

Live in Between

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

中国辽宁城市收缩背景下城郊地区的一体化与社会生态弹性发展

P5 Presentation
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Planning Complex Cities
MSc Urbanism
TU Delft



Live in Between

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The Introduction of Liaoning Megaregion
Urban Shrinkage in Liaoning
Dual-track Process of the Emergence of Desakota in Liaoning

2

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CHAPTER 1

CONTEXT



1.1 Motivation

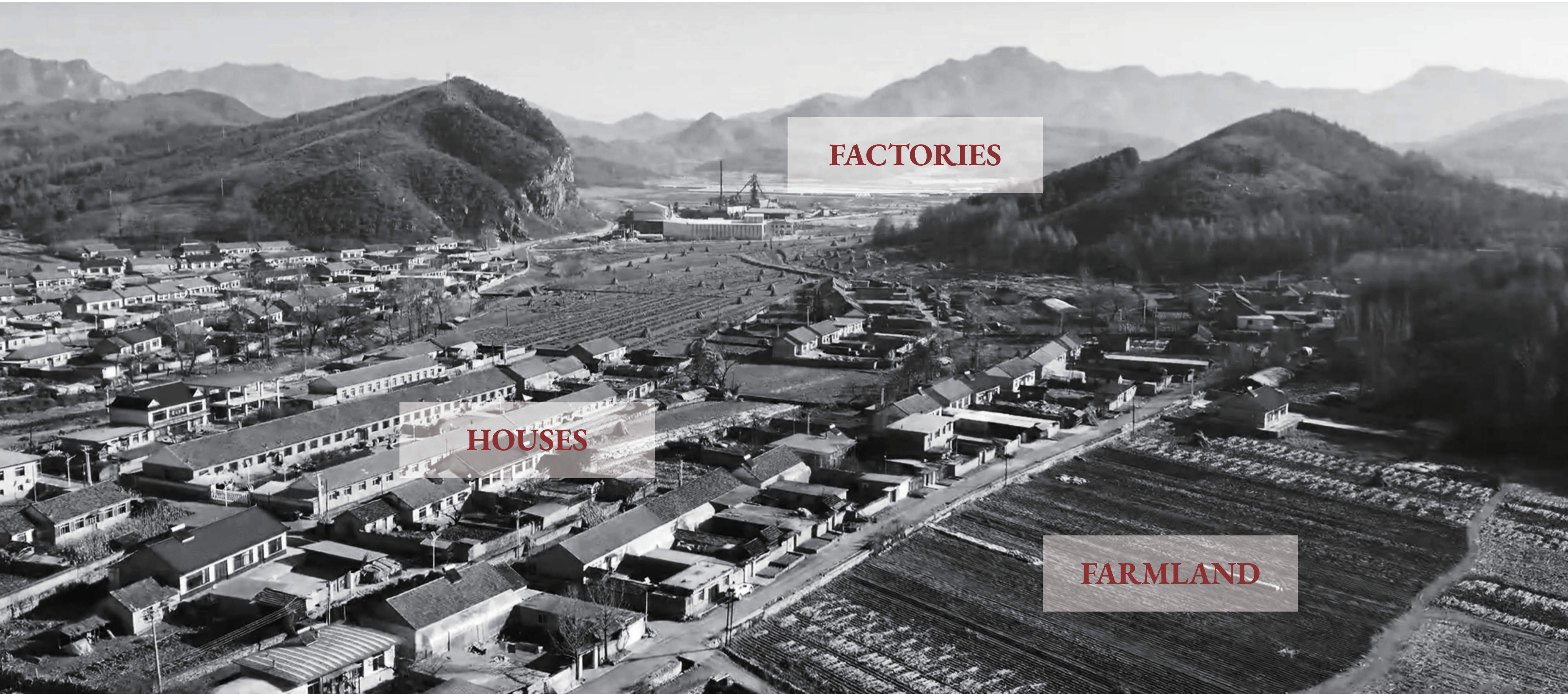


"KOTA"
URBAN

DESAKOTA

"DESA"
RURAL

1.1 Motivation



1.1 Motivation

Polluting factories in Liaoning's desakota



Source: Deng, 2022

Abandoned building in Liaoning's desakota



Photographed by author

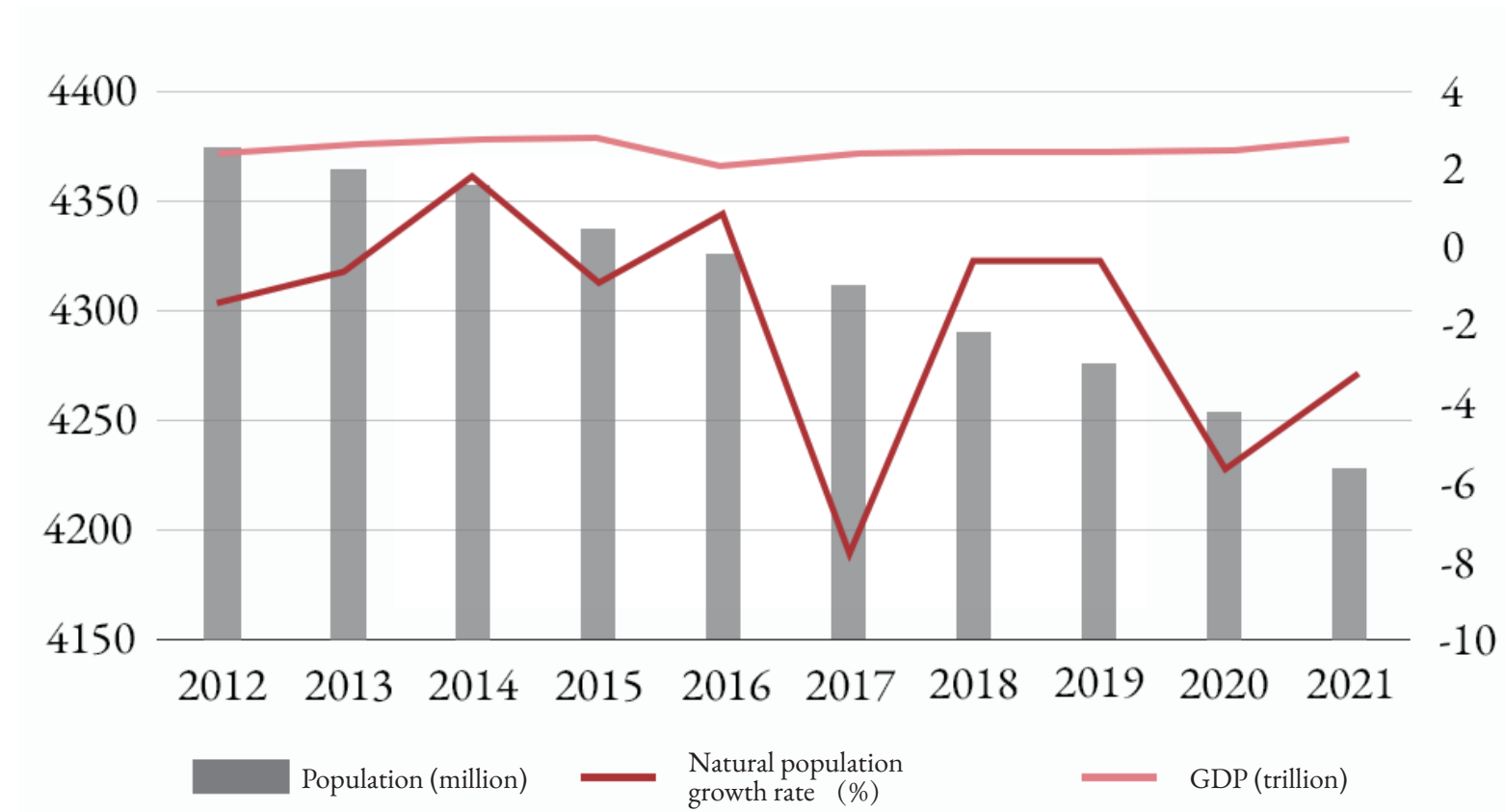
Low environmental quality of Liaoning's desakota



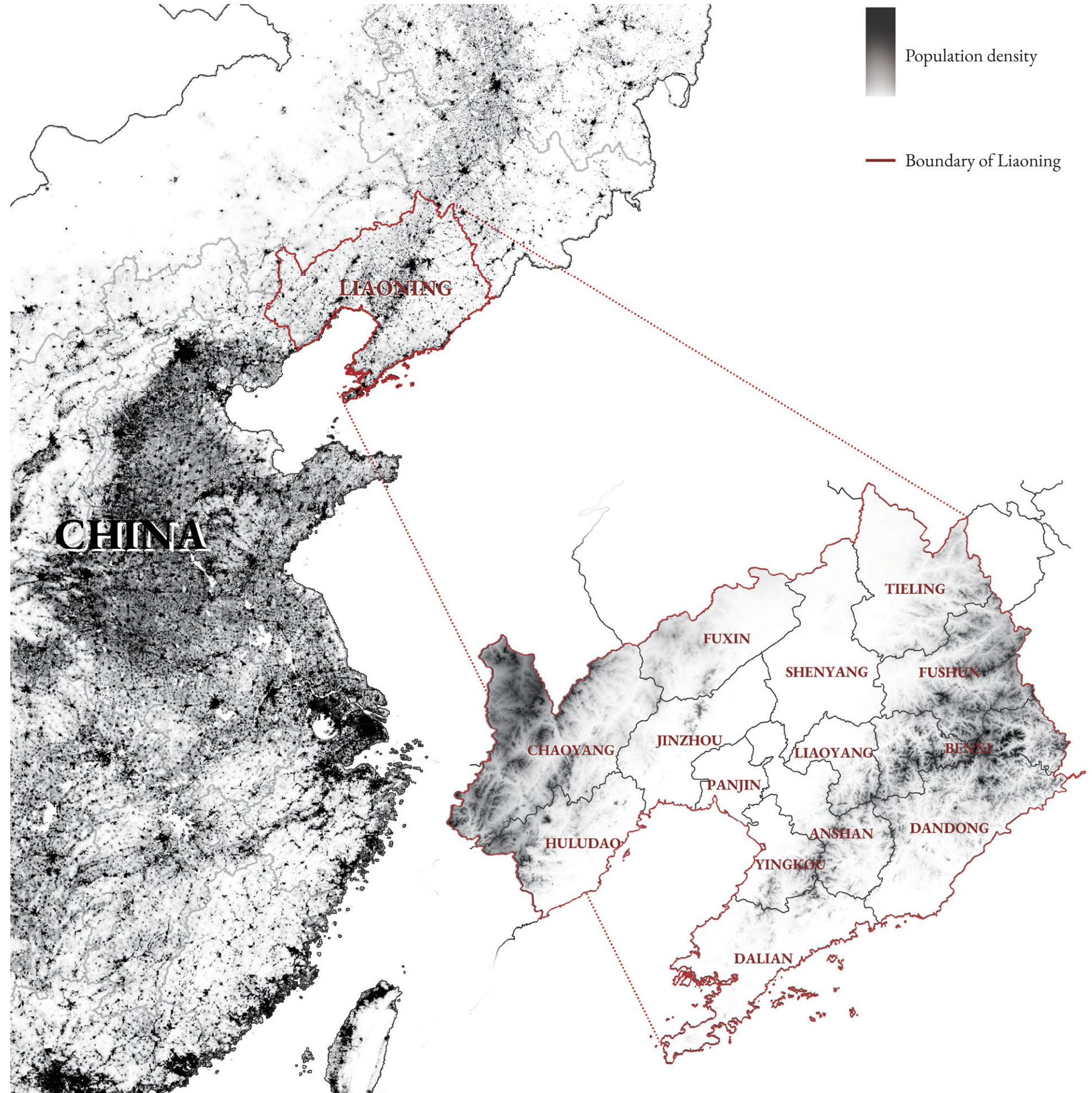
Photographed by author

1.2 The Introduction of Liaoning Megaregion

Suffering from population loss and GDP decline



CONTEXT

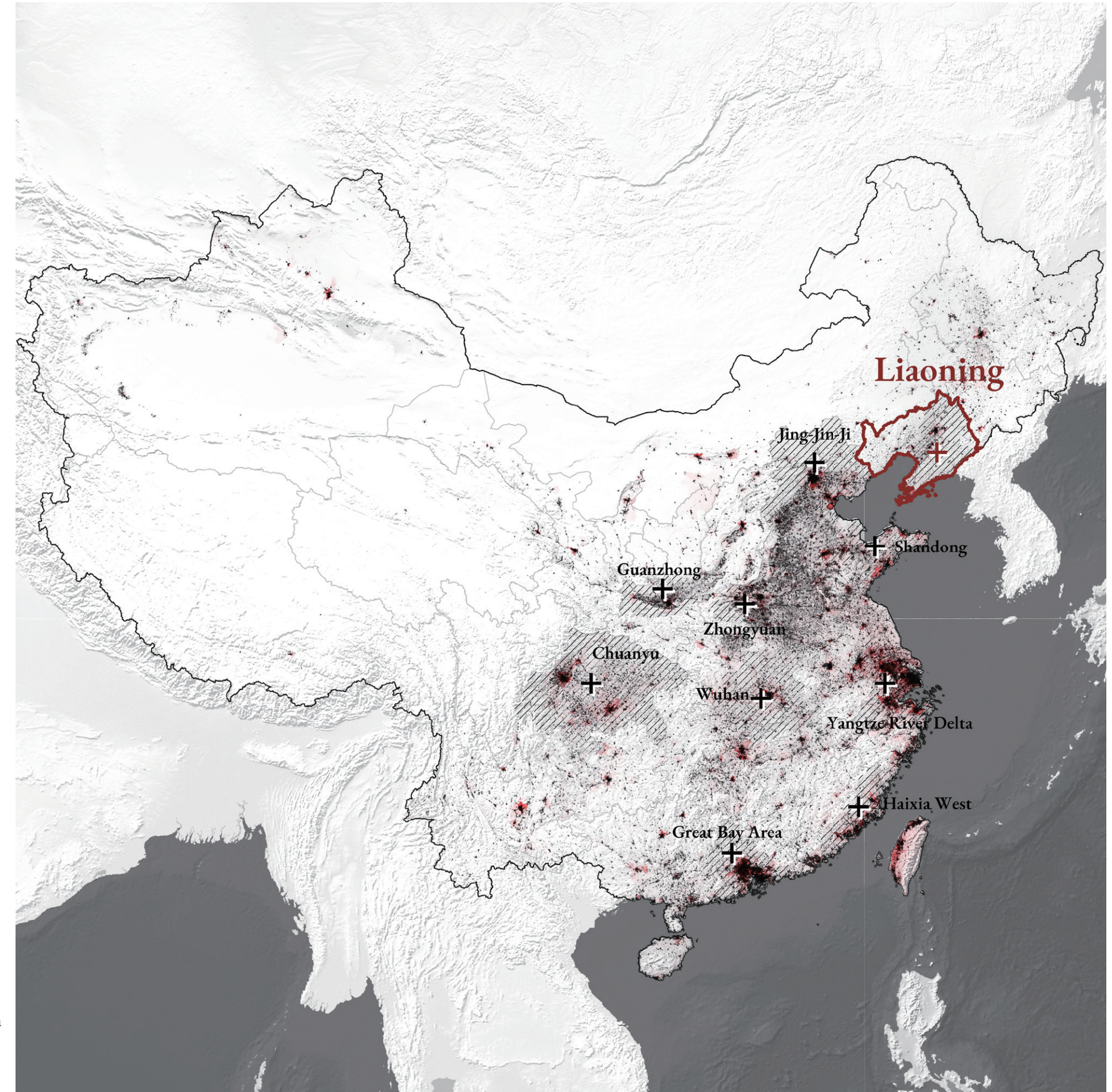
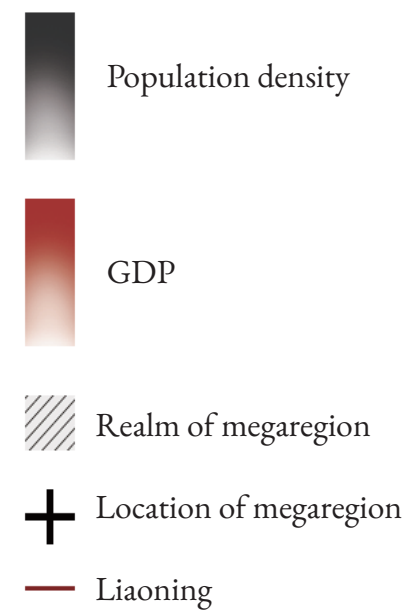


Population density of China and 14 cities in Liaoning Province

Data based on Worldpop, made by author

1.2 The Introduction of Liaoning Megaregion

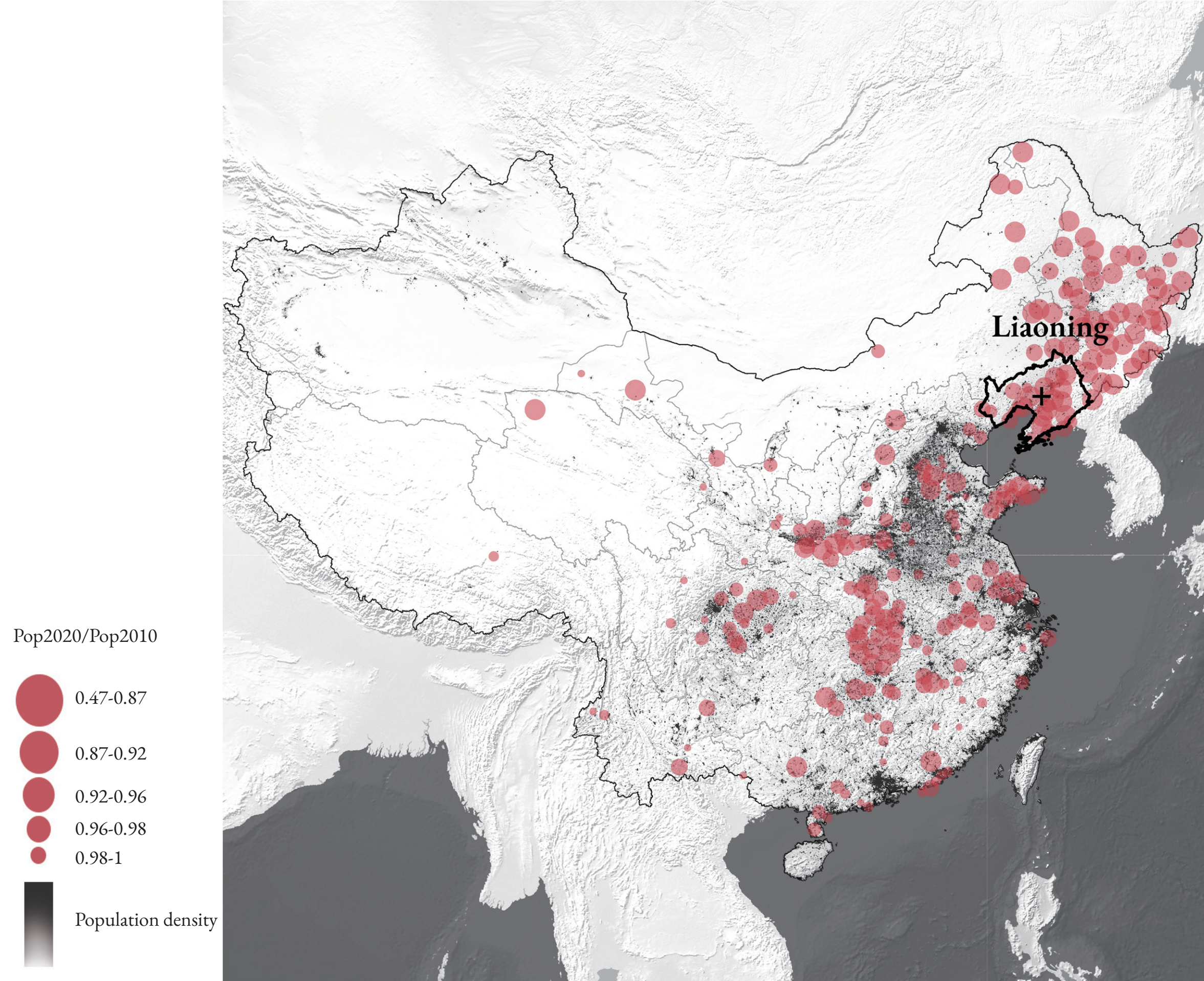
Less competitive than other megaregions in China



Population density & GDP distribution in China

Made by author

1.3 Urban Shrinkage in Liaoning



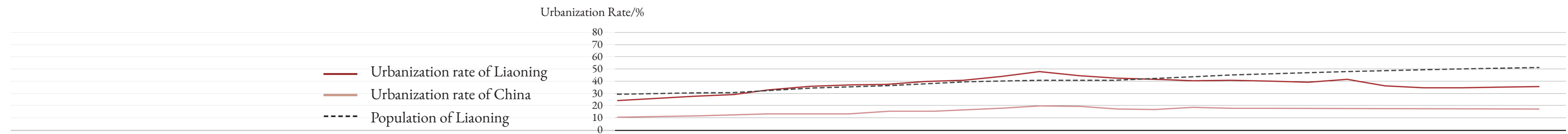
1.4 Dual-track Process of the Emergence of Desakota in Liaoning



1840-1948
The Colonial Period

1949-1957
The Planned Economy Period

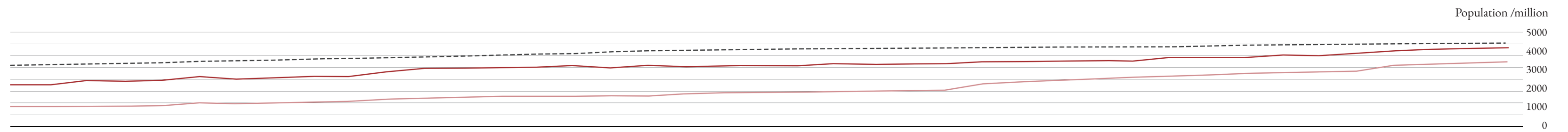
1958-1977
The Turbulent Period



1978-1990
The Boom Period

1991-2010
The Growth-oriented Period

2010-?
Nowadays



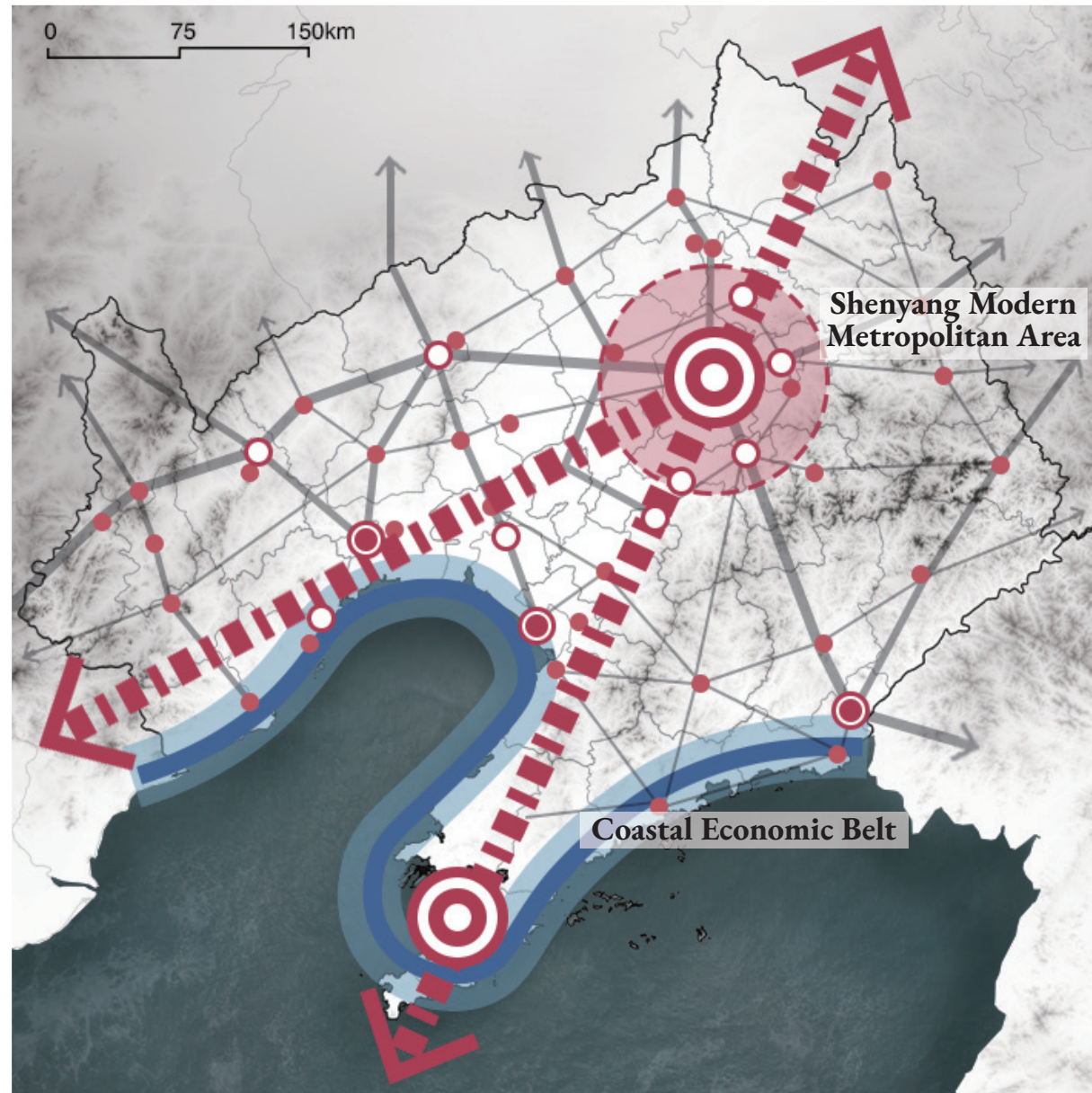


CHAPTER 2

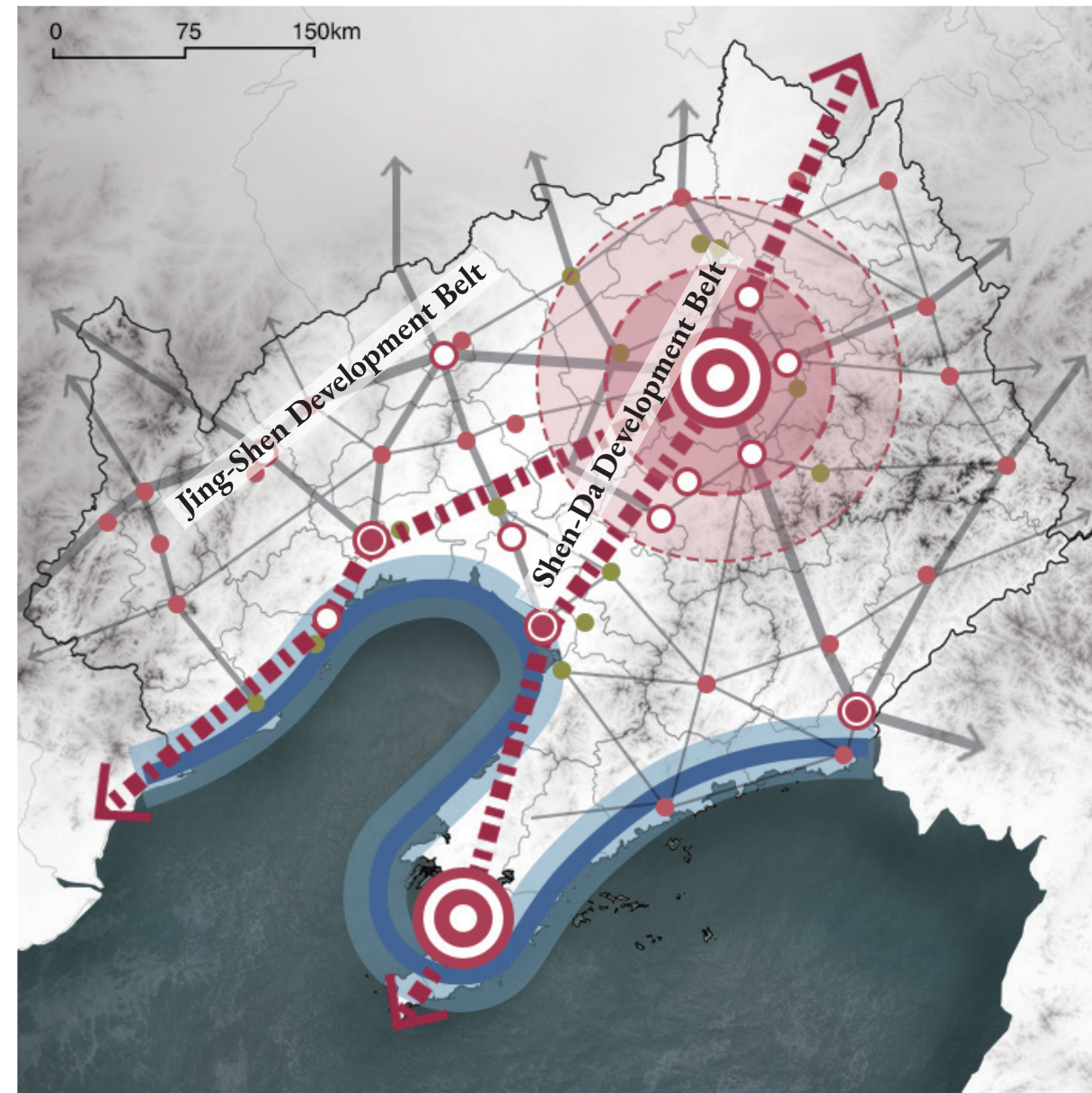
PROBLEMATIZATION

2.1 Problems Faced by Desakota in Liaoning

Neglected in Planning



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

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

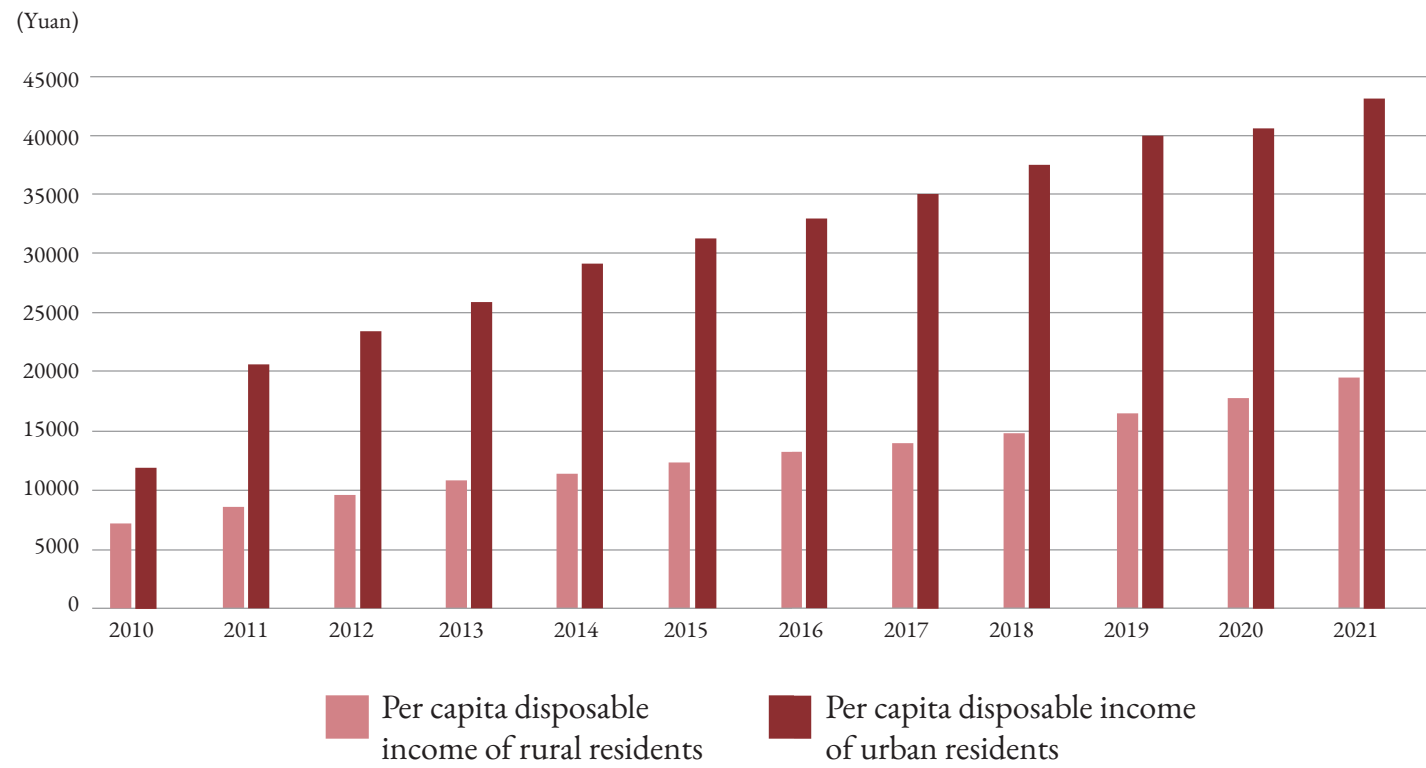
	集聚提升类 适度投放建设用地增量指标, 引导人口产业集聚。
	特色保护类 强化资源保护、设施配建, 鼓励土地复合利用、存量盘活。
	城郊融合类 强化城乡设施互联互通、共建共享。
	搬迁撤并类 保障基本生活, 稳步推进撤并减量发展。

