

# FARMING GUANGMING

Integrating agricultural landscape and new town  
development for the "Green City" Guangming in Shenzhen



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## Farming Guangming

*Integrating agricultural landscape and new town development for the  
"Green City" Guangming in Shenzhen*

MSc Thesis

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### Keywords

*agricultural landscape, new town development, landscape approach,  
ecosystem service, urban-rural relationship, urban agriculture, rural  
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### **Farming behind the high-speed railway station**

This is the high-speed railway station that has stimulated the development of Guangming new town. In front of the station, there will be large-scale complexes for creative industry and high-end services. The picture shows the back side of the station, where the vacant land has been transformed into an informal farmland. It seems to be a figurative expression of the current situation of Guangming: heading for a modernized future, with an agriculture root that has not yet fade away.



# 概述

## INTRODUCTION

Motivation & project aim / Methodology /  
Theoretical framework

# 1. Motivation & Project Aim

China is undergoing rapid urbanization. The urban population is 52.6% of the overall population in 2012, doubling that of 1990, and the number will increase in the coming decades. Hundreds of new towns or urban expansion areas are being planned or realized to boost the economy and accommodate rural migrants in a top-town way.

On the other hand, China has a long and rich history rooted in agriculture. As for the importance of agriculture for the country, feeding the huge population is of course one of the biggest challenges today, but more importantly, the way our ancestors farmed shaped the structure of the society before industrialization (Fei, 1947), which still has great impacts on today's society. Traditional way of farming has proved to be environmentally sustainable, since it works closely with nature. However, built on agricultural land mostly, new towns in China tend to ignore the existing agricultural conditions of the territory, no matter what kind of design concept they adopt. In the visual impressions of these urban area, little clue can be found about former landscape characteristics.

Based on the observation of the transformation of land from agricultural landscape to new towns, the study is motivated by a very simple question: instead of being eaten up by new towns, can agricultural landscape perform more actively in the process of development? What I mean "more actively" is to shift the current urban-oriented development mode that excludes agriculture in urban area towards a development mode in which agriculture is an important element in shaping the city.

The reasons behind the ignorance of agriculture in new town development are complicated, probably associating with the urban-rural dual system, fragmented institutional structure or people's imagination of modern cities. This project intends to tackle the issue from the point of view of urbanism, and aims to **1) question the current role of agricultural landscape in current planning and design of new towns, and 2) to explore the possibility of planning and design in facilitating and utilizing agricultural landscape to moderate the impacts of urban development on ecosystem and local communities.**

*Instead of being eaten up by new towns,  
can agricultural landscape perform more actively in the  
process of development?*



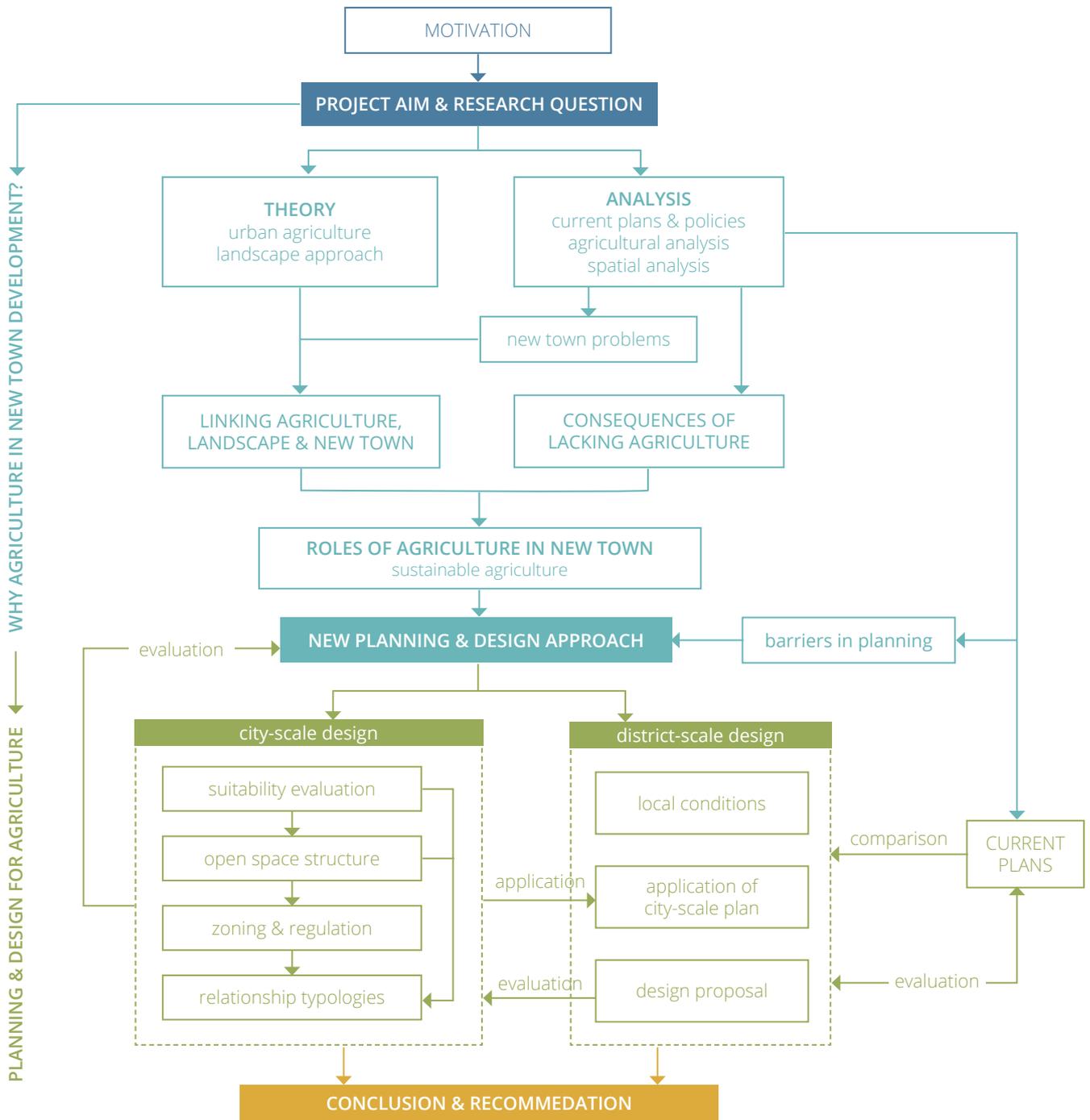
Figure 1. Urban construction is eating agricultural landscape. Guangming, 2013.

## 2. Methodology

I pick Guangming, a new town being built in Shenzhen, to test the idea of combining agriculture and urban development. The development of Guangming is driven by regional economic interests, led by infrastructure, aiming to attract high-tech industry, and designed with the Green City concept. The region also used to be an important agricultural base for Shenzhen and Hong Kong. The undergoing transformation from agriculture-based economy to knowledge-based economy in Guangming enables me to investigate the dynamic interactions between agricultural landscape and urban development in the new town development process.

The project is divided into two parts: 1) reasoning the integration of agricultural and new town development; 2) investigating the planning and design methods and tools to facilitate the integration. The two parts are interrelated and indispensable to each other. The reasoning part is the basis for the latter part, not only because it sets out the argument, but also because the argument points out possible dimensions for contributions of agriculture in the new town development. On the other hand, planning and design in the latter part can demonstrate the feasibility of the integration by providing practical instruments and illustrate the benefits by visualisation. In sum, my main research questions are:

- ***What are the potentials of agricultural landscape to contribute to new town development in Guangming?***
- ***How can planning and design help to facilitate the integration of agriculture and new town development and utilize agricultural landscape to improve the relationship between urban development, local people and ecosystem in Guangming, Shenzhen?***



### *Why agriculture in new town development?*

The first main question can be divided into three sub-questions:

- How to understand the relationship between cities and agricultural landscape in theory?
- What is the current performance of agriculture in current new town scheme?
- What kind of problem can be tackled by taking the potentials of agriculture into account in the urban development in Guangming?

The introduction of agriculture into urban development is not an aim in itself. The most important thinking behind this idea is *recognizing city regions as integrated landscapes, in which food production, natural environment and human development can be incorporated*. As one of the most important links between human and nature and the most common way to manage open spaces around cities, agriculture is taken as a medium to achieve more integrated landscape management of the city region.

To better understand the interaction between urban development, agriculture and nature, I refer to theories on *urban agriculture*, which mostly utilizes agriculture to achieve social cohesion, and the *landscape approach*, which investigates how to synergize cities and its wider ecological context. Linking the two academic discourses related to agricultural landscape contributes to the definition of potentials and roles of agriculture in Guangming.

On the other hand, it is also essential to understand the current role and performance of agriculture in Guangming by 1) *evaluating the consequence of the insufficient consideration for agriculture* and 2) *analysing the current agricultural systems and potentials in enhancing the synergy of ecological system, people, and urban development in Guangming*. The potentials of agriculture is also examined in the urban contexts, to show whether and how agricultural landscape can tackle urban problems in new towns.

I also evaluate the planning system in Guangming to understand reasons behind the current situation and the barriers to include these potentials of agriculture so as to provide more specific advices. Based on the on-site knowledge and theoretical studies, potentials of agricultural landscape in contributing to sustainability of Guangming

are defined, which is formulated as an approach to guide the urban development on agricultural land. The approach aims to utilize the potentials of agricultural landscape to facilitate more integrated city region of Guangming and moderate the impact of new town development on local population and ecosystem. The potentials and the new approach at the same time define criteria for sustainable performance of agricultural landscape in new towns.

### *Planning & Design for agriculture*

The second question is answered by the illustration of the city-scale and district-scale designs as testing grounds of the new approach.

Proposed scenario of agriculture is examined by suitability assessment to identify suitable locations for different types of agricultural practices. The suitability evaluation of agricultural land use provides basis for designing open space network for the new town. The new structure is further developed to be coherent with the urban system, and is elaborated into regulations to guide the activities and possible development within the open space network. Typologies of spatial relationship between city, agriculture and other landscape elements are developed to guarantee the spatial quality and suitability for agriculture at neighbourhood and street levels. Through these planning and design approaches, The plan is in the end evaluated to examined whether it is able to reserves spaces for agricultural use in both urban area and countryside, and facilitates synergy between agricultural landscape and city.

The implication of the city-scale plan for smaller scales is illustrated by designs of **two testing sites**, Xinqiang and Jiazitang. These two district-scale designs also show the process of applying the new city-scale framework to more practical plans for construction in smaller scales. Through the zooming-in, the new proposal is evaluated for its feasibility and capacity to facilitate urban agriculture for benefits, in comparison with the current plans.

In the end, the design proposal of both scales are reviewed and evaluated to examine whether they succeed in utilizing the potentials of agricultural landscape and facilitate better synergy between agriculture and urban development.



### **Cityscape of the new town**

This is the typical cityscape of the new town Guangming, with wide car-oriented roads, free-standing high-rise commercial housing, green buffers along the road that are meaningless for pedestrians.



# 分析

## ANALYZING GUANGMING

Context / Before new town development / Current plans & policies / Spatial analysis

# 1. Context

## 1.1 A brief history of agriculture in China

Farming activities in China can date back to around 8000 years ago. Main agricultural products are rice, wheat, potatoes, sorghum, peanuts, tea, millet, barley, cotton, oilseed, pork, and fish. The traditional farming methods was labour-intensive farming based on households or clans, which is considered as organic farming from the today's viewpoint (Paull, 2011).

Agriculture used to have a dominating role in the social structure. The traditional society was organized to facilitate the soil-based production mode (Fei, 1947). Population growth, distribution of settlements and towns, organization of government and family, religions, morality, customs were all bound by or related to the methods of agricultural production. These formed a strong identity for the country, which, however, are considered as barriers for modernization and urbanization, because agriculture makes people rooted in the field, while cities feature mobility.

### *Crisis of agriculture since P. R. China*

Since the establishment of the People's Republic in 1949, the main issues for rural development were developing agriculture to feed the vast population and at the same time building a proper urban-rural relationship that can facilitate industrialization and urbanization (Wu, 2007). Three periods are identified by Wu (2007) concerning the history of urban-rural relationship in China since 1949.

From 1949 to 1978, China applied the Soviet-type centrally planned model of development. Feeding the increasing population and providing raw materials for growing industry required the productivity of agriculture to be increased as well. However, the collectivization policy of agriculture, forcing peasants to work in collective farms (Long et al, 2011), diminished the working incentive of farmers, resulting in low productivity and poverty in the countryside. In order to prevent migration from rural area to cities, household registration system (Hukou) and food supply control system were set up to control the flow of population and goods between cities and countryside (Wu, 2007). It is the origin of the urban-rural dual system, which is still valid today and is one of the bigger institutional barriers of sustainable development in China.

After the economic reforms of 1978, the urban-rural relationship has transformed a lot, but the situation of “countryside supporting cities” remained. Inputs from the countryside to urban development were not only food and raw materials, but also low-priced labours, investment and land resource, which greatly contributed to rapid development in China in recent decades. Around 1980, household responsible system replaced collective farming, motivating farmers to work hard and thus enhancing the productivity of agriculture. However, in spite of the progresses in countryside, the income gap between urban and rural area has been enlarged by different speed of development (figure 2). The imbalance development of urban and rural area has resulted in shrinkage and aging population in the countryside, and has become a main threat of rapid development and economic growth.

What’s worse, rural land such as farmlands, forest and wetland are taken over by cities for expansion at a low price, and are sold to developers at a high price or industries at a low price as a means to attract investment. The price difference becomes vast

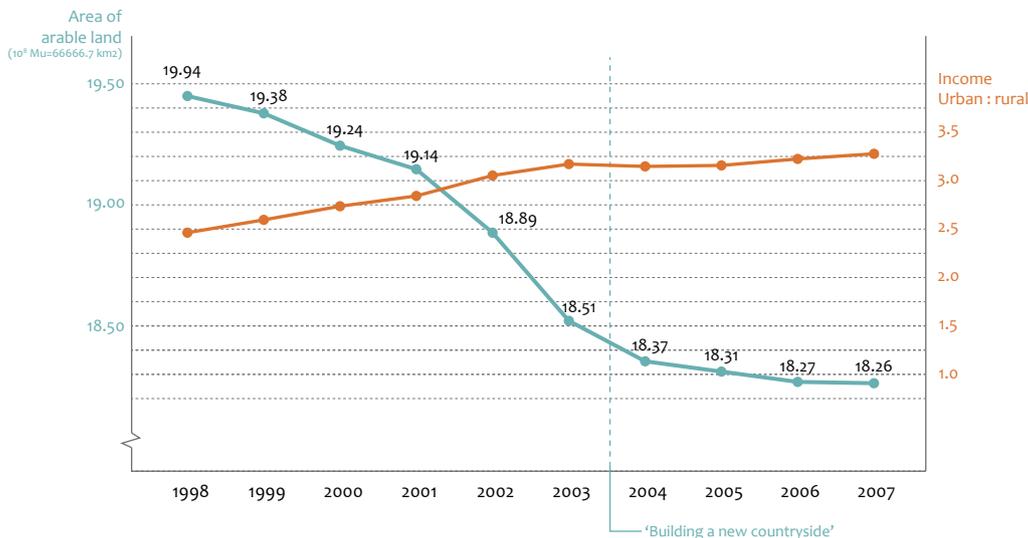


Figure 2. Changes of area of arable land and urban-rural income gap from 1998 to 2007.

revenue for local governments, which can be reinvested in infrastructure for new urban development. With *the land revenue system*, Chinese cities expand rapidly, while rural land, especially agriculture land, disappears at the same rate.

Acknowledging the importance of rural development, the central government put forward a series of policies to alter the model of "*countryside supporting cities, agriculture supporting industry*" after 2004. The milestone of the change is the abolishment of agricultural tax in 2004. "*Building a new countryside*" scheme was advanced in 2006, which is "the overarching goal" for rural development in China, targeting five major objectives: advanced production, improved livelihood, cultural and ethical progress, clean and tidy villages, effective management (Long et al, 2011).

In conclusion, agriculture in China is facing serious challenges to provide sufficient agriculture products for cities and achieve sustainability in agricultural practices:

- ***Farmland loss is inevitable.*** Although China adopts an extremely strict agriculture land protection policy (basic farmland policy, see also page X), urban development, as well as "building a new countryside", require land resources to fulfil their goals. Combined with *the land revenue system*, it is a great challenge to restrain the trend of farmland loss.
- ***The income from farming is too low*** to motivate farmers, which also makes farmers who cannot adapt to urban jobs vulnerable and suffering from poverty. For farmers, working on the soil means a lot of efforts and investment, but too little profits.
- ***Environmental problems*** also have negative effects on agriculture. Due to water pollution, decreasing fresh water supply and degrading ecosystem, agriculture land is getting less fertile and more vulnerable.

To deal with food supply for cities and social shrinkage and environmental degradation in the countryside, it is crucial to improve the urban-rural relationship by enhancing productivity of agriculture, controlling farmland loss, promoting sustainable agricultural practices, improving agricultural business model and educating farmers, etc.

## 1.2 Urban development in China

Urbanization in China proceeded slowly before the economic reform in 1979. From 1953 to 1982, urbanization rate of population just increased from 12.8% to 20.43%. Since the reform, urbanization has been accelerated together with industrialization and the release of labours from rural area. In 2011, the recorded urban population exceeded rural population, and the current annual urbanization rate is almost 2%.

Together with the growth of urban population, cities also expand in a rapid rate. The land revenue system mentioned above motivates local governments to advocate rapid urban expansion. More importantly, the privatization and marketization of real estate, esp. housing, boost the invasion of cities into rural area.

The booming housing market makes living in big cities almost unaffordable for general public. The highly dense population and explosive growth of cities also challenges the transportation systems in inner cities. Utilities and food supply systems are also under high pressure to sustain cities. The spatial injustice and increasing living costs have caused massive anxiety and high pressure for urban citizens in those megacities, making living in megacities less desirable,

Besides problems of the city itself, another challenge brought by the extensive urban expansion is environmental issues. Most megacities are suffering from severe urban heat in summer time, the decline of air quality or flooding threats.

To conclude, despite the success of cities in accelerating China's economic growth, the *liveability of urban environment and environmental resilience* of cities has become major challenges for sustainable development of today's cities in China. In the recent years, "*New Urbanization*" is advocated by the central government, which tries to alter the current extensive mode of urban development and places more attentions on environmental issues, efficiency of land resources and social cohesion in the process of development.

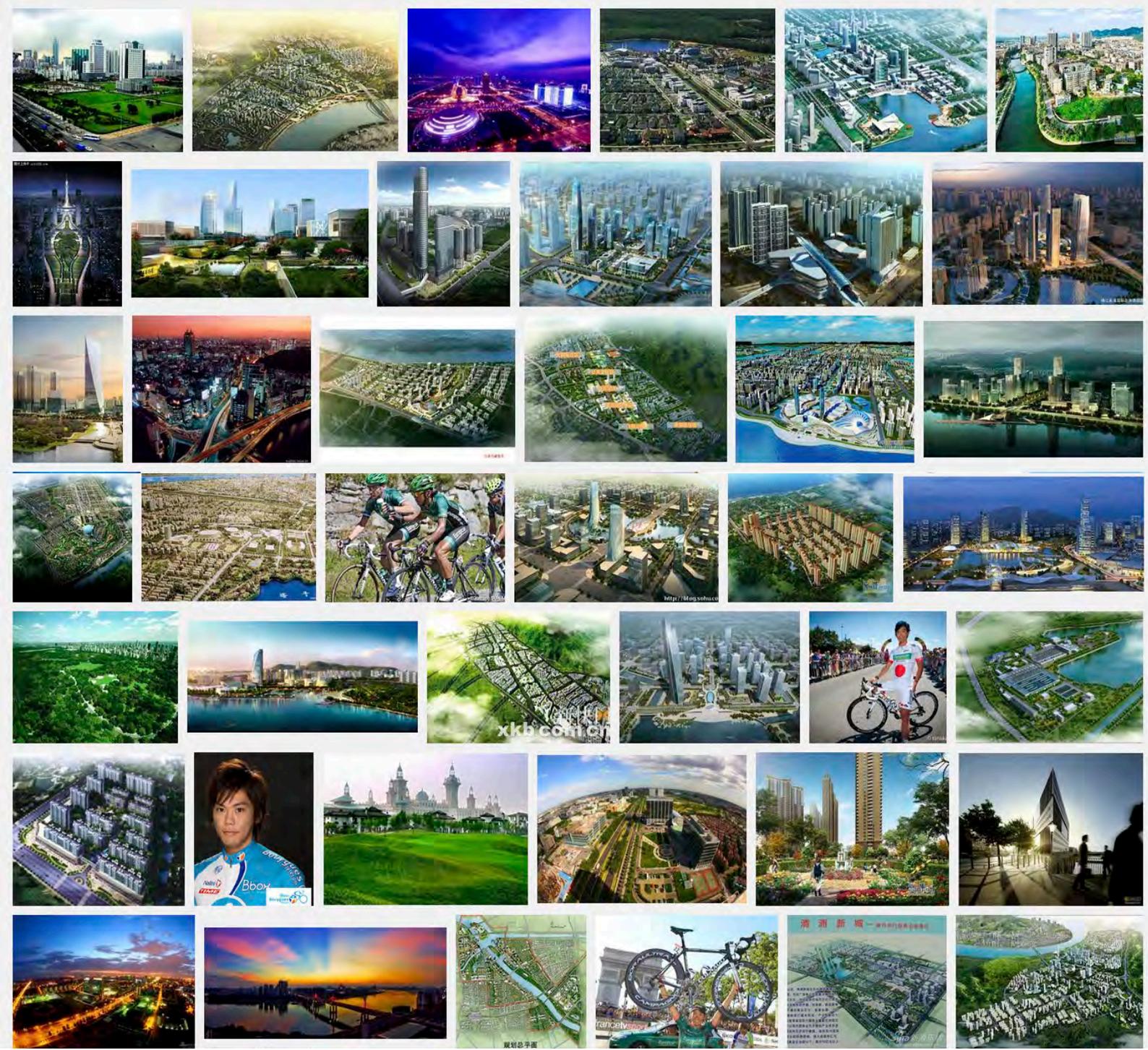
### ***New town development***

Large-scale new town development in China started around 2000, and currently hundreds of new towns are being built or planned all over China. A research by National Development and Reform Commission in China (2013) on 12 provinces shows that 90% of municipalities are planning new towns, and each municipality on average has 1.5 new towns. Most of the new towns are initiated by the government and developed in a top-down way, with an attempt to restructure the city regions and release some development pressure on existing dense urban areas.

To vitalize new towns requires a huge amount of initial investment, most of which comes from public finance. The money is used in construction of infrastructure and facilities like education, exhibition centres, logistic centres, administration centres. To get return on the huge investment in short term, the urban construction intends to attract real estate development and industries, with less attention to the living environment for future residents and environment issues. The ignorance results in long distance of commuting, high living expense, city centre with little vitality or urban realm of low quality. As a result, many new towns end up to be “ghost towns” or “dormitory towns”.

The efficiency and quality of new town development are now questioned by the public. To achieve more sustainable development of new towns requires ***more consideration for the future communities and environmental resilience*** in addition to economic benefits.

Figure 3. Searching “new town” in Chinese. Most images are about large-scale urban area with modern high-rise buildings using a bird’s-eye view.



### **1.3 New towns and agricultural land in Shenzhen**

#### ***Industrial upgrading and “land shortage” in Shenzhen***

Being one of the first Special Economic Zones in China, Shenzhen is also the first city in which limited suitable green field can be provided for urban development. Of a territory of less than 2000km<sup>2</sup>, only 58 km<sup>2</sup> in Shenzhen is available for development by 2020 (Hu, 2012). Land revenue is no longer a significant financial source for Shenzhen municipality. In 2012, only 9.31 % of the municipality's revenue in 2012 is from selling land (Zhang, 2014).

But urban expansion is still seen as an important way to boost economic growth, as it can attract industries and investment. Shenzhen is facing the challenge of upgrading its industry to more knowledge-based economy. As urban regeneration is generally more difficult than greenfield development, the municipality prefers further urban expansion to accommodate these new economic sectors. Therefore, the pressure of preventing open spaces from urban development is very intense in Shenzhen.

#### ***New towns in Shenzhen***

Four new towns outside of the Special Economic Zone (SEZ), Guangming, Longhua, Dayun and Pingshan (figure 4), are established by the municipality as strategic locations for industrial upgrading and restructuring the Shenzhen city for better regional connection (figure 5). Developed in a top-down approach, new towns require a huge amount of investment from the municipality at the first stage to build infrastructure and supporting facilities. The four new towns are supposed to function as urban centres by 2015.

#### ***Urbanization & agriculture in Shenzhen***

Shenzhen is the first city in China which claims to be 100% urbanization rate, which means all the population registered in Shenzhen is officially recognized as urban citizens. In 2011, in the economic statistic of Shenzhen, proportion of agriculture sectors in overall GDP is less than 0.05%. Majority of agro-products supply in Shenzhen have to be imported from other cities. In 2012, the municipal agriculture ministry was abolished, and related functions are merged into economy commission, which promotes better linkages between primary, secondary and tertiary economic sectors (Lei et al., 2012), but also implies that economic productivity is very likely to be the main concern on agriculture land.

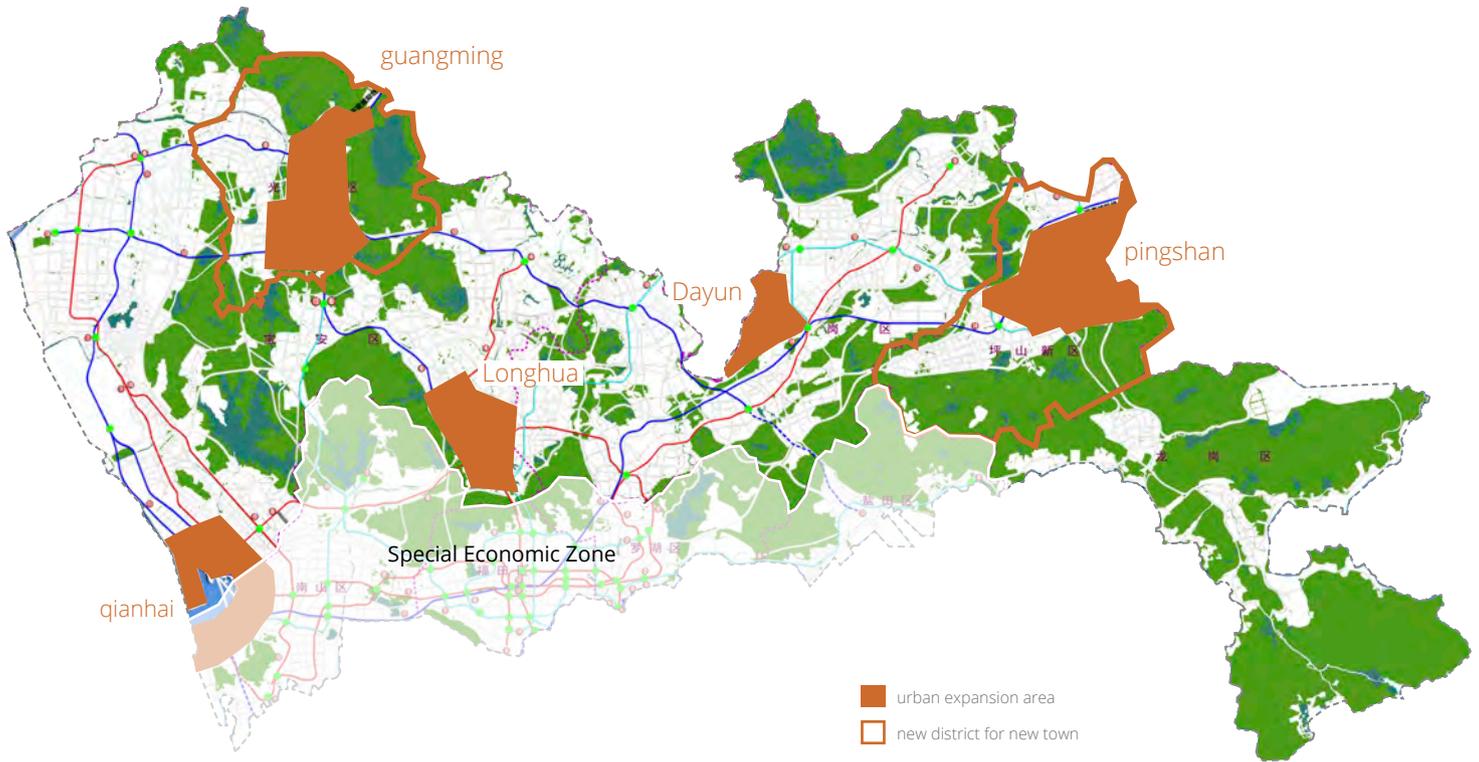


Figure 4. New town development in Shenzhen and new administrative districts for new town development.

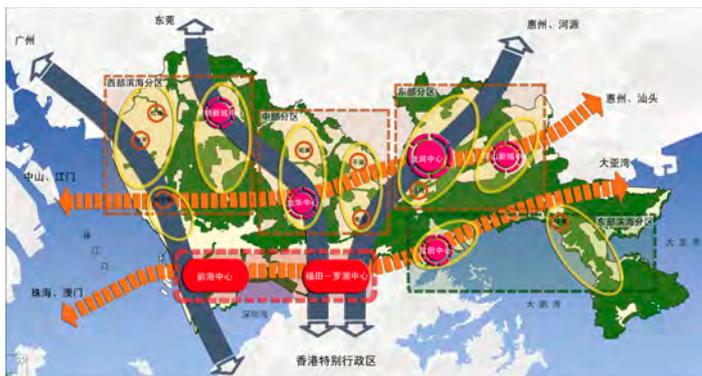


Figure 5. Restructuring Shenzhen by emerging new centers and infrastructure linkages. The structure plan of Shenzhen (2010-2020).

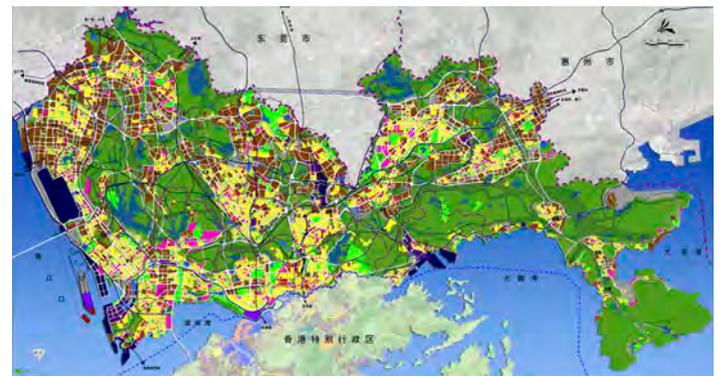


Figure 6. Green space and urban expansion. Master plan of Shenzhen (2010-2020).

In Shenzhen, there are 2000 ha of farmland which needs to be maintained permanently according to the basic farmland policy. On the basic farmland, agricultural sectors in Shenzhen are being upgraded through industrialization and introduction of modern management mode. Shenzhen attempts to develop high-tech agriculture as part of the scheme knowledge-based development. To ensure sufficient food supply for the city, “the shopping basket programme” is developed by the municipality, which utilizes modernized food production in peri-urban area of Shenzhen, run by agriculture enterprises mostly. To conclude, farming in Shenzhen is in the process of marketization and industrialization, and agriculture land is considered mainly as spaces for economic production.

#### 1.4 Brief introduction of Guangming

Located in the north of Shenzhen, Guangming used to be an important agricultural base to supply food for Shenzhen and Hong Kong.

The high-speed railway which connects Guangzhou, Shenzhen and Hong Kong brought development opportunity for Guangming. To seize the opportunity, **Guangming New District** was established in 2007, aiming to develop knowledge-based industries for industrial upgrading of Shenzhen. The huge amount of remaining agricultural land made it possible to develop a new town on green field. “**Green City**” is the key concept used to guide the development of Guangming. The concept includes the aspects of green ecosystem and green community. So focusing on local communities and ecosystem is not only my research concern, but also relevant for the achievement of the new town vision for the municipality.

The agricultural past and the shared concerns on ecosystem and community make Guangming a perfect location as a testing ground for my study.

