area through the study of desakota in Liaoning.

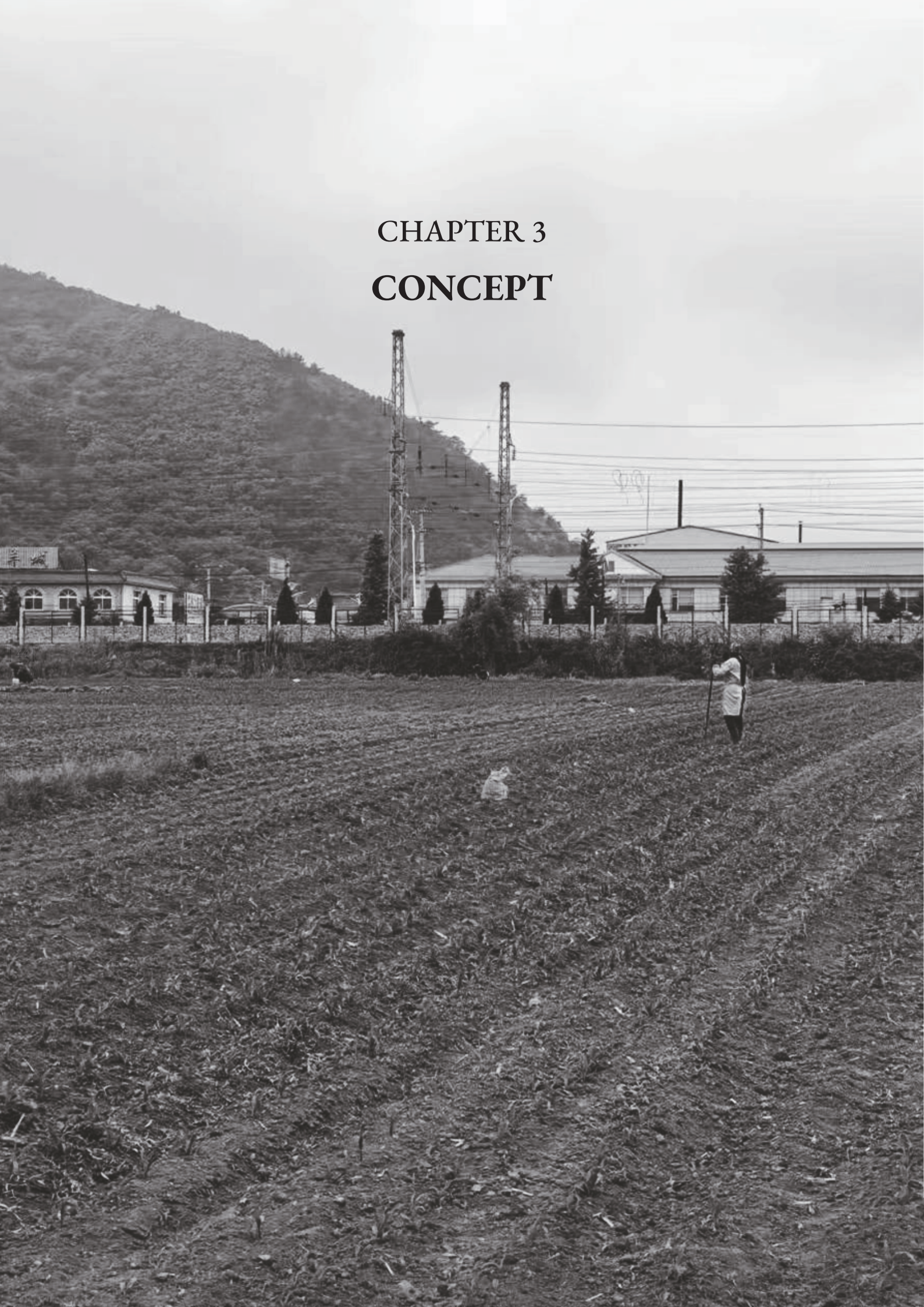
Some studies have discussed the relationship between resilience and adaptive planning. Davoudi (2021) states that the concept of

adaptive planning has emerged as a result of resilience and its application to the adaptive management of social-ecological systems. Eraydin (2012) claims that a new planning paradigm can be introduced based on the concept of resilience, with adaptive capacity at its core. And this capacity can be enhanced through planning. De Roo et al. (2020) state that the discussion on resilience shifts planning from control, management, and predictability to change, transformation, and adaption. Planning can influence the adaptive capacity which is important to the process of transformation. These findings fully validate the importance of adaptive planning for building resilience. This study hopes to enrich the research on adaptive planning to enhance socio-ecological resilience.

The importance of resilience in shrinking areas is also recognized by many scientists. By reviewing the policies adopted by different shrinking cities, Eraydin and Özatağan (2021) found that new attempts are made to identify ways to cope with shrinkage based on resilience. Bănică et al. (2017) state that shrinking cities and resilient cities are two major themes that should be studied and included in policies in an integrated manner.

The aim is to contribute to the potential of peri-urban areas to which several studies refer. Livesley et al. (2016) show how forests in the peri-urban provide diverse ecological services. Mngumi (2019) shows how well-managed peri-urban ecosystem services can enhance the ability of peri-urban areas to respond to ecological and social changes. Colucci (2015) points out that by increasing the resilience of social-ecological systems, peri-urban areas can play an important role in the future development of metropolitan areas. Consequently, there is a desire to build socio-ecological resilience in peri-urban areas to explore their future possibilities.

This study aims to answer the questions mentioned above for desakota experiencing shrinkage, by building socio-ecological resilience through adaptive planning.



CHAPTER 3

CONCEPT

This chapter is about the concept. There are four main sections in this chapter.

Firstly, the aim of this study and the main research questions are formulated based on the analyses and problem statement in the previous chapter.

Subsequently, a theoretical framework is developed by demonstrating the theories and concepts involved and building linkages between these theories to understand what socio-ecological resilience means for desakota based on existing literature and research.

Finally, a conceptual framework is proposed by explaining how to achieve socio-ecological resilience in desakota, and how desakota can be integrated into the megaregion.

3.1 Research Aim

To revitalize desakota through **socio-ecologically resilient** development and **integrate desakota into the megaregion** as an important role in the context of **shrinking cities**.

3.2 Main Research Question

How to achieve the **socio-ecologically resilient** development of desakota in the context of **shrinking cities** in Liaoning?

3.3 Theoretical Framework

Desakota, as a transition zone between urban and nature, is an area where social and ecological systems are intertwined and interact with each other. Besides, desakota has a higher level of urbanization compared to rural areas and higher ecological integrity compared to cities. Thus, desakota is the area that can well demonstrate the coupling of social and ecological systems. However, according to the analyses in the previous chapter, the socio-ecological system of desakota is degrading due to several reasons.

Therefore, building socio-ecological resilience is particularly important if the revitalization of desakota is to be realized.

To explore what does socio-ecological resilience mean and how to achieve it in peri-urban areas, the following theories are elaborated.



Desakota in Liaoning
Source: Quan, 2023

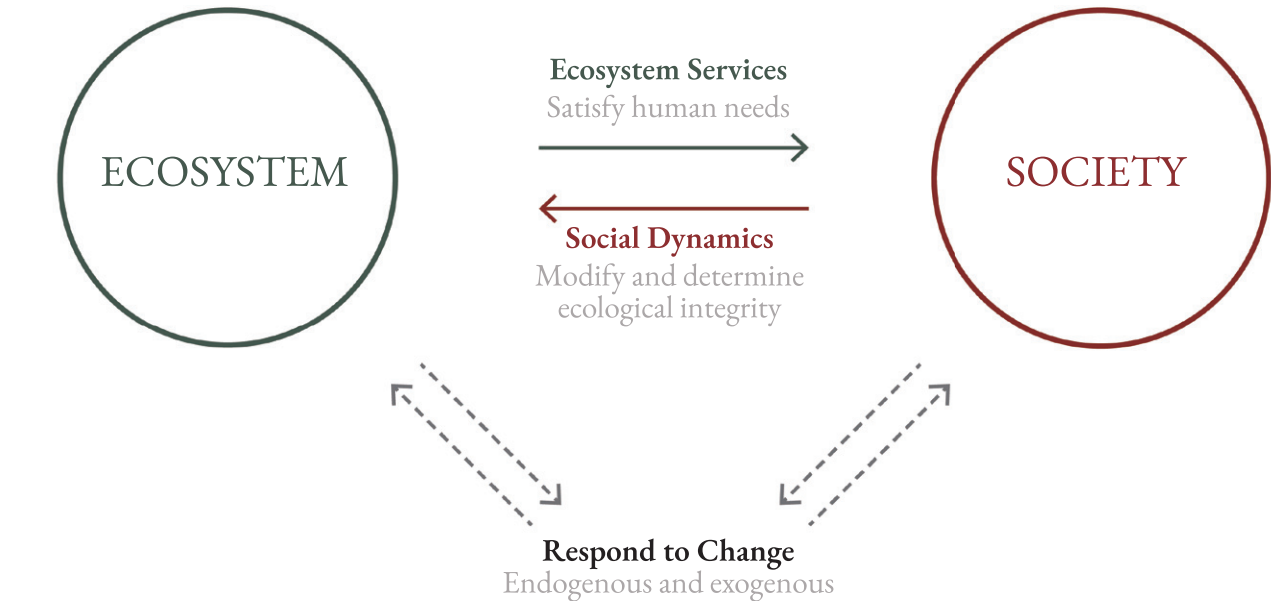
3.3.1 Socio-ecological System

Socio-ecological systems are integrated complex adaptive systems in which social and ecological subsystems are coupled and interdependent, each influencing and relying on the other in a series of mutual feedback relationships (Berkes, 2017). The concept of SES was developed in the 1990s to investigate the interdependent and interactive relationships between social and ecological systems. Berkes and Folke et al. (1998) systematically analyze the social and ecological linkages through 14 case studies, aiming to address sustainability, seek principles for resource management, and help degraded ecosystems regenerate the flow of services. Subsequently, ecosystems and social systems are often discussed as one integrated system (i.e., social-ecological systems).

Unlike the conventional view of social systems and ecosystems as separate entities, socio-ecological systems are treated as a whole, emphasizing the connections and feedback between the two sub-systems, which determines the dynamics of socio-ecological systems (Biggs et al., 2022). As outlined by Berrouet et al. (2018), there are three main streams of contemporary research on the

relationship between social systems and ecosystems in SES, which are (1) the exploration of how ecosystems satisfy human needs by providing ecosystem services, (2) an examination of how the social dynamics of demands and utilization of ecosystem services impact ecological integrity, and (3) an exploration of how social systems and ecosystems respond jointly to endogenous and exogenous changes.

Socio-ecological systems embody the characteristics of Complex Adaptive Systems (CAS). CAS refers to a dynamic system whose components can adapt to their surroundings through evolution and interactions among the components in the face of changing circumstances (Holland, 1992). The system is complex because it contains multiple dynamic components that are interdependent with dynamic and diverse interactions between them. In addition, the behaviors of individual components within the system are unpredictable, and the collective behaviors of the system resulting from these individual behaviors are also unpredictable.



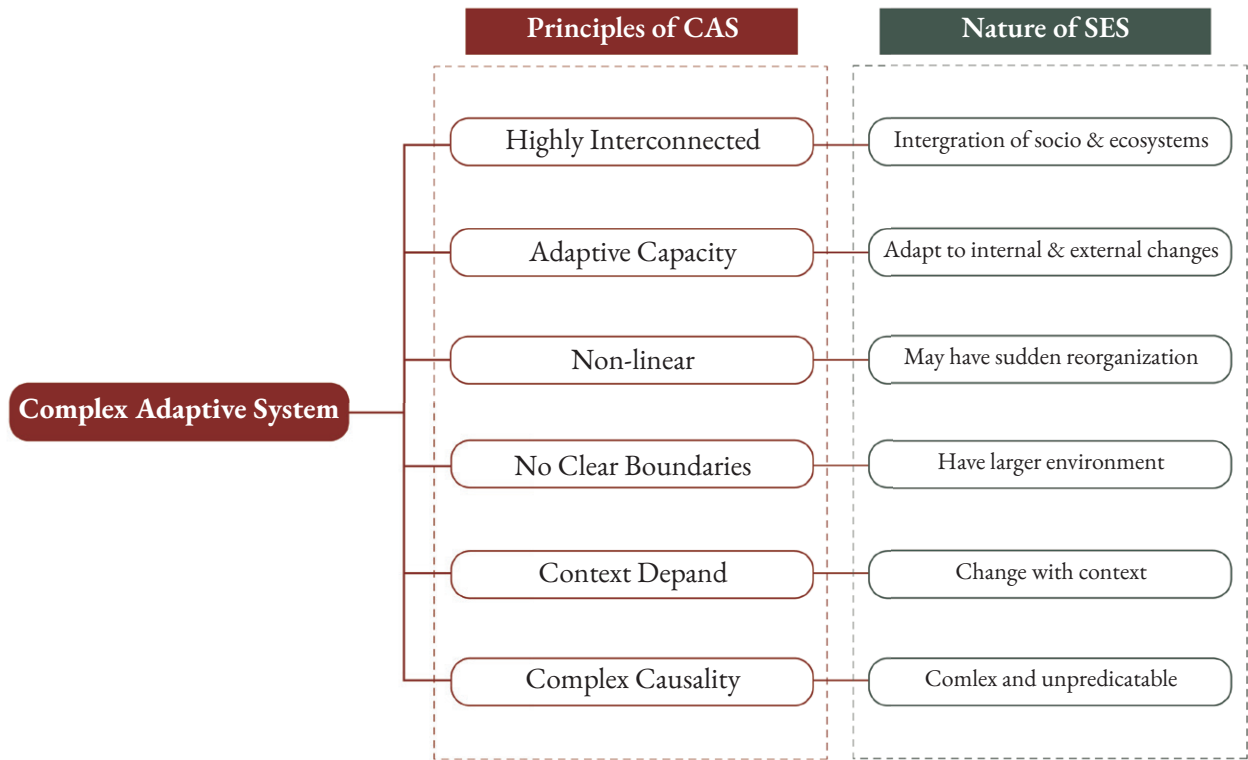
Socio-ecological system
Made by author

Besides, the system is adaptive in the sense that components evolve or change their interactions with others in response to endogenous or exogenous changes in order to better adapt to the changing environment. As de Roo (2015) states, CAS fluctuates between order and chaos “seeking the best fit to develop and to progress”.

The socio-ecological system as a type of complex adaptive system, has dynamic social and ecological subsystems, with continuous interactions between them, and the behaviors of these subsystems can influence the overall performance of the entire SES. Moreover, SES can maintain its structure and functionality in the face of change, responding to internal or external pressures through learning and self-organization (Levin et al., 2012). Biggs et al. (2022) note that the six principles of CAS proposed by Preiser et al. in 2018 help to understand the nature of SES. Firstly, the components of the system are highly interconnected. This reaffirms that the study of social systems and ecosystems should not occur separately; instead, it should be analyzed systematically focusing on the interactions between these

two subsystems. Secondly, the system can adapt. Mutual feedback processes between social systems and ecosystems allow SES to adapt to both internally and externally changing circumstances. Thirdly, the system is non-linear. Feedback loops can lead to sudden, large-scale, and continuous reorganization of the structure and functioning of the SES (Biggs et al., 2022). Fourthly, the system has no clear boundaries. SES coexist within, engage with, and are intricately linked to a larger environment that cannot be overlooked. Fifthly, the system is contextually determined. Many SESs can be revived by changing the roles of components when under stress. Finally, the system has complex causality. The linkages and intertwining of social and ecological systems in SES are complex, and because the subsystems are dynamic, the overall behavior of the entire SES is unpredictable (Biggs et al., 2022).

In summary, social and ecological systems are intertwined and interdependent. Therefore, they should not be studied in isolation but should be viewed systematically as a whole, with attention to the mutual feedback between



Socio-ecological systems are complex adaptive system
Made by author

them. Secondly, SES operates in a larger context, and its linkages and interactions with the rest of the megaregion should be considered when studying the SES of desakota. Thirdly, SES is complex and dynamic, adapting to a constantly changing environment. It should be recognized that planning cannot predict and control its uncertainty. Finally, as CAS adapts to unstable environments through change, viewing the SES of desakota as a CAS can help identify the conditions that facilitate or limit the desakota's adaptability (Rauws & de Roo, 2016).

3.3.2 Socio-ecological Resilience

Young et al. (2006) propose resilience, robustness, and vulnerability as structural characteristics of social-ecological systems. Resilience is the core concept of sustainability and the most widely employed theory in socio-ecological change (Berkes, 2017). Resilience refers to the ability of a system to absorb disturbances and reorganize itself, maintaining its functions, structure, properties, and feedback during periods of change (Walker et al., 2004).

Socio-ecological resilience signifies the capacity of the socio-ecological system to maintain its identity and main functions in response to change (Berkes, 2017; Walker et al., 2004). Berkes (2017) states that resilience is the characteristic of the socio-ecological system as a whole, not only the social system or ecosystem

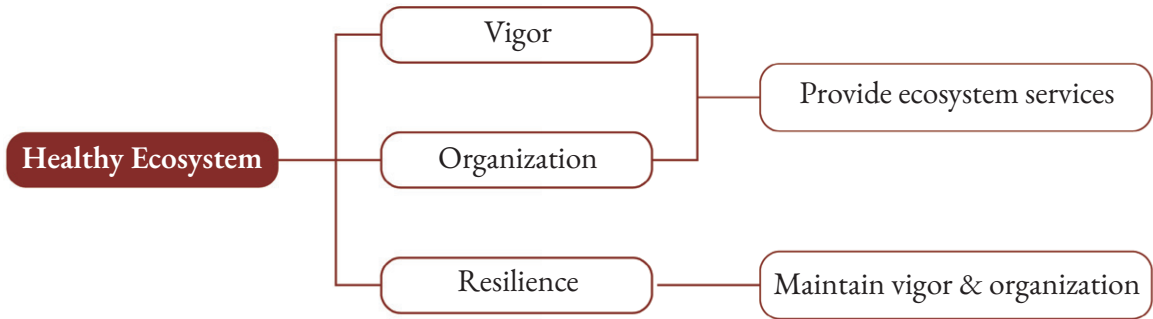


Socio-ecological resilience
Made by author

CONCEPT

3.3.3 Healthy Ecosystem

Costanza et al. (1992) note that a healthy ecosystem “is active and maintains its organization and autonomy over time and is resilient to stress”. An ecosystem is unhealthy if its lifespan is unnaturally shortened by disturbances and bad outcomes occur prematurely (Costanza & Mageau, 1999). Costanza and Mageau (1999) propose ecosystem health as a “comprehensive, multiscale, dynamic, hierarchical measure of



Healthy ecosystem
Made by author

In resilient social-ecological systems, healthy ecosystems enhance human well-being by providing stable ecosystem services to the social system. Hernández-Blanco et al. (2022) propose that the vigor and organization of healthy ecosystems can provide ecological functions, deemed as ecosystem services when they yield benefits to humans. These ecosystem services are broadly categorized into supporting, providing, regulating, and cultural aspects. According to Yamafuji and Woods (2021): (1) Supporting services revolve around meeting the needs of both humans and natural systems and enable the functioning of the other three services. (2) Provisioning services entail the supply of products from nature to people, encompassing essentials such as food, fresh water, wood, fuel, etc. (3) Regulating services involve nature's contribution to environmental regulation, including processes like air purification, water purification, disease and pest control, and pollination, etc. (4) Cultural services encompass non-material benefits provided by nature to humans, i.e. recreation, aesthetic values, spiritual health, etc.

CONCEPT

system resilience, organization, and vigor”. According to their study, vigor refers to the ability of activity, metabolism, and primary production of the system. Organization refers to the number and diversity of interactions between system components. Resilience refers to the ability of a system to maintain its structure (organization) and function (vigor) in response to stress(Costanza & Mageau, 1999).

As an exurban area, desakota plays a crucial role in maintaining fundamental ecosystem functions (Chen et al., 2023). These areas possess higher ecological integrity in comparison to urban areas, endowing them with the capacity to yield more ecosystem services. However, the escalating anthropogenic pressures on ecosystems have degraded their capacity to provide ecosystem services, coinciding with a surge in the demand for these services. The challenge lies in the conflict between the burgeoning demand for ecosystem services and the diminished capacity of the ecosystems (MEA, 2003)—a dilemma demanding careful consideration.

Provisioning	Regulating	Cultural
Products human obtained from nature: Food, Raw materials (e.g. wood, fuel, fibre), Medicine, Fresh water	Services nature provides regulating the environment: Air quality, Water purification, Climate, Waste treatment, Disease and pesr control, Pollination	Non-material benifits of nature for humans: Recreation, Aesthetic value, Spiritual value, Mental health, Education
Supporting		
The underpin services that enable all other services to function - emcompasses both human and nature needs: Photosynthesis, Nutrient Cycling, Soil Formation		

Ecosystem services
Edited by author, based on Yamafuji & Woods, 2021; MEA, 2005

3.3.4 Human Well-being

The concept of well-being is abstract and although there are many interpretations there is no clear definition that is widely accepted (Brown and Westaway 2011; McGillivray and Clarke 2006). The Millennium Ecosystem Assessment (2005) suggests that human well-being includes a variety of components, such as basic materials for a good life, freedom of choice and action, health, good social connections, and security. Current research on well-being mainly considers it in two types, objective and subjective well-being. King et al. (2013) state that objective well-being refers to the material and social attributes of a person's life situation, including physical resources, income and employment, housing, education, health, etc. which can be measured quantitatively. Subjective well-being refers to a person's thoughts, feelings, and satisfaction, including social connectedness, autonomy, personal security, and life satisfaction (King et al., 2013).

Human well-being can be enhanced by satisfying human needs (Costanza, 2007). Max-

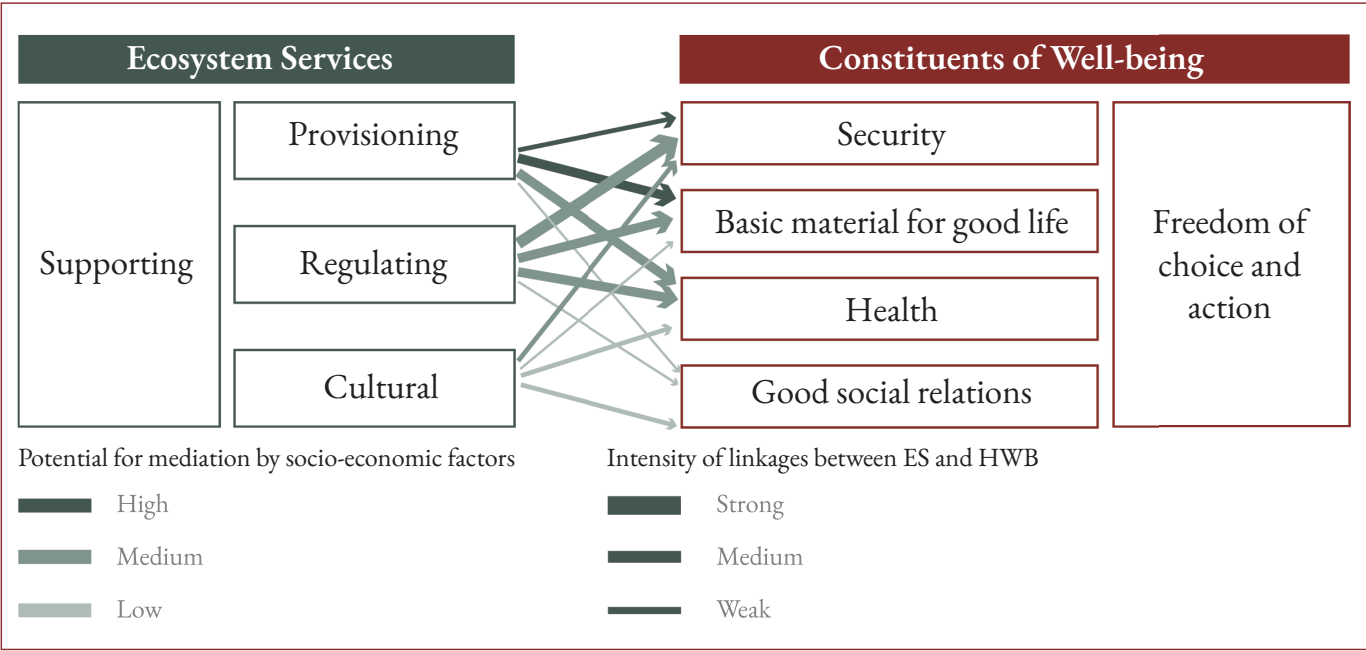
Neef's (1991) matrix of fundamental human needs lists a range of human needs and need satisfiers and categorizes them into existential (i.e., needs for being, having, doing, and interacting) and axiological (i.e., needs for subsistence, protection, affection, understanding, participation, creation, idleness, identity, and freedom) (King et al., 2013). Based on this, Cardoso et al. (2021) link cities to human needs and construct a table of human needs indicators to assess cities and examine whether they can provide need satisfiers. Although desakota is a non-urban area, parts of the framework are also applicable (See figure below). For example, people's need for 'subsistence' can be met by improving air quality, food availability, neighborhood quality, and infrastructure accessibility. The need for 'protection' can be met by upgrading the quality of the environment and health care (Cardoso et al., 2021).

Ecosystems can also enhance human well-being by providing ecosystem services that fulfill human needs. Ecosystem services are the

	Being	Having	Doing	Interacting
Subsistence		Air & water quality, Food availability, Housing, Neighborhood quality, Transport infrastructure		Food system, Housing markets, Infrastructure construction
Protection	Life expectancy, Crime preception	Health care, Environmental quality, Safe environment	Environmental action	Preparedness
Affection	Isolation, loneliness	Meeting spaces, Green and blue areas, heritage		Accessibility to public spaces
Understanding	Entrepreneurship	Education, Training, Knowledge institution		Sharing and learning opportunities
Participation	Trust and care, Solidarity	Symbolic public spaces	Commuting	Community-building, collective action
Leisure	Induced demand, Stress	Entertainment, tourism, resting space		
Creation	Personal and free initiative	Interaction spaces, Cultural clusters		Active sharing and learning, peer interaction
Identity	Spatial memory, Sense of belonging	Heritage, Collective symbol		Community cultures and faiths
Freedom	Political engagement	Public institutions, welfare, governance institution	Freedom to move into cities	Gender equality, Social responsibility

Human needs and indicators for satisfiers in desakota
Edited by author, based on Cardoso et al. ,2021

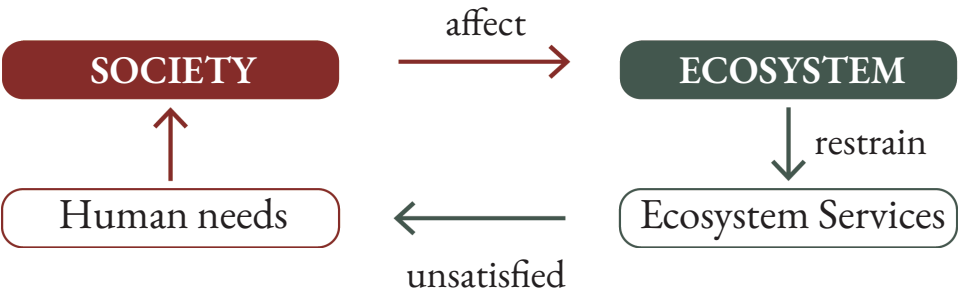
satisfiers of human needs and humans depend on ecosystem service flows (MEA, 2003). The Millennium Ecosystem Assessment illustrates the direct and indirect interconnections between the components of well-being and ecosystem services. For example, ecosystems provide the service of 'provisioning' through the provision of food and other products, which can fulfill the 'security' and 'health' dimensions of human well-being (MEA, 2003). The strength and mediation of the linkages between ecosystem services and human well-being may vary in different contexts (MEA, 2003).



Linkages between Ecosystem Services and Human Well-being
Edited by author, based on MEA, 2003

Chen et al. (2023) state that ecosystems in peri-urban areas have a huge impact on human well-being through the provision of multiple ecosystem services. This implies that desakota can enhance the well-being of local people or even the entire megaregion through the provision of ecological values. However, human activities are affecting the ability of ecosystems to provide ecosystem services. As indirect drivers of change, human activities can lead to changes in, for example, land use and cover, which directly affect the provision of ecosystem services and, ultimately, human well-being (MEA, 2003). In MEA (2003), it is stated that degraded ecosystems, which are under increasing pressure due to human activities, in turn, reduce human well-being

and limit economic development. Moreover, the degradation of ecosystems has greater impacts on rural populations and can have more direct and severe effects on the poor (MEA, 2003). Human well-being in desakota is more vulnerable to ecosystem degradation than in urban areas. Consequently, the regeneration of ecosystems is also important and urgent to improve human well-being in desakota, in addition to the fulfillment of basic human needs.

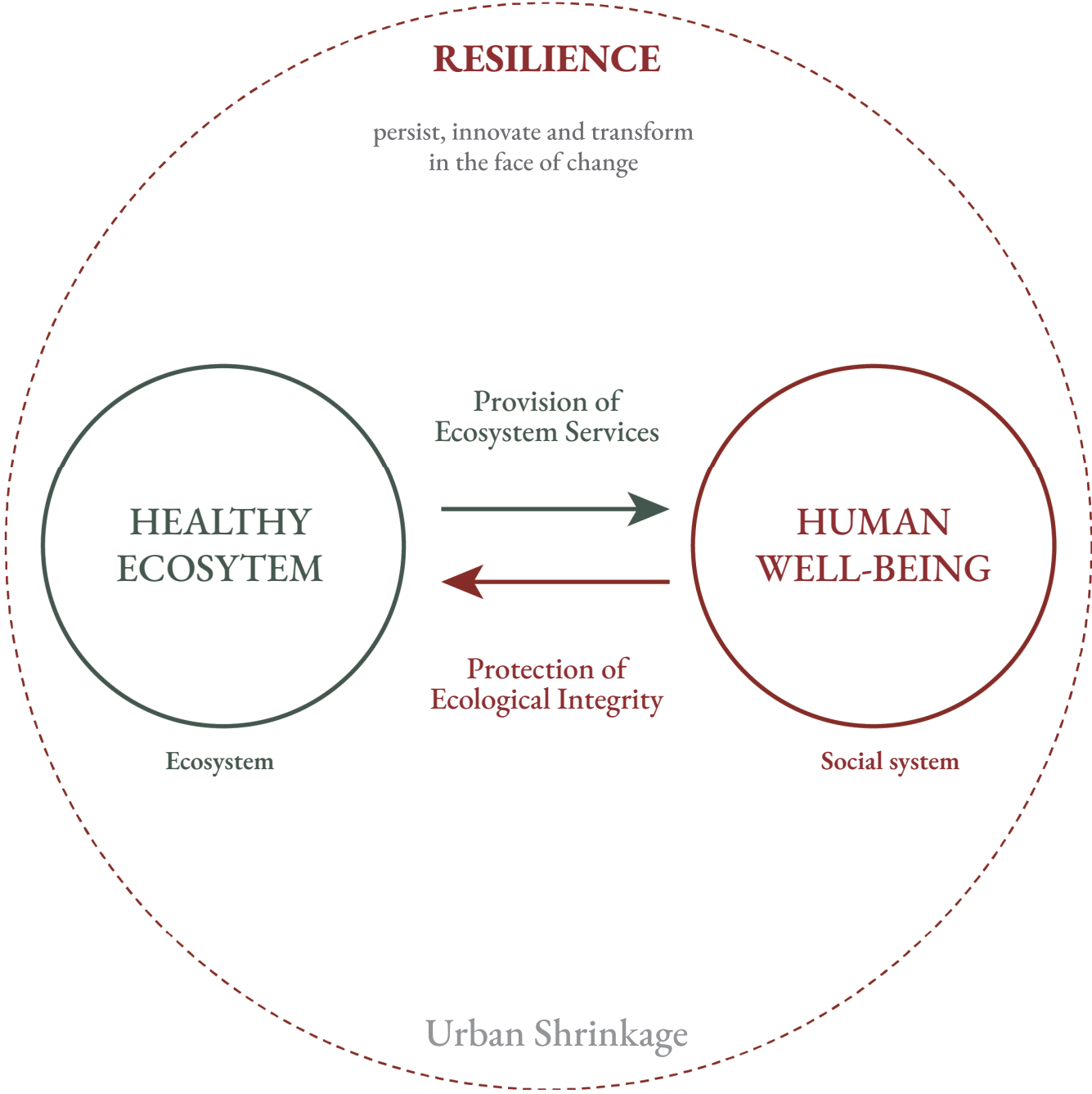


Feedback loop between society and ecosystem
Made by author

3.3.5 Theoretical Framework

Overall, healthy ecosystems and human well-being together constitute the socio-ecological resilience of desakota through interdependence and interaction. Healthy ecosystems provide stable ecosystem services to social systems to satisfy human needs, thereby enhancing human well-being. Social systems with high human well-being protect ecological integrity so that ecosystems are less stressed and better able to provide ecosystem services for the benefit of human society. This interaction unfolds as a virtuous feedback loop.

Simultaneously, social-ecological systems, as an interwoven whole, can work together to maintain the identity and functioning of the system in the face of internal or external changes and to innovate and transform to a more desirable state.



Theoretical framework
Made by author

3.4 Conceptual Framework

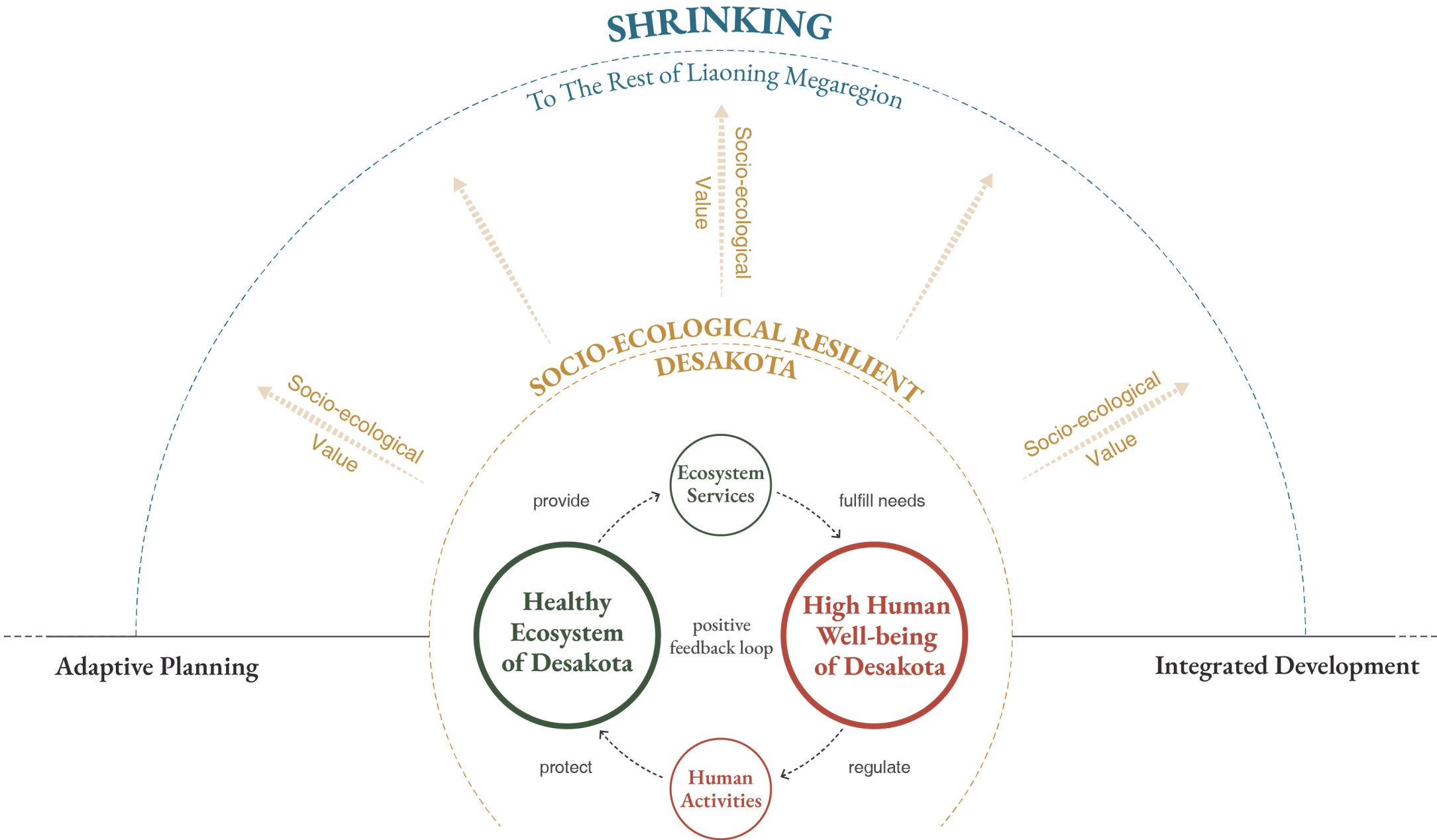
Adaptive Planning

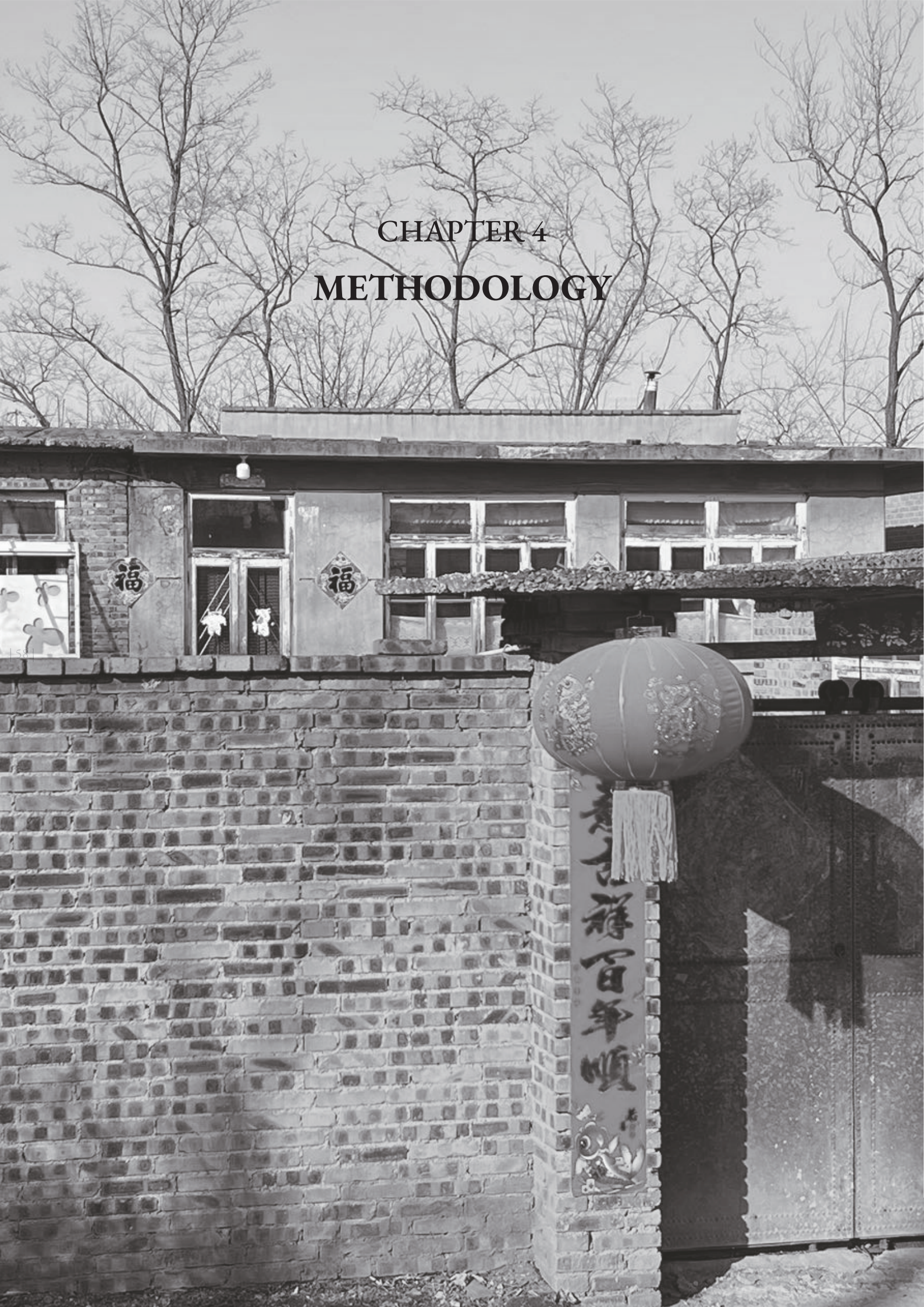
As mentioned above, social-ecological systems, as a kind of complex adaptive system, are dynamic and unpredictable. Traditional planning can only partially cope with change (Balducci et al, 2011) and has limitations in dynamic environments. While adaptive planning provides more room for uncertainty, change, and adaptive behavior (de Roo et al., 2020). It aims to support a range of possible future configurations based on development conditions (Rauws & de Roo, 2016).

When moving from deterministic and closed blueprint planning to uncertain and open adaptive planning, the responsibility of planners shifts to the manager of change, and the role of governance and planning changes to guiding the path of development, eliminating undesirable impacts, and supporting positive and desirable outcomes (de Roo, 2015). Thus, adaptive planning can contribute to building socio-ecological resilience.

Rauws and de Roo (2016) propose that adaptive planning approaches consist of two aspects: (1) creating development conditions for future spatial functioning configurations and improving the capacity of local actors that enhance resilience; (2) adjusting these conditions to make it more likely that an area will develop towards socially favored trajectories and avoid those perceived to be problematic. Thus, in addition to making regions more responsive to change, adaptive planning enhances bottom-up participation.

Seeking strategies to create a resilient future for shrinking cities is a difficult task (Eraydin & Özatağan, 2021). However, adaptive planning, with its flexible and dynamic character, can help desakota to achieve socio-ecological resilience in a changing environment by providing a range of open and attractive visions, proposing instructive principles for guidance, and encouraging the participation of diverse local stakeholders.



A black and white photograph of a traditional Chinese building. In the foreground, there is a brick wall. Above the wall, a large, round, traditional Chinese lantern hangs. The building behind the wall has several windows and doors. Two diamond-shaped decorative elements with the Chinese character '福' (Fú, meaning 'blessing') are visible on the wall. The background shows bare trees and a clear sky.

CHAPTER 4

METHODOLOGY

This chapter focuses on the methodology of this thesis.

Firstly, based on the theoretical and conceptual framework of Chapter 3, seven sub-research questions are proposed based on the main research questions.

To answer these sub-research questions, eight research methods corresponding to the questions are proposed. This is followed by a detailed explanation of the rationale for the use of each research method and exactly how it is operationalized. Then, following the logic and flow of this study, these research methods were integrated with the motivation, research aim, research questions, etc. into a methodological framework.

Finally, the chapter ends with a diagram of the workflow and important time points of this study.

4.1 Sub-Research Questions

According to the theoretical and conceptual framework, the following sub-research questions are formulated based on the main research question.

How to achieve the socio-ecologically resilient development of desakota in the context of shrinking cities in Liaoning?

1. What does socio-ecological resilience mean to desakota?

> Chapter 3 Concept - Conceptual framework

2. What's the current state of the social-ecological system in Liaoning's desakota?

> Chapter2 Problematization - Socio-ecological degradation

3. How does shrinkage affect the socio-ecological system of desakota in Liaoning?

> Chapter2 Problematization - Influenced by urban shrinkage

4. How to regenerate the ecosystem and enhance human well-being in desakota?

> Chapter 5 Case Study & Chapter 7 Scenario Building

5. How to ensure positive feedback between ecosystem and social system in desakota?

> Chapter 7 Scenario Building - Governance model & Socio-ecological resilient diagram

6. What socio-ecological values can desakota offer to the rest of the megaregion?

> Chapter 5 Case study - Strategies

7. How can adaptive planning enhance the resilience of desakota's social-ecological system?

> Chapter 7 Scenario Building

4.2 Main Methods

This thesis uses mainly qualitative research methods, but a small amount of quantitative data (mainly GIS data) will also be used. To answer the above questions, literature review, mapping, case study, fieldwork and interview, policy analysis, stakeholder analysis, elemental approach and scenario building will be used.

	SQ1	SQ2	SQ3	SQ4	SQ5	SQ6	SQ7
Literature Review							
Mapping							
Case Study							
Fieldwork & Interview							
Policy Analysis							
Stakeholder Analysis							
Elemental Approach							
Scenario Building							

Literature Review

Literature review is a predominant research method used in this thesis to analyze and set the theoretical and conceptual framework in the preliminary stage. The literature review centered on the following concepts.

Firstly, to better understand ‘desakota’, the definition and the development process of desakota in China were investigated through the literature, and the main research regions and topics about desakota in China were overviewed. During this process, the author identified the knowledge gap about desakota in Northeast China in the context of urban shrinkage. Then the literature on shrinking cities was examined to gain a deeper understanding of the causes and properties of Liaoning’s urban shrinkage and the impact of urban shrinkage on peri-urban and rural areas. Among these papers, it is found that shrinking areas are favorable for building resilience and there is a knowledge gap about building resilient peri-urban areas in the context of shrinkage. Moreover, the analysis revealed the socio-ecological degradation in Liaoning’s desakota, thus the research aim was established as achieving socio-ecological resilience and integration of desakota.

Subsequent literature readings focused on social-ecological systems, complex adaptive systems, and social-ecological resilience to gain insight into the characteristics of social-ecological systems and the qualities of resilient social-ecological systems. To better define the ideal state of a resilient social-ecological system, the author then read the literature on healthy ecosystems and human well-being, identifying the conditions required for ecosystems and social systems to achieve their good state and to realize positive feedback to each other. Based on this, the theoretical framework for this study was established. Finally, to understand how ecosystem resilience can be built through planning in desakota, the author read the literature on adaptive planning, learned about the features and processes of adaptive planning, and established the conceptual framework in conjunction with the other theories mentioned above.

In summary, the literature review of this thesis aims to critically assess and summarize the existing literature in the light of the urban shrinkage and characteristics of desakota, and to construct a theoretical and conceptual framework on this basis.