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

2.1 Problems Faced by Desakota in Liaoning

Marginalization

- Low population density, GDP and employment



CONTEXT



Population density and GDP of cities in Liaoning 2021

Made by author

2.1 Problems Faced by Desakota in Liaoning

Marginalization

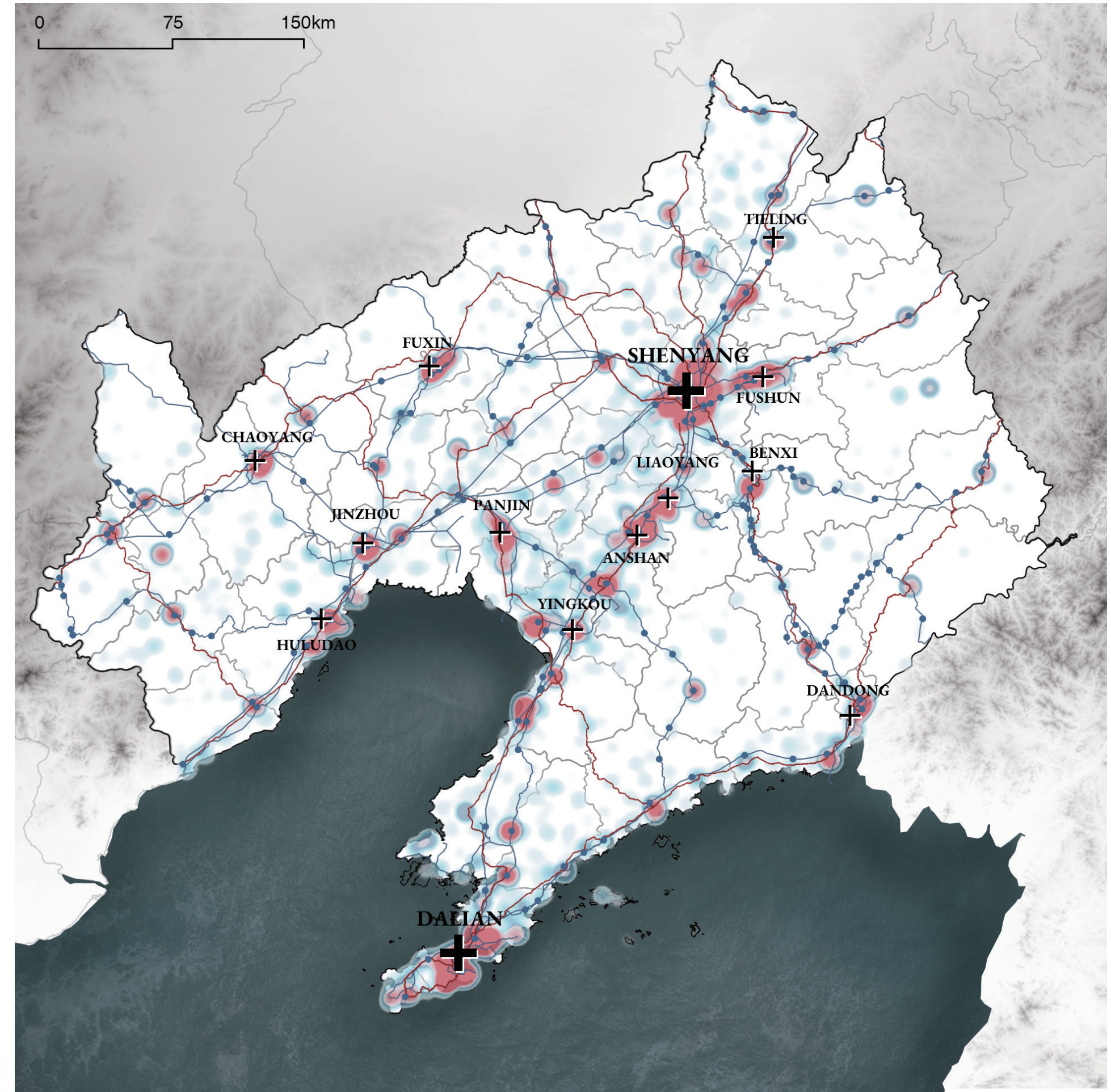
- Low availability of public services



Low-quality healthcare and middle school in desakota

Source: Internet

CONTEXT



Healthcare and school heat map of Liaoning

Made by author

2.1 Problems Faced by Desakota in Liaoning

Socio-ecological degradation

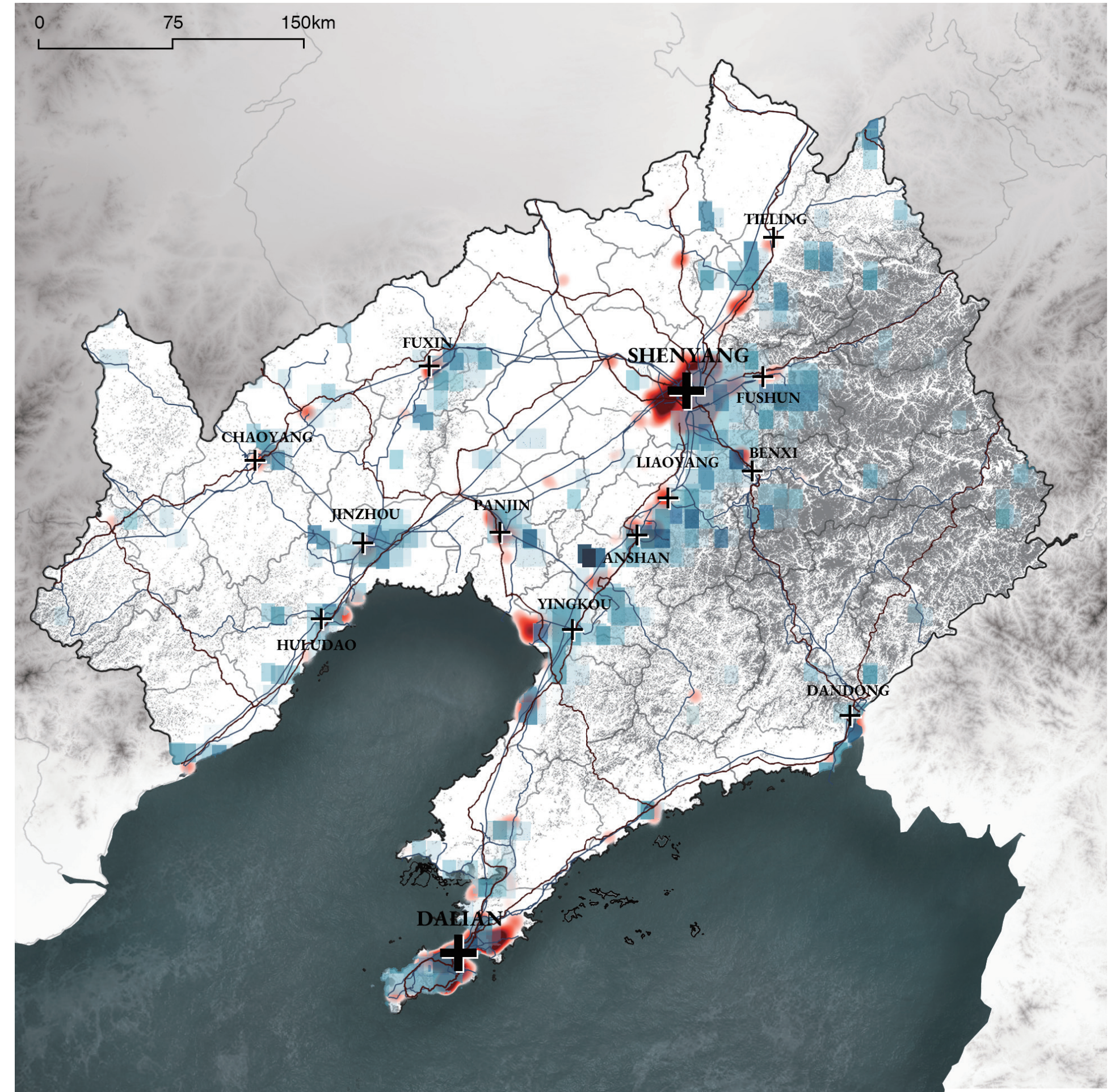
■ Air pollution in desakota



Pollution from factories and agriculture in desakota

Source: Internet

CONTEXT



Air pollution and industrial heat map of Liaoning 2018

Made by author

2.1 Problems Faced by Desakota in Liaoning

Socio-ecological degradation

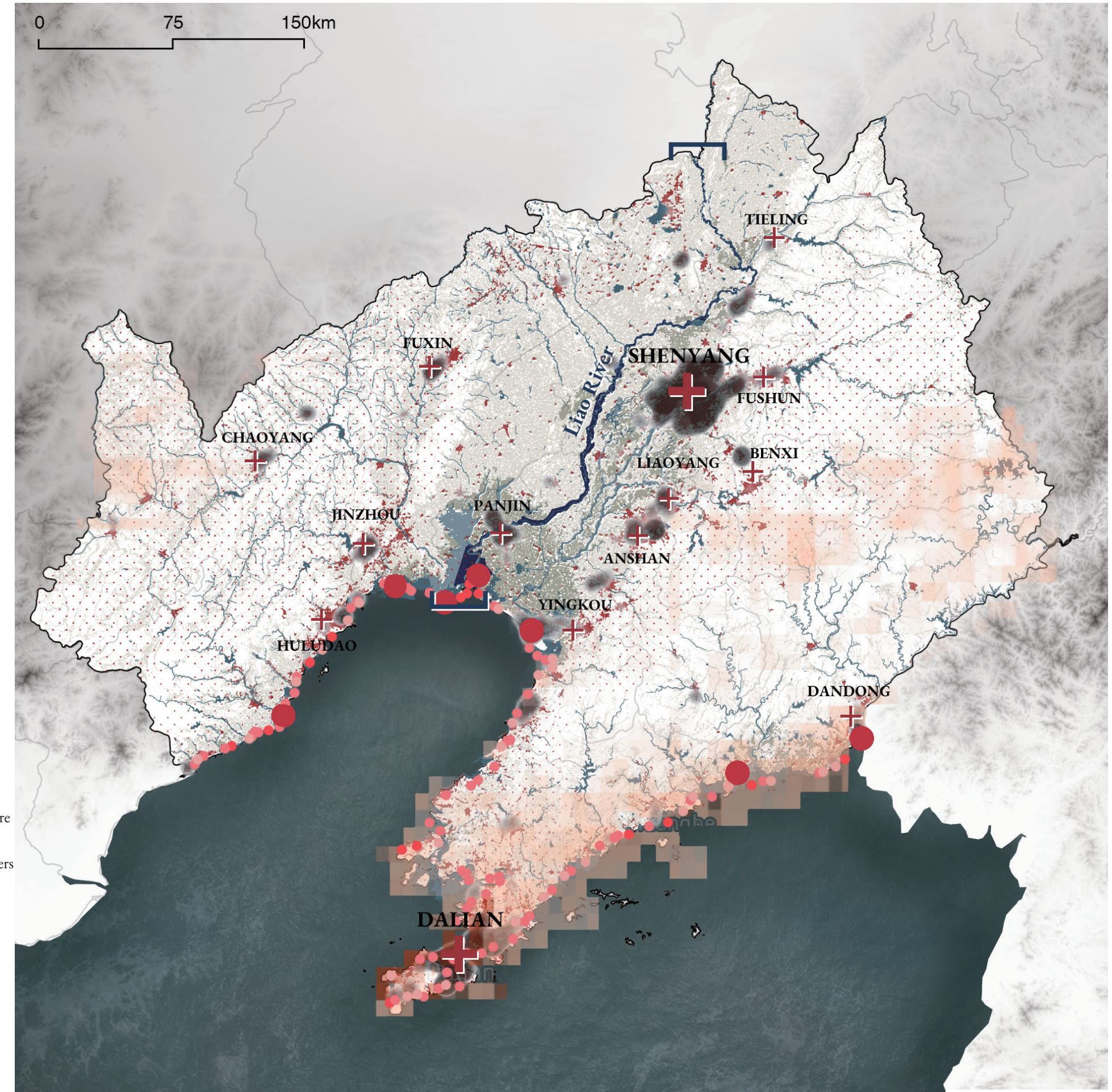
Water pollution in desakota



Water pollution from rural factories in desakota

Source: Internet

CONTEXT



Water pollution and water shortage in Liaoning

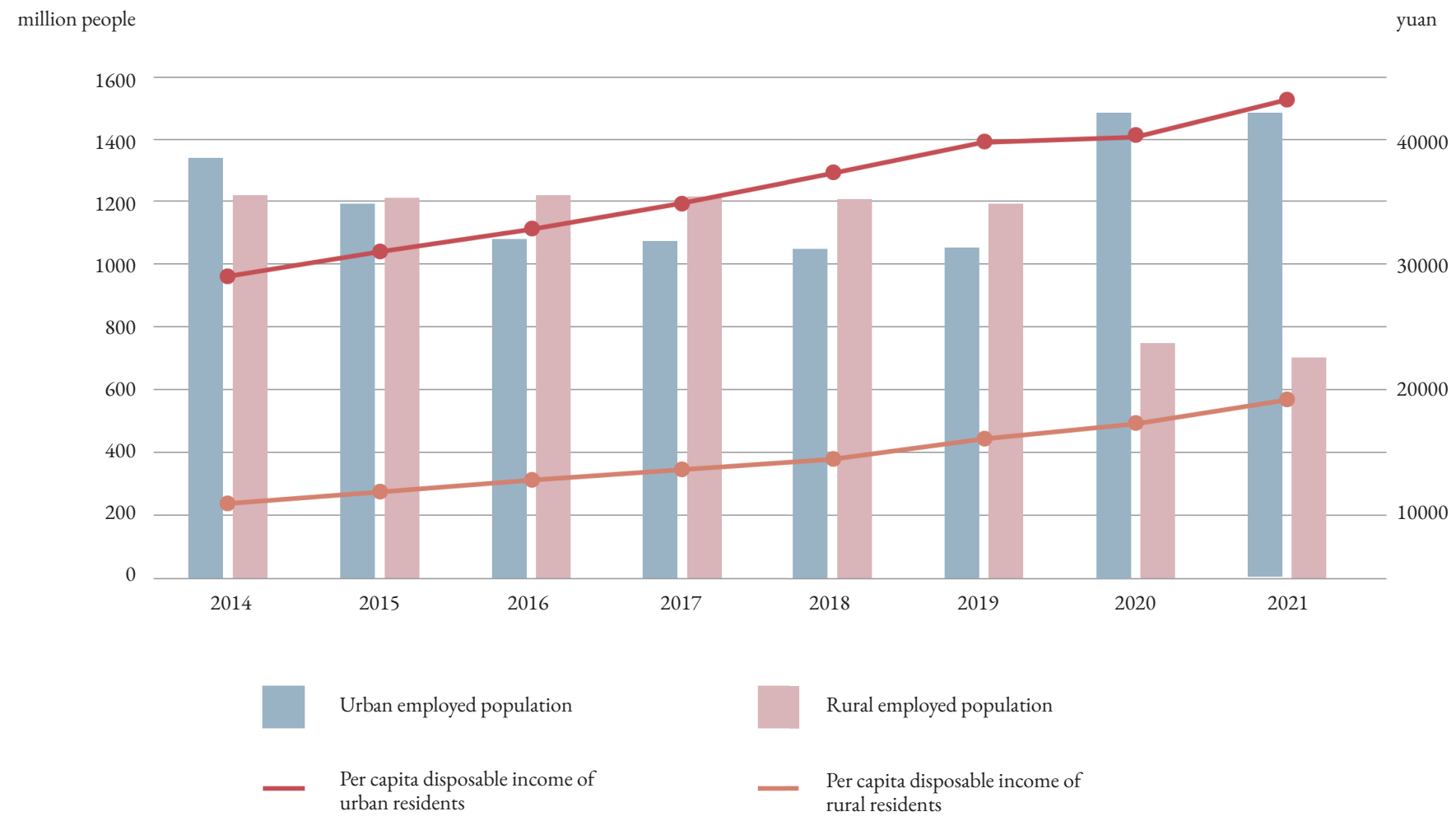
Made by author

2.1 Problems Faced by Desakota in Liaoning

Influenced by Urban Shrinkage

■ Aging population

■ Increased gap of income and employment between urban and rural areas



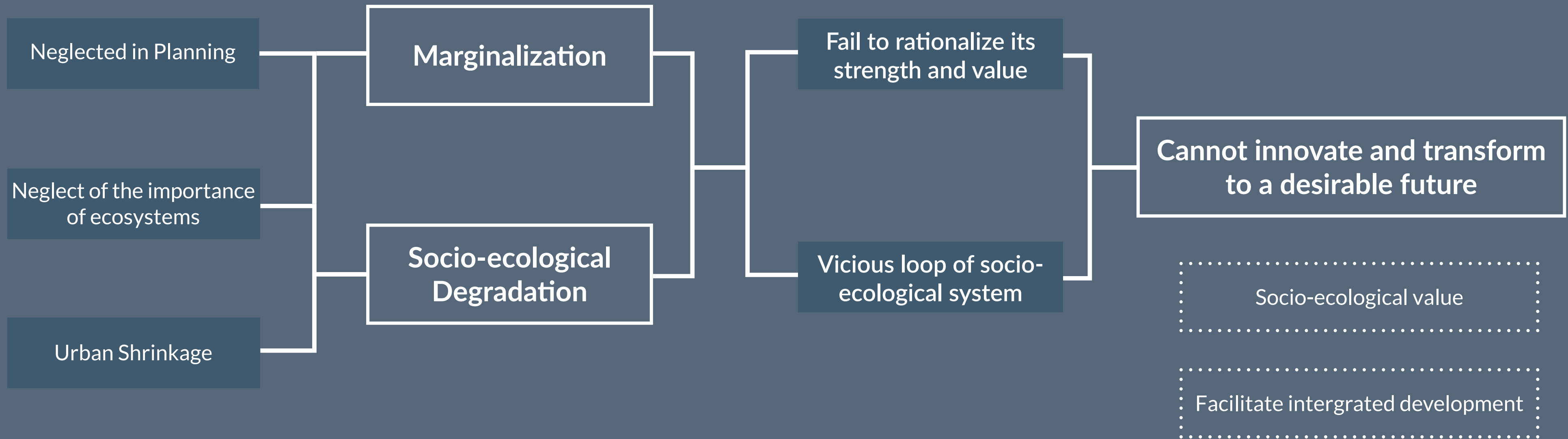
CONTEXT



Age structures of cities in 2021 in Liaoning

Made by author, data based on Liaoning Statistical Yearbook 2022 and Guan et al., 2020

2.2 PROBLEM STATEMENT



CHAPTER 3

CONCEPT



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 RESEARCH QUESTION

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

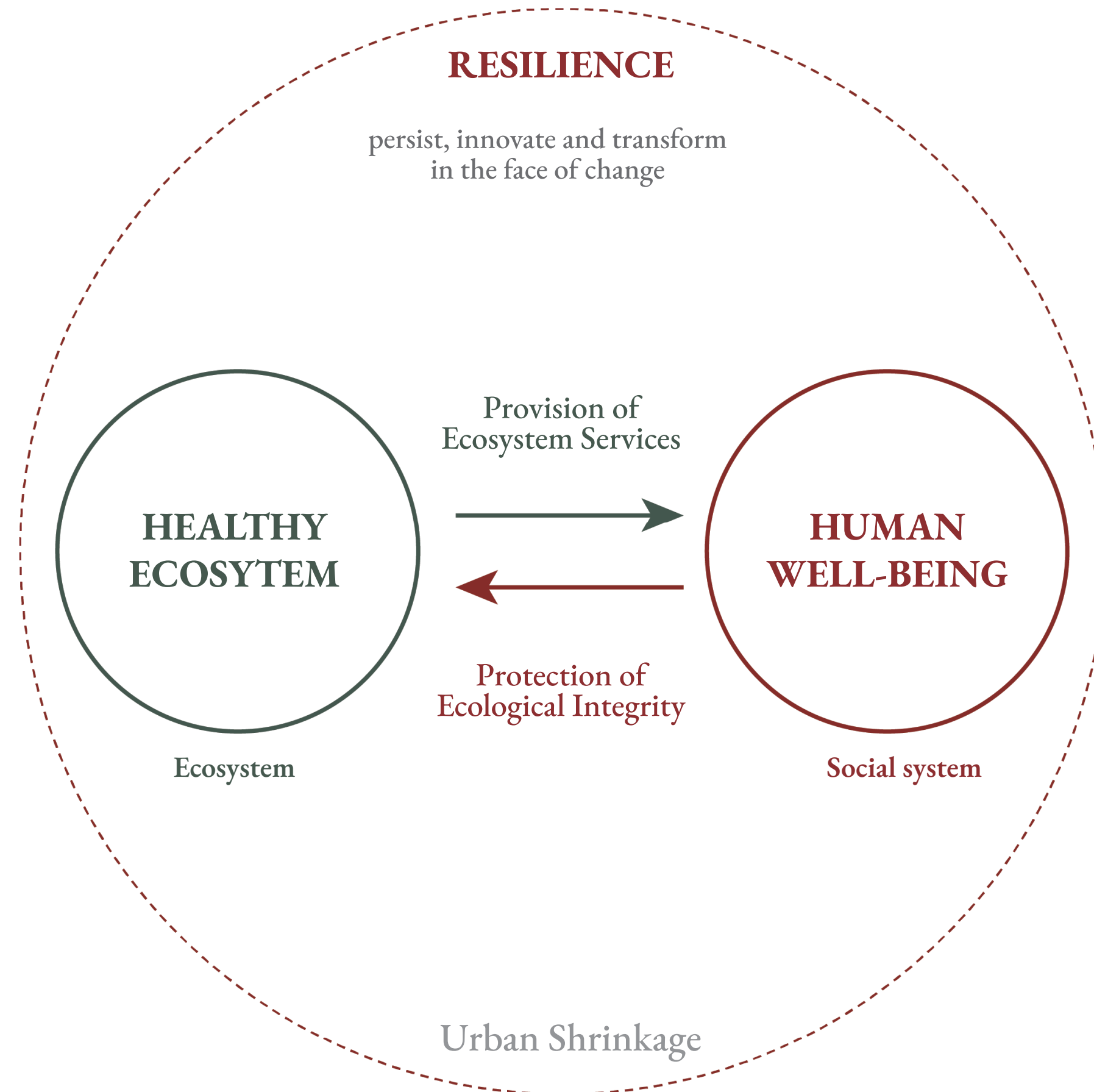
Current Situation

1. What does socio-ecological resilience mean to desakota?
2. What's the current state of the social-ecological system in Liaoning's desakota?
3. How does shrinkage affect the socio-ecological system of desakota in Liaoning?

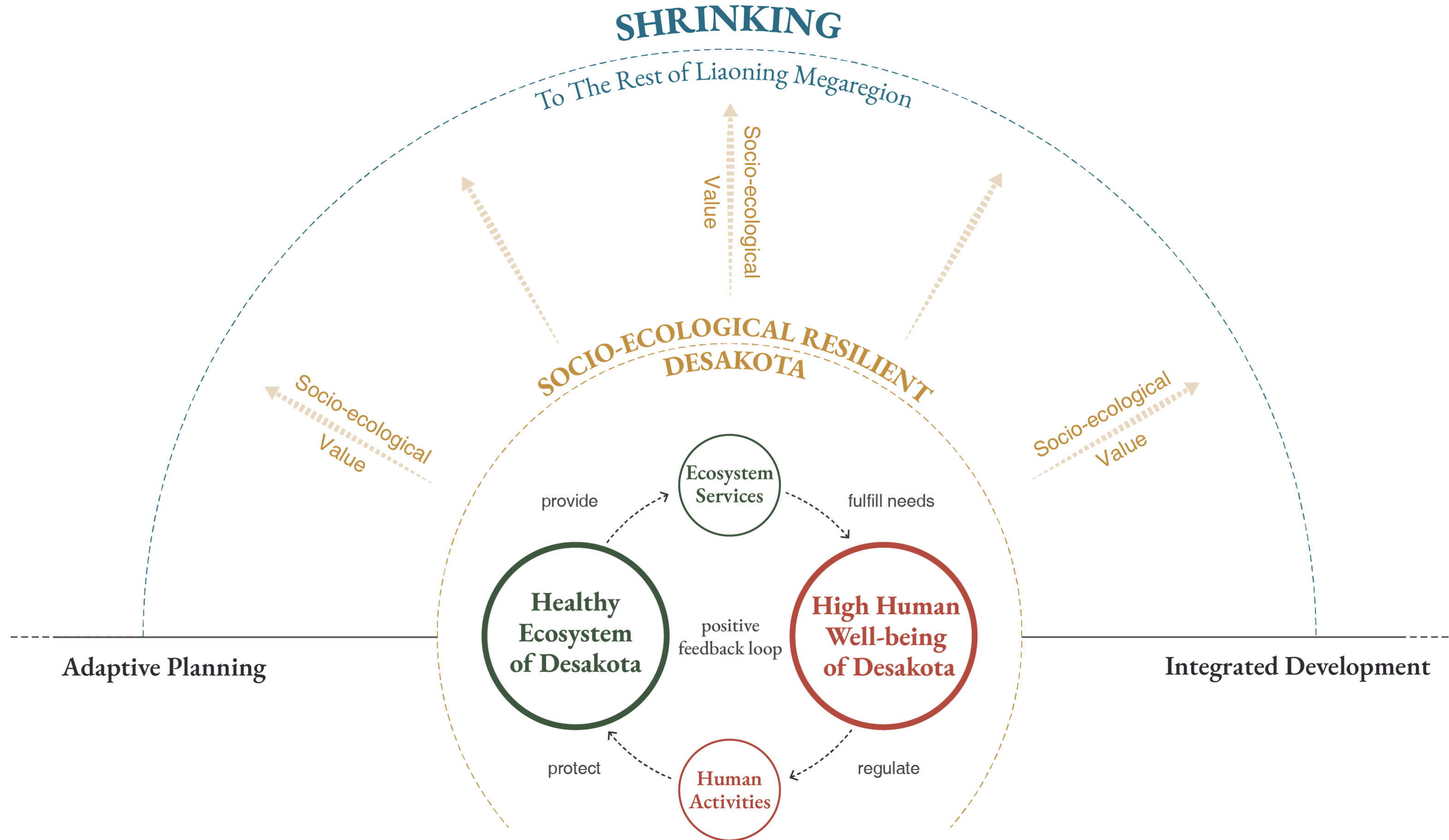
Future Transformation

4. How to regenerate the ecosystem and enhance human well-being in desakota?
5. How to ensure positive feedback between ecosystem and social system in desakota?
6. What socio-ecological values can desakota offer to the rest of the megaregion?
7. How can adaptive planning enhance the resilience of desakota's social-ecological system?