##### Basic facts of Guangming

*New town development start at 2007*

*Area: 156.1 km<sup>2</sup>*

*Population: around 1 million, of which registered population is 42,000*

*GDP in 2010: 30 billion RMB, 2.9% of the total GDP of Shenzhen*

*Average annual GDP growth since new town: 25%*

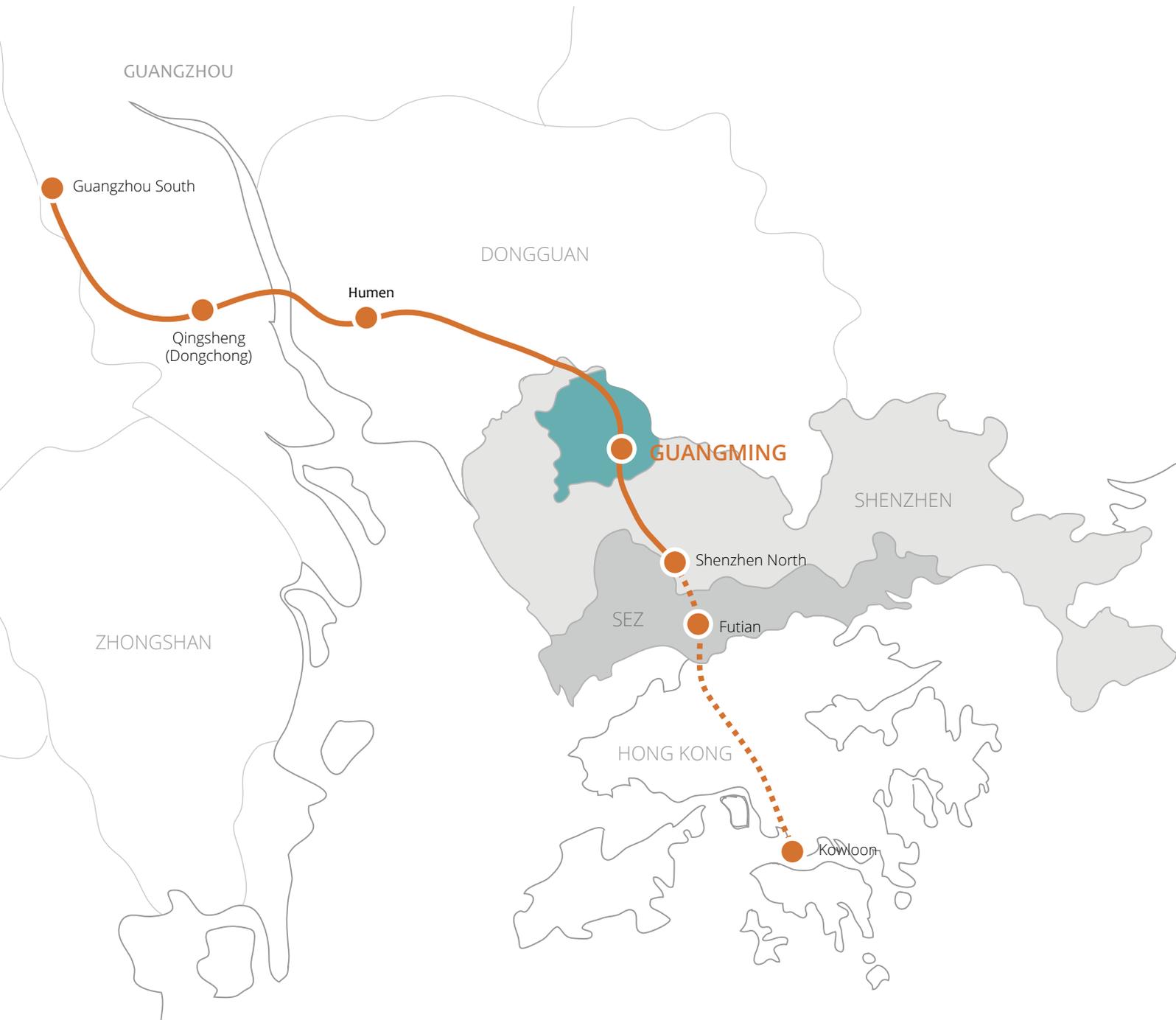


Figure 7. Regional high-speed railway that drives the development of Guangming new town. Elaborated by the author.

## 2. Before New Town Development

In the era of agriculture, Guangming new district used to be agriculture-based society, in which settlements were developed to manage the farmland. As the alluvial area has most fertile soil, so villages were mostly located along rivers, but with a distance away from the rivers to prevent settlements from flooding. In this way, settlement, soil and water were closely connected through agriculture activities (see also page 60).

Guangming district was established by combining Guangming Farm and Gongming town. In 1958 state-owned Guangming Farm was founded (figure 8-b). Afterwards, the farm and Gongming town became an important agricultural production area, supplying Shenzhen and Hong Kong with agro-products including pigs, fruits, vegetable, chicken, milk, fish and flower.

In 1980s, stimulated by economic reform and opening up policy, Gongming began to industrialize, with investments from abroad and local rural collectives. Those manufactories mostly were located along main roads for better accessibility and around existing settlements for better services. However, as settlements are situated on arable land, the amount of agriculture land decreased dramatically and replaced by industries. Meanwhile, Gongming was still an important food production area for the city region because of increased productivity and remaining agricultural land. On the other hand, controlled by the government, Guangming Farm mainly focus on agriculture and agriculture-based industries since its establishment. A great amount of agriculture land remained in Guangming Farm, which, however, becomes an advantage for Guangming to develop a new town.

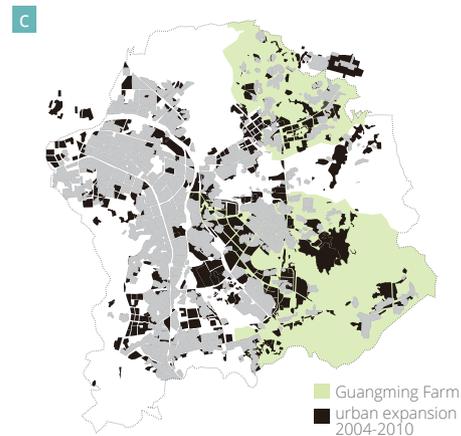
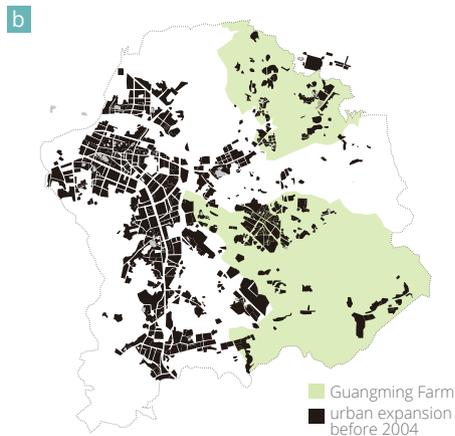
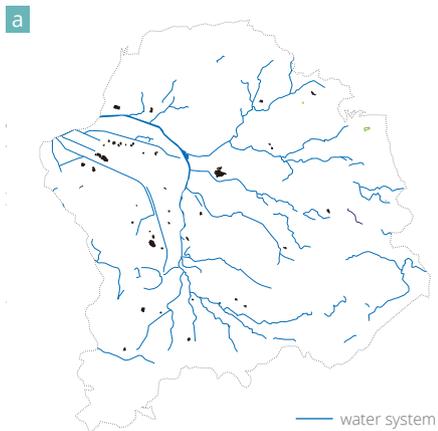
Figure 8. Historical analysis of infrastructure, urban growth and green spaces. Source: Google satellite map of 2003 and 2010, land use map by the municipality (2004), master plan of Guangming (2007-2020), the plan of the Shenzhen ECLs (2013).

Before industrialization

Before new town development (2004)

After new town development (2010)

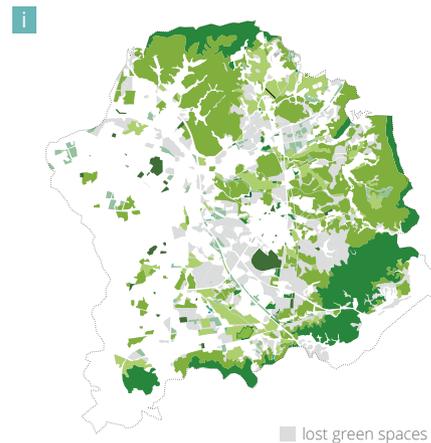
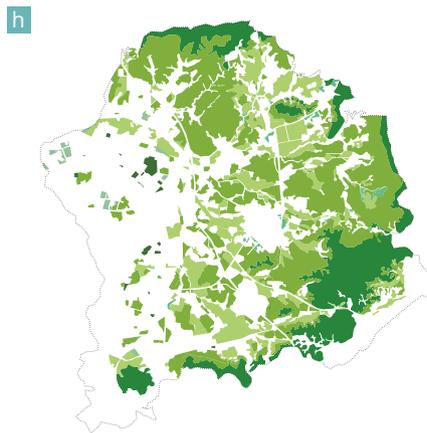
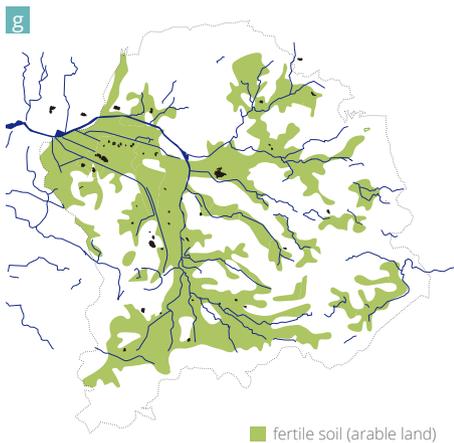
Urban growth



Infrastructure



Green Space



## 3. Current Plans & Policies

### 3.1 The Planning System in Shenzhen

#### *Urban planning's role in guiding urban development*

Since the establishment of Shenzhen Special Economic Zone (SEZ) in 1979, Shenzhen has known for the innovation and success of its planning system to guide the rapid urban development, which also makes urban planning an important tool for managing the city. According to Shenzhen's regulations on urban planning, *urban development should be based on and regulated by urban planning to guide the development and coordinate conflicts in land use between different sectors*. To ensure the legal authority of urban planning, permit for construction must follow regulatory plans, which means construction is restricted before regulatory plans are done.

In order to enhance the effectiveness of urban planning, Shenzhen's urban planning system has been coordinated with other administration sectors, like land planning of Land and Resource Ministry (which defines the quantity of built-up area and basic farmland, see chapter.X ) and five-year and annual development plan of the municipality.

#### *Urban planning system*

Due to the role of urban planning in guiding urban development, the formulation of plans is oriented to implementation and administration. Comprehensive plans are used to provide the whole picture and structure for the area. To better manage the whole territory, the comprehensive planning system is divided into five scales: regional master plan (the whole Shenzhen city), sub-regional master plan, district master plan, statutory plan and detailed blueprint. The regional master plan is foundationally important as it gives a direction and a structure for the whole city, while statutory plans are the practical tools to directly regulate development projects. In-between are plans to translate the regional master plan into more narrowed focus on the area.

Other complimentary plans include short-term construction plans and special plans. As the period for realizing comprehensive plans are too long (10-20 years), annual and 5-year short-term construction plans are developed by local governments to have a



Figure 9. The planning system in Shenzhen. Source: Regulations on City Planning of the Shenzhen Municipality, 1998

better management of recent urban construction and relate their actions to the long-term visions. Other special plans are also developed to guarantee the quality of spaces and deal with some specific issues like environmental protection, public transport and heritage protection, which are used as a complement to comprehensive plans. Detailed blueprints are used for pilot projects, infrastructure and public facilities that are promoted or built by the municipality as strategic interventions.

Regulations on implementation and administration of plans are also (being) developed to make sure that urban planning does play a part in guiding development, which can be facilitated by the special legislative power of being a SEZ, which allows innovations in regulations.

## 3.2 Planning for Guangming

### Development Goal

*The new town is aimed for low-carbon ecological city, a modern and green new city, based on technological innovation, guided by scientific urban planning, led by the development of infrastructure and utilities.*

### Size

*Urban construction should be controlled within 72.33 km<sup>2</sup> (Area of Guangming: 156.1 km<sup>2</sup>)*

### Planned land use in urban area

Residential	1062 ha	14.7%
Commerces and services	366ha	5.1%
Mixed-use	237ha	3.3%
Administrative	505ha	7.0%
Industrial use	1741ha	24.1%
Green areas	1008ha	13.9%

### *The planning system of Guangming*

Figure 10 shows the relationship and timeline of different plans related to Guangming. In the Shenzhen city masterplan (2010-2020), Guangming is defined a sub-centre situated along the corridor connecting Dongguan, Guangzhou and Shenzhen, functioning as a service centre for high-tech industry. West high-tech sub-region masterplan (2005-2020) defines the main urban structure for Guangming, while ecological control line (ECL) confines the urban development of Guangming in certain areas.

Formulated in 2007, the comprehensive masterplan for Guangming new district is an important linkage between the regulations of regional plans and the development of smaller scales. Based on the master plan, special plans like urban design, industrial plan, public facility plan and transportation plan are further developed. The masterplan is also divided into sub-districts, for which blueprints and statutory plans are formulated to guide construction.

Since the Guangming masterplan plays such a crucial role for urban development in Guangming, *the evaluation of current plans mainly focuses on the masterplan.*

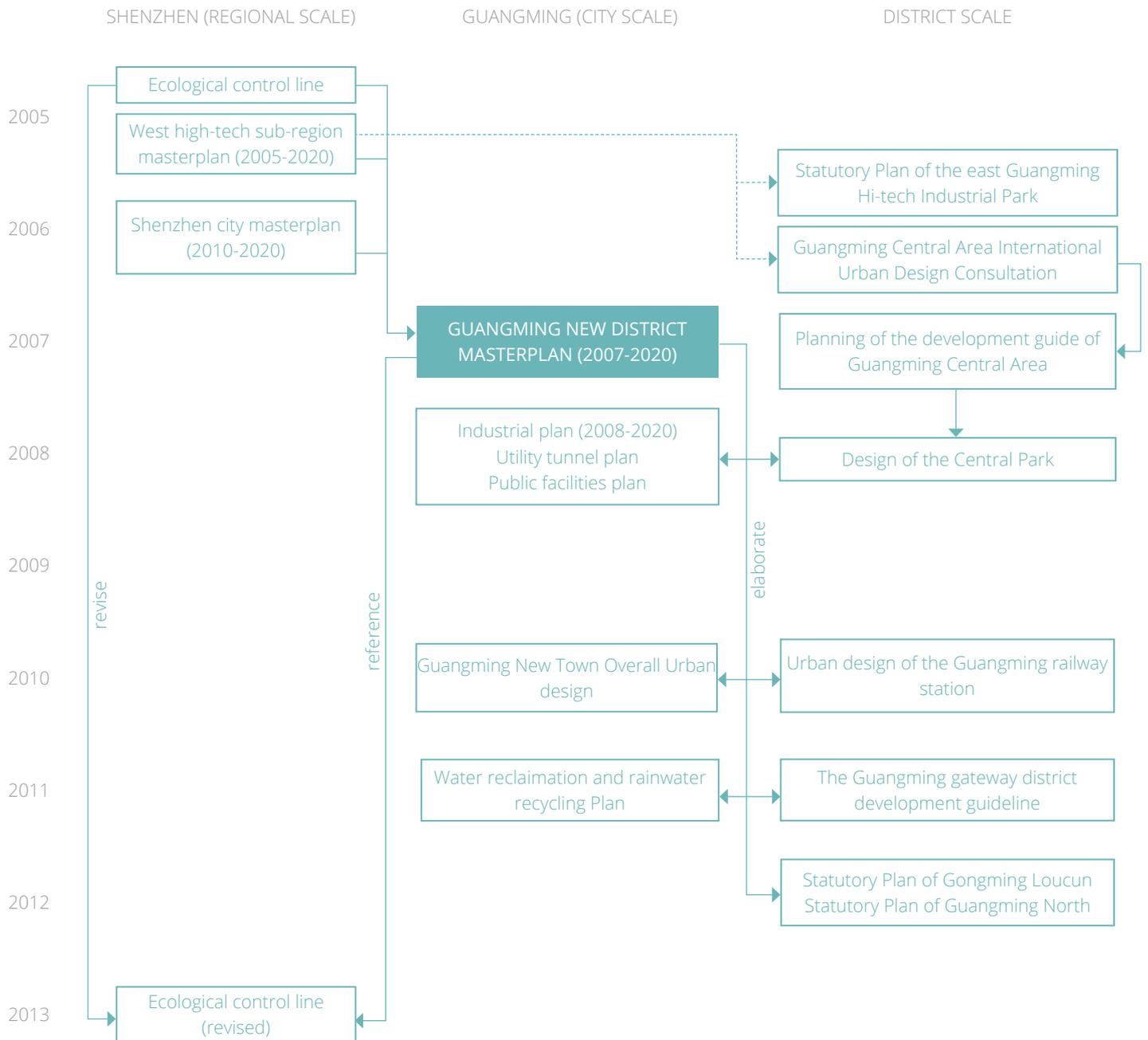


Figure 10. The timeline relevant plans of Guangming and relationship between plans. Elaborated from a workshop presentation of Shenzhen Center for Design, 2013.

## History of “green city” concept

- 2007: The concept of “green city” was proposed for the first time for Guangming district;
- 2007.5: Bao’an district government meeting – high standard urban planning, high standard construction, to develop Guangming new town as “a pilot project for scientific urban development” by 21st-century standard and post-modern concepts;
- 2008.3: Shenzhen and China Ministry of Construction signed a framework agreement to build Guangming New Town as a “pilot zone for green construction”;
- 2010.1: Shenzhen successfully applied for the construction of a “low-carbon eco-city, pilot project”, Guangming new town as an experiment and demonstration district.

Sources: a workshop presentation of Shenzhen Center for Design, 2013.

## “Green City” Concept

Guangming is branded as a “green city”, which is the key design concept behind the new town development. To achieve the vision of “green city”, “green indicators” are set up as development targets and evaluation criteria for the construction in Guangming, including environmentally friendly controlling indicators, resource conservation controlling indicators, economic prosperity controlling indicators and social harmony controlling indicators.

The implementation of “green city” vision includes seven dimensions, and is translated into many administrative documents and practices in Guangming (see table 1). According to the summary, we can conclude that the emphases of these measures for “green city” are placed on economy, building, (hard) infrastructure and city beautification, while *practical realization of green ecosystem and green community gets less attentions.*



Figure 11. Pilot green building projects, mostly public facilities, with free-standing buildings surrounded by car-oriented roads and placeless green spaces.

dimensions	contents	description
green economy	High-tech industry	LED, information technology, flat panel display, solar PV industry, medical biotechnology, materials Science
	Manufactory	Ungraded by relocation Main industries: undergarment, horologe, matrix
	Service industry	Producer service, tourism, logistic, real estate, culture, education, health care
	Modern ecological agriculture	Seed industry, research, medical biotechnology
green building	Green Building Standard (6 published, 20 in process)	Methods: Green wall, sunshade, natural ventilation Total building floor area: 596 ha (by 2013), including under construction, mostly from public investment, like public buildings and social housing
	LED lighting in public area	
	Floor area award	for buildings with light pipe system, etc
	Subsidies	for buildings with recycled energies, greywater recycle and roof greenery
green space	Green ecological area	Ecological area: more than 1000 ha Green space ratio: 53% (Shenzhen (2009): 50%) 8 urban parks, 28 neighborhood parks, 3 special parks Green roads
	Flower Sea	floriculture, combined with tourism, health care, creative industry, training
green infrastructure	Utility tunnel	21 km in total
	Transport	5 scenic roads (main roads, 8-lane) 2 metro lines 1 BRT line + bus lines Greenway (i.e. bicycle lane, total length:161 km, density 1 km/km2)
	Low-impact development (LID)	Reclaimed water system; rainwater utilization system; increase infiltration rate; flood storage area (171 ha.)
	Flooding	3 pumping stations to protect urban area
	Infrastructure-led urban expansion	Infrastructure is built before urban projects
green community	Waste sorting	Food waste turned into fertilizer for neighborhood use
green ecosystem	Define Ecological Control Line	Covering 53.45% of the territory
	Maozhou River restoration	Length: 31.2 km Methods: Remove factories and livestock, clean river bed, and improve sewage system, water storage for flooding Investment: 5.58 billion RMB (0.66 billion euro)
green identity	Greening the city	About 650 million RMB invested in improving green spaces: mostly along main roads, nodes and parks in 2012-2014

Table 1. The practices of "green city" concept in Guangming. (Source: Guangming municipality, <http://www.szgm.gov.cn>, elaborated by the author)

## Blueprint

*Blueprint is a complete or total design aiming to show a comprehensive and detailed vision of the area. Deterministic as it is, the outcome and the process is usually fixed (Carmona, et.al, 2010). When the whole circumstances change, the out-dated plan need to be replaced by another comprehensive plan. It is also a direct design, which means limited actors are involved.*

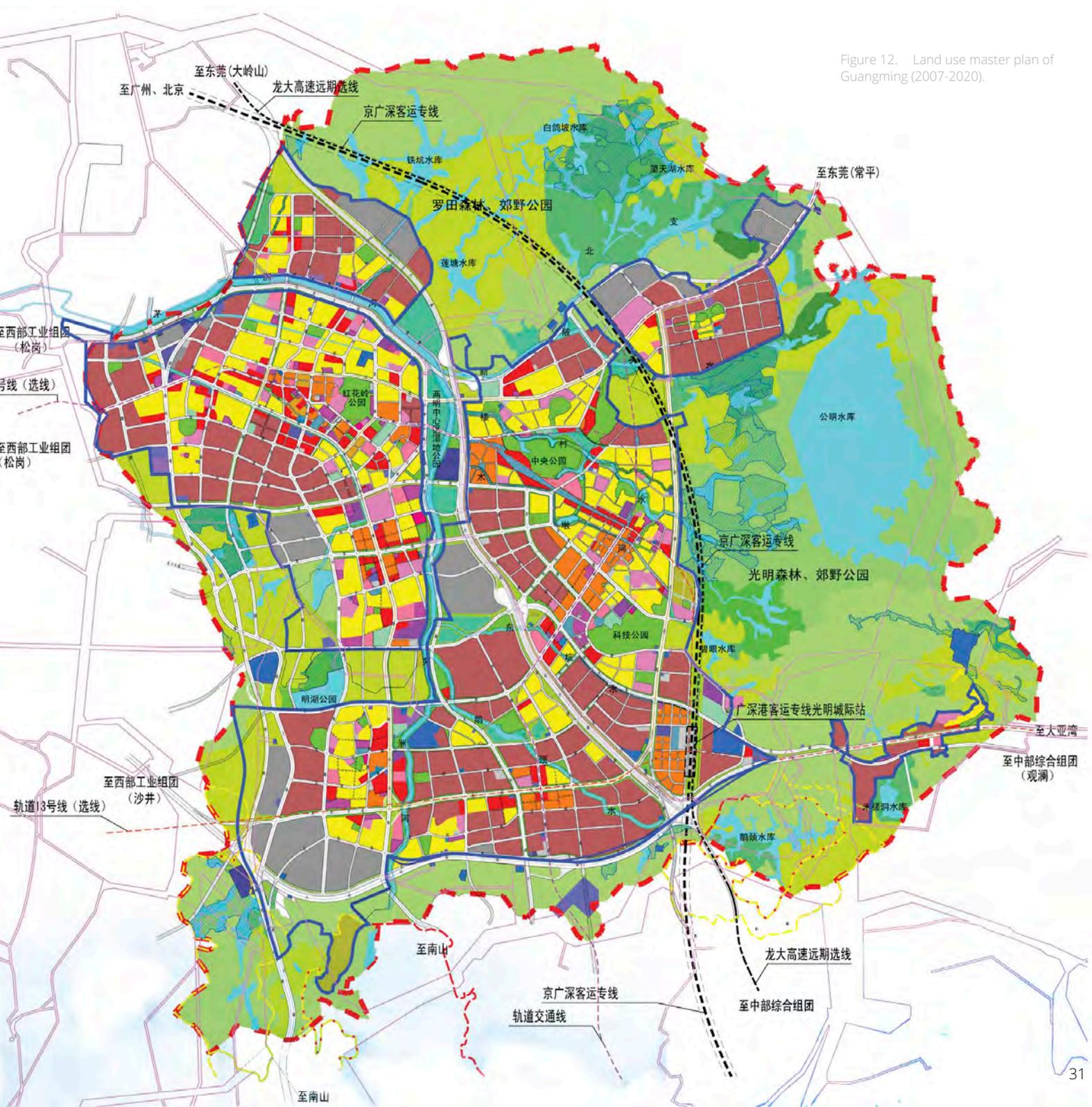
### 3.3 Blueprint master plan

The master plan is developed to illustrate the scenario of the new town in 2020 and also provide a comprehensive solution for the rapid urban growth of Guangming. Important as it is, detailed statutory plans and other complementary plans follow the main structure that the master plan defines.

The primary structure defined in the master plan is the road structure, of which regional connectivity and continuity are the main focus. In the blueprint, details like land use, neighbourhood streets are also designed. As comprehensive as it is, a fixed outcome is likely to be delivered, in which complex conditions in smaller scale are generally neglected.

With the introduction of the master plan, the development mode of the area since industrialization has been changed. Before the new town scheme, industries expanded along existing roads and around urban villages, usually in an unorganized way, while the master plan utilizes road network for land parcelling and structuring the new town. Wherever the grid goes, urban construction follows. In this way, the gaps between existing built-up areas are being filled rapidly.

Figure 12. Land use master plan of Guangming (2007-2020).



#### Basic facts of the ECLs

*Established: 2005*

*Modified: 2013*

*Total area in the ECLs in Shenzhen: 974 km<sup>2</sup>, 49.9% of the territory of Shenzhen*

*Ares in the ECLs in Guangming: 79 km<sup>2</sup>, 53.4% of the territory of Guangming*

### 3.4 The Ecology Control Line (ECL)

In order to preserve natural environment and open space from urban expansion, an Ecology Control Line (ECL) is introduced in Shenzhen in 2005, which covers almost half of the territory of Shenzhen. Shenzhen is the first city having an ECL in China, but an ECL will become obligatory for every city according to Communiqué of the Third Plenum of 18th CPC Central Committee (2013). So as the lines have been tested in Shenzhen for almost 10 years, the implication and impacts of ECLs in Shenzhen should be understood thoroughly in order to guide the formulation of the ECLs in other cities.

The basic concept is that within the ECLs, no construction is permitted except for important infrastructure, utilities, tourist facilities and parks. Even for existing buildings, modification and reconstruction need permission from government. In other words, it can be recognized as an urban stop line.

An ECL only defines the area that should be protected from urban development, which includes important natural resources in Shenzhen. But as it is invalid in built-up area or to-be-urbanized area, so it cannot guarantee that ecosystem in the urban area is respected and preserved. In the urban area of Guangming, many rivers and streams are narrowed and are irrelevant to the new urban structure, which will cause problems on, for instance, flood prevention. So to build a harmonious relationship between city and the ecological conditions in the city level, defining an ECL is far from enough.

Another problem is from the decision making process in defining the ECLs. Without consultation with local communities in the decision making process, the ECLs have strongly influenced the livelihood of local residents. Most communities in the ECLs stagnate as no factories or enterprises are able to move in, and many residents are suffering from unemployment (Liu, 2010). Some infrastructure construction also stops due to the ECLs. In 2013, the ECLs were modified according to the local demands (see figure 13), but still a lot of communities remain in the ECLs. A study on how to develop (or relocate) those communities is going on, led by the Urban Planning Land and Resource Commission of Shenzhen.

We should also be aware that strict regulations in the ECLs do not mean that nothing happens or changes in the ECLs now. Reservoir is under construction in Guangming, and many former farmlands are cleared and levelled to prepare for modern agriculture. Besides, a regional highline going through the ECLs in Guangming destroys the natural skyline. There is also one “greenway”, i.e. cycling path, in the ECLs, being part of the regional green way network. It has very good spatial quality, yet badly connected with other networks. Currently, there is no specific detailed spatial plan to guide development activities in ECLs.

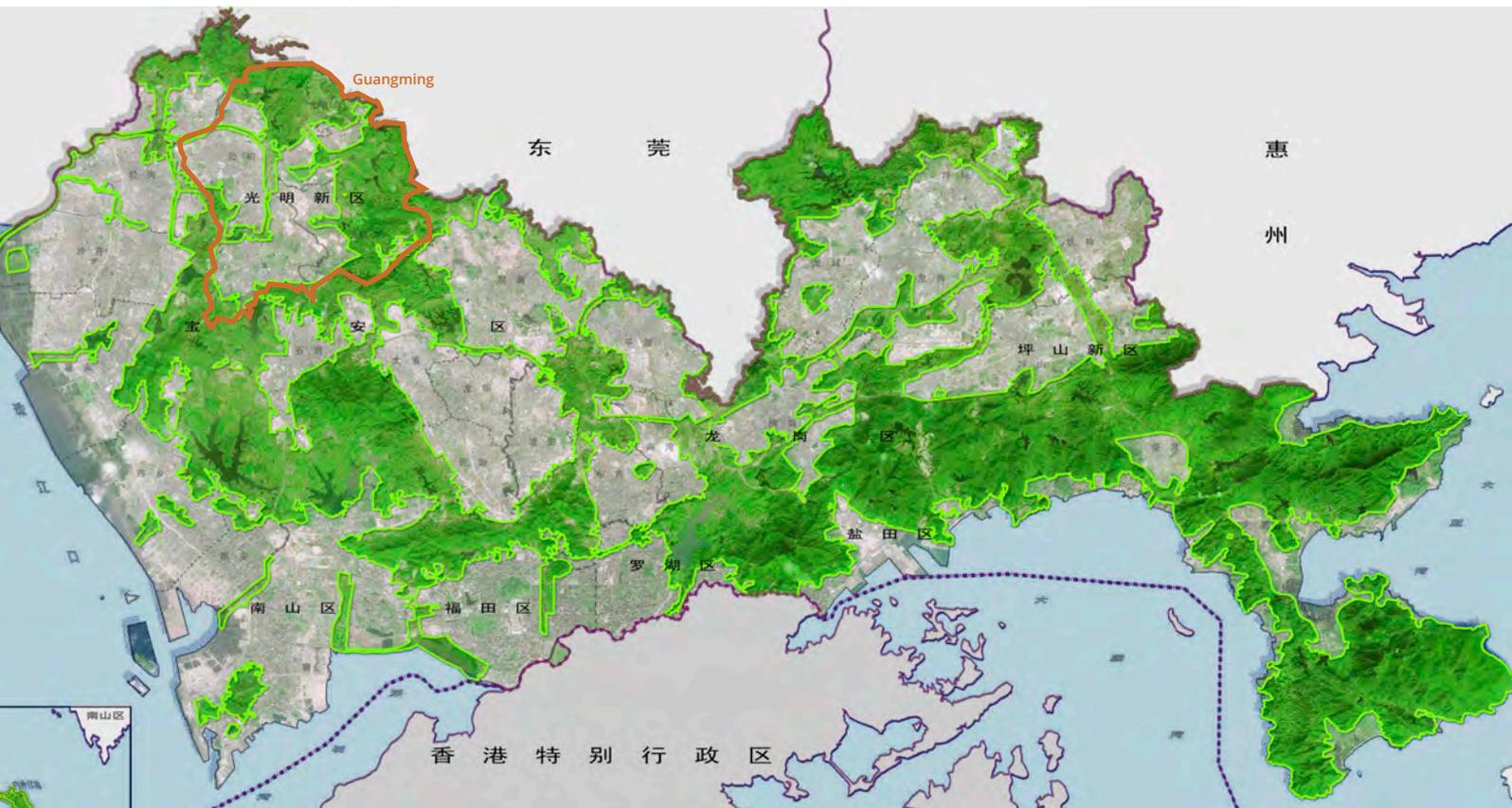


Figure 13. The ECLs of Shenzhen (2013).

### 3.5 Basic Farmland Policy

Basic farmland policy is a tool used by the Land and Resources Bureau for achieving food security of whole China. Basic farmland means cultivated land where other kinds of agricultural activities, like fish ponds and orchards, are not permitted. Every municipality should keep a certain amount of basic farmland, even for Shenzhen, a fully urbanized city. In Shenzhen, most basic farmland is for growing vegetable.

There is 12.26 km<sup>2</sup> of basic farmland in Guangming, accounting for 41% of basic farmland in Shenzhen, which implies maintaining basic farmland in Guangming is important for Shenzhen. In order to enhance the productivity of basic farmland and also better oversee it, from 2011 to 2013, small-scale farms with diverse agriculture activities are replaced by concentrated and standardized farmland, usually cultivated by enterprises. Temporary buildings are removed, and people who live next to their fields have to leave, generally without any compensation, because farming and those buildings are considered illegal. During my field study, some fields of a large area are vacant for more than one year, because no agricultural enterprise has moved in yet. According to a survey report by Shenzhen Center for Design (2012), at least one company working on the basic farmland is suffering from a deficit, so the profitability of these companies is still unclear.

Basic farmland in Guangming is mostly situated around communities in the ECLs, as the farmland used to be looked after by the local communities. In recent years, farming activities are taken over by immigrants, and local residents mostly rely on rental income from factories and housings or working in factories. But without opportunities to develop or land to farm, the future of these communities seems to be quite gloomy.



Figure 14. Massive vacant land after land consolidation on basic farmland in the ECLs.