Mapping

Mapping in different scales is used frequently in this thesis to visualize data and present information more directly. The national scale is used in Chapter 1 to introduce the basic situation of Liaoning province, compare the difference between Liaoning and other megaregions in China, and reflect the shrinkage trend of Liaoning. In Chapter 2, the main scale used is the megaregion scale. Zooming in on Liaoning, analyze the problems faced by desakota and show the differences between desakota and cities. In Chapter 5, In Chapter 5, the city of Wafangdian is used as a case study to focus on the municipal scale. Problems and strengths of desakota are analyzed at this scale and strategies to promote integrated urban-rural development and achieve socio-ecological resilience are proposed. Then the microscale is discussed in Chapter 6 and 7 which focus on Beiwang Village. Based on the analysis of current situation, Four scenarios are built to explore a range of socio-ecologically resilient possibilities on this scale.

Most of the maps are based on GIS data. Due to the low availability of open GIS data in China, the GIS data of the basic information of Liaoning are mainly purchased from

Taobao (an online shopping website), including land use, infrastructure, public services (schools and health care), etc. Other data such as air pollution, cropland loss, water pollution, etc. are mainly from the website Resource Watch, the specific URL and sources are detailed in the Appendix. GIS data on the national scale, such as population density and GDP distribution of China, are from the website GHSL with the detailed URLs shown in the Appendix. The data on shrinking cities in China are from the website of Beijing City Lab (SCRNC), and for the URL see the Appendix. Other data such as the disposable income of the urban and rural population in each city of Liaoning, food production, and demographic structure of each city are from Liaoning Provincial Statistical Yearbook 2022, which are visualized by the author in mapping.

Case Study

In this thesis, Wafangdian City and Beiwang Village are selected for detailed study when analyzing at mesoscale and microscale.

When choosing the specific case for the mesoscale study, Wafangdian, which is close to Dalian, was chosen. As a county-level city, Wafangdian is affected by the siphoning influence of Dalian, showing serious urban shrinkage problems and population loss. The bearing industry and equipment manufacturing industry are the pillar industries of Wafangdian, so there are many desakota around the city that take the spillover functions of the city and combine industrial and agricultural activities. Close to the Shen-Da Expressway, with a certain level of industry and retaining a large amount of agricultural land, the desakota around Wafangdian is significant and has a high potential. Therefore, Wafangdian is a good example to study desakota at a municipal scale.

Beiwang Village was selected for microscale cases study which is one of the desakota in Wafangdian. It is located on the outskirts of the city centre and relies on bearing manufacturing and agriculture. Beiwang Village is a typical desakota with fragmented land use. It is highly connected to the city center and the surrounding rural areas. It has a high potential with an industrial and agricultural base.



Mesoscale case study: Wafangdian
Made by author



Microscale case study: Beiwang Village
Made by author

Fieldwork & Interview

Fieldwork and interviews are conducted for this study. Over 80 questionnaires were completed during the fieldwork and interviews are conducted with various stakeholders. For example, Mr. Liu, the vice president of Wafangdian Municipal Planning and Design Institute; Mr. Zhou, the director of Wafangdian Gangdian Street Government; Mr. Zuo, the head of Beiwang Village; Mrs. Sheng, the director of Yuandong Bearing Factory and Mr. Zhang, the manager of Dong Li Textile Co. as well as several villagers.

Based on the fieldwork, the current situation of the village, its problems and the needs of the relevant stakeholders were understood in depth.



Fig.14 Interview with the head of Beiwang Village
Photographed by author



Fig.16 Interview with the director of Wafangdian Gangdian Street Government
Photographed by author



Fig.15 Interview with villagers
Photographed by author



Fig.17 Interview with the director of Yuandong Bearing Factory
Photographed by author

Policy Analysis

This thesis also contains policy analysis. Firstly, the problem of marginalization and socio-ecological degradation in desakota is largely due to the lack of planning. In Chapter 2, an analysis of current planning documents in Liaoning Province reveals that the government and planners have paid more attention to the major cities in Liaoning Province than to desakota in the planning process. Some sections of the policy document dealing with rural areas similar to desakota are vague and do not help in guiding the development of desakota.

Policies are analyzed in the subsequent analysis of enhancing the socio-ecological resilience of desakota through adaptive planning. Adaptive planning involves not only setting development conditions for future spatial configurations or functions but also institutional and

organizational changes. De Roo et al. (2020) point out that the ability of a system or area to respond quickly to changing circumstances requires hybrid governance structures, where solutions are found and agreed upon at different layers of institutions, with the participation of a variety of stakeholders willing to be accountable. This implies that if adaptive planning is to be implemented in Liaoning’s desakota, the current institutional structure for planning needs to be analyzed and improvement strategies proposed to increase bottom-up participation as a means of enhancing the adaptive capacity of the desakota.

Stakeholder Analysis

Desakota, as an outcome of peri-urbanization resulting from the extension of urban activities into rural areas, involves a lot of different stakeholders. So, stakeholder analysis is very important for sorting out the current situation and constructing future scenarios of desakota. In addition, since adaptive planning requires adjustments in the governance model to enhance bottom-up participation, stakeholder analysis can be used as a basis.

The stakeholders involved in desakota include: (1) Local residents: including those with local hukou and migrant workers and their families. (2) Farmers. (3) Local businesses: This includes factories and retailers that provide services to

residents. (4) Factory workers. (5) Government. (6) Village commitee.

Since desakota is closely linked to both urban and rural areas, it may also involve: (7) Urban residents. (8) Rural dwellers. (9) Rural farmers, etc.

Elemental Approach

The use of elementalism as an analytical and design tool can deconstruct complex systems and help deal with complexity. As socio-ecological system is a complex system, the elemental approach is adopted to analyze the problems of the system.

The elemental approach is mainly used in Chapter 6 during the analysis of Beiwang Village. There are mainly 4 kinds of elements that are studied: natural elements, living elements, transport elements and productive elements. The negative interaction between different elements will lead to socio-ecological degradation. Instead, planning strategies proposed to promote positive feedback between elements will help achieve socio-ecological resilience.

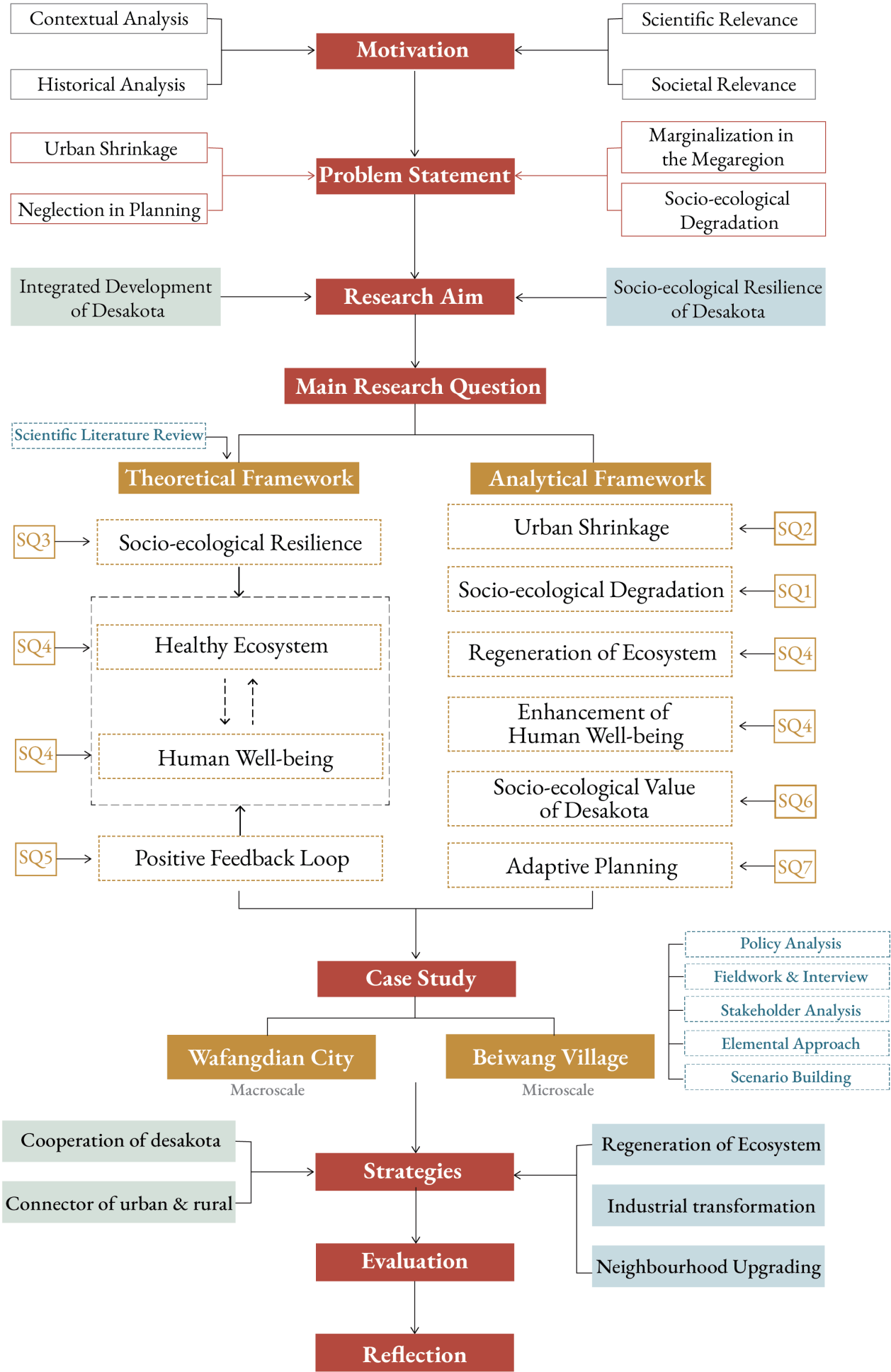
Scenario Building

Scenario building is a strategic planning tool that involves the creation of reasonable and alternative future scenarios to explore a range of possible outcomes (McGowan et al., 2019). To explore the possibilities of socio-ecological resilience in desakota, scenario building will be used in this thesis to portray different future visions. As stated above, adaptive planning is uncertain and aims to support a range of possible futures depending on the development conditions (Rauws & de Roo, 2016), so it is also in line with adaptive planning to provide different future possibilities for desakota through scenario building. Additionally, scenario building provides a platform to communicate complex

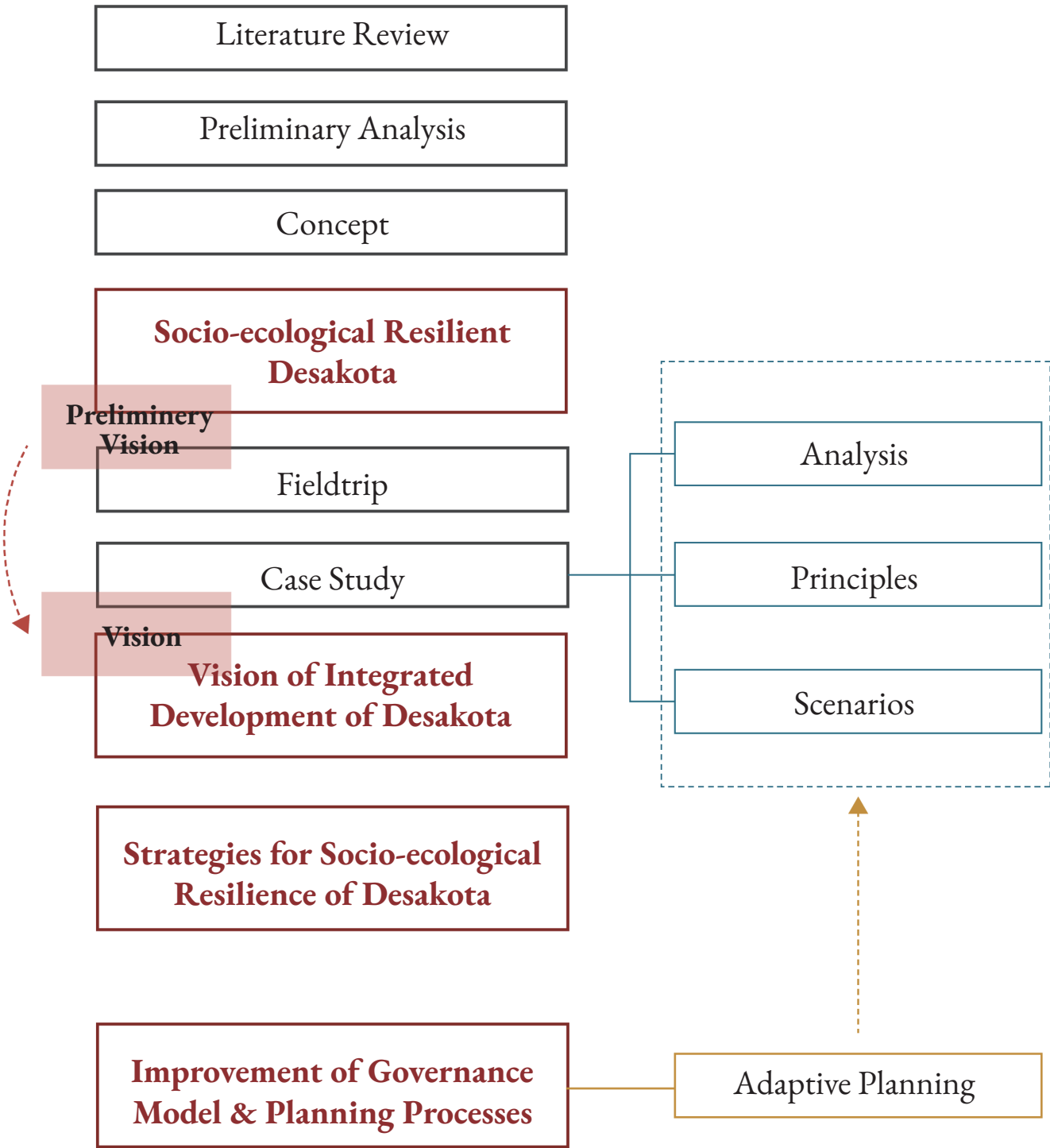
ideas and potential futures through a more understandable approach (Walton et al., 2019). By narrating or visualizing scenarios, it helps to communicate with stakeholders and get feedback.

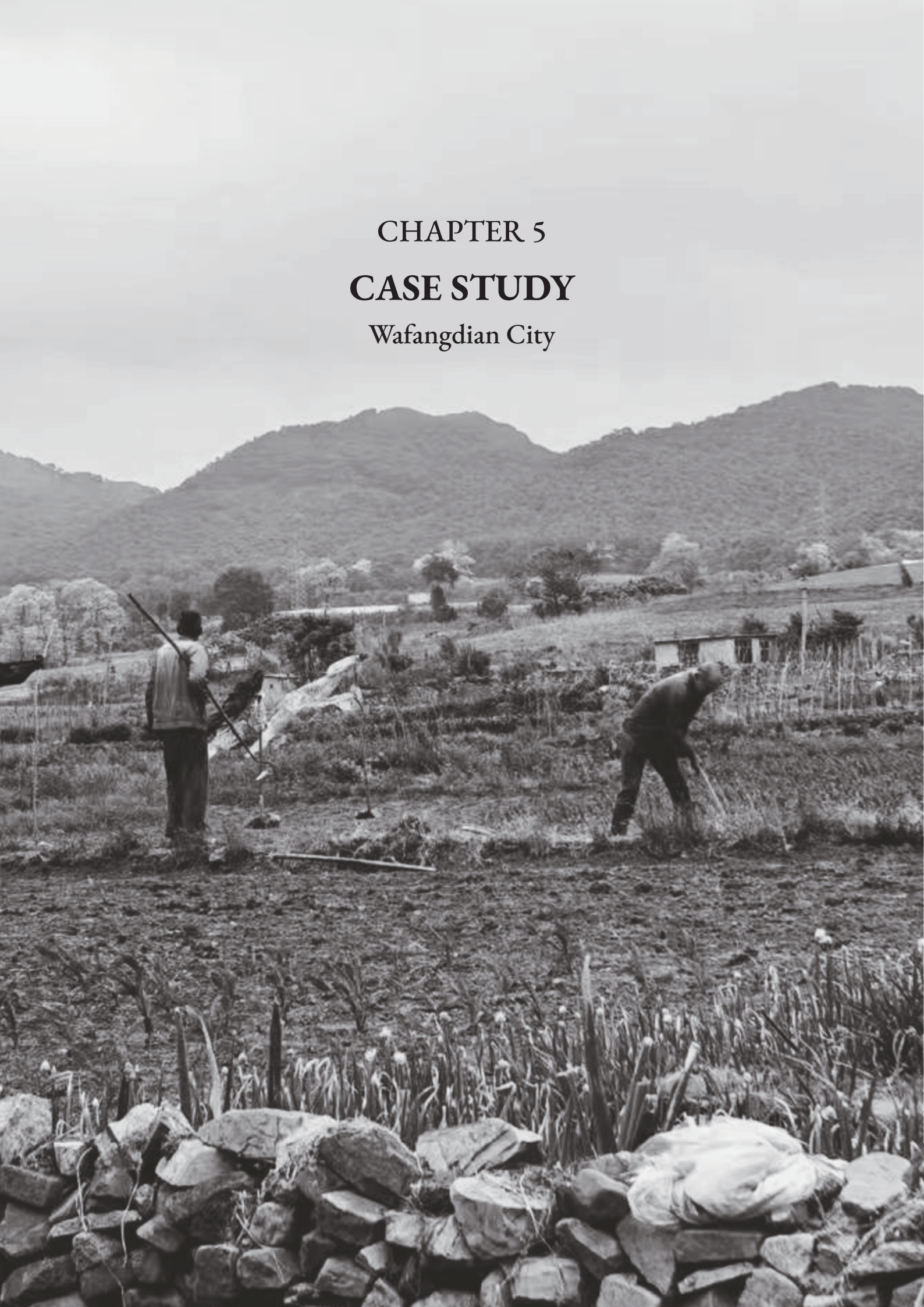
Why and how to conduct scenario building will be explained in detail in Chapter 5 and the results of scenario building will be presented in Chapter 7.

4.3 Methodological Framework



4.4 Work Flow





CHAPTER 5

CASE STUDY

Wafangdian City

This chapter takes Wafangdian City as a case study to explore the problems and development opportunities of desakota at the municipal scale.

Firstly, the basic information about Wafangdian is introduced, including its location, pillar industries, and population. Then the distribution and current situation of desakota in Wafangdian are presented.

Then the socio-ecological degradation problems faced by Wafangdian's desakota are analyzed from the municipal scale. Despite the serious problems faced by these desakota, they still have advantages. Therefore, the strengths of desakota are summarized based on their resources and location.

Subsequently, to achieve socio-ecological resilience and promote integrated urban-rural development, the principle of cooperation among desakota is proposed. This is manifested in ecological restoration and industrial transformation.

Ultimately, desakota cooperative clusters are formed at the municipal scale which lead to a new vision of Wafangdian.

5.1 Introduction of Wafangdian

Wafangdian is a county-level city, located in the south of Liaoning province and to the northwest of Dalian (a big city in Liaoning province). Mountain ranges extend from the northeast of Wafangdian to the southwest, forming a variety of landforms combining low mountains, hills, plains, land and mudflats. And there are 118 rivers in Wafangdian City. In general, Wafangdian is rich in natural elements.

Wafangdian is an essential link between Dalian

and the city cluster in the central of Liaoning province. Therefore, Wafangdian is highly connected to many cities in Liaoning. However, due to its high connection with big cities such as Dalian and Shenyang, Wafangdian is affected by their siphoning effect, **suffering from serious urban shrinkage and population loss all year round**. As of 2020, the resident population of Wafangdian is approximately 810,000, with a natural growth rate of -3.99%.

The pillar industries of Wafangdian are primary and secondary industries, i.e. agriculture, bearing industry, and other machinery manufacturing. Cherries, sea cucumbers, and other agricultural products from Wafangdian are very famous in Liaoning. Its bearing manufacturing industry and nuclear power industry are also well developed. Wafangdian has a beautiful natural environment and is famous for its leisure coast, fishing, hot springs and other tourism industries.



Fig.18 Greenhouses in Wafangdian
Source see Appendix



Fig.19 Machinery manufacturing industry in Wafangdian
Source see Appendix



Fig.20 Beach in Wafangdian
Source see Appendix



Location of Wafangdian City
Made by author

5.2 Distribution of desakota in Wafangdian

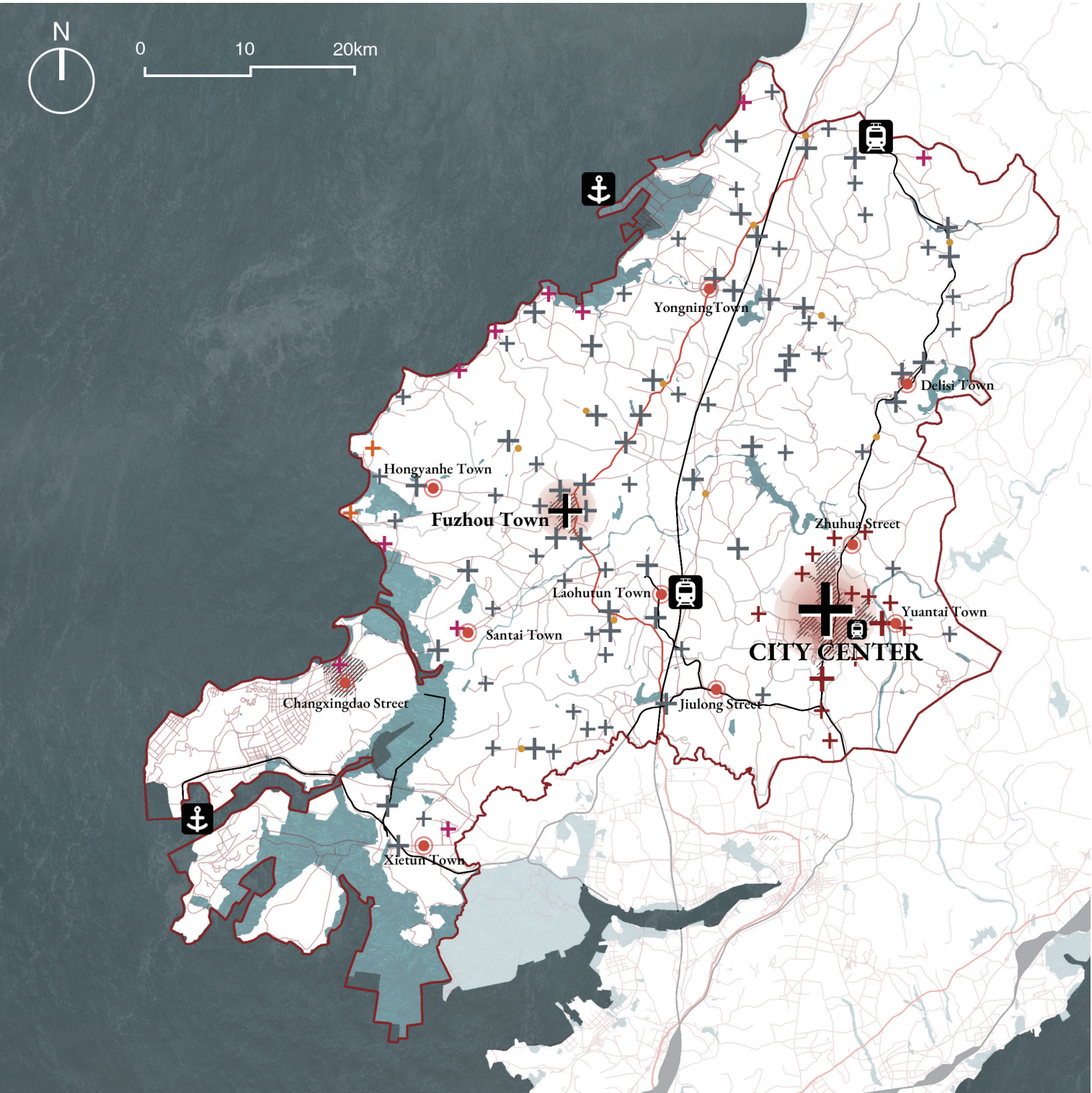
As a county-level city with agriculture and machining as its main industries, there are a great number of desakota in Wafangdian.

These desakota are located along important traffic lines such as highway and train lines, making them highly accessible. They are mainly clustered around the city center and Fuzhou town center with more population, reflecting the fact that the formation and development of desakota depends on their connectivity with the urban area.

Most of these desakota are dependent on agriculture and machinery production. However, there are many desakota along the northwestern coastline that have rich tourism resources such as hot springs and beaches, and have the potential to develop tourism. Besides, some desakota in the west of Liaoning have begun to develop clean energy industries. These strengths can contribute to the revitalization of desakota.



Impression of desakota in Wafangdian
Made by author



- Center
- Desakota Around the City Center
- Desakota Far from City Center
- Desakota with Tourism
- Desakota with Clean Energy Industry
- National Highway
- Railway
- Town Center with More Services
- Town Center with Less Services
- Train Station
- Harbour
- Urban Built-up Area
- Road System
- Township Boundary

Distribution of Different Types of Desakota in Wafangdian
Made by author

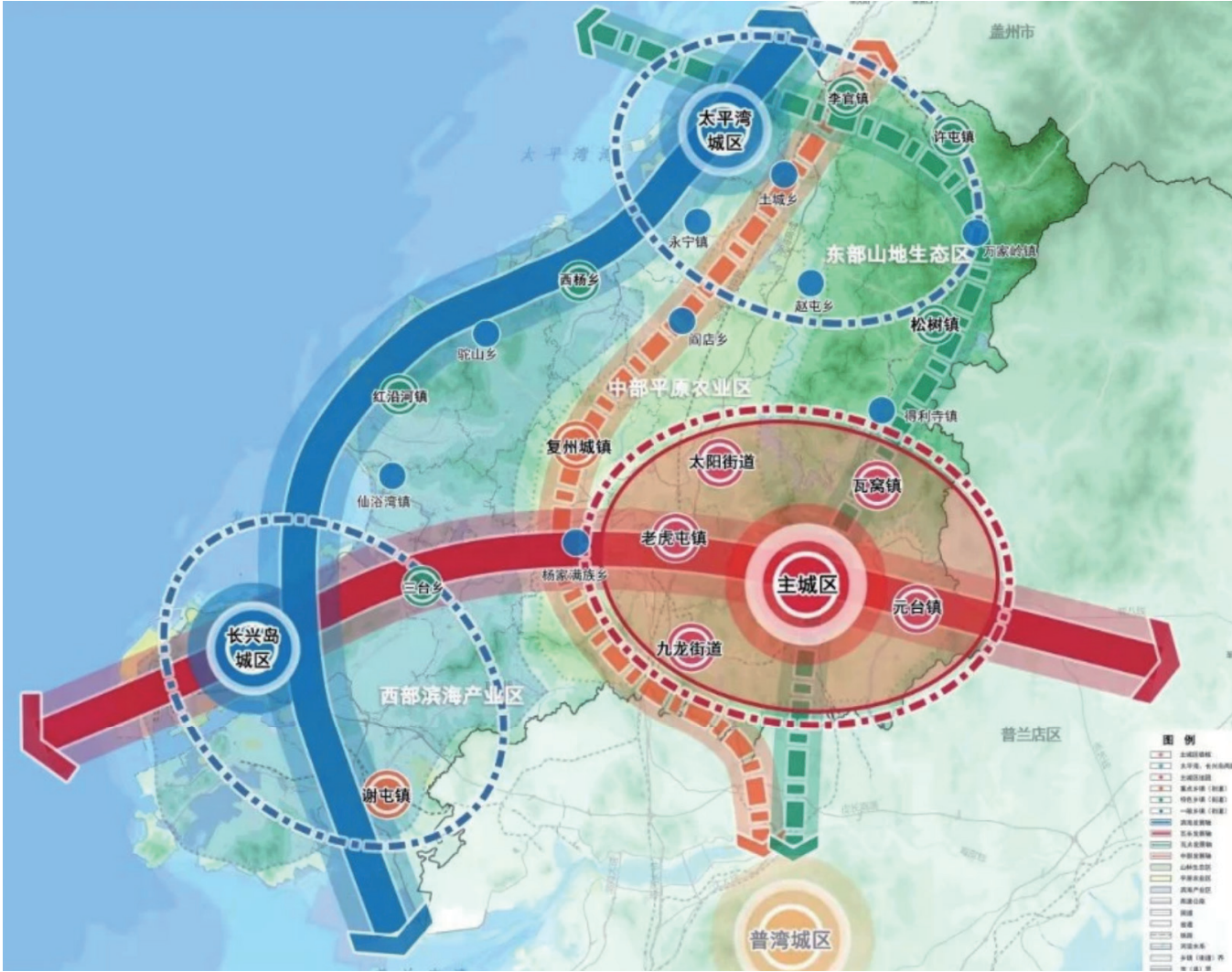
5.3 Problems of desakota in Wafangdian

Due to the lack of planning and people's excessive pursuit of economic benefits, desakota of Wafangdian are isolated, fragmented and facing socio-ecological degradation. As a result, these areas do not develop well on their own or interact well with urban and rural areas for the benefit of the megaregion.

5.3.1 Desakota are Fragmented and Isolated

Municipal planning focuses on township centers and city center and lacks attention to desakota.

At the municipal scale, the plan focuses more on urban centers and township centers, ignoring these widely distributed desakota. The government's increased focus on the development of urban centers and township centers has led to the marginalization of these desakota. The distribution of these desakota formed from the bottom up is fragmented due to the lack of planning guidance.

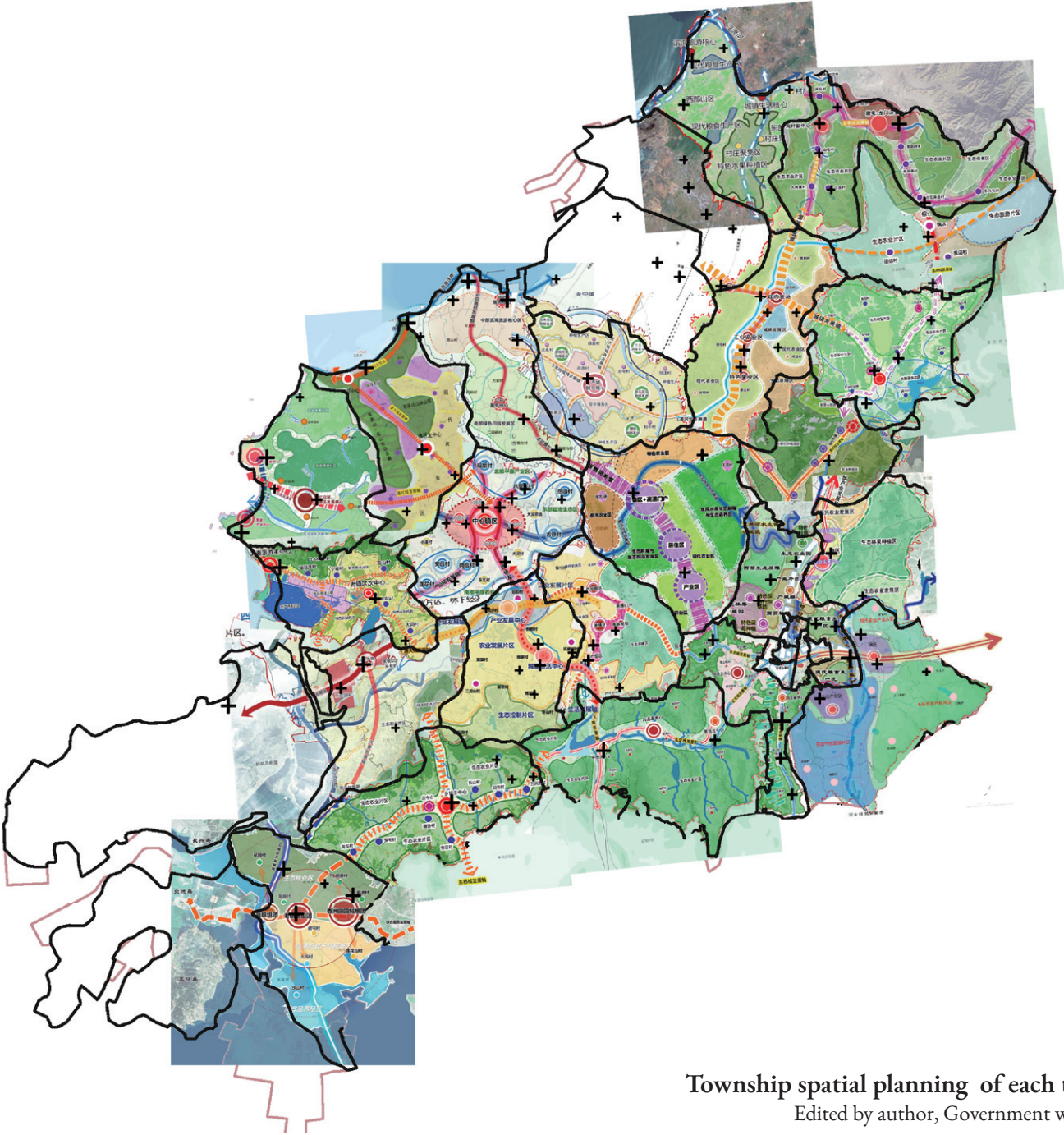
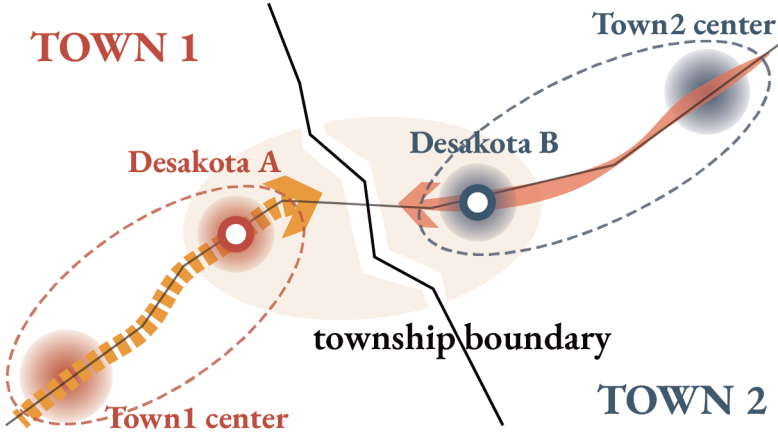


Municipal Territorial Spatial Masterplan of Wafangdian
Wafangdian City Territorial Spatial Masterplan (2021-2035), Government website

Each town has its own spatial planning, lacking overall coordination at the municipal scale.

At the township scale, each township has its own spatial planning, which is more specific than the municipal scale planning. However, there is a lack of large-scale coordination among them.

Moreover, each township's spatial planning is confined to its administrative boundaries, ignoring the possibility of interaction with its neighboring towns. Therefore, desakota in Wafangdian develop in isolation and lack competitiveness.



Township spatial planning of each town
Edited by author, Government website

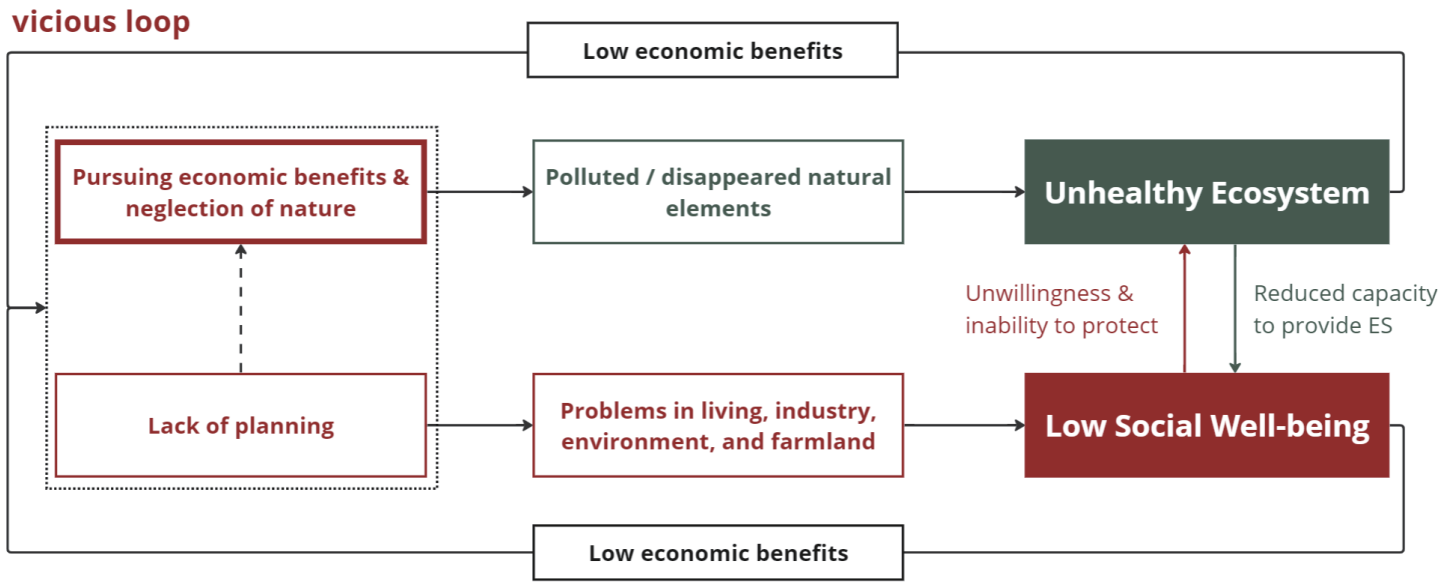
5.3.2 Desakota Suffering from Socio-ecological Degradation

Human activities in desakota pursue economic benefits and ignore the importance of ecosystems.

Currently, desakota in Wafangdian are suffering from socio-ecological degradation.

Human activities like agricultural and industrial production in desakota have adversely affected the ecosystem due to the pursuit of economic benefits. The capacity of ecosystems to provide ecosystem services is diminished. These ecosystem services

neither meet human needs nor generate economic benefits, leading to a decline in human well-being. People are neither willing nor able to protect the ecosystems, and human activities continue to damage the ecosystems, thus creating a vicious circle.



■ Agricultural pollution in desakota

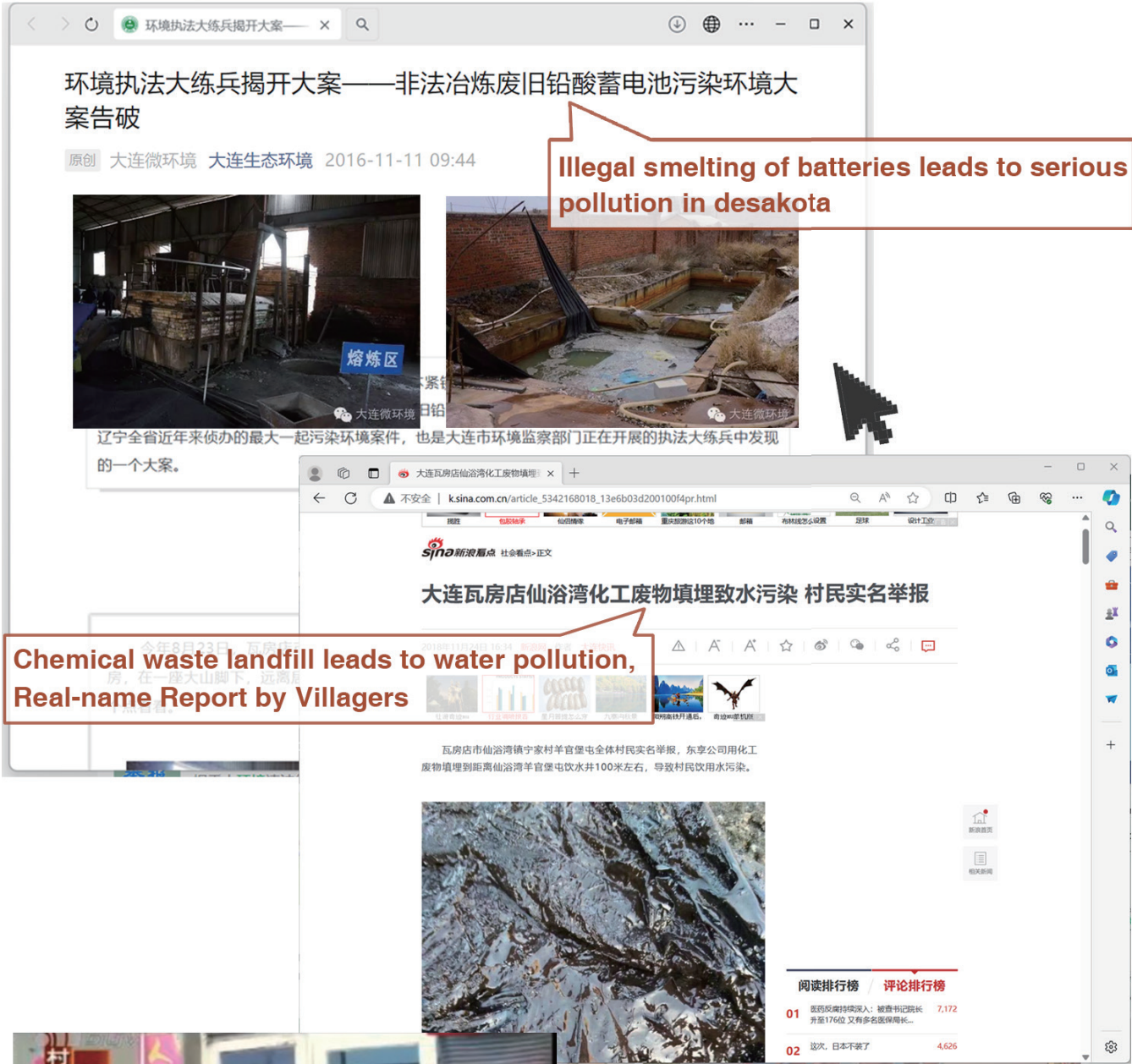


Fig.21 Agricultural waste on the farmland
Source see Appendix



Fig.22 Farmers burn straw in the open air
Source see Appendix

■ Industrial pollution in desakota



Illegal sewage from kelp processing plant makes water in farmers' homes salty

News about pollution in desakota in Wafangdian
Source see Appendix

5.4 Advantages of Desakota of Wafangdian

High connectivity

Despite the problems mentioned above, desakota also has advantages. Firstly, due to its location along the major transport routes, desakota is highly connected to both urban and rural areas and has the opportunity to serve as an interface for promoting urban-rural interaction and integrated development.

Strong agricultural & industrial base

In addition, desakota has a strong agricultural base, with a diverse range of agricultural products such as apples, grapes, cherries, sea cucumbers, sweet potatoes, blueberries, etc. These agricultural products are well known and have a large market in Liaoning, so the agricultural advantages of desakota should be developed. Besides, there are many industrial enterprises in the desakota of Wafangdian, and these factories provide desakota with a solid industrial base, which is an advantage for its development.

Rich tourism resources

Desakota with rich tourism resources is clustered in the coastal area in the west and north of Wafangdian. They have marine hot springs, soft beaches, etc., and some of them are also developing tourism in combination with sports such as sailing and skiing. These desakota have the potential to cooperate and form a tourism belt along the coast.

Clean energy resources

Two desakota in the west of Wafangdian have begun to develop clean energy industries such as nuclear power and wind power. The coastal area of the city has the advantage of developing clean energy industries such as wind and tidal energy, and the development of related industries should be encouraged to facilitate the realization of socio-ecological resilience.



Fig.23 High connectivity of desakota
Source see Appendix



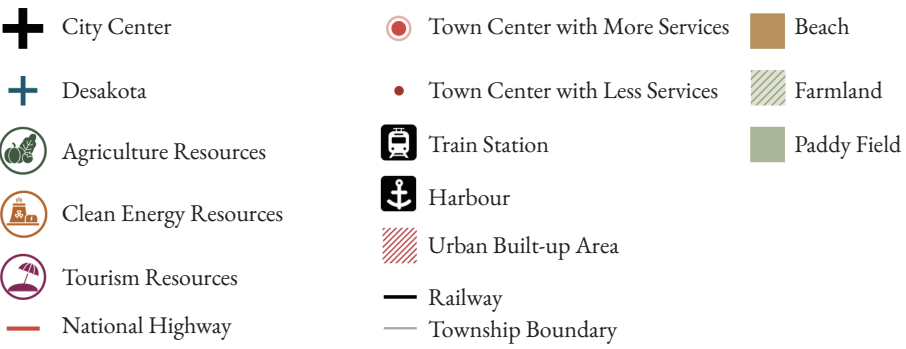
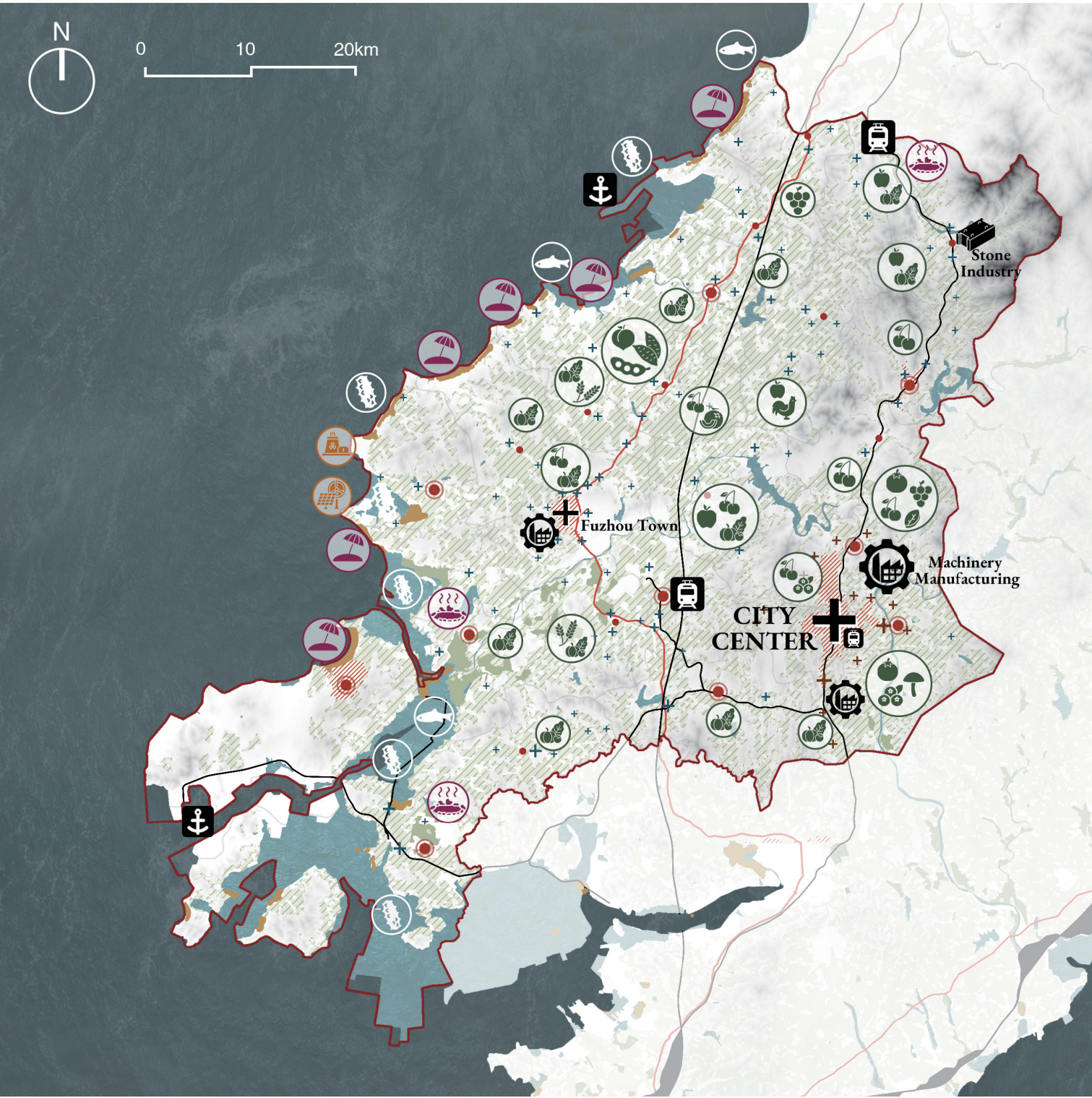
Fig.24 Cherry greenhouses in desakota
Source see Appendix



Fig.25 Hot spring in desakota
Source see Appendix



Fig.26 Nuclear power plant in desakota
Source see Appendix



Advantages of desakota in Wafangdian
Made by author

5.5 Cooperation between Desakota

To summarize, desakota in Wafangdian cannot develop well individually and suffer from socio-ecological degradation. However, they are highly connected and have solid industrial base and advantageous resources.