3.3 Theoretical Framework



3.4 Conceptual Framework

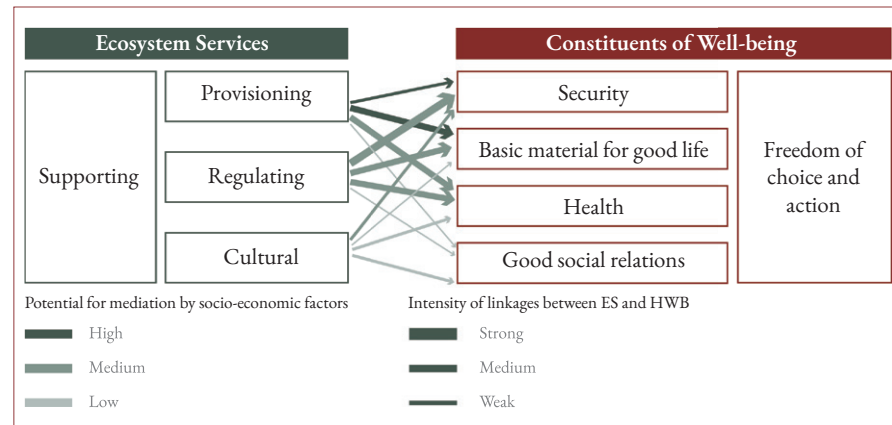


CHAPTER 4

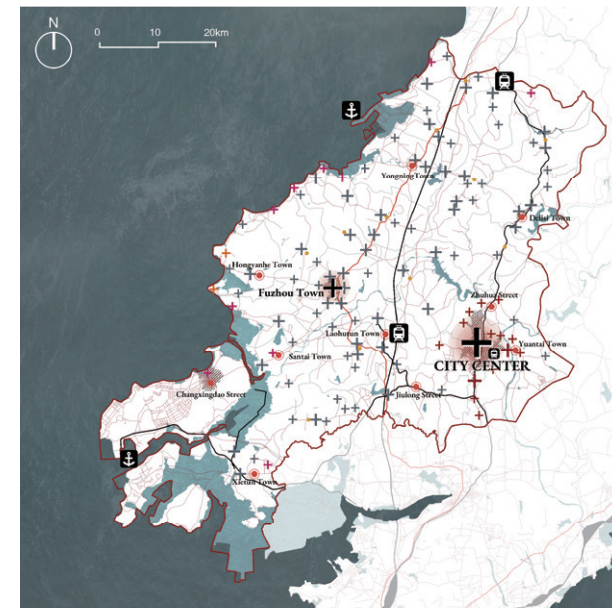
METHODOLOGY

4.1 Main Methods

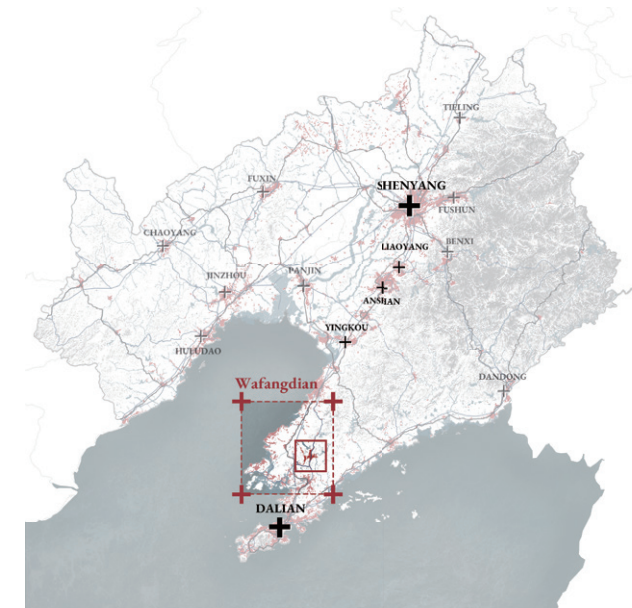
1. Literature Review



2. Mapping



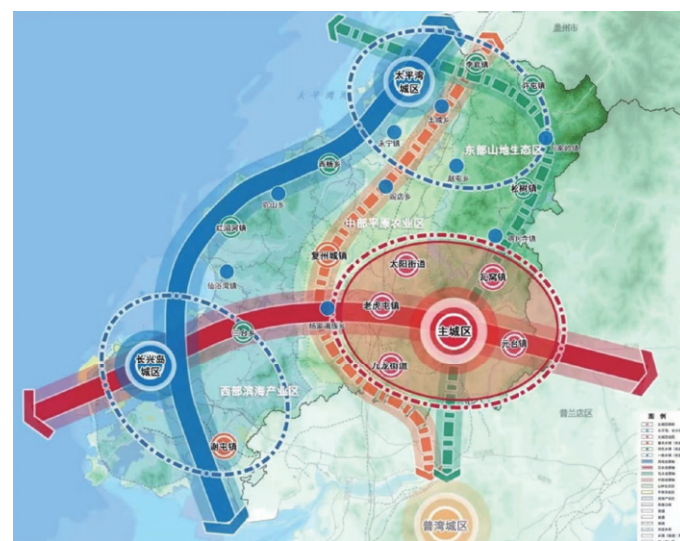
3. Case Study



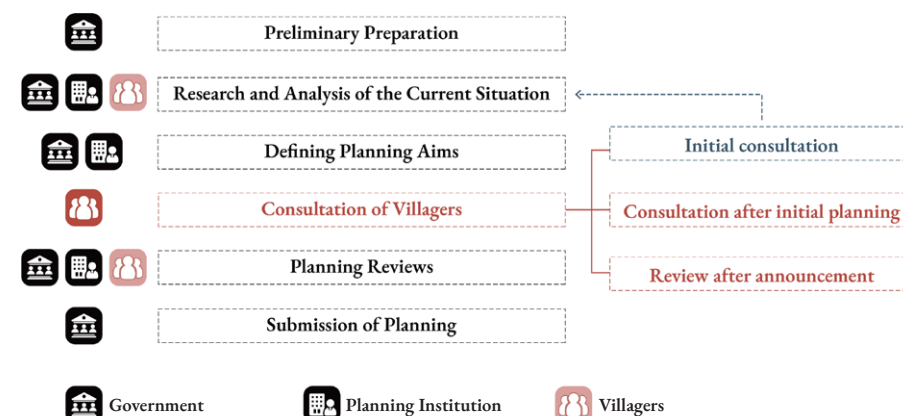
4. Fieldwork & Interview



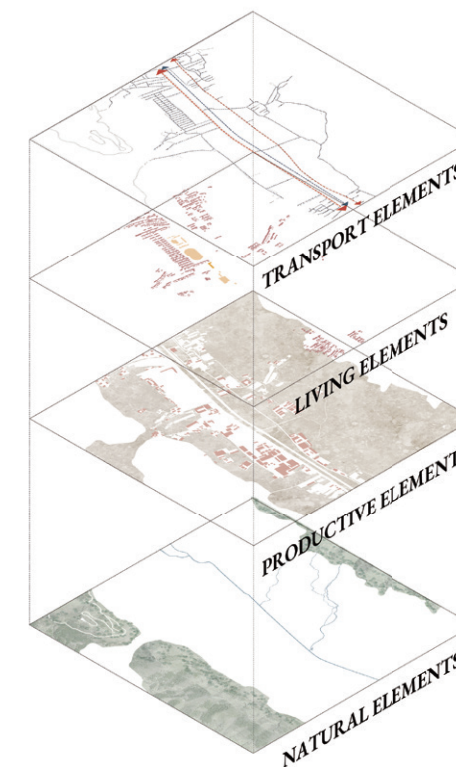
5. Policy Analysis



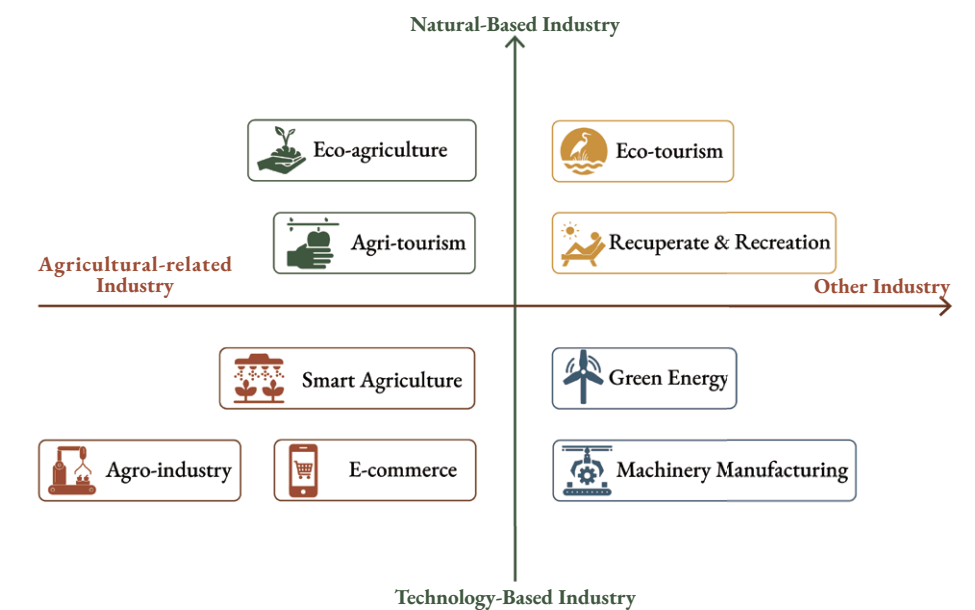
6. Stakeholder Analysis



7. Elemental Approach



8. Scenario Building



A black and white photograph of a rural landscape. In the background, there are several large, rounded mountains under a clear sky. The middle ground shows a field with some sparse vegetation and a few small, simple buildings. In the foreground, there are several people engaged in agricultural work. One person stands in the center-left, holding a long pole or tool. To their right, another person is bent over, working in the field. On the far left, two more people are sitting on the ground. The overall scene depicts a traditional agricultural setting.

CHAPTER 5

CASE STUDY
Wafangdian City

5.1 Introduction of Wafangdian



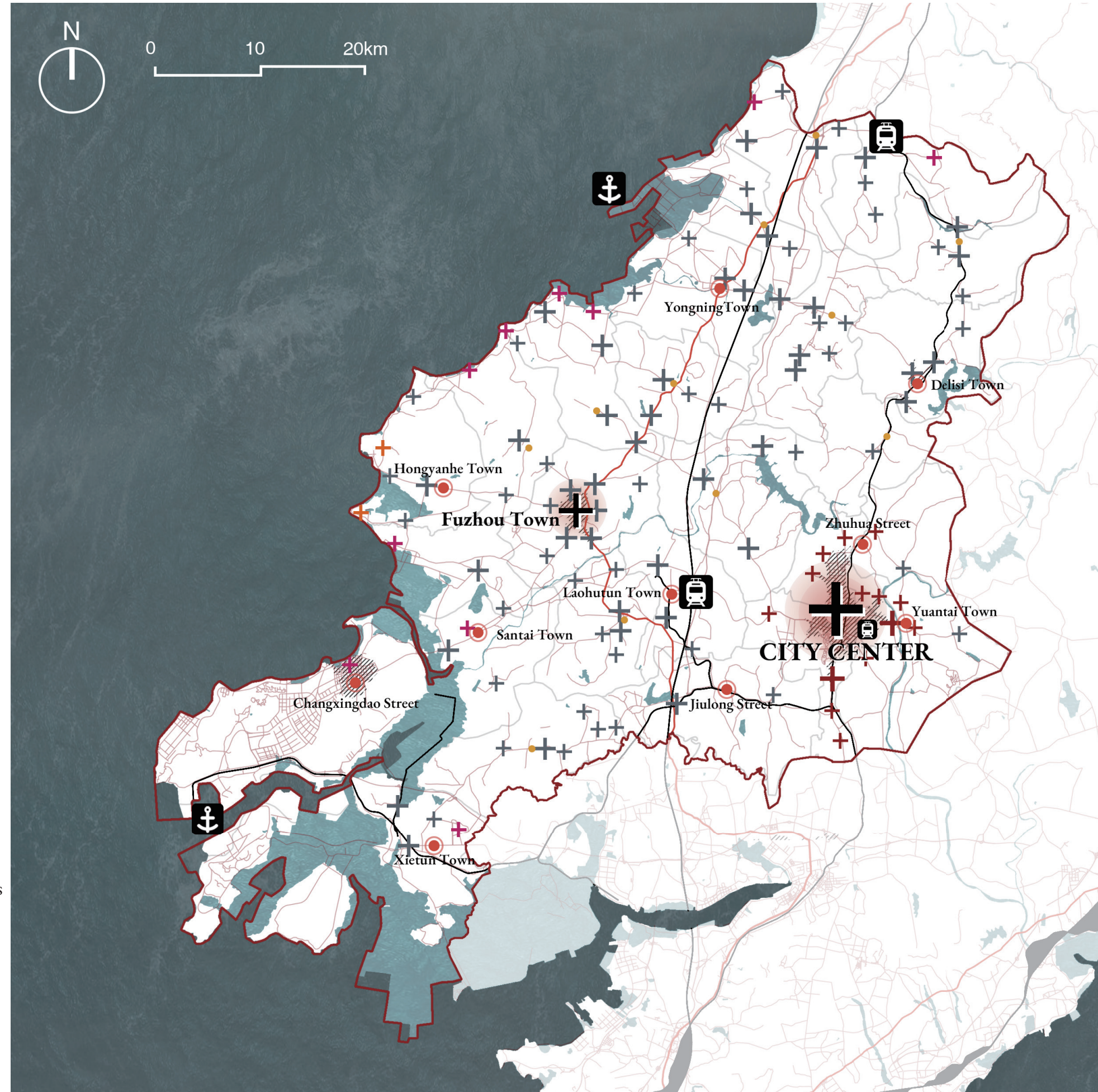
Source: Internet



5.2 Distribution of desakota in Wafangdian



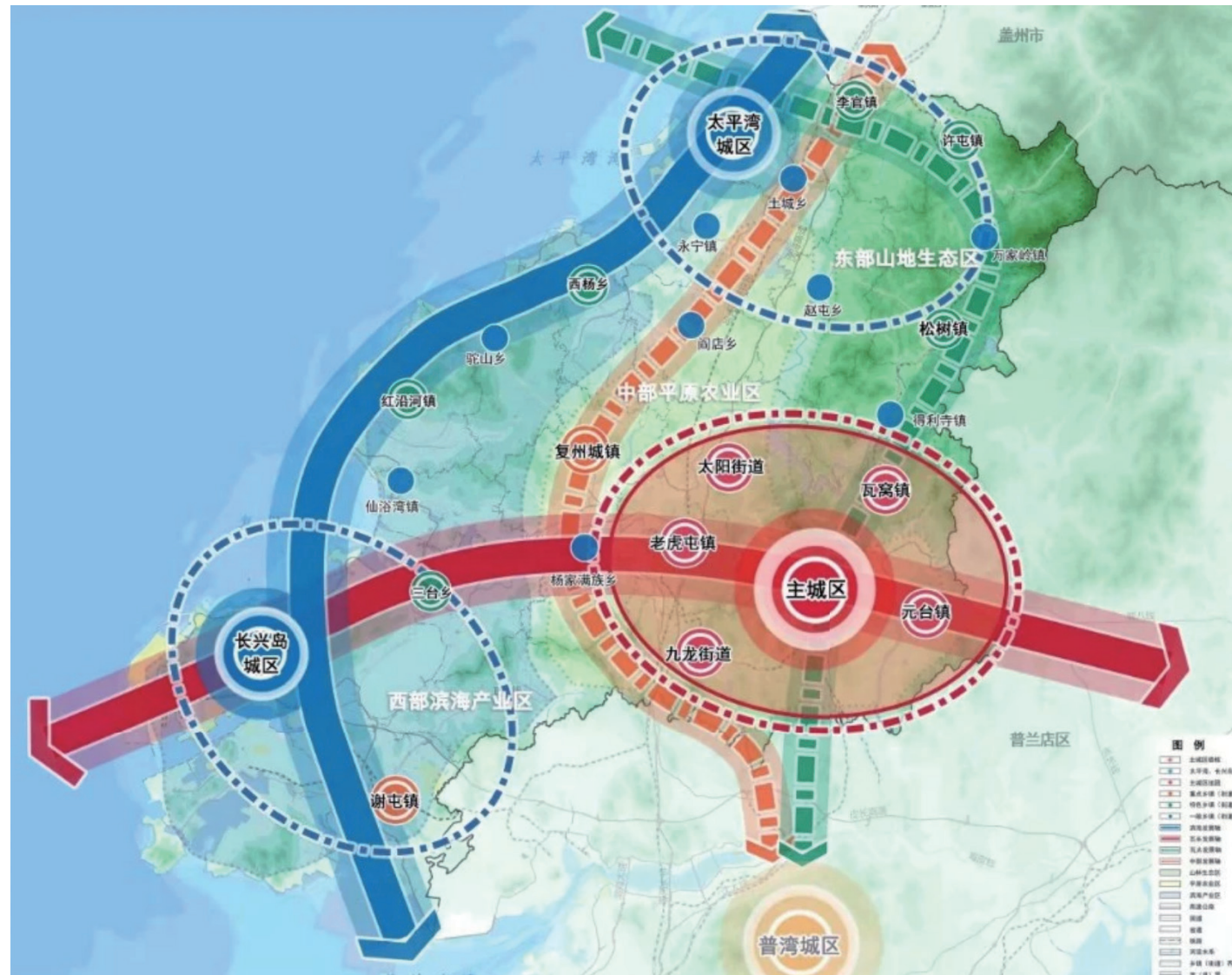
- | | | | |
|---|-------------------------------------|---|--------------------------------|
| + | Center | ● | Town Center with More Services |
| + | Desakota Around the City Center | ● | Town Center with Less Services |
| + | Desakota Far from City Center | 🚂 | Train Station |
| + | Desakota with Tourism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



5.3 Problems of desakota in Wafangdian

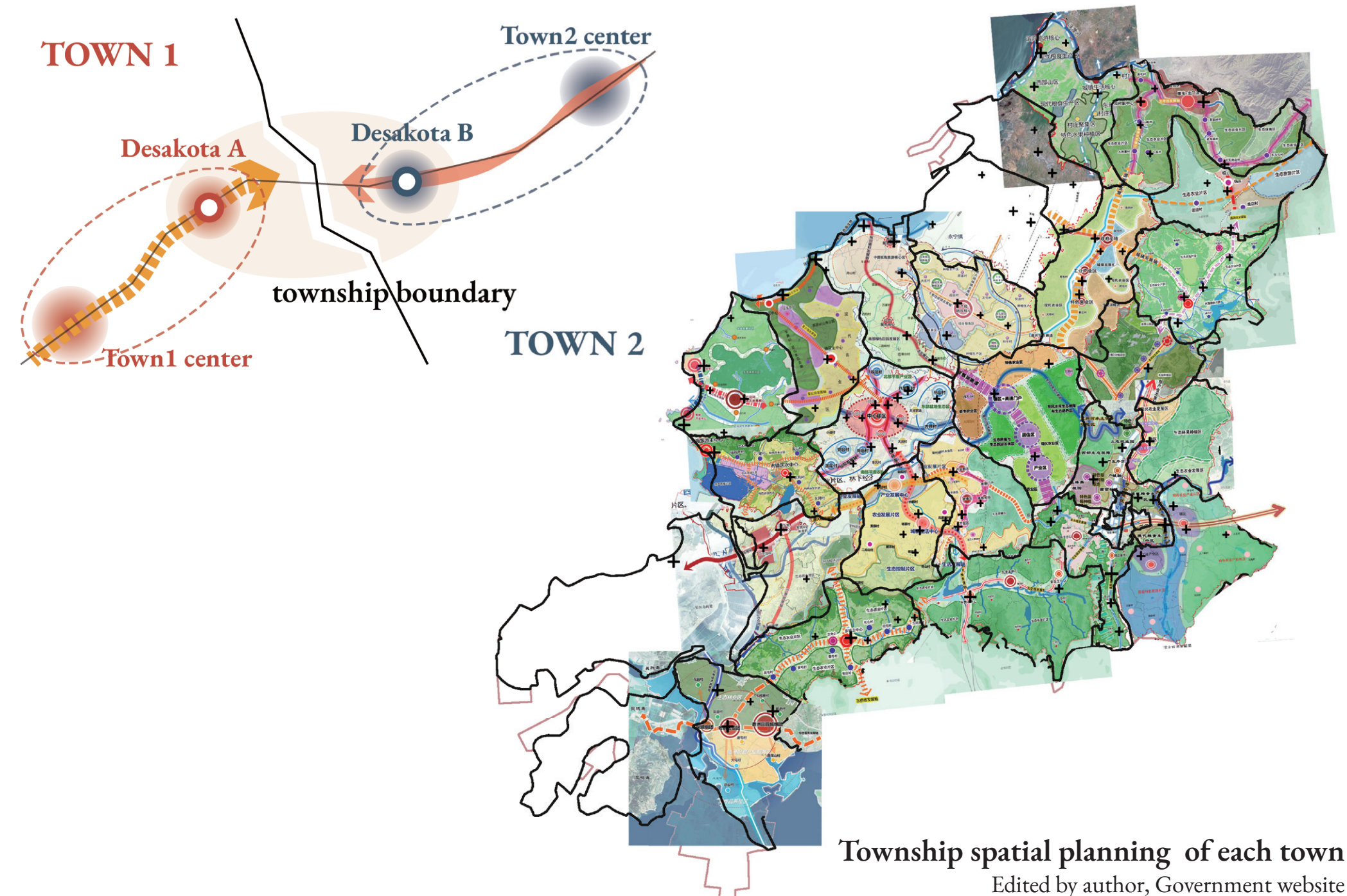
5.3.1 Fragmented and Isolated

Neglected in municipal planning



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

Lacking overall coordination



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

5.3 Problems of desakota in Wafangdian

5.3.2 Suffering from Socio-ecological Degradation



Source: Internet



环境执法大练兵揭开大案——非法冶炼废旧铅酸蓄电池污染环境大案告破

原创 大连微环境 大连生态环境 2016-11-11 09:44

非法冶炼废旧铅酸蓄电池污染环境大案告破

辽宁全省近年来侦办的最大一起污染环境案件，也是大连市环境监察部门正在开展的执法大练兵中发现的一个大案。

Illegal smelting of batteries leads to serious pollution in desakota

大连瓦房店仙浴湾化工废物填埋致水污染 村民实名举报

今年8月23日，瓦房店市瓦房店镇仙浴湾村羊官堡屯全体村民实名举报，东享公司用化工废物填埋到距离仙浴湾羊官堡屯饮水井100米左右，导致村民饮用水污染。

阅读排行榜 / 评论排行榜

01	医药反腐持续深入：被省委书记点赞 升至176位 又有多名医院院长...	7,172
02	这次，日本不装了	4,626

Chemical waste landfill leads to water pollution, Real-name Report by Villagers



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

Source: Internet, Made by author

5.4 Advantages of Desakota of Wafangdian

High connectivity



Strong agricultural & industrial base



Rich tourism resources

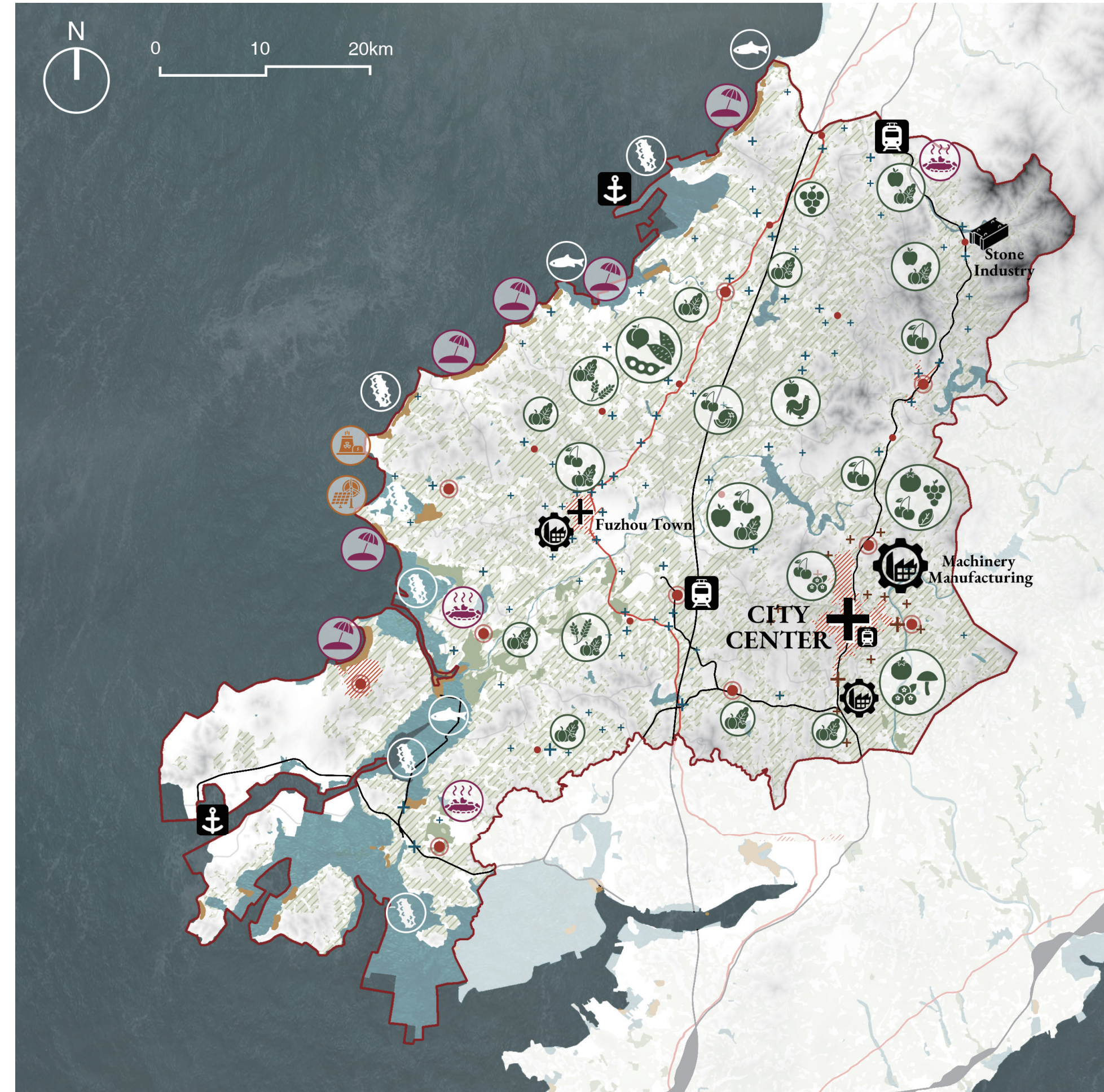


Clean energy resources



Source: Internet

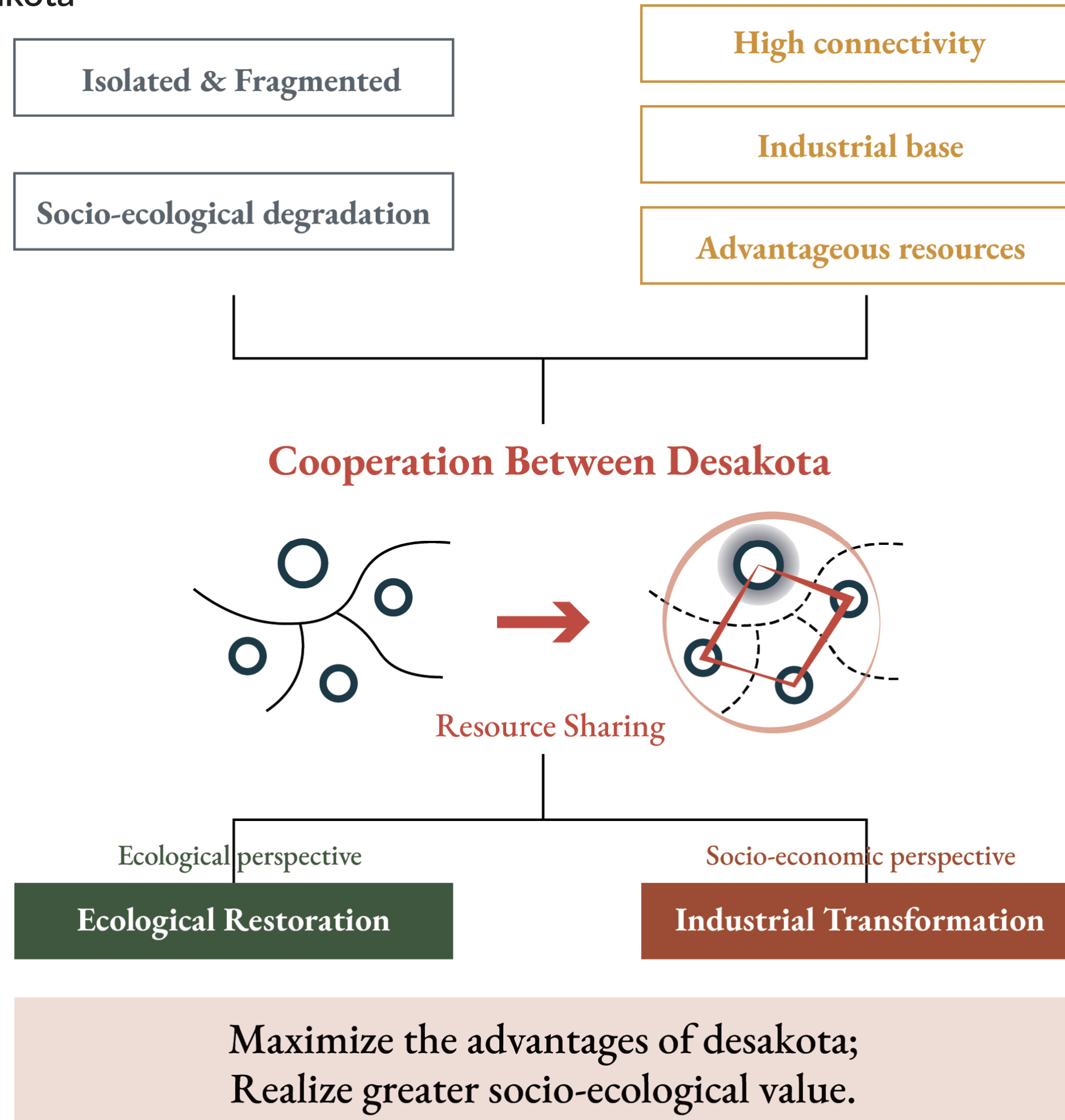
- | | | | | | |
|----|------------------------|---|--------------------------------|---|---------------------|
| + | City Center | ● | Town Center with More Services | ■ | Beach |
| + | Desakota | ● | Town Center with Less Services | ▨ | Farmland |
| 🌿 | Agriculture Resources | 🚂 | Train Station | ■ | Paddy Field |
| ⚡ | Clean Energy Resources | ⚓ | Harbour | ▨ | Urban Built-up Area |
| ☂️ | Tourism Resources | — | Railway | — | Township Boundary |
| — | National Highway | | | | |