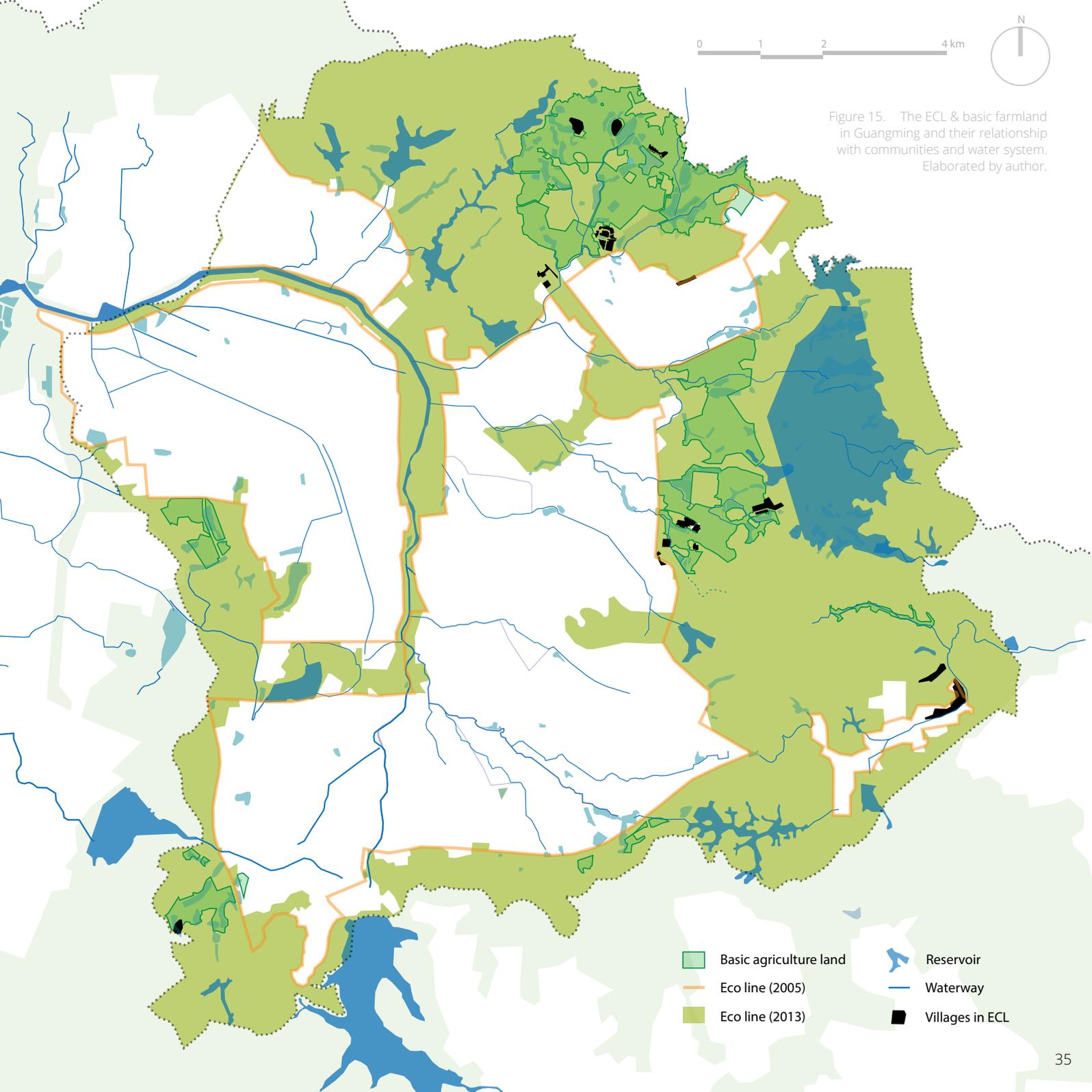


Figure 15. The ECL & basic farmland in Guangming and their relationship with communities and water system. Elaborated by author.

- Basic agriculture land
- Eco line (2005)
- Eco line (2013)
- Reservoir
- Waterway
- Villages in ECL

# 5. Spatial Analysis

## Maozhou river profile

*Length: 42 km*

*River basin: 400 km<sup>2</sup>*

*Main environmental issues: flooding, pollution*

*Source of pollution: industry, livestock, domestic wastewater*

*Population impacted: 3 million*

Source: Shenzhen Hydrology, 2001; [http://www.sznews.com/zhuanti/node\\_160046.htm](http://www.sznews.com/zhuanti/node_160046.htm)

## 5.1 Ecosystem and environmental issues

### *Environmental issues of Maozhou River*

Maozhou river in the main stream that goes through the territory of Guangming. The pattern of the river is shaped by the topography of the land. It originates from Yangtai Mountain and enters into the mouth of the Pearl River, and Guangming is located in the upper side of the river.

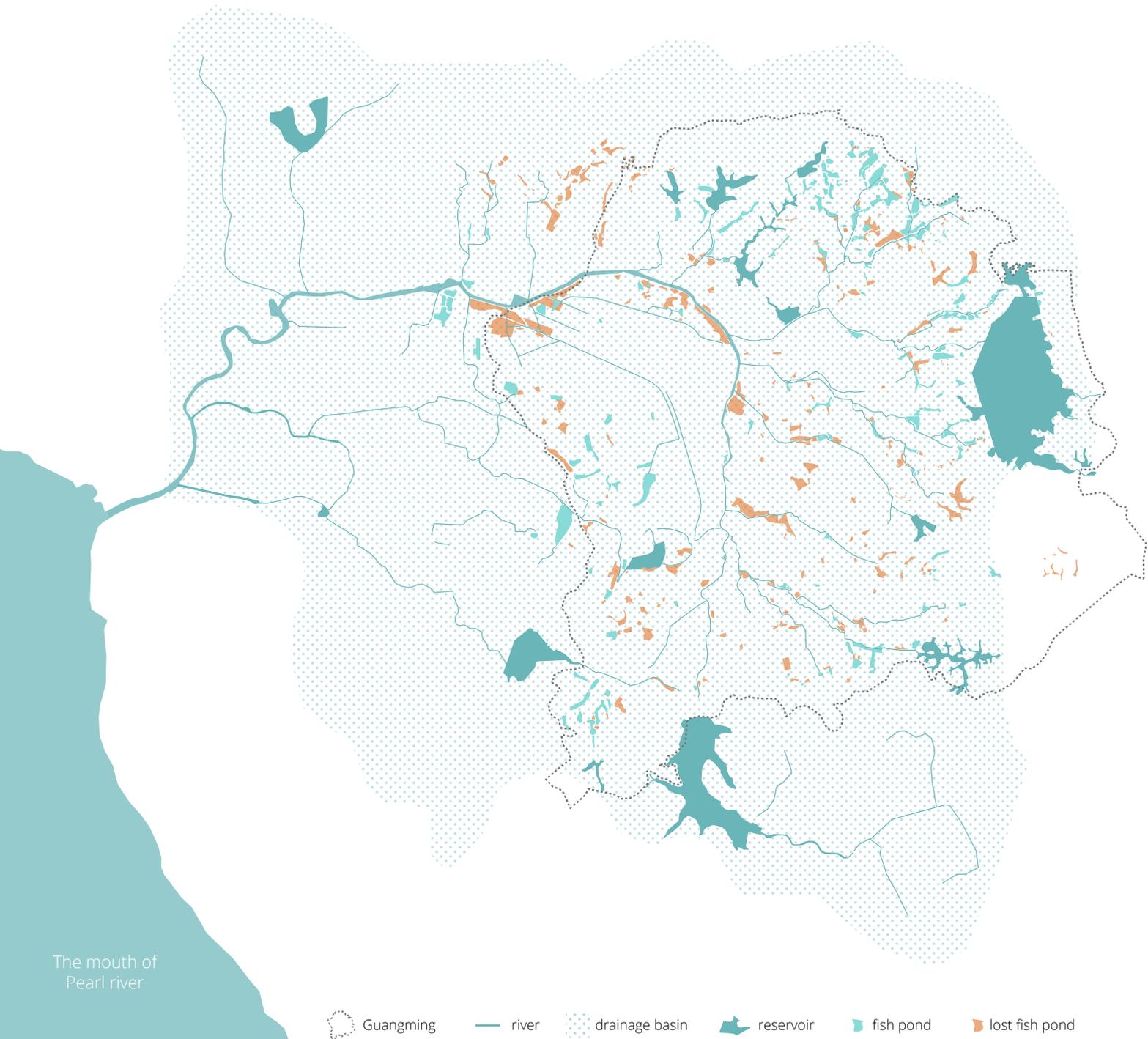
The environmental issues of Maozhou have become severe. In 1960s, water in Maozhou River was still drinkable, but now some claim that it is now the most polluted river in the Pearl River Delta. The main sources of pollution come from industries along the river developed since 1980s, industrial livestock farms (Guangming Farm) and domestic wastewater. The strong smell of the river, especially in summer time, has massively influenced the liveability of the region. However, there is still some small farmland along the river in which vegetables are still being cultivated by local citizens (see figure 20). Another issue is flooding. Along Maozhou River, especially in Gongming downtown, the level of flood risk is very high. Intensive rainfalls in summer often cause flooding problems in various locations along the river. As the river goes through dense urban area, it is estimated that 3 million of population are impacted by the environmental problems of the river.

A water restoration project with a huge investment to improve the water quality of the river has started since the beginning of new town development. But I was told that since the start of the water restoration project, flooding problems have become more severe. The water related projects mostly rely on hard infrastructure, like water pumps, pipes, narrowed watercourses with concrete river banks.

### *Changing water system*

People's activities and new town development have changed the water system in Guangming massively. Besides water pollution in Maozhou River, the amount of fish ponds is also decreasing rapidly since the new town development. More than half of the fish ponds along the river have been covered for farmland, urban construction or water restoration (see figure 18).

Figure 16. System of Maozhou River. Source: Shenzhen Hydrology, 2001



But fish ponds can also deliver environmental values for the region. Fish ponds in Guangming are mostly located next to the river. Being the lowest area of the surrounding, fish ponds have the capacities to buffer heavy rainfalls. Fish ponds can also contribute to the ecosystem in other ways like supplying underground water, mediating heat island effects and feeding birds, etc. In Hong Kong, fish ponds are considered as an important part of wetland systems (WWF, 2009).

Another massive project that changes the water system is Gongming Reservoir being built in the east of Guangming. Although Shenzhen is located in a humid subtropical area, water supply for the city is always a problem, especially in dry seasons. The construction of Gongming reservoir aims to secure water supply. Located inside the ECLs, the reservoir will be the biggest one in Shenzhen with an area of 6 km<sup>2</sup> and a



Figure 17. Natural watercourse



Figure 18. Watercourse in new town.



Figure 19. A fish pond that is gone. (On the board: "the pond is deep. Swimming is forbidden.")



Figure 20. Pollution in Maozhou River. source: <http://umedia.oeeee.com>



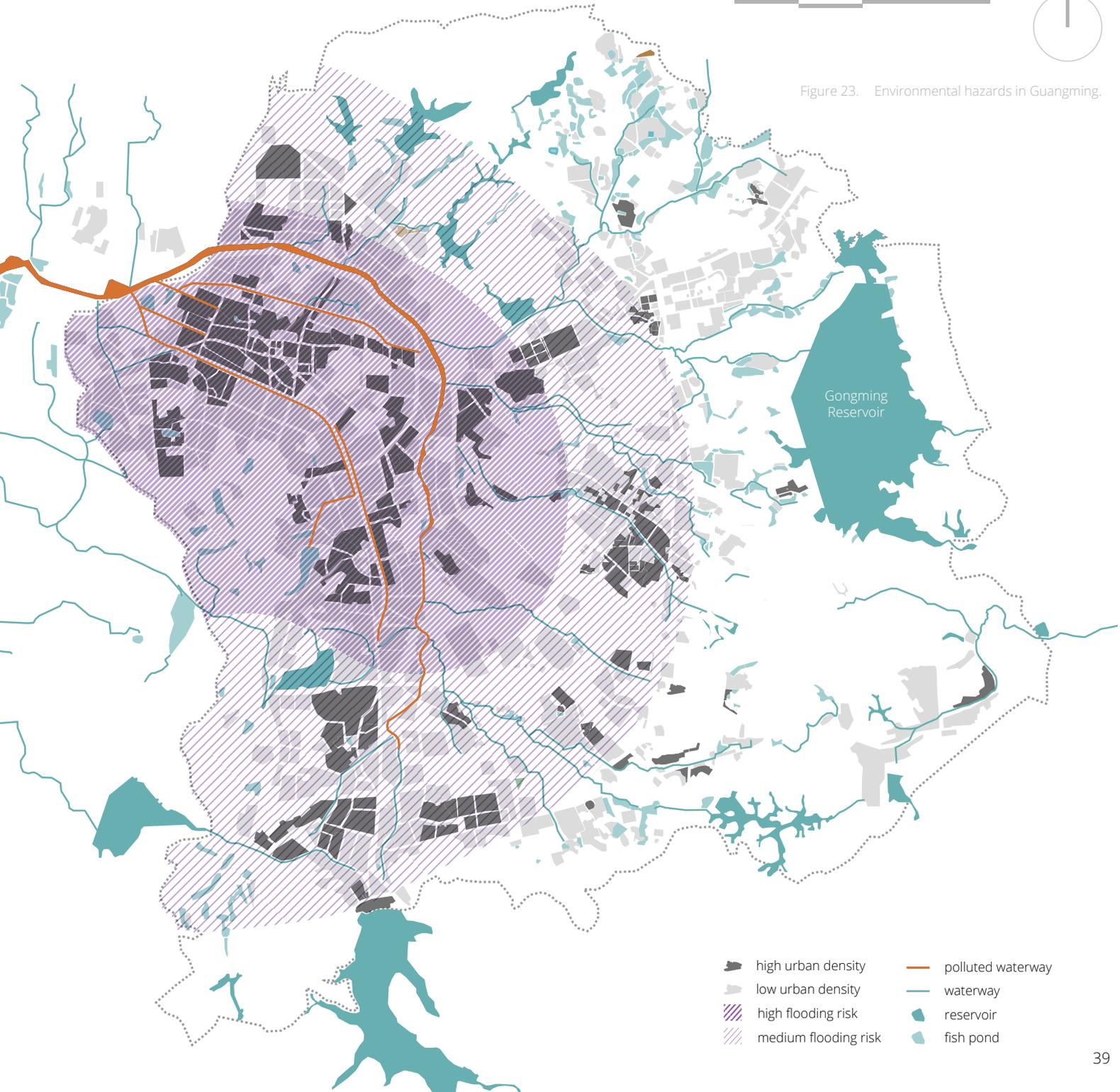
Figure 21. Farmland next to Maozhou River. source: <http://umedia.oeeee.com>



Figure 22. The dike of Gongming Reservoir. © Jiangnan LIU, 2013



Figure 23. Environmental hazards in Guangming.



- high urban density
- low urban density
- high flooding risk
- medium flooding risk
- polluted waterway
- waterway
- reservoir
- fish pond

volume of 148 km<sup>2</sup>. Dikes of more than 4 km are being built, with a height of more than 20 m. With Gongming reservoir, water security in Shenzhen will be enhanced. Making use of the height difference and wetland, a new recreational park will be created around the reservoir.

### ***Climate & environmental resilience***

Situated to the south of the Tropic of Cancer, Shenzhen has a warm, monsoon-influenced, humid subtropical climate, with long and hot summer and short and dry winter. It is generally a pleasing climate for living, but severe weather also happens frequently. In spring, autumn and winter, the city may experience drought, while storms and typhoons in summer, which last as long as six months, bring intense rainfall and strong winds, causing floods and damage to man-made structures or trees. Summer in Shenzhen is also humid with high temperature, making outdoor environment indisposing. Heat island effect in expanding urban area deteriorates the negative condition in summer. As for urban design and planning, the challenge is, therefore, to facilitate city's capacity to deal with the severe weather, say intense rainfalls, strong winds, urban heat and seasonal droughts.

Guangming is identified as the worse liveable area in terms of climate, according to Meteorological Bureau of Shenzhen. As it is located more inland and more to the north, Guangming is more likely to have high temperature and also low temperature than the rest of Shenzhen.

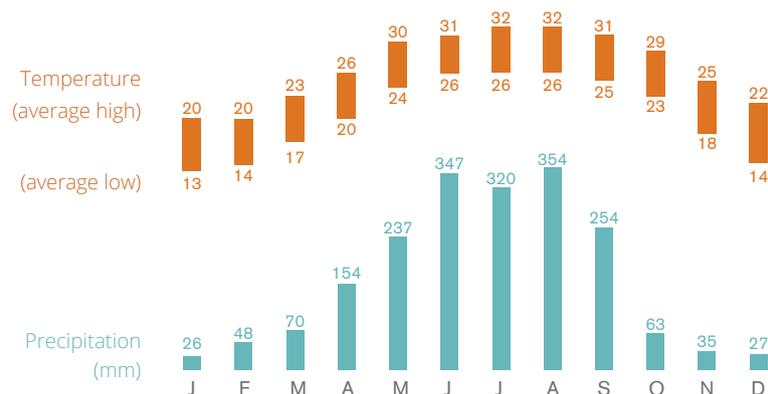


Figure 24. Shenzhen monthly climate average. Source: wikipedia

## 5.2 The open Space system

### *Blue & Green structure*

Figure 25 shows the design of blue and green networks documented in the overall urban design of Guangming (2010). The green network is developed by connecting green hilly parks, which is, however, not coordinated with the water structure.

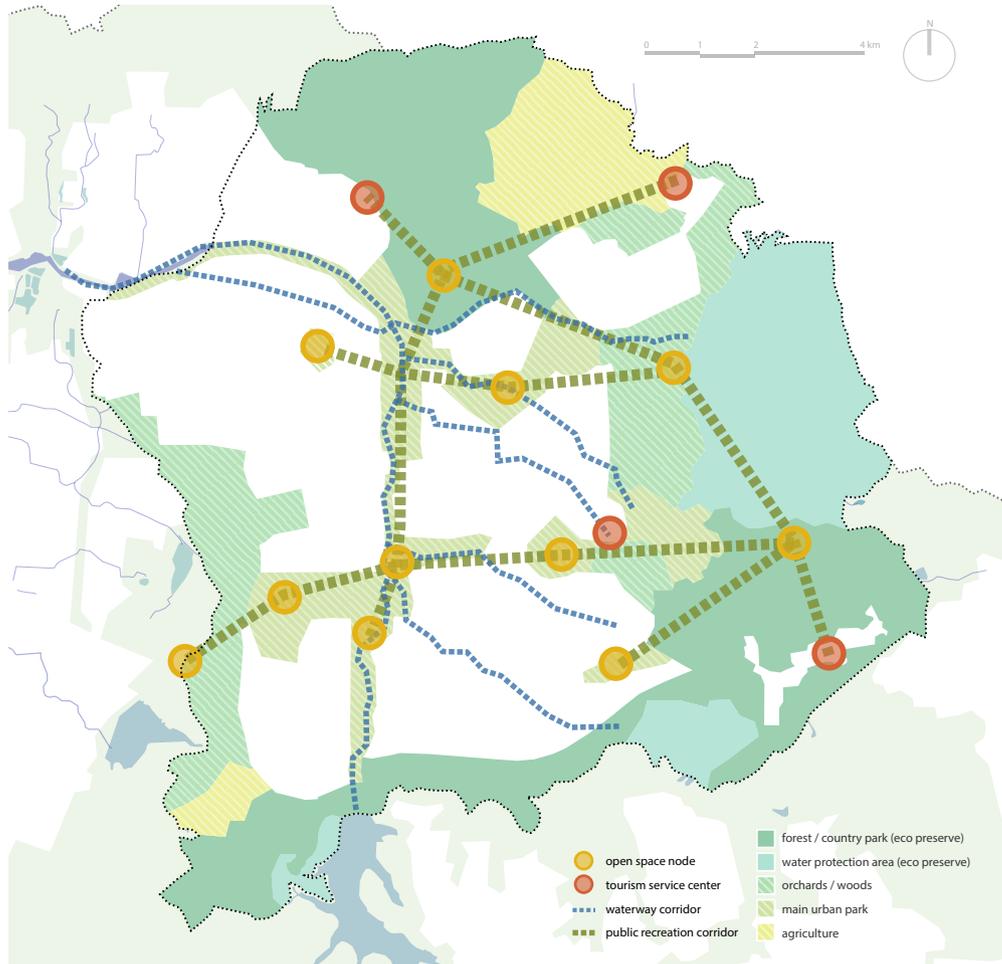


Figure 25. Overlaying green structure and water network according to the urban design of Guangming. (Source: Guangming New District Overall Urban Design, 2010. Elaborated by the author.)

### ***More than 2/3 of open spaces are productive landscape***

Agriculture can be considered as a way for local farmers and citizens to utilize and maintain open spaces. From this perspective, farming is one of the most popular outdoor activities and most common way of using open spaces in Guangming. So urban agriculture is more than an urban design concept for Guangming; it is part of daily life. *Without understanding how agriculture functions in the area we cannot get the whole picture of the performance of the open space system in Guangming.*

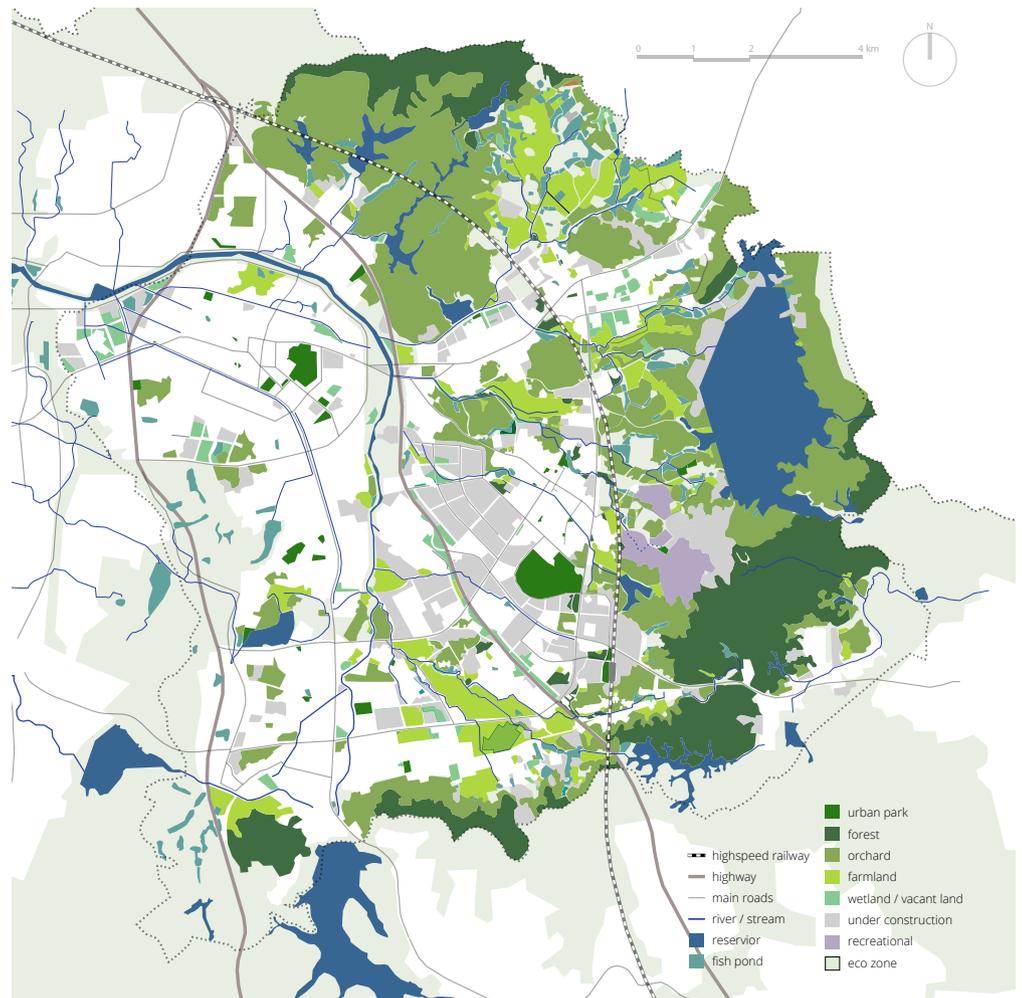


Figure 26. Open space land use in 2010. Based on Google satellite map of 2010, Elaborated by the author.

### ***Spatial quality of open spaces***

In weekends, the plazas and parks are crowded with people (figure 28, 29), as the amount of public spaces is insufficient to meet the demands of increasing population in Guangming. On the other hand, green spaces are created by the municipality along the roads with a huge amount of investment (figure 32), but they are not usable for residents. Meanwhile, residents make changes in open spaces themselves to meet their needs (figure 33-35), the most common way of which is small plots of farmland.



Figure 27. Linear park in Guangming downtown



Figure 28. Gongming urban plaza ©M. van Oostrum



Figure 29. Crowded hilly park ©M. van Oostrum



Figure 30. Public space by real estates developer



Figure 31. Artificial hilly urban park



Figure 32. Placeless green buffer along main road



Figure 33. Small-scale farmland.



Figure 34. Subsistence farming garden



Figure 35. Public space transformed by residents

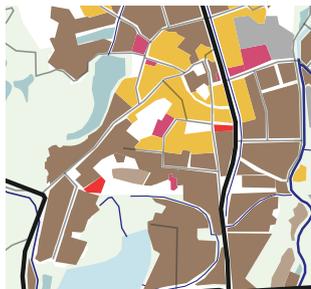
## 5.3 Built environment

### *Urban expansion mode*

Before the new town development, industrialization began since the economic reform in 1980s, which mostly happened around the existing villages following main roads. As most of the villages are located on fertile land, massive agricultural land was transformed. The urban fabric shaped in this period is more organic due to lack of planning.

Since the start of new town scheme in 2007, urban expansion in Guangming happen in a much more organized and rapid way. Infrastructure is built in advance to divide land for sale and also to ensure regional mobility, especially for cars and trucks. With the new method of urbanization, new development quickly fills in the gaps between existing built area (figure 39), and at the same time wipes away the remaining agriculture land. In those newly exploited land, mainly high-tech industries, research centres and commercial housing are being built.

For the organic urban fabric built before the new town, Guangming municipality's strategy is to remove most of them and relocate the industries to specialized industrial park. In this way, the original urban structure will be replaced by more organized urban structure, which requires large-scale urban regeneration of the industrial area. It to some extent implies *the preference for modern urban grids in the new town development*.



urban fabric before new town development



urban fabric after new town development

Figure 38. Different types of urban fabrics formed by different development mode.

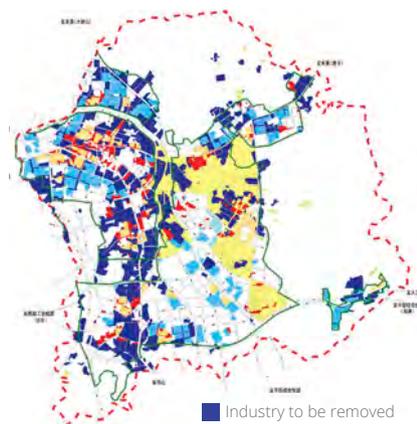


Figure 36. Urban regeneration guideline. Source: Guangming masterplan (2007-2020)

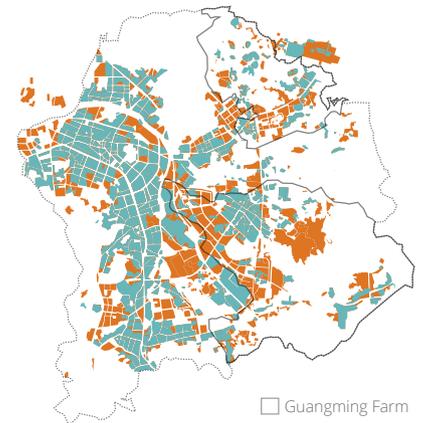


Figure 37. Development phases: before new town & after new town. Based on land use map 2004, 2010

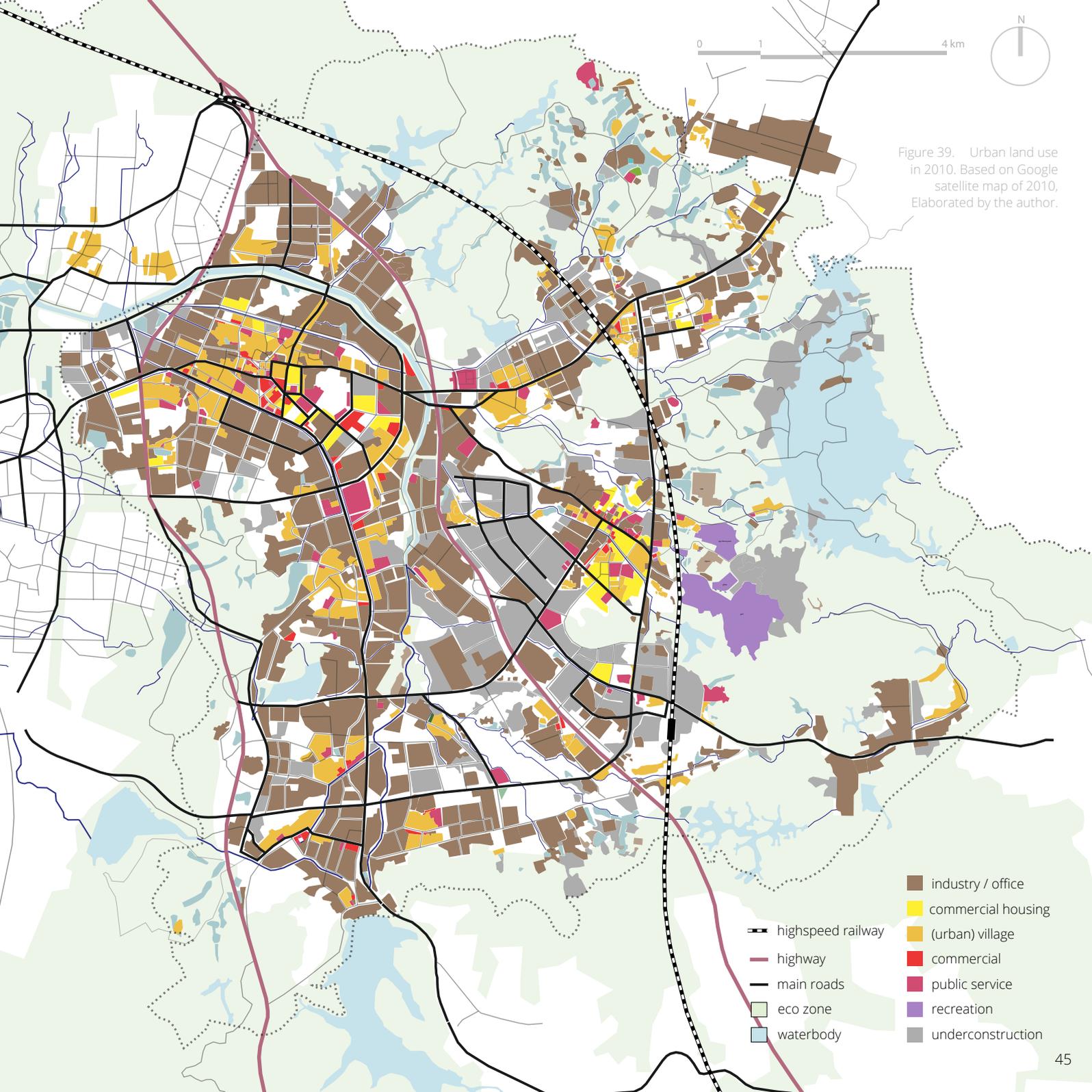


Figure 39. Urban land use in 2010. Based on Google satellite map of 2010, Elaborated by the author.

- industry / office
- commercial housing
- (urban) village
- commercial
- public service
- recreation
- underconstruction
- highspeed railway
- highway
- main roads
- eco zone
- waterbody

## ***Residence types***

Before the new town development, residence types include rural village, urban village, Danwei housing and workers' dormitory. People in rural villages mostly worked in the agriculture, while people who worked in state-owned enterprises lives in Danwei housing, which are mostly six-floor-height apartment blocks. For migrant workers in the factories, they may either live in dormitories offered by their employers, or urban villages built by local people.

In the process of new town development, real states are booming in Guangming. Most of the housing projects are large-scale commercial gated neighbourhoods developed by a single developer. Others are social housing offered by the municipality to low-income registered residents of Shenzhen. The potential residents of the emerging housing types are not only people who work in Guangming, but also people with a job outside of Guangming with different social statuses. *Encouraging social interactions between different groups is a challenge for Guangming to achieve social cohesion.*



commercial housing



social housing



dormitory for worker



Danwei Housing



rural village



urban village

## 5.4 Infrastructure & open space system

Based on the new town scheme, the main element utilized to build the urban structure is infrastructure that focuses on regional mobility and connectivity. Although the open space structure is designed and reflected in the masterplan, *the spatial continuity of the open space network challenged by massive infrastructure is not carefully considered* (figure 40-a). Due to the rigidity of the masterplan, the continuity is also difficult to be fixed in smaller scales.