Therefore, if desakota are to become an important role in the megaregion and bring its value into play, the limitations of the administrative boundaries of the townships should be broken down, and **cooperation among desakota should be encouraged at the municipal scale**, so that they can maximize their strengths and bring greater socio-ecological value at a bigger scale through resource sharing.

In addition, the desired effects of specific strategies are more likely to be realized through the cooperation between desakota in the context of shrinkage.

Ultimately, in order to realize a socio-ecologically resilient future, cooperation among desakota should be carried out from two perspectives: cooperation on ecological restoration and cooperation on industrial transformation.

5.5.1 Ecological Restoration

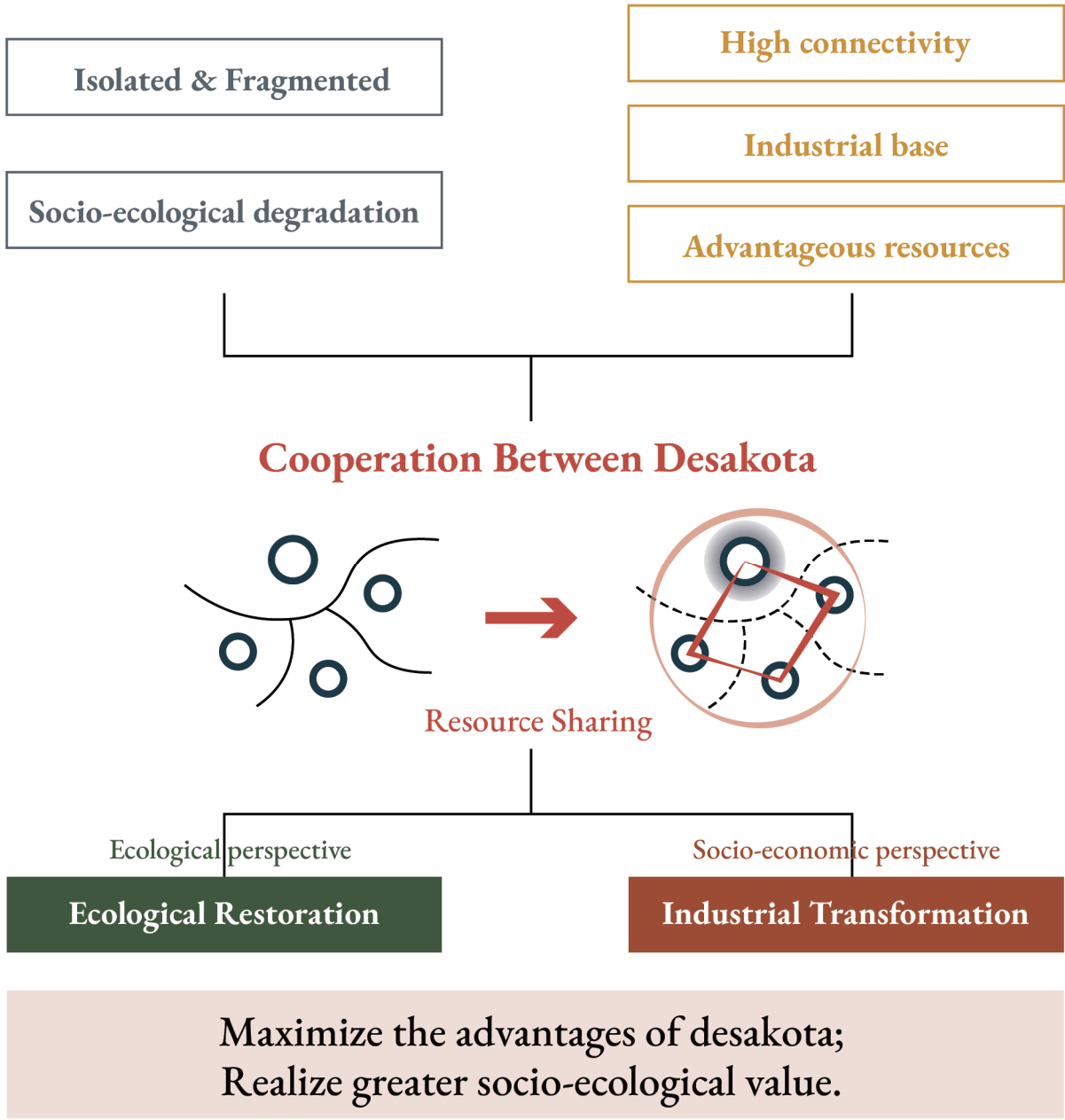
According to the theoretical framework, healthy ecosystems are required to achieve socio-ecological resilience. Therefore, ecological restoration is needed in desakota.

A blue-green network should be formed at the municipal scale along main mountains and rivers as shown in the map below. To build

healthy ecosystems, desakota located on the ecological corridors should pay extra attention to ecological restoration and reduce the impact of human activities on the ecosystem. In this way, these desakota will provide ecological values to the rest of the megaregion.



Ecological restoration and blue-green system
Made by author



5.5.2 Industrial Transformation

The current industry does not bring benefits to desakota and generates pollution.

Existing industries in the desakota are uncompetitive due to the short industrial chain and lack of planning. As a result, these industries are unable to contribute economic benefits and have a negative impact on the ecosystem. Therefore, if socio-ecological resilience is to be achieved, industrial transformation is needed in addition to ecological restoration.



New industries with low environmental impact should be added.

Based on the resources and conditions of desakota, industries that enhance economic growth and have a low impact on the ecosystem should be developed to maximize the advantages of desakota. In this way, desakota can not only achieve socio-ecological resilience, but also provide socio-ecological value to the rest of the megaregion and promote integrated urban-rural development.



Fig.27 Ecological agriculture
Source see Appendix



Fig.28 Ecological tourism
Source see Appendix



Fig.29 Clean energy
Source see Appendix

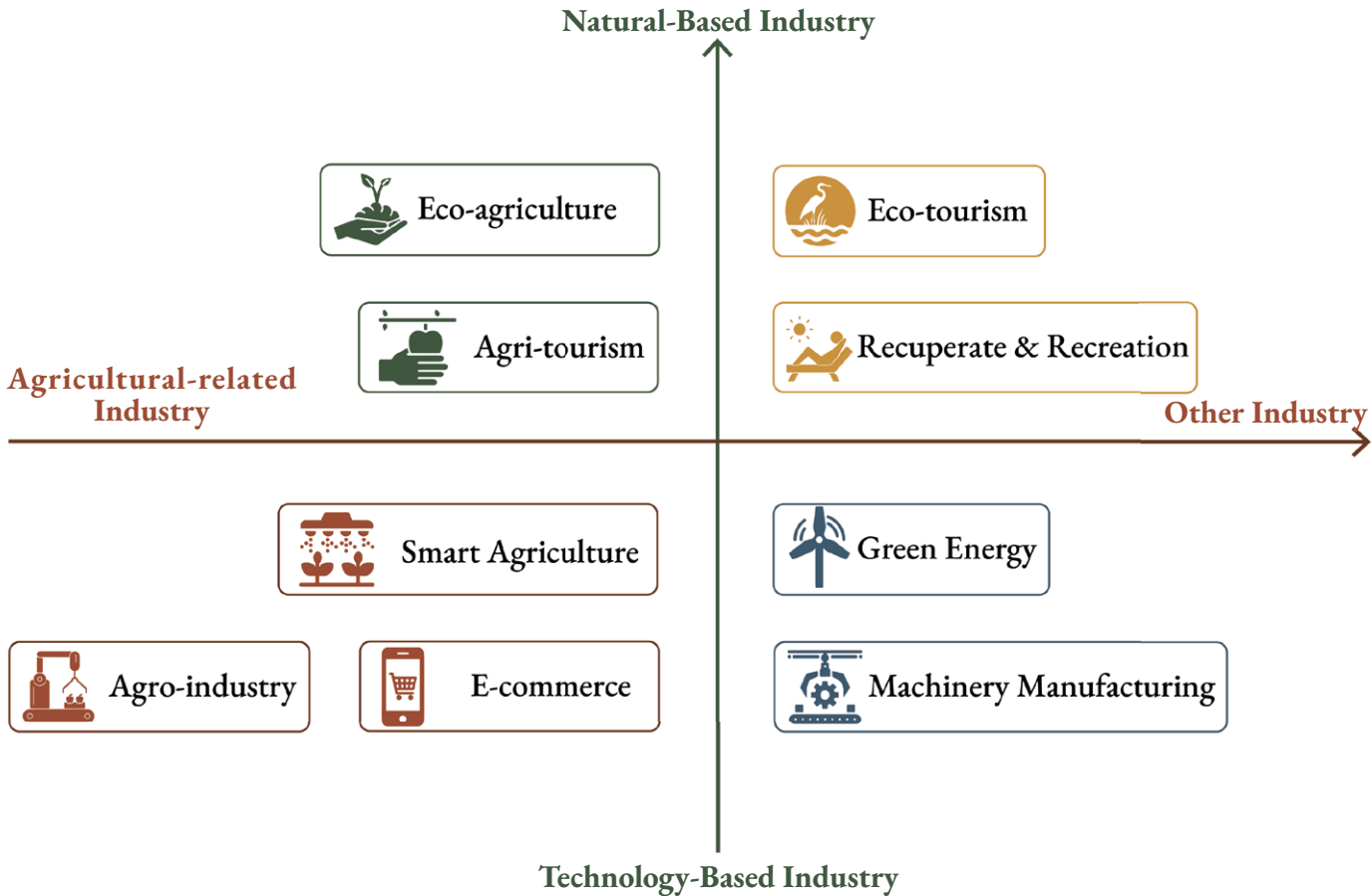
Several scenarios are built based on the resources of desakota, providing more flexibility.

Four scenarios were built in order to explore which new industries will contribute to building socio-ecological resilience in desakota. This scenario building axis was created based on the resources in desakota of Wafangdian City. Through scenario building, a range of future possibilities for the socio-ecological resilience of desakota are presented. It is demonstrated that desakota can achieve a bright future through a number of different development paths of industrial transformation.

As mentioned in Chapter 3, to build socio-ecological resilience, planning should be flexible and adaptive. Scenario building provides more flexibility for desakota's development by offering multiple choices.

Stakeholders of each desakota should choose the most suitable scenario based on local conditions and their interests. Planning is used to guide the development of desakota and to adjust development conditions to build socio-ecological resilience.

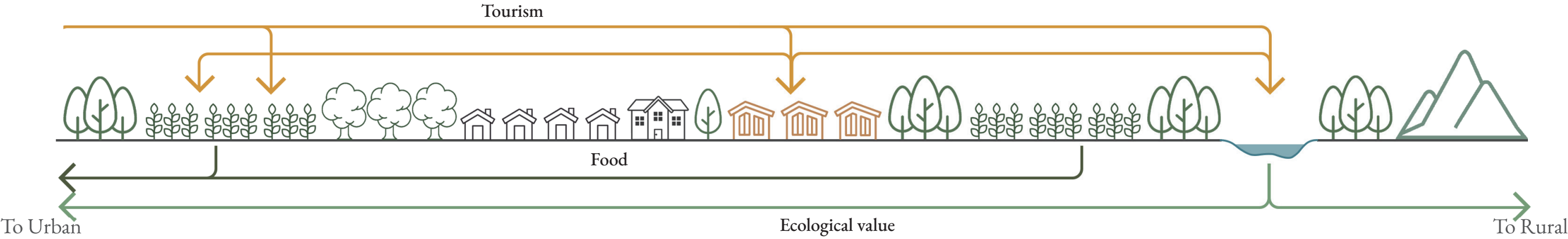
Today, desakota is experiencing population loss due to the problems of existing industry and other issues. Young people are leaving desakota for big cities in search of job opportunities and a better quality of life. Scenario building aims to convince locals that by developing new industries, job opportunities and quality of life in desakota will also be enhanced. This can entice people to stay and in turn attract new industries to the area.



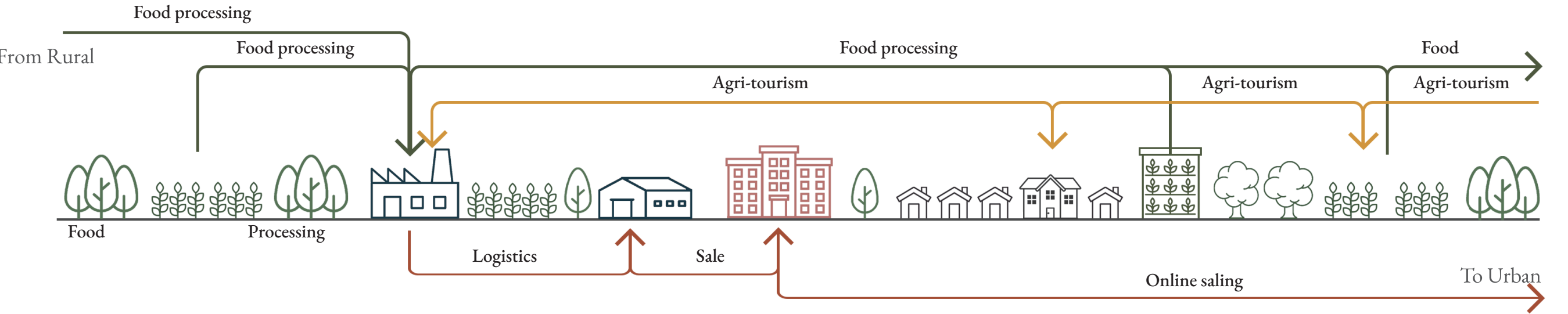
Desakota can cooperate with each other even if they develop different scenarios.

Based on the above scenarios, desakota that achieve industrial transformation can cooperate with each other. There are possibilities for interaction even if different industries are developed. In addition, these desakota will promote interaction with urban and rural areas.

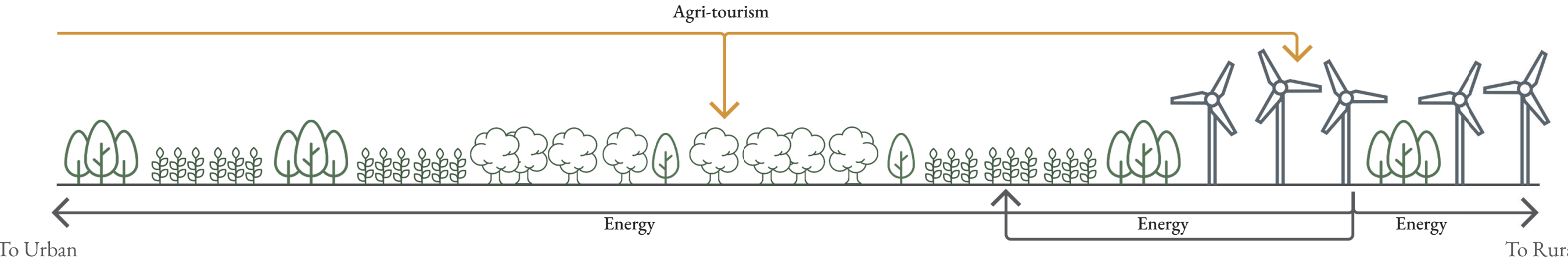
Scenario 1
+
Scenario 2



Scenario 1
+
Scenario 3

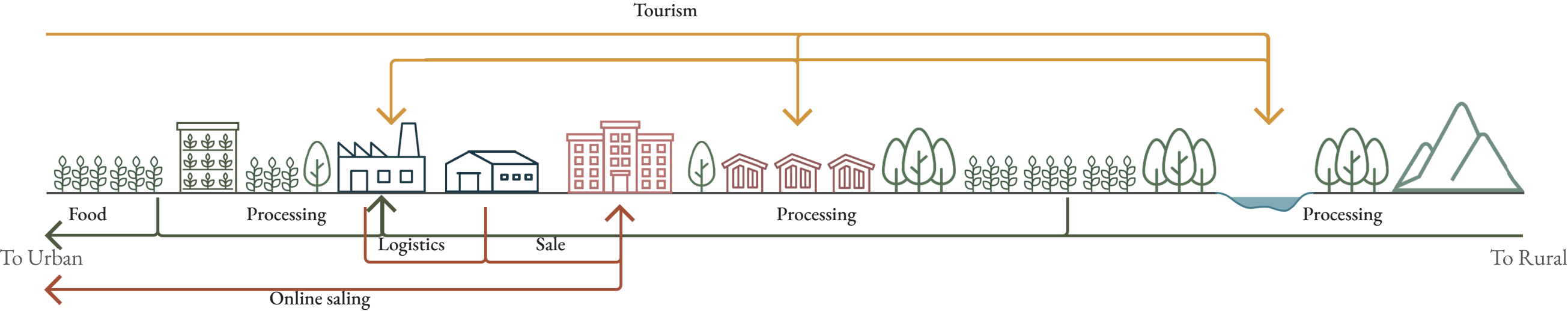


Scenario 1
+
Scenario 4

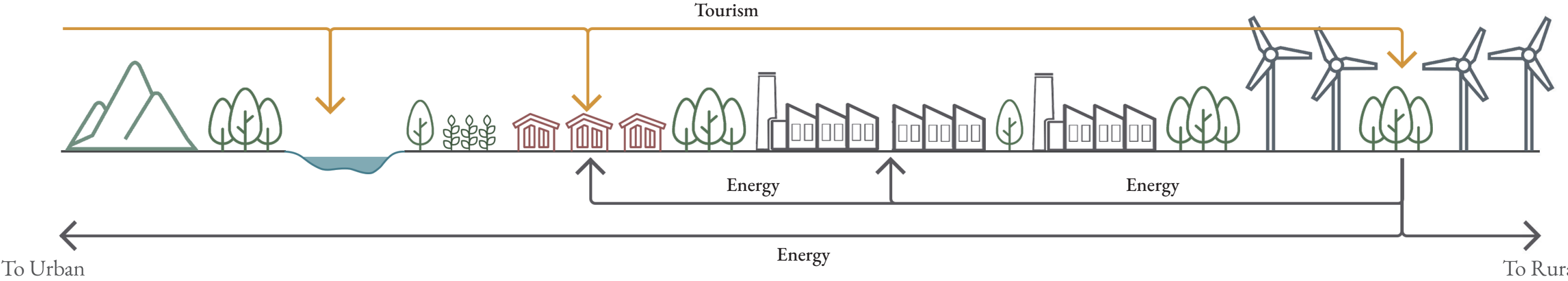


Desakota can cooperate with each other even if they develop different scenarios.

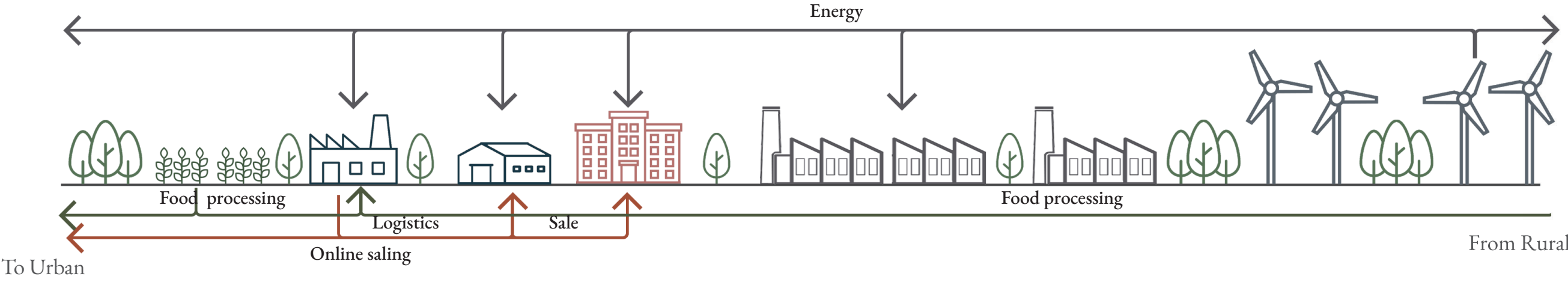
Scenario 2
+
Scenario 3



Scenario 2
+
Scenario 4



Scenario 3
+
Scenario 4



5.5.3 Desakota Cooperative Clusters

Based on connectivity, 3-5 desakota form a cooperative cluster.

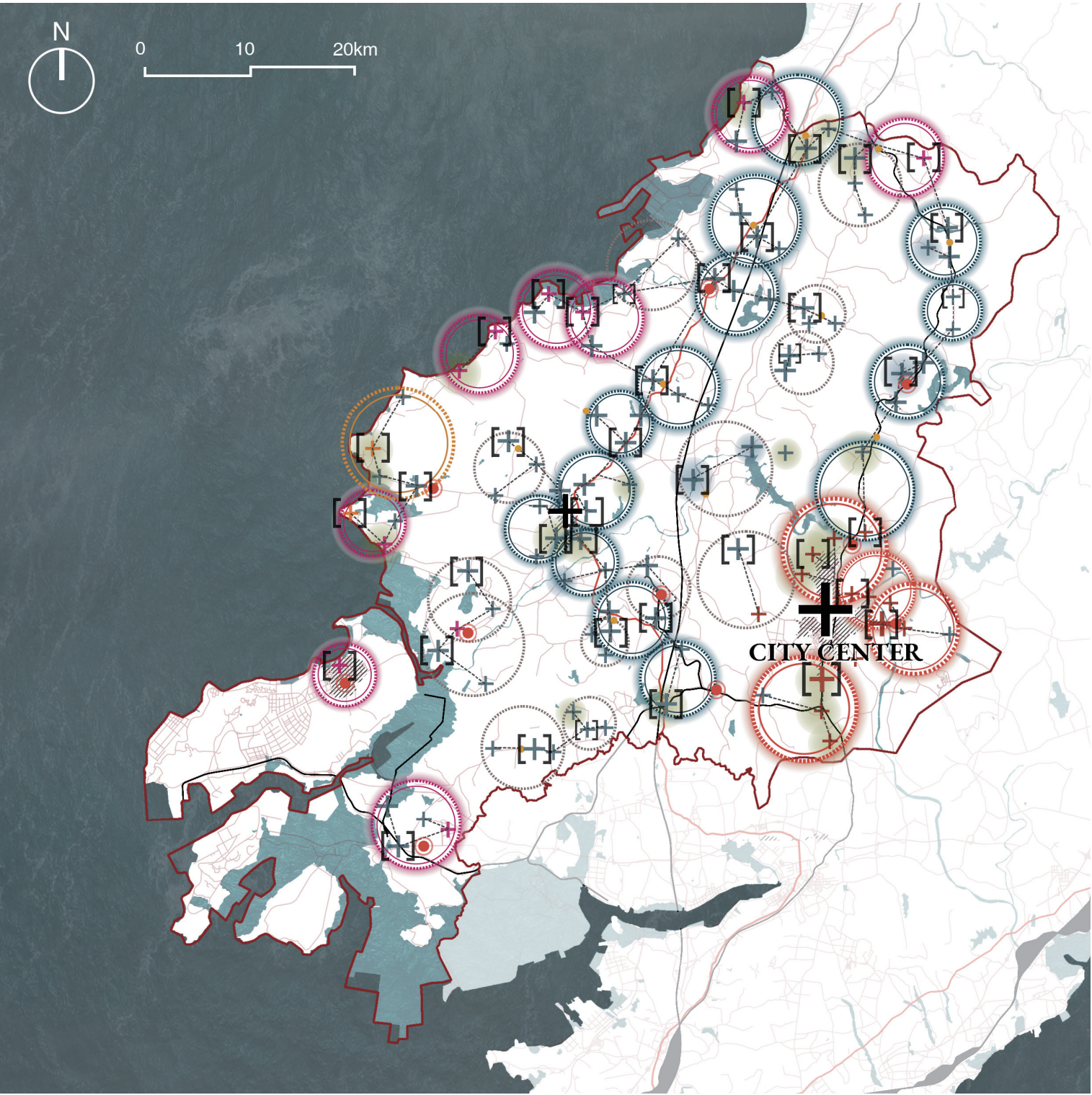
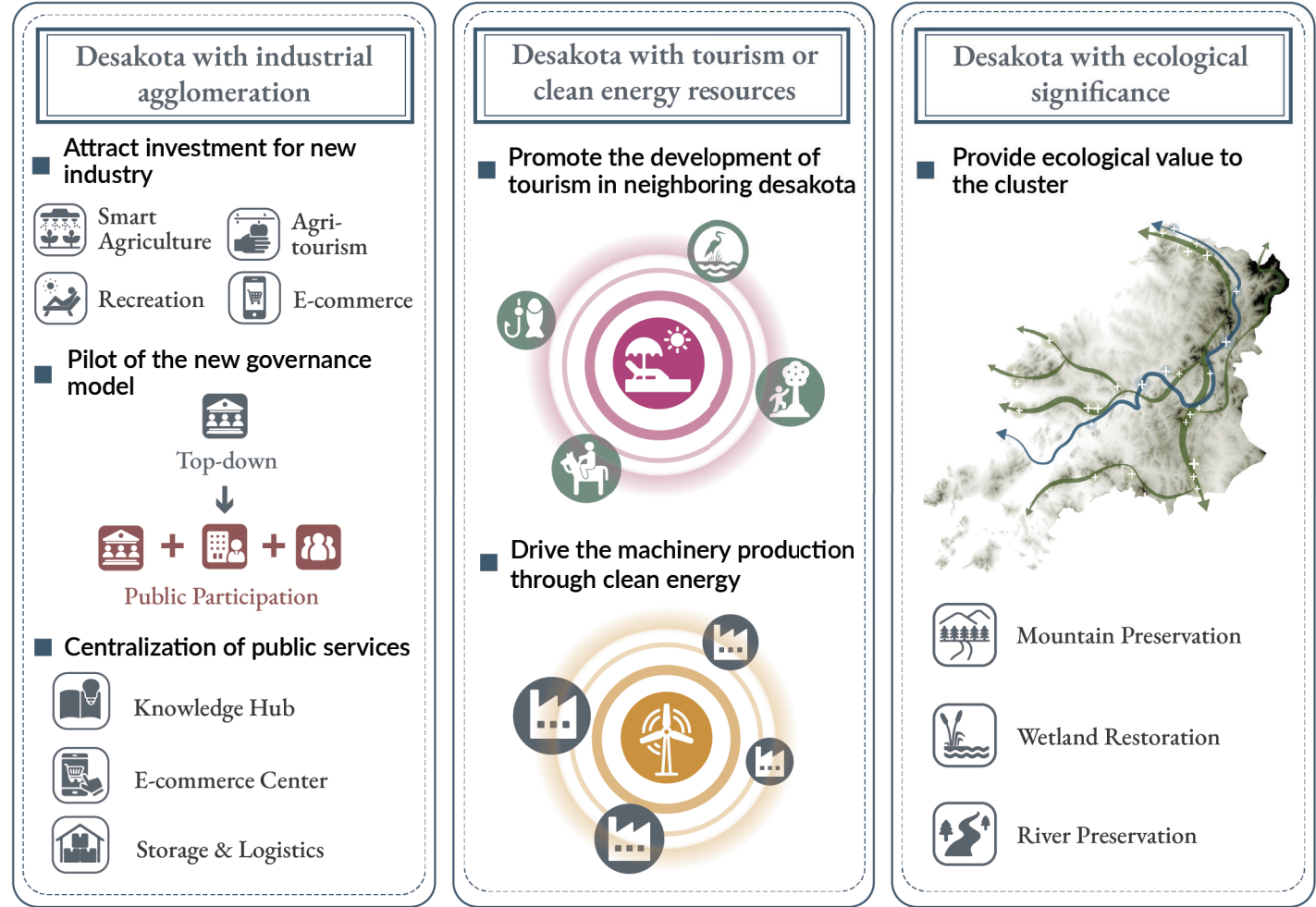
As mentioned above, desakota are overlooked in large scale planning and confined to the administrative boundaries of the townships in which they are located in small scale planning. However, when viewed from a municipal perspective, desakota belonging to different towns have the potential to break down administrative boundaries and cooperate.

According to the theory of borrowing size, these desakota can form cooperative clusters through resource sharing. Through the planning principles of ecological restoration and industrial transformation, these desakota clusters can provide socio-ecological value to other parts of the

megaregion. In addition, these desakota clusters will also facilitate urban-rural interactions and contribute to integrated development. So based on the connectivity, 3-5 desakota can form a cooperative cluster.

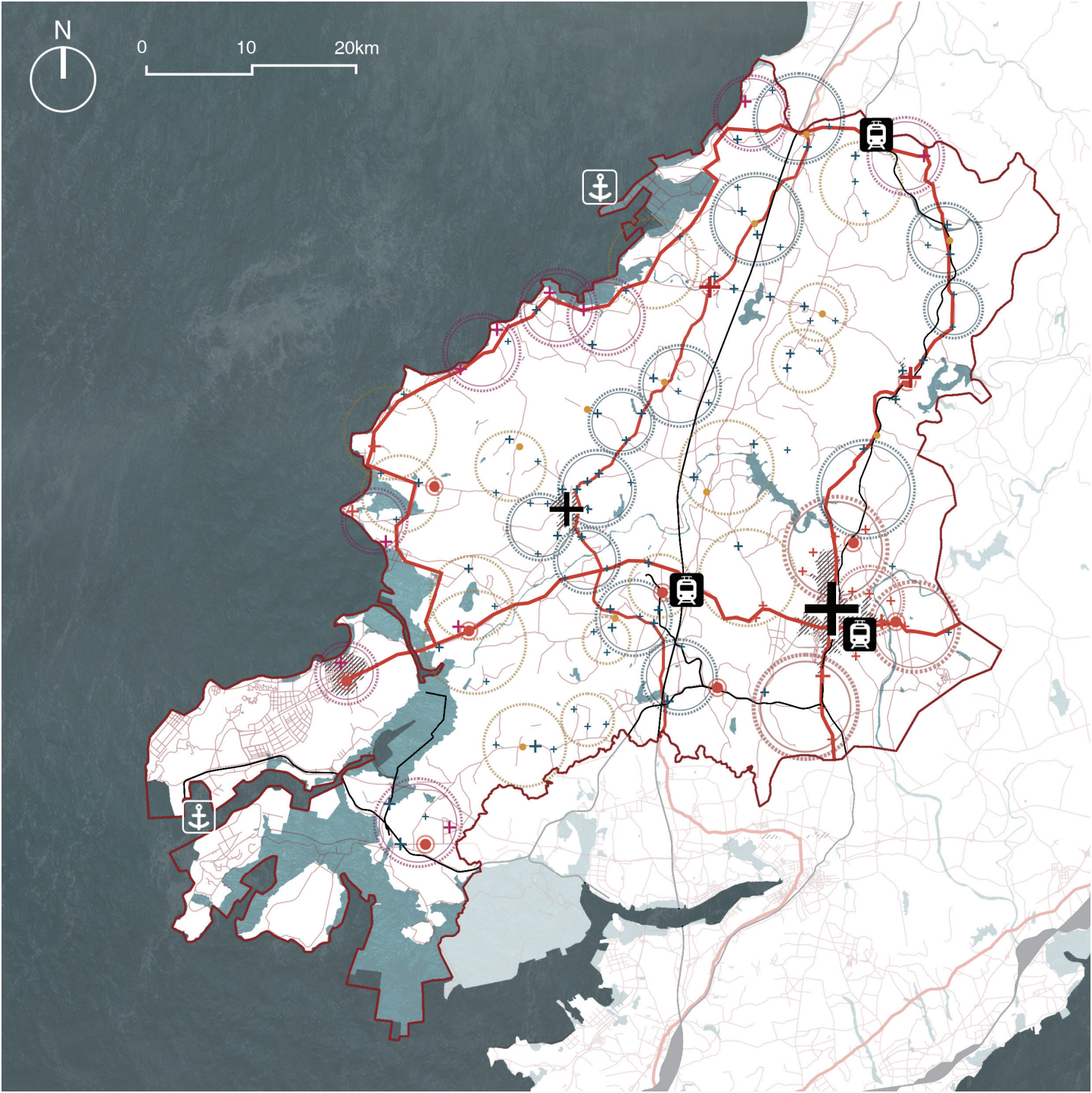
Overall, these desakota clusters provide opportunities for fragmented and isolated desakota to develop together.

Establish a desakota in each cluster as a strategic point to drive the development of the cluster as a whole.



Cooperative cluster of desakota in Wafangdian
Made by author

5.6 Vision of Wafangdian

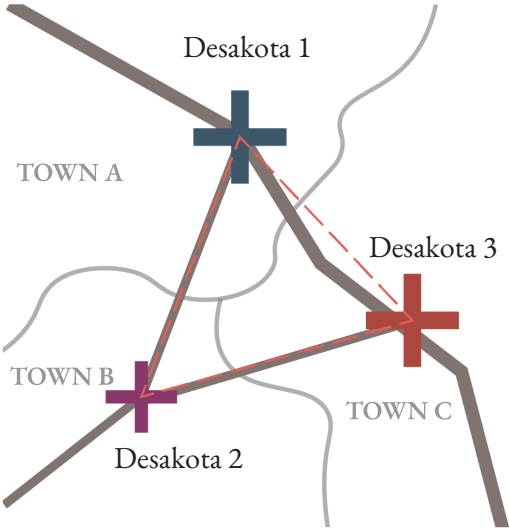


The connectivity between these Desakota cooperative clusters should be enhanced to facilitate the formation of a whole system at the municipal scale. Therefore several important roads should be upgraded, as shown on the last page.

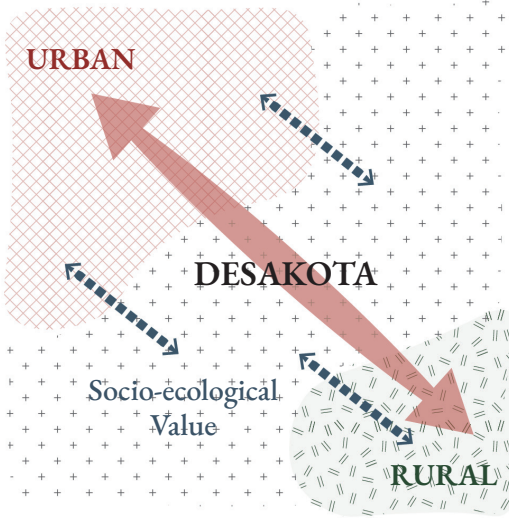
- | | | | |
|---|-------------------------------------|---|-----------------------------------|
| + | Center | ○ | Desakota Cluster Near City Center |
| + | Desakota Around the City Center | ○ | Desakota Cluster Along Main Road |
| + | Desakota Far from City Center | ○ | Desakota Cluster with Tourism |
| + | Desakota with Tourism | ○ | Other Desakota Cluster |
| + | Desakota with Clean Energy Industry | ○ | Train Station |
| — | Important Road | ○ | Harbour |
| — | Railway | | |

Improvement of cluster connectivity
Made by author

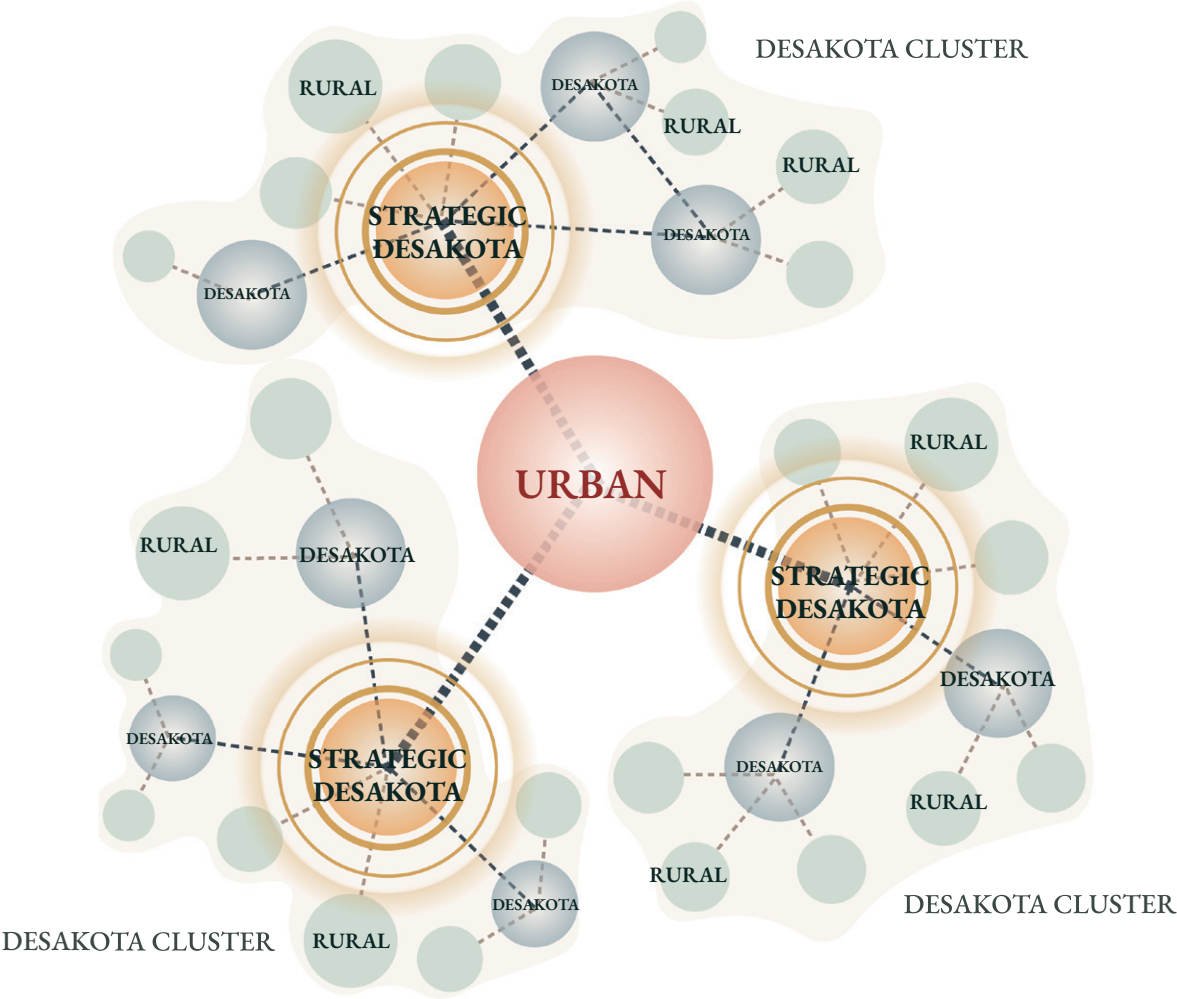
Breaking down township borders to cooperate



Desakota as a connector between urban and rural areas



A closely integrated and unified system

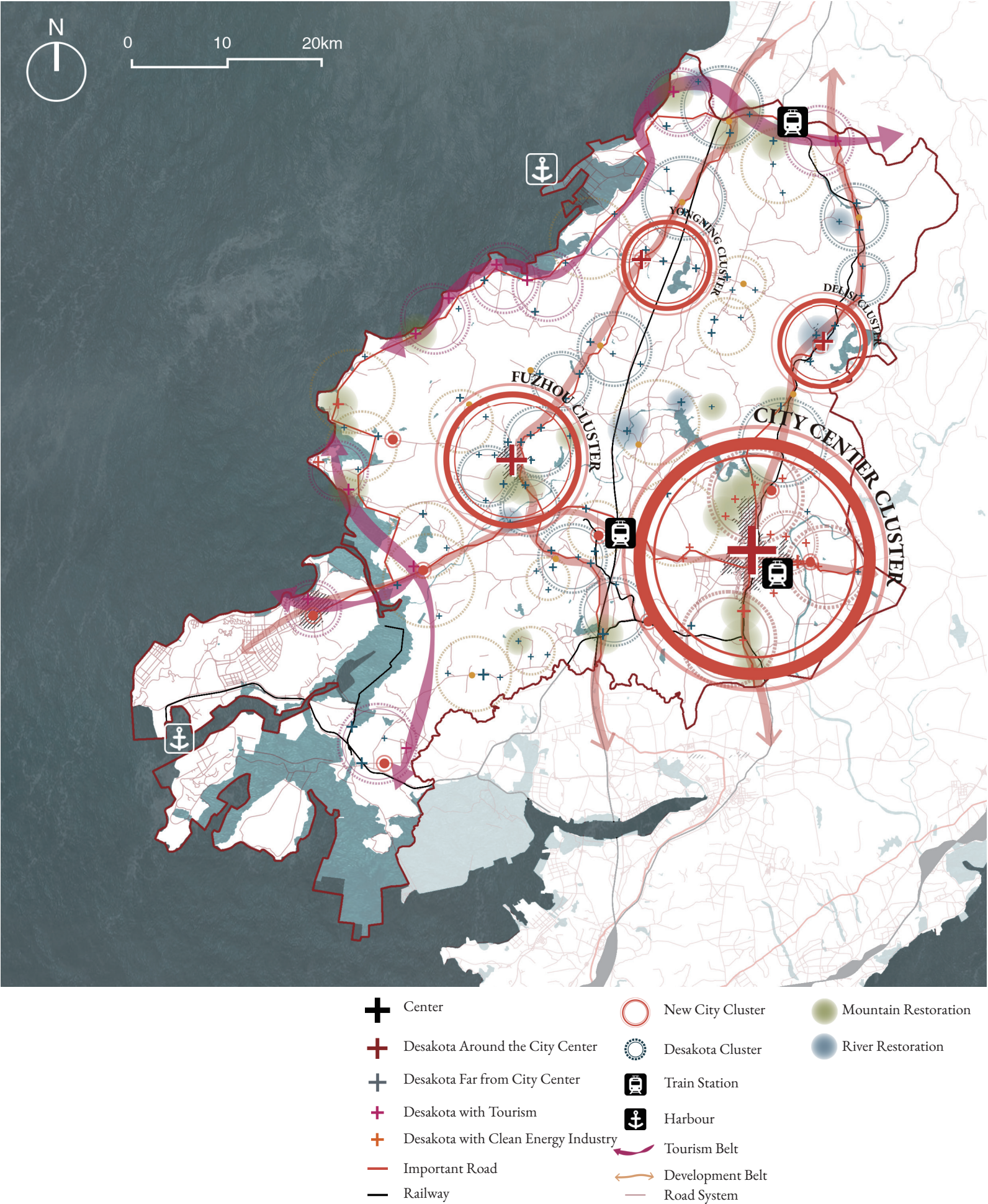


5.6 Vision of Wafangdian

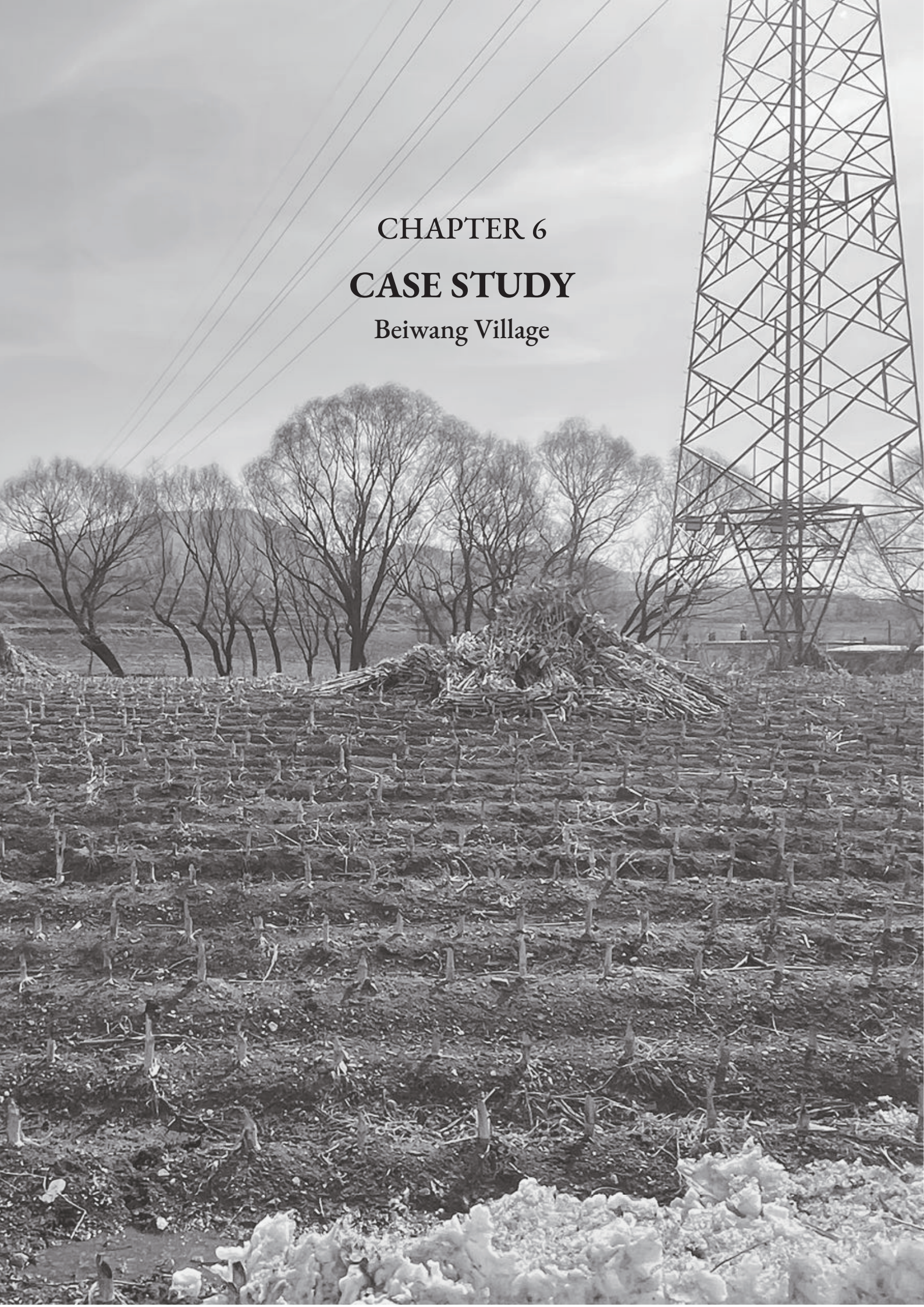
Overall, in the municipal scale vision, the administrative boundaries of townships should be broken down to encourage cooperation between desakotas, in addition to allowing desakotas to act as connectors to facilitate urban-rural interactions.