Advantages of desakota in Wafangdian

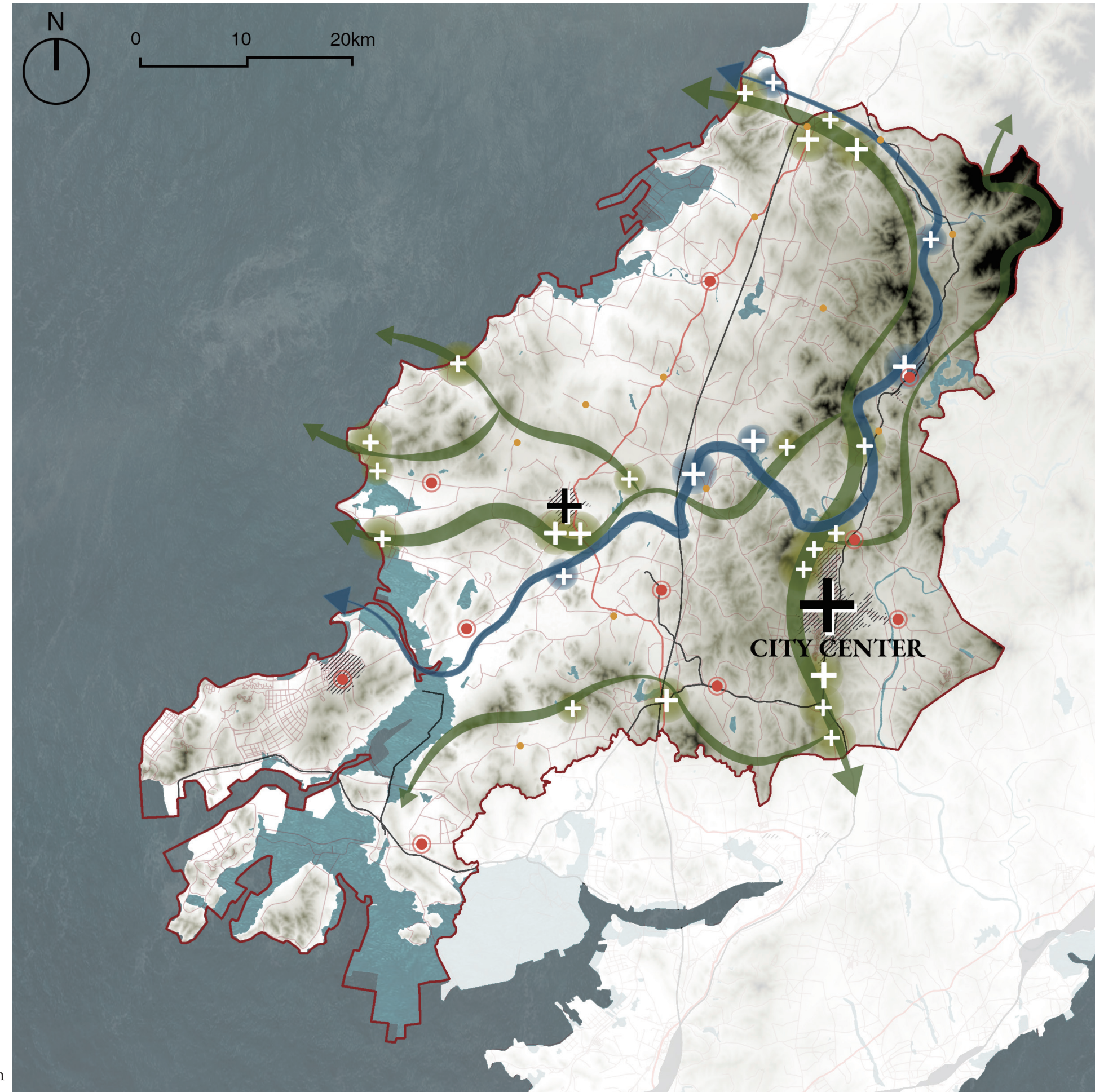
Made by author

5.5 Cooperation between Desakota



5.5 Cooperation between Desakota

5.5.1 Ecological Restoration



- Town Center with More Services
- Town Center with Less Services
- ← Green Corridor (mountain)
- ← Blue Corridor (river)
- ⊕ Desakota with river restoration
- ⊕ Desakota with mountain restoration

Ecological restoration and blue-green system

Made by author

5.5 Cooperation between Desakota

5.5.2 Industrial Transformation

Current Industry



Machinery Manufacturing



Building Material Industry



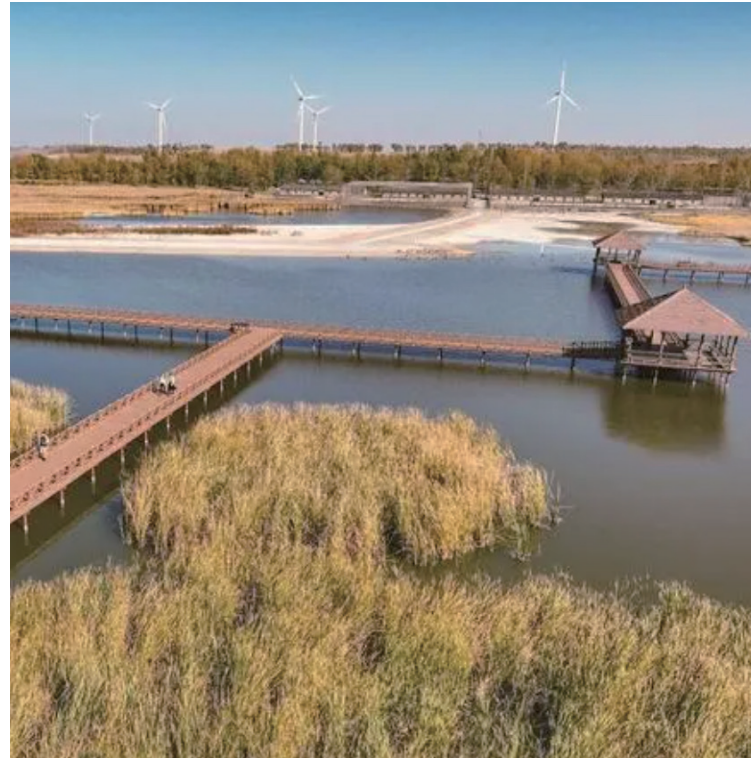
Textile Industry

Little job opportunity for low-skilled workers

Cannot help villagers achieve economic growth

Pollution

New Possible Industry



Eco-tourism



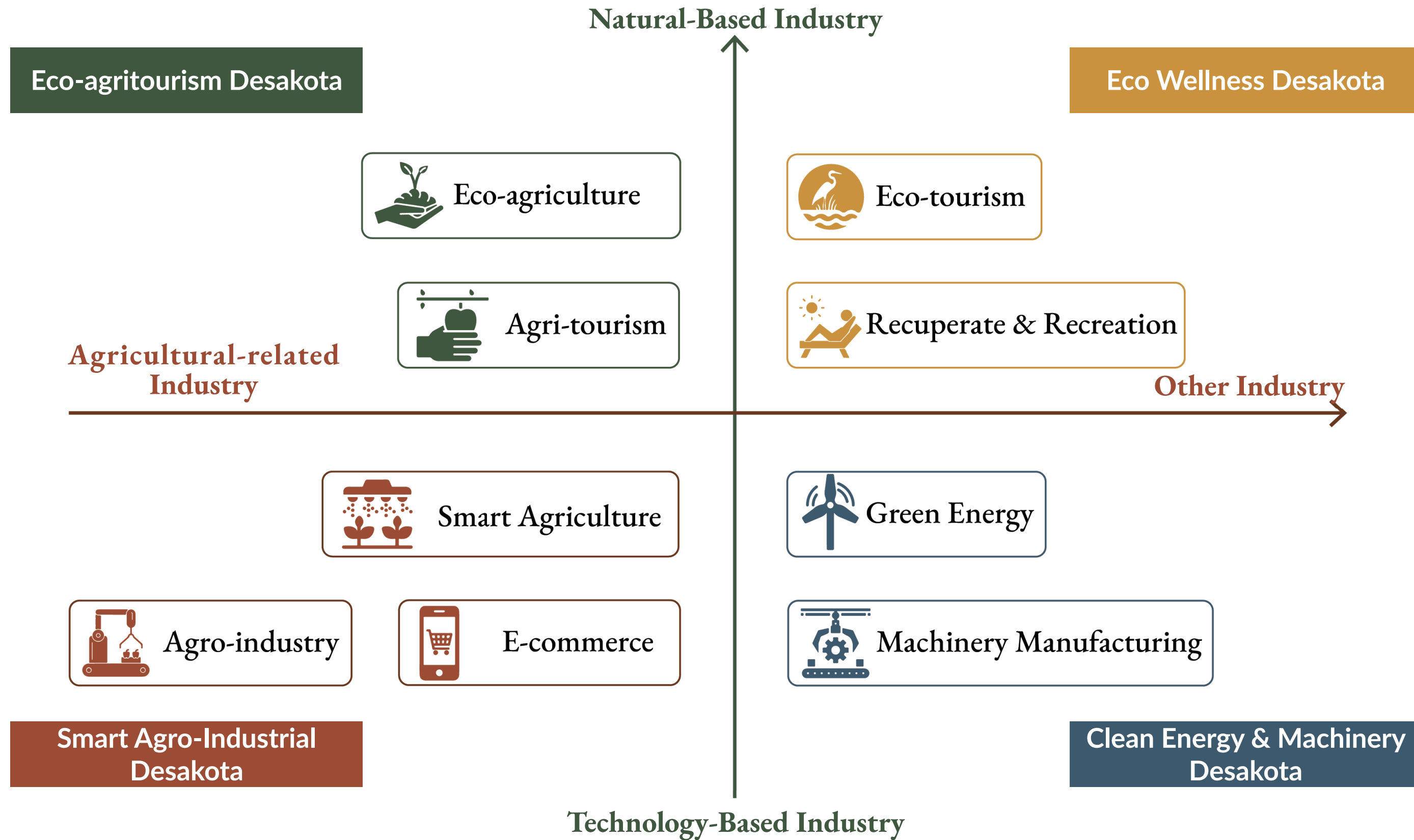
Clean Energy



Eco-agriculture

5.5 Cooperation between Desakota

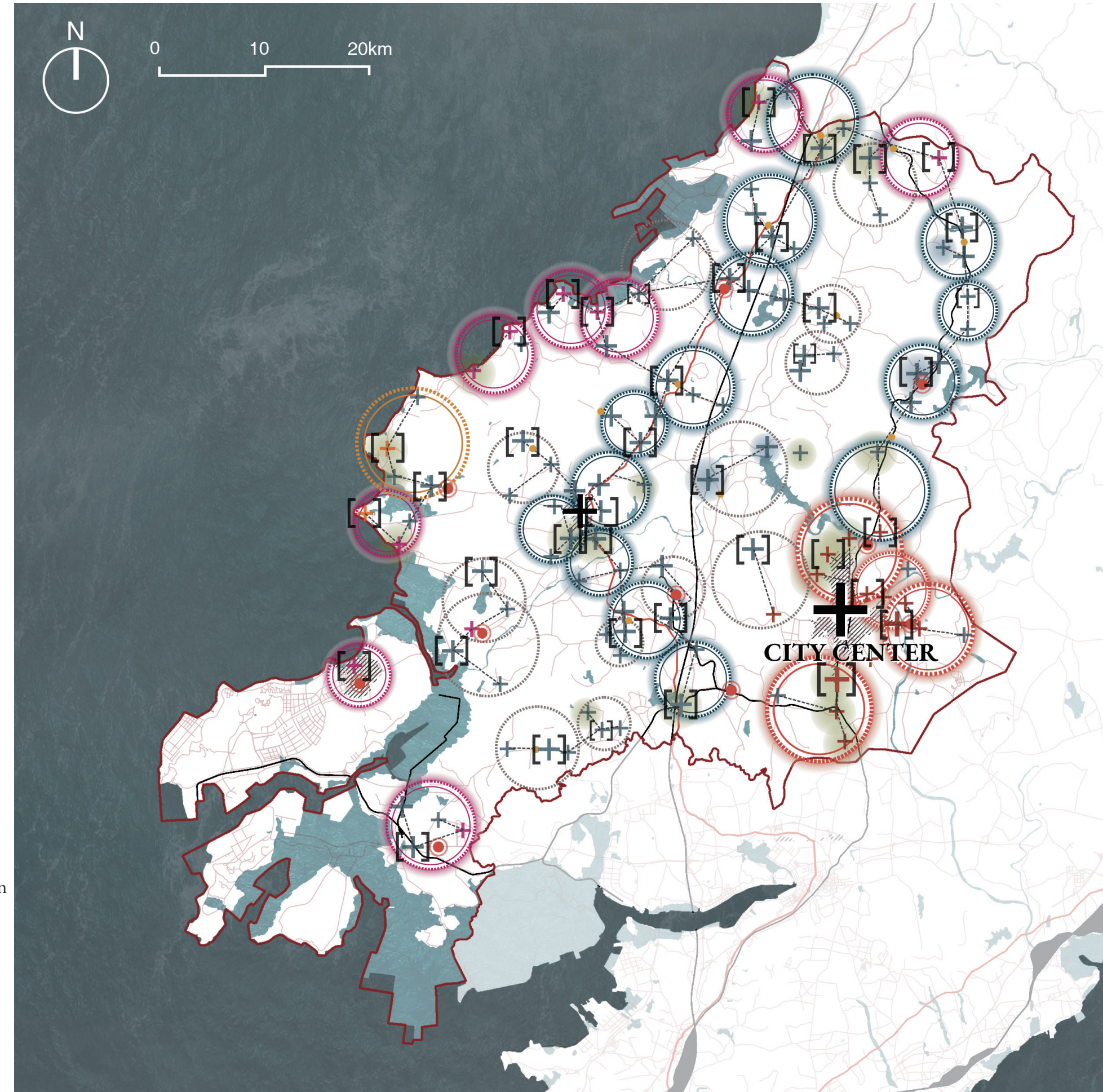
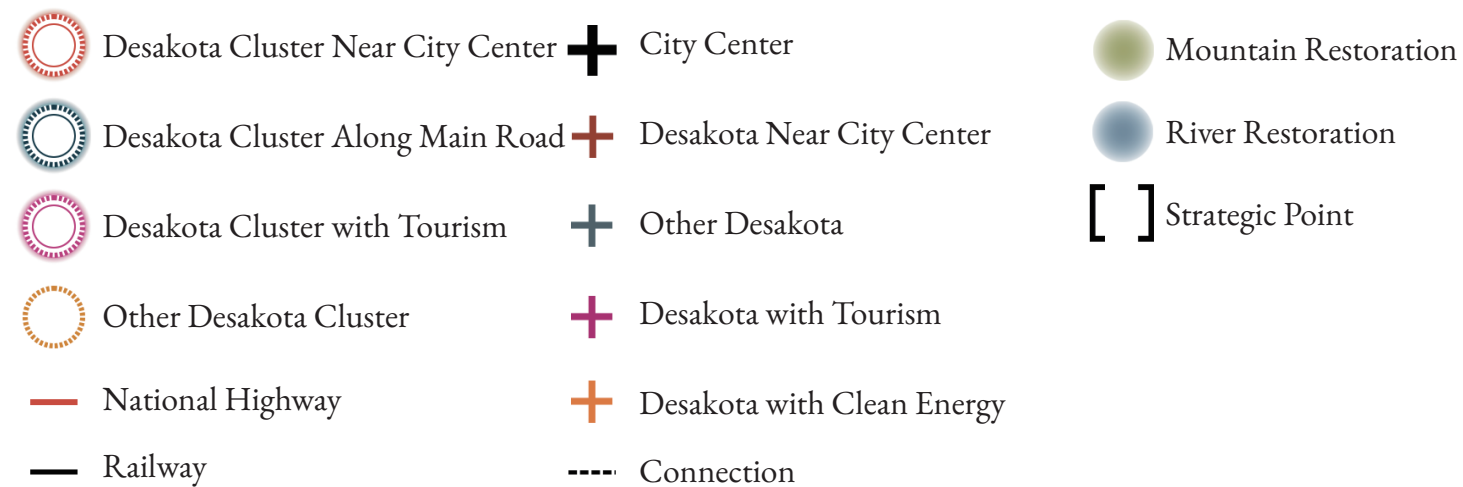
5.5.2 Industrial Transformation



5.5 Cooperation between Desakota

5.5.3 Desakota Cooperative Clusters

- Industrial agglomeration
- Tourism or clean energy resources
- Ecological significance

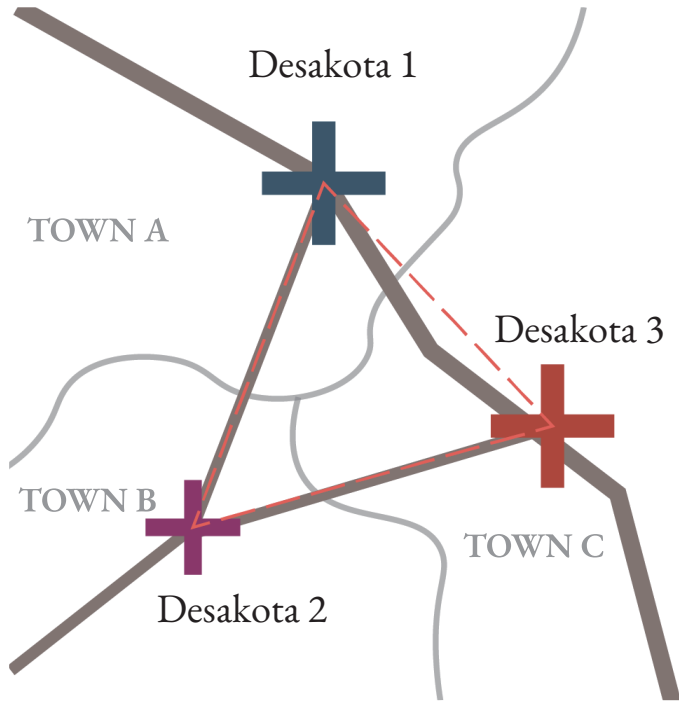


Cooperative cluster of desakota in Wafangdian

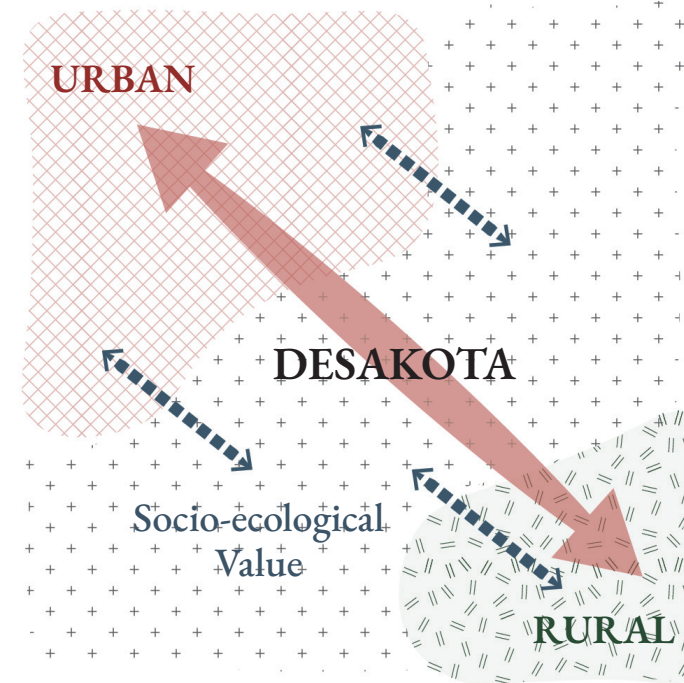
Made by author

5.6 Vision of Wafangdian

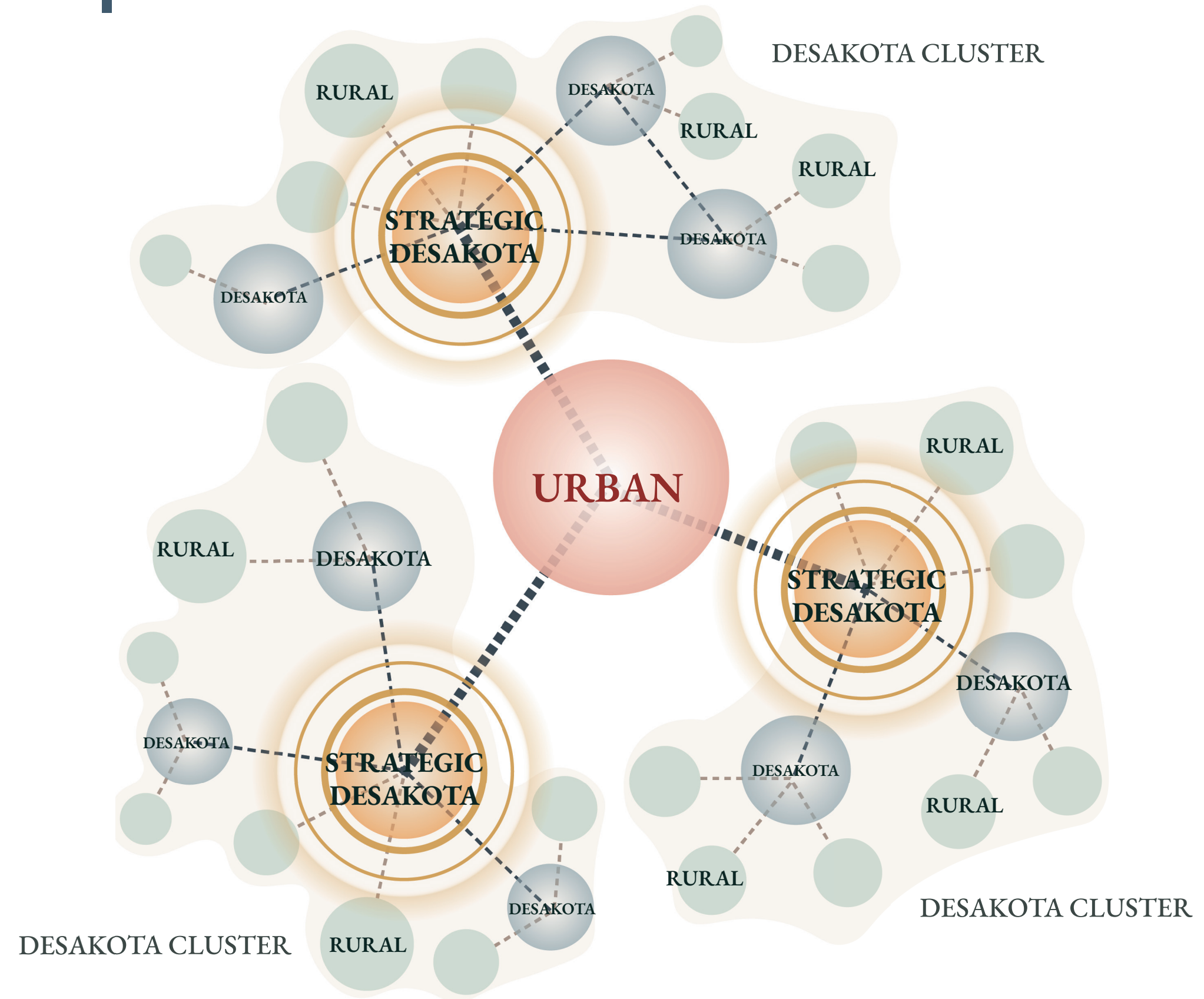
Breaking down township borders to cooperate



















Desakota as a connector between urban and rural areas

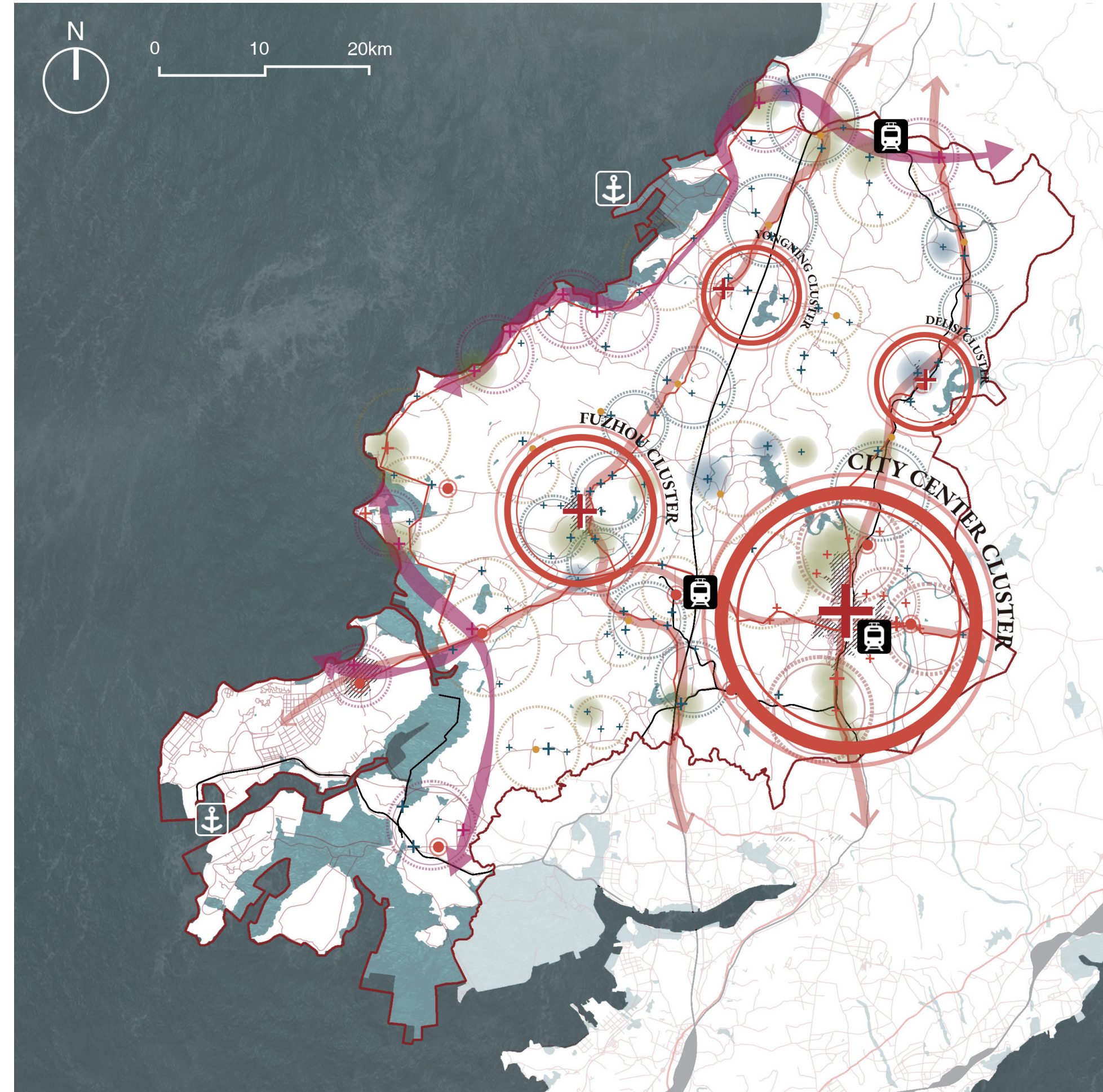


A closely integrated and unified system



5.6 Vision of Wafangdian

- | | | | | | |
|---|-------------------------------------|---|------------------|---|----------------------|
|  | Center |  | New City Cluster |  | Mountain Restoration |
|  | Desakota Around the City Center |  | Desakota Cluster |  | River Restoration |
|  | Desakota Far from City Center |  | Train Station | | |
|  | Desakota with Tourism |  | Harbour | | |
|  | Desakota with Clean Energy Industry |  | Tourism Belt | | |
|  | Important Road |  | Development Belt | | |
|  | Railway |  | Road System | | |