The urban grids override not only the planned open structure, but also the existing network and landscape. Figure 40-b illustrates the comparison between original network and planned infrastructure. To implement the plan, existing residence and road network have to be removed mostly. *The disrespect results in a complete change of the ecosystem and excessive investment on new town development.*

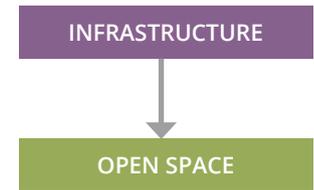


Figure 41. Hierarchy of elements in defining urban structure

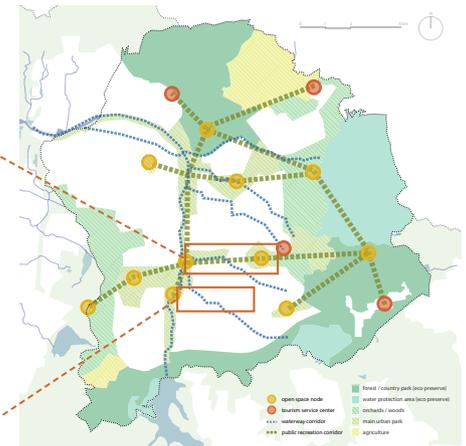


Figure 40. (a) Top :Infrastructure overrides green connection. (Source: Guangming Master land use plan 2007-2020)

(b) Bottom: Planned roads (dashed line) damaging existing urban villages (orange) and current spatial network. (Source: Guangming master plan 2007-2020, Google satellite map. Elaborated by the author.)





# 農業

## UNDERSTANDING AGRICULTURE

Land use classification / Agricultural operation /  
Agricultural landscape / Agriculture in new town vision /  
Summarizing agricultural problems

# 1. Land Use Classification

Having a state-owned farm and making use of its geographical advantages, Guangming district had a remarkable performance in agriculture in 1980-1990s. It used to be one of the main food resources for Shenzhen and Hong Kong. To understand the legacy from its agricultural past for today's new town, a systematic analytical approach that fits in the research aim is essential.

The first step is to formulate a suitable classification system of agricultural land use types. The classification approach I adopt is adjusted from the land utilization type (LUT) system by FAO (1976, 2007). A LUT system is prepared for land evaluation for agriculture, while the land evaluation is considered as part of the land use planning process. Therefore, the attributes of land use types should be determined by the purpose of planning.

<i>Layer</i>	<i>Current land use types</i>	<i>Relevant land quality</i>	<i>Remark</i>
Agriculture produce	<ol style="list-style-type: none"> <li>1. Temporary crops</li> <li>2. Permanent crops</li> <li>3. Livestock</li> <li>4. Fishery</li> <li>5. Non-food crops</li> </ol>	<ul style="list-style-type: none"> <li>• Soil quality, topography, hydrology</li> <li>• Environmental hazard (flooding, pollution)</li> <li>• Location in relation to residence</li> </ul>	Current featured products: Lychee, longan, mango, corn, milk, pork, pigeon
Non-agricultural produce	<ol style="list-style-type: none"> <li>1. Recreation / Education</li> </ol>	<ul style="list-style-type: none"> <li>• Location in relation to residence, other urban functions</li> <li>• Environmental hazard (flooding, pollution)</li> <li>• Existing vegetation</li> </ul>	An agriculture theme park
Management	<ol style="list-style-type: none"> <li>1. Subsistence farming gardens</li> <li>2. Informal small-scale family farms</li> <li>3. Formal small-scale family farms</li> <li>4. Large-scale agribusiness</li> <li>5. Recreation agri-park</li> </ol>	<ul style="list-style-type: none"> <li>• Size of potential management units</li> <li>• Location in relation to markets, supplies of inputs, residence, etc</li> <li>• Availability of land for long-term agricultural use</li> </ul>	

Table 2. Three layers and definition of land use types.

It is also important to acknowledge that the performance of agriculture relies on its economic, social and physical contexts, and evaluation for agriculture should “takes into consideration the economics of the proposed enterprises, the social consequences for the people of the area and the country concerned, and the consequences, beneficial or adverse, for the environment.” (FAO, 1976)

The defect of the LUT system is that one LUT combines different attributes and describes agricultural practices in such details that less flexibility can be incorporated in the established system. I do not intend to provide a comprehensive solution for agriculture in Guangming in this project. Besides, it is also difficult to define LUT for urban agriculture as urban agriculture should be adaptive to urban contexts. Therefore, instead of having synthetic and simplified land-use types, I describe **agricultural land use in three layers: agriculture produce, non-agriculture produce and management**. **Agricultural produce** is relevant for ecological conditions, and also creates spatial characteristics of the area. Non-agricultural produce is mainly about recreational functions and environmental benefits, which is relevant for the urban and natural contexts. Management methods of agricultural operating units are highly relevant for the livelihoods of farmers.

Table 2 shows the current land use types of each layer respectively. The spatial distribution of agriculture and non-agriculture produce in Guangming is shown in figure 27 (page 42). More detailed description of the management methods of farms is elaborated below, to illustrate the conflicts and imbalanced power relationship in the realm of agriculture.

## Land utilization type (LUT)

*The concept of land utilization type is a tool widely used to define typologies in agriculture. It is “a synthetic, simplified, representative land-use type” (FAO, 2007) aiming for detailed study on land suitability (George, 2003).*

*A LUT consists of a set of technical specifications in a given physical, economic and social setting. Attributes of LUTs include data or assumptions on:*

- Produce, including goods or other benefits
- Market orientation (subsistence or commercial production)
- Capital intensity
- Labour intensity
- Power sources
- Technical knowledge and attitudes of land users
- Technology employed
- Infrastructure requirements
- Size and configuration of land holdings, including whether consolidated or fragmented
- Land tenure, the legal or customary manner
- Income levels

*Example: Commercial wheat production on large freehold farms, with high capital and low labour intensity, and a high level of mechanization and inputs.*



Temporary crops  
(vegetable)



Permanent crops  
(orchards)



Fishery  
(fish pond)



Non-food crops  
(plantation forestry)

## 2. Agricultural Operation

### 2.1 Management types of agriculture



#### *Subsistence farming garden*

A subsistence farming garden means agriculture land that is farmed by urban or rural residents living around to grow vegetable for their own use. It takes over small plots of possible arable land that is vacant in industrial area, after the construction of railway, in some urban neighbourhoods, near or in the urban villages, and turns the deserted land into a productive green area. A farmland is often divided into small plots with an area of 2-5m<sup>2</sup>, cultivated by different households. The food produced from the farmland is not enough for a household to be self-sufficient, but it saves the urban poor some expenditure on food. As a farmland is shared by different household, types of vegetable vary from plot to plot, creating a quite pleasing and human-scale landscape.

The spontaneity of farming gardens indicates that farmers own at least basic farming skills. It is very likely that they come from rural area or used to be full-time farmers. The fact is that most of the population in Shenzhen and Guangming have a certain degree of rural background. So the phenomenon implies a common desire for farming of residents with rural background, which can be utilized for improving public space in and around neighbourhoods if designed and implemented properly.

#### *Informal small-scale family farm*



Informal family farming is usually cultivated by one household (often one couple) with an area of 1300 m<sup>2</sup> to 2000 m<sup>2</sup> (2 mu to 3 mu). The products usually are fish or vegetable, sometimes horticulture, and mostly are sold by themselves in Guangming. The revenue from farming highly depends on the weather and market price, so it is not stable. Most of the farmers are migrants, who used to farm in their hometown and move to Shenzhen to be close to the market. Some have worked in the farmland in Guangming for more than 10 years. They usually live in their temporary houses or vacant buildings next to the field, with elementary water and electricity supply.

Recently, due to the urban development or consolidation of basic farmland, some farmers have lost their farmland (or fish ponds) and were forced to leave or relocate

themselves. Usually no compensation is paid for those farmers because their farming activities are considered illegal in the eyes of the government, making those farmers very vulnerable. Besides, since their farming is not overseen by authorities, it is likely that their products are not safe and the chemical they use pollute water and soil.

### **Formal small-scale family farm**

The farming activities in formal small-scale family farms are basically the same as informal small-scale family farms. The biggest difference is that in formal family farms, farmers lease the land from companies. Small-scale household farming is a traditional type of farming in China, and it provides a livelihood for at least 400 households in Guangming. But it is now losing its competitiveness in the face of modernized large-scale agribusiness. It seems that this kind of farming doom to disappear if no change is made. In fact, they generally lack long-term land security, and plots of farms are too small for upgrading. So it is not likely that those farms are able to adapt themselves to new conditions. However, despite its drawbacks and dim future, it currently accommodates low-skilled rural migrants in the city and provides affordable and localised food for the city, so it should not be wiped off from the territory of Guangming in a simple and direct way.

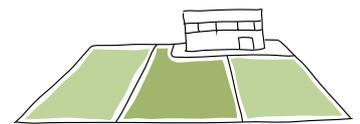
### **Large-scale agribusiness**

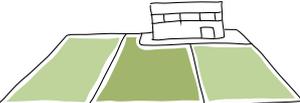
Farming carried out by a agribusiness is often intensive, standardized and of large scale. The biggest agricultural enterprise in Guangming is a state-own farm, which now has grown as Guangming Group with business in the fields of food, biotechnology, real estate, recreation and manufacturing.

Besides Guangming Group, more and more modern farming enterprises move in after the consolidation of basic farmland since 2010. But the operation of those new enterprises is highly constrained by the basic farmland policy, as only grow grains or vegetables for food are allowed on the basic farmland. For most market-oriented enterprises, the best choice of crops on basic farmland is leafy vegetable, and some have a few recreational fish ponds to attract tourists. Some basic farmland is developed as fields for agricultural research and experiments. As most of basic farmland

### **Agribusiness: Guangming Group**

*With an area of 55km<sup>2</sup> and a history of more than 50 years, Guangming Group (former Guangming Farm) owns more than 7km<sup>2</sup> orchards, 20km<sup>2</sup> economic forests. It also has a grass skiing field of 6 hectares and an agricultural theme park of 66 hectares. The main products are milk, pigeons, pig, chicken, lychee and ham. It is an important source of food supply for Hong Kong. As a state-owned farm, Guangming used to build infrastructures, facilities and housings for production and its staff, including built reservoirs, water supply, sewage system, schools and hospitals, etc. In 2002, the functions of government were separated from those of the enterprise in Guangming Farm. But since the new town development in 2007, Guangming Group has been again under the administration of the Guangming government in order to facilitate new town development, like relocating some livestock factories.*



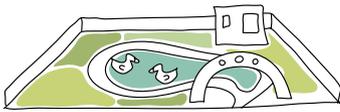
	MAIN PURPOSE	AGRICULTURE PRODUCE	NON-AGRICULTURAL PRODUCE	SIZE OF UNITS
 <p>subsistence farm</p>	 <p>subsistence agro-products</p>	 <p>vegetable / fruit / livestock</p>	—	 <p>2m<sup>2</sup>-30m<sup>2</sup></p>
 <p>informal small-scale family farm</p>	 <p>agro-products for sale</p>	 <p>vegetable / fish / flowers</p>	—	 <p>2 Mu -3 Mu (1333m<sup>2</sup> - 2000m<sup>2</sup>)</p>
 <p>formal small-scale family farm</p>	 <p>agro-products for sale</p>	 <p>vegetable / fish / flowers</p>	—	 <p>2 Mu -3 Mu (1333m<sup>2</sup> - 2000m<sup>2</sup>)</p>
 <p>large-scale agribusiness</p>	 <p>agro-products for sale</p>	 <p>vegetable / fruit flowers</p>	—	 <p>&gt;1000 Mu (&gt;66 ha.)</p>
 <p>Recreational agri-park</p>	 <p>tourism (entrance fee, agro-products, services)</p>	 <p>vegetable / fruit / meat / milk / processed food</p>	 <p>education / recreation</p>	 <p>1000 Mu (66 ha.)</p>

FARM MANAGEMENT	LEVEL OF INCOME	MARKET	LAND LEGITIMACY	PROBLEMS & TRENDS
 <p>individual household / communities</p>	—	—	 <p>illegal temporary</p>	<ul style="list-style-type: none"> <li>- should be legalized</li> <li>- to be used to improve public space in and around neighborhood and encourage social interaction</li> </ul>
 <p>individual household</p>	 <p>Low</p>	 <p>informal</p>	 <p>illegal temporary</p>	<ul style="list-style-type: none"> <li>- should be legalized to oversee its farming activities and prevent negative impacts</li> </ul>
 <p>household + cooperative / companies</p>	 <p>Low</p>	 <p>informal / formal</p>	 <p>legal temporary</p>	<ul style="list-style-type: none"> <li>-losing its competitiveness</li> <li>-need to be upgraded, otherwise will disappear</li> </ul>
 <p>enterprise</p>	 <p>average</p>	 <p>formal</p>	 <p>legal long term / permanent</p>	<ul style="list-style-type: none"> <li>- Homogeneous landscape</li> <li>- constrained by the basic farmland policy</li> </ul>
 <p>enterprise</p>	 <p>average</p>	 <p>formal</p>	 <p>legal long term / permanent</p>	<ul style="list-style-type: none"> <li>-getting popular</li> <li>-need to be more integrated to the environment around</li> </ul>

is currently vacant, waiting to be developed, economic profitability of those new farming enterprises is still not clear. However, from the environmental and aesthetics perspectives, if most of the basic farmland is developed as vegetable and experimental fields, the diversity of the countryside landscape and biodiversity in Guangming will surely decrease.

### ***Recreational agri-park***

There is one recreational agri-park in Guangming, founded by Guangming Group, with an area of 66 hectares. It is gated park, isolated from the surroundings, and the entrance fee is 50 RMB (around 6 euro). The park provides diverse agriculture activities that tourists can experience and participate, like feeding milk cow, growing silkworms, learning technique of processing, picking organic vegetables. It is a popular tourist site for families and students.



Near the entrance are a few restaurants providing local cuisines, and some informal markets selling local food. A golf club, an outward bound field and a grass skating field are located next to the park, together constituting an outdoor recreational location for Shenzhen citizens. The tourism cluster is not accessible enough for tourists due to poor road connection. Besides, those parks and sport fields do not have a good interaction with landscape characteristics and local conditions.



subsistence farming



(formal / informal) small-scale family farm



large-scale agribusiness

## 2.2 Trends of agricultural operation

### *Spontaneity shows a strong incentive to grow food*

Many small-scale farming activities happen in a spontaneous and informal way all over the new town. Residents transform available land, no matter how small it is, into urban farms and gardens. It can be recognized as a way of greening the city (or claiming spaces) initiated by the people out of their daily demands. However, in current plans and policies, this informal way of using open spaces is not yet included, and is likely to be controlled as the physical characteristics of Guangming is shifting from rural to urban.

### *Agricultural system is in rapid transformation*

Small-scale family farming is decreasing massively in number to make room for urban expansion and land consolidation for basic farmland. The dominating farming operating methods in Guangming is shifting from household-based to enterprise-led (figure 42). The agricultural enterprises utilized industrialized and modernized way to manage the farmland, which increases the productivity of the land. This change may influence the local food markets, as the distribution of the agricultural produce is more organized and oriented to the whole Shenzhen city being part of “the shopping basket programme”.

On the other hand, non-food high-tech agriculture is growing with the support of the municipality, which includes the development of seed industry, floriculture and agricultural researches. A national agriculture scie-tech park is also founded in Guangming in 2010, located near Guangming downtown, to support the upgrading of agriculture. The rapid transformation of production methods results in a rapid transformation of the agricultural landscape.

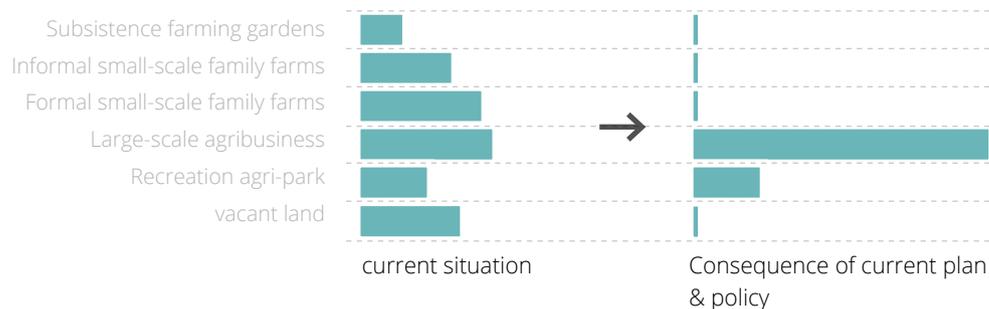


Figure 42. Trend of farming types according to current policies

### 3. Agricultural Landscape

As mentioned above, agricultural landscape is the main type of open space in Guangming. Therefore, the performance of agriculture to a great extent determines the sustainability of open spaces and the city region. In this chapter, I explore the characteristics of agricultural landscape in Guangming and also explain *how the agricultural landscape is linked to human and ecological systems*.

#### ***Spatial dimension***

When we look back and investigate the spatial relationship between nature and human in the era of agricultural society before industrialization, it is easy to recognize the strong connection between water system, soil types and human settlements (figure 43). The soil along the river was most fertile, where intensive agriculture was developed. To better manage the farmland, settlements were situated on the fertile soil, yet with a distance from the river to prevent flooding. The road network was organic, connecting dispersed settlements.

In the city-scale, the coherent relationship between human settlement and nature has lost due to urbanization. Yet the relationship still exists in some remaining agricultural land that is free from urbanization. The case of Xinqiang (figure 44) demonstrates the diversity of agricultural landscape and the landscape pattern that ensures the settlements free from flooding, enables local circulation of materials and supports local agricultural economy. The case of Jiazitang shows the structural relationship between water system and road network based on agricultural production. However, the fish ponds being part of the system are disappearing in recent years due to urbanization land consolidation and environmental projects in Guangming.

In the agricultural society, the form and locations of settlements always were determined by demands of agricultural production and adapted to the natural environment to minimize environment hazards for human. The structure and types of agriculture relied highly on the given ecological conditions, such as the typography, water system and soil types. Therefore, *through agriculture people gained knowledge of the ecosystem in the area they lived in, and adapted their behaviours and construction to the environment*. It provides a perspective to reconsider the structure and the relationship with natural environment of contemporary new towns.

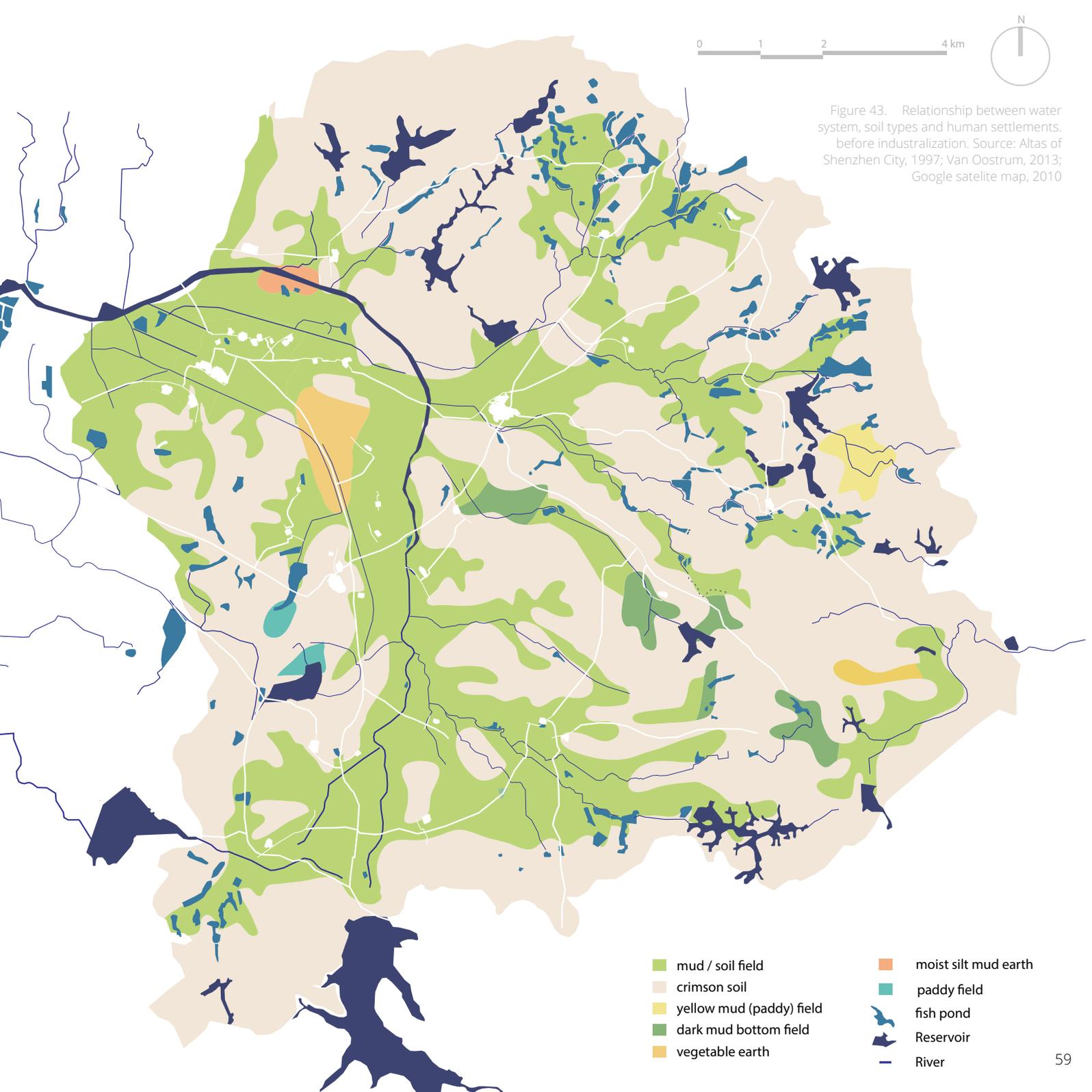


Figure 44. Coherent relation of human & nature: Xinqiang



Located in the ECL, Xinqiang Neighborhood is not threatened by the urban expansion, so the original landscape of Guangming can be learnt from the area (it remained until the consolidation of basic farmland, 2013). Using the Google satellite map of 2010, a pattern of relationship between water, fish ponds, farmland, settlements and roads can be identified. The pattern ensures the settlements free from flooding, enables local circulation of materials, and supports local agricultural economy.

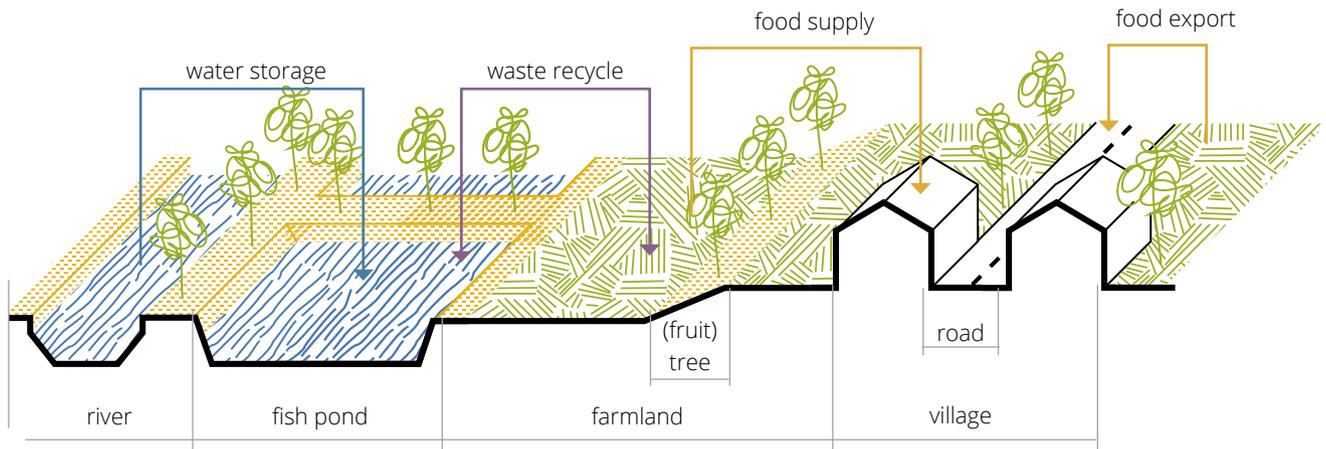
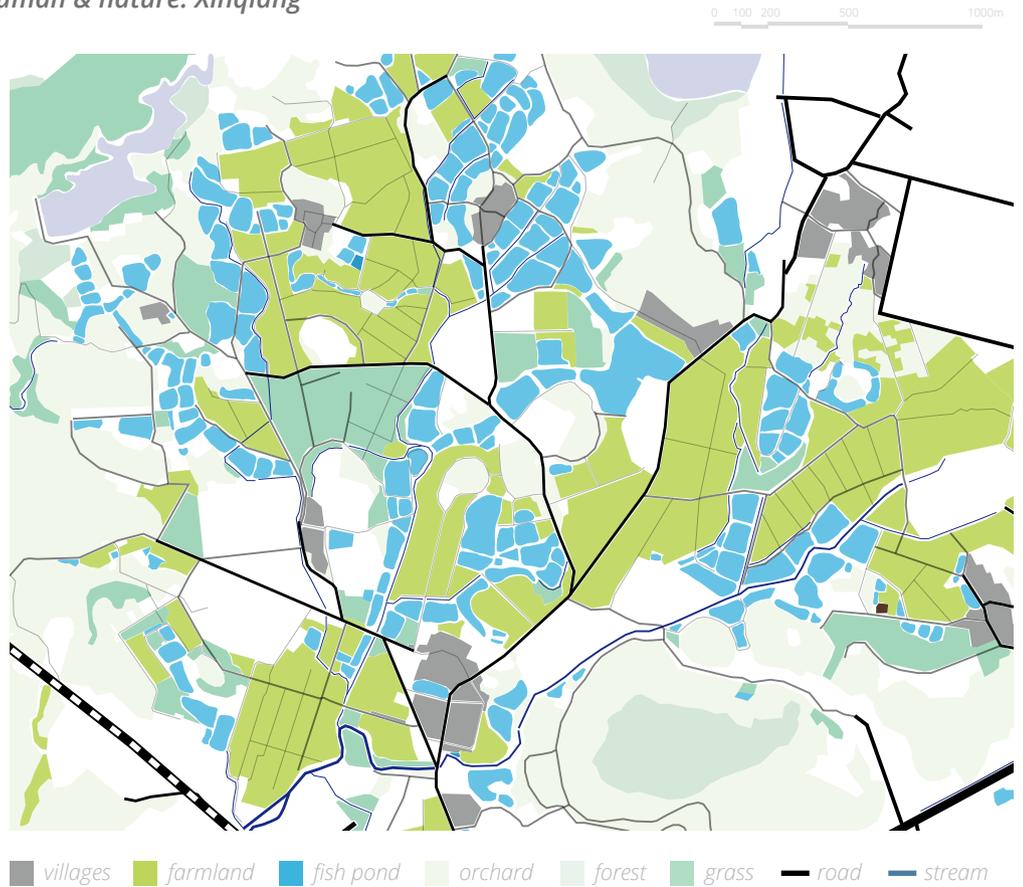


Figure 45. Coherent relation of human & nature: Jiazitang



Surrounded by urban grid, Jiazitang area still retains a corridor of agricultural land. The map shows the relationship between water network and the road structure built before new town. The road structure which is based on agriculture and later extended for industries, follows the direction of the streams. As a comparison, the road built since the new town scheme is not coordinated with the water structure.

Figure 46. Transformation between agriculture and cities



### **Material dimension: urban Metabolism**

Agriculture as a medium can also build functional and material connections between ecosystem and urban systems. I take the view of urban metabolism to understand these connections in different periods in the development process of Guangming.

In the era of agriculture, the flow of energy, food, water and material that happened between natural system, agriculture and human settlements was to a high extent closed locally (figure 47). Agriculture was the key medium to enable this circulation. After the industrialization, the material and energy input and output increased dramatically, bringing in pollutions, while local circulation went weak (figure 48). After the construction of the new town, closing some circulation locally is an objective for the “green city” vision. The methods adopted rely mostly on hard infrastructure at city level, such as centralized water reclaiming system (figure 49).



*Case study: the importance of agriculture in Asia*

**Central Park, Nangan, Matsu Island, Taiwan**

*Given the opportunity to create their own central square, the local government and citizens decided to turn the square into a food production garden.*

*Source: <http://www.foodurbanism.org/central-park-matsu/>*

*The re-introduction of agriculture into human settlements can help to close the circulation of materials in a smaller scale while producing green spaces at the same time.* It can produce food locally in the urban area, make use of food waste as fertilizer and enhance infiltration of surface, etc. (figure 50)

### **Cultural dimension**

The importance of agriculture in urban area in Guangming is also demonstrated by people’s behaviours in open spaces. Many small plots of leftover land are transformed into farming gardens by residents nearby. The fever for farming is actually embedded in the culture. Fei (1947) gave an interesting explanation for this phenomenon:

*I met an American friend who had returned from a trip to Inner Mongolia. He told me he could not understand why the people who moved to those frontier prairies still tried to farm as if they lived in China’s heartland. Mongolian grasslands are best suited only for pastureland, but he said that every family had carved up the land into small plots for farming. It was as if they have dived, headfirst, into the soil, as if they were unable to see any other way of using the land. ... These accounts show that the Chinese are really inseparable from the soil. ... Now it appears that these very limitations imposed by agriculture will hold China back, will prevent the nation from moving forward.*

Of course, the importance of agriculture has changed a lot since 1947. But, learnt from the small plots of green agricultural land cultivated by the local residents in Guangming, we can conclude that the culture that is rooted in the soil has not yet faded away. To facilitate the subsistence farming by residents is not only a way to preserve the tradition, but also important for community engagement in the public realm and raising awareness on the living environment and public issues. Through involvement, the sense of belonging as well as the identity of the new town can be also cultivated.

### ***Financial dimension***

The central park, which was designed in 2008 but does not yet start construction so far, demonstrates the difficulty of creating and maintaining open space at the beginning of new town development. Besides, green spaces along main roads and in urban hilly parks are created, yet with low quality, as public spaces for residents are not carefully designed.

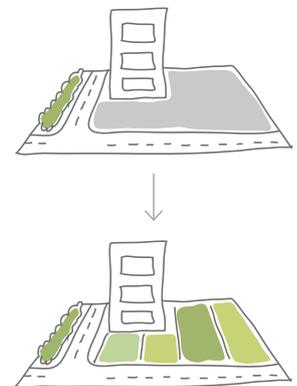
On the other hand, The small plots of farmland cultivated by local residents show a promising alternative ***to achieve high quality open space at low cost***. It is by involving people in the creation of open spaces. In the open spaces cultivated by the residents, the role of the government is reduced to providing opportunity and relevant facilities, creating a spatial framework, and monitoring agricultural practices, which requires less investment and guarantees the usefulness of the open spaces to residents.

### ***Transformative dimension***

The spatial transformation between agriculture and the city can be categorized into three types (figure 46):

- Agricultural land to urban built environment;
- Agricultural land to urban open spaces;
- Urban available vacant land to urban agriculture.

The process of urbanization on agricultural land is usually irreversible, yet the spontaneous farming activities that make use of urban vacant land demonstrates the dynamics of agriculture as a force of “counterurbanization” in the process of urbanization.



*“Counterurbanization” by subsistence farming by residents*

Before industrialization (before 1980)



Figure 47. In the era of agriculture, the flow of energy, food, water and material that happened between natural system, agriculture and human settlements was to a high extend closed locally.

agriculture land green spaces

Before New Town (1980-2007)



Figure 48. Agriculture was the key medium to enable this circulation. After the industrialization, the material and energy input and output increased dramatically, bringing in pollutions, while local circulation went weak.

# New Town Scenario (2007-present)



Figure 49. After the construction of the new town, closing some circulation locally is an objective for the Green City concept. The methods adopted rely mostly on hard infrastructure at city level, such as centralized water reclaiming system/

## Adding agriculture into current scheme: localisation / decentralisation



Figure 50. The re-introduction of agriculture into human settlements can help to close the circulation of materials in a smaller scale while producing green spaces at the same time. It can produce food locally in the urban area, make use of food waste as fertilizer and enhance infiltration of surface, etc.