Eventually, the desakota clusters combine with the city or town centers to form four large development clusters in Wafangdian. And a tourism belt will also be formed in the coastal area.

To sum up, **desakota serve as connectors linking the city center with other villages, forming a closely integrated and unified system at the municipal scale.** At the same time, by providing socio-ecological values, desakota functions as an interface that promotes exchange and interaction between urban and rural areas, closely connecting the city center, towns, and surrounding rural areas, thus achieving integrated urban-rural development.



Vision Map of Wafangdian
Made by author



CHAPTER 6

CASE STUDY

Beiwang Village

In order to gain a deeper understanding of the problems of desakota in Wafangdian and explore how to achieve socio-ecological resilience in desakota, this chapter takes Beiwang Village as a case study for in-depth analysis.

Firstly, the current situation of Beiwang Village such as location, population and industry is introduced. Then the elemental analysis of Beiwang Village is carried out from four aspects: natural elements, living elements, productive elements, and transport elements.

Subsequently, combined with the above analysis, it is concluded that the social system and ecosystem of Beiwang Village form a vicious circle and the village is facing socio-ecological degradation.

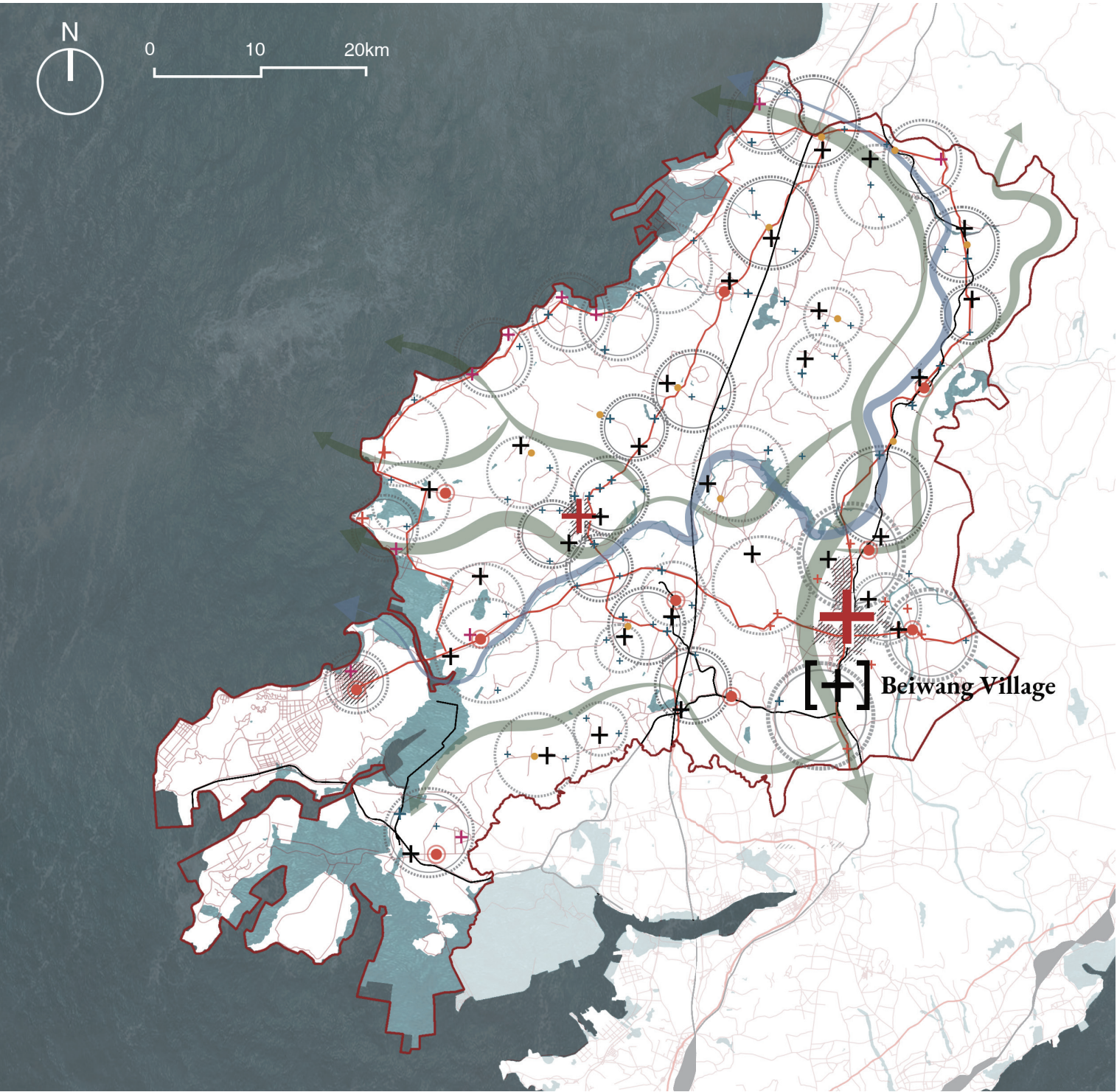
Finally, the current planning process is analyzed and it is found that villagers are less involved.

6.1 Overview of Beiwang Village

Less resourceful than coastal desakota but universal in Wafangdian

Beiwang village was chosen as a micro-scale case study. The first reason is that Beiwang village is more uncompetitive than the desakota along the coast of Wafangdian City, which is rich in tourism resources. **Those "ordinary" desakota like Beiwang village, which do not have the advantage of resources, are more common in Wafangdian City** and even in the whole Liaoning Province. Therefore, the choice of Beiwang village as the case study is more universal and representative.

It is hoped that through the study of Beiwang village, the planning principles for establishing socio-ecological resilience in desakota in the context of shrinkage can be proposed.



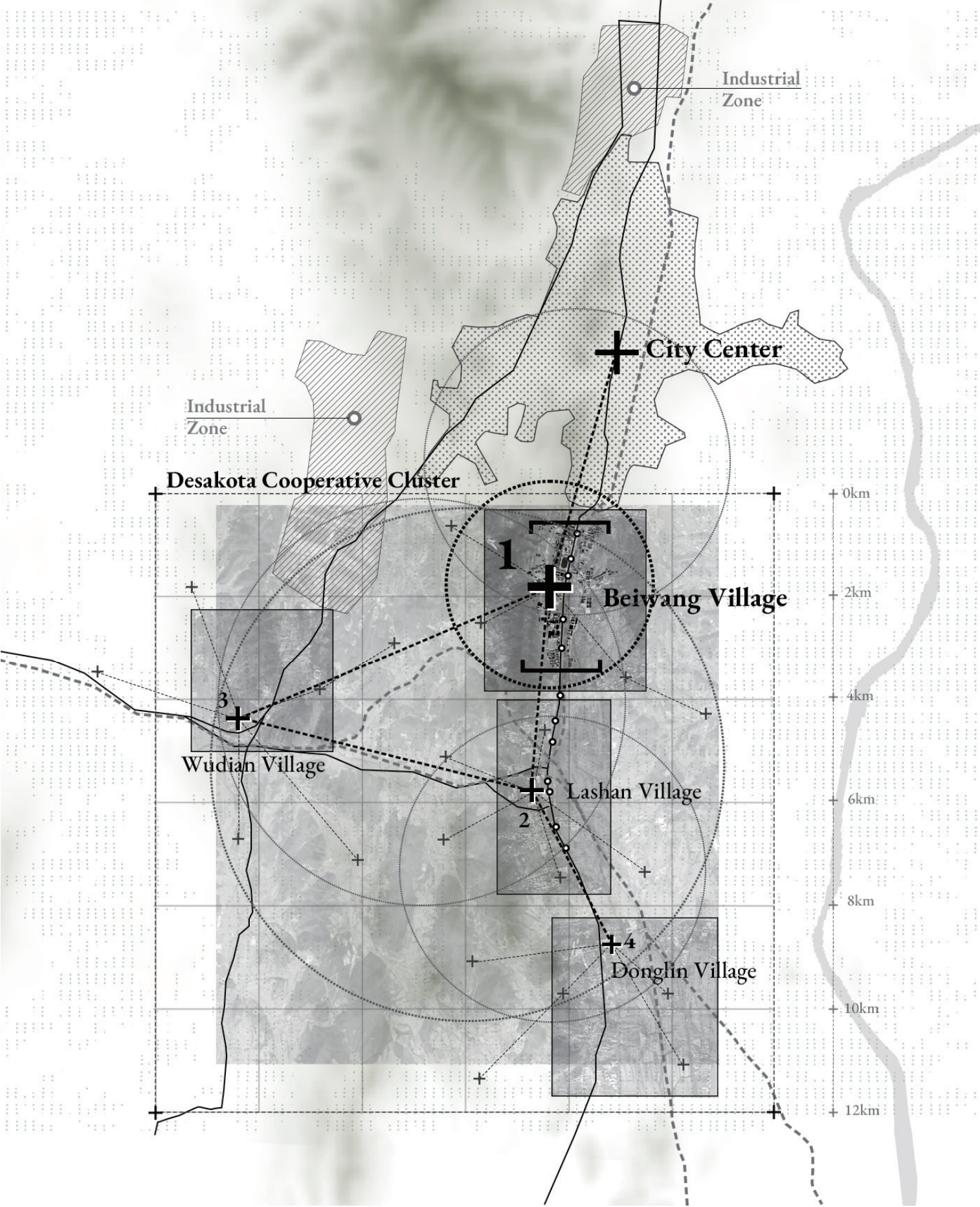
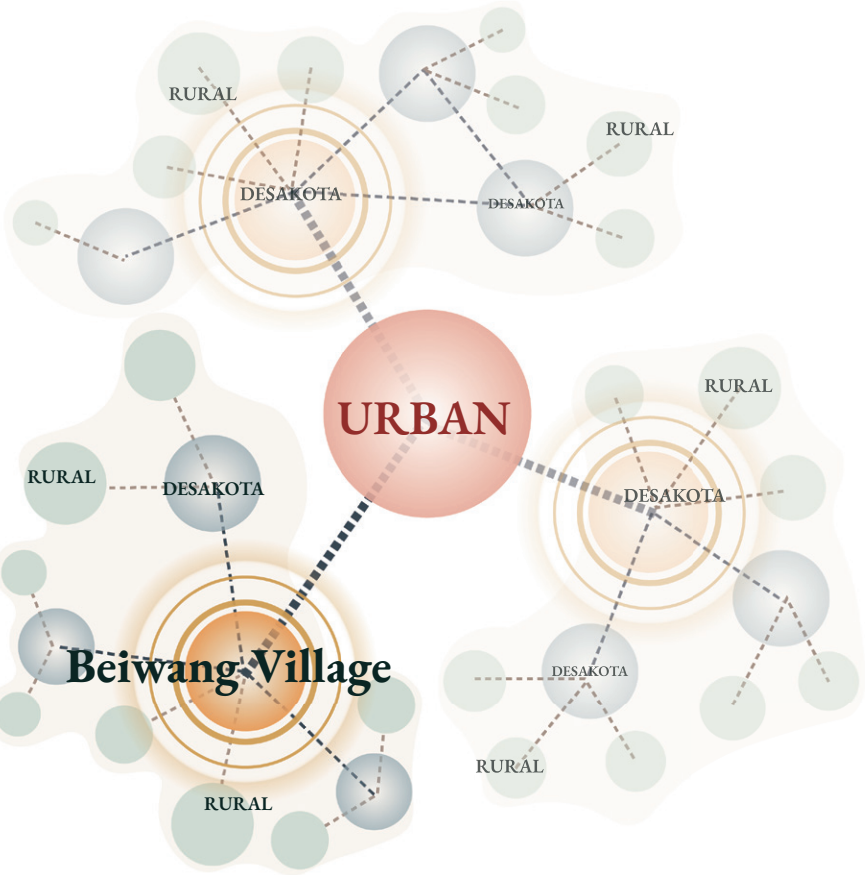
- Desakota Cooperative Cluster
- Beiwang Village
- Normal Desakota as Strategic Point
- City/Town Center
- Important Road
- Railway
- Green Corridor
- Blue Corridor

Position of Beiwang village in Wafangdian city
Made by author

As a strategic point in the cluster

Secondly, in Chapter 5, it was mentioned that to create integrated development and build socio-ecological resilience at the municipal level, it is necessary to promote cooperation among desakota and form desakota cooperative clusters. There is a strategic point in each cluster that drives the development of the whole cluster. **Beiwang village plays the strategic role in its cooperative cluster due to its industrial agglomeration and proximity to the city center.** Therefore, Beiwang village is more likely to be a pilot project that prioritizes the establishment of socio-ecological resilience and drives the development of the entire cluster.

It is hoped that the case study of Beiwang village will depict various possibilities of strategic points.



- + Desakota
- + Surrounding Rural Area
- Important Road
- Railway
- Urban Area
- Industrial Zone
- River
- Connection
- Bus Stop
- Mountain
- Desakota Cooperative Cluster

Position of Beiwang village in the cluster
Made by author

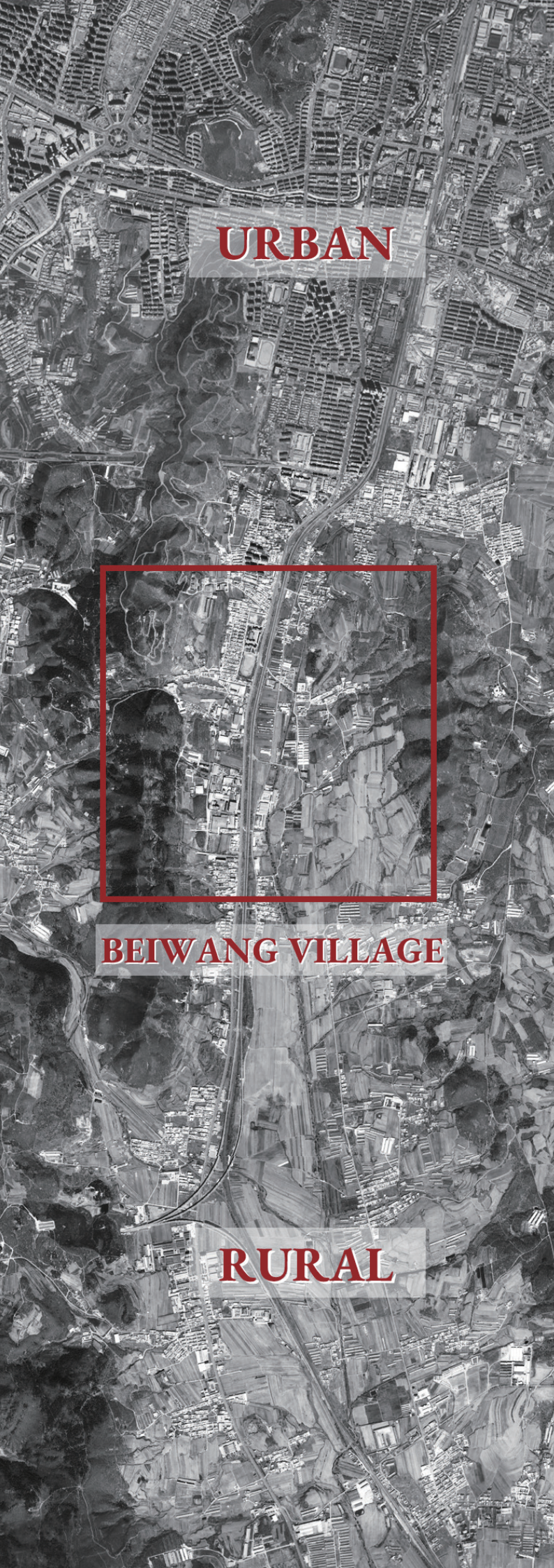
Introduction of Beiwang Village

Beiwang Village is located in the southern part of Wafangdian city with 2400 rural population and 400 urban population.

There is about 1 square kilometre of farmland in Beiwang Village, mainly planted with cherries, peaches, apples, corn, cucumbers, tomatoes, potatoes and other fruits and vegetables.

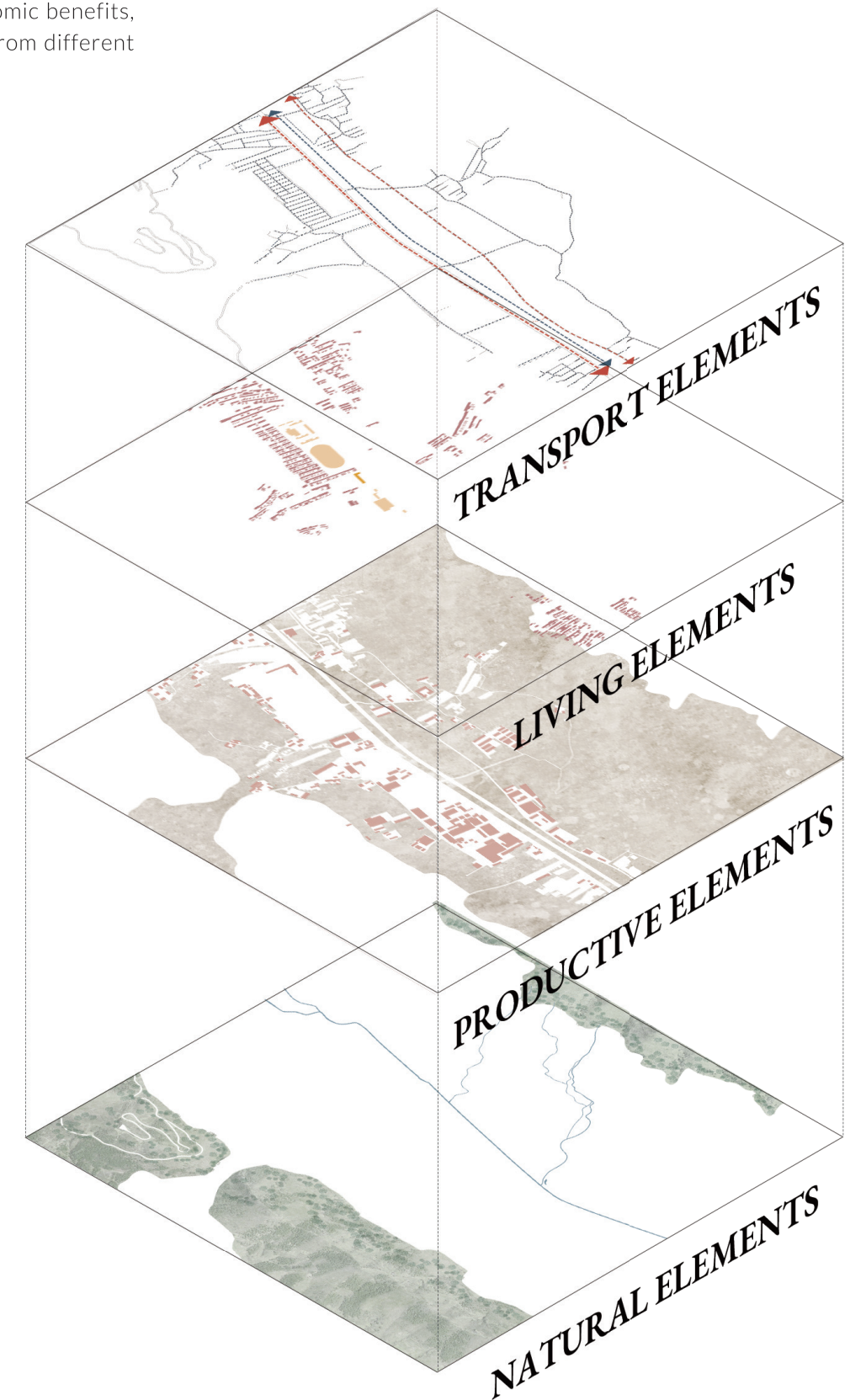
There are 24 enterprises and nearly 100 individual small business in the village. The main industry in Beiwang Village is bearing manufacturing industry.

A main road and a train line run through the village, making it highly connected to the urban center and the surrounding rural areas.



6.2 Elemental Analysis of Beiwang Village

Beiwang Village has a variety of elements consisting mainly of natural elements (mountains and river), productive elements (farmland and factories), living elements (houses and public services) and transport elements (road systems and trainline). These elements interact with each other and form the socio-ecological system of Beiwang Village. However, due to the lack of planning and the pursuit of economic benefits, all these elements are suffering from different problems.



6.2.1 Natural Elements

■ Unmanaged mountain

The natural elements of the village contain mainly mountains and rivers. There is a mountain park in the north-west of Beiwang Village, extending northwards into the city center. The rest of the the village's mountainous areas are not easily accessible because they are unmanaged. However, at the municipal level, Beiwang village is located on the green corridor. So the mountain in the west of the village has ecological significance which is currently neglected.



Nanshan mountain park
Internet, Photographed by Ziyi Zhao



Unmanaged mountains in Beiwang village
Photographed by author



Polluted river in Beiwang village
Photographed by author



Hard border along the river in Beiwang village
Photographed by author

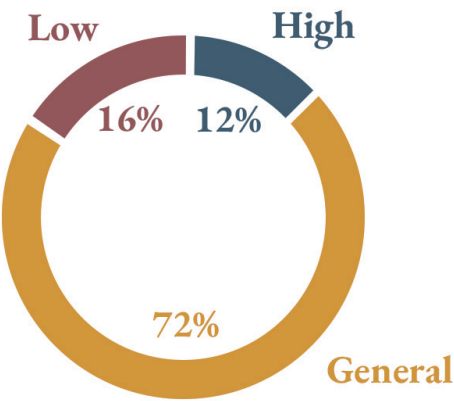
6.2.1 Natural Elements

■ Polluted river

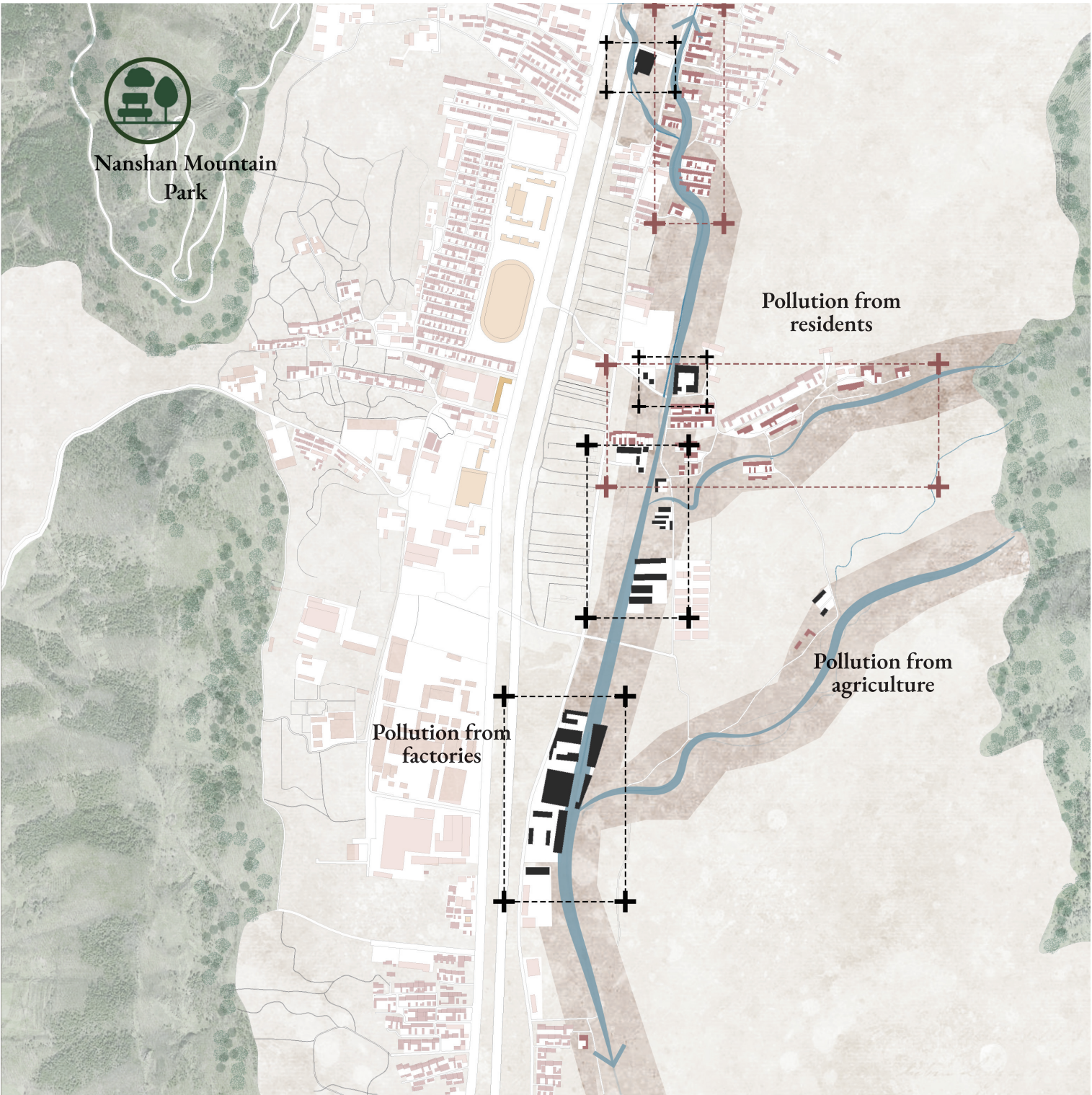
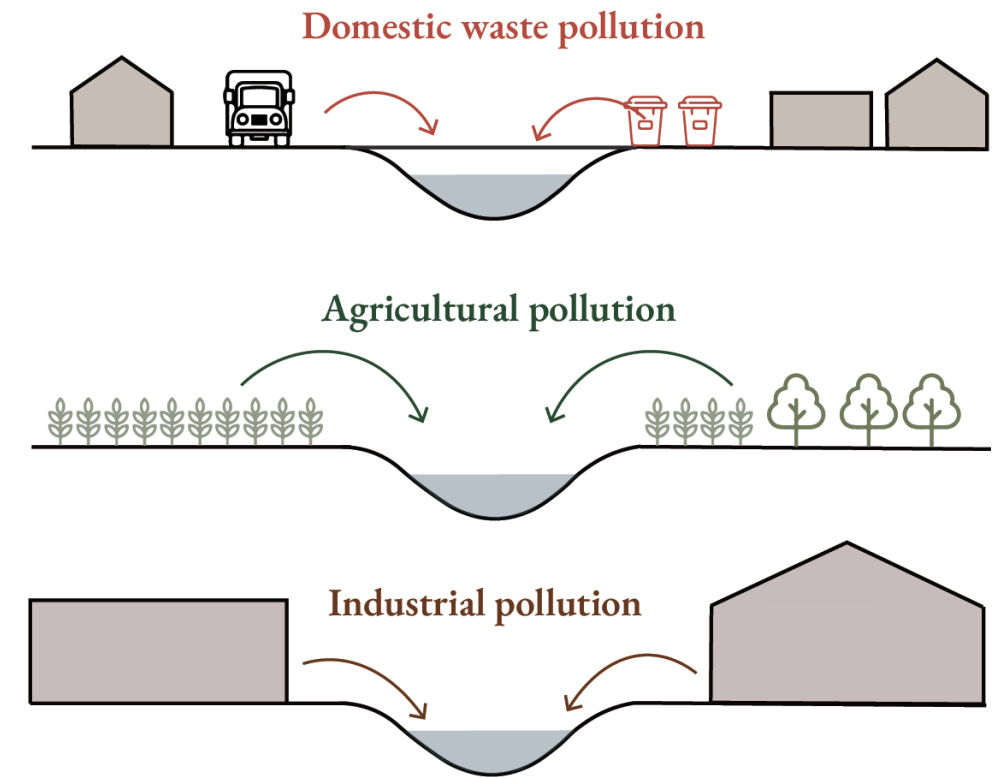
The banks of the river in Beiwang village are mostly hard boundaries with factories, houses, and farmland along the banks, causing serious pollution to the river. Agricultural wastes and household garbage can be found everywhere along the banks of the river. There are even garbage collection points and factory sewage pipes along the river.

The results of the questionnaire show that most of the villagers think that the quality of the village's landscape is average, and 16% of the villagers think that the quality of the landscape is poor.

Level of satisfaction of villagers with river and mountains in the village



Data based on questionnaire, Made by author



- Farmland
- Mountain
- River
- Residential Buildings
- Factories
- Public Services
- Houses polluting rivers
- Factories polluting rivers

Condition of natural elements in Beiwang Village
Made by author

6.2.2 Productive Elements

■ Rift between Industries and Resources

The main industries in Beiwang Village are machinery manufacturing industry and agriculture. According to the head of the village, although the factories have a large output value, **they do not bring much benefit to the village collectively.** And since the factories require skilled workers, there is a certain threshold for employment, which does not provide many job opportunities for the villagers.

There is not much arable land in the village, with only 400 square metre of arable land per capita. Villagers create small gardens in front of their houses and grow fruits and vegetables for self-sufficiency. Large areas of farmland were contracted out to farmers to grow mainly fruit and vegetables for supply to the city. Although

mechanized cultivation has taken place, yields are low compared to surrounding rural villages in the vicinity.

To sum up, **there is a rift between existing industries and resources in Beiwang Village,** which prevents it from maximizing its strengths. Industry and agriculture do not bring much benefit to the village communities, but there are problems such as pollution and lack of spatial regulation. Therefore, industrial transformation is needed for socio-ecologically resilient development in Beiwang Village.



Small scale farmland in front of houses
Photographed by author



Large scale and well-managed farmland
Photographed by author



Large scale factories
Photographed by author



Small scale factories
Photographed by author



- Farmland
- Mountain
- Factories
- Residential Buildings
- Public services

Distribution of Productive elements in Beiwang Village
Made by author

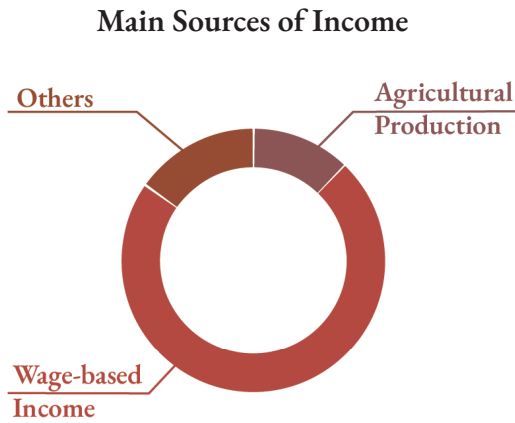
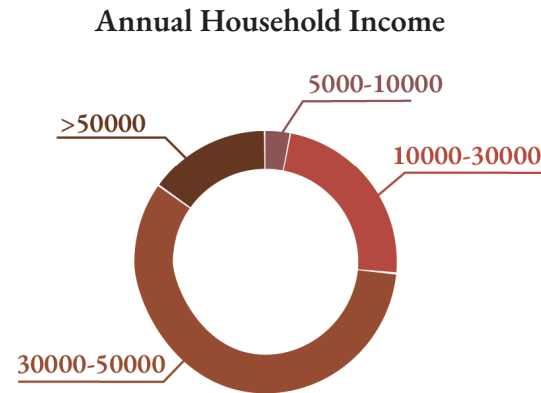
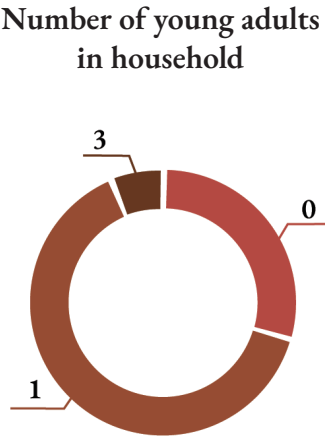
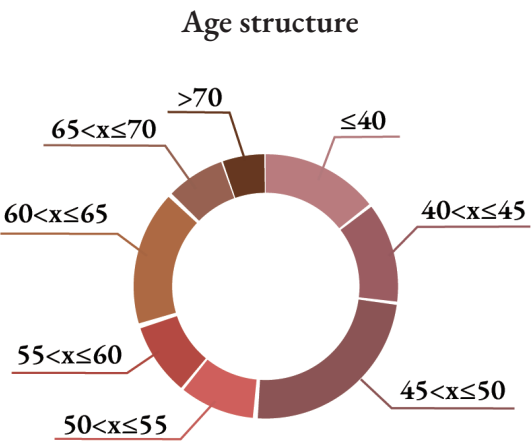
6.2.3 Living Elements

■ Aging Population & Low Income

The village has a population of about 2,800, of which 2,400 are agricultural hukou. There are 800 households in the village, with an average of 3 persons per household. The residents of the village are mainly middle-aged and old people, and most of the young people are working outside the village, so there is an aging problem. The average household income in the village is about 30,000 to 50,000 yuan per year, with wage income being the main source of income.



Old people working in the farmland
Photographed by author

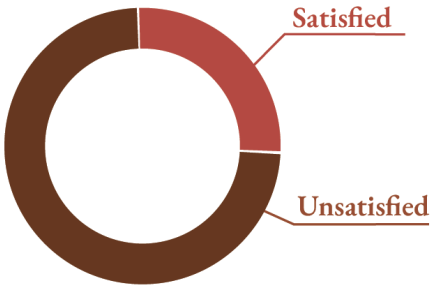


Data based on questionnaire, Made by author

■ Low Living Condition

The quality of residential houses in the village varies, and the structure of houses is mostly brick-concrete houses. Some of the houses in the village are of poor quality and there are cases of abandoned houses. 74% of the villagers are not very satisfied with the living conditions.

Satisfaction of Living Condition



Data based on questionnaire, Made by author



House in good condition
Photographed by author



Abandoned houses in low condition
Photographed by author

■ Poor Condition of Public Spaces

There is a lack of public space in a favourable environment and the main public space is the street. However, the streets are poor and lack greenery. The street environment is relatively good only in the neighbourhoods on the north-east side of the village.

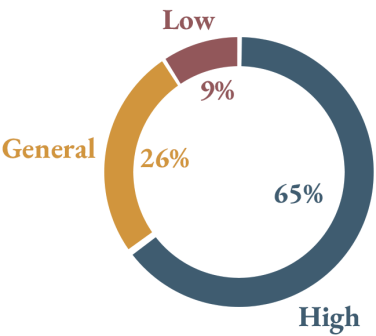


Street as public space for gathering
Photographed by author



Street in the north-east of the village
Photographed by author

Level of satisfaction of villagers with the overall environment in the village



Data based on questionnaire, Made by author

■ Low Environmental Quality

The quality of the environment in the village is poor, with rubbish everywhere, and in need of environmental improvement and upgrading. However, according to the results of the questionnaire, most of the villagers are more satisfied with the overall environment of the village.



Rubbish piles up in open spaces
Photographed by author

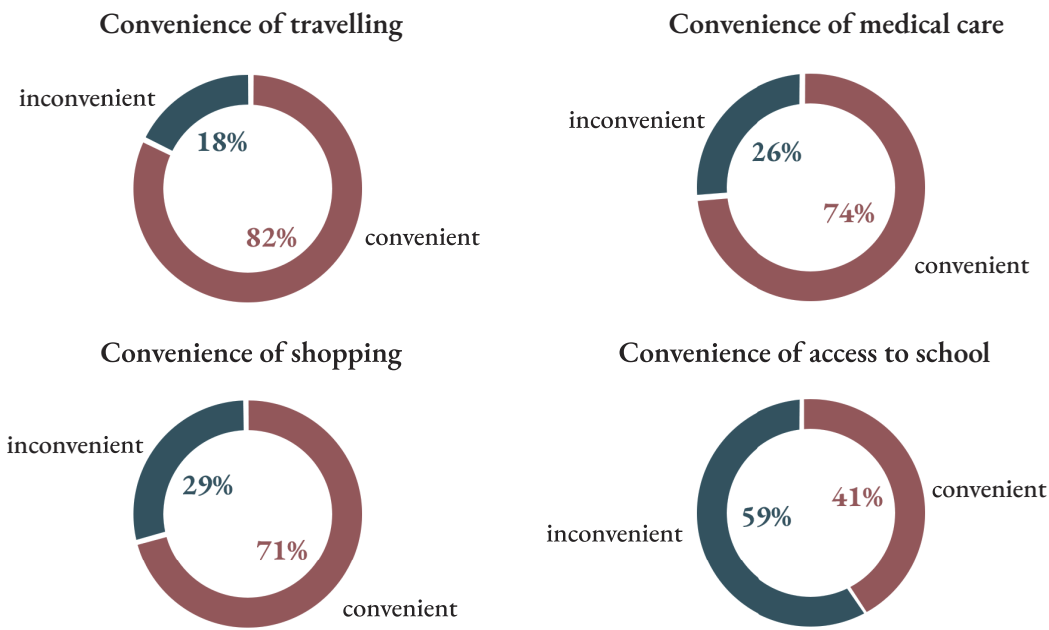


Abandoned vacant land
Photographed by author

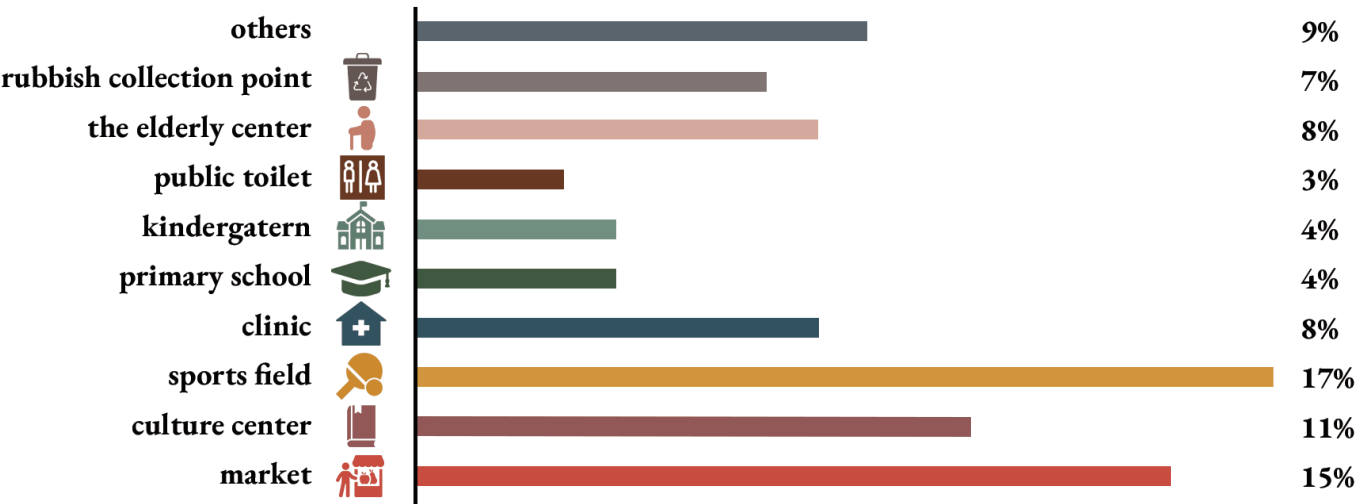
■ Low Accessibility to Public Services

Public services in the village are centered on the western side of the village and include the village government, clinic and kindergarten. There is a lack of educational facilities in the village, with only one vocational secondary school, and the nearest primary and secondary schools are a 30-minute bus ride away. Residents on the eastern side of the village need to cross unsafe roads if they want to use public services. Accessibility to public services is therefore low.

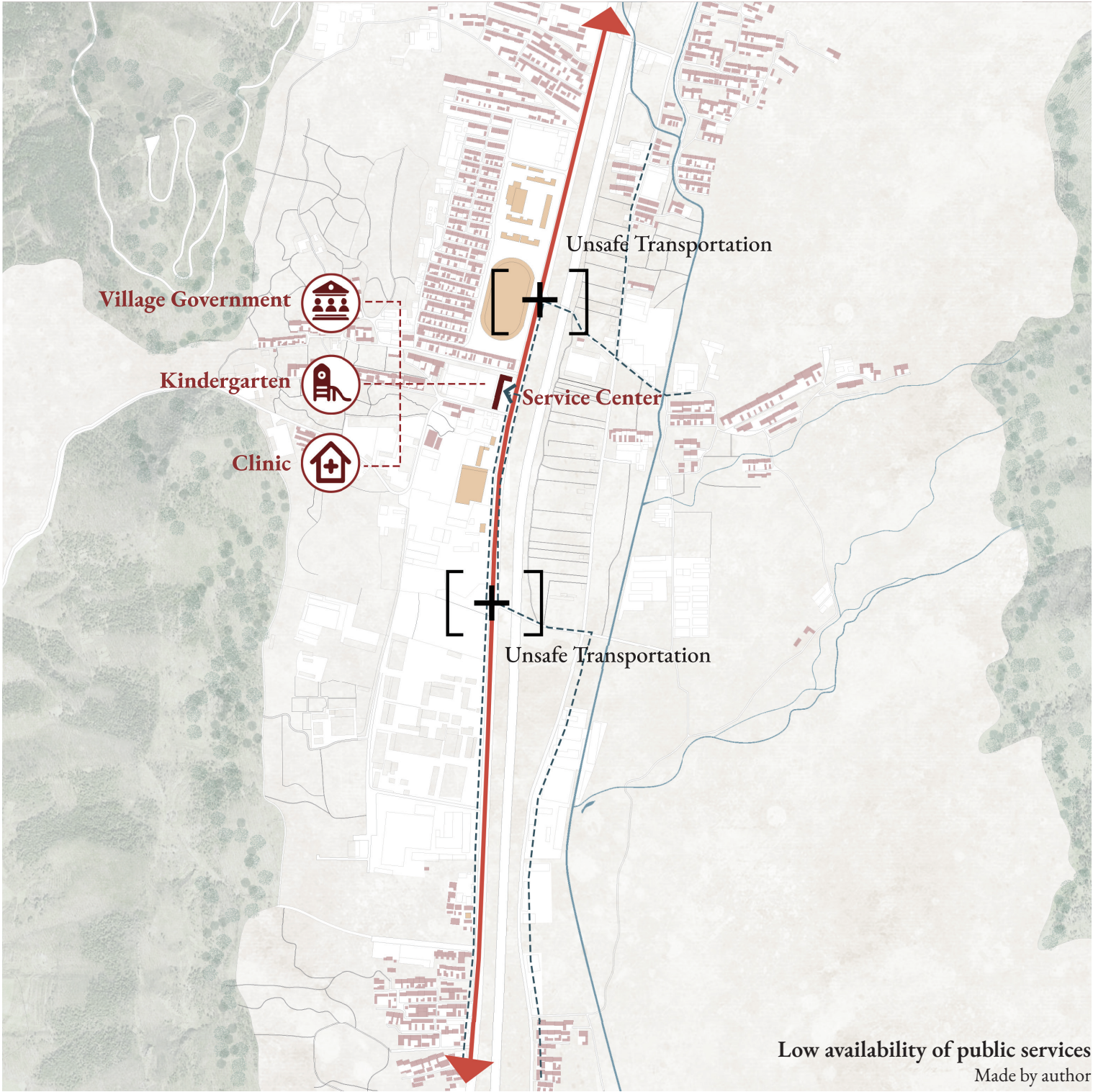
According to the results of the questionnaire, villagers preferred to have sports fields and markets.



Villagers' demand for public services



Data based on questionnaire, Made by author



Service center of Beiwang Village
Photographed by author



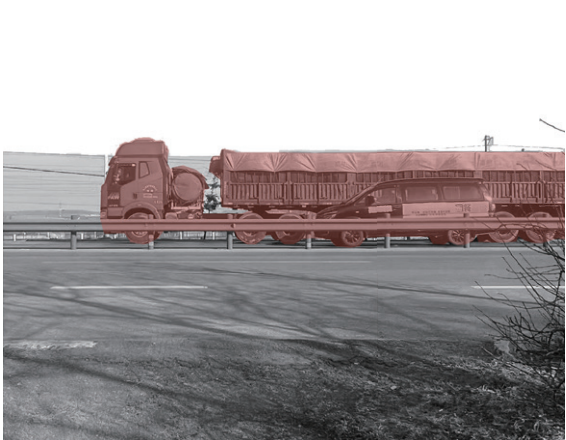
Service center of Beiwang Village
Photographed by author

6.2.4 Transport Elements

■ Unsafe Transportation & Low Quality of Roads

The main road in the village is unsafe, with cars travelling at excessive speeds and large trucks passing by frequently. The lack of traffic lights and pavements makes it even more unsafe. Another road on the east side of the village is also used by lorries. This road is also unsafe due to the mix of pedestrians and vehicles.