Vision Map of Wafangdian
Made by author











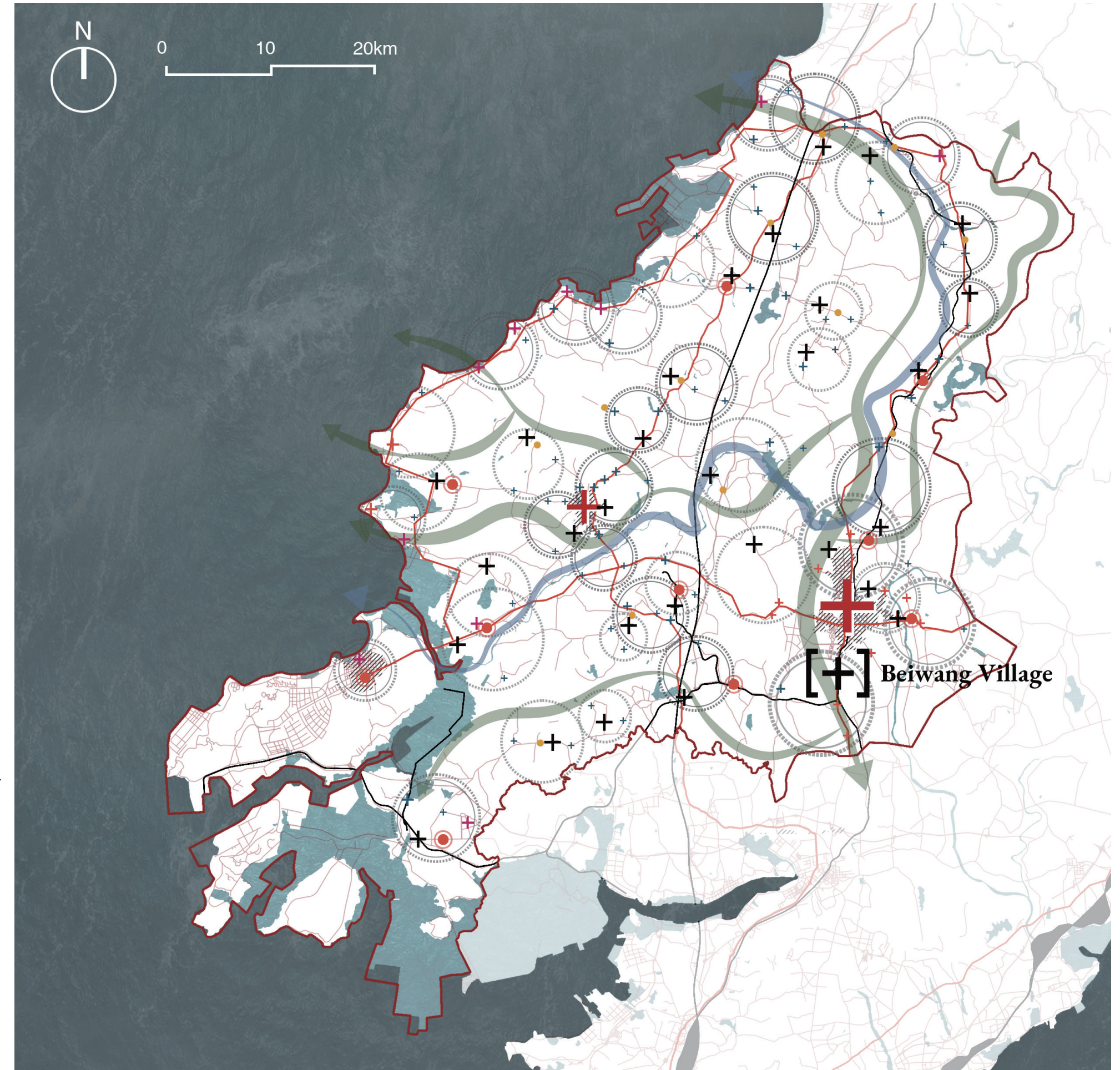
CHAPTER 6

CASE STUDY
Beiwang Village

6.1 Overview of Beiwang Village

Less Competitive

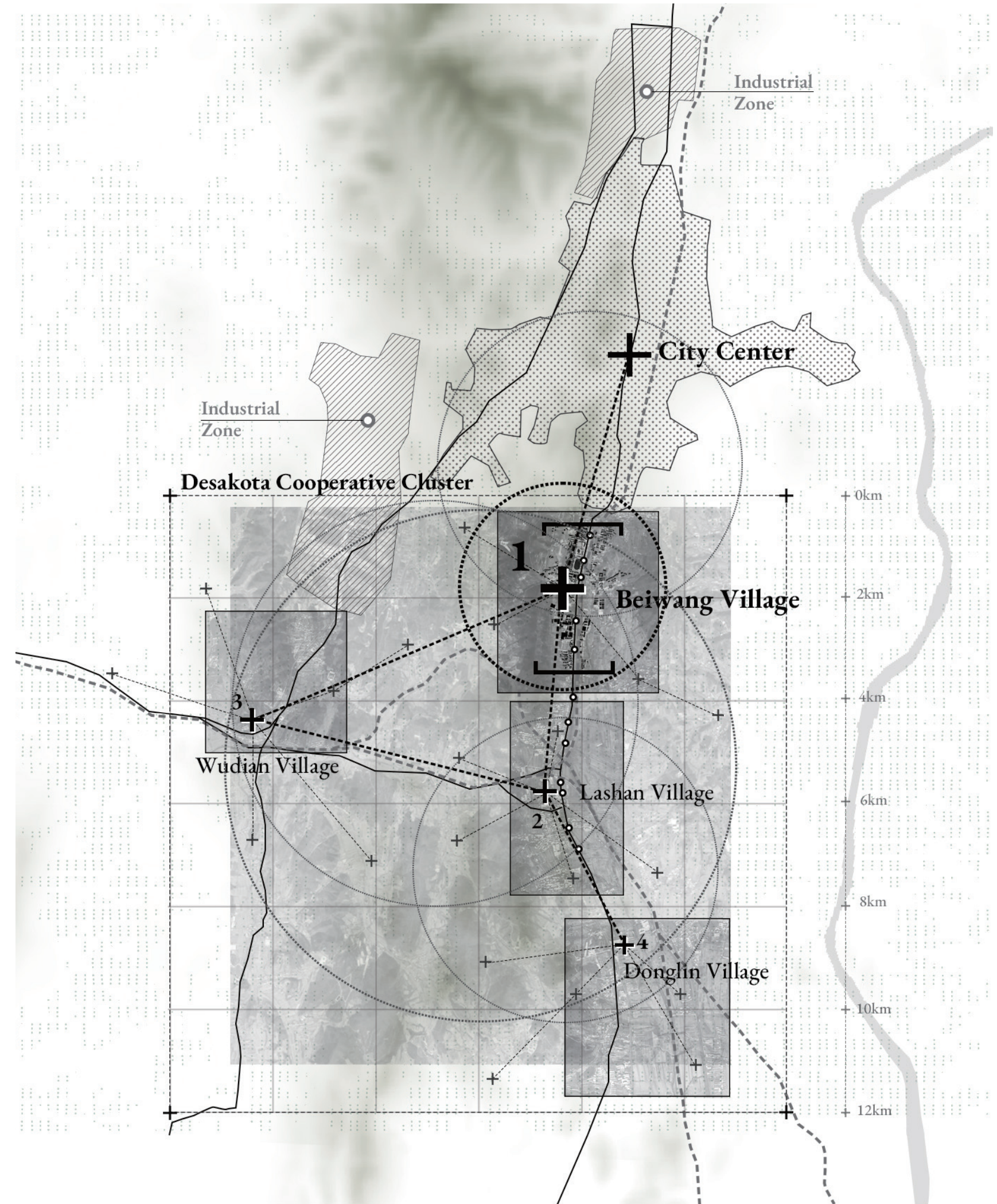
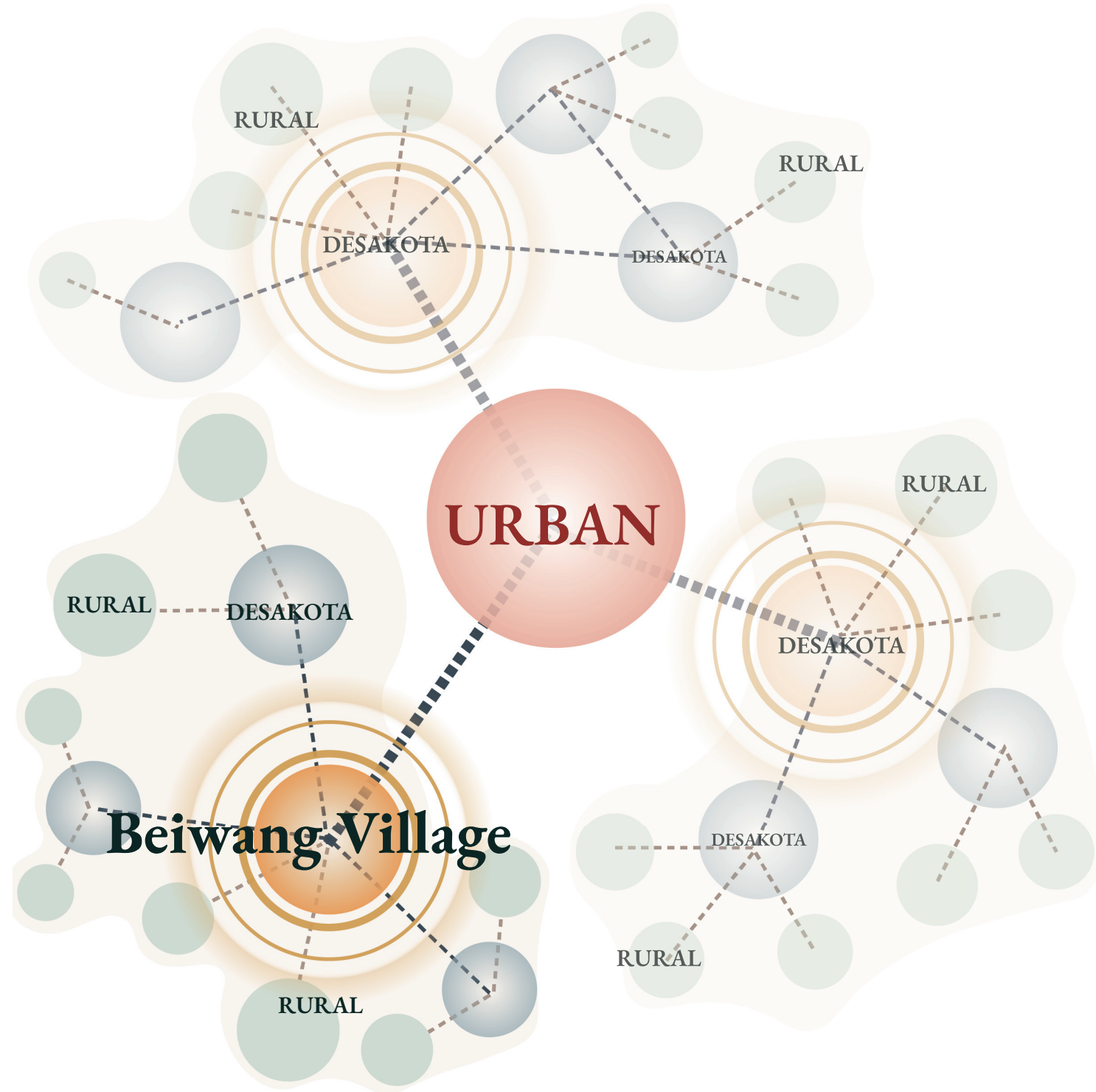
-  Desakota Cooperative Cluster
-  Green Corridor
-  Beiwang Village
-  Blue Corridor
-  Normal Desakota as Strategic Point
-  City/Town Center
-  Important Road
-  Railway



Position of Beiwang village in Wafangdian city
Made by author

6.1 Overview of Beiwang Village

Strategic Point



6.1 Overview of Beiwang Village



Well-managed farmland

Photographed by author



Abandoned farmland

Photographed by author



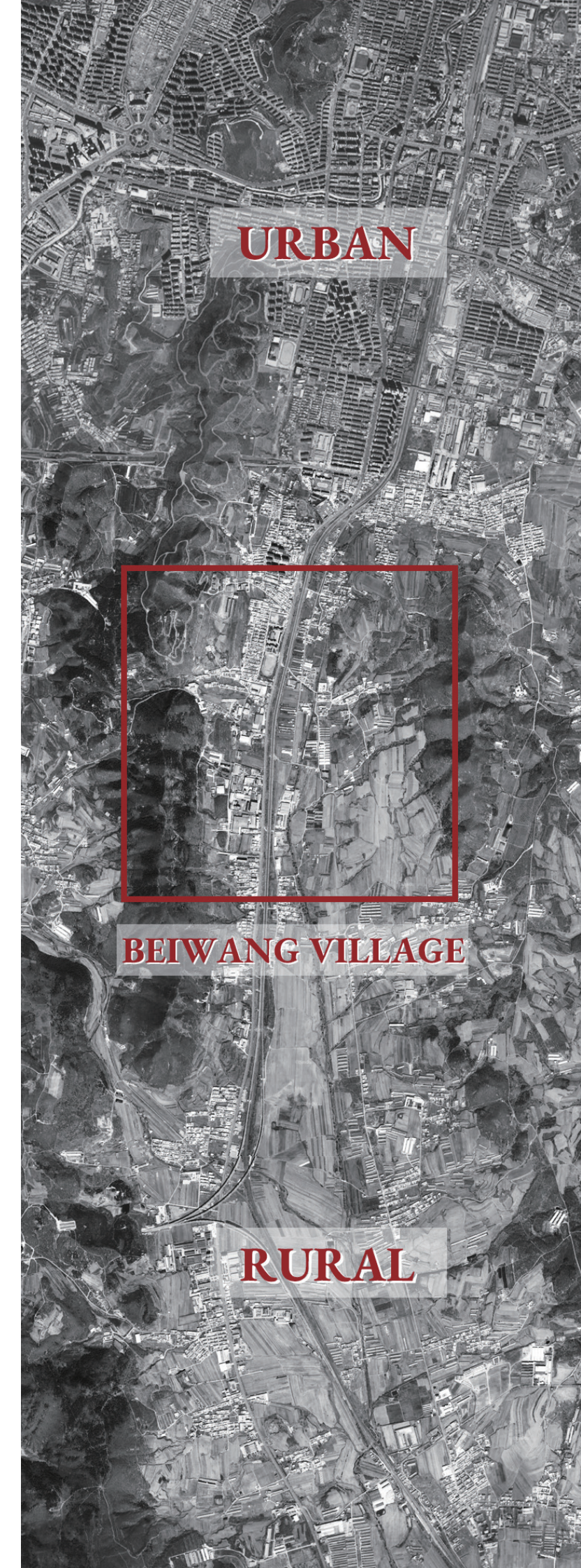
Big factories in Beiwang Village

Photographed by author



Small factories in Beiwang Village

Photographed by author



6.2 Elemental Analysis of Beiwang Village



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

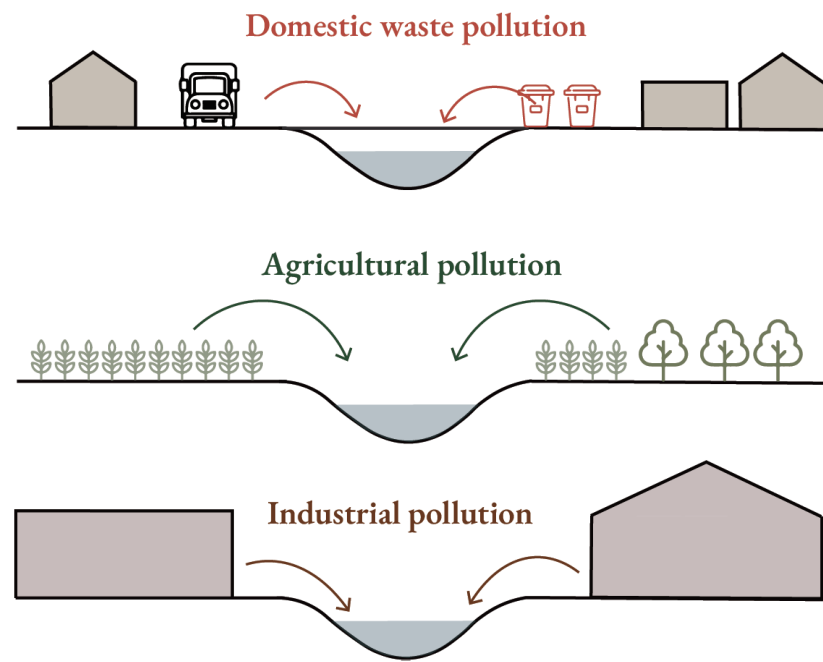
Reuse of Existing Factories

Agricultural Base

High Connection to
Urban & Rural

Better Condition than Rural

6.3 Socio-ecological Degradation of Beiwang Village



Pursuit of economic benefits
&
Lack of planning



Human Activities

- > Machinery manufacturing industries
- > Villagers' daily life
- > Agriculture

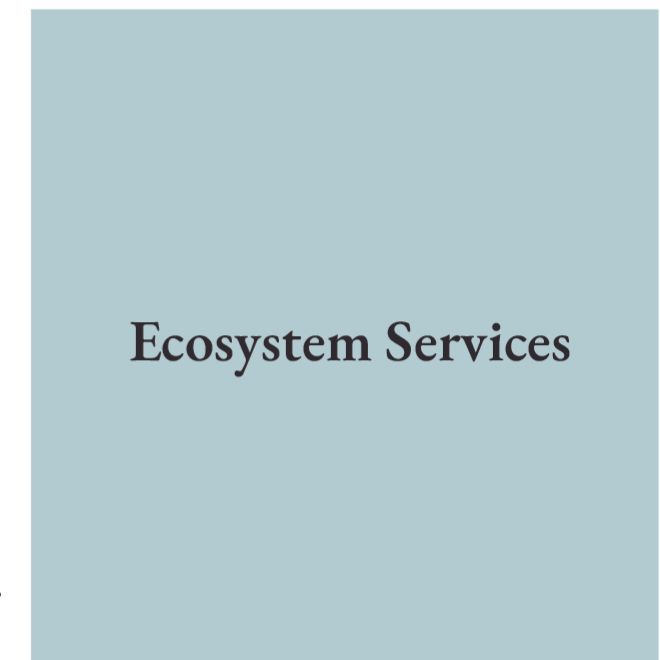
Low economic benefits

Polluted &
disappeared nature

Unwillingness &
disability to regulate

Reduced capacity
to provide

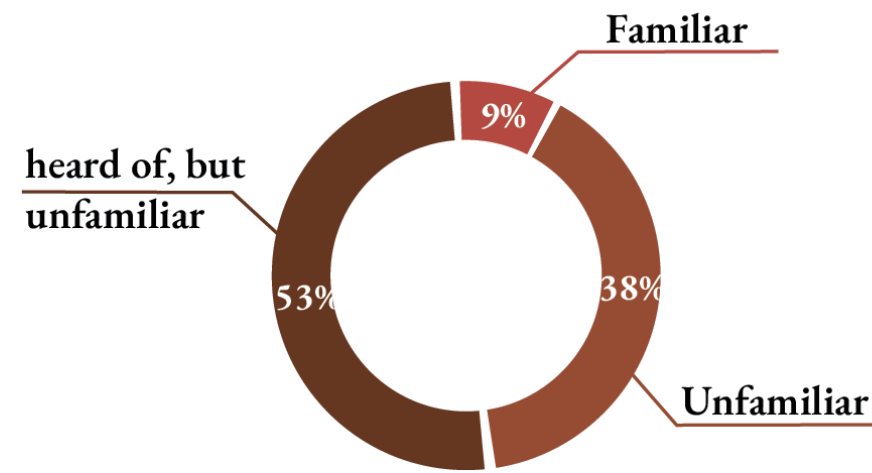
Cannot fulfill
human needs



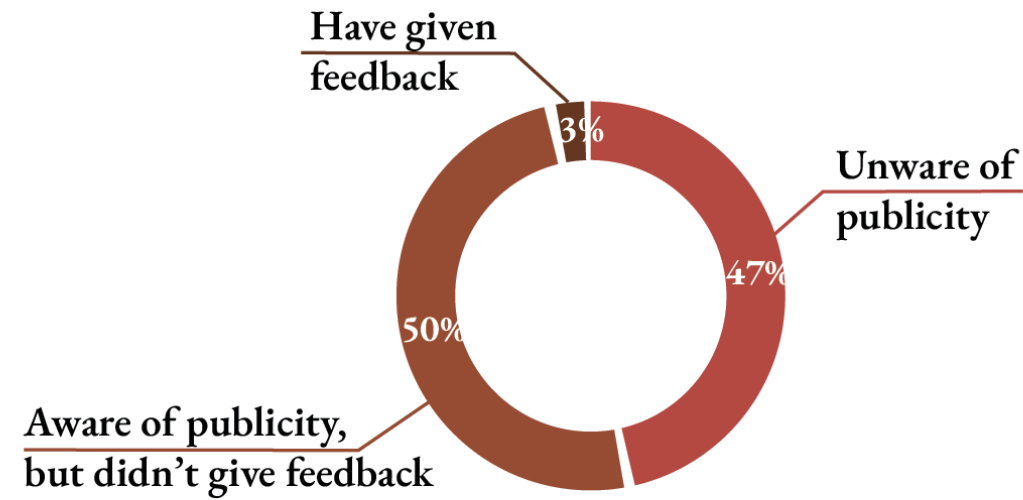
6.4 Low Level of Public Participation

27 questionnaire with villagers + **50** questionnaire with workers

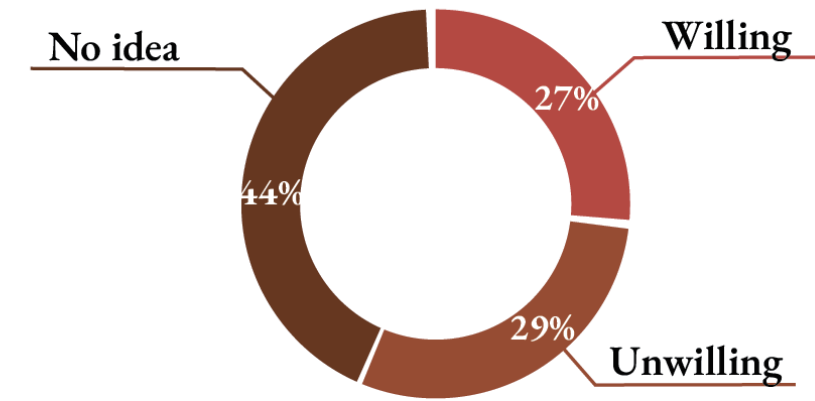
Familiarity with planning



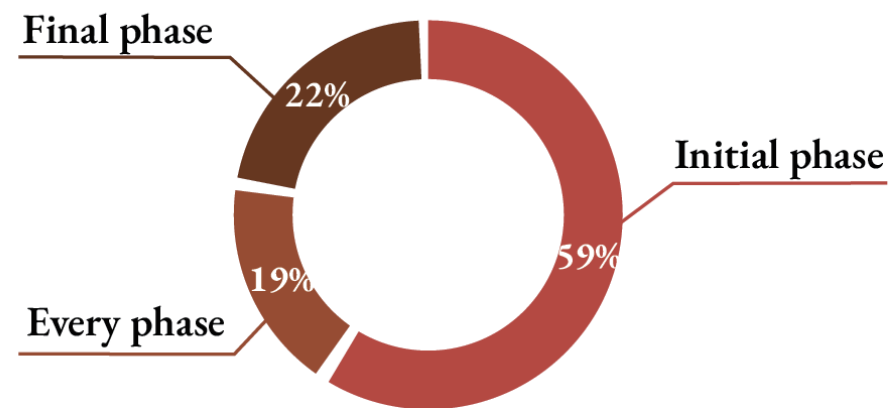
Engagement in planning



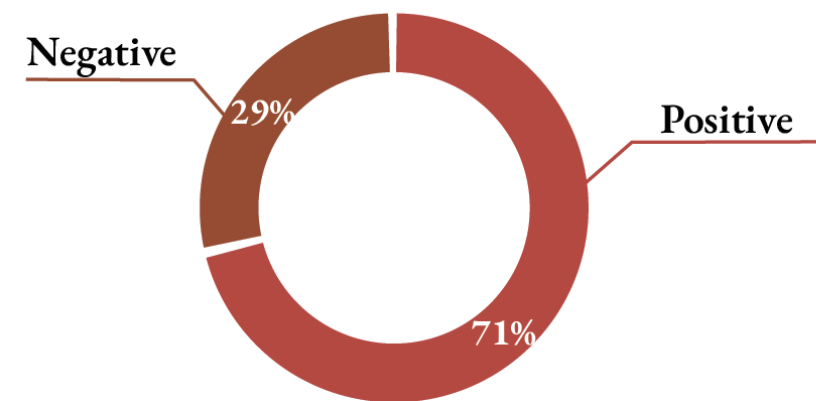
Willingness to engage in planning



Preferences for engagement in the planning phase



Views on the adoption of the feedback



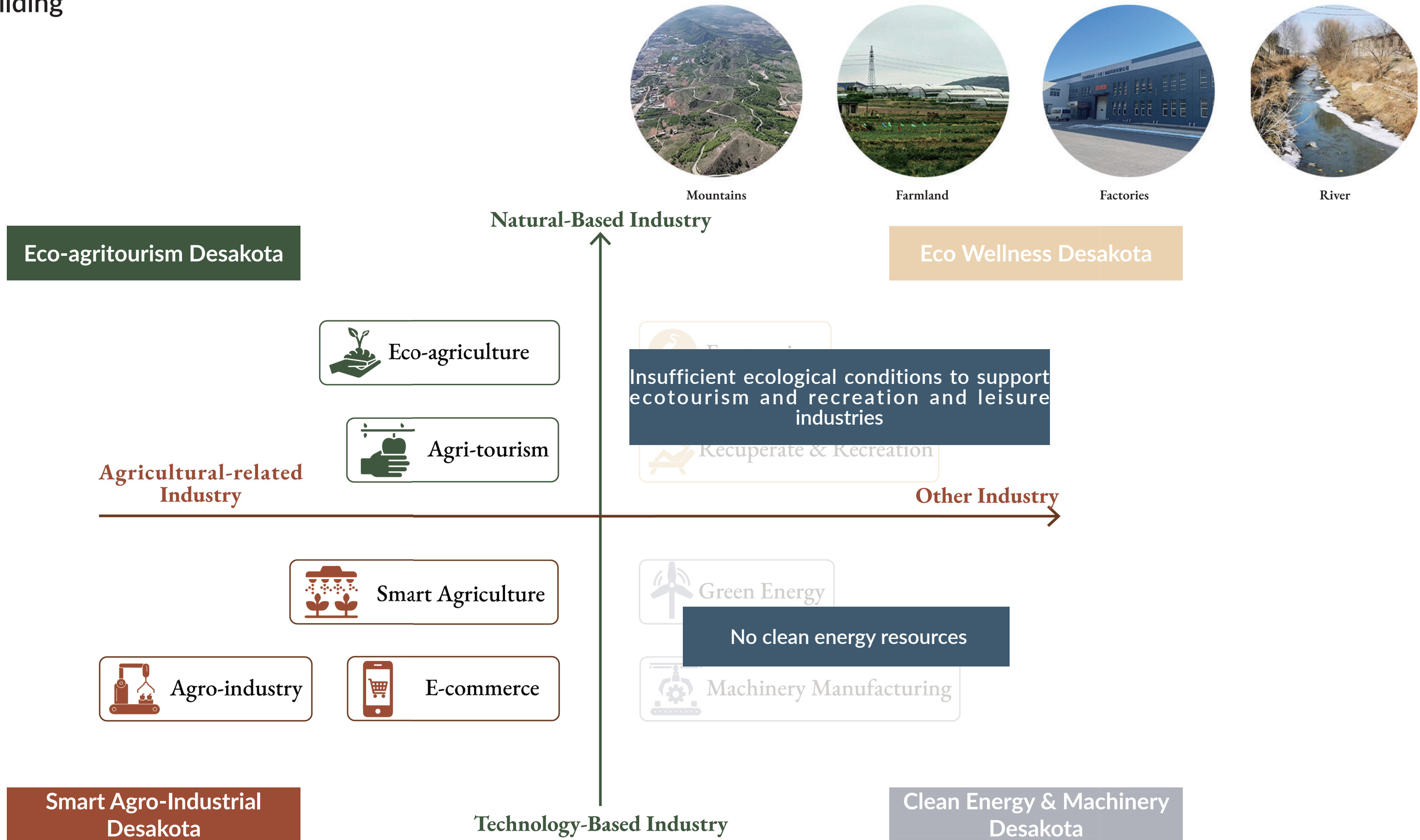
Interviews during fieldwork
Photographed by author