## 4. Agriculture in New Town Vision

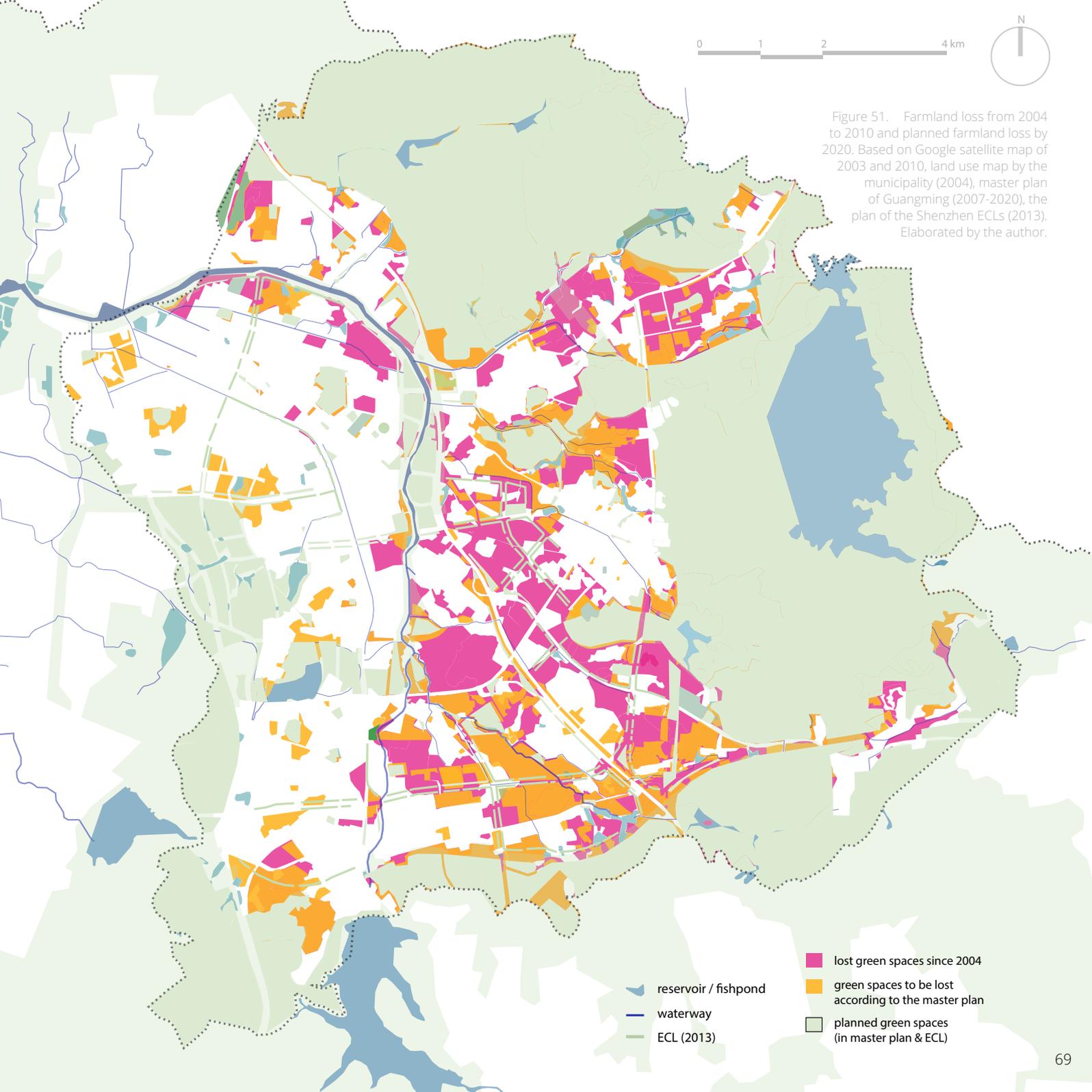
### *The current role of agriculture in the new town vision*

Table 3 shows the agriculture-related projects and plans promoted by the municipality or built by enterprises. From the plan of the municipalities, we can conclude that the agriculture is mainly regarded as an economic sector to generate revenue and shape identity for the city, rather than a livelihood for farmers or a lifestyle for urban residents. Especially in the ECL area, where urban construction is restricted, high-tech agriculture is the most effective way to make profit and transform the traditional farming landscape to a modern landscape. Therefore, it is not surprising that agriculture described in the documents is mostly run by large-scale enterprises, while the original farming activities are mostly categorised as illegal.

In the urban area, the idea of urban agriculture is introduced as a design element in the Central Park. The agriculture proposed in the design is in the form of allotment gardens,

Project / plan	Content	Area / location	Schedule	Investment
Agriculture in industry planning	Keywords: high-tech, intensive, industrialized, modern management, ecological, landscaping Program: food production for the city; high-tech park for agriculture Featured products: vegetable, floriculture, fruit, milk, meat		2008-2020	
Agriculture exhibition park	Education and exhibition on agriculture Entrance fee: 50 RMB	1000 Mu (67 ha) in the ECL	Built in 2000s	Guangming Group
Basic farmland consolidation	Clean the field and improve farmland for high-tech agriculture like seed industry, bio-tech, research, agribusiness Combined with tourism Remove small-scale illegal farming	Total: 18395 Mu (1226 ha) Arable land: 13628 Mu (908 ha); In the ECL	2010-2013	Land prepared by the municipality; Farming by agribusiness
Flower Sea Project	Copy the Dutch experience in floriculture and the experience of Butchart Gardens in floral display Tourism, research, education included Making use of hilly area, ecological protection area, basic farmland	In the ECL	Start from 2014	Land prepared by the municipality; Farming by agribusiness
Guangming Central Park	Allotment gardens in the park Slow traffic, sport facilities Investment: 790 million RMB (92 million euro)	193 ha	Designed in 2009, not start yet due to lack of funds	Invested by the municipality

Table 3. The agriculture-related projects and plans in Guangming. Source: Guangming municipality website, [www.szgm.gov.cn](http://www.szgm.gov.cn)



where urban residents can farm (which is actually happening spontaneously all around the city). However, the construction of the park is not yet on the agenda in lack of funds. The investment is a great amount because all the existing agricultural landscape has to be removed and replaced by new vegetation to create a completely new landscape.

### ***Impact of the new town plan on agriculture***

The most obvious impact is the loss of agricultural land. Figure 51 shows the massive farmland loss as a result of new town development. Figure 54 overlaps the soil types with the open spaces designed in the master plan. It shows the most arable land with fertile soil will be almost eaten up by built-up area by 2020. However, some land remains vacant for several years after being transformed from farmland, because the new town development mode which utilizes large-scale urban grids to structure the city has to remove existing landscape at once before construction. Therefore, ***agricultural land is removed not only extensively, but also rapidly.***



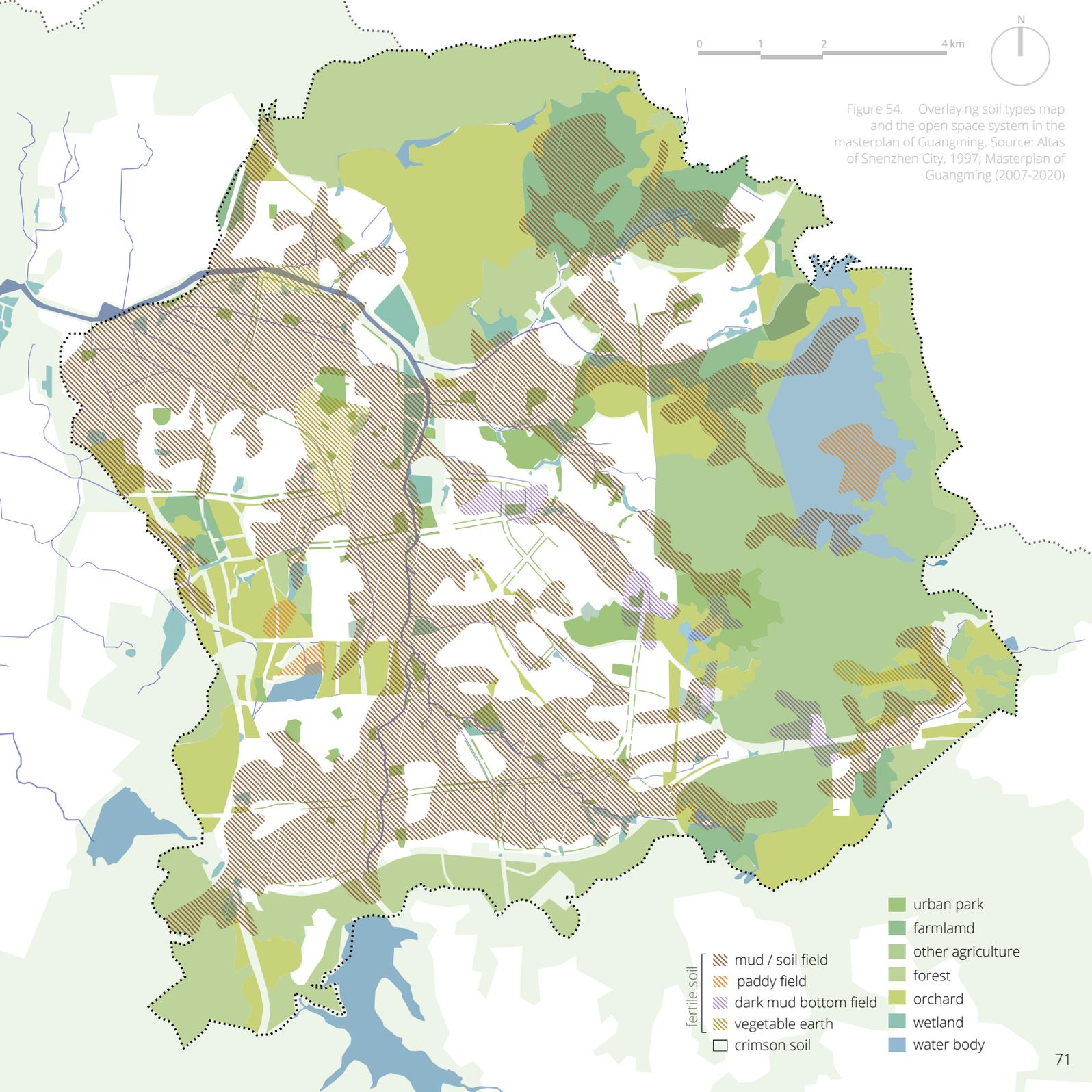
Figure 53. Massive change of the land after land consolidation on basic farmland in the ECLs.

Another major impact of new town plan is ***the loss of access to land of local farmers.*** Even though a certain amount of agricultural land is kept by basic farmland policy and ECL regulation, the arable land is not accessible for local small-scale farmers, which changes the farming system in Guangming completely, and makes local farmers vulnerable to the change. The land consolidation of basic farmland in the ECLs also alter the land surface massively by changing topography, removing fish ponds along streams. ***Diversity of landscape is thus reduced,*** so is biodiversity of the countryside.

### ***Barriers to include agriculture in urban area***

Two elements are needed to take agriculture as one of the dominant factors in shaping the city: institutional structure and knowledge. The institutional separation of urban area and countryside makes it difficult to create an integrated open space management means for both city and countryside. The idea of providing urban green spaces in a top-down way also hinders the bottom-up initiatives to provide green spaces by farming. The blueprint masterplan pays little attentions to the development process, making it unlikely to include the transformation process and temporary use of agricultural landscape.

The imagination of modern agriculture is always about large-scale, intensive farming run by enterprises. The knowledge of benefits and sustainability of small- and medium-scale farms is missing. There is also ***a lack of knowledge*** of the potential performance that agriculture can have in improving living environment and urban form, which is also what this project would like to contribute.



0 1 2 4 km



Figure 54. Overlaying soil types map and the open space system in the masterplan of Guangming. Source: Atlas of Shenzhen City, 1997; Masterplan of Guangming (2007-2020)

- |              |   |                       |   |                   |
|--------------|---|-----------------------|---|-------------------|
| fertile soil |  | mud / soil field      |  | urban park        |
|              |  | paddy field           |  | farmland          |
|              |  | dark mud bottom field |  | other agriculture |
|              |  | vegetable earth       |  | forest            |
|              |  | crimson soil          |  | orchard           |
|              |   |                       |  | wetland           |
|              |   |                       |  | water body        |

## 5. Summarizing Problems

In the process of urbanization, farmland loss is inevitable. However, the way farmland is transformed influence the farmers, local residents and ecosystem. Unfortunately, the agricultural land and landscape characteristics are removed from the territory rapidly and extensively with little consideration for the consequences:

### *Ignorance of agricultural landscape characteristics in new town development results in fragmented countryside and declining environment*

Countryside before industrialization used to be self-sufficient in terms of daily necessities and relatively isolated from other regions, so culture and landscape is intergrated to support production and people's daily life. After the industrialization, the impact of urban system on countryside gets more and more remarkable, not only economically, but also socially, spatially and culturally. With the introduction of the standardized farming and large scale farming enterprises, countryside has been debased to an area for food production. Identity crisis arises among the countryside residents when they compare their conditions with prosperous urban area, and then they will regard urban way of living as a superior lifestyle.

The reduced diversity in culture and society also means reduced diversity in landscape and biological species, as large-scale farms usually create a “placeless landscape” (Morgan, 2013). The land surfaces are changed due to land consolidaton, and the orginical synergy between different agricultural landscape is also removed.

### *Subsistence farming is not included in the new town development while placeless and costly open spaces are not affordable, accessible or usable for local people*

In Guangming, farming activities used to be and still is part of people's life as shown in subsistence farming practices. However, the new agriculture scheme tends to exclude citizens and communities in farming. Instead, enterprises are introduced to take over the job of agricultural production for the city. The positive side of this includes improved productivity of agriculture land and better monitoring of production. But the negative effects may arise due to the homogeneity of farming system, when there is little space for citizens to get involved in farming as they used to do. For citizens living in urban

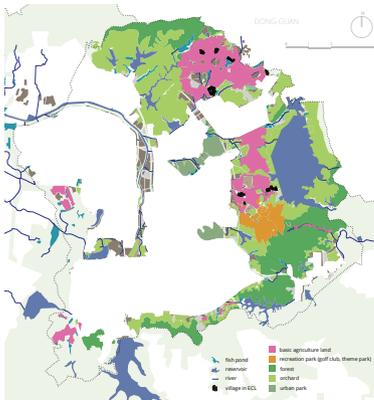


Figure 55. Fragmented countryside as a result of lack of knowledge of potentials of agriculture and holistic planning for the countryside

area, the strong motivation to farm cannot be utilized as a means to green the city, so potentials are neglected; for communities inside ECL, the problem is more severe as the communities do not have other way to make a living after their opportunity to develop industry was deprived.

### *Rapid transformation challenges the adaptability of local farmers*

A small-scale family farm, no matter whether it is formal or informal, inside the ECLs or in the urban area, is vulnerable facing urban expansion and invasion of agriculture enterprises. The family farms decrease in number and farming population who used to live on the field have to relocate themselves and find another livelihood. As most of the farms are considered illegal, no compensation is given to them. Their products can only be sold in the informal market, and due to the temporality of their access to land, they do not have sufficient facilities to prevent the damage from severe weather. This type of farming seems to lose its competitiveness and is likely to disappear from the territory from Guangming.

Someone may claims that the inefficiency of family-based management accounts for the decline. However, experience from other countries (like the Netherlands and U.S.A) shows that one household is sufficient to run a profitable farming business with the help of modern technology. The main reasons for the vulnerability of farmers in Guangming are the lack of land security, lack of technology and small size of farmland, which do not allow them to upgrade or have long-term investment on their farms.

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*The problems are results of insufficient consideration on existing agricultural performance and social and ecological values of agriculture for urban systems.* It should be acknowledged that other than economic benefits, agricultural landscape is also tightly linked to the life of people and ecosystem, not only in the countryside, but also in urban area. By understanding the dynamics and conditions of agriculture, a more sustainable relationship between urban systems and agriculture can be developed.



### **Small-scale family farm**

The woman, together with her husband, earns her living from the field with 2 Mu (1300 m<sup>2</sup>). The main product is vegetable, which is sold in local markets. The couple live in an abandoned factory right next to the field. She said there used to be about a dozen families living in the factory, all of whom farmed on the farmland nearby. But due to the urban construction, the field they used to farm were expropriated by the municipality, and her field was relocated to the place she is now.



# 定位

## POSITIONING AGRICULTURE IN GUANGMING

Reasoning agriculture in cities / Planning for urban agricultural  
landscape / Agricultural landscape approach / ALA for new town  
problems / Sustainable agriculture in Guangming

# 1. Reasoning Agriculture in Cities

## City region as landscapes for food, people and nature

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UN-HABITAT 2012. *Working with Nature: Urban Patterns for a Green Economy*. UN-HABITAT.

### *Challenges for today's megacities: globalization and localization*

The process of urbanization has contributed massively to the economic prosperity of human beings in the last one hundred years. In the era of globalization, a megacity plays a key role in linking its hinterland with the rest of the world, and has to strengthen its competitiveness to gain more benefits from the networked world.

However, megacities also face challenges from their territories and surroundings. A city is a conglomeration of people. It is more than a place for economic growth, but also home to citizens. A city is also situated and connected to its ecosystem, which supplies a city with food and water and absorbs its waste. The ignorance of people's needs and environmental conditions definitely results in severe problems on people and nature, like poverty, overloaded transport, unaffordable housing, environmental hazards, which has been demonstrated by numerous cases and researches. On the other hand, cities are also challenged by global environmental issues like climate change, which requires local adaptation. Therefore, the performance of cities cannot be isolated from its local people and ecosystem.

The force of globalization and economic growth and the concern for local conditions conflict sometimes, especially under the imbalanced power relationship. One example is urban expansion, which changes the land surface and ecosystem and has impacts on local residents. To build a sustainable city, it is crucial to situate the city in global and regional networks and at the same time create synergy among economy, people and nature within the territory the city is in.

### *Urban-rural division and linkages*

The division between urban and rural area is commonly used to distinguish cities from its surroundings. This division extends to different levels and dimensions of our society, governance and economy. However, recently there are increasing discussions and critiques concerning this division, which is built on the deeper understanding of the urban-rural interactions within broader contexts.

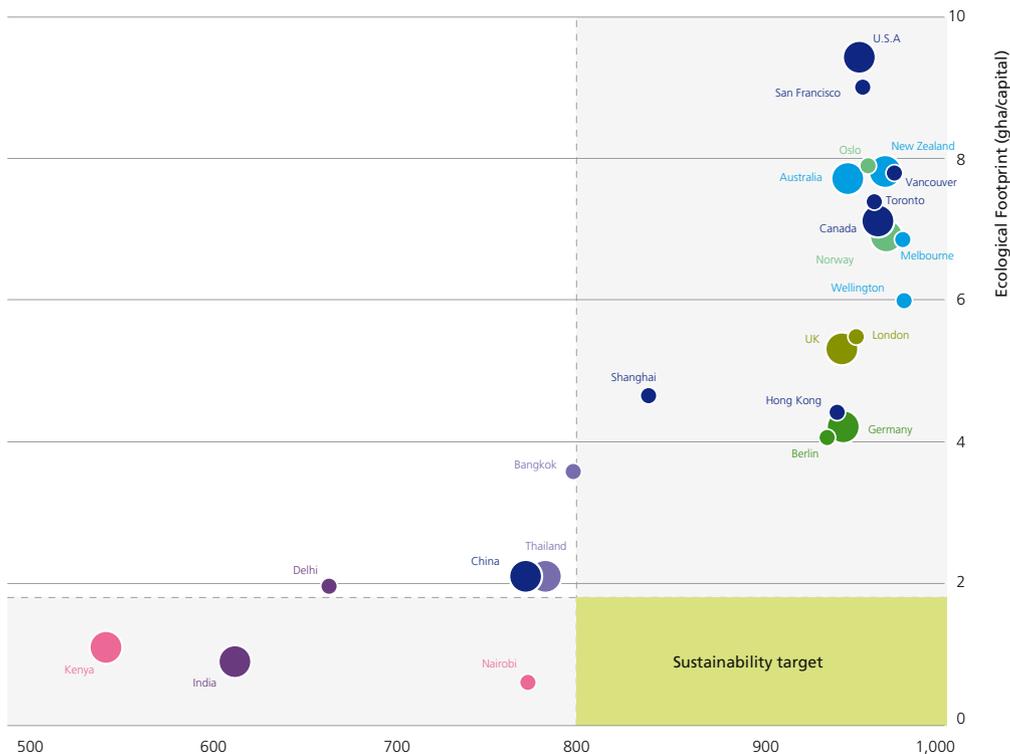


Figure 56. Ecological Footprint and Human Development Index for selected countries and cities © Philipp Rode  
Source: UN-habitat, Working with Nature: Urban Patterns for a Green Economy, 2012

Firstly, the boundary between urban and rural has been blurred. Food production, which used to be considered as rural issues, can also happen in urban realm using vertical farming technique. The lifestyle of urban and rural citizens is getting close with the raise of consumer economy. Low density can also happen in some urban sprawl areas, which house urban people with urban lifestyle. In today's cities, it is getting difficult to distinguish urban and rural.

Secondly, impacts of urbanization on the countryside are increasing. Figure 56 shows a clear relationship between the ecological footprint and human development index (UN-habitat, 2012). It indicates that the enhancement of human wellbeing relies on the supports from the countryside and ecosystem. With the growth of urban population all around the world, challenges are placed on not only physical urban area but also rural

*“The divide between urban and rural is artificial and counter-productive, and it is increasingly recognized that the two sectors are intimately connected in a larger system.”*

*Getz Escudero, 2011*

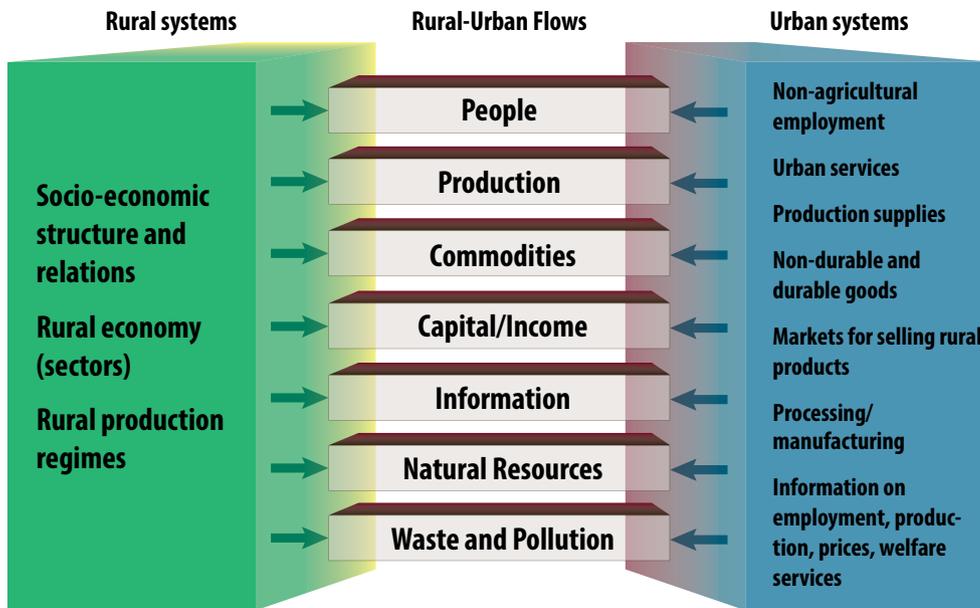
area, which should be able to sustain cities with both natural and labour resources (Forster and Escudero, 2014). Leant from the history of the urban-rural relationship in China since 1950s (page X), we can conclude that the performance of the countryside and agriculture have massively depended on the urban conditions and demands, and the impacts are getting more profound.

Thirdly, the artificial division of urban and rural strengthens conflicts between cities and their surroundings. Escudero (2011) points out that the “divide between urban and rural is artificial and counter-productive, and it is increasingly recognized that the two sectors are intimately connected in a larger system.” For instance, within a urban-rural divided system, urban and rural land use are considered contradicting and it is difficult to develop cooperation and integration of urban and rural land use. Besides, urban planners and researchers often “ignore the rural sectors and agriculture, especially when urbanization has been framed solely around urban issues rather than incorporating the relationship with rural, urban and peri-urban areas” (Forster and Escudero, 2014). From the perspective of food security, FAO (2011) also suggests that urban and rural sides of the food system are complementary and should not be separated.

Therefore, urban sustainability cannot be achieved without improving urban-rural linkages (Forster and Escudero, 2014), especially when urban and rural interactions are getting more and more intense and complex. Research and practices have also shown that single-sector approach is insufficient to deal with interrelated sustainability issues. Escudero (2011) points out that “fundamental challenges of stemming biodiversity loss, improving land use, adapting to climate change and increasing food security are mutually-reinforcing, and a holistic approach to their management can establish bundled solutions—generating results important to each and all of these challenges”. Therefore, it is essential to rethink the urban-rural relationship and consider improving urban-rural linkages as part of the integrated strategy to enhance urban sustainability.

### ***Integrated urban-rural landscape***

The point of view of *urban ecology* may provide some insights to reimagine the spatial relationship between cities and their hinterlands. It is increasingly recognized that nature is always present in cities and urban areas are ecosystems too (McDonnell et al., 2009; Pickett and Grove, 2009). Pickett et al. (2013) extend the term urban to a broader sense as a contrast with wild and natural landscapes and consider humans and their actions and artifacts are “part of the organismal and the physical components”. In this definition, cities, suburbs and exurbs are subsets of *urban ecosystems*, and “cities and other urban ecosystems are jointly biological, social, built, and geomorphic”.



Adapted from: Allen, A. 2010. *Pathways to Sustainability: Agendas for a New Politics of Environment, Development and Social Justice*. Presented at: *Peri-urban Dynamics*, 23 - 24 September, Institute of Development Studies, Sussex, UK.

Figure 57. Flows across the rural urban continuum (Forster and Escudero, 2014)

From the landscape perspective, the urban-rural integration not only means crossing the sectoral boundaries, but also achieving territorial synergy. In the Oxford dictionary, landscape is defined as “all the visible features of an area of land, often considered in terms of their aesthetic appeal”. But landscape is more than just scenery for eyes. It indicates the spatial relationship between elements in an area and human’s behaviours behind the scenery. The European Landscape Convention defines landscape as “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.” In this thesis, *the term landscape is used for place-based approaches to manage natural resource, agriculture and human built environment*. Nassauer (2013) points out that landscape can be used as a method and a medium for the ecological design of cities, as landscape integrate different environmental processes and is a shared experience of visible characteristics for different people.

The attention to ecology of urban planners has led to the concept of *ecosystem services*. The UN-habitat (2012) defines ecosystem services as “goods and services produced by nature and shaped by social ecological processes that are beneficial to humans”, which includes provision of food, water and other resources. It implies that agriculture and the rural realm are parts of ecosystem services for cities, which enables the rural to be

### Ecosystem Services

Kongjian Yu (2010) argues that ecological infrastructure works to safeguard critical eco-services by:

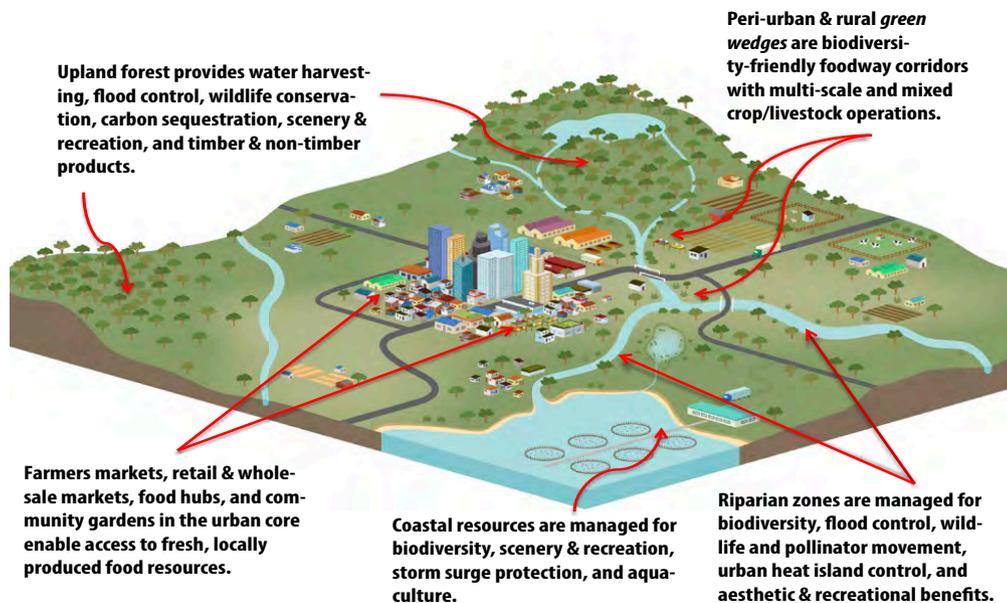
- Providing food and water;
- Regulating climate, disease, flood and drought;
- Supporting habitats for indigenous plants and animals; and
- Providing spiritual and recreational benefits.

Figure 58. Ecosystem service flows along the urban rural continuum. (Forster and Escudero, 2014)

### The Five Elements of Integrated Landscape Management

- *Shared or agreed management objectives that encompass multiple benefits (the full range of goods and services needed) from the landscape;*
- *Field, farm and forest practices are designed to contribute to multiple objectives, including human well-being, food and fiber production, climate change mitigation, and conservation of biodiversity and ecosystem services;*
- *Ecological, social, and economic interactions among different parts of the landscape are managed to realize positive synergies among interests and actors or to mitigate negative trade-offs;*
- *Collaborative, community-engaged processes for dialogue, planning, negotiating and monitoring decisions are in place;*
- *Markets and public policies are shaped to achieve the diverse set of landscape objectives and institutional requirements.*

Source: Scherr and Friedman. 2013. Defining Integrated Landscape Management for Policy Makers.



*Adapted from: Victoria (Australia) provincial government framework "Building healthy and resilient ecosystems across the landscape", Chapter 6: 72-73.*

involved into urban landscapes (Forster and Escudero, 2014). Figure 58 illustrates how ecosystem services are incorporated in city regions crossing the urban-rural boundaries. The implementation of landscape or ecosystem services requires institutional supports, economic viability and engagement of local communities. The Economics of Ecosystems and Biodiversity (TEEB) have explored a pathway to include ecosystem services in urban area using the economic approach.

The integration of nature, food production and human environments requires a different approach of decision making and planning, which is sometimes referred as *"integrated landscape management"* (ILM) or *"landscape approach"*. It suggests a cross-sectoral and place-focused approach that is built on the long-term collaboration among stakeholders takes landscapes as a social-ecological system (Scherr et al., 2013). Being aware of the links between landscape and ecosystem services, Termorshuizen and Opdam (2009) suggest adopting the term *"landscape services"* to make ecosystem more relevant and integrated at more local scale.

### *Agriculture as medium for linking urban and rural*

In fact, landscape approaches are not new. In an agriculture-based society, rural communities often managed territory as a holistic system, in which “their management of land and resources for agriculture, grazing, forest production, water and all other uses were closely interconnected” (Scherr et al., 2013). In modern society and agriculture, however, the territorial integration built around agricultural production is challenged by pursuits for productivity.

FAO (2011) points out that through food system, urban and rural are connected in domains of food and agriculture, natural resources management, and socio-economic and health factors. FAO also advocates a food system approach by linking urban and rural for greater resilience, which proposes four interrelated dimensions: a people-centred and social development policy dimension; a natural resource management dimension; a multi-level governance dimension; and an urban and territorial planning. These dimensions strengthen the urban rural relationship, which not only facilitate a more sustainable and resilient food supply system for cities as promised by FAO, but also provide a lens to examine our planning systems for planners. ***First, it should be recognized that agriculture is an indispensable part of the urban-rural continuum.*** The lack of consideration for food and agriculture is excluding an important aspect of urban ecosystem. ***Second, productivity should not be the only concern for agriculture.*** Planning for agriculture should include people-centred and natural resource management dimensions.

***The concept of ecosystem services and redefinition of cities and its hinterland enable us to question the current role of agriculture and the idea of keeping agriculture in the rural area.*** What is the benefits of agriculture in addition to economic value and food production for cities? Being part of the ecosystem services for cities, can agriculture also be present in the urban environment? If agriculture are present in urban environment, how can agriculture and urban systems coexist?

In the following sections, the potential benefits of including agriculture into cities and urban planning system are introduced. The landscape approach is also explored with more focus on spatial synergies of agriculture and cities.

*“Building resilient food systems for the future through integrating rural and urban areas and strengthening their linkages will benefit both small farmers and the urban poor”*

*Alexander Müller (FAO ADG-NR Dept)*

# 2. Planning for Urban Agricultural Landscape

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- *Urban agriculture*

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## 2.1 Urban agriculture

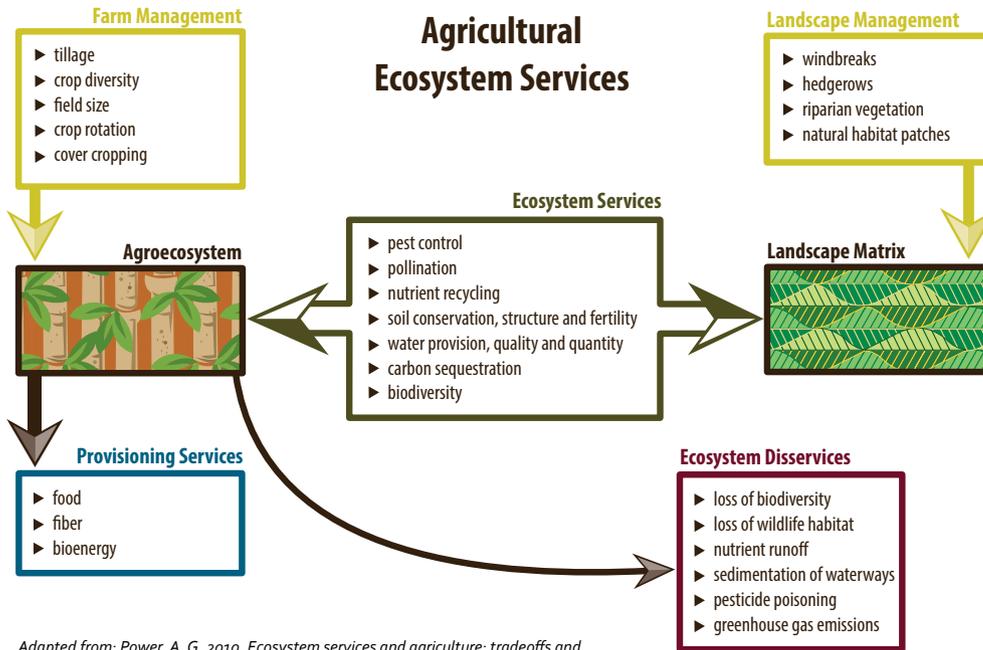
*Urban agriculture* (UA) or urban and peri-urban agriculture (UPA) are used to describe the agriculture in and around urban area, which has different performance compared with rural agriculture. The popularity of the concept has been increasing since the beginning of this century, and studies on the realm of UA is also growing. In this project, UA is an important concept to understand the possible interaction between agriculture and urban systems. Here is a summary of the relevant literatures.