The quality of roads within the village varies, with some roads in the east of the village being in poor condition, leading to imbalanced development between the east and west sides of Beiwang Village.



Big trucks and high speed cars on road 1
Photographed by author



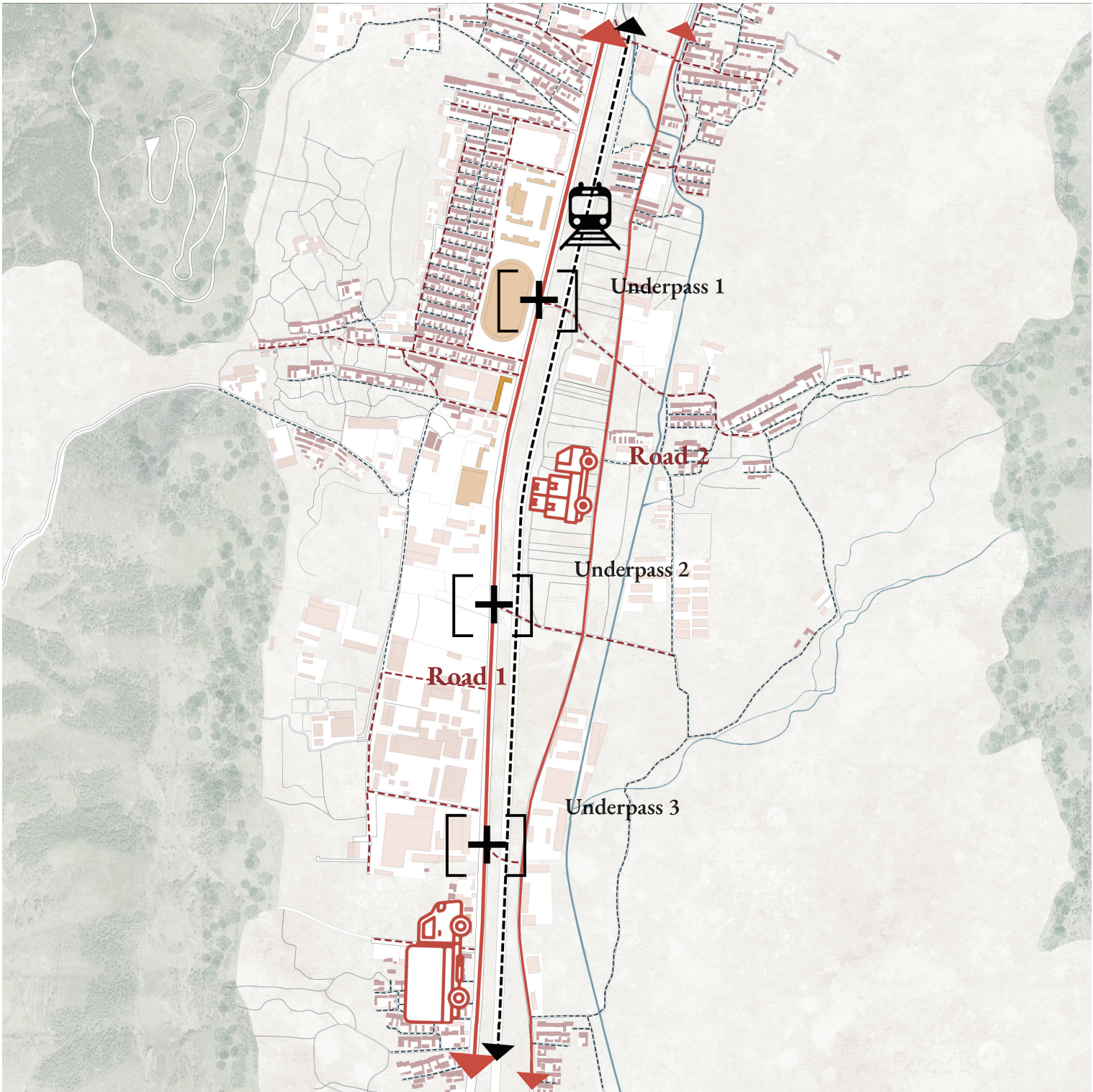
Trucks on road 2
Photographed by author



Low Quality of underpass
Photographed by author



Low quality of road in the east of Beiwang Village
Photographed by author



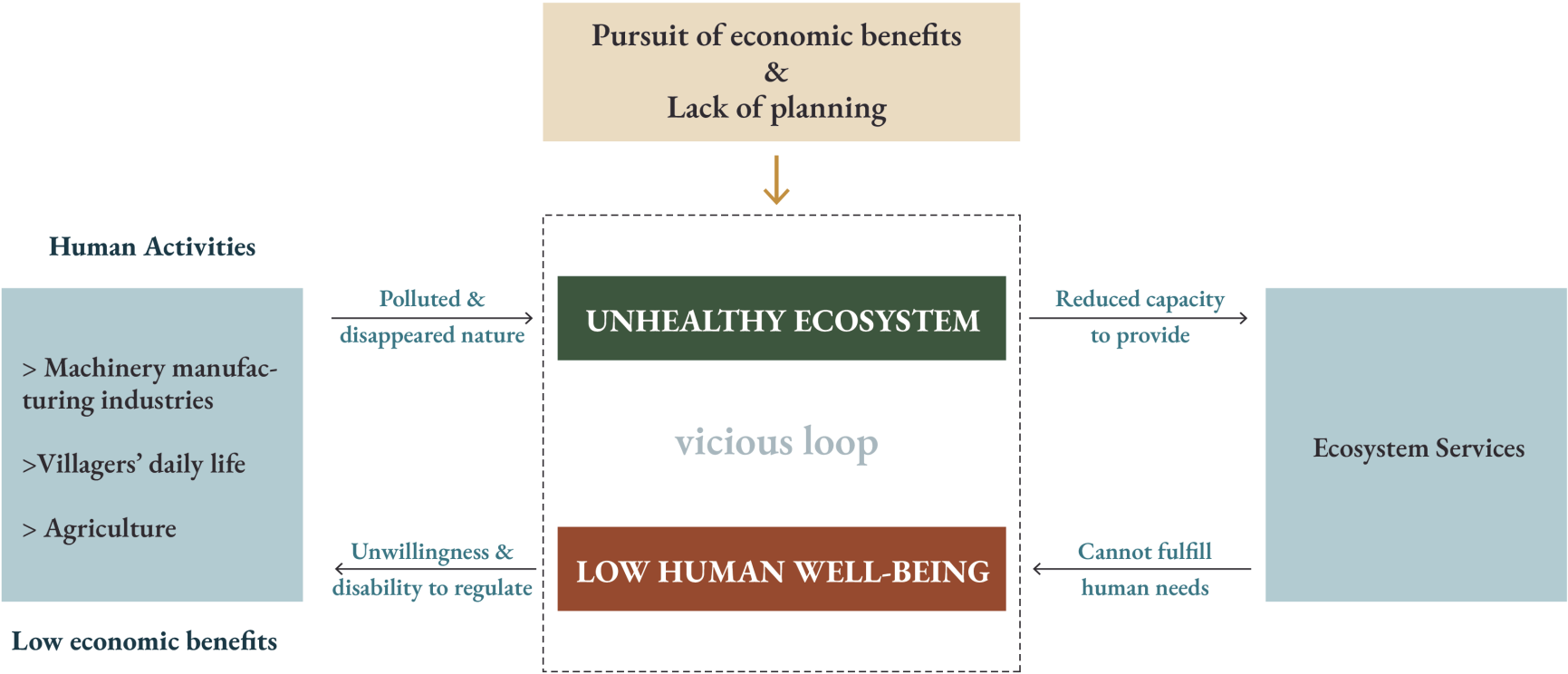
- Main Road
- - - Train Line
- - - High Quality Roads
- - - Low Quality Roads
- [+] Underpass

Transport Elements in Beiwang Village
Made by author

6.3 Socio-ecological degradation of Beiwang Village

Based on the elemental analysis in previous pages, the socio-ecological degradation in Beiwang Village can be summarized as a vicious cycle.

Due to the pursuit of economic benefits and a lack of planning, various human activities such as industrial production, agriculture, and daily life in the village are problematic, causing detrimental effects on the ecosystem. The importance of natural elements like mountains and rivers has not been adequately recognized, leading to a weakening of their capacity to provide ecosystem services. These ecosystem services fail to meet human needs and do not generate economic benefits, resulting in lower human well-being in Beiwang Village. Consequently, villagers are neither willing nor capable of protecting the ecosystem. Furthermore, the rift between industries and resources in the village leads to a decline in economic benefits. Additionally, the lack of constraints on human activities continues to impact the ecosystem negatively, perpetuating the vicious cycle.



ELEMENTS



Ecological Elements



Factories



Existing Industries



Farmland



Road System



Neighbourhood

PROBLEMS

Neglected

- > Pollution
- > Flood risk

Lack of spatial regulation
Informal Industries

- > Pollution
- > Regulatory difficulties

Simple and short industry chain
Rift between industries & potential
Low employment

- > Lack of competitiveness
- > Inability to attract investment
- > Low economic contribution

Lack of management

- > Pollution
- > Inefficient use of resources
- > Cluttered landscape

Unsafety
Low availability

- > Uneven development

Low living condition

- > Lack of public spaces
- > Lack of public services
- > Low housing quality

OPPORTUNITIES

Ecological & Social Value

Reuse of Existing Factories

Reuse of Existing Factories

Agricultural Base

High Connection to
Urban & Rural

Better Condition than Rural

STRATEGIES

Ecological Restoration

Remove of Some Factories

Implantation of New Industries

Restructure & Transformation
of Farmland

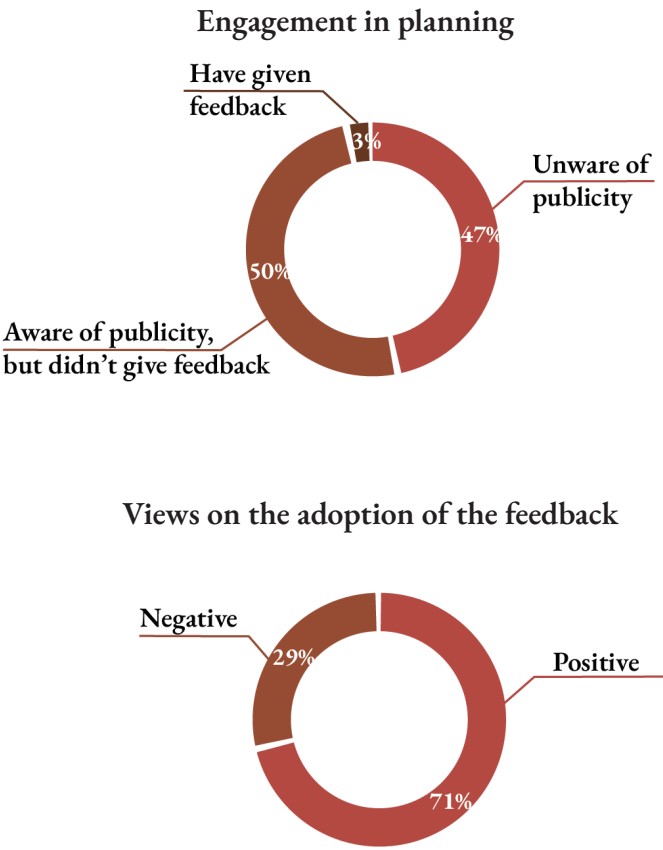
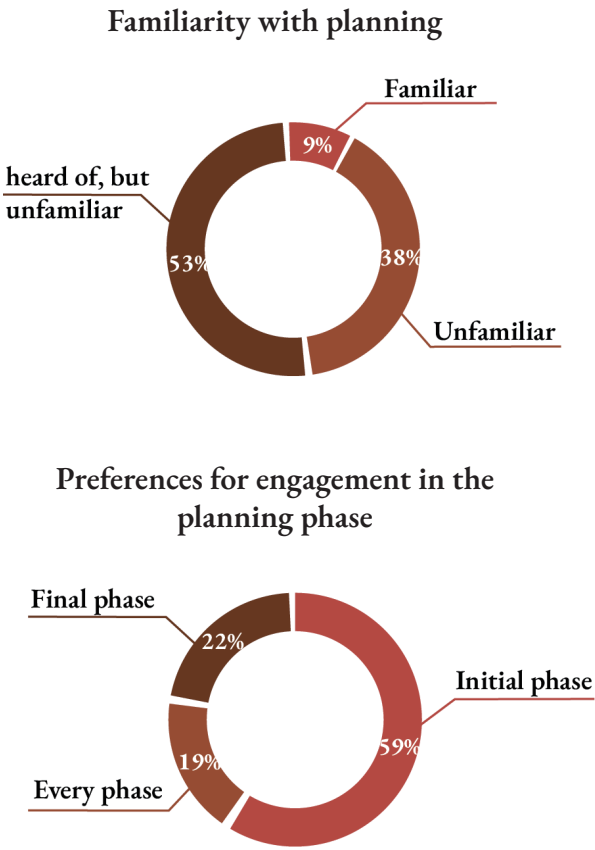
Reorganization of Road System

Neighbourhood Upgrading

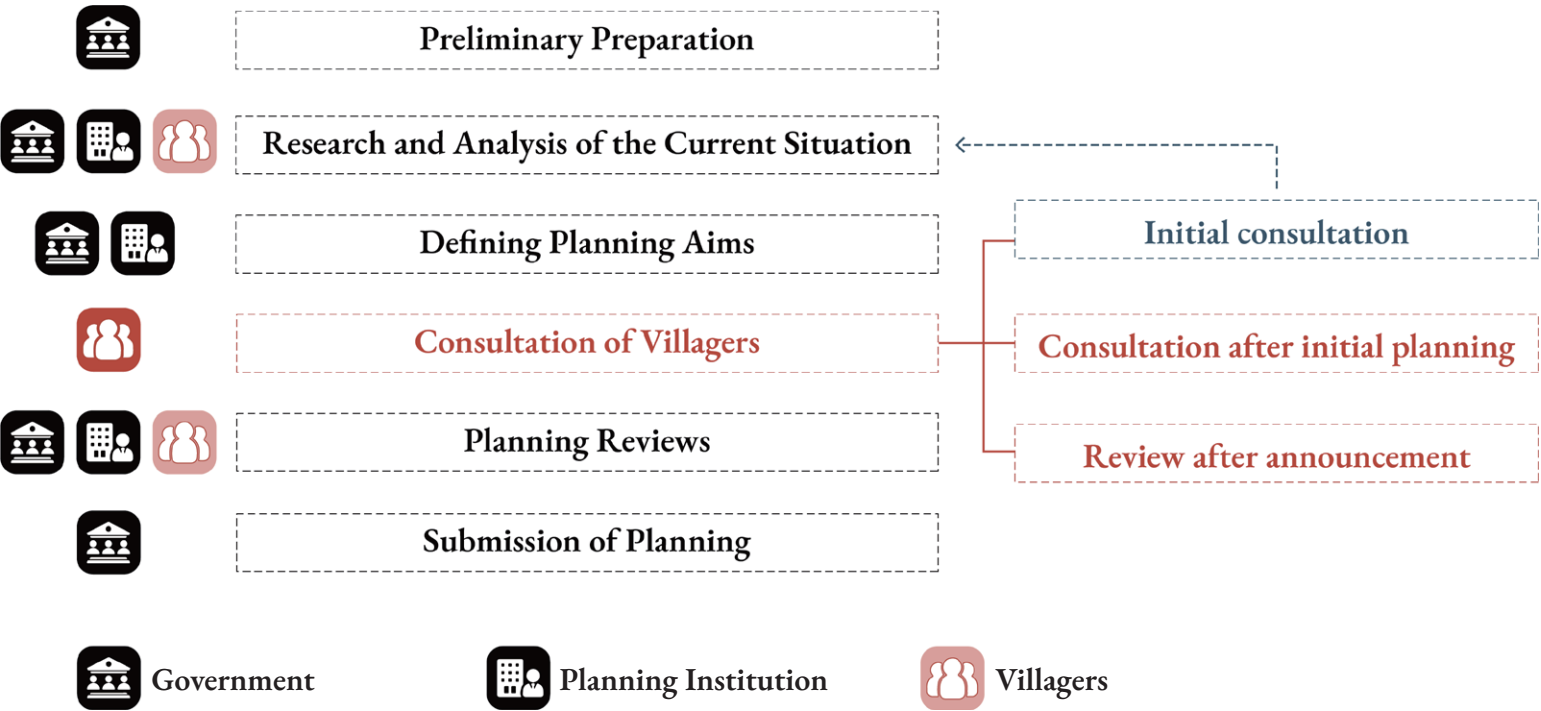
6.4 Current Planning Process

At present, **the degree of participation of villagers in planning in Beiwang Village is low**, although villagers are engaged in the planning process at the stages of initial research, consultation, and planning reviews, **their influence on the outcome of the planning is relatively small**. Current planning is top-down planning led by government and planning agencies.

The results of the questionnaire show that 44% of the villagers have no idea about participation in planning, and only 27% are willing to participate. The main reason is that villagers do not know much about planning, the degree of engagement in the existing planning process is low, the existing ways of participation are relatively single, and villagers' feedback has less impact on the planning results.



Level of villagers' participation in planning
Data based on questionnaire, Made by author



Current planning process
Made by author





CHAPTER 7

ADAPTIVE PLANNING

This chapter explores how to build socio-ecological resilience in desakota through adaptive planning, using the example of Beiwang village.

It first describes why scenario building is proposed as a method. Then the position of Beiwang village was analyzed, and suitable scenarios were identified based on its conditions. Subsequently, the two scenarios were built, including spatial planning strategies, vision map, and rendering of spatial quality. From an institutional perspective, a new governance model is proposed to facilitate the establishment of socio-ecological resilience. Then an evaluation system is proposed to compare these scenarios more objectively. Based on this, no-regret strategies are also proposed to support the occurrence of multiple future possibilities.

Finally, the chapter summarizes the adaptive planning process and explains how to co-construct a socio-ecologically resilient future by engaging different stakeholders.

7.1 Why Scenario Building

■ Improve flexibility and adaptivity.

Scenario building provides desakota with multiple future possibilities, and desakota can choose the appropriate development paths based on their own conditions. Compared to fixed blueprint planning, desakota can explore diverse future possibilities through scenario building. This provides more flexibility and enhances the adaptivity of desakota by supporting multiple futures which is crucial for building socio-ecological resilience.

■ Choose the most suitbale scenarios and propose no-regret strategies.

Through scenario building, desakota can select one or more scenarios that will help it maximize its value and in turn come up with no-regret strategies. These no-regret strategies support the occurrence of multiple scenarios and are therefore flexible and adaptable, contributing to resilience building.

■ Engage stakeholders in the planning process.

Scenario building offers more possibilities for enhancing public participation and involving more stakeholders than traditional planning. Once the selected scenarios and no-regret strategies are determined, stakeholders can choose the final scenarios and specific strategies to be developed according to their interests. Therefore, through scenario building, the influence of stakeholders on the final decision will be increased.

7.2 Compare Different Scenarios

Based on the condition of Beiwang village



Mountains



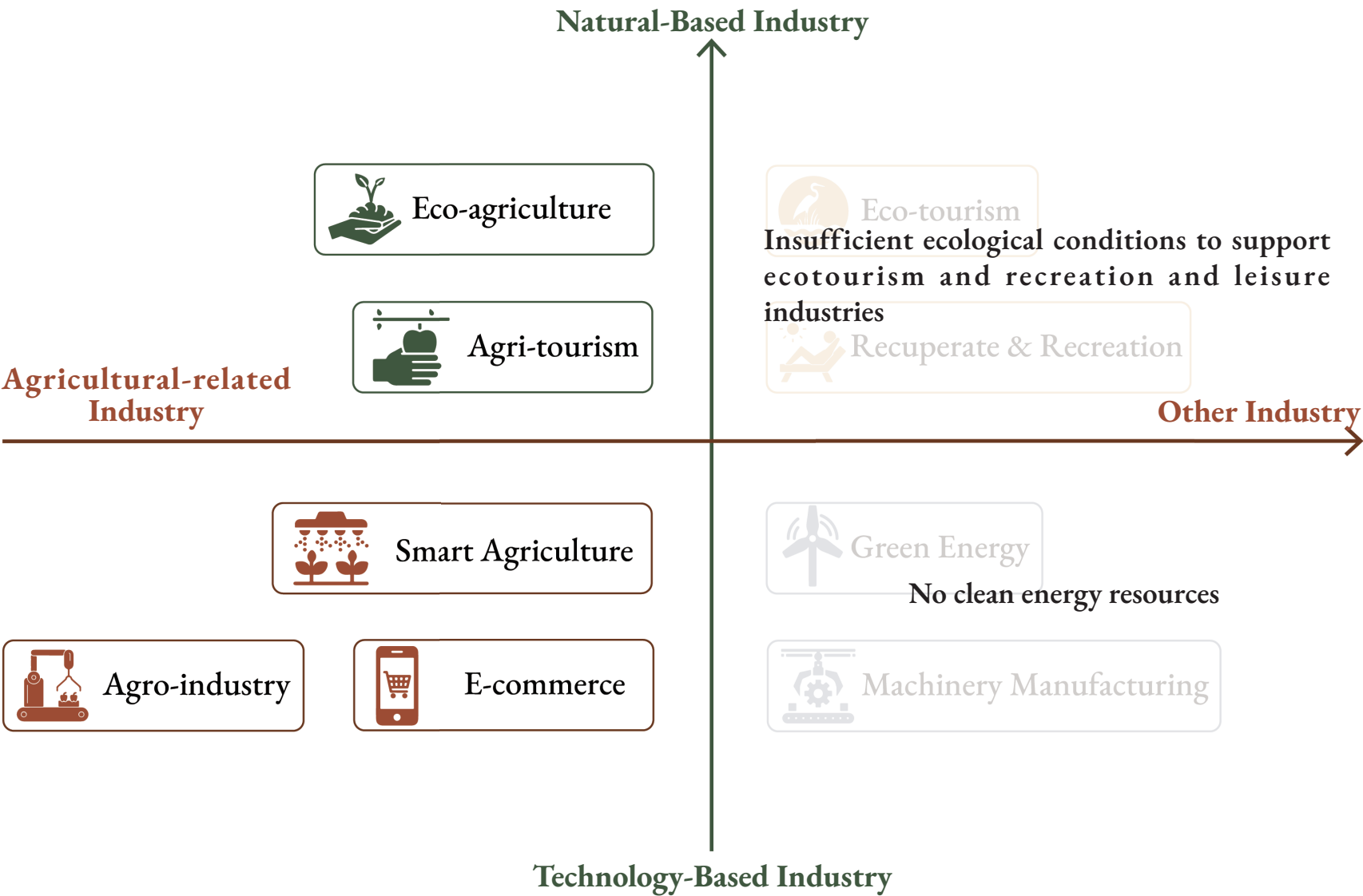
Farmland



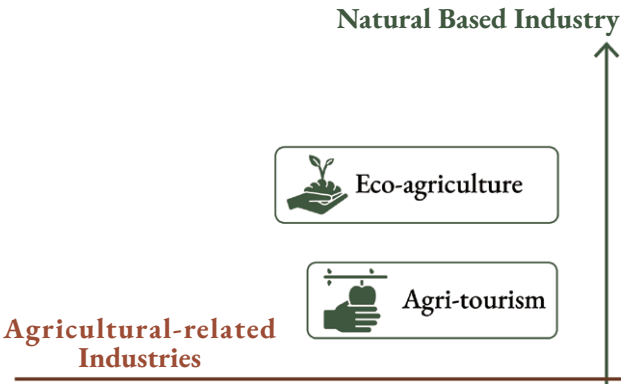
Factories



River



7.2.1 Scenario 1: Eco Agri-tourism Desakota



Overview of Beiwang village

■ On the green corridor

Beiwang village is ecologically important as it is located on the green corridor of the city. Therefore, in scenario one, the mountain in the west of the village should be preserved and a mountain park can be constructed in conjunction with agritourism. At the same time, transforming

traditional agriculture into eco-agriculture will also help Beiwang village provide ecological value. **Relying on the construction of the city-scale green corridor, the development of agritourism and eco-agriculture in Beiwang village complements it.**

■ Near to the city center

Due to its proximity to the city center, Beiwang village has great potential for developing agritourism. Its high connectivity with the urban center and high public transportation accessibility makes it easier to attract urban tourists. In addition, due to its high connectivity,

the ecological agriculture in Beiwang village can also provide food for the urban center, facilitating the interaction between Beiwang Village and the urban center.

■ The strategic point of the cluster

Beiwang village, as a strategic point of the cluster in which it is located, can develop agritourism and eco-agriculture on a pilot basis, and its development model can be promoted in the cluster. Since the development conditions of Donglin village, Lashan village and Wudian village

within the cluster are similar to those of Beiwang village, **it has the opportunity to drive them to develop agritourism and eco-agriculture together, which will in turn promote the joint development of the entire cluster.**



Position of Beiwang Village
Made by author

Strategies

1. Mountain preservation & wetland restoration

- > Removal of factories that pollute the river
- > Wetland restoration along the river
- > Mountain preservation and park construction

In this scenario, the socio-ecological resilience of Beiwang Village is realized through the development of natural-related industries and agricultural-related industries.

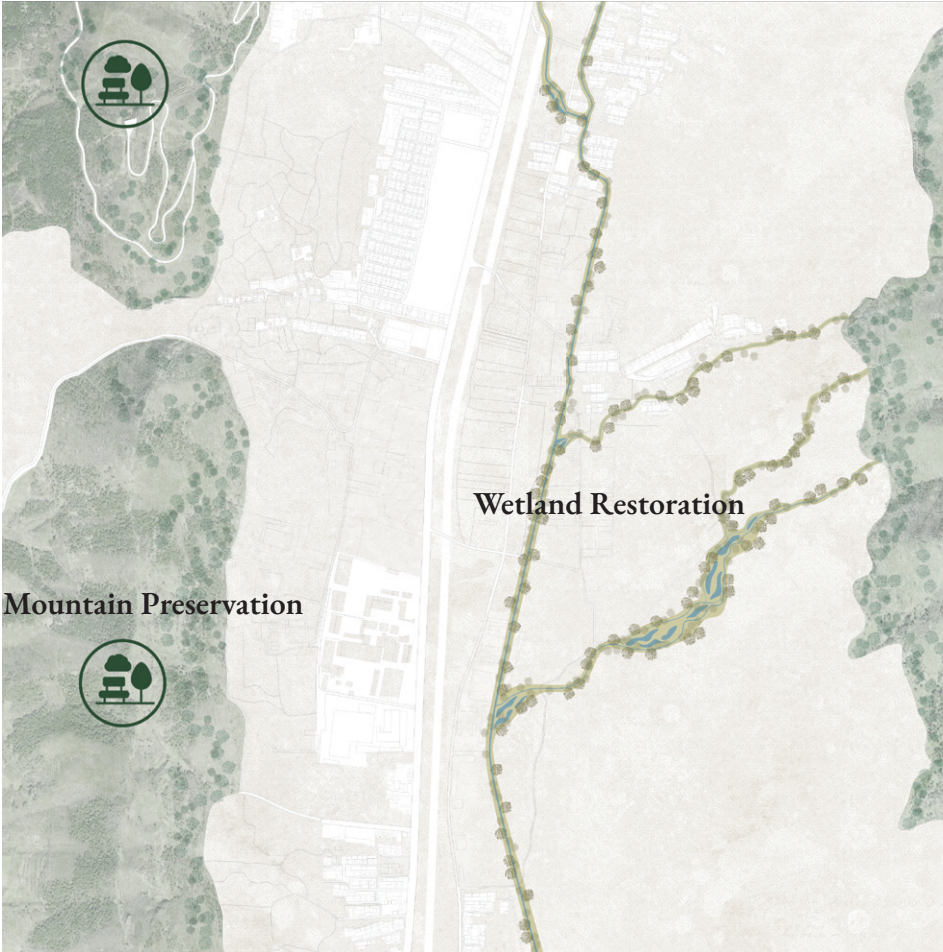
As the importance of the ecosystem is emphasized, the primary strategy is ecological restoration. Currently, there are farmlands and factories along the river which cause pollution. Therefore, the

factories along the river need to be removed and the wetlands need to be restored to form soft boundaries on both sides of the river in order to improve the environmental quality for tourism. In addition, the mountains need to be conserved and the one on the southwest side of the village can be developed into a mountain park in combination with agri-tourism.

BEFORE



AFTER



2. Transformation to ecological agriculture

- > Crop rotation
- > Agroforestry

To build socio-ecological resilience, human activities need to be shifted to have less impact on the ecosystem. Specifically, the transformation of traditional agriculture and machinery manufacturing into eco-agriculture and agri-tourism. Beiwang Village has an agricultural base, and by dismantling fragmented factories in the farmland, restructuring the farmland, and implementing eco-agriculture strategies such as agroforestry and crop rotation,

the impact of agricultural production on the ecosystem can be reduced while the agricultural harvests will be promoted. An eco-agriculture knowledge hub can also be set up in the village to teach local villagers and other rural villagers in the surrounding areas to implement eco-agriculture which also benefits the surrounding rural areas.

BEFORE



AFTER



3. Add agri-tourism activities

- > Implantation of agri-tourism activities and services
- > Connecting industries with pedestrian and cycling pathway system
- > Reuse of factories for indoor tourism activities

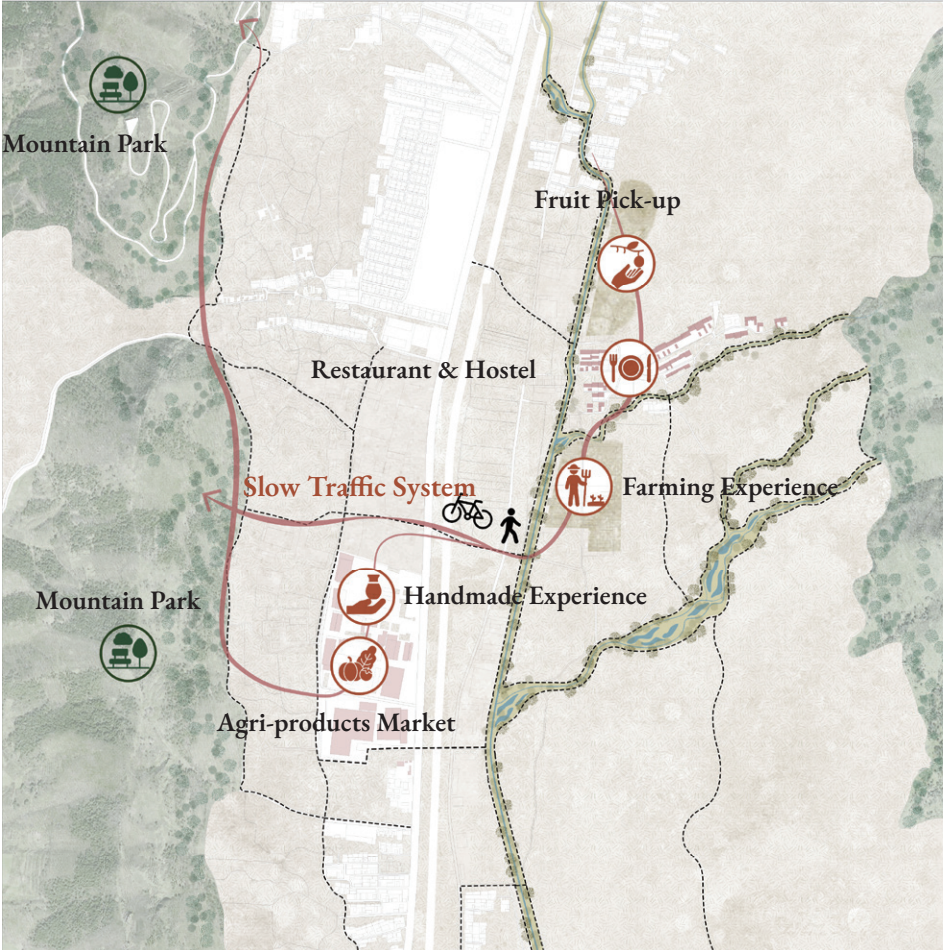
Besides, based on the agricultural advantages of Beiwang village and its connectivity to the city center, the existing machinery manufacturing industry should be transformed into agri-tourism. Specifically, activities such as fruit picking, farming experience, handicraft experience, and agricultural exhibitions can be implanted, which add educational functions to tourism. Tourism-related services, such as accommodation, restaurants, and retail, can provide more low-skilled job opportunities for villagers which benefit them more than current industries.

According to the case of Voies Vertes in France, if agri-tourism is going to be developed, there is a need to construct slow traffic system. By linking the agri-tourism sites through pedestrian and cycling pathways, tourists can have a better experience of the nature and the rural landscape. The east and west sides of Beiwang Village should be connected through the slow-moving system to drive balanced development. The carriageway on the west side of the village should be speed-restricted and changed to mainly slow traffic.

BEFORE



AFTER



4. Social infrastructure upgrading

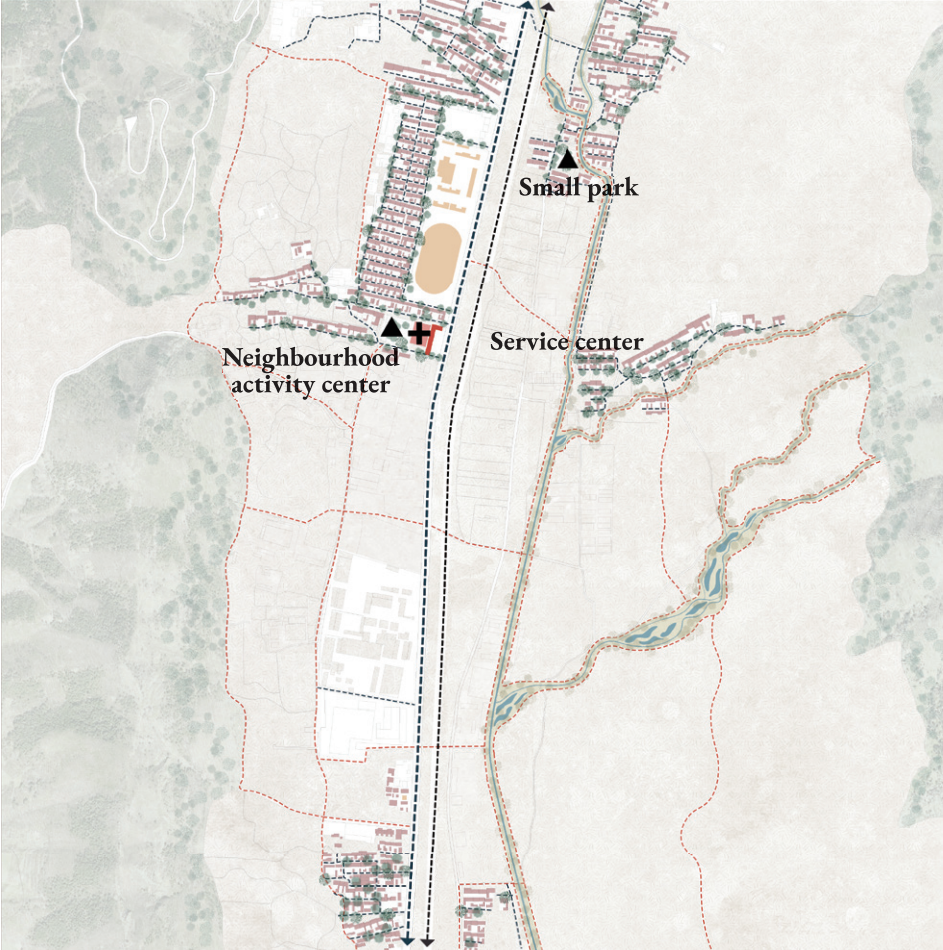
- > Add small parks with sports facilities
- > Add greenery in neighbourhoods
- > Reuse of warehouse as neighbourhood activity center
- > Connecting settlements to natural spots

Finally, the neighbourhood should be upgraded to enhance human well-being in Beiwang Village. Some of the fragmented houses should be demolished and relocated in the settlement, small factories within the settlement will be converted into villagers' activity centers, and public spaces with sports facilities will be added. The accessibility of the neighbourhood to public services and natural attractions will also be improved through the construction of roads, and greenery will be added along the roads to enhance the neighbourhood environment.

BEFORE



AFTER



Vision map of eco agri-tourism desakota

In this scenario, an attractive ecological agri-tourism desakota is built. Ecological restoration and eco-agriculture promote a healthy ecosystem that provides diverse ecosystem services to support agricultural production, agri-tourism, and the daily lives of villagers, which thus enhances human well-being.

Since the industry relies on the ability of ecosystems to provide ecosystem services, villagers are more likely to protect the ecosystem and constrain the impact of human activities on the ecosystem. Eventually, a socio-ecological resilience loop will be achieved.

- Residential houses

Factories

Public services

Service center

Farmland
- Wetland

Main road

Trainline

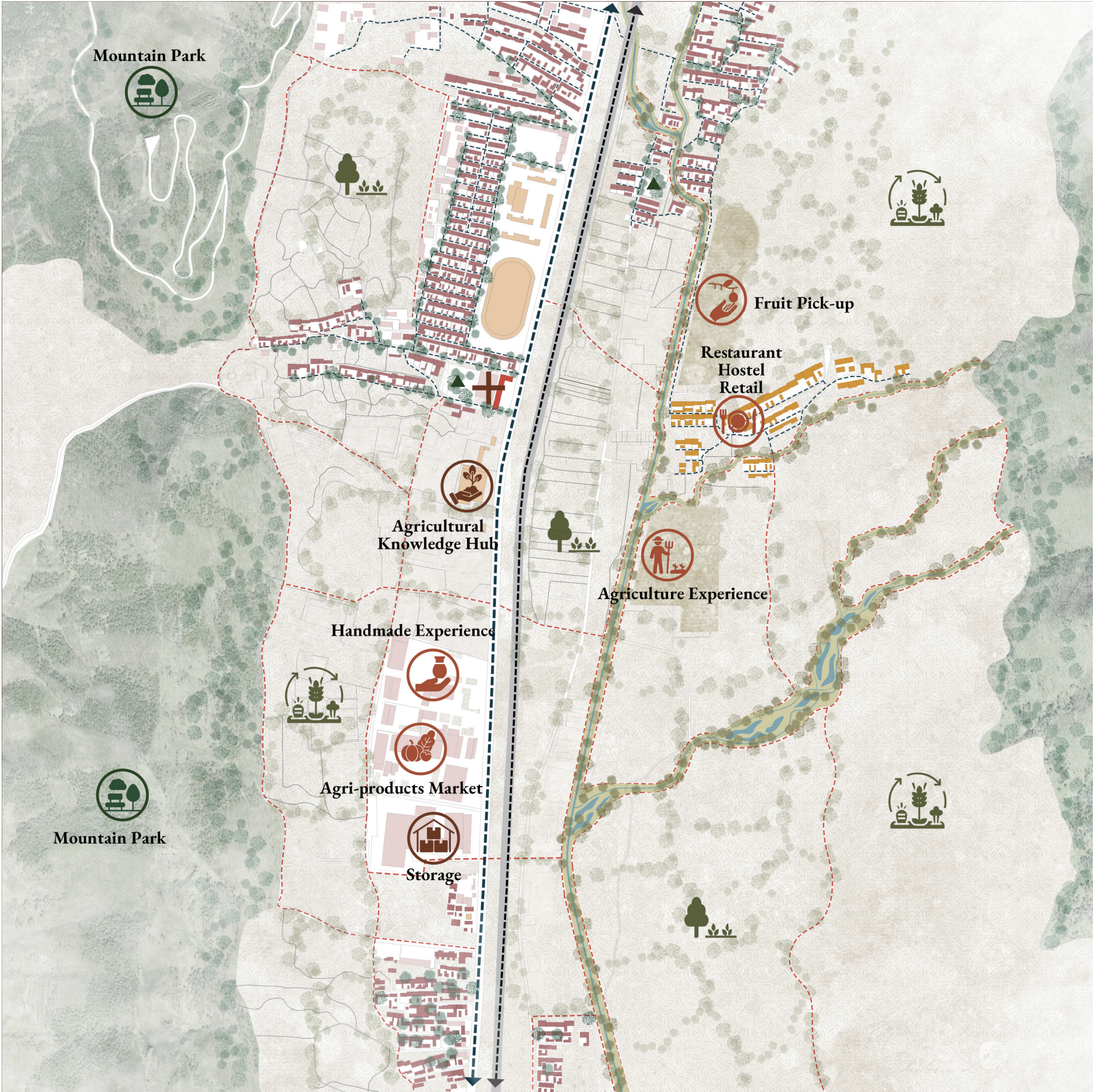
Slow traffic system

Carriageway
- Open spaces

Neighbourhood activity center

Crop rotation

Agroforestry



Beiwang village with a beautiful ecological environment, high human well-being, and a combination of ecological agriculture and agritourism will be constructed. Visitors will be able to experience agricultural activities such as fruit picking and plowing, as well as cycling or walking along the river and enjoying the rural scenery. Crop rotation and agroforestry have reduced environmental pollution and enhanced the ecological environment of the village. The restoration of wetlands has greatly enhanced the spatial quality and biodiversity of the village, which in turn has enhanced the well-being of the villagers. Ultimately, a socio-ecologically resilient Beiwang village was realized.



Adjustment of governance model

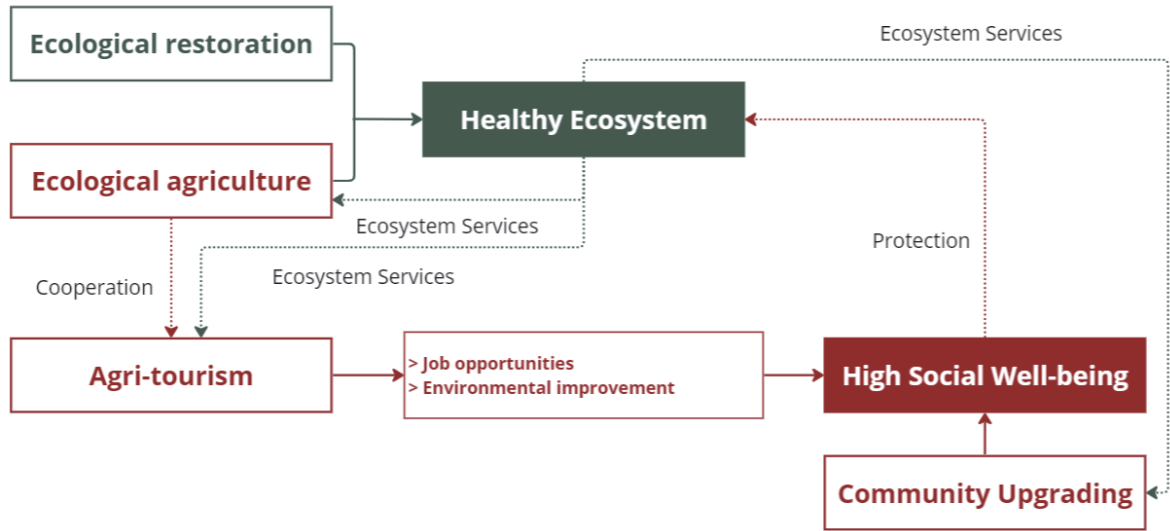
To engage various stakeholders to build socio-ecological resilience in Beiwang Village, a new governance model is proposed.

When ecological restoration is carried out, it is funded by the government with the participation of ecological experts. The ecological condition in the village is monitored annually by the government and NGOs. If the condition is favorable, a bonus can be provided to the village committee for neighbourhood upgrading to encourage villagers to protect the ecosystem.

At the initial stage of converting traditional agriculture to eco-agriculture, the government has to provide policies and subsidies and promote eco-agricultural products. The village committee should also publicize the brand name of Beiwang's ecological agricultural products. Village collectives can participate in agricultural production by contracting farmland to farmers or in the form of eco-agricultural cooperatives. Eco-agricultural

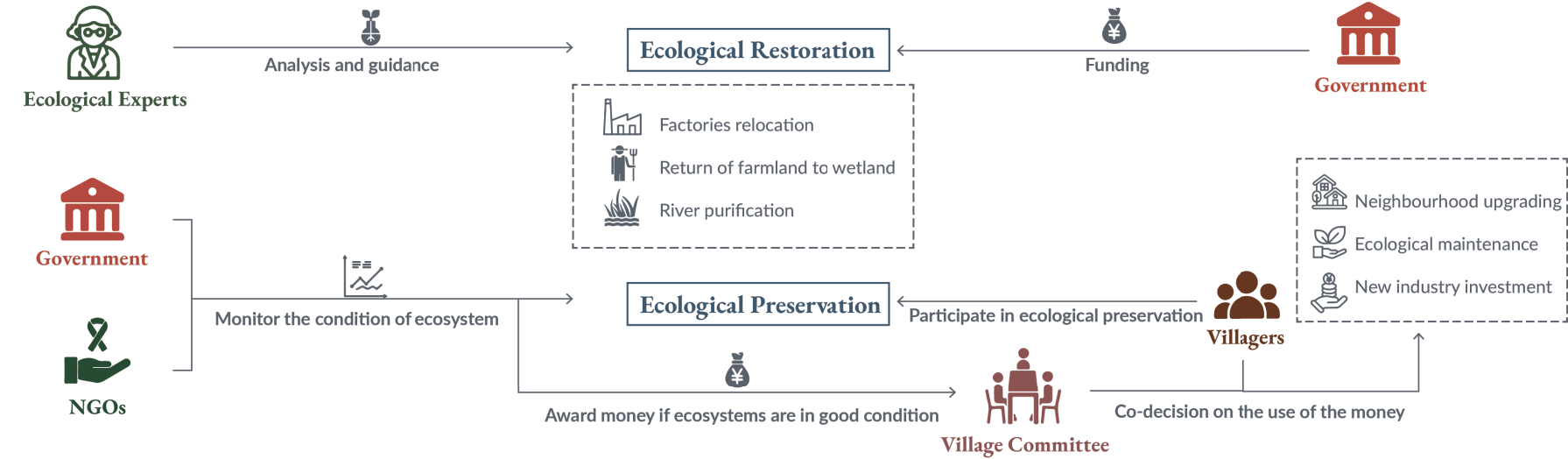
experts will train and assist villagers and other rural farmers. The village committee will fund the construction and management of a market that will generate income for the village community by renting out stalls, as well as allowing local villagers and rural farmers to earn money through the sale of their own produce.