CHAPTER 7

ADAPTIVE PLANNING



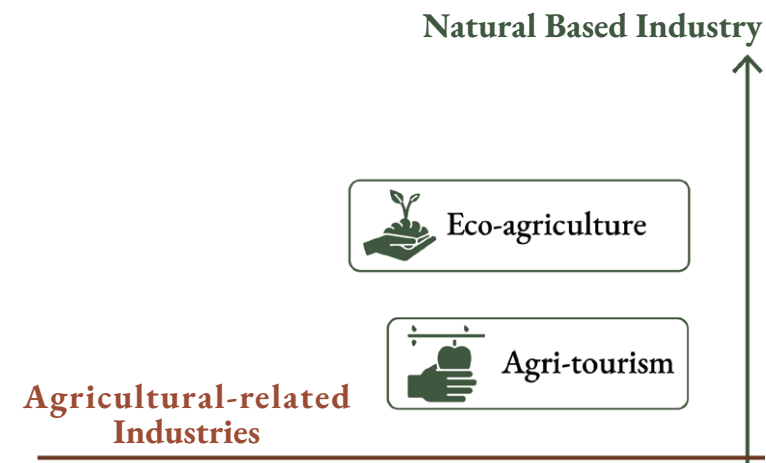
7.1 Scenario Building



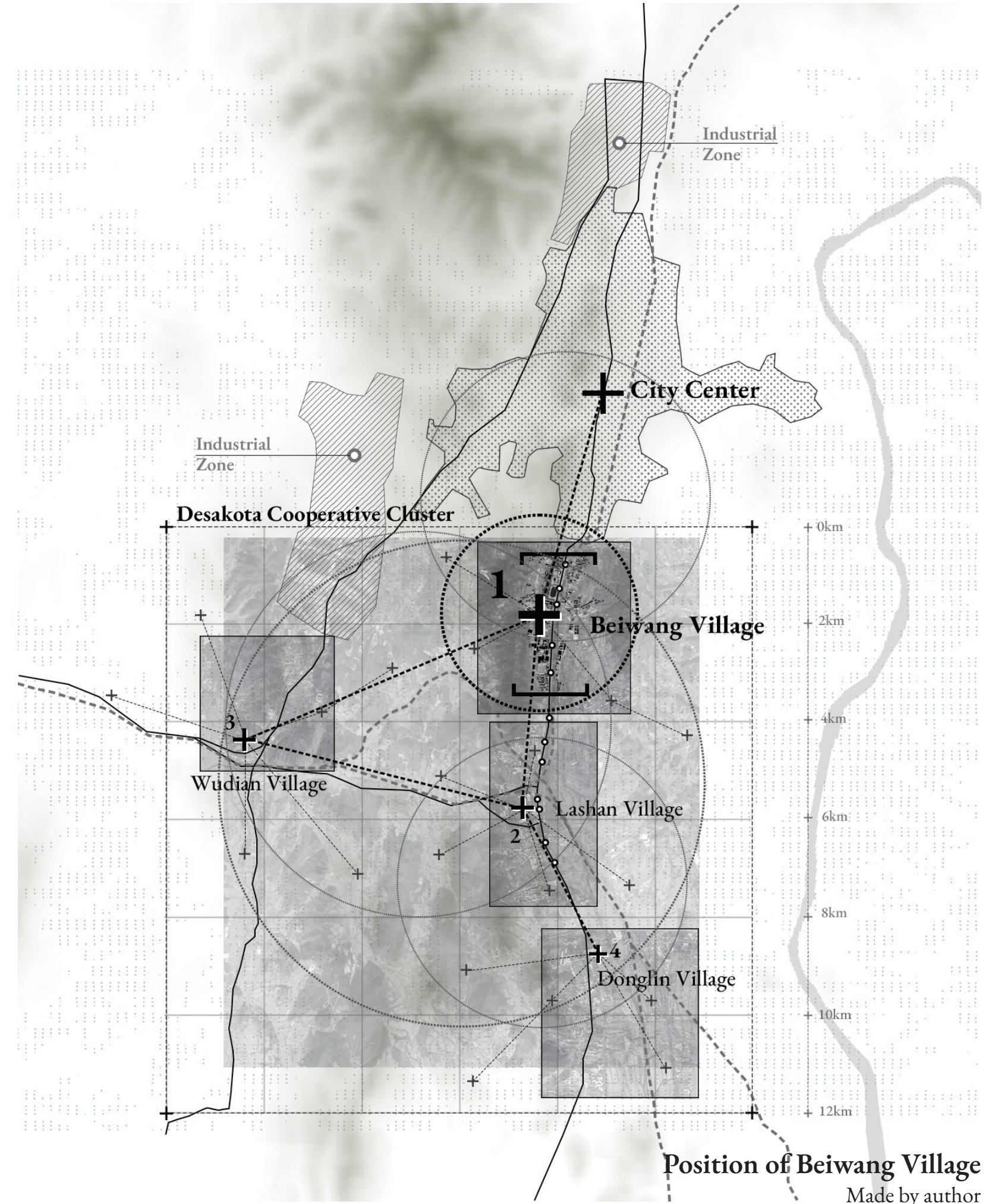
7.1 Scenario Building

7.1.1 Eco Agri-tourism Desakota

Overview of Beiwang village



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



7.1 Scenario Building

7.1.1 Eco Agri-tourism Desakota

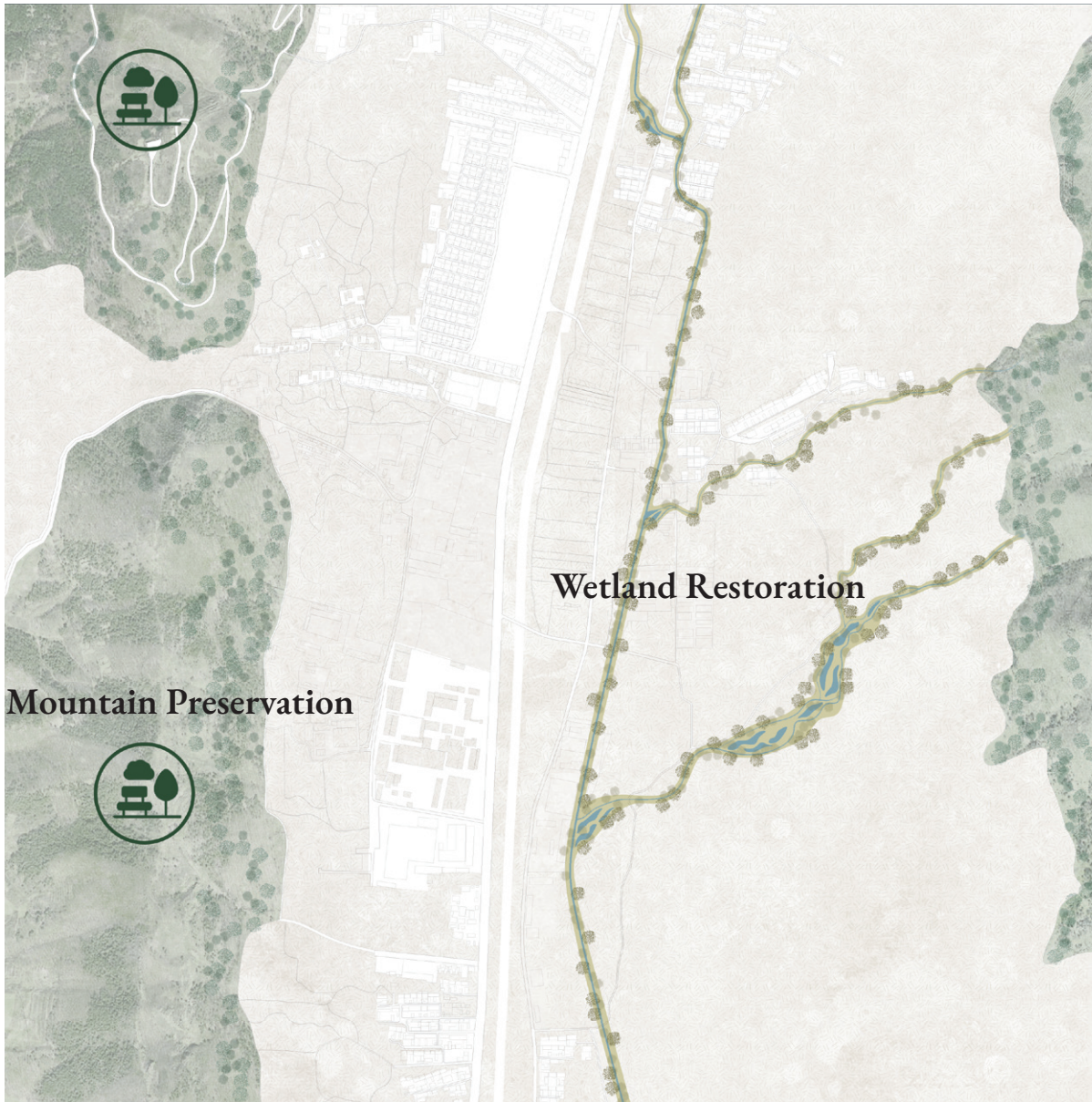
Strategies

1. Mountain preservation & wetland restoration

BEFORE



AFTER

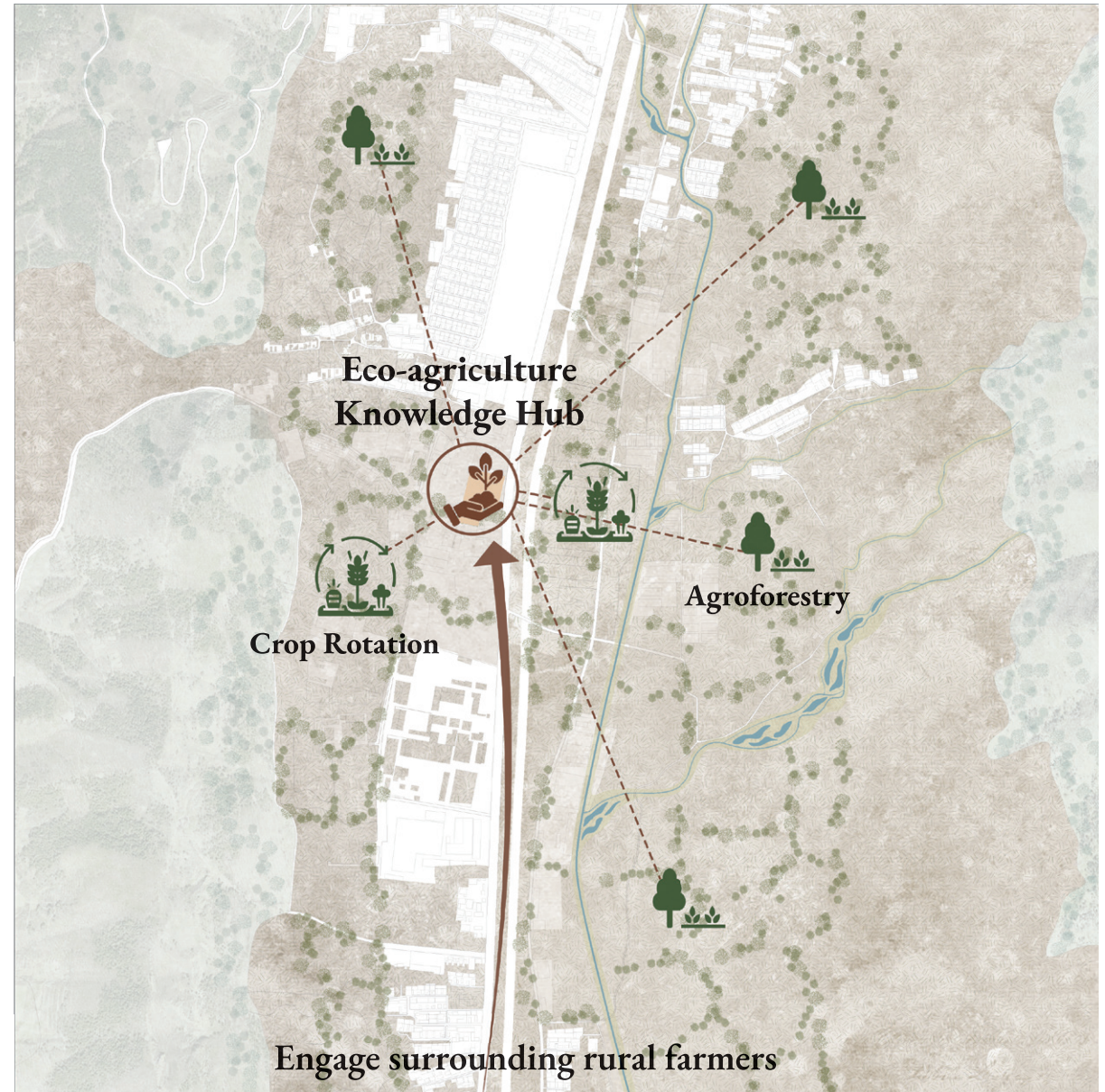


2. Transformation to ecological agriculture

BEFORE



AFTER



7.1 Scenario Building

7.1.1 Eco Agri-tourism Desakota

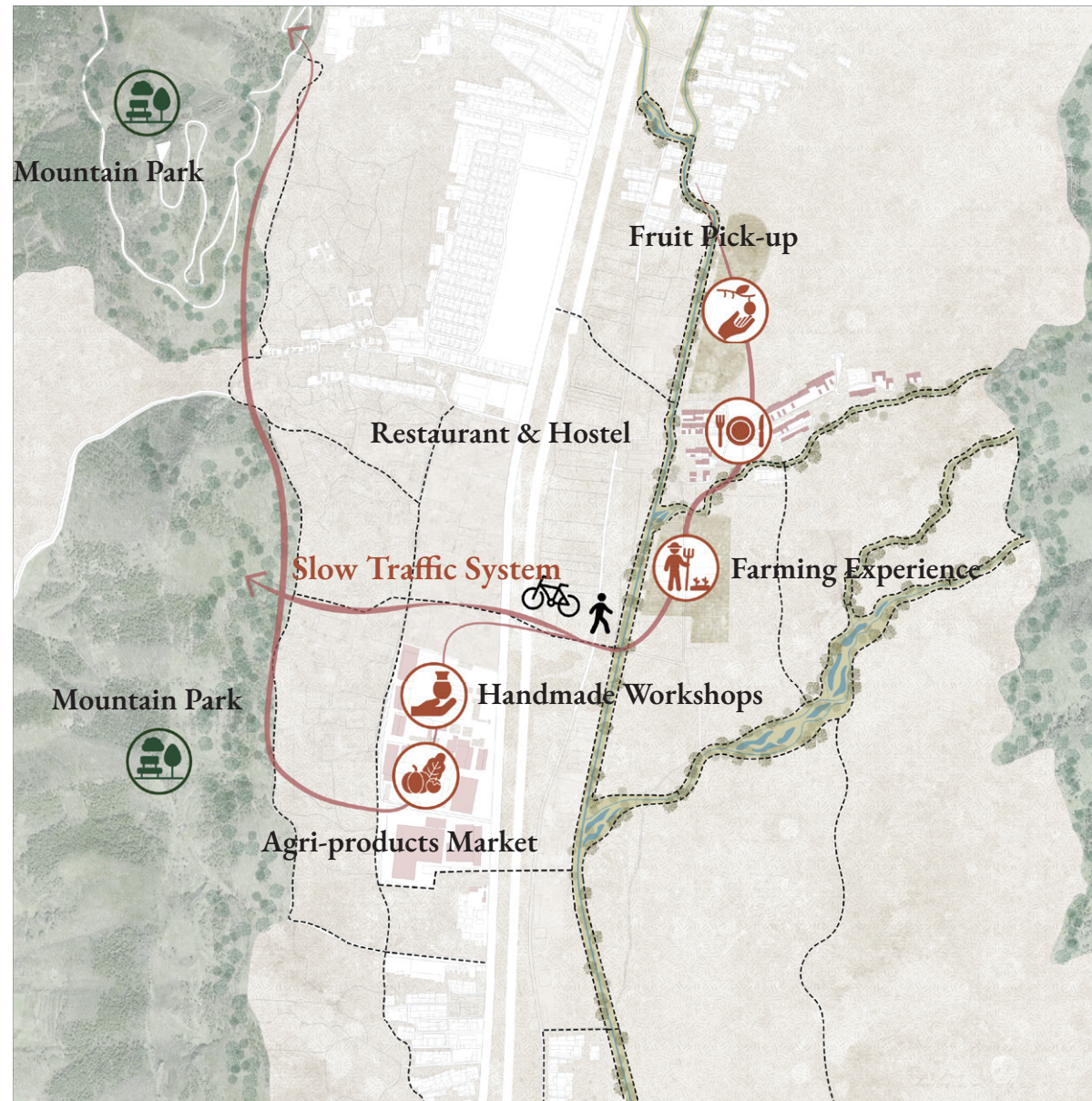
Strategies

3. Add agri-tourism activities

BEFORE



AFTER

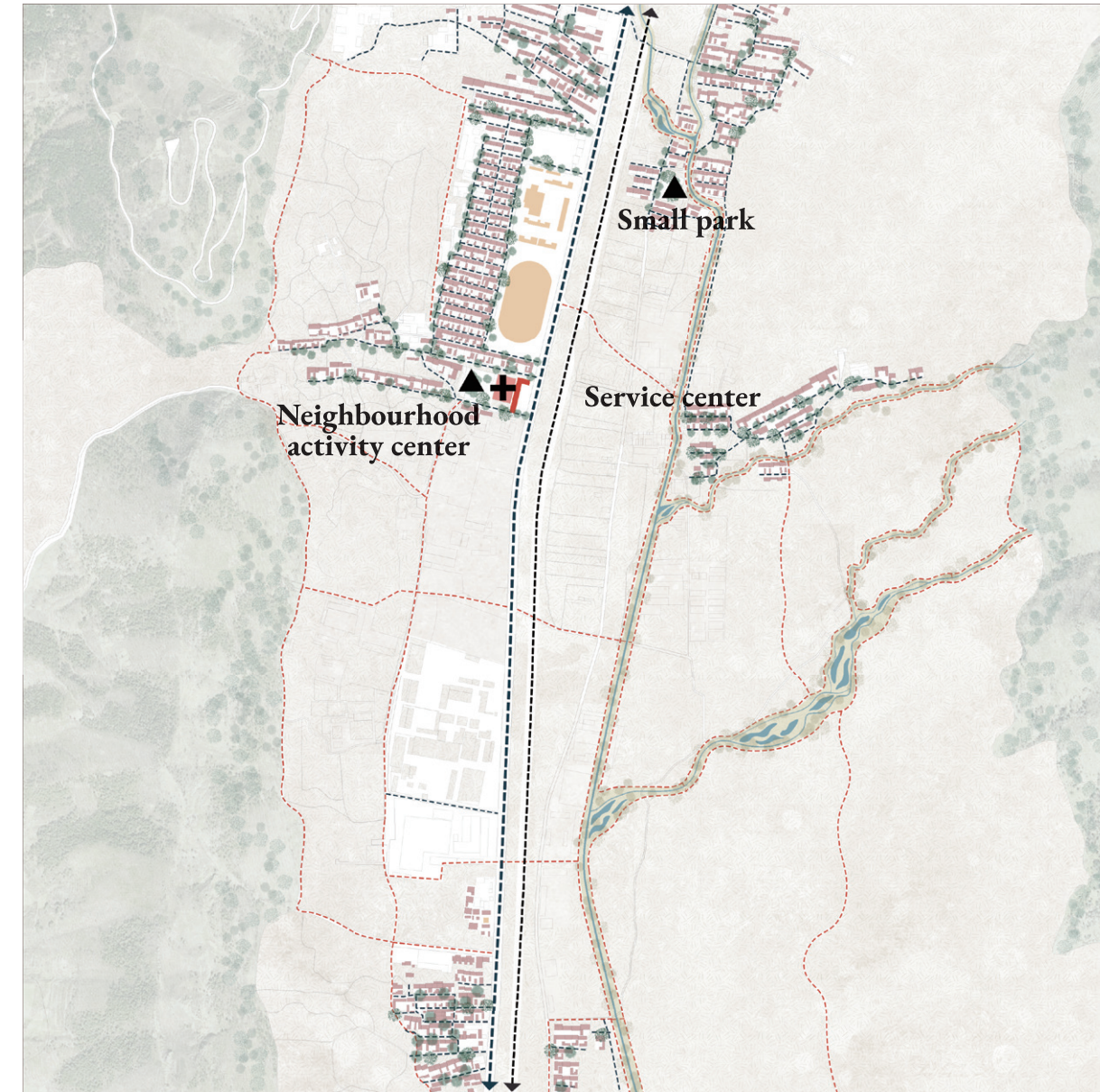


4. Social infrastructure upgrading

BEFORE



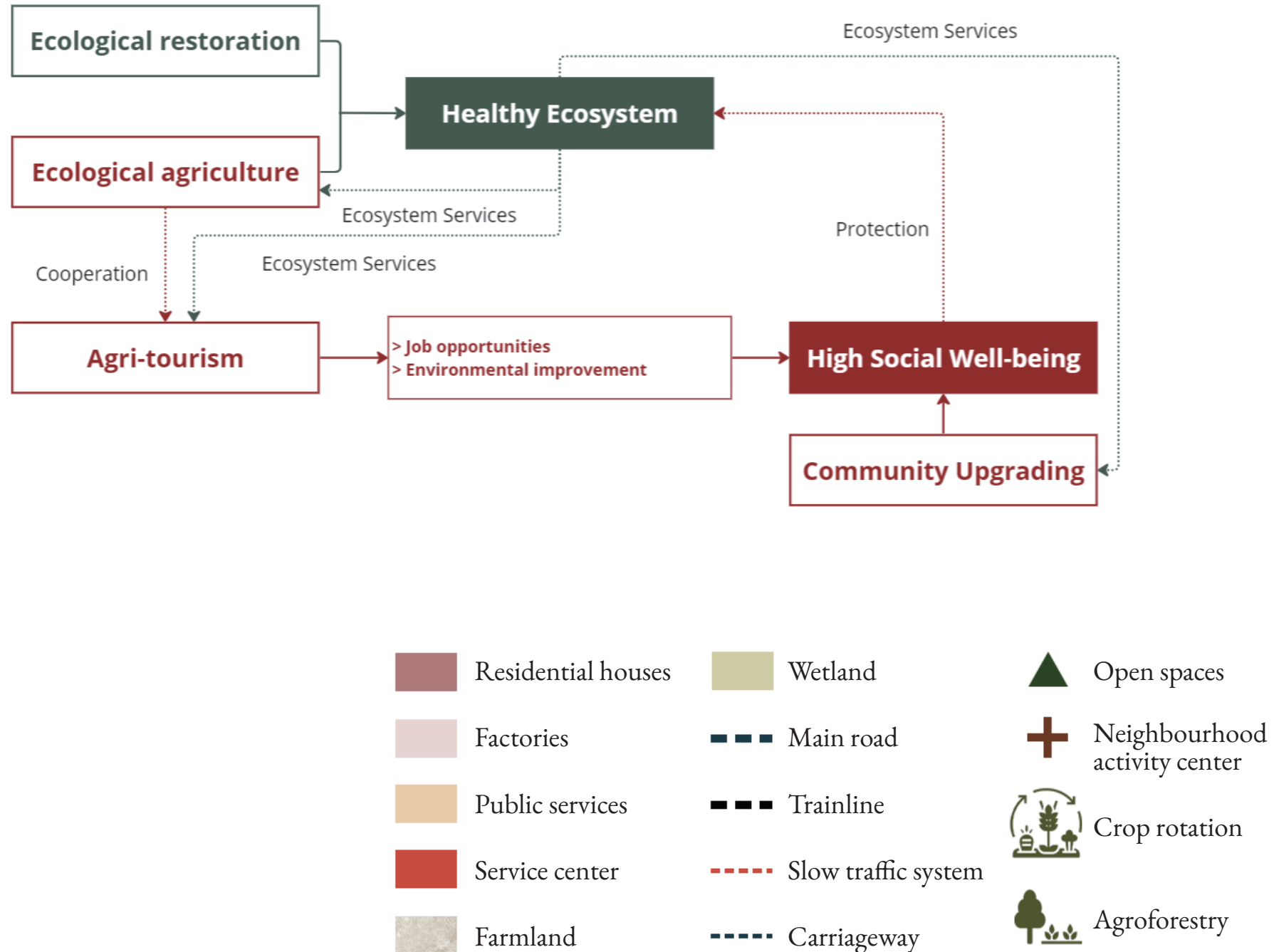
AFTER



7.1 Scenario Building

7.1.1 Eco Agri-tourism Desakota

Vision map



7.1 Scenario Building

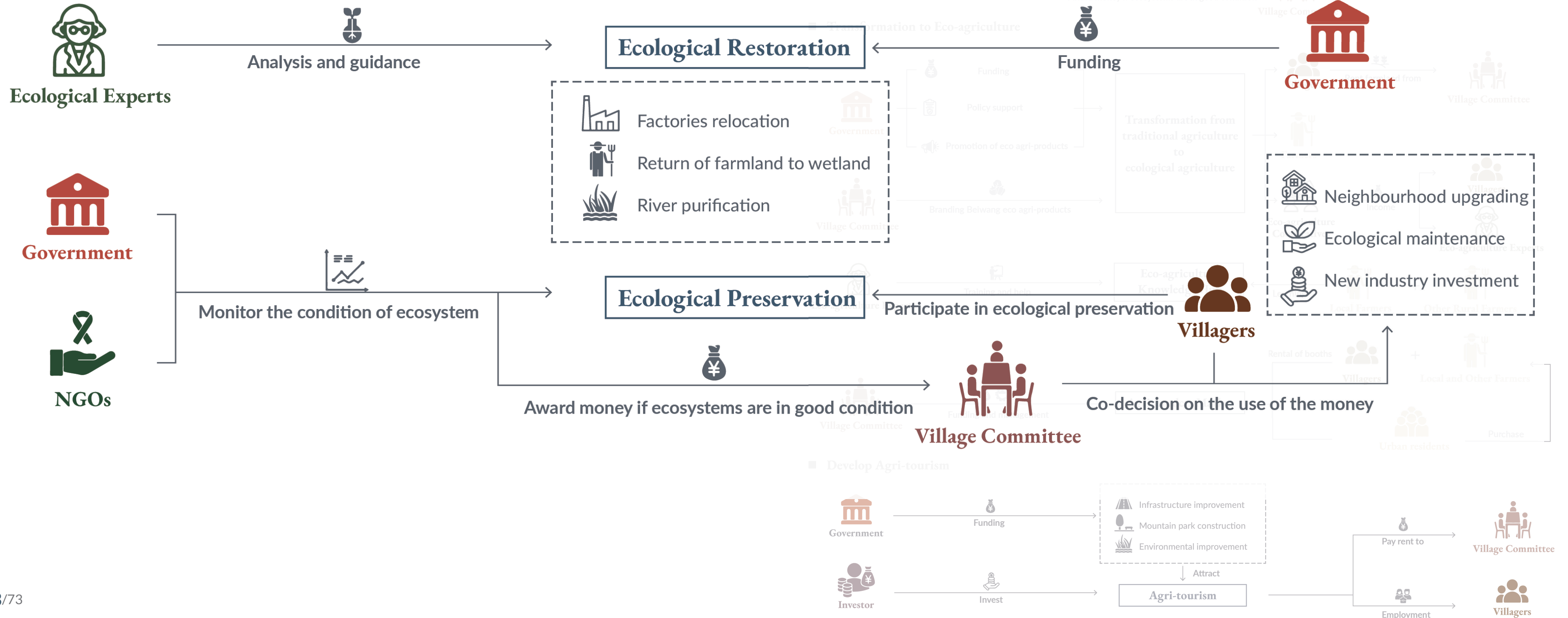
7.1.1 Eco Agri-tourism Desakota



7.1 Scenario Building

7.1.1 Eco Agri-tourism Desakota

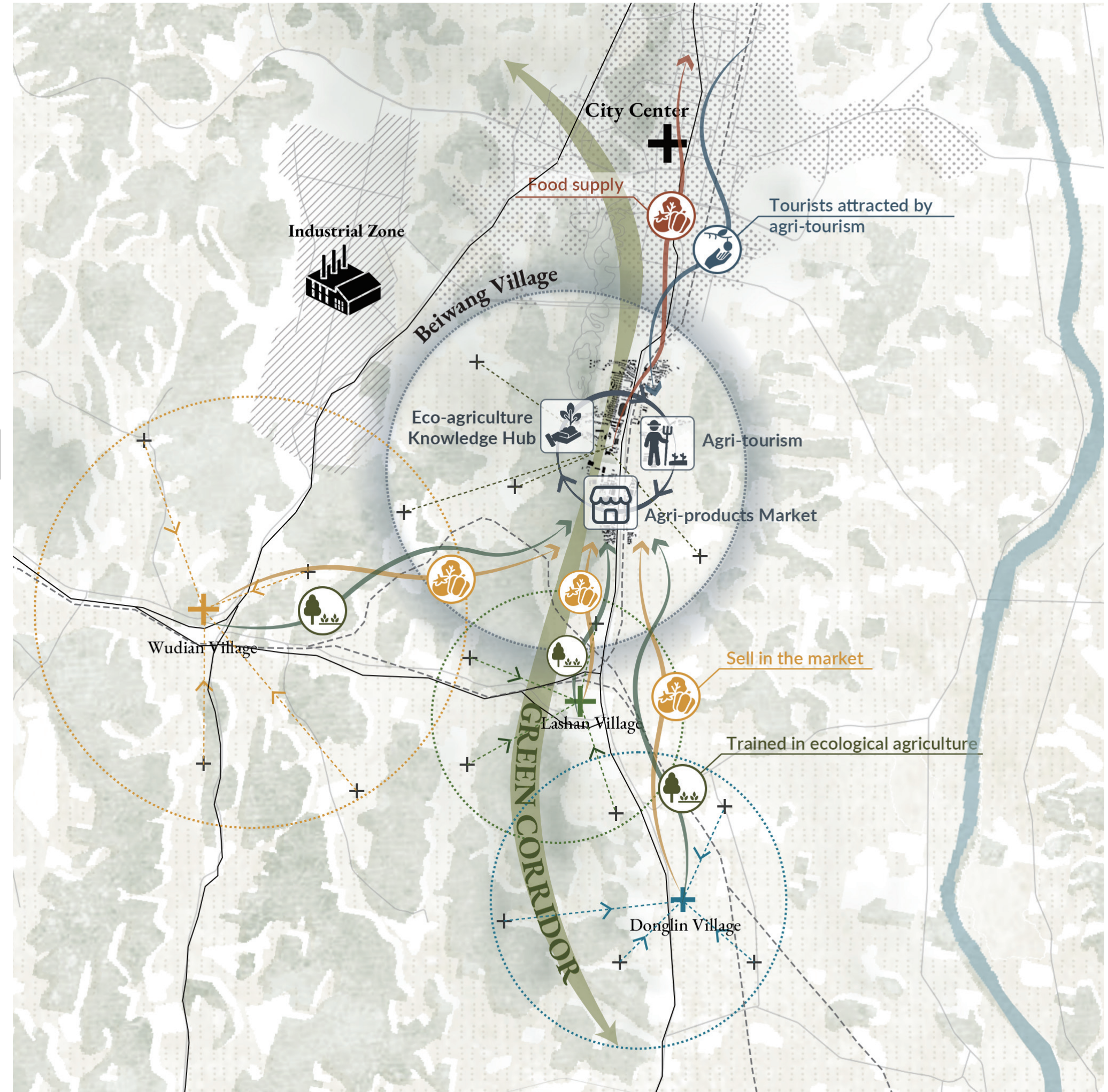
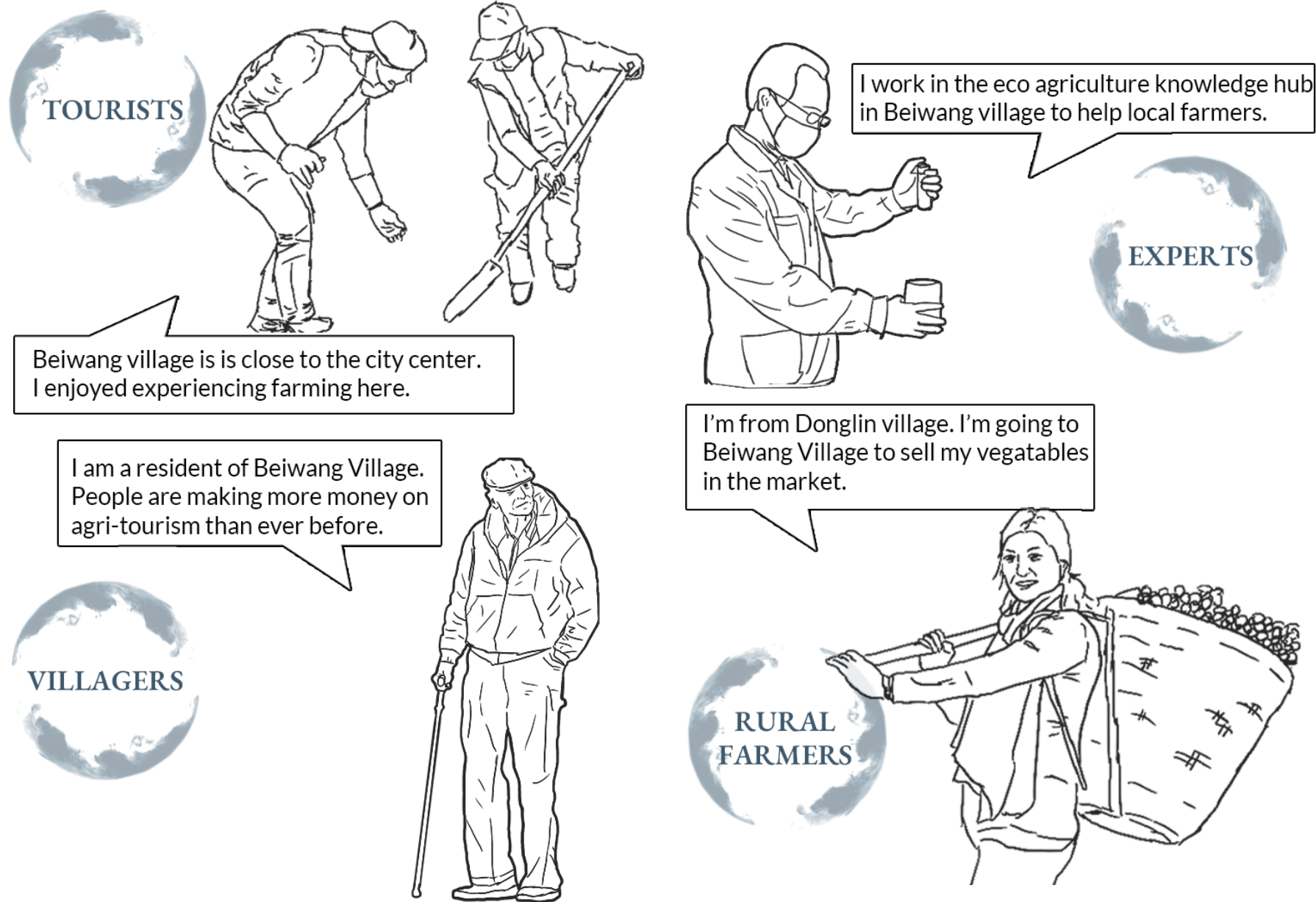
Adjustment of governance model



7.1 Scenario Building

7.1.1 Eco Agri-tourism Desakota

Beiwang village in the cluster

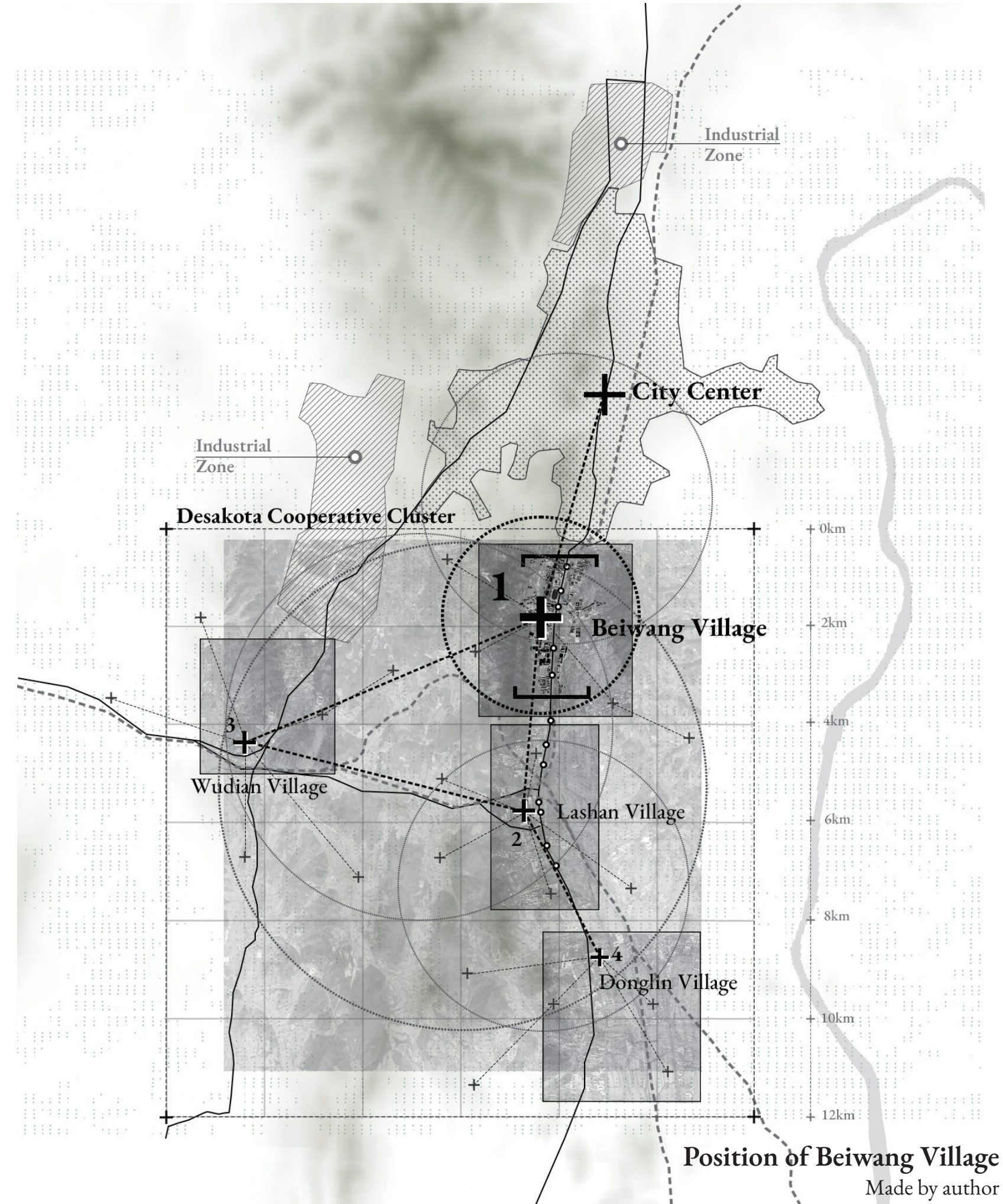


7.1 Scenario Building

7.1.2 Smart Agro-Industrial Desakota

Overview of Beiwang village