### **UA-city relationship and sustainable UA**

Rural agriculture and urban agriculture is different in many aspects: farm types, livelihood, products, production factors, farmer organization, social context, environmental context, market, land security, etc. (van Veenhuizen and FAO, 2007). But to distinguish UA and rural agriculture, the most important criteria is the relationship between cities and agriculture: UA is an integral part of the urban economic, social and ecological systems (Bohn and Viljoen, 2005, Pearson et al., 2010).

Urban system is highly dynamic compared with rural system, which has a strong influence on the development of UA (van Veenhuizen and FAO, 2007). For instance, urban development provides economic opportunities for the agriculture producers in peri-urban area, while urban sprawl, increasing land price and relatively high income from urban sectors become challenges to sustain UA in and around city (Tsubota, 2006). **Mega (2010) listed synergies and conflicts between city and UA in the dimensions of environment, society and economy, and suggested that the degree of synergy and conflict between UA and city in the long term determines the sustainability of UA. Supply-demand relationship between agriculture and city overviewed by Vermeulen (2013), points out the opportunities for synergy and integration.**

As for the sustainability of urban agriculture, van Veenhuizen and FAO (2007) summarized that UA should “maintains its dynamism and flexibility, adapting to changing urban conditions and demands, intensifying productivity and diversifying its functions for the city while enhancing synergy and reducing conflict, and thereby



Adapted from: Power, A. G. 2010. Ecosystem services and agriculture: tradeoffs and synergies. *Philosophical Transactions of the Royal Society B* 365: 2960.

Figure 59. Impacts of farm and landscape management on the flow of ecosystem services and disservices to and from agroecosystems. (Forster and Escudero, 2014)

gaining more social and political acceptability". This definition is about the performance of UA itself. It highlights UA's adaptation to urban systems. But it does not address the reasons and purposes of the presence of agriculture in urban area. In a broader urban-rural context as discussed above, *UA should function as part of the ecosystem services for cities, with more concerns for people and natural resource management*. The adaptability is a crucial aspect to achieve this role. Figure 59 shows how agricultural and landscape management influences the performance of ecosystem services and disservices, which explains why it is important to take the agricultural management into account for sustainability of cities and their ecosystems.

### Potentials and problems of UA

There are various potentials of UA to function as ecosystem services and urban landscape to benefit cities and people. Table 4 shows the potentials categorized into economic, social and environmental dimensions, based on Graaf (2013), Zasada (2011), Pearson et al. (2010), van Veenhuizen and FAO (2007), Mubvami et al. (2006).

It should be recognized that the actual roles that UA can or should perform in a given area to a great extent depend on the context. For instance, UA serves different purposes in developing and developed countries. In developing world, UA address more food security and economic issues, while in the context of developed countries, environmental, recreational and health issues are more relevant (Hagan, 2005, Pearson et al., 2010).

Despite the potential advantages, UA is not always welcomed in cities and planning. One of the reasons is the potential negative impacts of UA on urban living environment. Due to its close proximity to densely populated area, UA, if not practiced properly, has more severe impacts than rural agriculture. The problems associated with UA are listed by the Urban Agriculture Network. Smit et al. (2001) grouped them into four categories: health and hygiene effects, environmental effects, inefficiency and aesthetic effects.

Because of the problems of UA, many local authorities tend to prohibit UA rather than trying to resolve them (Smit et al., 2001). But, health hazards and environmental damages of UA can be minimized or prevented by proper management and education. For instance, education to farmers can help to prevent agrochemical pollution and spread of diseases through crop and livestock production; area with pollutants can be identified and zoned from research, from which regulations and farming methods can be developed to ensure food safety and reduce environmental risks; monitoring systems on urban farming can also be developed to oversee the impacts of farming activities; organizational structure at community level which empowers community-based groups, farmers' associations and local professionals can help to create localized solution combined with scientific methods. Due to its close proximity to concentrated population, those potential problems should be treated with more care.

Urban farming is also frequently considered as an economically inefficient use of land. It generates less revenue compared with other types of land use like housing and offices, so it is usually not favoured by local governments and developers. But "urban agriculture is also opportunistic by nature", adapting to "the possibilities and limitations of the city"(Graaf, 2013). It can turn idle land like roofs, courtyards or along roads, into resources, or add more productivity to existing green spaces. So it does not necessarily compete with other types of land use. Besides, cost and benefits of land use should be evaluated from the perspectives of not only economy, but also environment, social justice and culture, etc. UA can play a role in various aspects like health, local income generation, food security and urban resilience, which should also be taken into account

		Potential	Problems
Economic	Local economy	<ul style="list-style-type: none"> <li>• Employment in urban agriculture to reduce social inequity and poverty</li> <li>• Supporting micro-enterprise providing services for agriculture</li> </ul>	<ul style="list-style-type: none"> <li>• May cause women (often the primary farmers) to overwork, considering other family obligations</li> <li>• Engages and can overwork children</li> </ul>
	Economic opportunity	<ul style="list-style-type: none"> <li>• Promoting a viable business model</li> <li>• Higher profits due to proximity to densely populated area</li> </ul>	<ul style="list-style-type: none"> <li>• In some cases occupies a site that may command a higher rent for another use</li> <li>• Uses expensive potable water without paying for it</li> </ul>
Social	Food access, security	<ul style="list-style-type: none"> <li>• Affordable food for the urban poor</li> <li>• Improving diet by provision of fresh and healthy food</li> </ul>	
	Interpersonal relationship	<ul style="list-style-type: none"> <li>• Social integration of disadvantaged groups and enhancing gender equity (UPA are mainly undertaken by women in some developing countries)</li> <li>• Community development, social interaction, capacity building</li> <li>• Provision of aesthetically pleasing landscape in and around cities</li> </ul>	
	Liveability & health	<ul style="list-style-type: none"> <li>• Involving city residents in growing and preparing food</li> <li>• Open space for outdoor recreation and leisure</li> <li>• Promoting awareness of food, health and the environment</li> <li>• Encouraging physical activities by farming</li> </ul>	<ul style="list-style-type: none"> <li>• Diseases carried by animals like mosquitos, cows, pigs, rats</li> <li>• Unsafe food (Fish or vegetable with hepatitis and heavy metals, food with insecticides, contaminated food, planted on polluted soil or irrigated with polluted water)</li> <li>• Raising livestock in the city leads to informal, unsupervised slaughtering</li> </ul>
Environmental	Resilience	<ul style="list-style-type: none"> <li>• Increase cities' adaptation to climate change</li> <li>• providing natural buffer against natural disasters</li> <li>• Water infiltration for flood control and groundwater replenishment</li> <li>• Urban micro-climate moderation (greening, air and heat)</li> <li>• Urban biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>• Water pollution from waste and chemicals</li> <li>• Insecticide air pollution</li> <li>• Damage to grassland if overgrazed</li> <li>• Soil pollution from waste and chemicals</li> <li>• Sometimes replaces forest cover with field crops</li> <li>• Drains wetlands and reduces biodiversity, as do all urban land uses</li> <li>• Farming practices on riversides and steep slopes contribute to flooding and erosion</li> </ul>
	Low-carbon	<ul style="list-style-type: none"> <li>• Urban waste recycling</li> <li>• Production of local food to reduce food miles</li> </ul>	
Management		<ul style="list-style-type: none"> <li>• More efficient management of open space</li> <li>• Productive use of vacant land</li> </ul>	<ul style="list-style-type: none"> <li>• Can be unattractive, depending on how it is implemented</li> <li>• In some cases, the shoulders of highways used by farmers contribute to accidents</li> <li>• Difficult to tax</li> <li>• To be safe, urban agriculture requires more monitoring per unit of production than some other urban production processes</li> </ul>

Table 4. 1 Summary of potential and problems of UPA. Based on Graaf (2013), Zasada (2011), Pearson et al. (2010), Veenhuizen and FAO (2007), Veenhuizen (2006), Tsubota (2006)

in planning. By using the concept of multifunctionality, agriculture practices can also embrace other urban functions like recreation and education. Thus, more value in addition to economic benefits can be generated from urban farming if it is implemented in an integrative way.

Urban farming is also perceived as inappropriate in modern cities and contrary to the urban beauty. But agriculture needs not to be ugly if it is managed in a proper way. In Guangming, most of the spontaneous small-scale agriculture is actually well maintained and provides a quite pleasing landscape in the city. If designed in a modern way, it can be well integrated in the urban modern environment and thus overcome the traditional bias.

In sum, the negative effects and inefficiency of UA can be prevented by proper planning, guidance and monitoring. In the case of Guangming, despite the formalized agriculture, most urban farming happens in a spontaneous and unorganized way. There are strong initiatives to farm in Guangming, which is embedded in the society and culture. Therefore, banning or ignoring the existence of informal farming activities is not an effective way to deal with the negative impacts of UA. Only by accepting, legalizing and regulating farming activities, especially small-scale farming, can the problems be prevented, of which the first step is to find out what types of farming are suitable in which parts of the city through research and analyses (Smit et al., 2001).

### ***Knowledge gaps in urban agriculture***

Pearson et al. (2010) categorize UA-city relationship into: urban agriculture in isolation; its interface with the people and environment within which it is situated; and its contribution to the design and construction of built form of cities. With this categorization, Pearson et al. point out that the knowledge gap in the benefits of UA is the biggest “where it relates to the opportunities for UA to impact on urban form (planning, design and construction)”. Besides, the dynamic interaction between UA and city over time is also deficient.

With the perspectives of landscape approach and ecosystem services, this graduation project attempts to utilize on-site knowledge of Guangming to fill these gaps. Therefore, ***this project places special attention to urban form and temporal dimension of development in city-UA relationship.***

## 2.2 The role of Planning and design in advancing agriculture

By reviewing research on urban agriculture, Pearson et al. (2010) summarized two elements that facilitate sustainable UA and enhance city-UA relationship, which are *knowledge and institutional structure*. In the field of spatial planning and design, the key issues are to *justify the existence of urban agriculture* by spatial plans and regulations and to investigate the social, economic and environment goods and services delivered by *urban agriculture to improve the urban environment*. As the potential benefits of urban agriculture for urban environment have been discuss, the section focuses on provision of spaces for UA by planning and design.

### ***Provision of space***

Urban farming requires urban space. Provision of land is a key issue for spatial planning and policy to facilitate agriculture in urban and peri-urban area. To provide land for agriculture, availability, accessibility and usability are necessary conditions (Mubvami et al., 2006). It means land should be officially acknowledged for agriculture use, affordable for farmers, with secured tenure, and equipped with sufficient services.

Above all, security of land tenure is the most fundamental issue for preservation of UA, as it more or less determines the investment level of urban farmers on their farms. But preservation of agriculture land is always challenged by other types of competitive land use, so access to land is also one of the most controversial issues. Therefore, to protect agricultural uses in urban area, the conflicts in land use should be taken into account.

Land tenure for UA includes “the right to possess or occupy the land” and also “the right to use the land for agricultural activities” (Wooten and Ackerman, 2011). Securing “the right to possess or occupy the land” require a series of supportive land policies, like taxing, ownership, a property lease, while “the right to use the land for agricultural activities” should be justified in spatial planning.

RUAF and UMP (2003) summarized the strategies applied in various place around the world to enhance the access of urban farmers (especially from lower class) to land for agriculture:

- First is to enable access to public or semi-public land for temporary agriculture use. An inventory of available vacant land in cities and analysis of the suitability for farming is usually the first step for this approach. Temporary occUAnCy licenses are provided for legality and security of farming activities.

- A second strategy is using allotment gardens on privately owned land, which can be leased to urban farmers. In this strategy, involvement of municipalities and NGOs is important to coordinate the relationship between land owners and farmers.
- Third is taking UA as a permanent type of land use and integrating it in land use planning. Legalizing UA in zoning laws can enhance the security of agricultural land use, and also help to conserve and maintain open spaces in and around cities. In different contexts, legitimization of agricultural uses may happen in different manners.

In the developed society, UA practices often happen in the intra-urban area in a bottom-up way at the community level. These bottom-up movements, in the Netherlands for example, often encounter planning restrictions. Vermeulen (2013) suggested a more supportive land use and building policies by the local government to encourage local farming initiatives. Hagan (2005) also argued that top-down approaches are needed to free up lands for agriculture.

In areas where cities grow rapidly, like many developing countries, long-range comprehensive planning based on blue-print approach is often used to guide the rapid urbanization (Mubvami et al., 2006). In a rigid plan, if urban agriculture is not considered during the planning process, it would then be very difficult to properly include it in the implementation of the plan, and to achieve the maximum benefit (Mubvami et al., 2006). Planning instruments like zoning, master plans, local plans, site plans should include UA and recognize it as part of the development strategy.

Difficulties to include UA in planning often come from the lack of awareness and knowledge on UA. Urbanists should play a leading role in delivering the knowledge to local authorities and the public. In addition, the success of those inclusive plans to a great extent depends on the capacity and will of local authorities, and multi-stakeholder approaches are also important for effective guidance and minimizing negative effects of farming activities. To facilitate the multi-stakeholder planning process, ***an inventory of potential agricultural land and evaluation of suitability and availability of land for agricultural use is often the first step.*** Conditions, benefits, risks, and management guidelines of each type of UA should be described and provided. Besides, urban farmers should be empowered to get themselves organized and educated for effective implementation of plans.

## 2.3 Landscape as methods and medium

*The landscape approach*, or integrated landscape management (LIM), has been developed with a special concern for agricultural operation and rural communities. With the recognition that fragmentation in institutional structure and disciplines results in fragmentation in spaces, the traditional sectoral-focused approach is shifting towards a territory-based approach. The notion landscape approach is built on these various approaches that aims to achieve territorial integration of agriculture, environment and rural livelihood outcomes. It suggests ***a cross-sectoral and place-focused approach that is built on the long-term collaboration among stakeholders takes landscapes as a social-ecological system*** (Scherr et al., 2013). Being aware of the links between landscape and ecosystem services, Termorshuizen and Opdam (2009) suggest adopting the term "*landscape services*" to make ecosystem more relevant and integrated at more local scale.

In the context of urban-rural integration, the idea of landscape is also utilized and implemented in planning and design, which is derived from the idea of bringing ecology into urban development process. Despite different origins from the landscape approach, territorial integration is still the key word, which indicates more attentions to environmental process and human's experience in planning and design (Nassauer, 2013; Termorshuizen & Opdam, 2009). In the North America, the introduction of ecology into urban process management has led to "***a method for urban design through landscape as the medium for transformation***", which is recently identified as "***landscape urbanism***" (Nassauer, 2013). In landscape urbanism, landscape functions as a medium to convey ecology into clear forms and spaces that are both functional and meaningful for society, which also embraces creativity and temporal aspects of development.

Focusing in landscape is also a strategy to deal with uncontrollable cities that are highly decentralized in urban forms and shaped by capital rather than welfare state planning (North & Waldheim, 2013). Controls merely on urban environment may result in low density urban sprawl. To deal with the unplanned or uncontrollable urban growth, UN-habitat (2013) in its publication *Urban Patterns for a Green Economy: Working with Nature* advocates utilizing ***landscape ecology*** to guide the development and "ensure the ability of ecosystems to support sustainable human settlement". UN-habitat's guide adopts Forman's idea of landscape mosaic pattern, in which some areas are designated for development and others for natural habitat to ensure the connectivity of the natural networks.

*Landscape has become both the lens through which the contemporary city is represented and the medium through which it is constructed.*

*Waldheim, 2006*

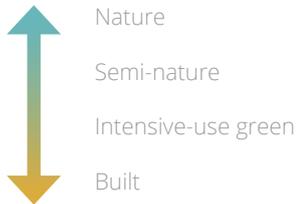
### Four themes of Landscape Urbanism

*James Corner (2006) summarizes four themes of landscape urbanism: processes over time, the staging of surfaces, the operational or working method, and the imaginary.*

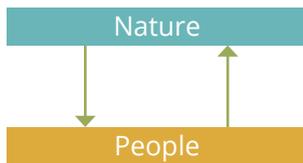
*The process over time theme addresses the temporal aspects of landscape urbanism, and indicates that planners and designers should "how things work in space and time". The staging of surfaces means taking horizontal surface as a "field of action" and creating "an ecology of various systems and elements that set in motion a diverse network of interaction." The operational or working method means the development of a new mode of representation to understand and present the first two themes. The imaginary implies creativity in addition to rationality in urban ecological design.*

## Principles to plan for nature in urban regions (Forman)

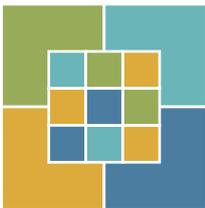
*Principle 1: Classification of natural areas*



*Principle 2: Effect of people on nature and vice versa*



*Principle 3: Grain size and landscape (coarse-grained with small fine-grained landscape)*



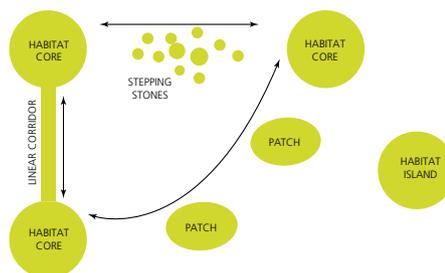
Forman categorizes nature into four gradient sections: natural area, semi-natural area, intensive-use green space and built area, which is used to classify the environment during the planning process. The alteration of nature by planning does not have a central environmental focus, but embraces diverse possibilities and facilitate integration of ecosystem services. Nature can also be reserved and restored by ecological succession or by ecological design.

Planning for nature in city region requires understanding on nature and human interactions. It is recognized by Forman that the relationship between people and nature determines the level of degradation of environment. Nature provides ecosystem services to human settlements, but also brings natural disasters. People may protect and restore nature, but most of time their behaviors result in environmental degradation. In the interaction between people and nature, the most significant impact is the negative effects of human on nature.

Therefore, Forman suggests a combination of coarse-grained and fine-grained landscape to reduce the impact of human's impacts on some areas, while facilitate more intense close relationship between different mosaics in other areas.

In the coarse-grained area, some habitat cores are formed. Forman argues a "patch and corridors" approach to connect the cores, which is conveyed into the form of green corridors. The corridors enable species to move between areas, which enhance the biodiversity of the area. The width and continuity are determined by the species and the contexts. The "patch and corridors" approach also requires adapted roads and infrastructure to be ensure the connectivity. With the green network defined, development is confined in areas with lower economic value to protect the ecological process.

*Patches and Corridors*



*Connectivity*

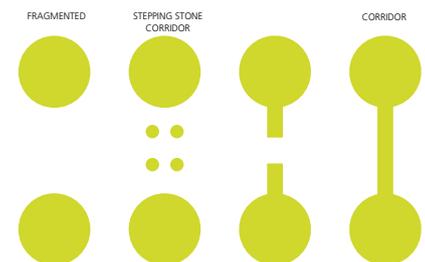


Figure 60. (left) Patches and Corridors; (right) Connectivity. Source: After Forman (Forman, R.T.T., 2008, *Urban Regions: Ecology and Planning Beyond the City*. Cambridge University Press)UN-Habitat, 2013, *Urban Pattern for a Green Economy, Working with Nature*.

With a similar recognition of utilizing green networks for ecological, social and economic purposes, the concept of **urban green-blue grid** based on Dutch experiences is advocated, with special attention to integration of the surface water and green spaces. Utilizing surface water can also dissipate stream energy, provide native landscape irrigation, create aesthetically pleasing landscape and enhance the real estate value, but ecology of water is also vulnerable to urban development. Due to the importance and complexity of the issue, green-blue networks integrate different issues like water management, urban environment, natural process, food production, biodiversity using a wide range of techniques and design tools. The green-blue grids enable heterogeneity of the territory to be reflected in the spatial plans and also indicate the importance of adaptation of urban form to the green-blue structure.

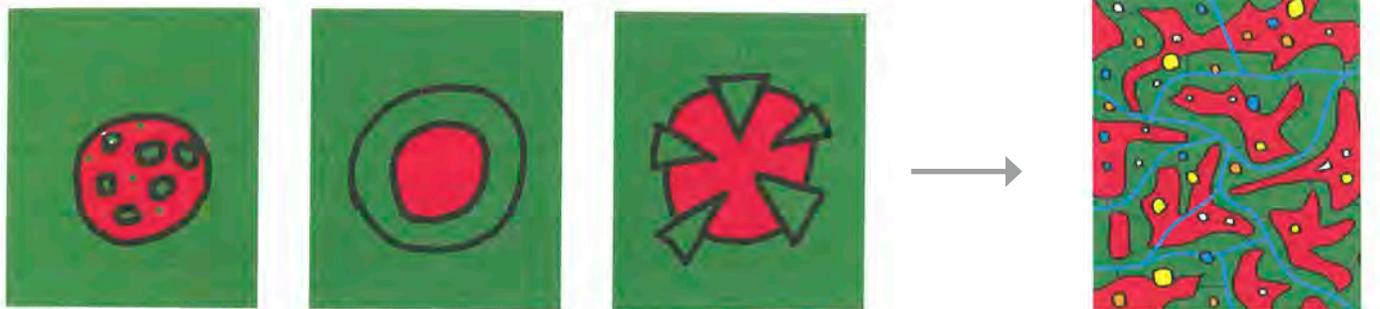
To conclude, there are several characteristics of utilizing landscape as a medium and methods in urban design and planning:

- **Process over time:** address and present the transformation of both ecology and urban development;
- **Ecological green network:** utilize open spaces and green networks to address environmental issues, which should be incorporated into urban forms;
- **Landscape characteristics:** respect ecological and landscape conditions of the territory and guide the interactions between environment and people according to ecological and urban contexts;
- **Relevant for people:** enhance and diversify social and economic values of open spaces to make ecosystem services relevant for people at more local scale;
- **Multi-scalar framework:** requires multi-scalar approach to consider both ecology in large-scale and people in local scale.

#### Themes of urban green-blue grids

- *water*
- *energy*
- *heat*
- *biodiversity*
- *urban agriculture*
- *air quality*
- *social and economic importance*

Figure 61. Development of green spaces in cities (left to right): garden in a walled city, green ring, green slab, green-blue grids  
Source: Pötz & Bleuzé, 2012, Urban green-blue grid for sustainable and dynamic cities, Coop for life, Delft



## 2.4 Linking urban agriculture and landscape approach

### *Common ground*

As mentioned, the landscape approach of managing land already exists in traditional agricultural practices. Agriculture is not only production but also a way of life for agriculture-based communities. The concern for agriculture integrates different activities and knowledge of the area. Therefore, people's close relationship with agriculture and direct experience about the land help to achieve territorial integration of the area.

The types and fertility of soil is highly associated with the dynamics of water in Guangming. Therefore, a continuous pattern following water system is formed, which is very much similar to the pattern of the urban green-blue grid. Therefore, preserving green-blue spaces in urban area is mostly protecting areas with fertile soil for agriculture.

The comparison shows that agricultural practices are linked to ecosystem inherently. As for planning and design, this linkage implies that:

- Agricultural conditions and patterns, especially the traditional agricultural landscape, can *be utilized to understand the ecology of the area*, and a respect to agricultural landscape is in one way respecting ecosystem;
- Agricultural activities can be well embedded in open spaces if green networks are designed with consideration for the agricultural conditions like water and soil;
- The close linkage of agriculture with ecology and open spaces enables agriculture to act as *a medium to convey ecology into urban form and practical design projects*.

### *Urban agriculture contributes to landscape*

Fertile soil is formed due to the overflow of water from river in flooding seasons. The soil map on one hand identifies the locations with highest agricultural value of the area, and on the other hand indicates the most vulnerable places under the threat of flooding. The landscape pattern of agriculture also shows how people who live in the area manage the land to moderate impacts of environmental disaster. This on-site knowledge can contribute to the ecological design and creativity in urban form if we understand it correctly.

Agriculture is a result of people's activities. Therefore, including agriculture in urban landscape supports *people's engagement in open spaces*. The engagement indicates that

people is not just users of open spaces, but also creators and maintainers. Compared with urban parks provided by municipality, agricultural land facilitates **adaptation of open spaces** to people's needs as the landscape can be constantly changed by its users.

Permits for the presence of agriculture in urban area can also address the issue of social justice. Urban agriculture may provide livelihood for the urban poor, or lessen the living expense of some urban households, which is in a way a productive way of utilizing some leftover and to-be-urbanized land.

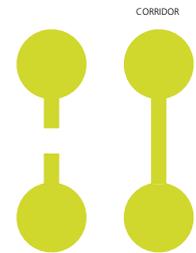
### Urban agriculture situated in green networks

The concept of continuous productive urban landscape (CPUL) is first mentioned by Viljoen et al. (2005), intending to incorporate agriculture into cities to prevent scarcity in European city development from a spatial design perspective. "Productive" includes economic, social-cultural and environmental aspects and CPUL suggests integrating food production in the urban and peri-urban area in urban open space network.

The concept of CPUL suggests that urban agriculture is more than dispersed spots in the neighbourhood, but also a landscape element that can be embedded in different types and scales of open urban spaces, like urban parks, urban forest and urban gardens (Bohn and Viljoen, 2005). Embraced in the urban green network, UA can also benefit from being part of the networked landscape. In CPULs, non-vehicular circulation routes are introduced to link open urban spaces, increasing the accessibility of wider regional landscape, in which way peri-urban agriculture can be more meaningful for urban residents, making more leisure activities possible.

With increasing popularity and acceptance, urban agriculture has been incorporated in many design guidelines and practices including UN-habitat's *Working with Nature* (2013) and *Urban Green-Blue Grids* (2012). Although agriculture is adaptive and responsive to urban contexts, the ecological conditions for urban agriculture are sometimes neglected as they can rely on new cultivation technique. In this project, agriculture is treated as landscape which is connected to the broader ecological context and relevant to farmers who work directly on the land. Therefore, small plots of agriculture separated from the field are not discussed in the project.

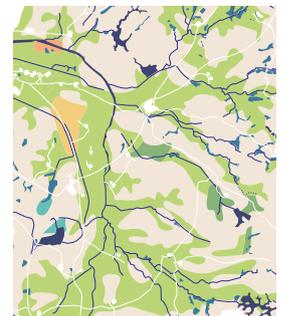
landscape connectivity



urban green-blue grid



natural soil and water pattern in Guangming

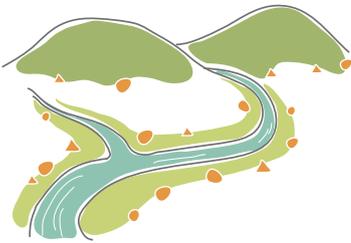


# 3. Agricultural Landscape Approach

## Landscape approach for rapid urban growth on agricultural land

In rapidly urbanizing area like Guangming, the land surface is highly dynamic. The main transformation is from agricultural landscape to urban built-up area, which calls for special attention to agriculture. Following the theories mentioned above and barriers in current planning system, I propose five principles of a planning and design approach which takes landscape as medium and methods to guide the rapid urban growth on agricultural land for Guangming new town. These principles are interrelated and site-specific, as they all aim to facilitate integrated landscapes for the city region of Guangming. Out of convenience, this approach is referred as an *agricultural landscape approach (ALA)* in this project.

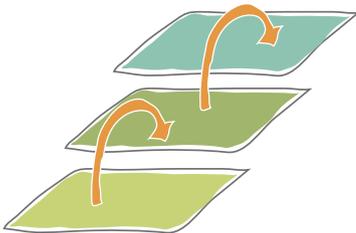
### Ecological green network



- Design the green network based on the knowledge of ecological and agricultural conditions and dynamics;
- Incorporate the green network in urban forms and ensure its connectivity;
- Carefully design interfaces between urban built area and green network.

The green network is built on the understanding on the operation of agricultural system and its relationship with human settlement and ecosystem. Various environmental issues can be tackled in this green network, which should also be able to contribute to urban environment, so that solutions for different issues can be integrated by implementing holistic landscape projects.

### Process over time



Transformation of surface in Guangming include two dimensions: 1) agricultural land to built area; 2) agricultural land to urban open spaces. Therefore, phasing for development also includes two parts:

- Directing urbanization primarily on areas with less ecological and agricultural values;
- Guiding the transformation of agricultural landscape to green spaces with more urban functions and identity.

The transformation framework is based on ecological green network. It embraces flexibility and can also take the adaptability of farmers into account. It also implies a different urban form to facilitate these transformation processes.

### Landscape characteristics

- Formulate a typological language to describe the landscape characteristics according to the degree of urban functions, agricultural operation and ecological protection;
- Identify landscape typologies in the territories and convey them into regulations.

The degrees of urban functions, agricultural operation and ecological protection determine the impact of people's action on nature. It should be recognized which open spaces are to be protected from development and which should be integrated with more recreational functions for citizens. The categorization also implies the main responsibility to maintain the open spaces, the municipality or farmers, so that management and planning methods can be varied in different areas.

### Relevant for people

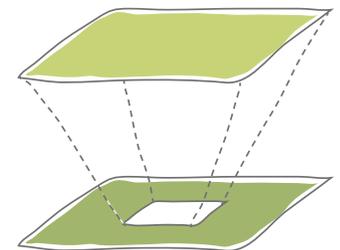
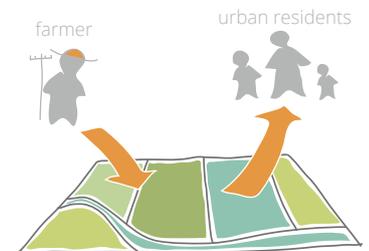
- Facilitate local integration of ecosystem services and urban environment using agriculture;
- Allow local communities to farm on the land and provide guidance and services to facilitate people's engagement.

Farmland should not only be used by agricultural enterprise. By involving people in the field, open space can generate more benefits for communities, such as enhancing their health, facilitating community building, reduce people's daily expense on food and creating pleasing public spaces with human scale. The cost on the maintenance of open space will also be lessened for the municipality.

### Multi-scalar framework

- Define spatial framework at city scale, which leaves enough flexibility for local scales to design networks and structure based on local conditions, while regional mobility and connectivity of open space system should be guaranteed

Many new town problems are results of the masterplan whose rigidity disables local adaptation according to local conditions. Therefore, a framework approach is proposed in order to achieve better integration at more local scales.



## 4. ALA for New Town Problems

The proposed agricultural landscape approach (ALA) is merely derived from theories. It is developed with the knowledge based on the analysis of the development process of Guangming and aims to tackle the problems in Guangming. In fact, the formulation of the approach is a process of pairing potentials of agriculture and problems in Guangming. This section explain what kinds of problems ALA can address and how ALA can address these problems in Guangming.

### *Problem 1: Urban structure defined in the masterplan pays not enough attention to local communities and ecosystem*

From the spatial analysis, the urban structure in Guangming has the following problems:

- The green structure and water system are not coherent. As a result, some streams are removed or not well integrated in urban fabric.
- The connectivity of green network is damaged by dominating infrastructure. The planning green connection is just a series of green spaces which are separated by several main roads. The role of road structure is so dominating in urban form that open spaces are confined in separated plots, which limits the opportunities for open spaces to function as ecosystem services for Guangming;
- Urban structure focusing on regional mobility is defined in such a detail in the masterplan that local networks are likely to be overlooked. As a result, the possibilities of integrating open spaces and urban functions are limited; existing settlements have to be removed due to the planned roads and the remaining urban villages are isolated from the rest of the new town.

In the agricultural landscape approach, the *ecological green network* is integrated in urban structure in a way that its connectivity and ecological performance is ensured. It indicates that urban road networks are modified to facilitate such connectivity. By placing attention to agricultural landscape, the new green network is able to embrace agriculture as ecosystem service for the new town.

The *multi-scalar framework* challenges the current rigid masterplan with more flexibility and adaptability to local conditions at local scales. It suggests to define main connections to ensure regional mobility while enables local adaptation of networks and land use to include local conditions in local plans.

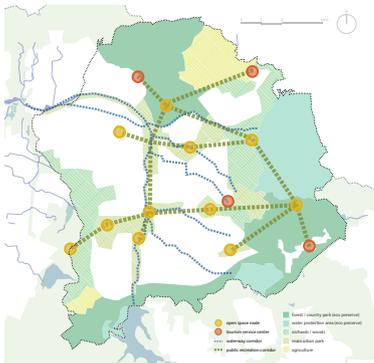


Figure 62. Overlaying green structure and water network according to the urban design of Guangming. Source: Guangming New District Overall Urban Design, 2010. Elaborated by the author. See also page 47)



Figure 63. Planned roads (dashed line) damaging existing urban villages (orange). Source: Guangming master plan 2007-2020, Google satellite map. Elaborated by the author. See also page 53.