The government first funds infrastructure improvements, ecological restoration, etc. to attract agritourism industries. The village collectives can decide together which industries can be implanted according to their interests to bring more benefits to the village.

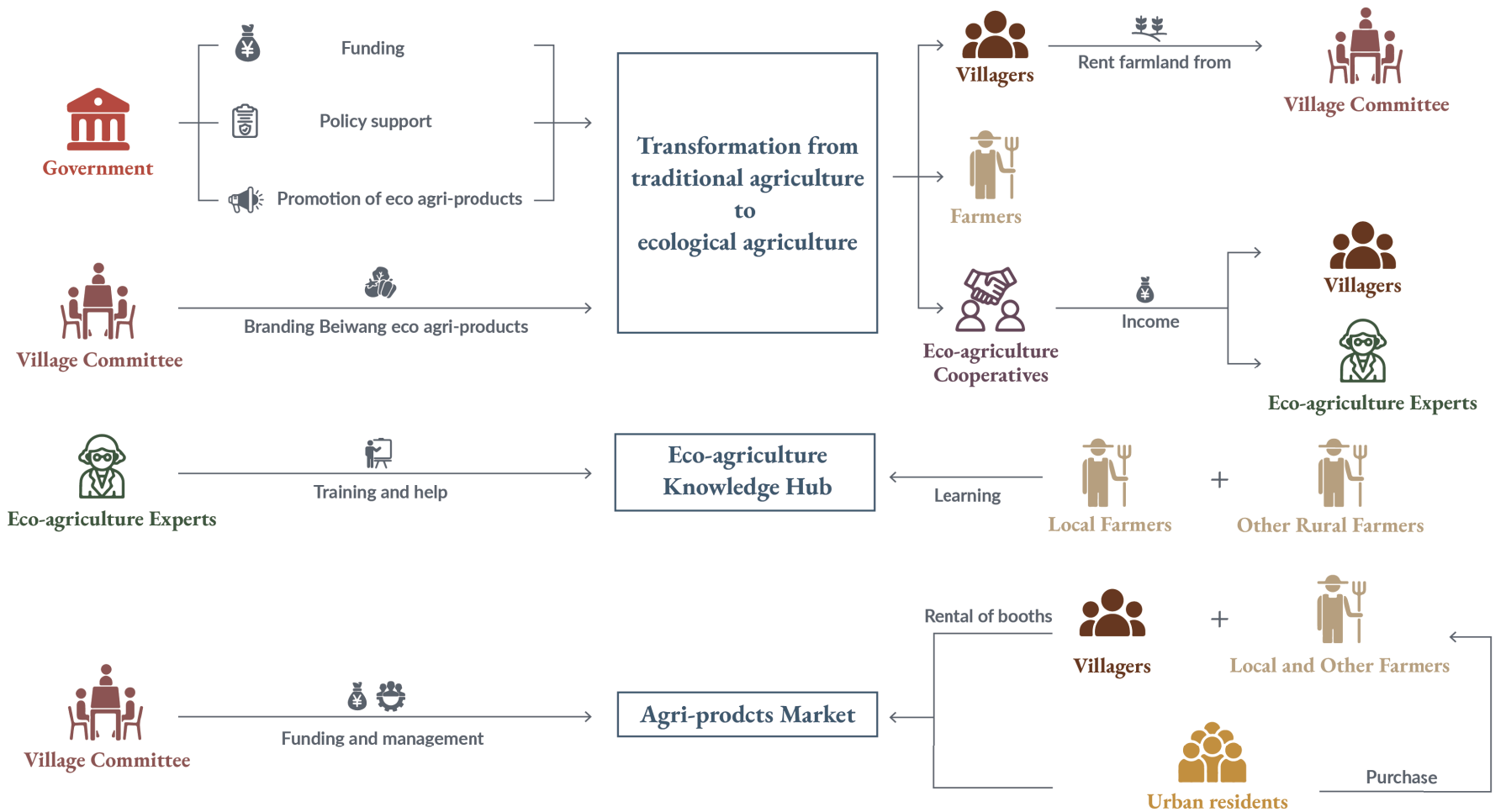


Socio-ecological resilient loop
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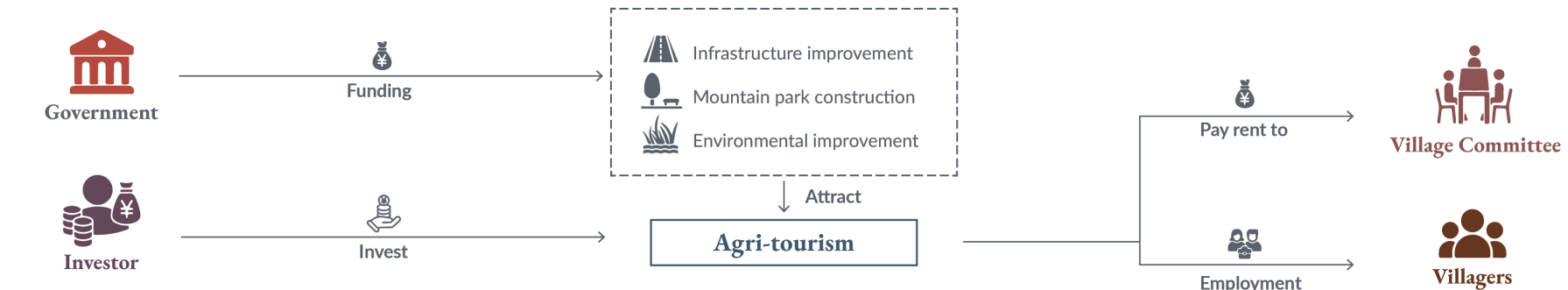
Ecological Restoration



Transformation to Eco-agriculture



Develop Agri-tourism

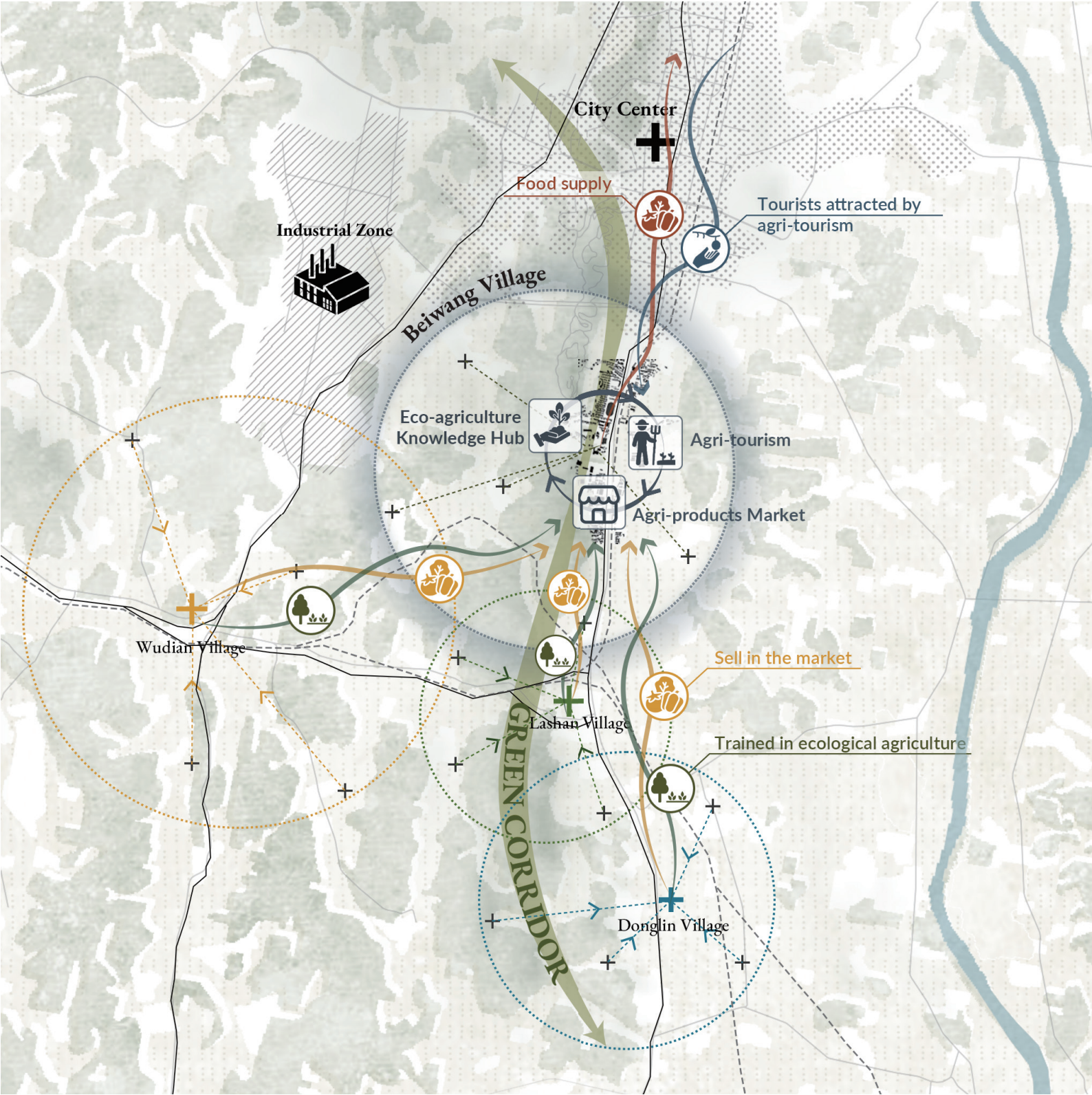
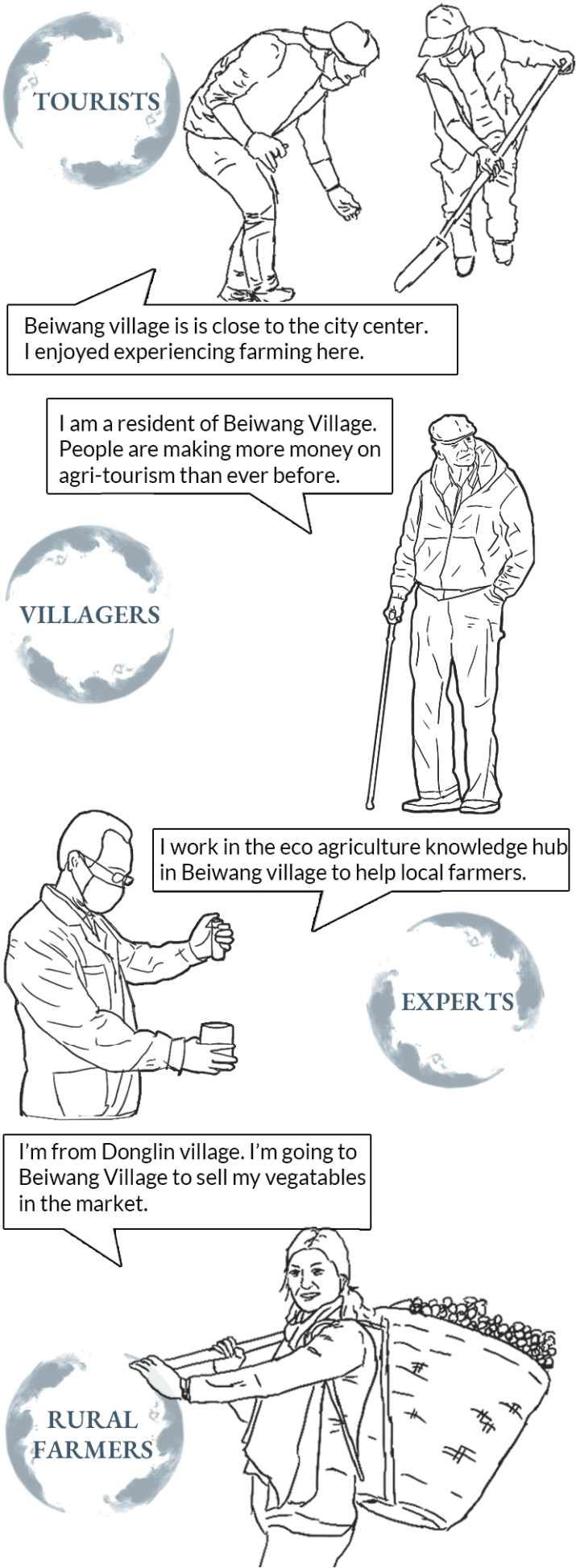


Scenario 1 in cluster

In Scenario 1, Beiwang village can drive the development of the whole cluster through agritourism and eco-agriculture. Firstly, Beiwang village, as a pilot of agritourism, can drive other desakota to develop agritourism together. By sharing resources through highly connected infrastructure, a slow-traffic tourism route connecting multiple desakota can be formed within the cluster, which also has the opportunity to drive the development of the surrounding rural areas. In addition, a market can be added to Beiwang village to help local farmers and other surrounding rural farmers sell their agricultural products in conjunction with agritourism, which also promotes interaction between the city center, desakota and rural areas.

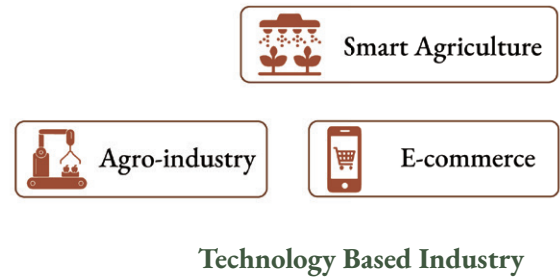
Besides, Beiwang village can also rely on ecological agriculture to drive the entire cluster. This is reflected in the development of eco-agriculture in Beiwang village as a pilot project, and the establishment of a knowledge hub to promote eco-agriculture and train farmers from the surrounding desakota and rural areas. Eventually, the whole cluster will be transformed from traditional agriculture to eco-agriculture. On the one hand, the increase of crop yield will enable the cluster to better provide food for the city center, and on the other hand, there is a positive feedback between agricultural activities and ecosystems in the whole cluster, which can provide ecological value for the city.

In summary, in Scenario 1, through the development of agritourism and eco-agriculture, Beiwang village can not only drive the development of other desakota in the cluster, but also link the neighboring rural areas and increase the interaction between city center, desakota, and rural areas. This helps to realize integrated development at the municipal scale.



7.2.3 Scenario 3: Smart Agro-Industrial Desakota

Agricultural-related Industries



Overview of Beiwang village

■ On the green corridor

Beiwang village is ecologically important as it is located on the green corridor of Wafangdian, so in this scenario it is also important to focus on the conservation of the mountain on the west side.

■ Near to the city center

Given its proximity to the city center, there is an opportunity for Beiwang village in this scenario to **drive agricultural production and sales through e-commerce**. Beiwang village has the opportunity to develop services such as vegetable and fruit delivery, which on the one hand can boost local agricultural production and on the other hand

■ The strategic point of the cluster

As a strategic point of the cluster, Beiwang village can be used as a pilot for smart agriculture. Through the establishment of a knowledge hub, smart agriculture will be promoted throughout the cluster in order to enhance the yield of agricultural products. In addition, the development of e-commerce will also drive the entire cluster, with

provide more low-skill job opportunities such as packaging and delivery. In addition, due to its high connectivity to the city, Beiwang village has the advantage of providing food for the city center, so industries such as agricultural processing and smart agriculture will also be promoted.

functions such as e-commerce center, agricultural product processing and logistics and warehousing in Beiwang village, which **collects, processes, sells, and distributes desakota and rural crops**.



Position of Beiwang Village
Made by author

Strategies

1. Mountain preservation & environmental enhancement

- > Mountain preservation
- > Removal of factories that pollute the river
- > Wetland restoration along the river

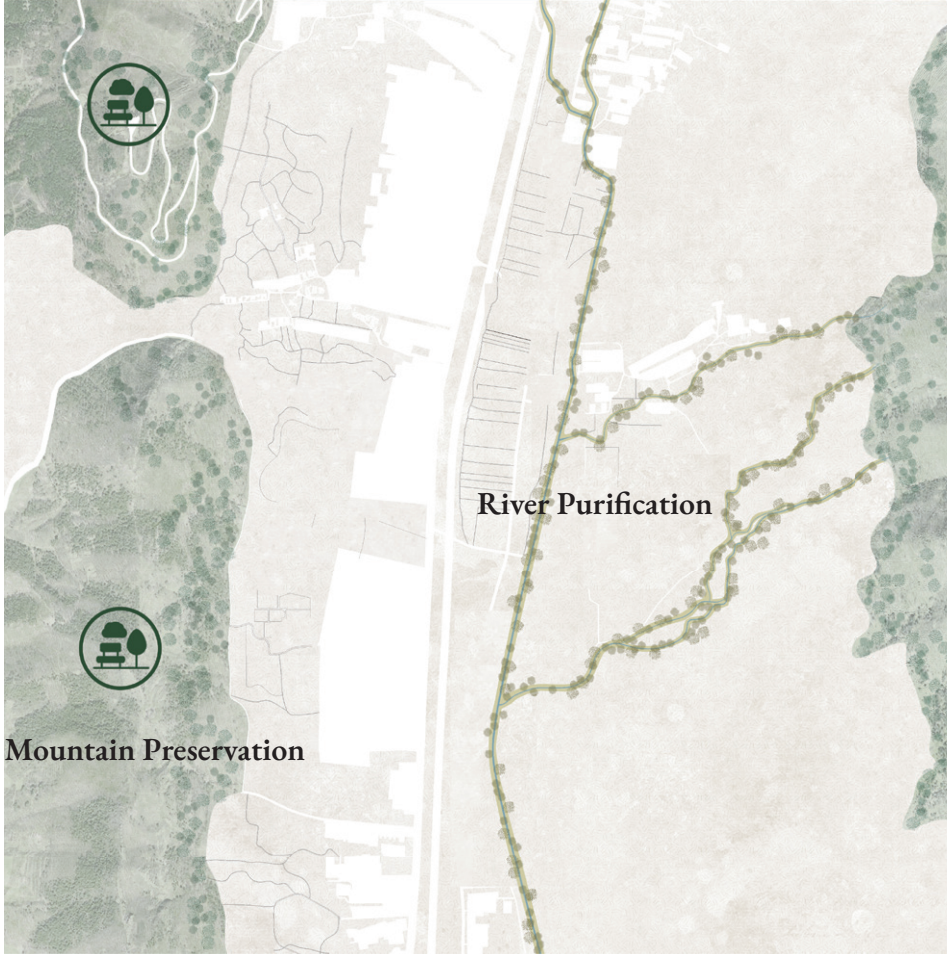
In this scenario, the socio-ecological resilience of Beiwang Village is realized through the development of technology based industries and agricultural-related industries, i.e. smart agriculture, agro-industry and e-commerce.

Although these industries are not natural related, ecological restoration is still needed to build socio-ecological resilience. As mentioned above, it's important to preserve the mountain in Beiwang village. There is also a need to purify the river and restore its banks.

BEFORE



AFTER



2. Transformation to smart agriculture

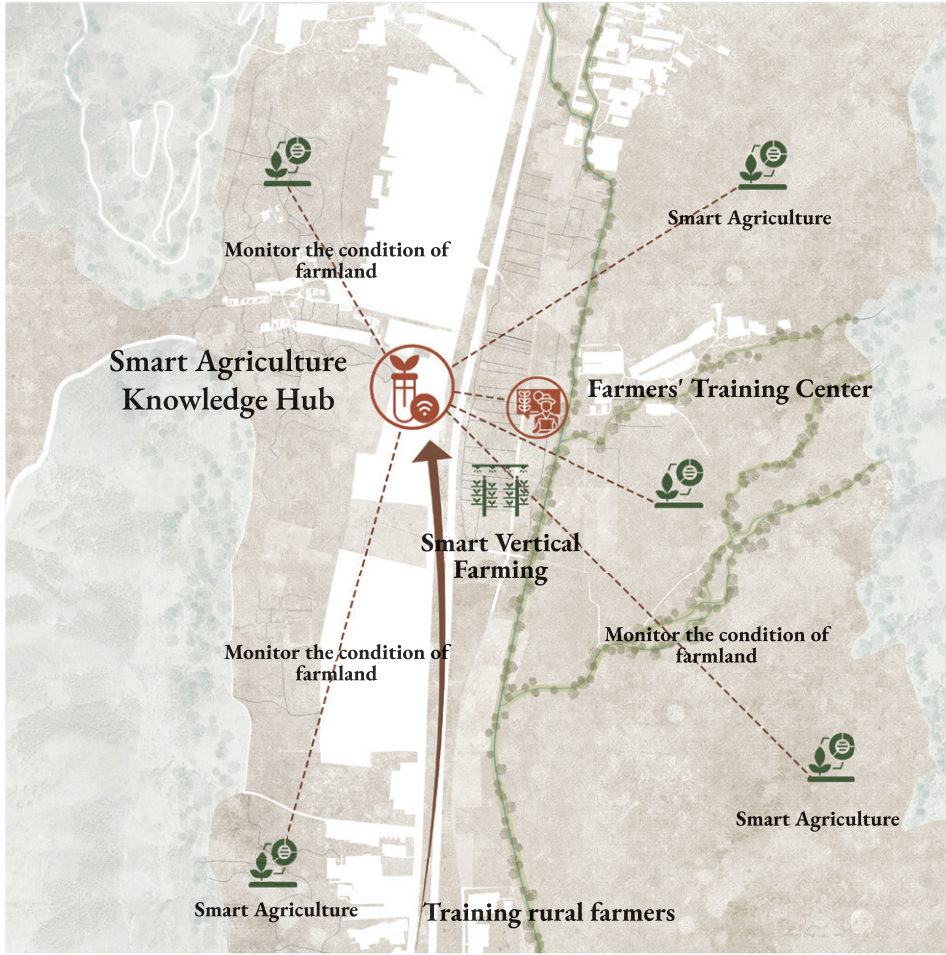
- > Smart agriculture
- > Smart vertical farming
- > Smart agriculture knowledge hub & Farmers' training center

Secondly, reorganizing farmland and transforming traditional agriculture into smart agriculture to increase agricultural production. Local farmers and other rural farmers will be taught about smart agriculture through the establishment of smart agriculture knowledge hub and farmer training centers. The smart agriculture knowledge hub should also provide smart monitoring, data analysis, management, and research of farmland to control pests and diseases and improve agricultural production.

BEFORE



AFTER



Strategies

3. Implantation of agro-production and smart industries

- > Transformation of existing factories to agro-production
- > Cooperation between food production, e-commerce, storage and logistics

In conjunction with smart agriculture, the existing machinery manufacturing industry should also be transformed into agricultural product processing, logistics and storage, and e-commerce, to maximize the agricultural strengths and extend the agricultural industry chain. The agro-production industry can process fruits and vegetables from Beiwang village and surrounding rural areas, providing more low-skilled job opportunities. In addition, e-commerce can help sell agricultural products and enhance the interaction between

the city, desakota and rural areas. Due to its proximity to the city center, Beiwang village can also develop fruit and vegetable delivery services such as 'Mei Tuan Vegetable Buying' with the help of e-commerce. Its packaging and delivery process can also promote local employment. To sum up, a complete industrial chain from agricultural cultivation, agricultural product processing, to e-commerce selling can be realized within Beiwang Village to maximize its agricultural advantages.

4. Social infrastructure upgrading

- > Add small parks with sports facilities
- > Add greenery in neighbourhoods
- > Reuse of warehouse as neighbourhood activity center
- > Connecting settlements to natural spots

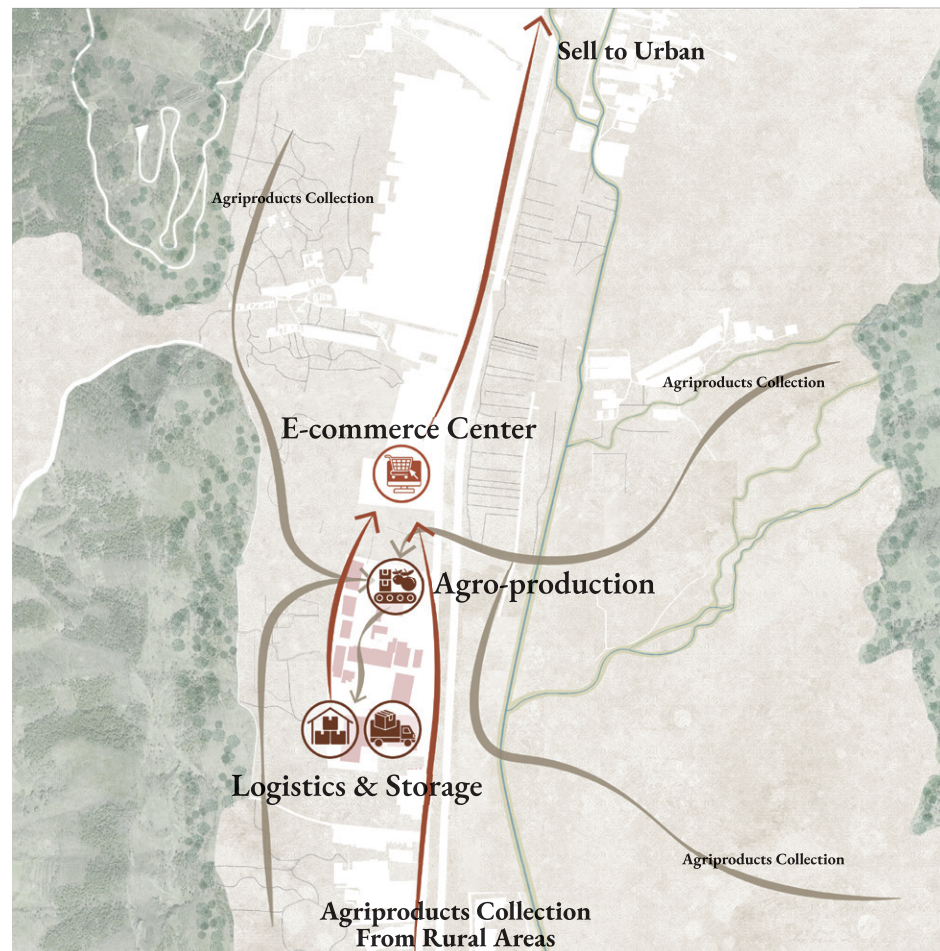
To enhance villagers' accessibility to the natural environment, footpaths connecting neighbourhoods to rivers and mountains will also be planned.

The neighbourhood will also be upgraded through the provision of additional public space, greenery along the roads, and activity center to enhance the human well-being of the villagers.

BEFORE



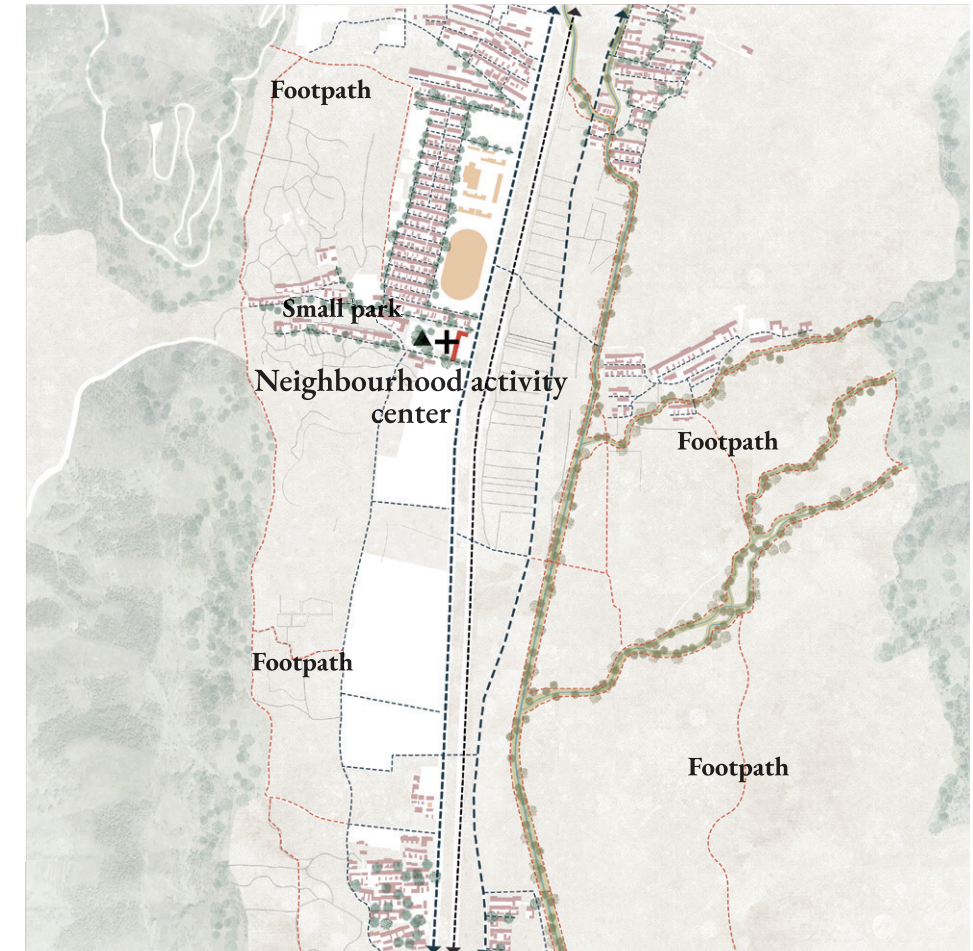
AFTER



BEFORE



AFTER



Vision map of smart agro-industrial desakota

In this scenario, a smart agricultural desakota is built. Ecological restoration promote a healthy ecosystem that provides diverse ecosystem services to support agricultural production and the daily lives of villagers, which thus enhances human well-being.

Although these industries are not very dependent on the condition of the ecosystem, they have less negative impact on the ecosystem than machinery manufacturing and provide more employment opportunities for villagers. The industries are closely related to agricultural resources and maximize their advantages which will bring more economic benefits to the village. Villagers will also be encouraged to protect the ecosystem through the strategies in the governance model that will be explained later. Ultimately, the socio-ecological resilience loop will be realized.

- Residential houses

Factories

Public services

Service center

Farmland
- Wetland

Main road

Trainline

Slow traffic system

Carriageway
- Open spaces

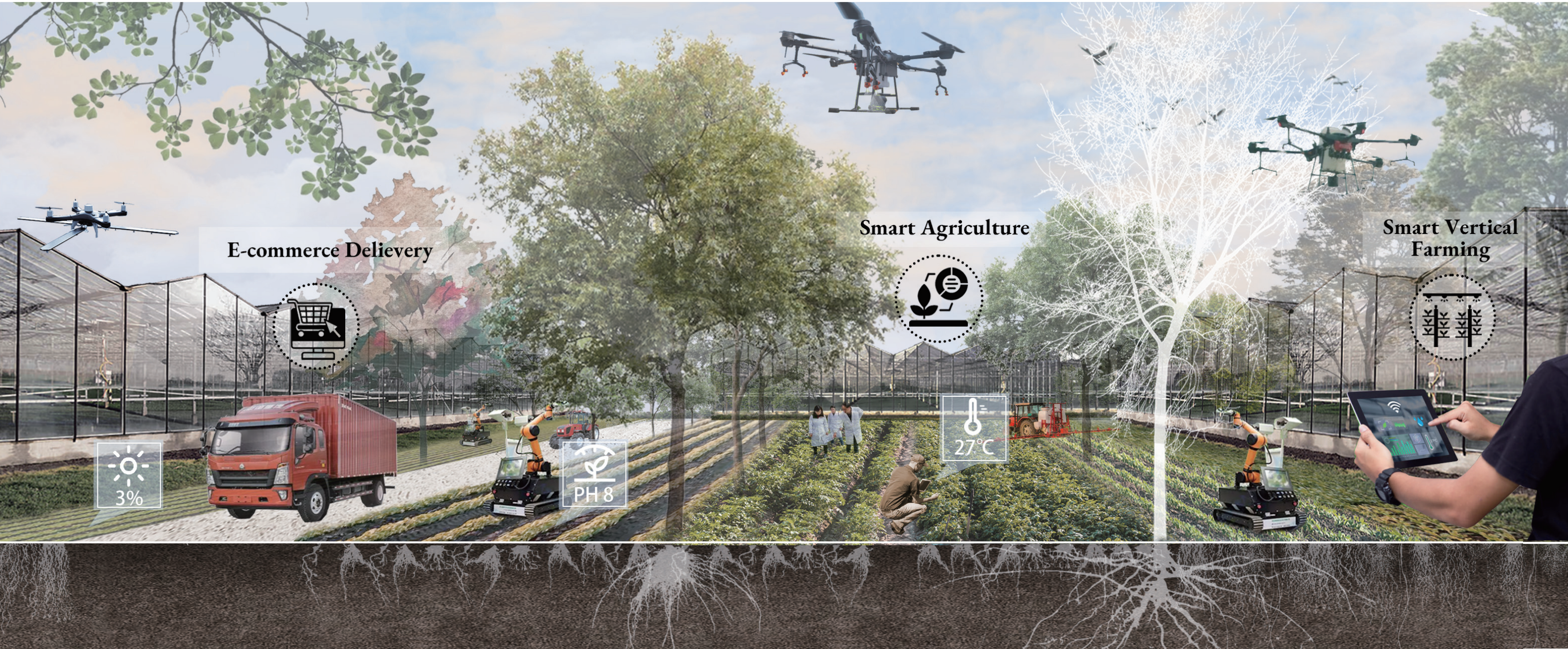
Neighbourhood activity center

Smart vertival farming

Smart agriculture



In Scenario 3, Beiwang village integrating e-commerce, agricultural product processing, and smart agriculture will be established. The village has a large number of smart greenhouses, with robots farming the farmland and agricultural experts monitoring and analyzing the state of the farmland. Agricultural products are sold to the city through e-commerce. These activities have low negative ecological impacts and can greatly enhance local human well-being, and a socio-ecologically resilient desakota is built.

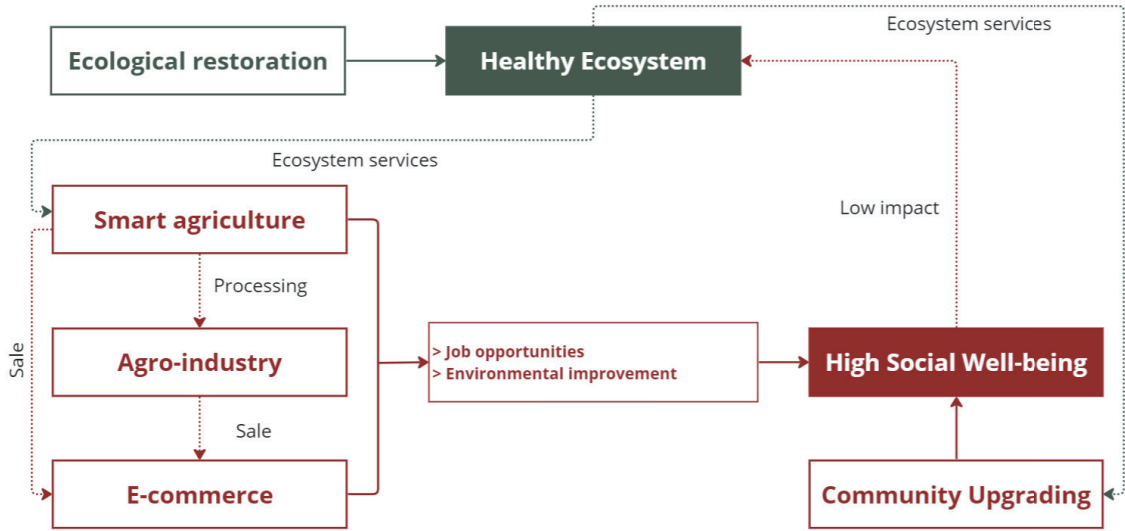


Adjustment of governance model

The governance model of ecological restoration is the same as scenario 1.

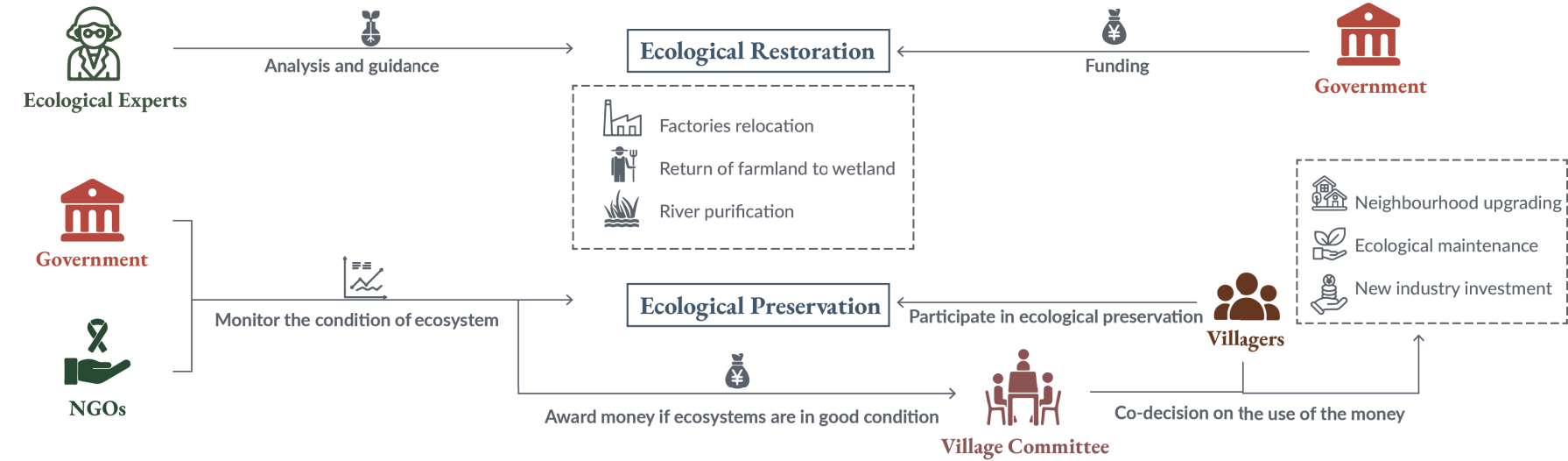
Similar to Scenario 1, in the initial stage of conversion of traditional agriculture to smart agriculture, the government will provide policy and allowance subsidies and promote smart agricultural products. The village committee should also promote the brand of Beiwang's smart agricultural products. The village collective can participate in agricultural production by contracting farmland to farmers or in the form of a smart agriculture co-operative. Smart agriculture experts will monitor and manage the farmland, as well as train and help rural farmers.

The village collectives can jointly decide on the implantation of agro-processing industry and e-commerce. These new industries can help villagers sell their produce and provide more low-skilled job opportunities.

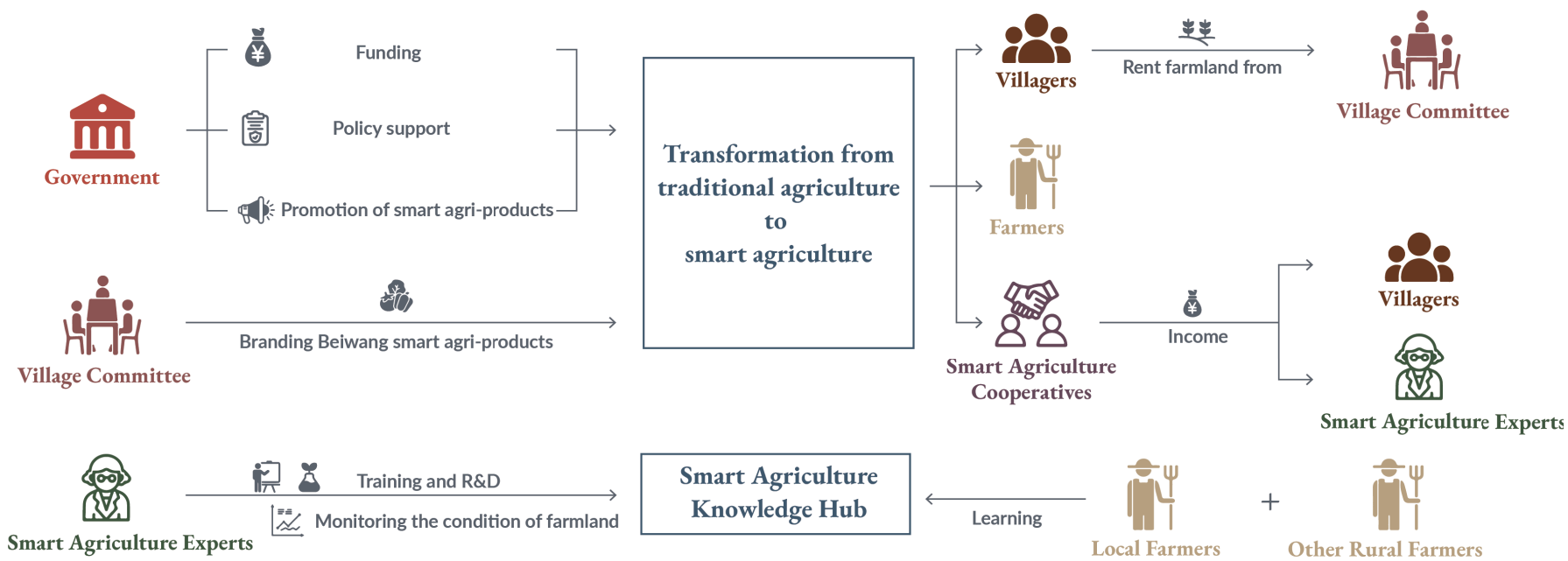


Socio-ecological resilient loop
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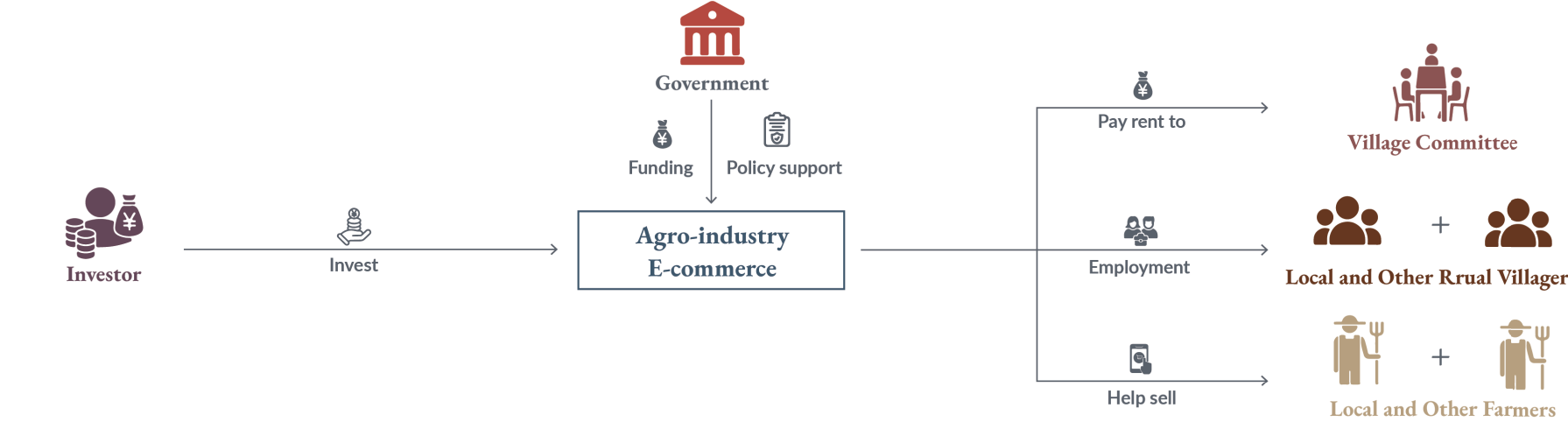
Ecological Restoration



Transformation to Smart Agriculture



Develop Agro-industry and E-commerce



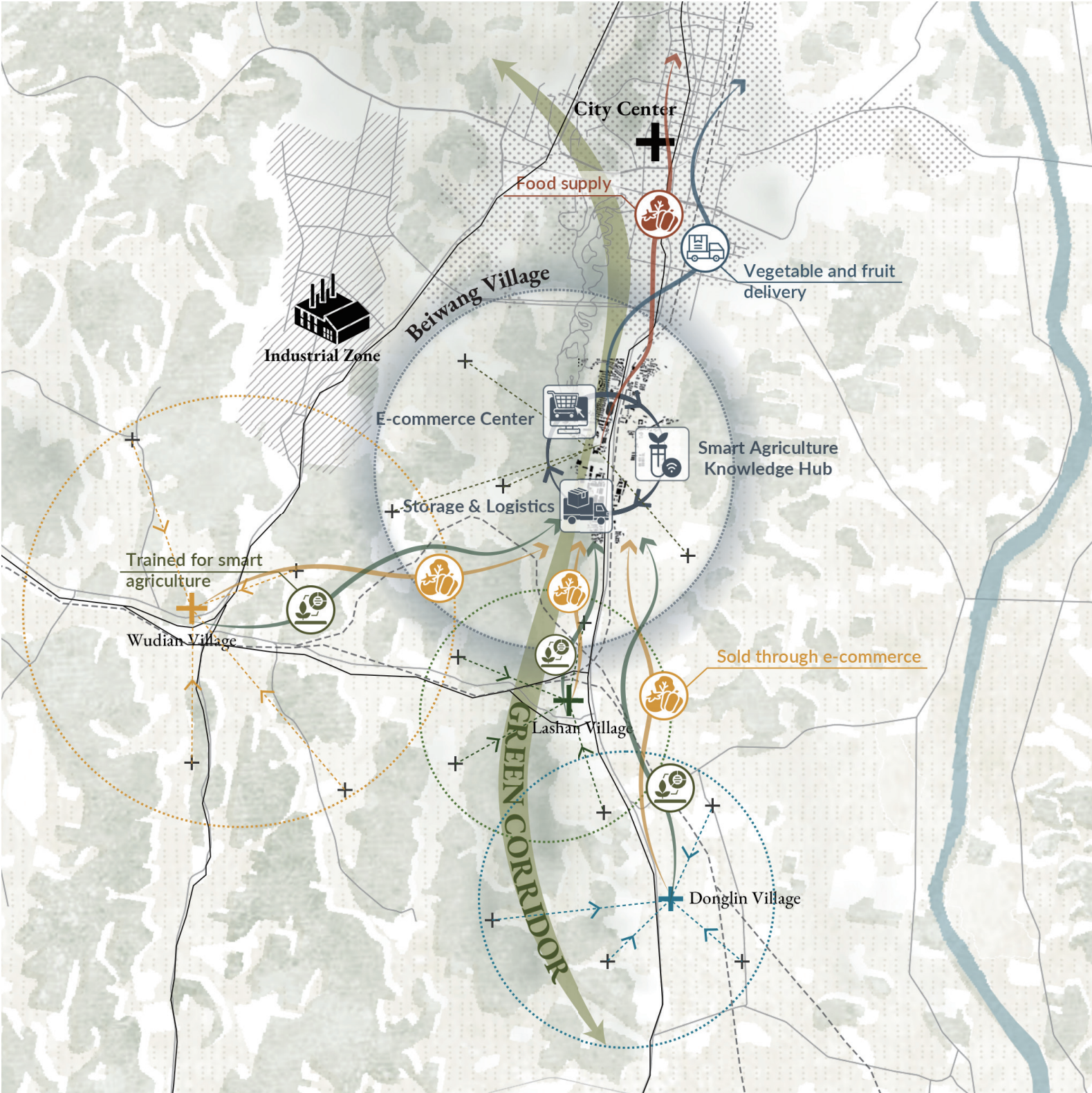
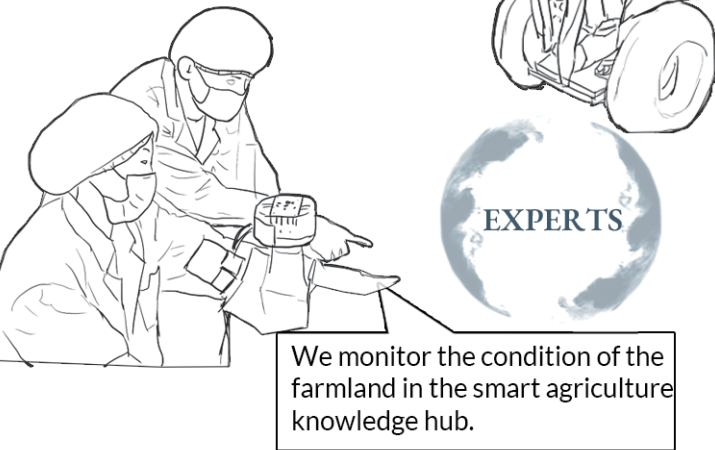
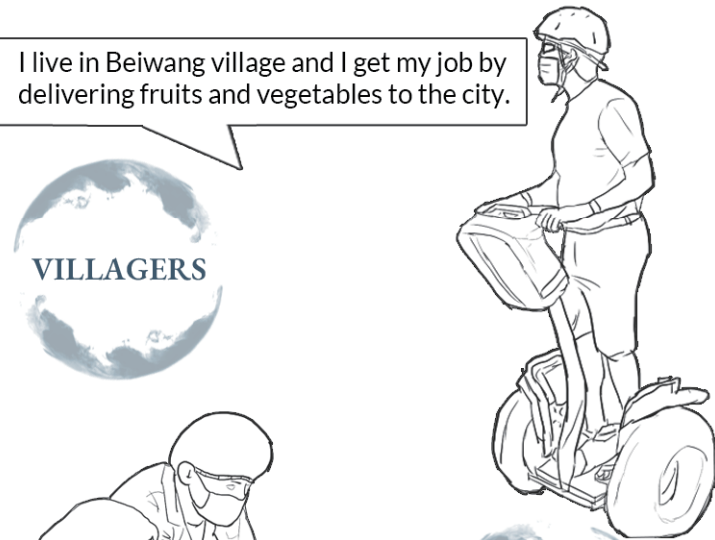
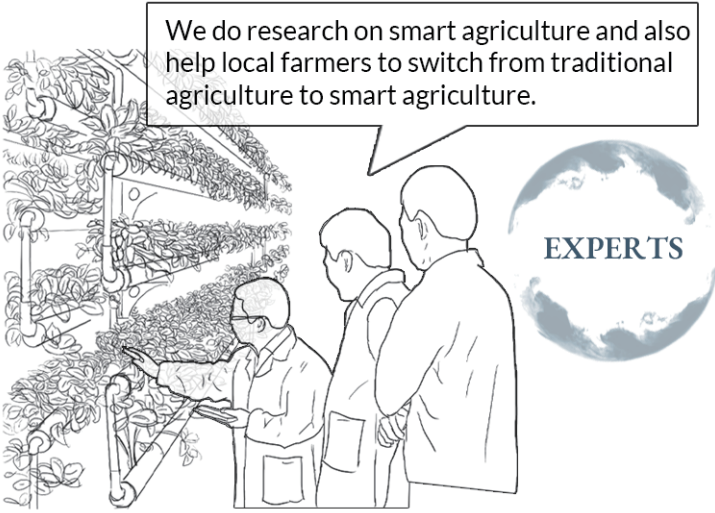
Scenario 3 in cluster

In this scenario, Beiwang village drives the development of the entire cluster through the development of e-commerce, agricultural production and smart agriculture. First, Beiwang village serves as a pilot for smart agriculture and promotes smart agriculture within the cluster through the Knowledge Hub, engaging the surrounding rural areas by training farmers. Through the development of smart agriculture, the cluster can increase agricultural yield and play an important role in providing food for the urban center.