- | | | | | |
|-------|------------------------|-----------------|-------|------------------------------|
| + | Desakota | Urban Area | o | Bus Stop |
| + | Surrounding Rural Area | Industrial Zone | ■ | Mountain |
| — | Important Road | River | ⊠ | Desakota Cooperative Cluster |
| - - - | Railway | | | Connection |



Position of Beiwang Village
Made by author

7.1 Scenario Building

7.1.2 Smart Agro-Industrial Desakota

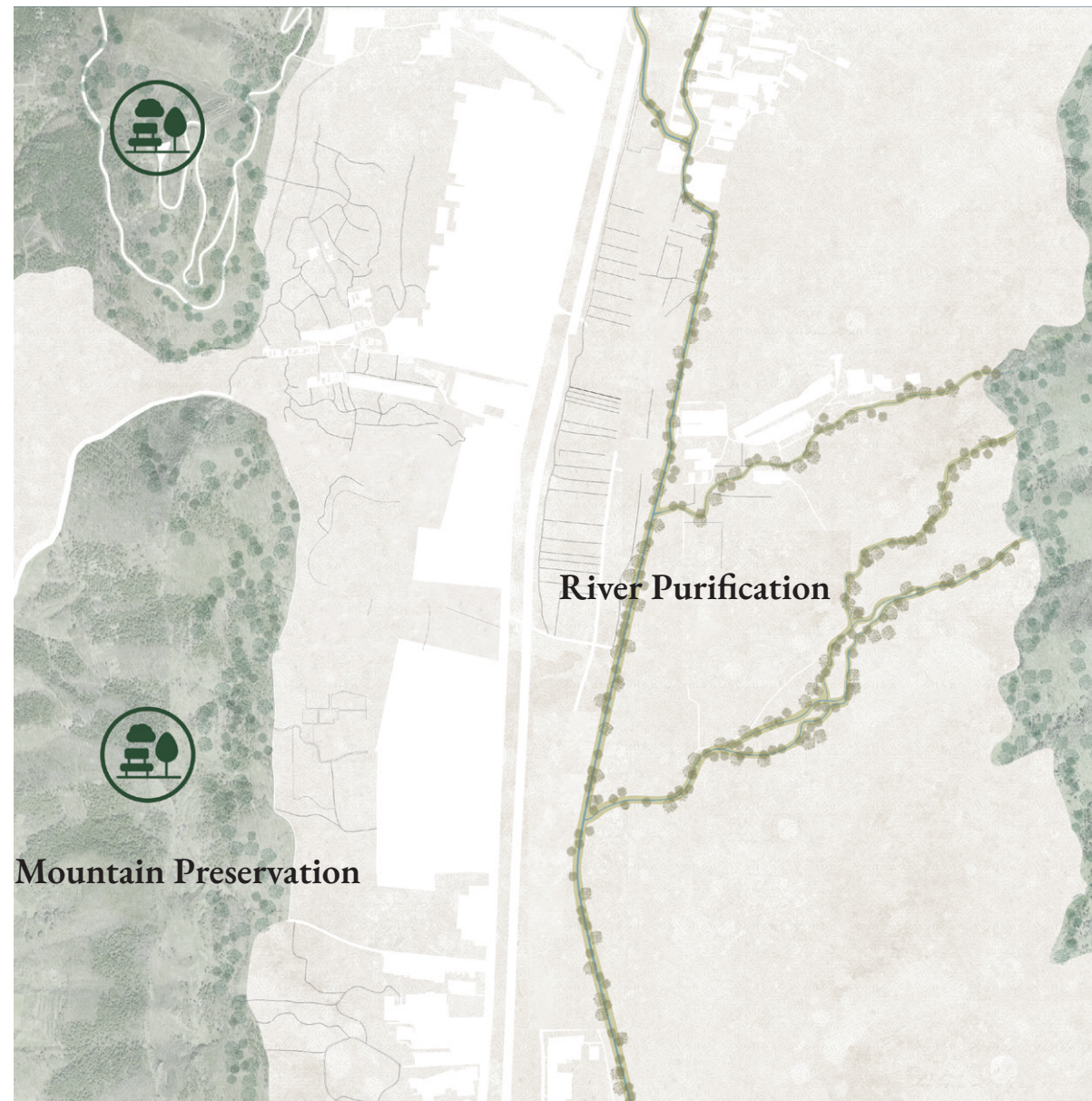
Strategies

1. Mountain preservation & environmental enhancement

BEFORE



AFTER

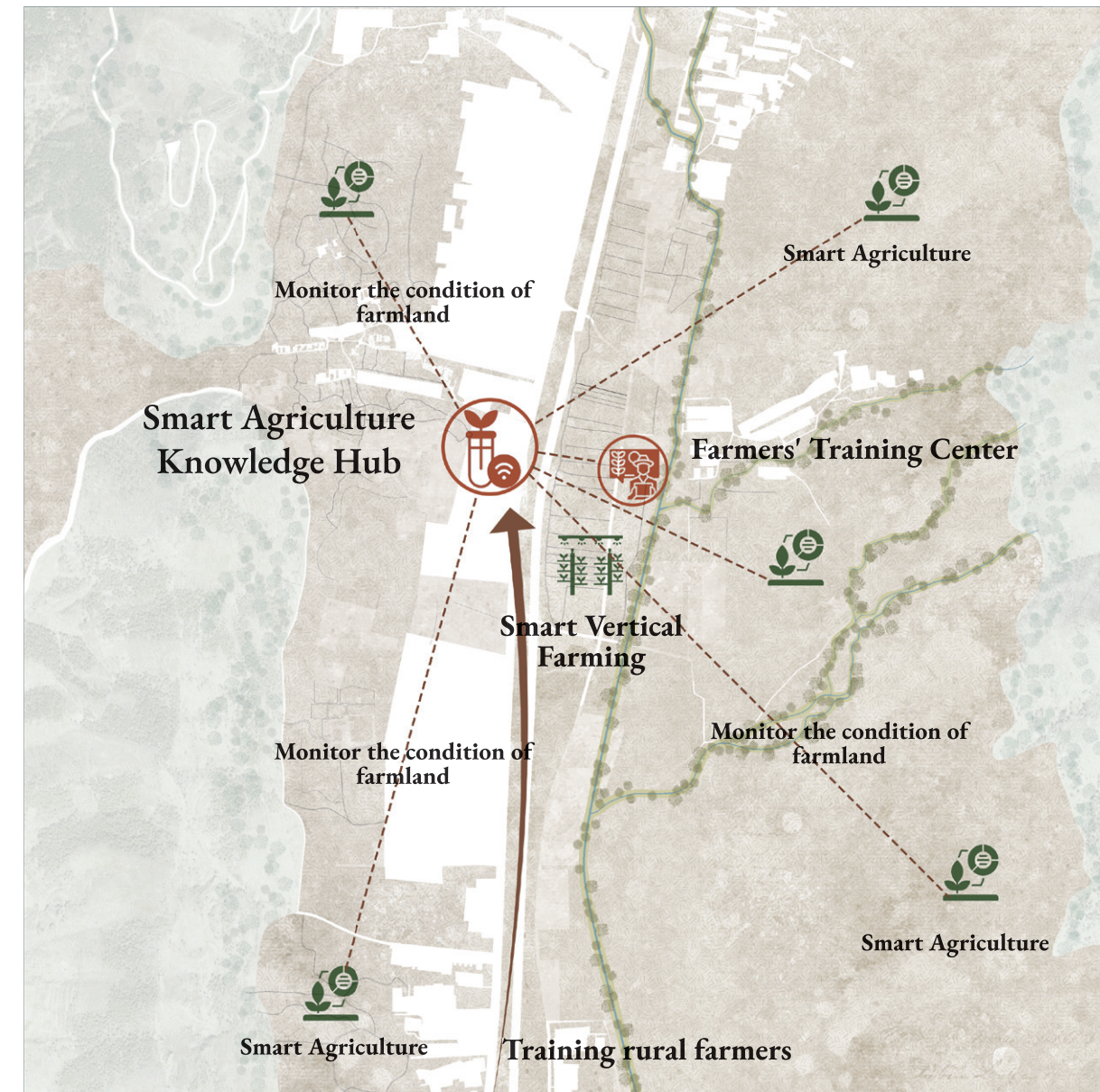


2. Transformation to smart agriculture

BEFORE



AFTER

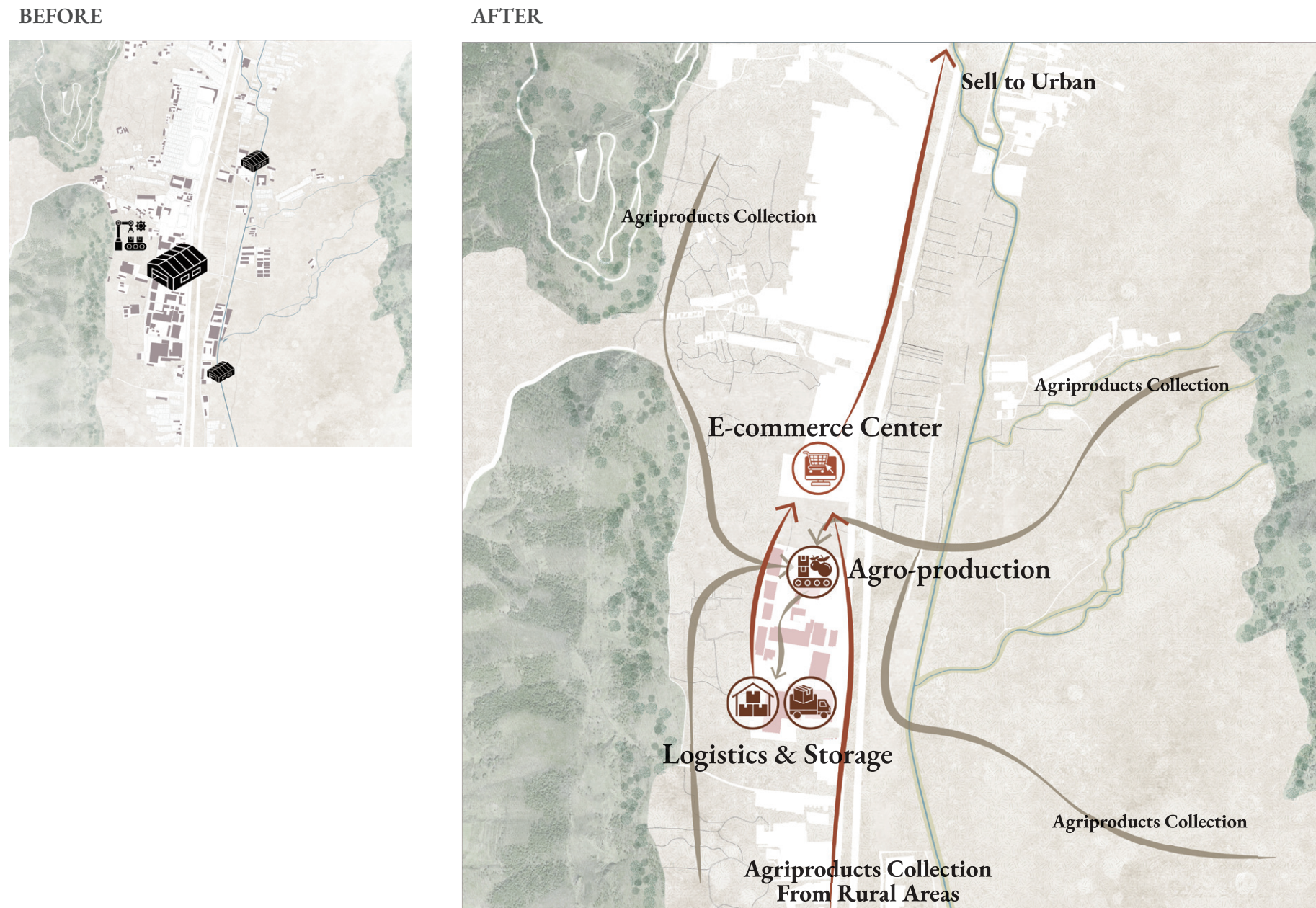


7.1 Scenario Building

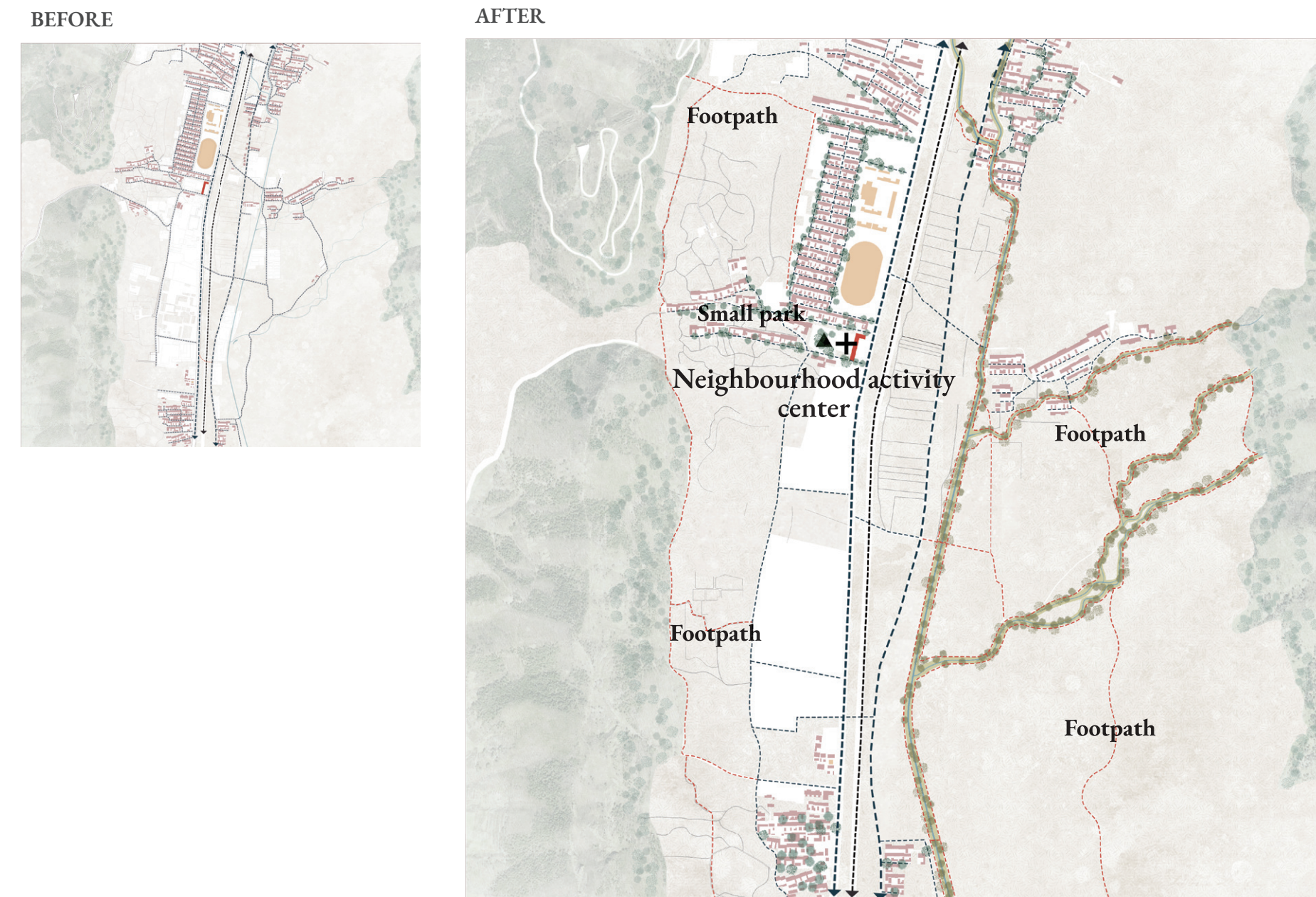
7.1.2 Smart Agro-Industrial Desakota

Strategies

3. Implantation of agro-production and smart industries



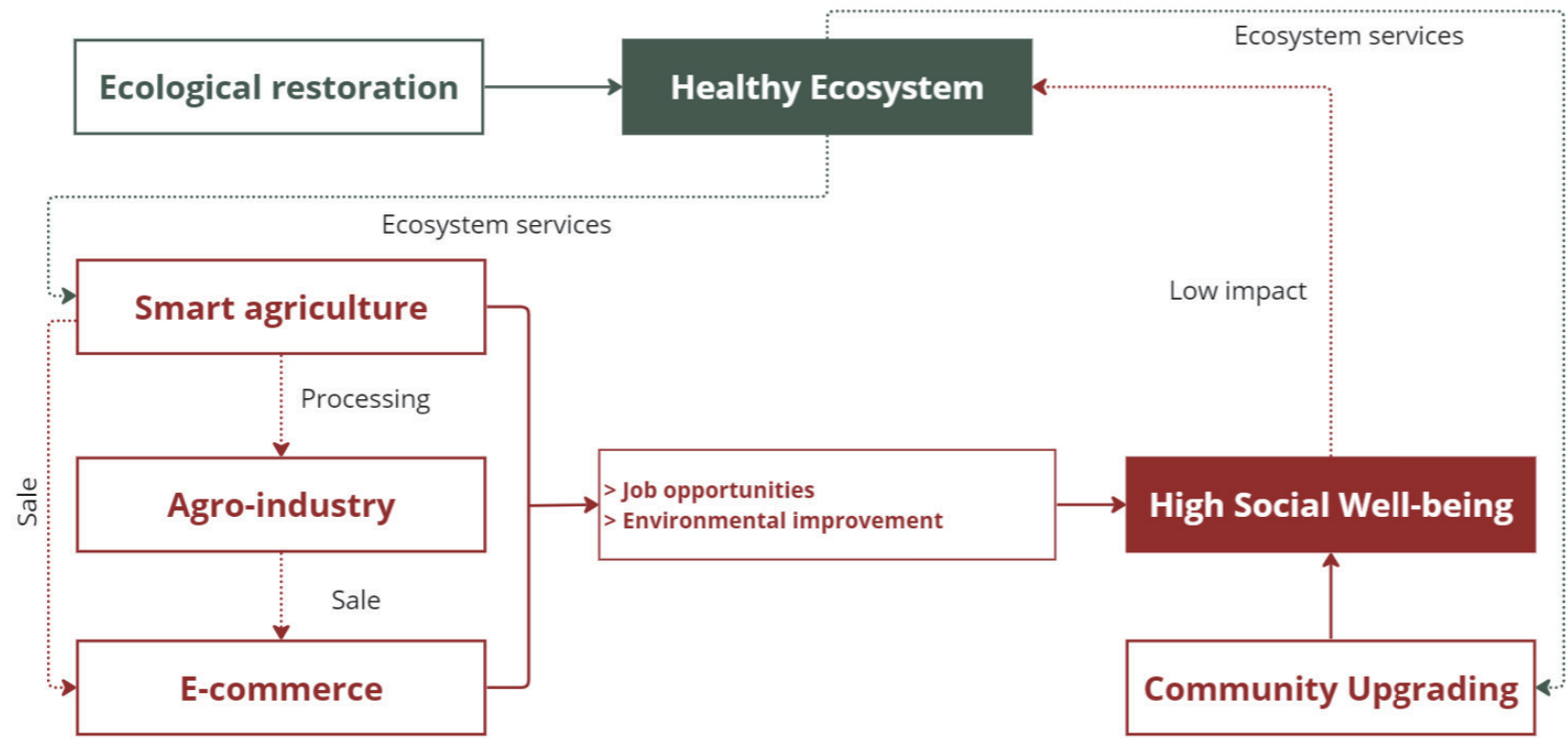
4. Social infrastructure upgrading



7.1 Scenario Building

7.1.2 Smart Agro-Industrial Desakota

Vision map

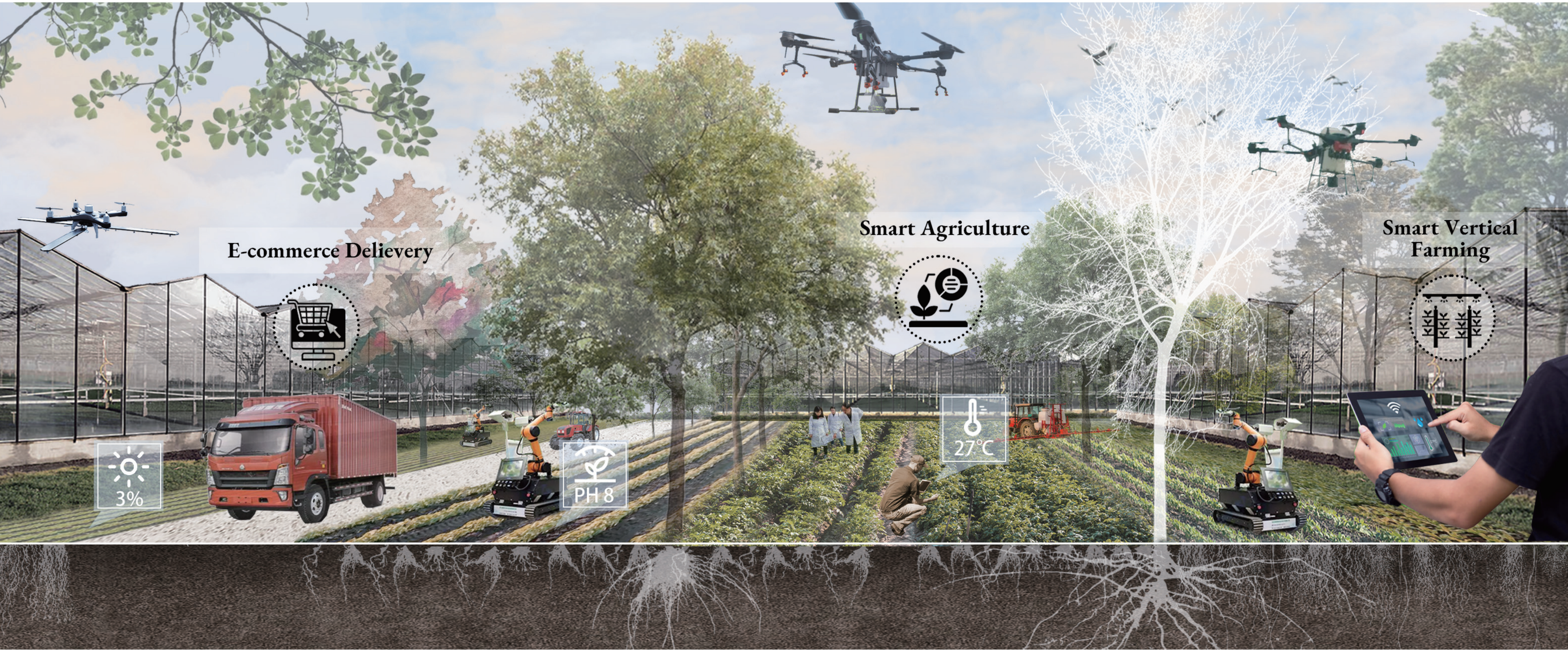


- | | | |
|--------------------|---------------------|-------------------------------|
| Residential houses | Wetland | Open spaces |
| Factories | Main road | Neighbourhood activity center |
| Public services | Trainline | Smart vertical farming |
| Service center | Slow traffic system | Smart agriculture |
| Farmland | Carriageway | |