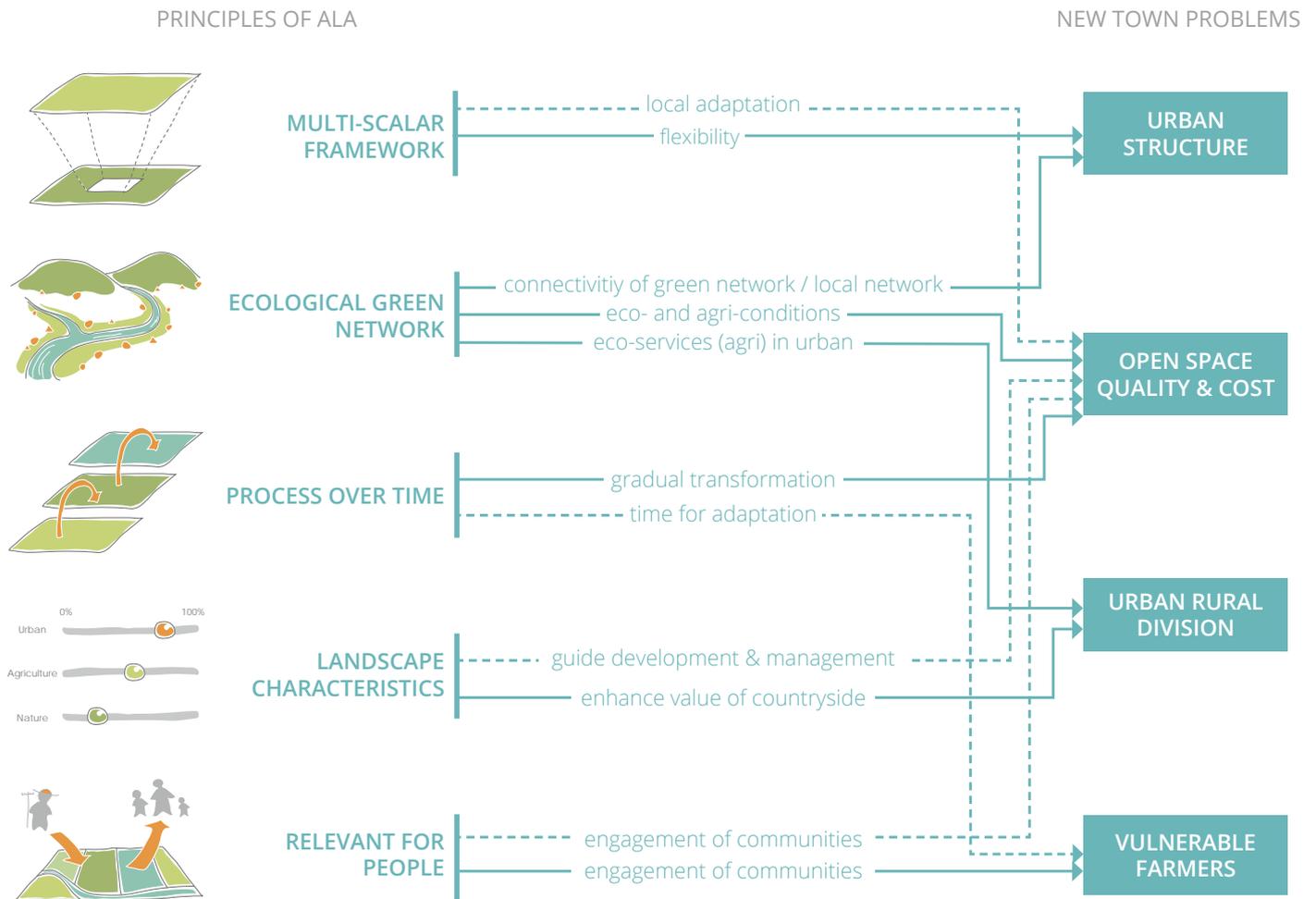


Figure 64. Linking agricultural landscape approach with new town problems in Guangming.

## Urban beautification & urban agriculture in Guangming

*One additional thing to notice is that the idea of urban agriculture is included in the design of Central Park, which is targeted to be Manhattan Central Park. But the reality is that five years after the completion of the design, the construction has not started yet due to lack of funds, which demonstrates that taking agriculture merely as a design element is not sufficient to deal with the high expenditure of maintenance of open spaces.*

### **Problem 2: Subsistence farming is not included in the new town development while placeless and costly open spaces are not affordable, accessible or usable for local people**

The definition of ECL separates urban and rural area in Guangming, and also implies two different management modes of open spaces in the urban area and the countryside:

- In the urban area, open spaces are used as a means for urban beautification and shaping identity of Guangming, yet resulting in placeless and costly green spaces along main roads and removal of original vegetation on hills. The large amount of investment in greenery has little to do with improving living standard of the local population, and reduces the biodiversity compared with the previous agricultural landscape;
- Inside ECLs, basic farmland occupied most of the arable land, which is not well accessible for local farmers or attractive for visitors. Recreational parks built by the local enterprise are gated charging entrance fees that are not affordable for migrants. The construction and maintenance of natural parks cost a huge amount of public finance;
- The bottom-up farming activities by residents are not utilized to green the city in the new town development scheme;

Urban agriculture in *ecological green networks* is advocated to facilitate integration of ecosystem services and *local demands*. The permission for subsistence farming in urban area enables various functions be embedded in open spaces and generating benefits for communities. Utilizing agriculture in open spaces also reduce the municipality's expense on open space construction and maintenance.

The *landscape typologies* define the degree of urban functions, agricultural operation and ecological protection, which help to regulate main management responsibility, and guide the open space design to respect existing landscape quality. The guided *process of transformation* of agricultural land to green spaces can reduce the municipality's financial burden by separating urban park construction in different phases. The multi-scalar framework enables the design of open space system more relevant to people's demands and local ecological conditions.

### **Problem 3: Institutional separation of urban area and countryside makes it difficult to facilitate better urban-rural interfaces and balance urban and rural development**

- The ECLs define the boundary of detailed statutory planning units, which makes it difficult to create more diverse and integrated interfaces between urban and rural in small-scale planning. As a result, urban and nature are often separated simply by roads as hard boundaries;
- The not-to built strategy applied in the ECLs restrict the development opportunities for local communities while land consolidation of basic farmland disables local communities to farm, which enlarges the development gap between urban and rural.

The landscape approach for urban growth on agriculture land is built on the reimagination of the relationship between cities and their hinterlands, which is interpreted as cities and ecosystem service rather than the division of urban and rural. With this understanding, the interfaces between urban and nature happens not only on the edge of urban area, but along the *ecological green network*, which requires careful design for the interfaces between open spaces in green networks and urban functions so as to enhance and diversify the social, economic and environmental value of open spaces.

Instead of focusing controlling urban construction in the ECLs, the ALA places more attention to utilizing and enhancing values of natural and agricultural resources to maintain the *landscape characteristics* in the ECLs. It allows urban construction and infrastructure to enhance the livelihoods of local communities and provide amenities for visitors, but they should be planned and restricted to be coherent with the landscape. These added values and functions enhance the economic viability of environmental protection and local community development in the countryside.

#### **Problem 4: Rapid transformation challenges the adaptability of local farmers**

The urban expansion replaces small-scale farms and forces farmers to leave the soil and seek jobs in other urban sectors, which is difficult as Guangming is moving towards high-tech economies and low-skill jobs are limited. As most of the farms are considered illegal, no compensation is given to them.

The guided *transformation over time* facilitates preservation of ecological green network, which is based on agricultural conditions. It implies that farmland can be temporally available for *urban farmers*, allowing them to have more time to adapt to the impact of urbanization.

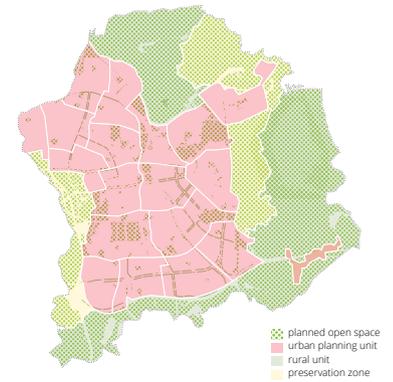


Figure 65. Different planning methods for urban and rural. Urban: planning units with statutory and comprehensive plans; rural: without holistic visions

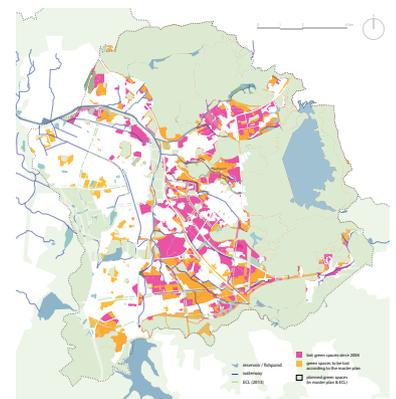


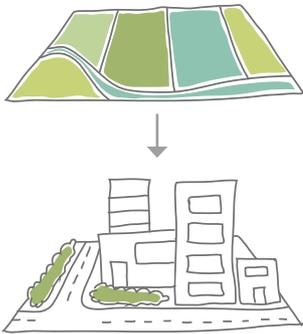
Figure 66. Farmland loss since new town and in the future, which removes farmers from the field.

# 5. Sustainable Agriculture in GM

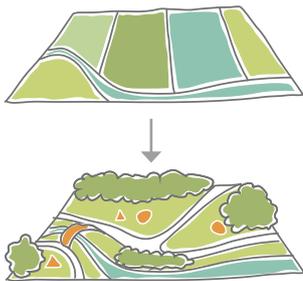
## 5.1 Agriculture in the agricultural landscape approach

Agriculture-city transformation:

*Agricultural land to built area*



*Agricultural land to urban open spaces that may include agriculture*



The agricultural landscape approach implies special roles of agriculture in new town development process in Guangming. The transformation between agricultural land and new town development: 1) agricultural land to built area, 2) agricultural land to urban open spaces; 3) urban vacant land to agriculture. As the transformation from vacant land to agriculture can be considered as a bottom-up way of utilizing open spaces by residents, the third category thus can be embedded in the second one, if open spaces in Guangming also include agriculture.

Taking agricultural land as to-be-urbanized area, it should contribute to the city and planning in the following aspects:

- Dynamics of agricultural landscape is studied to **gain knowledge** of the ecosystem and people's adaptation to the environment, because agriculture is part of the ecosystem and the traditional way of farming has been adapted to the environment for generations.
- Urbanization on most of agricultural land in Guangming is inevitable due to the demands for urban development. But during the process, agricultural land can still be **temporarily available** for farmers and residents. By small interventions, these temporary farmland may be transformed as temporary urban parks or community gardens to benefit surrounding communities.

As part of urban open spaces, agriculture can have following functions to benefit the city:

- Agriculture in Guangming should be able to **engage communities and local farmers** in farming, so as to provide a livelihood for urban poor and recreational amenities for residents during the development process.
- Agriculture which produces food for cities is inherently part of **ecosystem services**. But it can at the same time be embedded with other ecological functions for the city like biodiversity, flood buffer, water infiltration and urban heat moderation to reduce its damages to the environment and bring more benefits to the new town.
- Agriculture can also provide **recreational and educational amenities** for urban residents if it is combined with urban parks, restaurants, sport facilities, events, etc.

*"Small farms and urban farms are more likely than large, industrial farms to use sustainable agricultural practices."*

*D. A. Denckla, 2013*

## 5.2 Sustainable agricultural use of land

### *Land use types improvement*

Sustainable agriculture should include social, environmental, economic and technological dimensions. According to the problems defined previously, the main focuses of achieving sustainable agriculture in Guangming are involving residents in farming, sustaining farmers and restoring diversity of vegetation and landscape, which should be facilitated by planning to provide land.

Table 5 shows the improvement of current land use types, which includes ecosystem service in non-agricultural produce layer, and medium-scale family farm and collective farm in management layer. Medium-scale family farms and collective farms enable higher degree of involvement of local farmers, which not only provides employment locally, but also makes it likely to achieve sustainable agricultural practices due to their local knowledge and more careful management of the land. For more detailed definition and benefits of new farm types, see page X.

Layer	Current land use types	Improved land use types
Agriculture produce (P)	<ol style="list-style-type: none"> <li>1. Temporary crops</li> <li>2. Permanent crops</li> <li>3. Livestock</li> <li>4. Fishery</li> <li>5. Non-food crops</li> </ol>	<ol style="list-style-type: none"> <li>1. Temporary crops</li> <li>2. Permanent crops</li> <li>3. Livestock</li> <li>4. Fishery</li> <li>5. Non-food crops</li> </ol>
Non-agricultural produce (N)	<ol style="list-style-type: none"> <li>1. Recreation / Education</li> </ol>	<ol style="list-style-type: none"> <li>1. Recreation / Education</li> <li>2. <b>Ecosystem service</b></li> </ol>
Management (F)	<ol style="list-style-type: none"> <li>1. Subsistence farming gardens</li> <li>2. Informal small-scale family farms</li> <li>3. Formal small-scale family farms</li> <li>4. Large-scale agribusiness</li> <li>5. Recreation agri-park</li> </ol>	<ol style="list-style-type: none"> <li>1. Subsistence farming gardens</li> <li>2. Small-scale family farms</li> <li>3. <b>Medium-scale family farms</b></li> <li>4. <b>Collective farms</b></li> <li>5. Large-scale agribusiness</li> <li>6. Recreation agri-park</li> </ol>

Table 5. Three layers for defining land use types.(Green: new land use types)

### Problems of agricultural system in Guangming

- *Spontaneity shows a strong incentive to grow food, which is not included in planning*
- *Farming systems is in rapid transformation, which making small-scale farms vulnerable*
- *Reducing diversity in countryside*

### Sustainable agriculture

*The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such development...conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable. (FAO. 1991)*

### ***Scenario of management types***

Current agriculture plans and policies advanced by the municipality mainly focus on the economic productivity of agricultural land. Social and environmental dimensions of agriculture are mostly neglected. (Interestingly, the agriculture bureau of Shenzhen was cancelled in 2012, and the function of administrating agricultural activities is merged into the Economy, Trade and Information Commission.)

Besides the introduction of ecosystem services and more eco-friendly farming techniques in agricultural land, another important means to achieve sustainability in agricultural operation is the management methods of farms. According the current plan, farmland in Guangming will be managed by large-scale agricultural enterprises, which generally are motivated by economic revenue from the land, and less attention are paid to environmental issues in the field. Meanwhile, local farmers are excluded from the agriculture scheme and can only become an employee in those enterprises.

The introduction of medium-scale family farms and collective farms gives more possibilities to diversify farming system and enhance the capacity of local farmers. The scenario I purpose consists of diverse farming systems in which local initiatives are included. The spatial distribution and conditions of these farming types is guided by suitability evaluation and is also illustrated in the district-scale designs.

## Family farm

Family farming is a means of organizing agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labour, including both women's and men's.

Family Farming is the predominant form of agriculture both in developed and developing countries. Family farmers carefully manage their lands to sustain remarkably high levels of productivity despite having less access to productive resources such as agricultural inputs and support (most research shows an inverse relationship between land size and productivity). Family farming preserves traditional food products, while contributing to a balanced diet and safeguarding the world's agrobiodiversity and the sustainable use of natural resources.

Source: <http://www.fao.org/family-farming-2014/en/>

## Medium-scale family farm in CN

Currently, the most common mode of organizing farming activities in rural area in China is "individual farms + farmers cooperative", in which a group of small-scale household farms are organized to help mutually to offer services like marketing, processing, logistics, providing technologies and information, etc.

But due to the migration of younger generation from rural to urban area, and the appearance of large-scale enterprises, the competitiveness of household farms is decreasing. In the NO.1 central document of 2013, the concept of "family farm" is introduced to enhance the capacity of farms run by households. The difference of family farms from original household farms relying on cooperatives is larger scale and independence, which enable farmers to increase yield and diversify their products. The difference of family farms from large-scale farms is less reliance external labors, so that the land and resources can be managed with more care (Chen, 2013).

Research shows that the size of family farms in china generally range from 50 mu to 500 mu (3.3 ha to 33 ha).

Source: <http://www.tdzy.com/subject/jiatingnongchang> (in Chinese); Law of the People's Republic of China on Specialized Farmers Cooperatives; Chen: [http://news.ifeng.com/mainland/detail\\_2013\\_03/10/22940990\\_0.shtml](http://news.ifeng.com/mainland/detail_2013_03/10/22940990_0.shtml)

"Any form of sustainable urbanism is dependent on the presence of a sustainable user."

T. De Jong







# 整體

## CITY-SCALE DESIGN

Contents of city-scale design / Suitability assessment / Spatial structure & zoning / Relationship typology / Evaluation

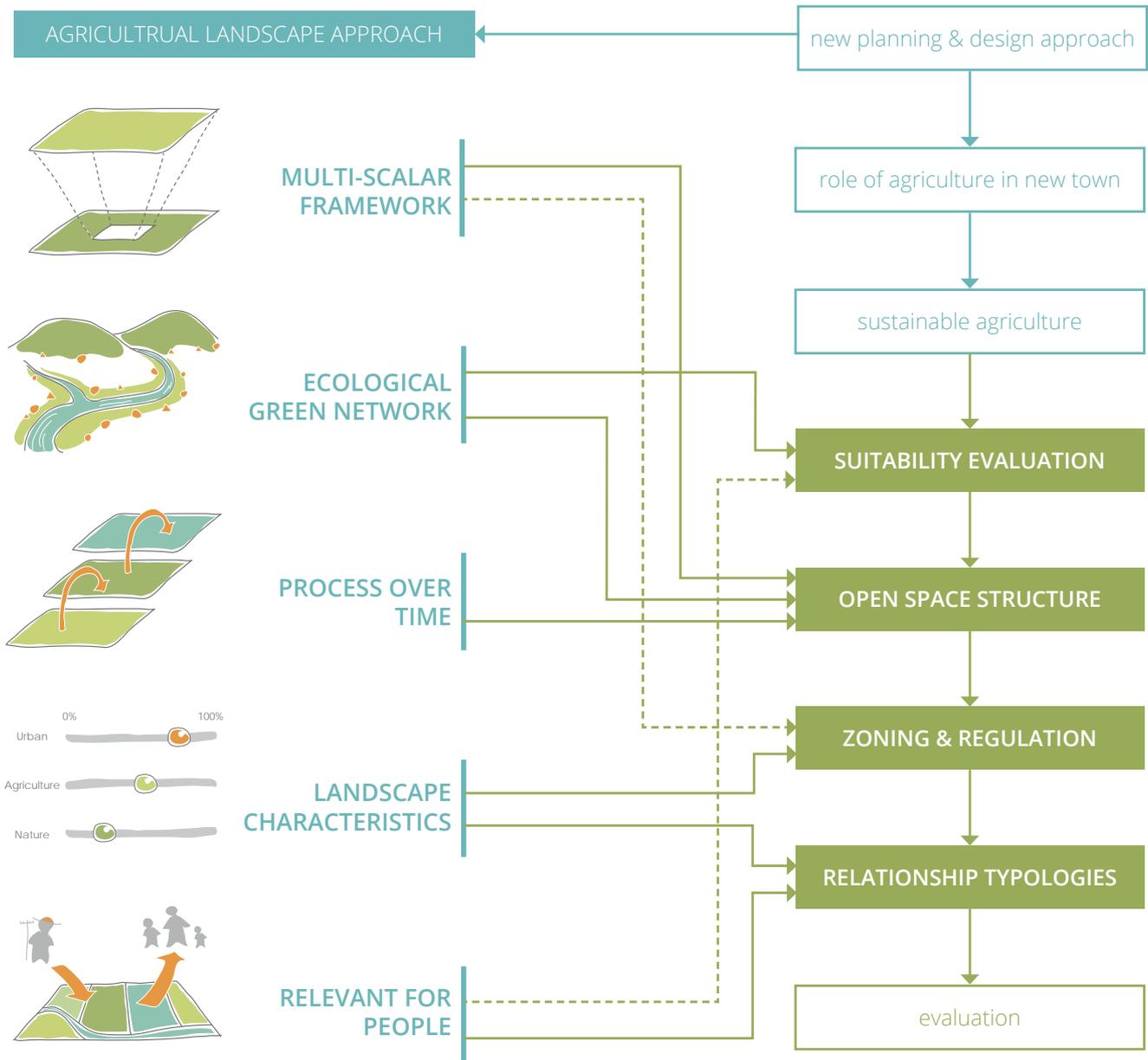
# 1. Contents of City-scale Design

The city-scale design aims to explore the feasibility and effects of the agricultural landscape approach (ALA) on the city-scale structure through conveying the principles into forms, from which the ALA can be evaluated.

According to *multi-scalar framework* principle, the city-scale design should provide a framework plan in which green networks and main urban structure are defined. The first step is to define *green network for ecological value*. As urban growth happens on agricultural land, agricultural conditions should be understood first. In order to provide more precise spatial information for designing the green network, *suitability* of different agricultural land uses is evaluated. Combined with other maps concerning ecosystem, *open space network* is defined to preserve areas with high ecological value. The ecological green network is further elaborated with *landscape characteristics*, *planning units definition* and *urban growth on agricultural land in phases*. To ensure the connectivity of the green network, the main urban structure is modified accordingly.

In addition to redefining the structure of the new town, it is also crucial to show the benefits and spatial quality that the structure can achieve at neighbourhood and street scales. Therefore, I formulate a *toolbox of possible spatial combination typologies of agricultural landscape, nature and urban elements*. These tools and guidance offer knowledge and inspiration for agricultural operation and design for individuals, communities and local authorities, which enable them to create their own solutions based on their demands.

The development of the city-scale design is based on the principles defined in the agricultural landscape approach. The final outcome is evaluated to see whether it meets the objectives of the approach and how the new approach influences the new town.



## 2. Suitability Assessment

Ecological green network

Process over time

Landscape characteristics

Relevant for people

Multi-scalar framework

### ***Purpose of assessment***

The evaluation of suitability is essential to find proper locations for land uses and to deal the complexity of the different dimensions of agriculture land. The result is an important source to understand the land resource from the perspective of agriculture so that planning can act accordingly. In this project particularly, it is used in the analysis of agriculture performance, definitions and regulations of urban-rural transect zones (page X) and city-scale references to guide agricultural activities in lower scales.

### ***Suitability evaluation approach***

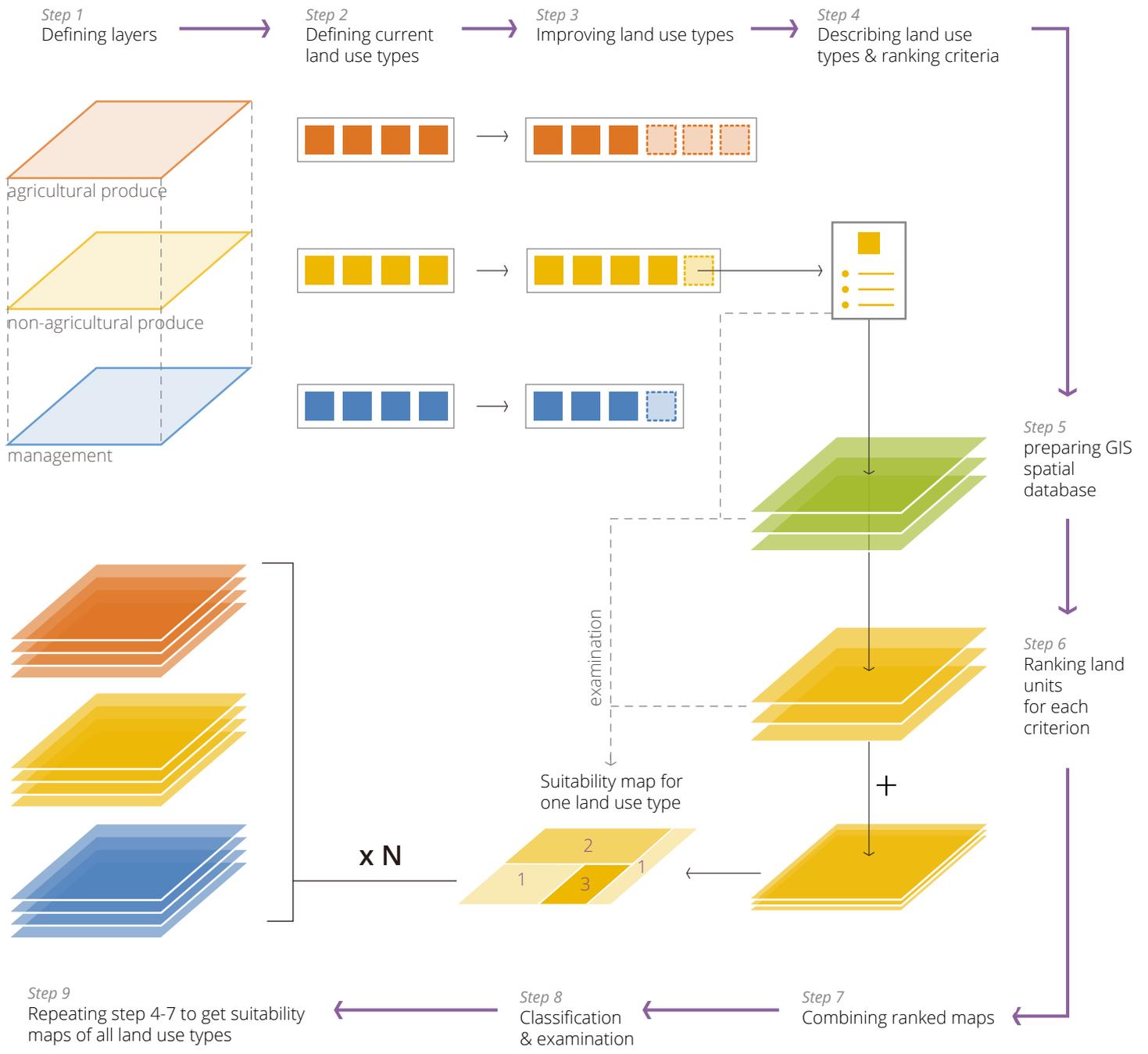
The approach of suitability evaluation is based on land evaluation method of FAO (1976, 2007) and spatial analysis model in ArcGIS manual. GIS is used to provide more explicit results for later decision making. The evaluation approach has been adopted to make the results more relevant and useful for leading design decisions throughout the project, which can be simplified into nine steps:

Step 1: Defining layers. In order to reflect environmental, social and economic conditions for agriculture in Guangming, three layers are identified: agriculture produce, non-agriculture produce and management methods. The agriculture and non-agriculture produce layers determine the degree of multifunctionality. Management methods reflect the ownership and responsibility of maintaining the land.

Step 2: Defining current land use types. A land use type is a representative characterization of activities that happen on the ground. Land use types are defined by the previous analysis and combining with local land use standards.

Step 3: Improving land use types. Land use types are improved or modified to tackle problems of the site and reflect objectives of the study. In practice, the voice of stakeholders should be included in this section.

Step 1-3 defines the framework of suitability evaluation, which has been introduced in the analysis of agriculture operation (page X) and scenario of sustainable agricultural operation (page X).



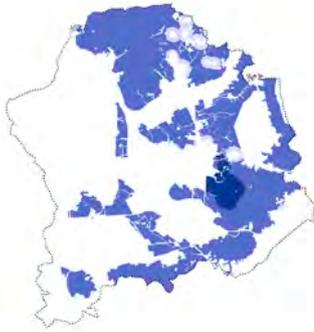
## An Example of defining evaluation criteria

### *Large-scale agribusiness*

*Definition: a large-scale, intensive, standardized farm (usually with an area more than 30 ha.) operated by an agriculture enterprise for production or research.*

### *Criteria:*

- *Size of land (>30ha.)*
- *Near agriculture centers / industrial area*
- *Away from communities in the ECL to give communities access to land to develop their own economy*
- *Not on temporarily available land*



Step 4: Describing land use types and ranking criteria. The question of finding suitable location for a land use type can be broken down into smaller questions, which reflects different conditions and objectives of the type. The criteria are also translated into quantitative expression for GIS analysis.

Step 5: Preparing GIS spatial database. Spatial information is digitalized and imported into GIS database, including soil, hydrography, topography, current land use, infrastructure, urban density, etc.

Step 6: Ranking land units for each criterion. Using the quantitative criteria, suitability of each land unit for each criterion can be evaluated and shown on maps.

Step 7: Combining ranked maps. Calculation tools in GIS are used to combine suitability maps of each criterion.

Step 8: Classification and examination. Reclassify the final result and examine it with criteria and conclusion from previous analysis. Four classes are identified: high suitability, medium suitability, low suitability and unsuitable.

Step 9: Repeating step 4-7 to get suitability maps of all land use types.

Following the procedure, 13 suitability maps are produced for each land type (figure 68). More details of the criteria and data sources for evaluation are documented in Appendix 2.

### ***Analysis of suitability maps***

By overlaying and calculation of the suitability maps, we can have some preliminary conclusions. They identify the locations which:

- have capacity and potential to develop diverse agriculture products (figure 69);
- are more suitable for ecological protection than developing recreational uses (figure 70);
- have more possibilities to develop different means of production organization, which may results in conflicts in the right to use the land (figure71).

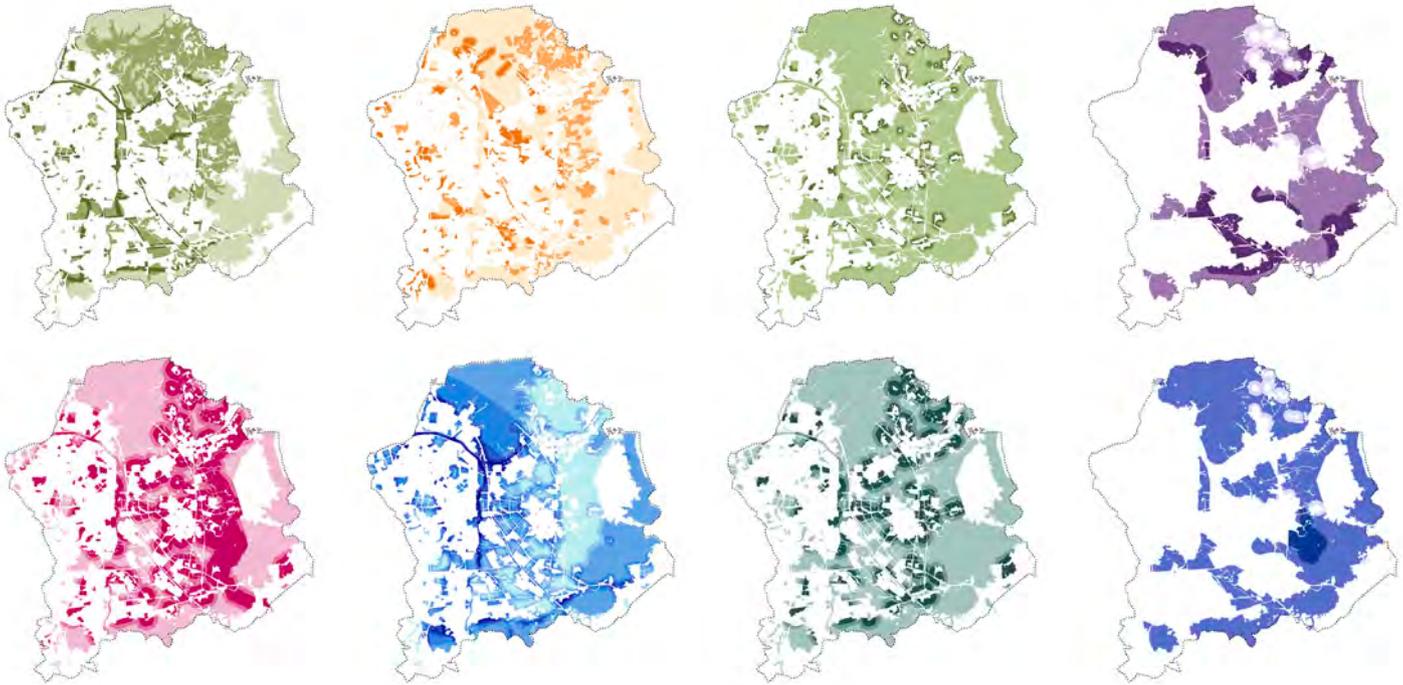


Figure 68. Examples of suitability maps for each land use types..For the all maps and their criteria, see Appendix 2.

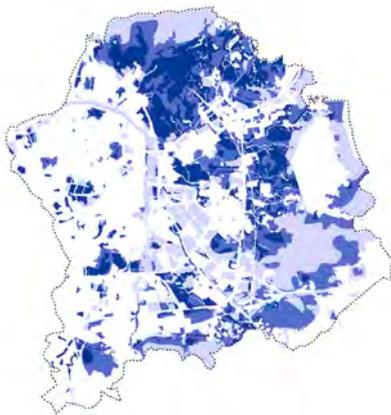


Figure 69. Diversity of agriculture produce by overlaying agricultural produce layer.