In addition, with the development of e-commerce and logistics and warehousing centers, agricultural products within the cluster can be collected in Beiwang village and subsequently distributed to the city center. This better helps farmers sell their produce and can bring greater benefits to the cluster.

Besides, through mountain preservation, Beiwang village forms a green corridor with other surrounding mountain ranges, which can provide ecological value at the municipal scale. Through the development of smart agriculture, the negative impact of agricultural activities on the environment is reduced throughout the cluster. Therefore, the cluster can provide social-ecological value to the neighborhood.

In summary, in this scenario, Beiwang village can not only drive the development of other desakota in the cluster, but also promote the interaction between urban and rural areas, to integrate urban centers, desakota, and rural areas into a system through the provision of social and ecological values.

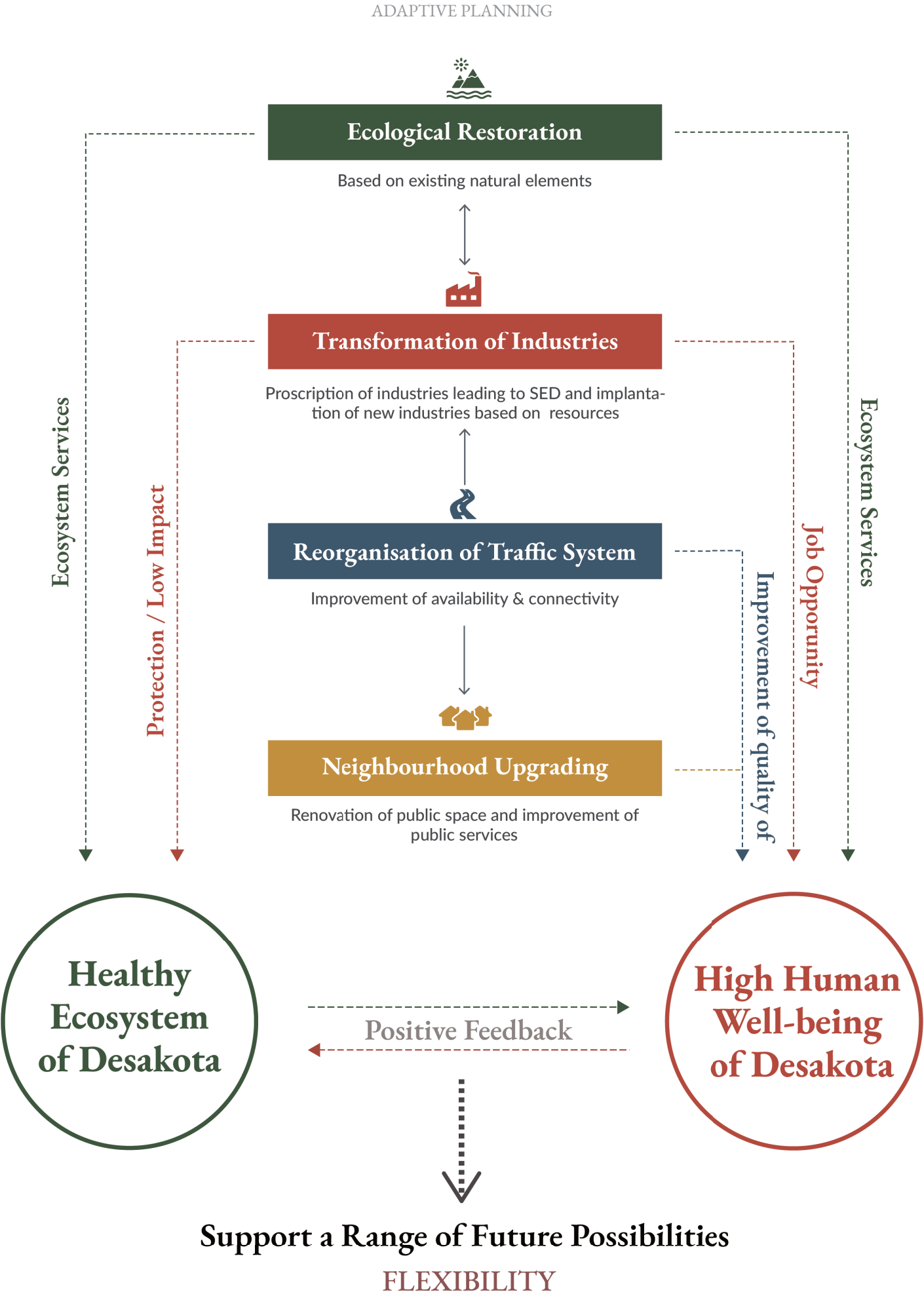


7.3 Principle Framework

Comparing the 4 scenarios mentioned above, some overlapping principles can be summarized that contribute to achieving socio-ecological resilience in desakota. These are: ecological restoration, industrial transformation, road system reorganization and settlement upgrading.

The first is to carry out ecological restoration based on the natural elements of the desakota, such as mountain restoration, river purification, and wetland restoration. The second is to remove existing industries that lead to the socio-ecological degradation of desakota and to implant new industries with low environmental impact. The new industries should be associated with the resources of desakota to maximize their strengths. Thirdly, the road system should be reorganized to connect various elements such as settlements, industries and nature, to improve connectivity within the desakota and avoid unbalanced development. Finally, it is necessary to upgrade the neighbourhoods in desakota, which is reflected in the upgrading of public services, the increase of public space and greenery. These planning principles help to promote positive interactions between the desakota's social and ecological systems, creating a virtuous loop that ultimately leads to socio-ecological resilience.

In summary, even though each scenario is different, the planning principles are the same. These principles help create development conditions that support a range of future possibilities for desakota. By enhancing the ability of different elements to promote socio-ecological resilience, desakota is guided to choose development paths flexibly, mitigating bad impacts and supporting desirable futures. Development conditions will be adjusted based on the choices of multiple stakeholders and a socially preferred scenario will be selected. This provides desakota with more flexibility than blueprint planning and enhances desakota's adaptability in a changing environment.



7.4 Evaluation of Scenarios

In order to assess the scenarios more objectively, an evaluation system was established as described below. The assessment focuses on four main components: feasibility, socio-ecological resilience, villagers' benefits and planning alignment.

Feasibility reflects the possibility of scenario realization and the degree of compatibility with current resources and conditions. Specifically, it includes government investment, ease of construction, potential barriers, and compatibility with existing resources. By comparing and scoring the two scenarios mentioned above, the results show that Scenarios 3 is more feasible for Beiwang village.

The assessment of socio-ecological resilience is divided into construction of healthy ecosystem and the enhancement of human well-being. Healthy ecosystem building is assessed primarily in terms of soil, air, water and forest health and biodiversity, and the ability of ecosystems to provide ecosystem services. Human well-being is assessed in terms of basic materials for living, quality of life and spiritual abundance, impacts on ecosystems, and willingness to protect ecosystems. **These dimensions reflect the potential to promote a virtuous loop in which ecosystems and social systems provide positive feedback to each other.** Combining these assessment criteria for Beiwang village, scenarios 1 scored high.

As villagers are the main stakeholders and are closely related to village development. **The four scenarios were also assessed in terms of**

villagers' interests. This is reflected in the level of economic growth, job opportunities, required investment, enhancement of the environment and public services, and the promotion of village. Thus, Scenario 1 is more likely to bring benefits to villagers in Beiwang village.

The assessment of planning alignment reflects the extent to which the scenarios promote urban-rural interaction and the degree to which they coincide with municipal-scale planning. From this perspective, Scenario 3 best promotes urban-rural integration and cooperation between desakota in Beiwang village.

Since these four dimensions have different levels of influence on building socio-ecological resilience and achieving integrated development, each of their scores was given different weights for each component separately, and the final results show that scenarios 1 and 3 are both suitable for Beiwang village.

EVALUATION CRITERIA				Scenario 1	Scenario 2	Scenario 3	Scenario 4
FEASABILITY	Less Financial Investment (Government)			2	1	3	4
	Ease of Construction			2	1	4	4
	Less Potential Barrier			2	1	3	4
	Compatibility with Existing Resources			5	1	4	2
	SUM 30%			11/20	4/20	14/20	14/20
SOCIO- ECOLOGICAL RESILIENT	Level of ecosystem health	Soil Health Level		5	4	4	2
		Air Quality		4	5	3	2
		Water Quality		4	5	3	3
		Forest Quality		5	5	5	5
		Biodiversity		4	5	2	2
		Capacity to provide diverse ecosystem services		4	5	2	2
	SUM 15%			26/30	29/30	19/30	16/30
	Level of Social Well-being	Basic Material of Life	Availability of Clean Air and Water	4	5	2	2
			Housing Quality	5	5	4	4
			Job Opportunity	4	3	5	1
		Quality of Life	Public Services Quality	4	5	3	3
			Transportation Quality	5	5	3	3
			Public Spaces Quality	4	5	2	2
			Environmental Quality	4	5	2	2
		Mental Fullfillment of People	Reduction of Isolation and Loneliness	4	4	4	4
			Sharing, Learning and Interaction Opportunities	5	2	5	3
		Less negative impact on ecosystems		5	5	3	3
		Willingness to protect ecosystems		4	5	2	2
	SUM 15%			48/55	49/55	35/55	29/55
	VILLAGERS BENEFIT	Economic Growth Level			4	2	4
More Job Opportunities			5	3	5	1	
Environmental & Public Service Enhancement			4	5	2	2	
Less Investment (Village Committee)			3	2	4	4	
Village Promotion			5	5	5	4	
SUM 30%			21/25	17/25	20/25	13/25	
PLANNING ALIGNMENT	Consistency with Municipal Planning	Level of Synergy Development of Desakota	5	1	5	2	
	Promoting synergistic urban-rural development	Level of Promoting Rural Development	3	2	5	3	
		Level of Interaction with Cities	4	4	5	3	
	SUM 10%			12/15	7/15	15/15	8/15
FINAL SCORE				0.75	0.59	0.74	0.58

7.5 No-regret Strategies

In order to provide flexibility for village development, scenarios 1 and 3 are compared and some overlapping no-regret strategies are proposed that are compatible with the development of both. Such as mountain preservation and river purification, slow traffic system construction and neighbourhood upgrading.

Regardless of which scenario is ultimately decided, these strategies will help to realize the final vision and ultimately result in a socio-ecologically resilient desakota.



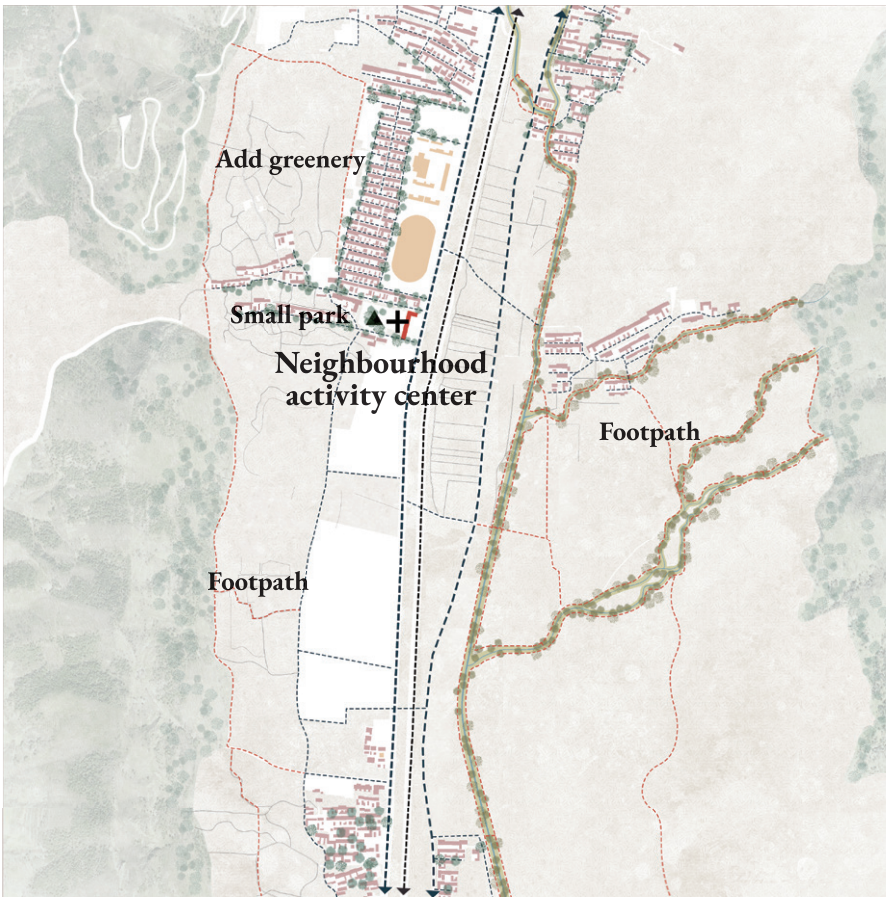
1. Mountain preservation & river purification

- > Mountain preservation
- > Removal of factories that pollute the river
- > Wetland restoration along the river



2. Removal of factories in the farmland

- > Restructure the farmland for eco-agriculture or smart agriculture



3. Neighbourhood upgrading

- > Add small parks with sports facilities
- > Add greenery in neighbourhoods
- > Reuse of warehouse as neighbourhood activity center
- > Connecting settlements to natural spots

7.6 Summary of the Adaptive Planning Process

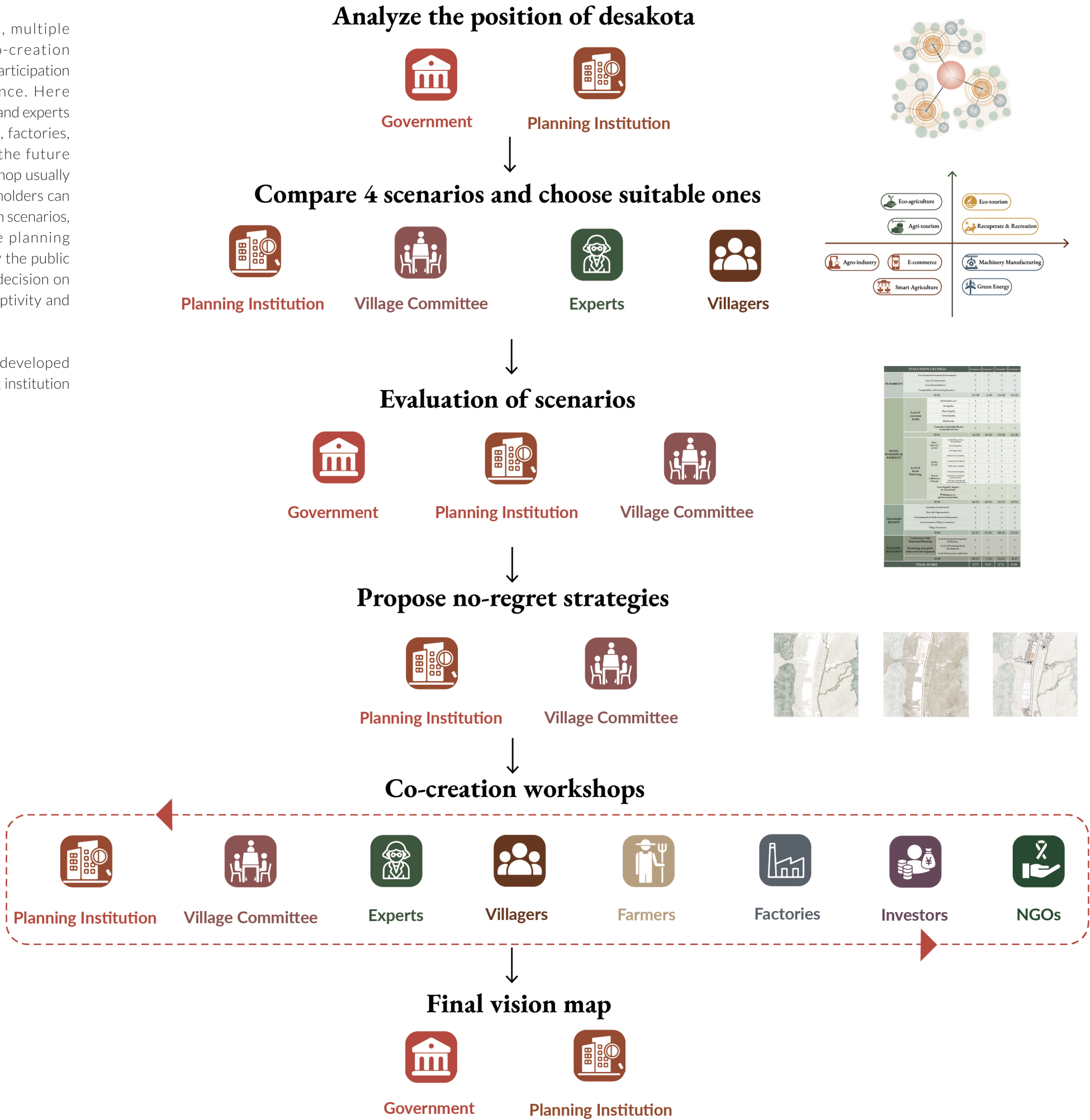
In summary, building social-ecological resilience in desakota should be done through flexible adaptive planning. The planning process can be summarized in the following steps.

Firstly, the position of desakota should be analyzed at the municipal scale, to determine whether it is a strategic point or an ordinary desakota, and whether it is strategically important at the municipal scale, e.g., located on an ecological corridor, or on a tourism development belt. This overview can guide subsequent scenario building. This process is led by the government and planning authorities.

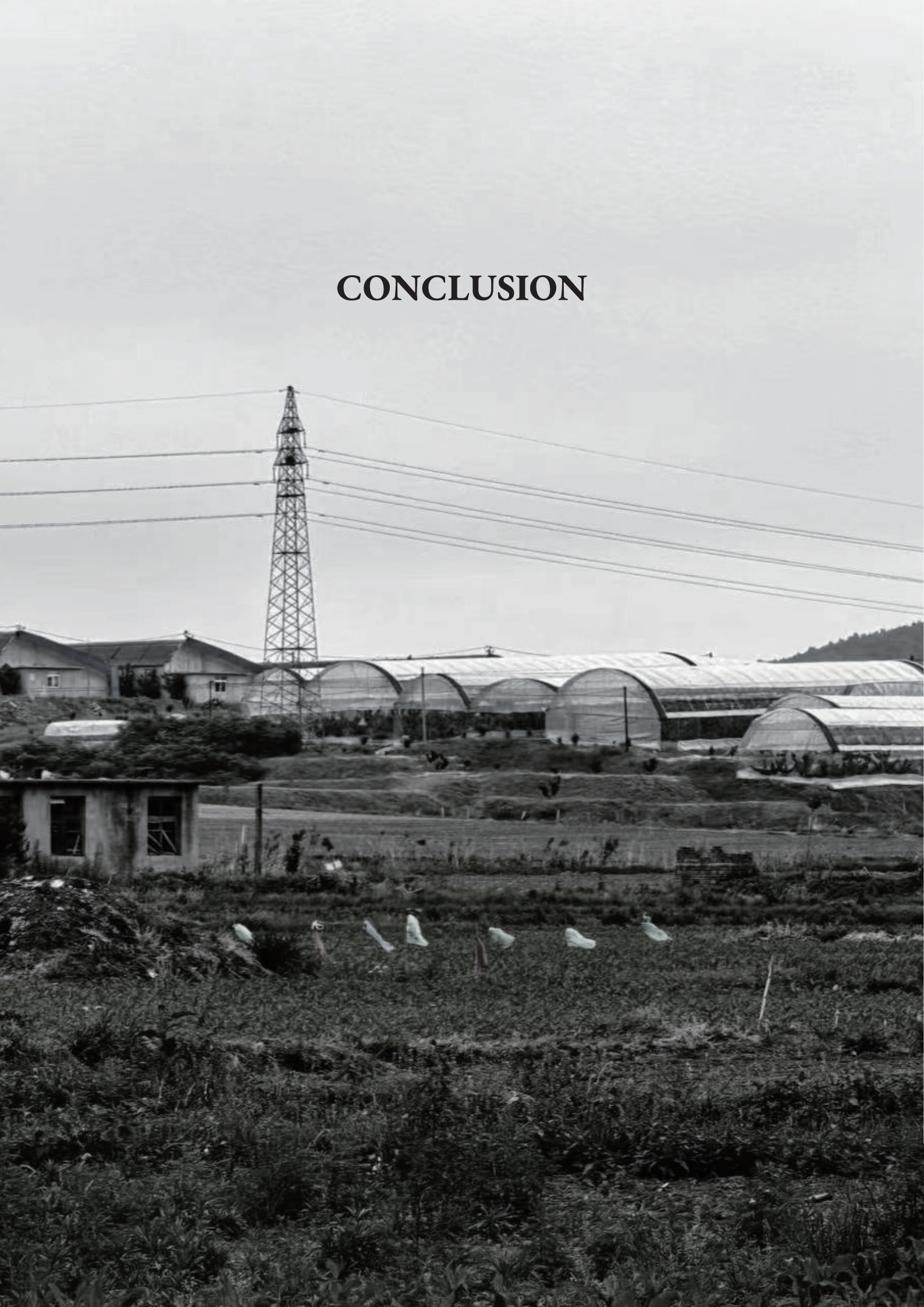
The four scenarios should then be compared according to the conditions and resources of the desakota, eliminating completely unsuitable scenarios and selecting likely scenarios for scenario building, including proposing planning strategies and vision maps, etc. This process involves the planning institution, experts and the village committee. The process also engages villagers in order to meet their needs.

Based on the no-regret strategies, multiple stakeholders were engage into co-creation workshops in order to enhance public participation and build socio-ecological resilience. Here planning institution, village committee, and experts work together with villagers, farmers, factories, investors, and NGOs to decide on the future development of the village. This workshop usually takes place several times, where stakeholders can propose their suggestions on the chosen scenarios, which are then coordinated by the planning institution and the experts. In this way the public becomes more influential in the final decision on planning, which can improve local adaptivity and human well-being.

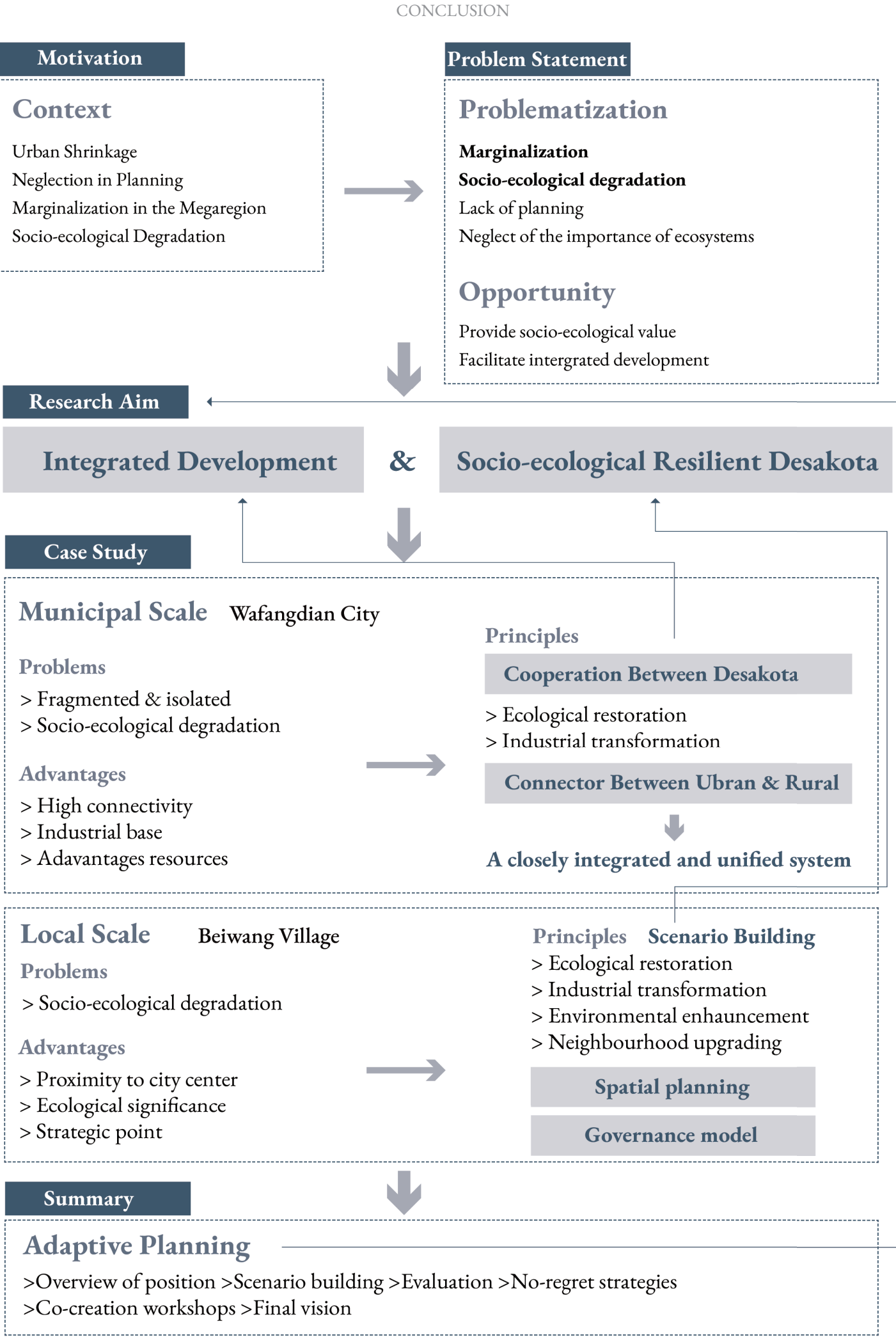
Finally, a vision map for desakota is developed jointly by the government and planning institution based on the results of the workshops.



[160] After scenario building, those scenarios are evaluated by the government, the planning institution, and the village committee based on the evaluation system mentioned above, and the scenarios with the highest scores are finally selected. These scenarios are compared, and no-regret strategies are proposed to support diverse possibilities which provides more flexibility for future development.



CONCLUSION





REFLECTION

The topic of this thesis is the socio-ecologically resilient and integrated development of desakota in villages in a shrinking context. Taking Liaoning as an example, this study explores how to build socio-ecological resilience in shrinking desakota through planning from both spatial and governance dimensions. China's peri-urban areas, as intermediate areas different from urban and rural areas, are always neglected in the planning process and thus suffer from marginalization and socio-ecological degradation. In the context of shrinkage, desakota suffer more pressure. By exploring a range of future possibilities for desakota, this study hopes to demonstrate that desakota can also be socio-ecologically resilient and have a bright future.

The research of this project mainly consists of theoretical research and practical research. The theoretical research refers to the theoretical and conceptual frameworks proposed based on the literature review, while the practical research is the specific analysis of Liaoning, Wafangdian City and Beiwang Village. The research guided the design of the planning principles, the vision of Wafangdian, and four scenarios of Beiwang Village. The design of these strategies, visions and scenarios in turn influenced the research. For example, through the vision design of Wafangdian, the author adjusted the conceptual framework to better demonstrate how to build socio-ecological resilience in desakota and how to achieve integrated development. In this study, research and design complement each other in a loop and drives the study process.

This study uses the elemental approach to specifically analyze the problems in desakota and deconstruct the complex issue of socio-ecological degradation. It then explores how to realize integrated development and build a socio-ecologically resilient desakota at both the municipal and local scales through two case studies. This study argues that desakota is expected to achieve a more desirable future through cooperation and to serve as a connector between urban and rural areas to build a unified and integrated system at the municipal scale. This study suggests that adaptive planning presents multiple possibilities for desakota to achieve socio-ecological resilience through scenario building. It provides more flexibility and enhances local adaptivity from both spatial and institutional perspectives.

This study hopes to fill the knowledge gap of adaptive planning to enhance socio-ecological resilience in peri-urban areas in shrinking context. Besides, this study hopes to draw the attention of other researchers to desakota in a shrinking context through the study of Liaoning and provide implications for rural peri-urban areas facing similar problems.

However, due to the time issue, there are still some questions that remain unresolved in this study. For example, how likely is it that desakota can achieve industrial transformation in a shrinking context? Are the planning principles proposed in this study applicable to all desakota in the same context? These questions still need to be answered by more in-depth research.

APPENDIX



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22. Diagram1: Fig 1: <https://b2b.baidu.com/land?id=88d576ad6d60cd4334767fc519bb2cd010>
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1. Historical Analysis of Liaoning

The Colonial Period 1840-1948

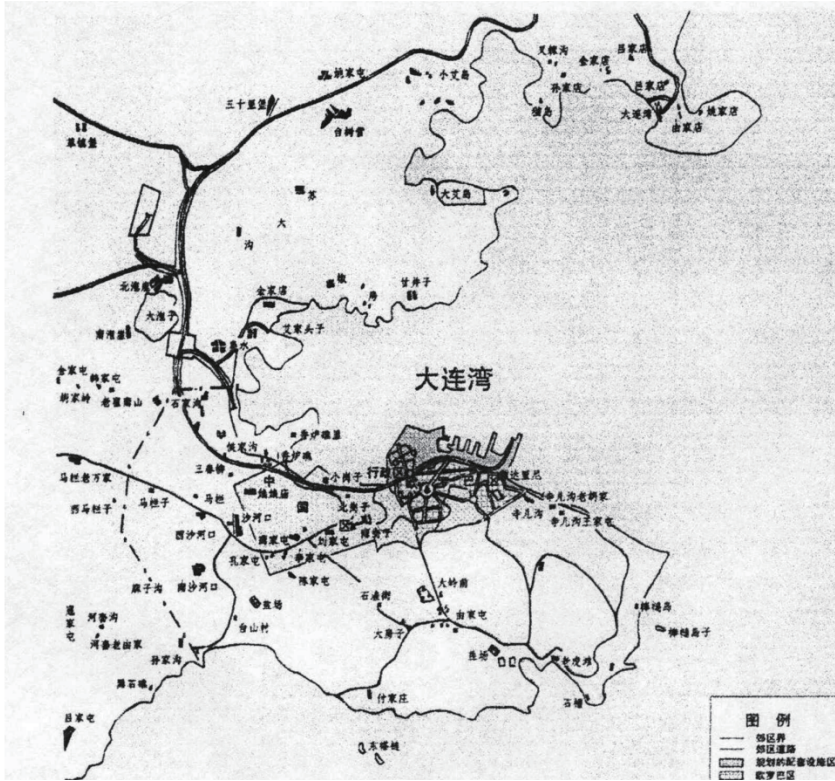
- >Cities were developed based on railroads and harbour.
- >Dual-core status of Shenyang and Dalian initially emerged.
- >Laid the foundation for Liaoning's industrialization and urbanization.

Dalian City Center in 1930s

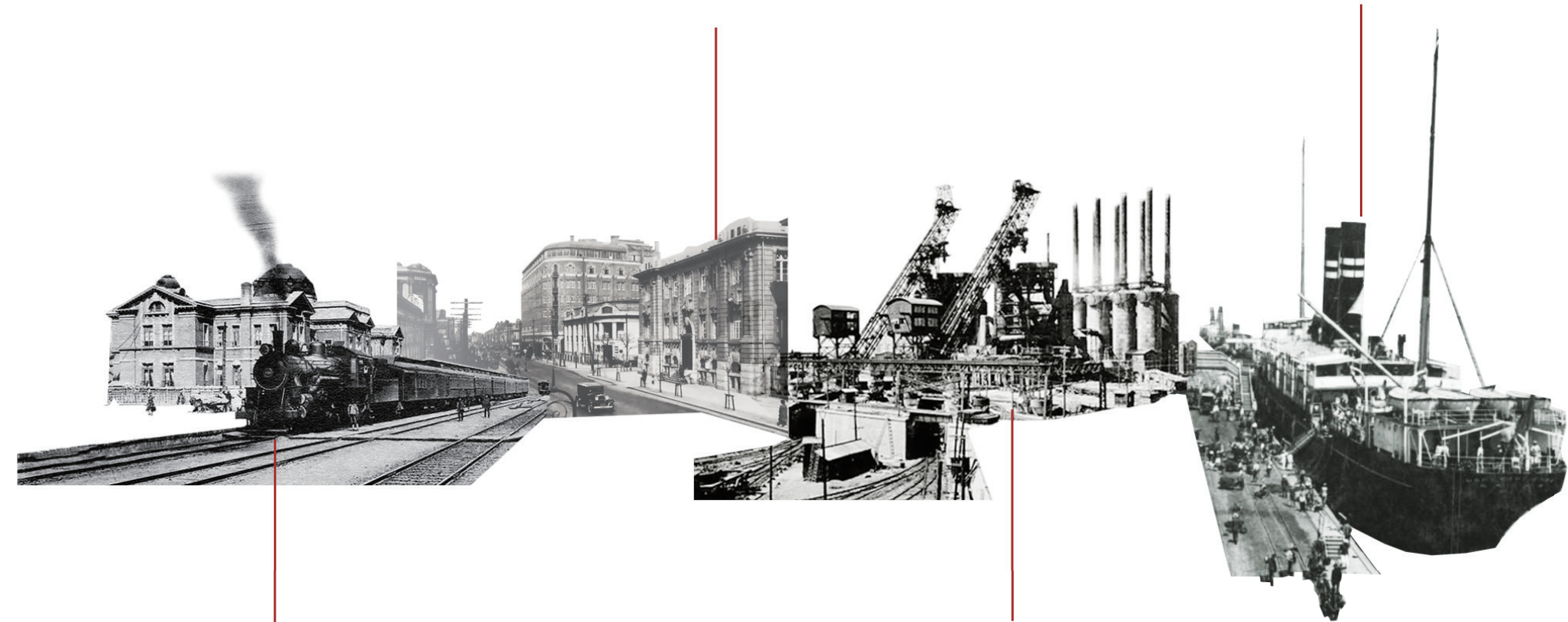
Urban development during this period was reactive, largely following the architectural style and planning of the Tsarist colonial period.

Harbour of Dalian

Tsarist Russia and Japan for the development of export trade, both attach great importance to the port of Dalian. The master plan of Dalian was made with the port of Dalian as the center.



Masterplan of Dalian in 1901
Source: Dong, 2001

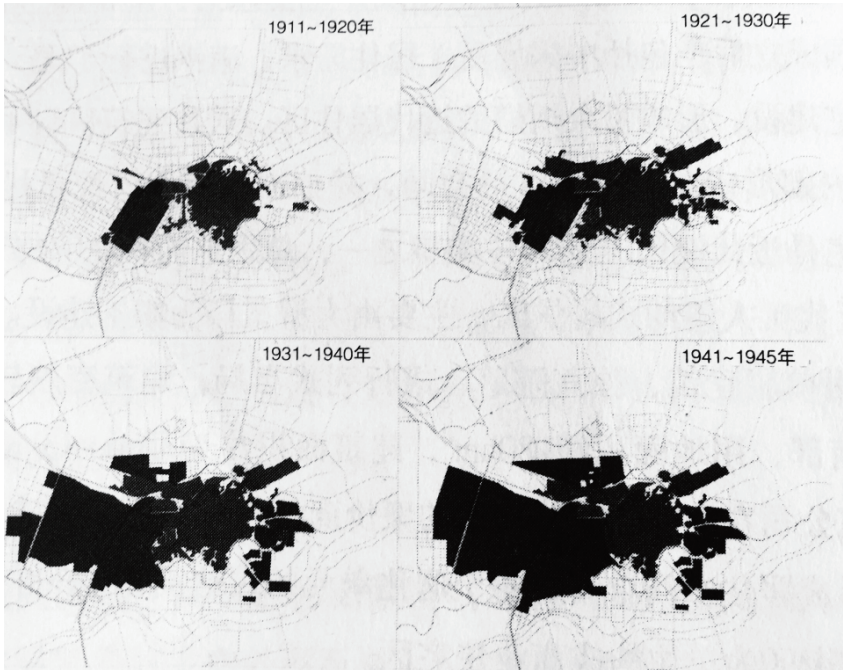


Train station in Shenyang

In order to facilitate the transportation of goods and the occupation of territory, Japan built the Fengtian Railway Station in Shenyang in 1912.

Industries in Dandong in 1930s

During the Japanese colonial period, many resource-based cities in Liaoning were industrialized in order to develop military industries



Urban expansion of Shenyang
Source: Gao, 2015

1. Historical Analysis of Liaoning

The Planned Economy Period 1949-1957

- >This was the most prosperous period of national industrialization and Liaoning's vigorous development of heavy industry.
- >Farmers owned their land, but the rural surplus labor force was not resettled.
- >Large-scale urban construction and plenty of people moved from rural to cities.
- >Creation of an urban-rural dichotomy.

Land Reform in 1953

Peasants own their land after the land reform, but the surplus labor force has not been properly resettled

The Industrial Spirit

Plenty of industrial products were produced, and a representative of the industrial spirit was nurtured here - the "Iron Man Spirit" and the "Daqing Spirit" became spiritual examples leading the nation.



A Street in Dalian in 1956

Large-scale urban construction and renovation took place during this period, increasing the demand for labor and the influx of large numbers of people into the cities.

Industries in Anshan

During this period, the country was fully industrialized, and Liaoning vigorously developed heavy industry, which flourished in many cities.



Car factory in Changchun
Source: Internet



Jin county in Liaoning in 1955
Source: Internet

1. Historical Analysis of Liaoning

The Turbulent Period 1958-1977

- >Controlling urbanization through population control.
- >Enactment of 'hukou' system to limit the urban population.
- >Development of sideline businesses and communal enterprises.
- >The beginning of rural industrialization set the stage for the growth of non-agricultural activities later.

Rural Mechanized Production

The Liaoning countryside was mechanized during this period, and the level of agricultural production increased.

Lock Production in 1960s

In order to accommodate surplus agricultural labour, side industries and communal enterprises were developed in the countryside, laying the foundations for the industrialization of the countryside.



Registration of hukou
Source: Internet



People are making steel
Source: Internet



Communal Collective Agricultural Production

In order to realize the vision of urban-rural parity, MaoZedong established communes in the countryside and encouraged collective production.

Industries in Anshan

Both urban and rural areas were developing industrialization during this period.

1. Historical Analysis of Liaoning

The Boom period 1978-1990

- >Rapid development of small and medium-sized towns throughout the country.
- >The emergence of a large number of township and village enterprises.
- >Large-scale rural industrialization, emerging a lot of semi-industrial and semi-agricultural villages.
- >Unorganized and dispersed in-situ urbanization.

Rapid Growth of Small Towns

The State controls the development of large cities and encourages the development of small and medium-sized towns.

Industrialization in towns

During this period, township and village enterprises were the focus of development, and a large number of small-scale industries emerged in the countryside, creating unorganized rural industrialization.

Household Contract Responsibility System

Comprehensive implementation of the household contract responsibility system, with increased incentives for farmers to produce and a significant increase in food production.



Rural People Going to Work in Towns

Despite the massive industrialization of the countryside, a large number of rural people are still migrating like small towns.

Rural Industrialization

Relaxation of State economic control over the countryside and vigorous industrialization of the countryside.



Factory in a town of Fushun
Source: Internet



People working in village enterprises
Source: Yuwen Wang

1. Historical Analysis of Liaoning

The Growth-oriented Period 1991-2010

- >Economies of scale and agglomeration guided the development of cities. Many megacities emerged.
- >Growth-oriented urban development led cities to develop land to the periphery or beyond. Villages were surrounded by industrial zones and high-dense residential buildings.
- >Transformation of the economic system and decline in the proportion of heavy industry.
- >Rural industries were in decline and were gradually replaced by industrial zones.

Construction of High-dense Housing

Urban sprawl to the periphery and massive construction of high-density housing.



Construction of megacities

The benefits of economies of scale and agglomeration have been realized, and a large number of megacities have emerged across the country.

Construction of Industrial Zones

A large number of industrial parks have been built on the outskirts of cities, and these are gradually replacing rural industries.

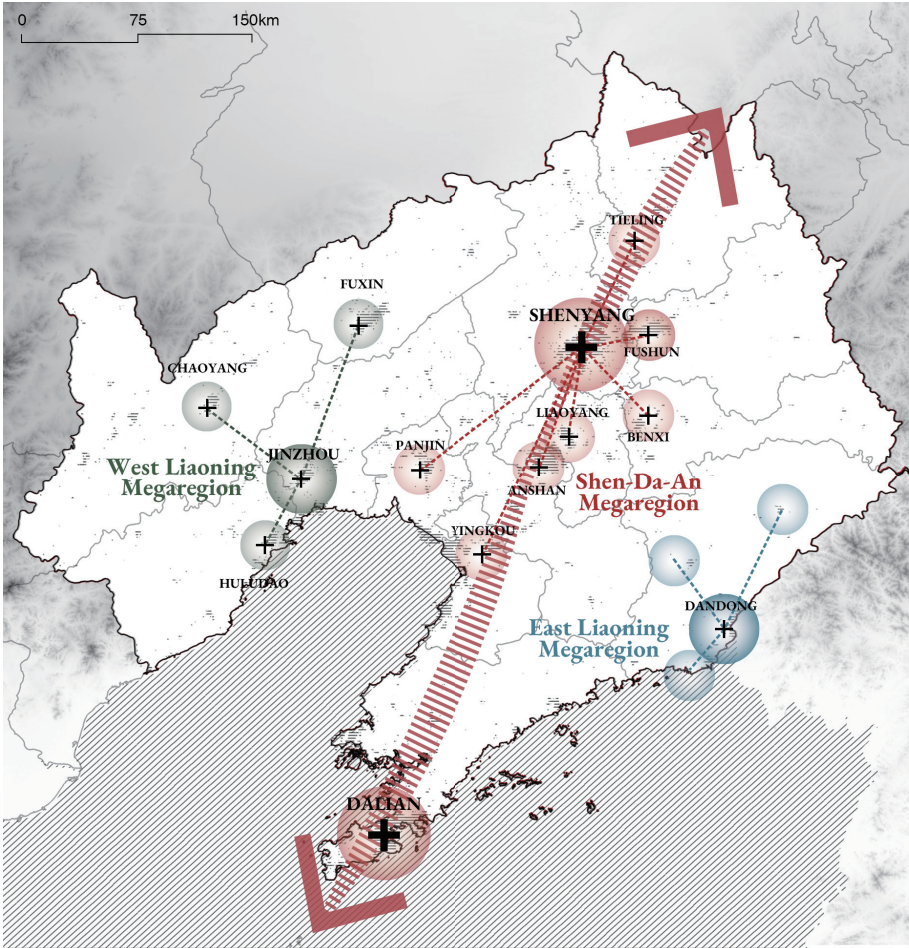


Factory workers lost their job

As a result of the transformation of the economic system, many heavy industries in Liaoning have suffered and many workers have been laid off.