7.1 Scenario Building

7.1.2 Smart Agro-Industrial Desakota



E-commerce Delievery

Smart Agriculture

Smart Vertical Farming

☀️
3%



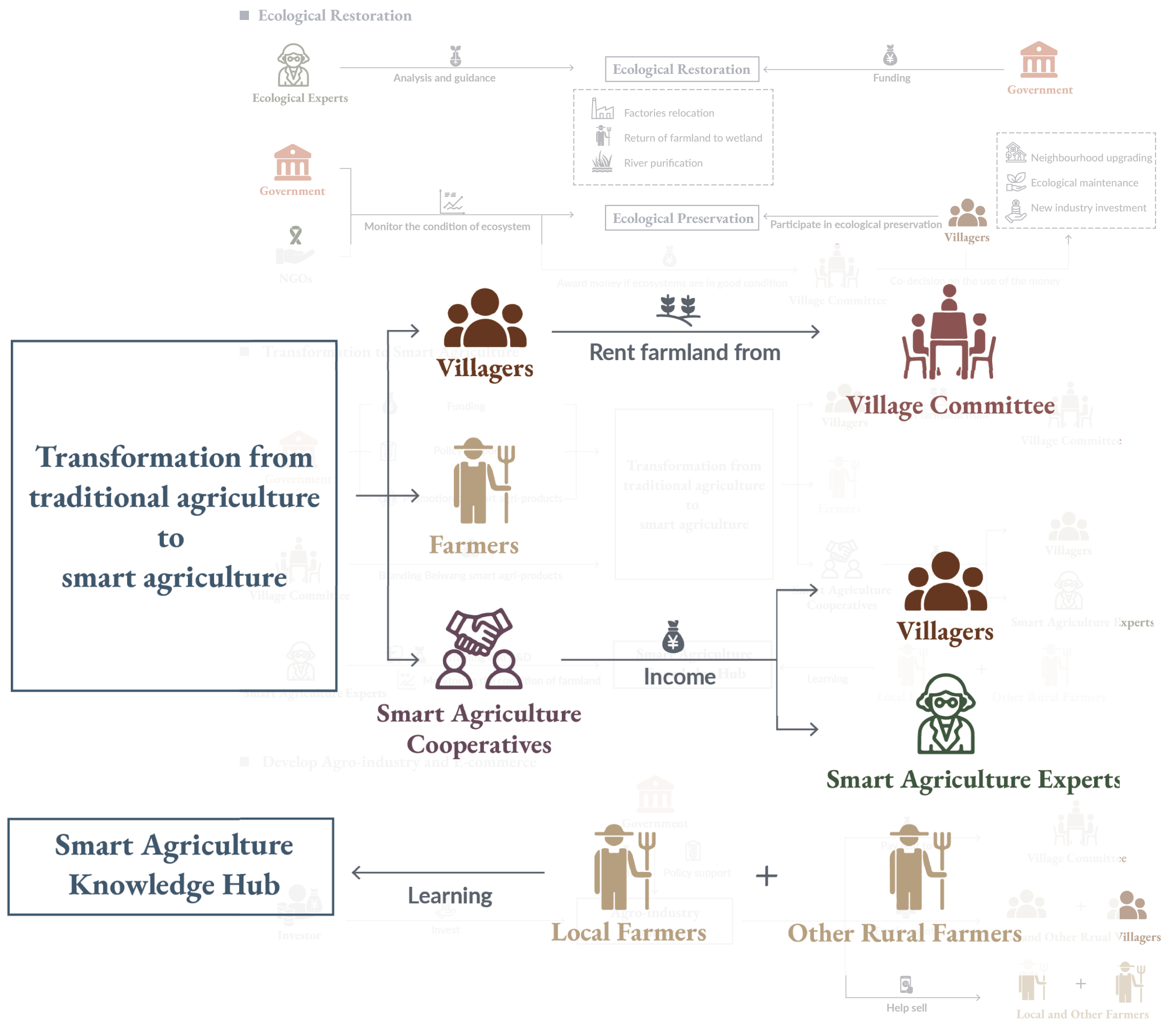
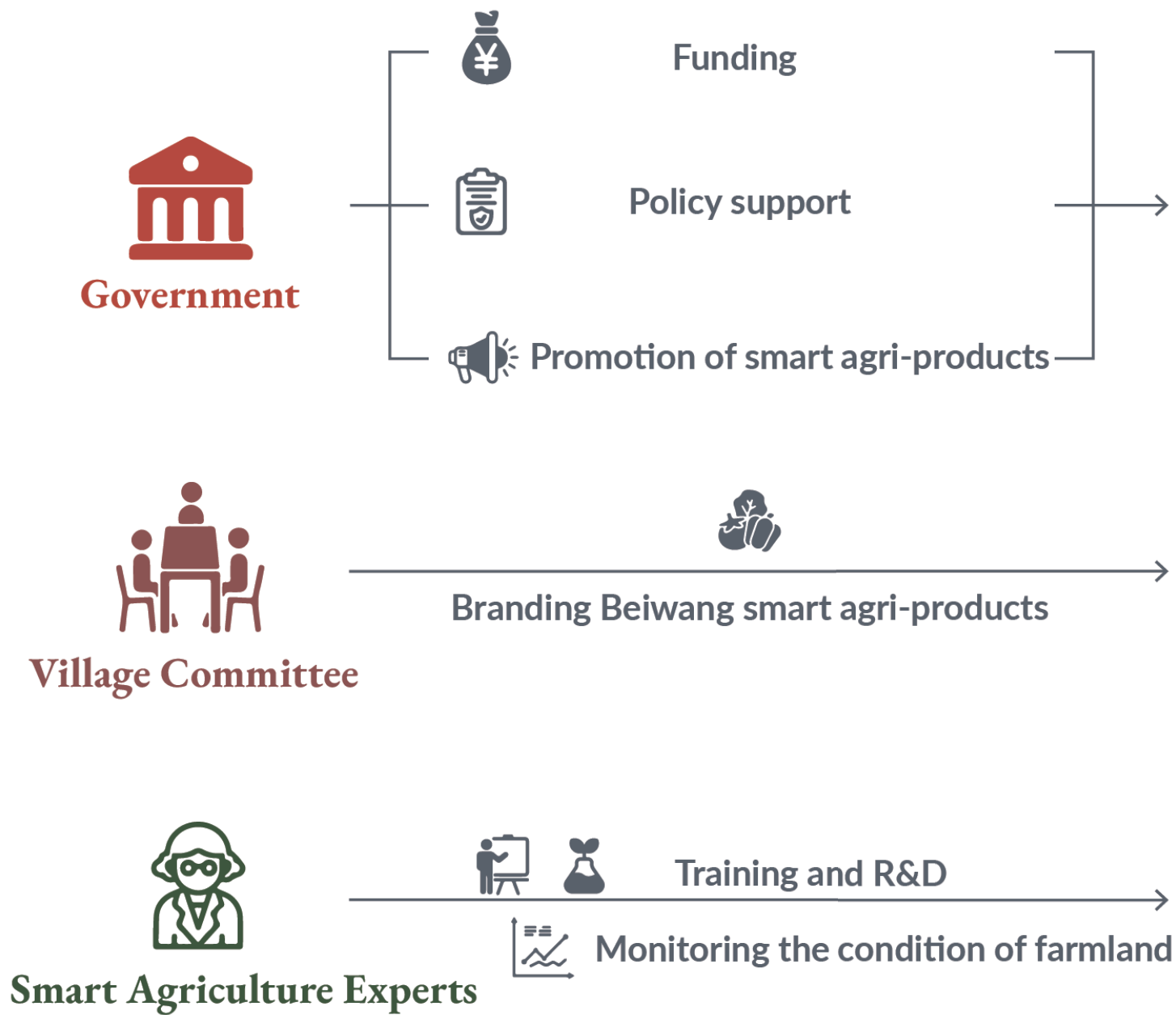
🌱
PH 8

🌡️
27°C

7.1 Scenario Building

7.1.2 Smart Agro-Industrial Desakota

Adjustment of governance model




7.1 Scenario Building

7.1.2 Smart Agro-Industrial Desakota

Beiwang village in cluster

We do research on smart agriculture and also help local farmers to switch from traditional agriculture to smart agriculture.



EXPERTS

I live in Beiwang village and I get my job by delivering fruits and vegetables to the city.




VILLAGERS

We help farmers in Beiwang and surrounding villages sell vegetables and fruits through e-commerce.

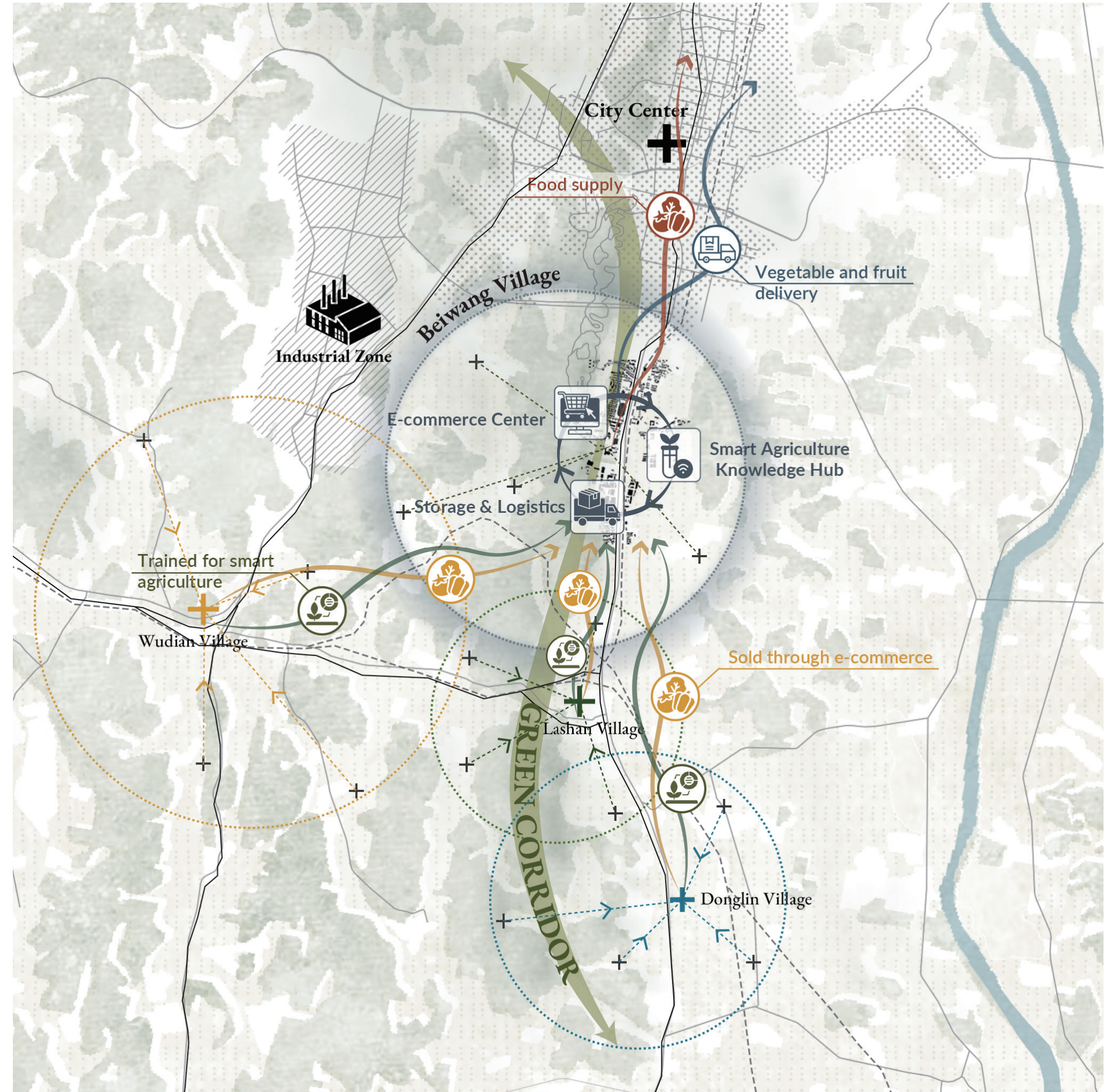


VILLAGERS

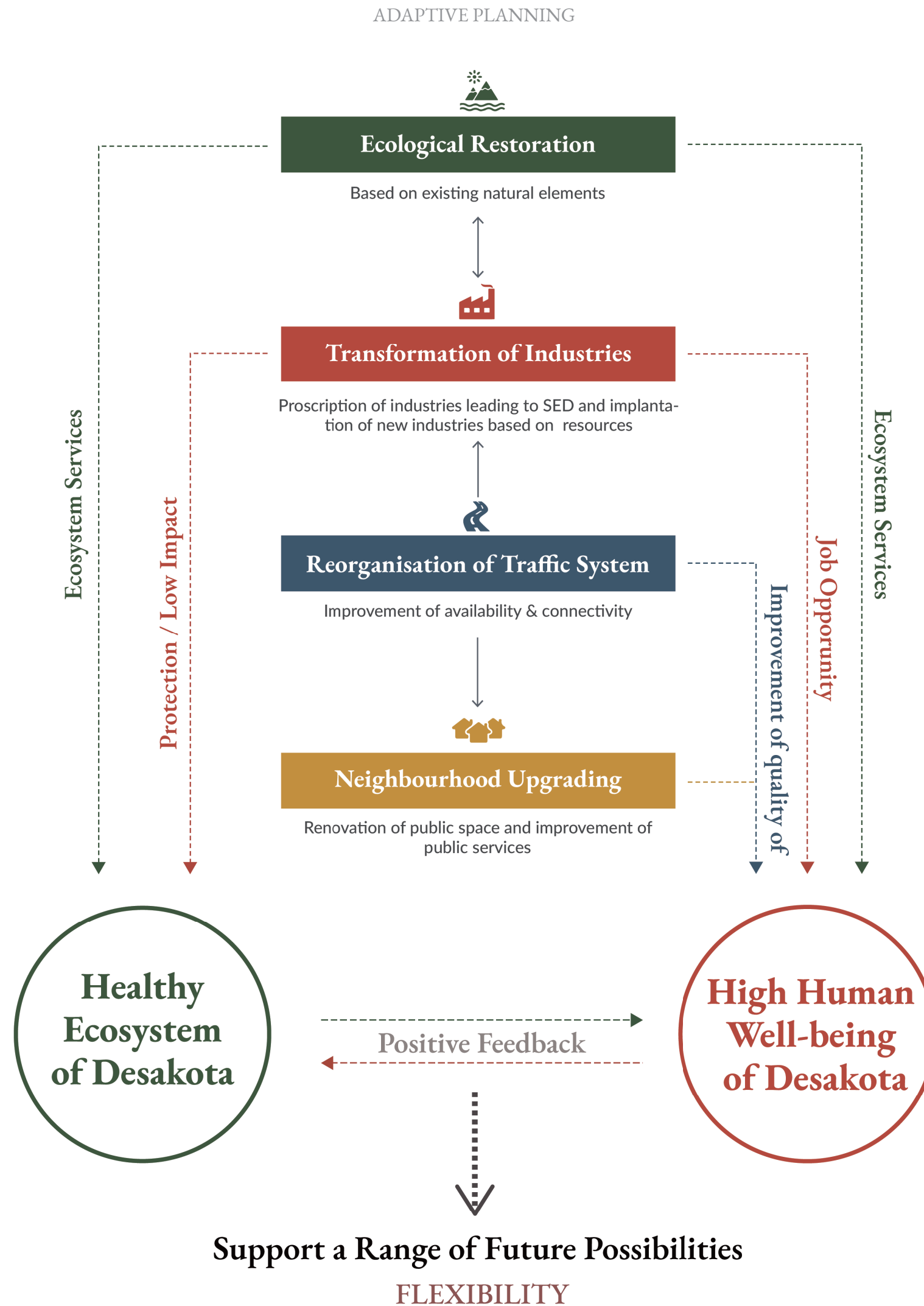
We monitor the condition of the farmland in the smart agriculture knowledge hub.



EXPERTS



7.2 Principle Framework



7.3 Evaluation of Scenarios

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

7.3 Evaluation of Scenarios

EVALUATION CRITERIA		Scenario 1	Scenario 2	Scenario 3	Scenario 4		
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 Fulfillment 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

7.3 Evaluation of Scenarios

EVALUATION CRITERIA		Scenario 1	Scenario 2	Scenario 3	Scenario 4
VILLAGERS BENEFIT	Economic Growth Level	4	2	4	2
	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

7.3 Evaluation of Scenarios

EVALUATION CRITERIA			Scenario 1	Scenario 2	Scenario 3	Scenario 4
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

7.3 Evaluation of Scenarios

Eco Agri-tourism Desakota

Final Score

0.75/1

Smart Agro-Industrial Desakota

0.74/1

EVALUATION CRITERIA			Scenario 1	Scenario 2	Scenario 3	Scenario 4	
FEASIBILITY	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	2	
	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	
		Level of Promoting Rural Development	3	2	5	3	
	Promoting synergistic urban-rural development	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	

7.4 No-regret Strategies



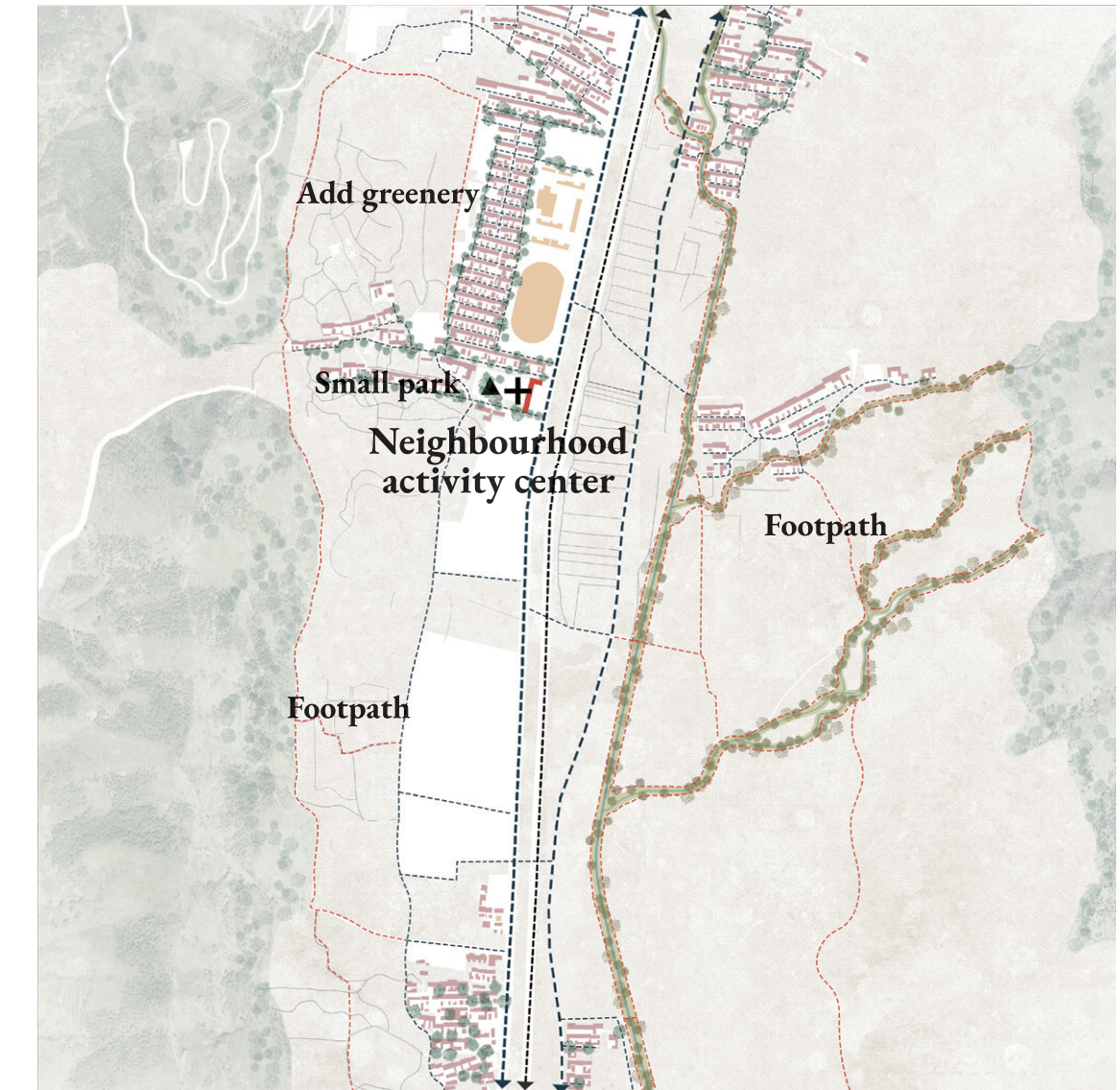
1. Mountain preservation & river purification

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



2. Removal of factories in the farmland

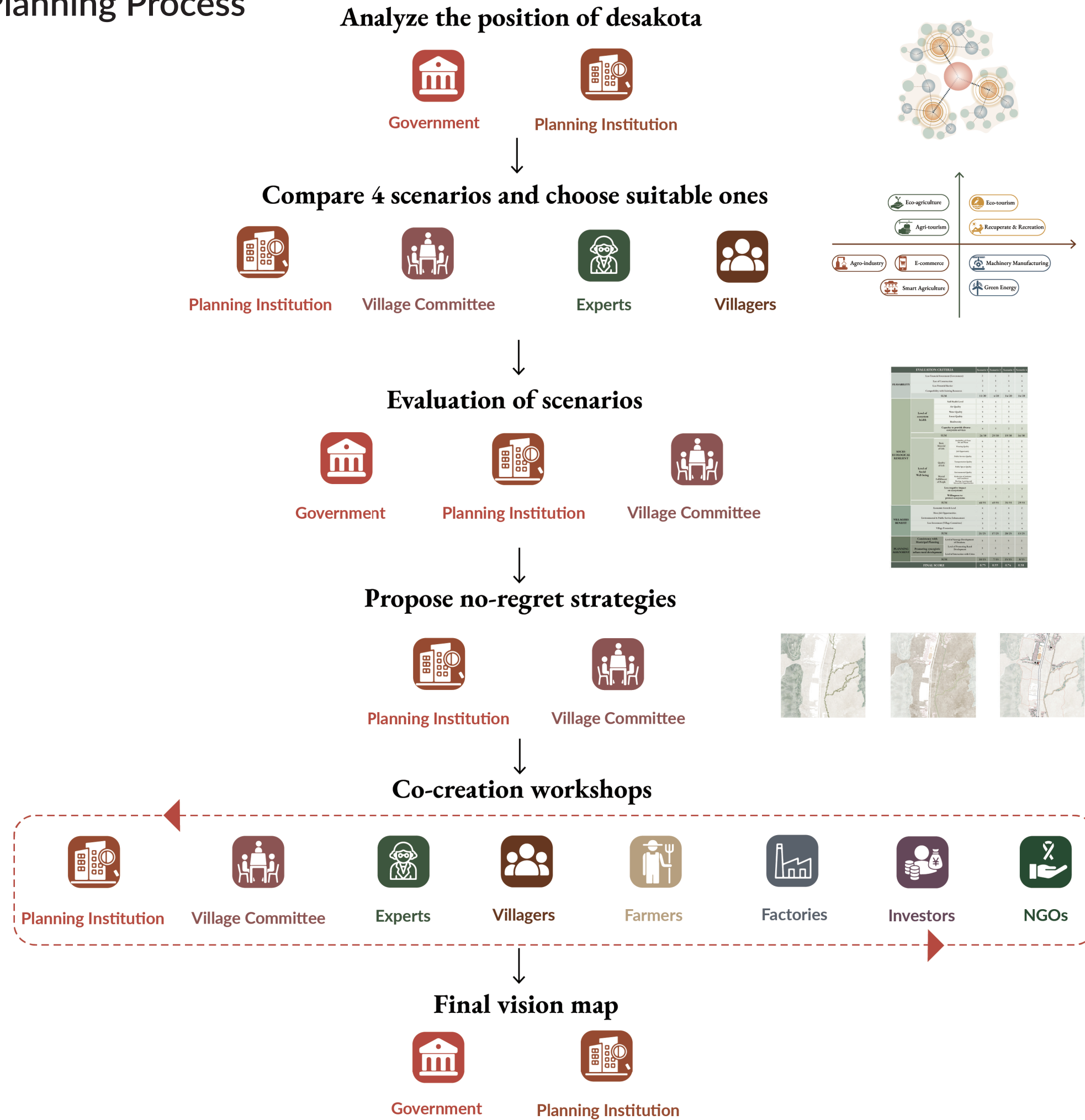
- > Restructure the farmland for eco-agriculture or smart agriculture




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

7.5 Summary of the Adaptive Planning Process



A black and white photograph of a rural landscape. In the center, a tall, lattice-structured power tower stands prominently, with several power lines stretching across the sky. To the left, a row of simple, single-story houses is visible. To the right, a series of long, arched greenhouses are arranged in a row. The foreground is a field of low-lying vegetation and some scattered debris. The overall scene suggests a rural or agricultural setting.

**CONCLUSION
&
REFLECTION**

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.

Spatial Planning
+ *Adaptive Planning*
Governance Model
= **A socio-ecologically resilient desakota**

Cooperation between Desakota
+
Connector between Urban and Rural Areas
= **A closely integrated & unified system**

CONCLUSION

Urban Shrinkage

Adaptive Planning → Socio-ecological Resilience Desakota

Flexibility and Adaptivity ----- Scenario Building

REFLECTION

Contribution:

- > Desakota in a shrinking context
- > Revitalize desakota through adaptive planning

Limitation:

- > Lack of discussion with planning experts

THANK YOU FOR YOUR ATTENTION

:)