People Move to Other Cities for Jobs

Liaoning's economic downturn has left many people to leave their homes and look for work abroad.



Planning of Liaoning in 2003
Made by author



Industrial zone in Shenyang
Source: Internet

1. Historical Analysis of Liaoning

Nowadays 2011-?

- >Emphasizing rural-urban integration and encouraging rural revitalization.
- >Rural revitalization focuses on rural areas with beautiful landscape and historical heritage.
- >Strategies for rural revitalization are mostly agro-tourism and e-commerce.
- >**Lack of planning guidelines for normal desakota.**

Development of Agro-tourism

Most of the existing policies for rural revitalization are to develop agro-tourism.

E-commerce Helps Agriculture

To achieve rural revitalization and help farmers increase their income, the government encourages e-commerce to drive the sale of agricultural and sideline products.



Construction of 'Beautiful Village'

For rural areas with excellent landscape conditions, the Government encourages the construction of 'beautiful villages'.

Preservation of 'Historical Town'

For historical towns with cultural heritage, the Government promotes the 'preservation of historical towns'.



Agro-tourism
Source: Internet



E-commerce helps agriculture
Source: Internet

2. Scenario Building for Beiwang Village

Scenario 2: Eco Wellness Desakota

In this scenario, the socio-ecological resilience of Beiwang Village is realized through the development of natural-related industries and other non-agricultural industries. Similar to the previous scenario, the primary strategy is ecological restoration. The factories along the river need to be removed, a lake will be constructed in the middle of the river, and the wetlands along the river need to be restored. And the mountains need to be conserved and the one on the southwest side of the village can be developed into a mountain park for ecological tourism. Eventually, a blue-green system will be formed in Beiwang Village.

Human activities also need to be shifted in this scenario. Existing machinery manufacturing will be transformed into ecological tourism and recreational industries while the factories' buildings will be reused. Some farmland will be eliminated to support the development of ecotourism and recreation industries.

Strategies

In this scenario, the socio-ecological resilience of Beiwang Village is realized through the development of natural-related industries and other non-agricultural industries. Similar to the previous scenario, the primary strategy is ecological restoration. The factories along the river need to be removed, a lake will be constructed in the middle of the river, and the wetlands along the river need to be restored. And the mountains need to be conserved and the one on the southwest side of the village can be developed into a mountain park for ecological tourism. Eventually, a blue-green system will be formed in Beiwang Village.

Since there is an existing football center in the village and the village's proximity to the town

center, an ecological and recreational desakota with golf, yoga, outdoor sport fields, equestrianism, etc. can be built. In addition, eco-tourism projects such as mountain parks and camping zones can be created, and related service industries can be developed to provide more job opportunities for the villagers.

This scenario also requires the construction of a slow-moving system to connect the tourist attractions on the east and west sides of the village and to upgrade the neighbourhood. The specific strategies are the same as in the previous scenario, and will not be repeated here.

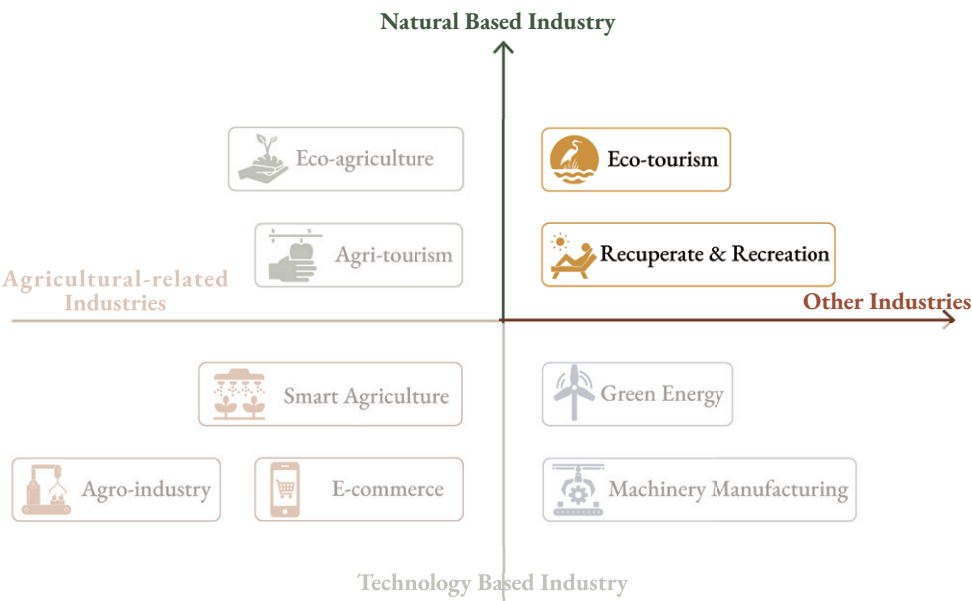
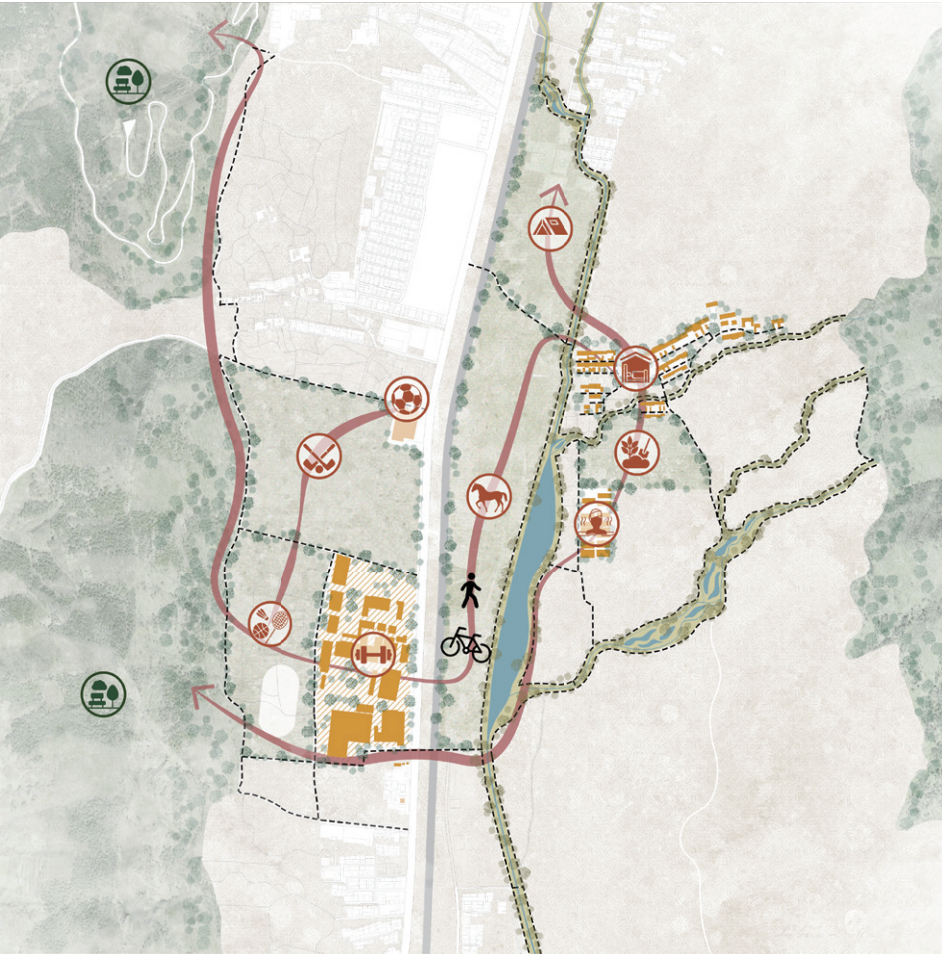
Implantation of ecological tourism and recreational industries

- > Implantation of ecological tourism and recreational activities and related services
- > Connecting industries with pedestrian and cycling pathway system
- > Reuse of factories for spa and gyms

BEFORE



AFTER



Vision map of scenario 2

In this scenario, ecological restoration promotes a healthy ecosystem that provides diverse ecosystem services to support ecological tourism, recreational industries, agriculture and the daily lives of villagers, which thus enhances human well-being.

Since the industry highly relies on the ability of ecosystems to provide ecosystem services, villagers need to protect the ecosystem and constrain the impact of human activities on the ecosystem. Eventually, a socio-ecological resilience loop will be achieved.

- Residential houses

Factories

Public services

Service center

Farmland
- Wetland

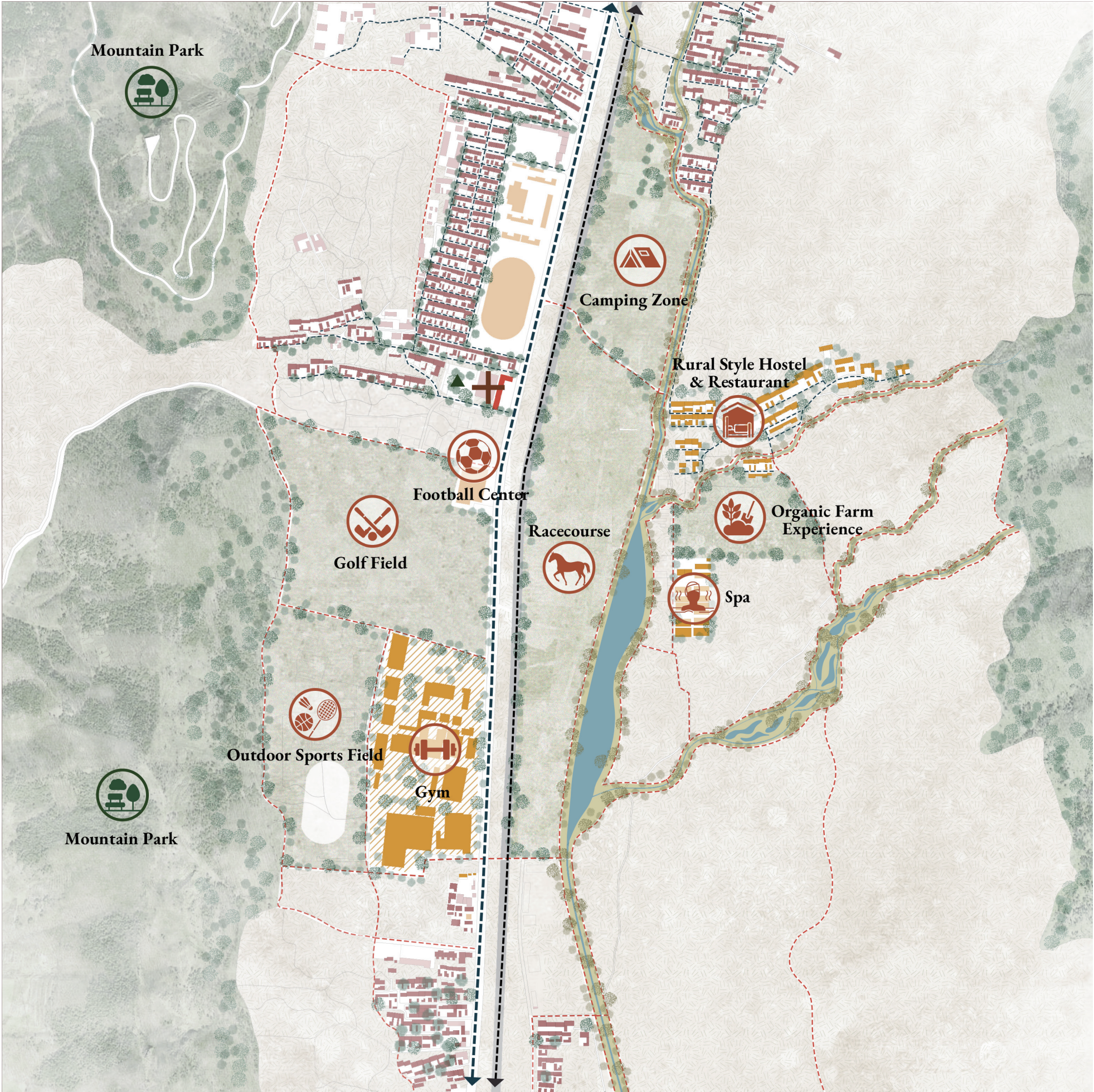
Main road

Trainline

Slow-moving system

Carriageway
- Open spaces

Neighbourhood activity center

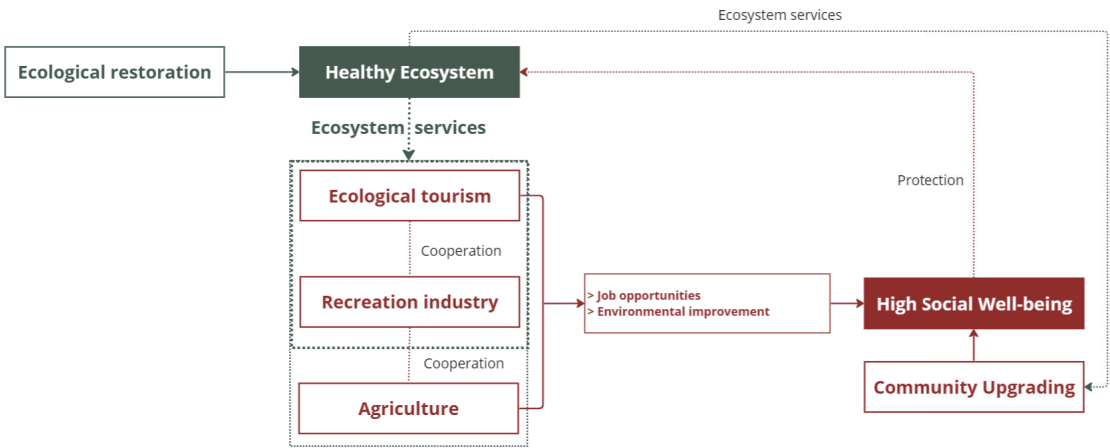




Adjustment of governance model

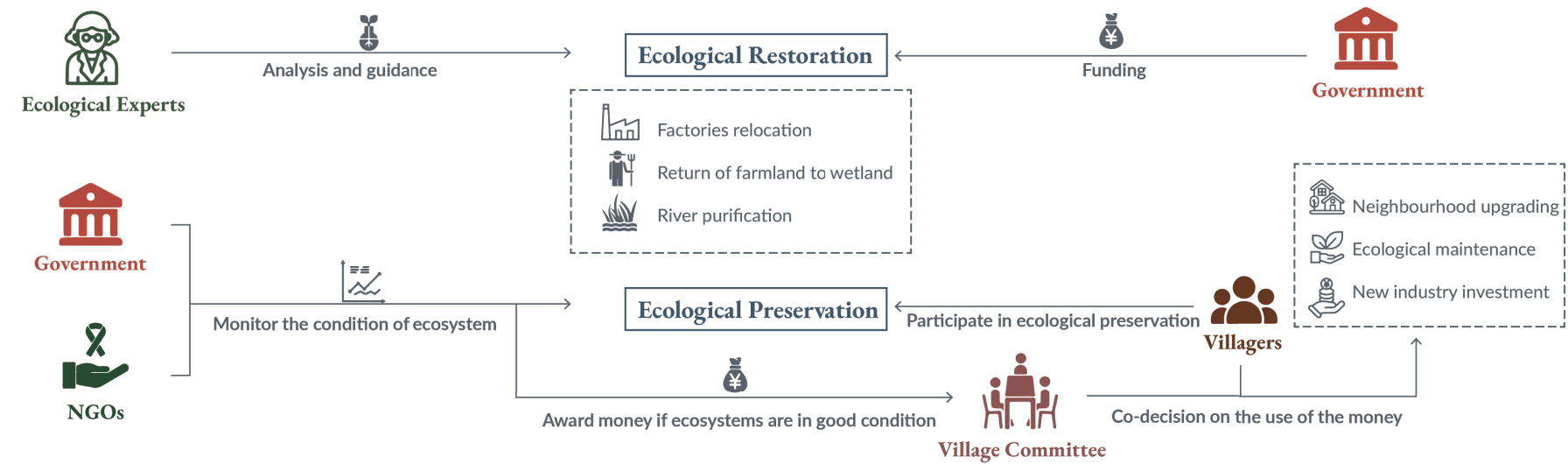
The new governance model for this scenario is similar to the previous one. But there are still some differences.

Firstly, as new industries highly rely on the environmental condition, investors will also be engaged in providing fundings for ecological restoration and infrastucture upgrading. But the main body is still the government.

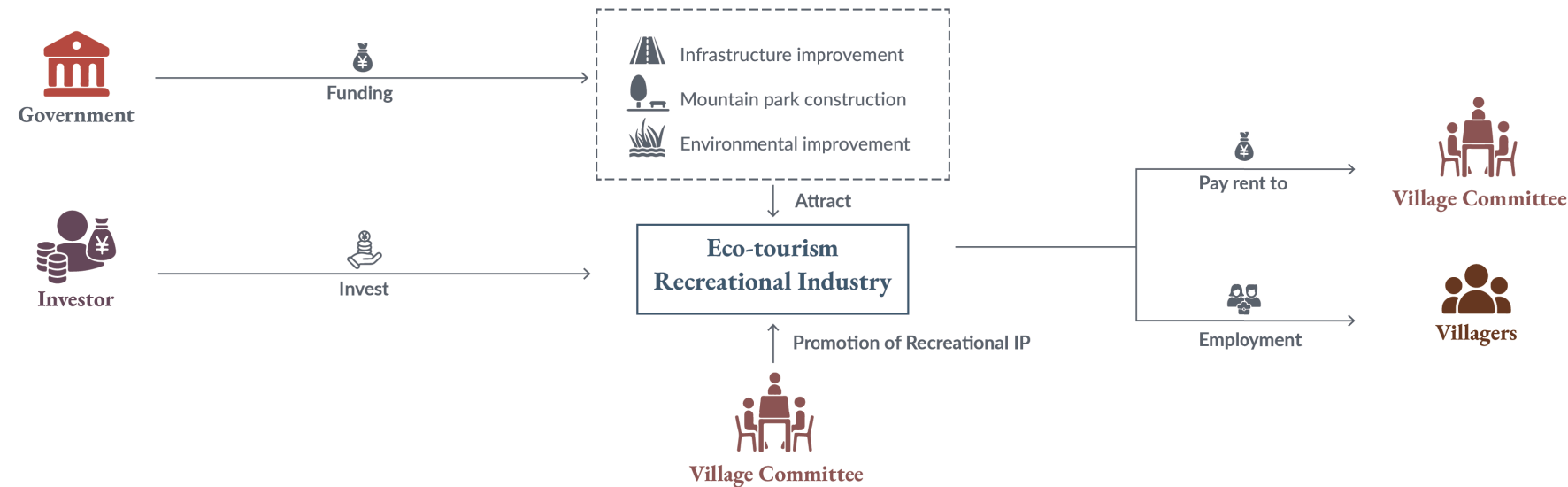


Socio-ecological resilient loop
Made by author

Ecological Restoration



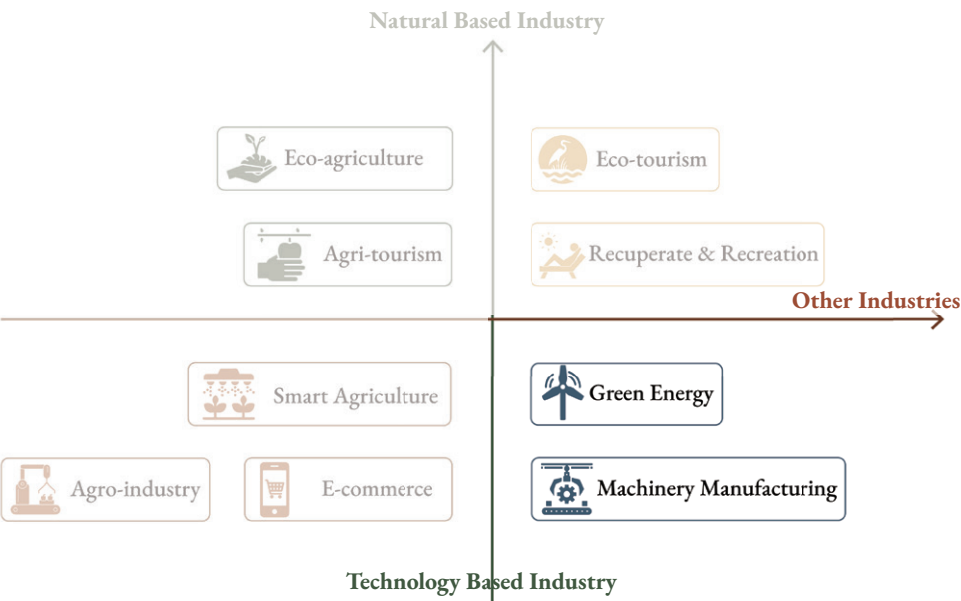
Develop Eco-tourism and Recreational Industry



Scenario 4: Clean Energy & Machinery Desakota

In this scenario, the socio-ecological resilience of Beiwang Village is realized through the development of technology based industries and other non-agricultural industries, i.e. green energy and machinery manufacturing.

The natural restoration is the same as scenario 3. Some existing factories also need to be removed and the farmland will be restructured. Some large factories near farmland will be kept and used as agricultural waste trading center which is related to the production of biomass energy. Farmers can sale their agricultural waste, such as crop residues (corn stalks, wheat straw, and rice husks) and animal manure to the trading center. In this way, farmers will be able to turn waste into treasure and agriculture will cause less pollution to the ecosystem.



Strategies

Some big scale machinery manufacturing industries will be kept, others will be removed while biomass energy production and eco-friendly agri-machinery manufacturing will be implanted. The agricultural waste collected from farmers will be used for the production of biomass energy. The energy will be used in machinery manufacturing industries and daily use of the village. Existing machinery manufacturing can cooperate with eco-friendly agri-machinery manufacturing, and these agricultural equipment will be used in Beiwang and surrounding villages thus reducing agricultural pollution. Therefore, a circulation will be achieved.

To support these industries, the road system will need to be re-planned to enhance connectivity between factories. In addition, to enhance villagers' accessibility to the natural environment, footpaths connecting neighbourhoods to rivers and mountains will also be planned. And the neighbourhood upgrading strategies are the same as above scenario.

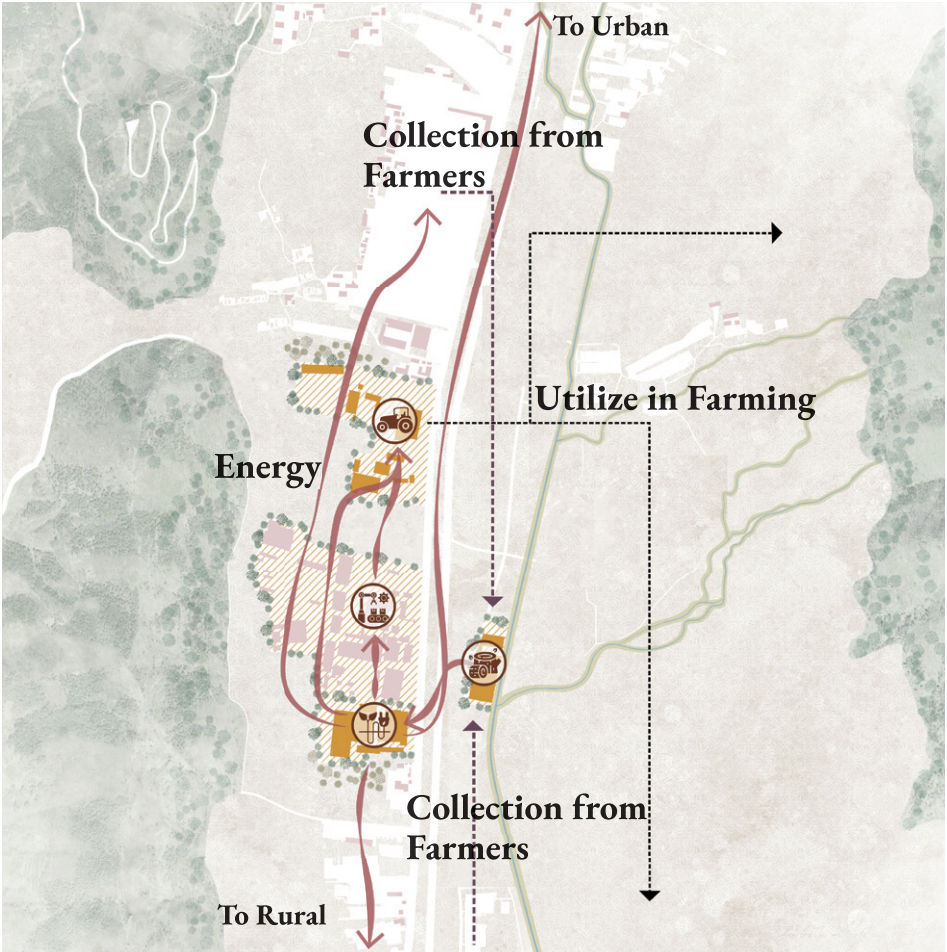
Implantation of clean energy industries

- > Retention of part of the existing machinery manufacturing
- > Reuse existing factories for biomass energy production and eco-frienly agri-machinery manufacturing
- > Cooperation between biomass energy industry, machineru manufacturing industries and farmers

BEFORE



AFTER



Vision map of scenario 4

In this scenario, a desakota focused on clean energy and machinery manufacturing is built. Ecological restoration promote a healthy ecosystem that provides diverse ecosystem services to agriculture and the daily lives of villagers, which thus enhances human well-being.

Although the new industries are not very dependent on the condition of the ecosystem, they will reduce the negative impact on the ecosystem by reusing the agricultural waste for clean energy and promoting eco-friendly agricultural equipment. The sustainable manufacturing and clean energy will contribute to resilience. And villagers will also be encouraged to protect the ecosystem through the strategies in the governance model that will be explained later. Ultimately, the socio-ecological resilience loop will be realized.

- Residential houses

Factories

Public services

Service center

Farmland
- Wetland

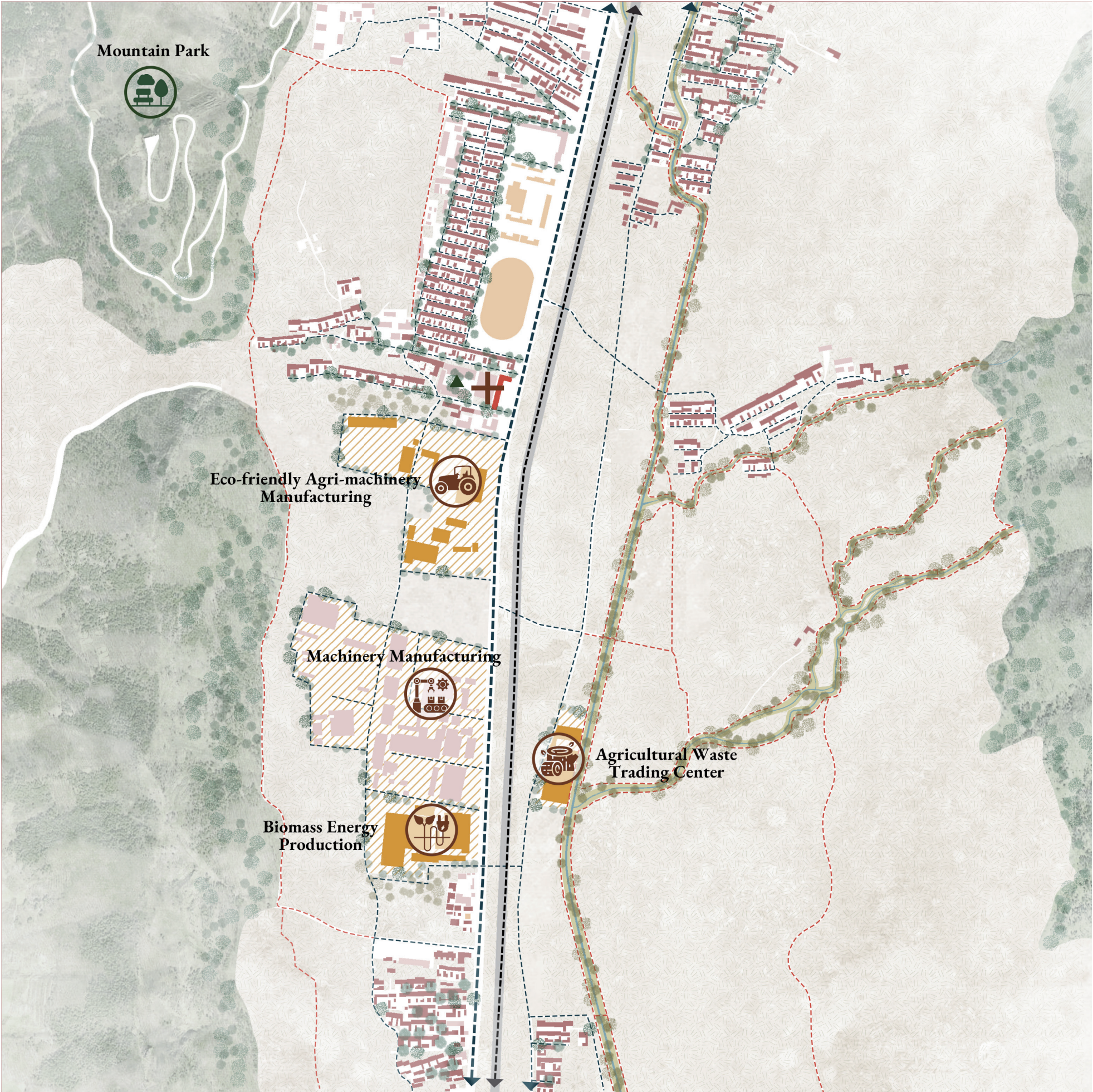
Main road

Trainline

Slow-moving system

Carriageway
- Open spaces

Neighbourhood activity center



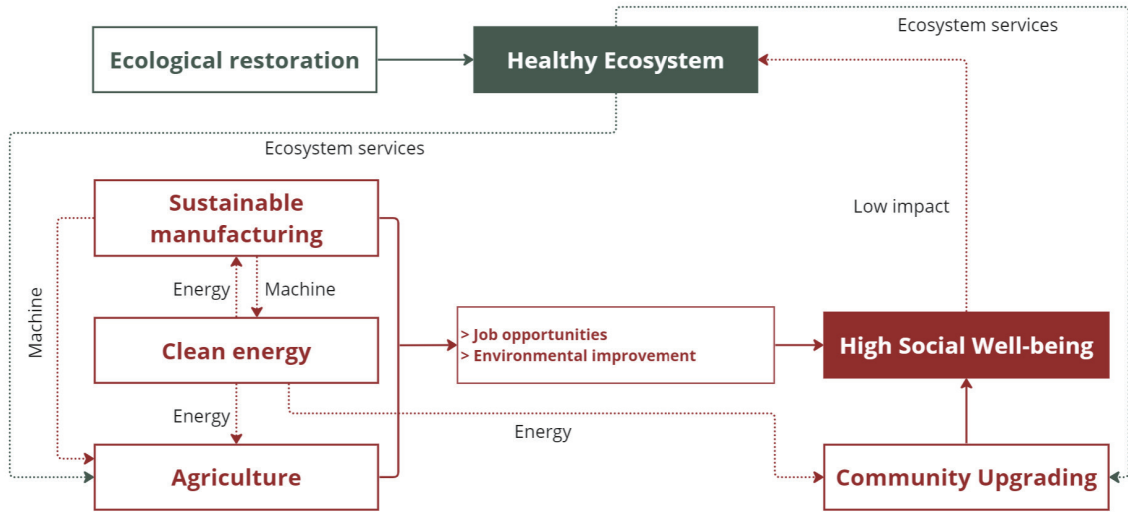
Adjustment of governance model

The governance model of ecological restoration is the same as scenario 1.

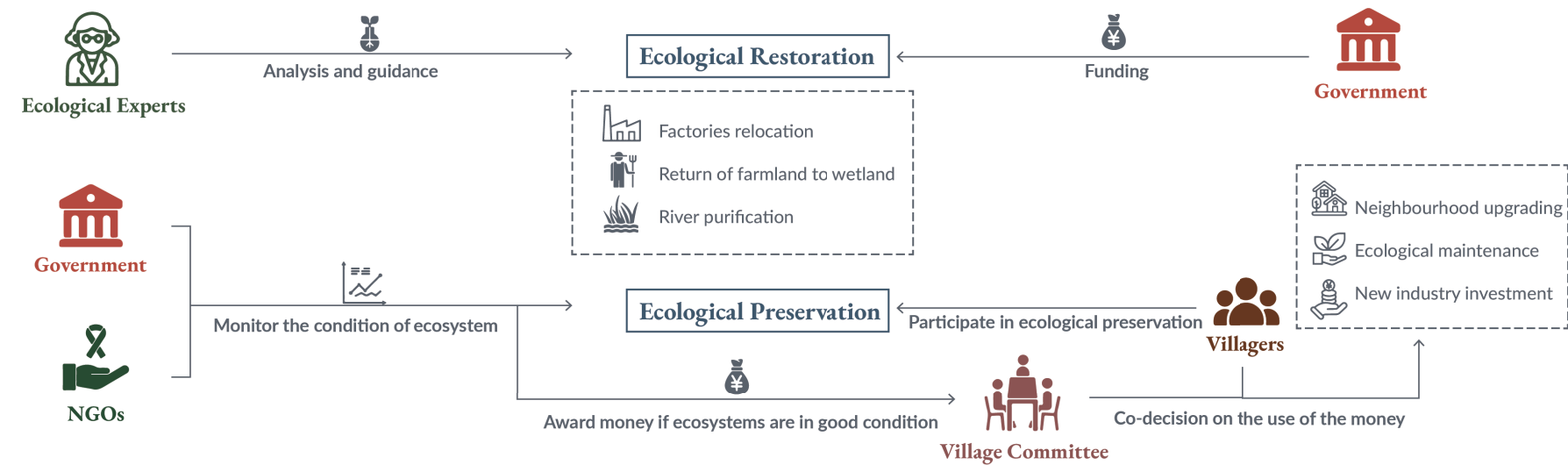
The government will support the biomass energy and eco-friendly agri-machinery manufacturing by providing policy and allowance subsidies.

The village committee can be responsible for managing the agro-waste trading center. Farmers who sell their agricultural waste will receive a discount on the purchase of eco-friendly agricultural machinery, which will encourage farmers to use these machines with a low environmental impact.

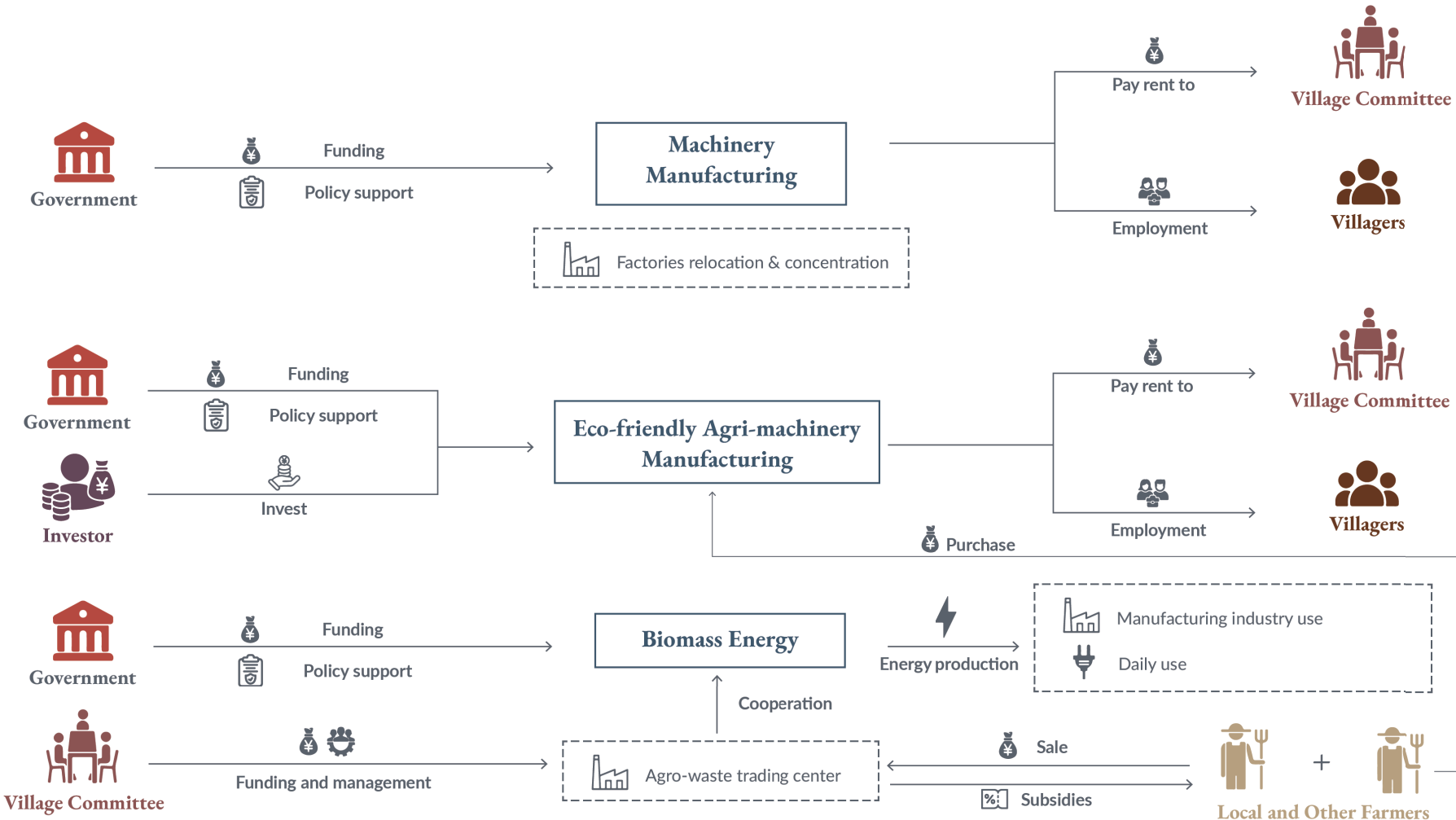
Socio-ecological resilient loop
Made by author



Ecological Restoration



Develop Eco-tourism and Recreational Industry





3. Questionnaire

关于北王村居民日常生活的调查问卷

尊敬的先生或女士：
您好！感谢您百忙之中填写这份调查问卷。此问卷仅作学术用途，用于调查北王村村民的日常生活情况。本问卷为匿名作答，您填写的答案不会披露给任何个人和企业，您的答案仅作学术研究分析之用，请您根据实际情况作答。
感谢您的配合，祝您生活愉快！

【基本信息】

1. 年龄 67
2. 性别 男
3. 籍贯 辽宁省大连市瓦房店市北王村
4. 户口 ☒ 农业户口 ☐ 非农户口
5. 居住时长 ☐ <5 年 ☐ 5-10 年 ☐ 10-30 年 ☒ >30 年
6. 家中几口人 四口人
7. 家中有青壮年吗？ ☒ 是，有 1 个 ☐ 没有
8. 若有，从事什么工作？ ☒ 农业种植 ☐ 养殖 ☐ 附近工厂上班 ☐ 瓦房店市区工作 ☐ 其他 _____
9. 家庭年收入 ☐ 小于两千 ☐ 两千-五千 ☒ 五千-一万 ☐ 一万-三万 ☒ 三万-五万 ☐ 五万以上
10. 主要收入来源 ☒ 农业生产 ☐ 政府补贴 ☐ 工资性收入 ☐ 个体经营 ☐ 其他

【日常生活】

1. 目前居住的房屋质量 ☒ 较好 ☐ 一般 ☐ 较差
2. 您的房屋结构为 ☐ 土坯房 ☐ 砖瓦房 ☒ 砖混房 ☐ 其他 _____
3. 若改造房屋，您有哪些需求 近几年才装修
4. 您的出行方便吗？ ☒ 方便 ☐ 不方便
5. 您购物方便吗？ ☒ 方便 ☐ 不方便
6. 您村看病方便吗？ ☒ 方便 ☐ 不方便
7. 您村孩子上学方便吗？ ☒ 方便 ☐ 不方便
8. 您对村级路况满意吗？ ☒ 满意 ☐ 不满意
9. 您认为村中的环境如何？ ☒ 良好 ☐ 一般 ☐ 较差
10. 村中是否有公共的休闲场地？ ☒ 是 ☐ 没有
11. 若有，您对公共休闲场地的环境满意吗？ ☒ 满意 ☐ 不满意 ☐ 没有想法
12. 若对村中公共场地进行改造，您有哪些建议 多建几个休闲场地

关于北王村工厂工人基本需求的调查问卷

尊敬的先生或女士：
您好！感谢您百忙之中填写这份调查问卷。此问卷仅作学术用途，用于调查北王村工厂工人的基本需求。本问卷为匿名作答，您填写的答案不会披露给任何个人和企业，您的答案仅作学术研究分析之用，请您根据实际情况作答。
感谢您的配合，祝您生活愉快！

【基本信息】

1. 年龄 50
2. 性别 女
3. 工作于 东亚 工厂
4. 籍贯 北王
5. 户口 ☒ 农业户口 ☐ 非农户口
6. 居住在北王村时长 ☐ <2 年 ☐ 2-5 年 ☐ 5-10 年 ☒ >10 年
7. 您居住在 北王村
8. 您的家人居住在？ ☒ 也在北王村 ☐ 在北王村周边村镇 ☐ 在瓦房店市区 ☐ 在瓦房店其他地区 ☐ 其他 _____
9. 您的月收入 ☐ 小于一千 ☐ 一千-两千 ☒ 两千-三千 ☐ 三千-四千 ☐ 四千-五千 ☐ 五千以上

【基本需求】

1. 目前居住在 ☐ 公司宿舍 ☐ 自己租房 ☒ 自己购买的房子
2. 房屋位于 ☒ 北王村内 ☐ 北王村周边村镇 ☐ 瓦房店市区 ☐ 其他 _____
3. 您居住的房屋质量 ☐ 较好 ☒ 一般 ☐ 较差
4. 您的房屋结构为 ☐ 土坯房 ☒ 砖瓦房 ☐ 砖混房 ☐ 其他 _____
5. 若改造住房，您有哪些需求 质量提升
6. 您通勤方便吗？ ☒ 方便 ☐ 不方便
7. 您的通勤方式是？ ☐ 步行 ☐ 公共交通 ☒ 摩托车、电动车、自行车 ☐ 私家车 ☐ 其他
8. 您购物方便吗？ ☒ 方便 ☐ 不方便
9. 您看病方便吗？ ☐ 方便 ☒ 不方便
10. 您孩子上学方便吗？ ☒ 方便 ☐ 不方便
11. 您认为北王村的环境如何？ ☐ 良好 ☒ 一般 ☐ 较差
12. 厂区附近是否有公共的休闲场地？ ☒ 是 ☒ 没有



致谢

写下这些话的时候，窗外有淅淅沥沥的雨，这是我在荷兰的第二个夏天。

去年 9 月，我把毕设题目最终确定为辽宁城郊的研究。起初只是想，那里毕竟是家乡，做起研究来也会比较熟悉。有天查资料的时候，看着那些熟悉的地名，我突然想到史铁生的那段话：“一旦有一天我不得不长久地离开它，我会怎样想念它，我会怎样想念它并且梦见它，我会怎样因为不敢想念它而梦也梦不到它。”是啊，那里毕竟是家乡。那一刻伴随着想念的，还有一种名为渴望的情感。我突然渴望了解更多，关于辽宁的衰败，关于城郊的没落，关于那些明明爱着家乡却不得不背井离乡的人。

这个项目的完成需要感谢很多人的帮助。首先我想感谢导师曲蕾。在这为期一年的学习过程中，老师从未缺席，几乎每周一次 meeting。我自认为不是有天赋的人，很多问题不能一下想明白，但老师总是耐心地引导。我曾经和朋友说每次我在课题中迷茫的时候像是溺水，老师就是那个救生员。她不厌其烦地教导，帮助我在困顿时拨云见日，让我的焦虑得以缓和。我还要感谢二导 Alex。每次会议他都让氛围很轻松，也总是鼓励我说出自己的想法。他对城郊地区的深入的见解很大程度地帮助我完成这个项目。我还要感谢我的舅舅，帮我联系了规划院、街道、村委会和工厂负责人，让我的访谈无比顺利。

在这个项目结束的这个初夏，我总是回想起几个月前的冬天。

调研的时候是二月，大连的冬天很冷，田埂里还有化不开的雪。爸爸妈妈开车陪着我在瓦房店周边的各个农村乱逛，从长兴岛到瓦房店南，从瓦房店南到瓦房店北，带着厚厚一沓调查问卷和给村民准备的小礼物。有天风很大，妈妈在副驾，说膝盖冻得有点痛，过了会说但是陪你调研怎么这么开心呢？那天爸爸爬到一个小山坡上帮我录视频，我转身找不到他，心里有点埋怨要在冷风中等他。那个视频我两个月后才点开，不平稳的画面夹杂着呼啸的风声，和爸爸带着点口音的讲解。他的语气大概带着点微微的得意，说：在这个小山坡上几乎可以看到村子的全貌。

这个项目至此告一段落了，但我对这个领域的好奇和探索不会停止。尽管未来依旧未知，但我即便跌倒也会兴致勃勃地再出发。

窗外雨停了，偶尔有几声鸟鸣。这是我在荷兰的第二个夏天。