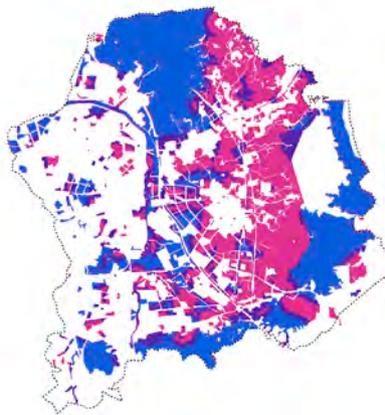


Figure 70. Main non-agricultural function by comparing non-agricultural produce layer.(recreation: pink; ecosystem service: blue)

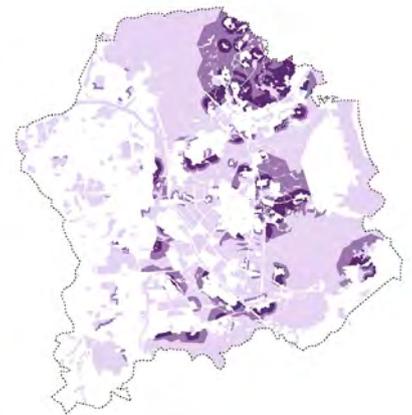


Figure 71. Area with more conflicts in the right to use the land by combining management methods layer.

# 3. Spatial Structure & Zoning

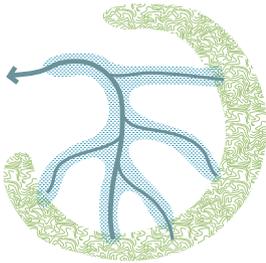
Ecological green network

Process over time

Landscape characteristics

Relevant for people

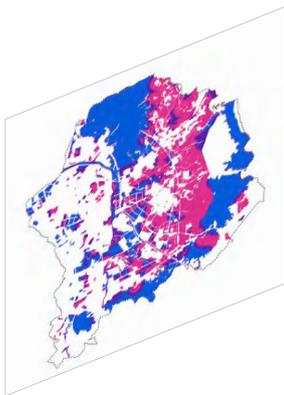
Multi-scalar framework



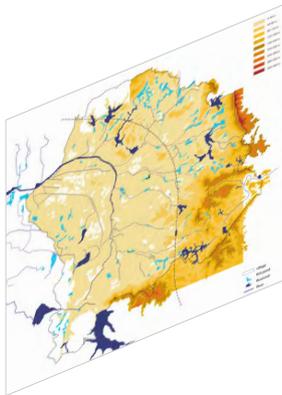
## 3.1 Defining Open space structure based on ecological and agricultural conditions

The definition of open spaces structure aims to sustain the existing ecosystem functions and dynamics and moderate environmental impacts on human settlements. By understanding the river system of Maozhou River, the prior open spaces to be preserved are riparian zones, whose complex environment and interactions with urban systems should be ordinated, and hilly areas, which are important habitat for plants and animals. Combined with maps of topography, soil, existing open spaces, environmental hazards, and suitability of agricultural land use, current urban land use, a new open space network is purposed, which:

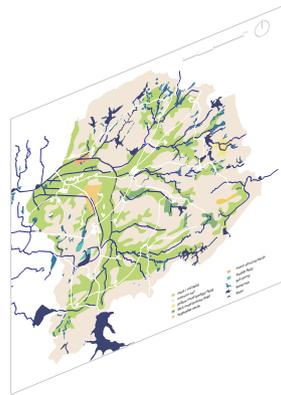
- includes fertile land for agriculture, riparian buffer zones, green buffers along main infrastructures, hilly area with orchards and natural forests;
- respects current urban built-up area and structure;
- is continuous, leaving opportunity to be integrated with slow traffic systems, bio-corridors and ecosystem services.



suitability maps



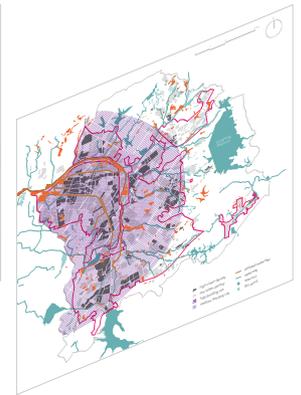
topography



soil types



existing open spaces



Environmental hazard

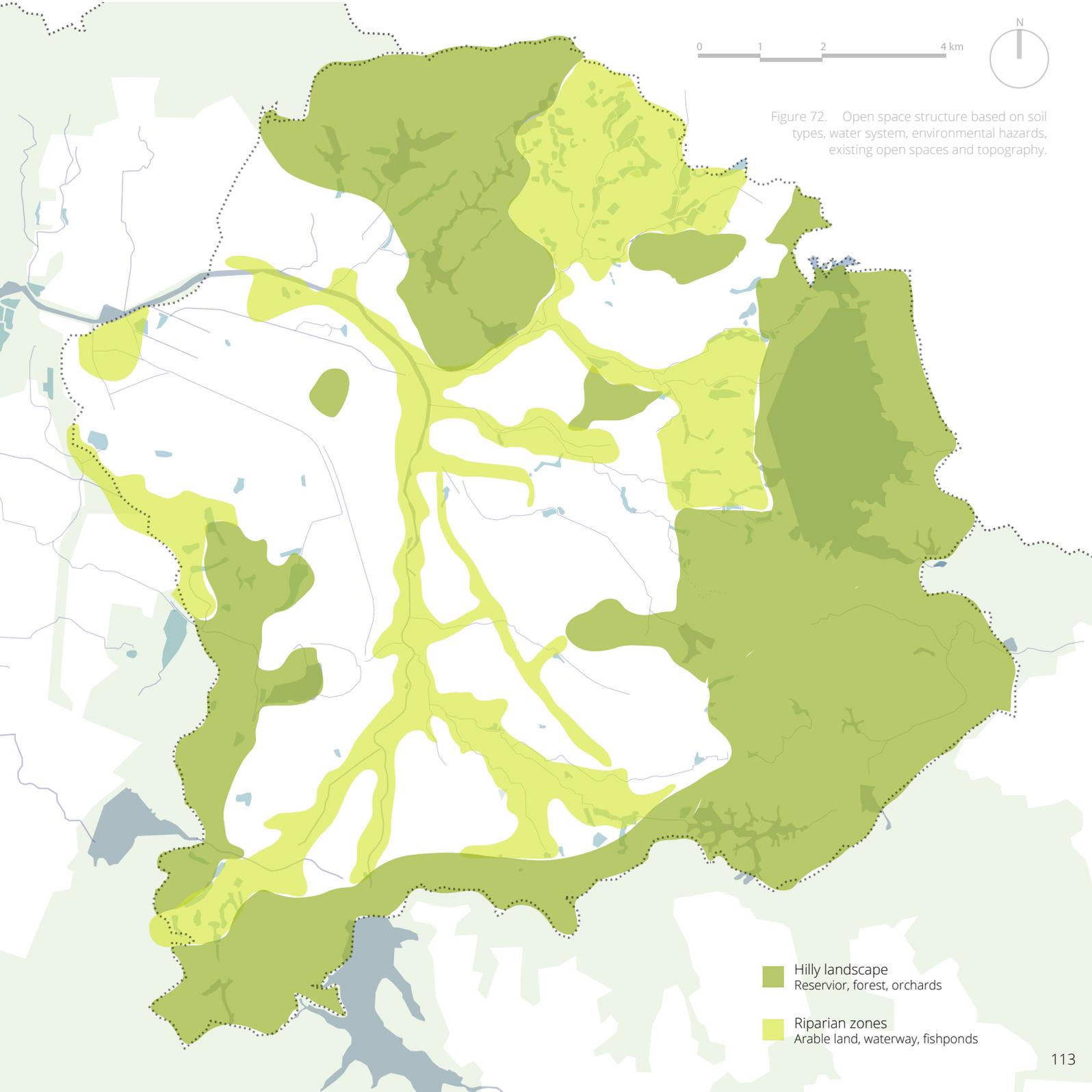


Figure 72. Open space structure based on soil types, water system, environmental hazards, existing open spaces and topography.

- Hilly landscape  
Reservoir, forest, orchards
- Riparian zones  
Arable land, waterway, fishponds

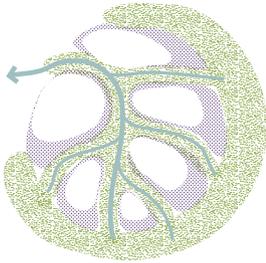
Ecological green network

Process over time

Landscape characteristics

Relevant for people

Multi-scalar framework



### 3.2 Open space structure guiding urban growth

To meet the demands of *short-term rapid urban growth* and *long-term ecological preservation*, I propose two-step new town development: phase one for rapid urban growth for economic boom, and phase two for slow urban growth with more concerns for ecological performance and environmental values.

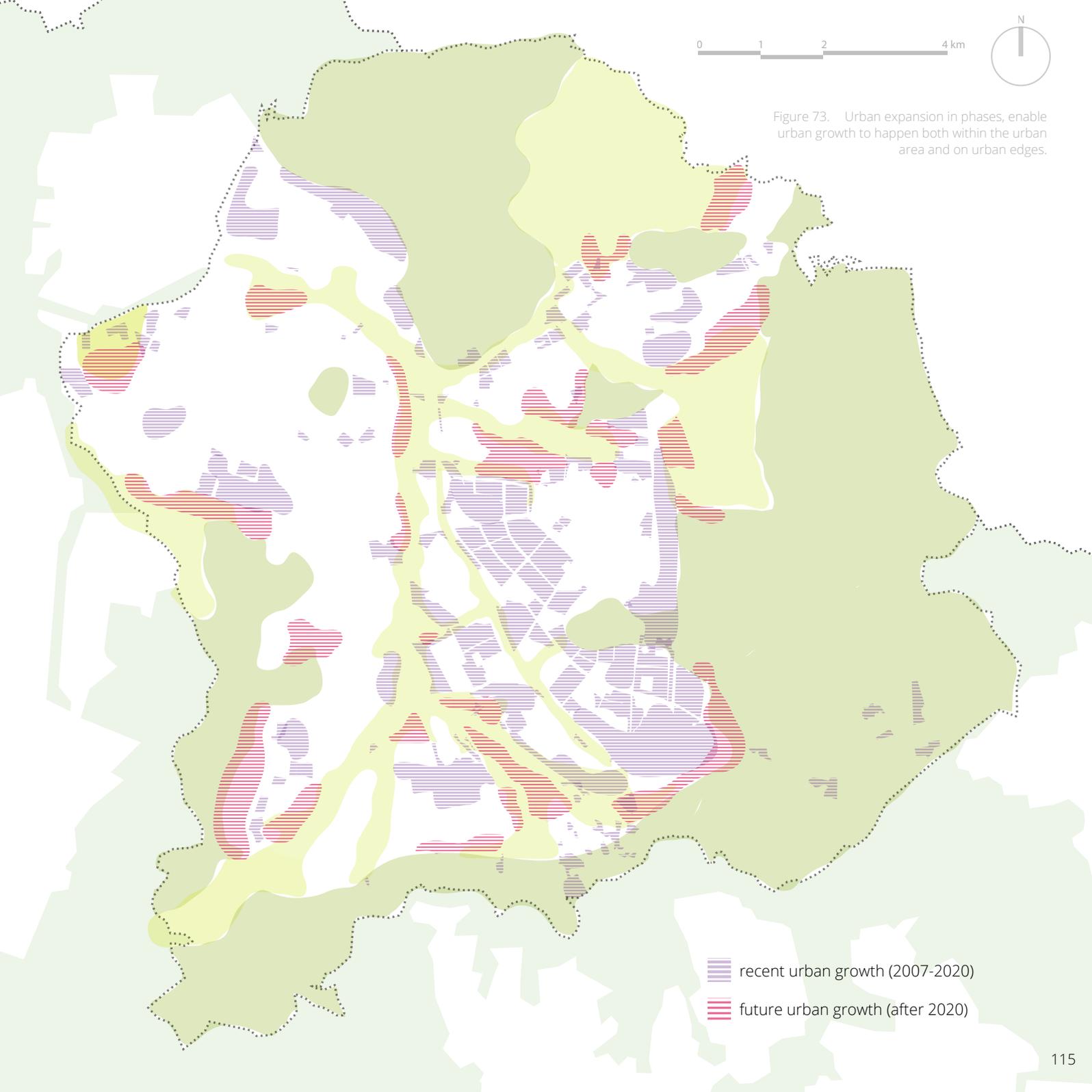
- Until 2020: The areas which are less sensitive to agriculture and ecosystem can be urbanized in the first place at a high speed, so as to enhance the economic performance of the region. The sensitive places are preserved for agricultural use or improvement of ecosystem services. The agricultural land are improved and supported for more sustainable practices during this period.
- After 2020: when the financial status of the municipality and people's livelihood make great progress and gets smoother, the more sensitive area for agriculture and ecosystem can be used for urbanization more meticulously. At that time, more environmental and social issues are more likely to enter government's agenda at that moment. And the time gap also helps local farmers to adapt themselves to new circumstances.

The two step urban growth has other benefits in addition to ecosystem preservation. Compared with the current new town plan that defines a fixed future for the city, the two-step urban growth can incorporate *future demands and flexibility* in the framework. Besides, some agricultural land with environmental values can still be utilized *temporarily by farmers* as a way to moderate the impacts of urban expansion on farmers.

0 1 2 4 km



Figure 73. Urban expansion in phases, enable urban growth to happen both within the urban area and on urban edges.



- recent urban growth (2007-2020)
- future urban growth (after 2020)

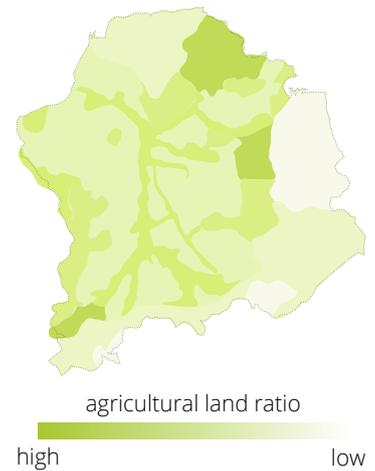
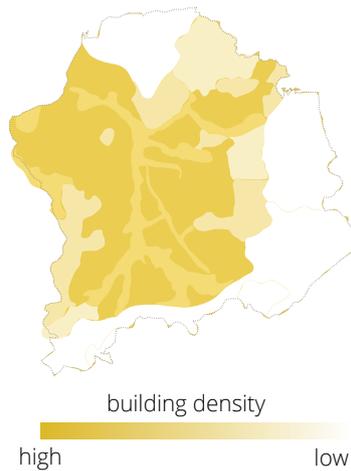
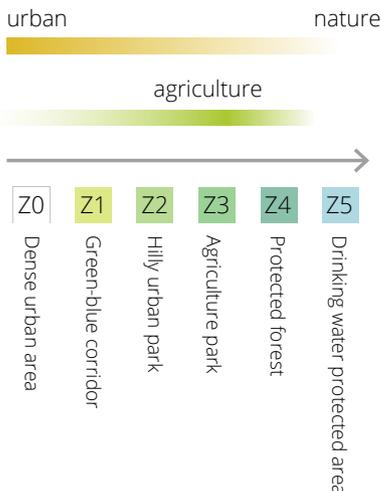
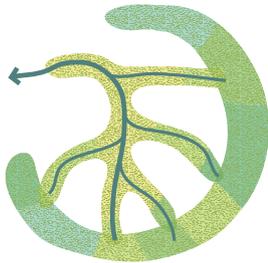
### 3.3 Landscape characteristic zones

Ecological green network
Process over time
Landscape characteristics
Relevant for people
Multi-scalar framework

Following the idea of *Forman* on categorization of nature based on people's impact on nature, the characterization of landscape in the project adds **another dimension: agricultural operation**. One reason is the special roles of agriculture in Guangming, and another is that defining the degree of impact is not sufficient in guiding land management. Adding agriculture as the third dimension helps to clarify management responsibilities and approaches. It should be also recognized that some agricultural operation may have serious impacts on the ground. Using only urban and nature as attributes cannot distinguish such unsustainable agricultural practices.

Therefore, six landscape characteristic zones are defined to describe the degree of people's impact, agricultural operation and ecological protection: drinking water protection zone (Z5); protected forest (Z4); agriculture park (Z3); hilly urban park (Z2); green-blue corridor (Z1); dense urban area (Z0).

With detailed profiles and regulations on building density, agricultural practices and landscape characteristics, the six zones constitute a spectrum from urban to nature, from small-scale to intensive agriculture. Compared with the current strict rules of ECLs, which forbids construction in the ECLs, the proposed landscape characteristics zones allow limited and controlled construction according to the landscape characteristics of the area, and purpose different kinds of integration of urban and rural functions in different area. In other words, the focus of the development of an area is placed on creating synergies in the territory, rather than construction control and separated projects.



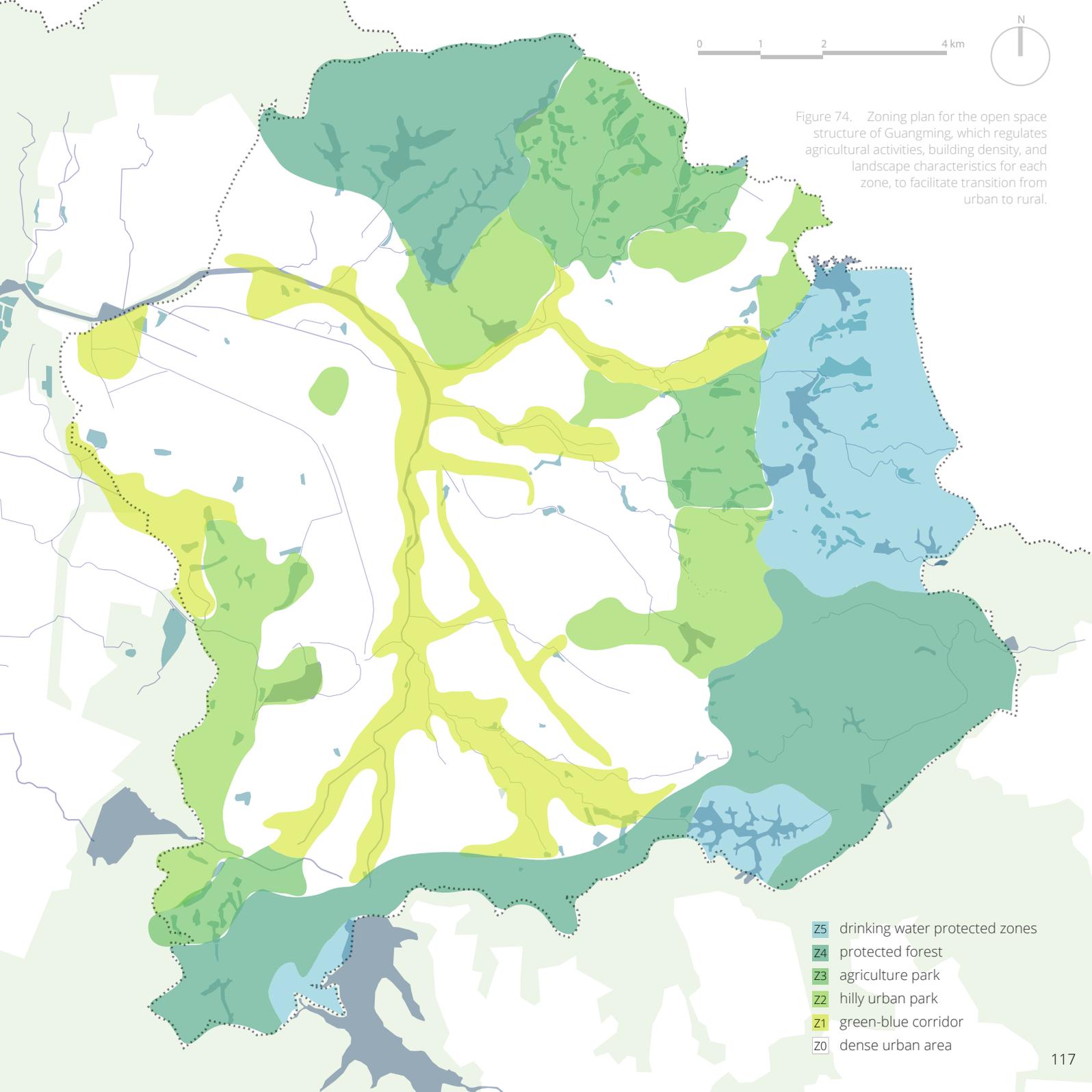
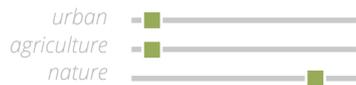


Figure 74. Zoning plan for the open space structure of Guangming, which regulates agricultural activities, building density, and landscape characteristics for each zone, to facilitate transition from urban to rural.

- Z5 drinking water protected zones
- Z4 protected forest
- Z3 agriculture park
- Z2 hilly urban park
- Z1 green-blue corridor
- Z0 dense urban area

## Z5: Drinking Water Protected Areas



General Character

Natural landscape with restricted agricultural use and construction

Building Height

not applicable

Building Footprint

not applicable

Types of Agriculture

restricted; must be pollution-free, organic agriculture; mainly orchards with some arable land

Agricultural Land Area

<20%

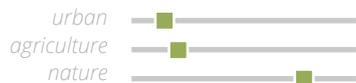
Farmers' organization

local farmers / agribusiness

Location for agriculture

A certain distance from drinking water with a buffer in-between

## Z4: Protected Forest



General Character

Hilly area covered by natural woods and diversified orchards, with walking routes for hiking

Building Height

<5m

Building Footprint

<2%

Types of Agriculture

pollution-free, organic agriculture; diversified orchards with some arable land

Agricultural Land Area

<60%

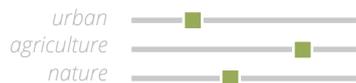
Farmers' organization

agribusiness

Location for agriculture

hillsides with low slope

## Z3: Agriculture Park



General Character

primarily agricultural landscape on plain area with scattered buildings; tourism economy developed based on agricultural produce and landscape; well connected to urban road network

Building Height

<12m

Building Footprint

5-10%

Types of Agriculture

organic, diversified agriculture for local communities; standardized, experimental agriculture for agribusiness

Farmers' organization

Rural communities; farming households; agribusiness

Location for agriculture

main surface

## Z2: Hilly Urban Park

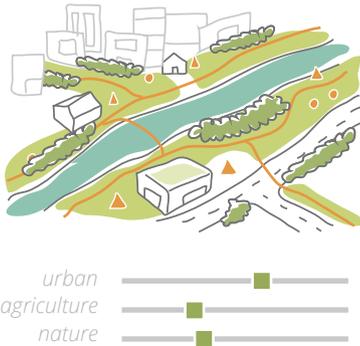


General Character  
Building Height  
Building Footprint  
Types of Agriculture

Open spaces on hilly area mainly for recreational use  
<10m  
3-5%  
pollution-free orchards, some free-range livestock & arable land  
30-90%  
local farmers, agribusiness  
Near residential area as allotments / community gardens;  
design elements in green spaces

Agricultural Land Area  
Farmers' organization  
Location for agriculture

## Z1: Green-blue Corridor



General Character

Continuous open spaces along rivers or streams, combined with public services, like theaters, libraries

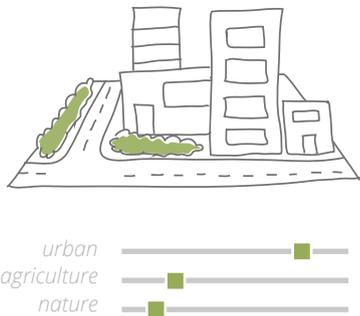
Building Height  
Building Footprint  
Types of Agriculture

<20m  
5-10%  
pollution-free & diversified agriculture as riparian buffers for flooding and eco-corridor in dense urban area

Agricultural Land Area  
Farmers' organization  
Location for agriculture

20-50%  
Communities or local farmers  
Near residential area as allotments / community gardens;  
design elements in green spaces

## Z0: Dense Urban Area



General Character

Medium to high-density urban area for administrative, industrial, residential, commercial and recreational use;

Building Height  
Building Footprint  
Types of Agriculture

20-230m, average 20-50m  
30-50 %  
Subsistence or small-scale farms as a landscape element for community development & maintenance for open spaces

Agricultural Land Area  
Farmers' organization  
Location for agriculture

2-5%  
Individuals, communities or local farmers  
Attached to buildings (roof, balcony), community gardens, neighborhood parks

### 3.4 Integrative urban-rural management

Ecological green network
Process over time
Landscape characteristics
Relevant for people
Multi-scalar framework

As discussed above, the ECL differentiates management methods for urban area and countryside. Detailed planning units are confined in the ECL (figure 76), making it difficult to deal with the complexity of interface between urban and nature and formulate integrative solutions for urban edge areas along the ECL. Besides, without the process of making holistic and statutory plans, different projects may not be able to work cooperatively. One of the consequences of lack of holistic vision is the current plight of the communities in the ECLs.

To facilitate more integrative planning for the urban edge area, the line that defines the boundary of detailed planning units is enlarged. Basically, the line include agriculture park (Z3), hilly urban park (Z2) and green-blue corridor (Z1), where certain types of construction is permitted and some urban functions can be embedded. With the enlarged boundary, areas with more rural characteristics can also be planned and regulated in detailed to avoid fragmentation, and the interface between urban and countryside can be better designed and managed (instead of merely using a road as a boundary as it is now).

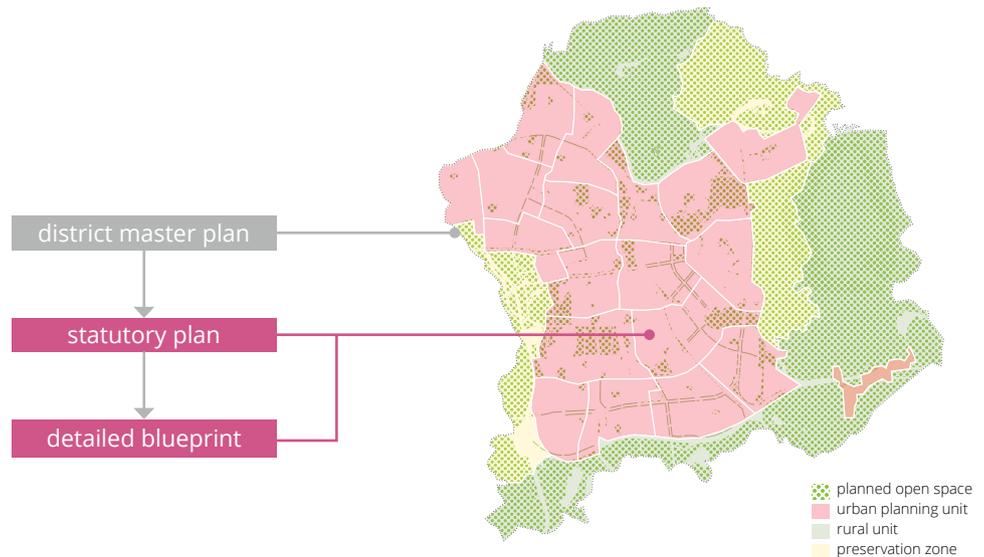
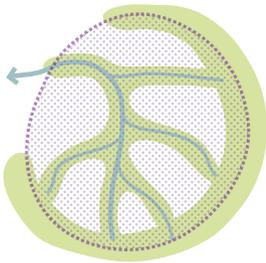
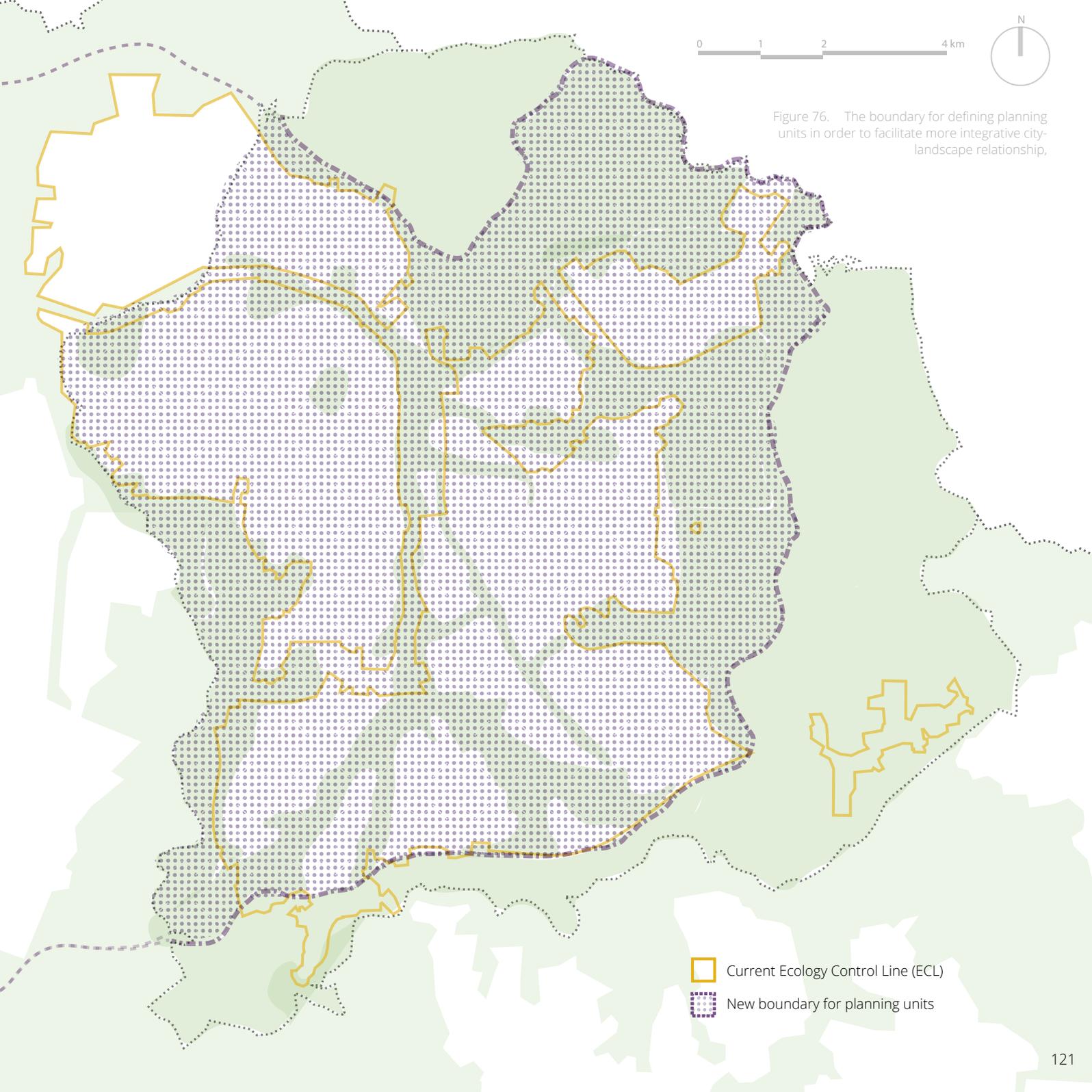


Figure 75. Urban planning units for statutory planning that use ECL as the boundary, indicating different management methods of urban area and countryside.



0 1 2 4 km



Figure 76. The boundary for defining planning units in order to facilitate more integrative city-landscape relationship,

- Current Ecology Control Line (ECL)
- New boundary for planning units

### 3.5 The ECL and the open space framework

Ecological green network

Process over time

Landscape characteristics

Relevant for people

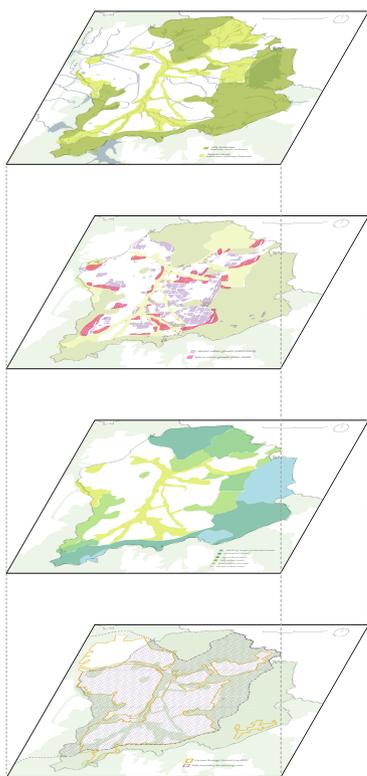
Multi-scalar framework

Currently, the Ecology Control Line (ECL) has four purposes: defining the main green structure for the city; defining locations for urban growth; protecting open spaces; defining the boundary of urban management. In today's cities, the urban-rural boundary has been blurred. Urban systems, administration system and ecosystem have different dynamics. So using one single line to guide the development of these systems at the same time actually oversimplifies the intense interaction between city and its surrounding landscape.

By separating these functions of the ECL, we can get an open space framework that can better serve these purposes. Each layer mentioned above serves as one function of ECL:

- Agriculture- and ecosystem-sensitive areas are defined, which form an *open space structure* for the city;
- Green-field urban expansion is identified into *two phases to guide rapid urbanization* on less eco-sensitive area, enable more flexibility for the future, and guide adaptation of the agricultural-related society to the emerging economic system;
- Open spaces are protected by reinforcing and regulating *landscape characteristics* to achieve synergies within the territory;
- *The statutory planning boundary* is enlarged to facilitate better integration and transition from city to countryside at urban edges.

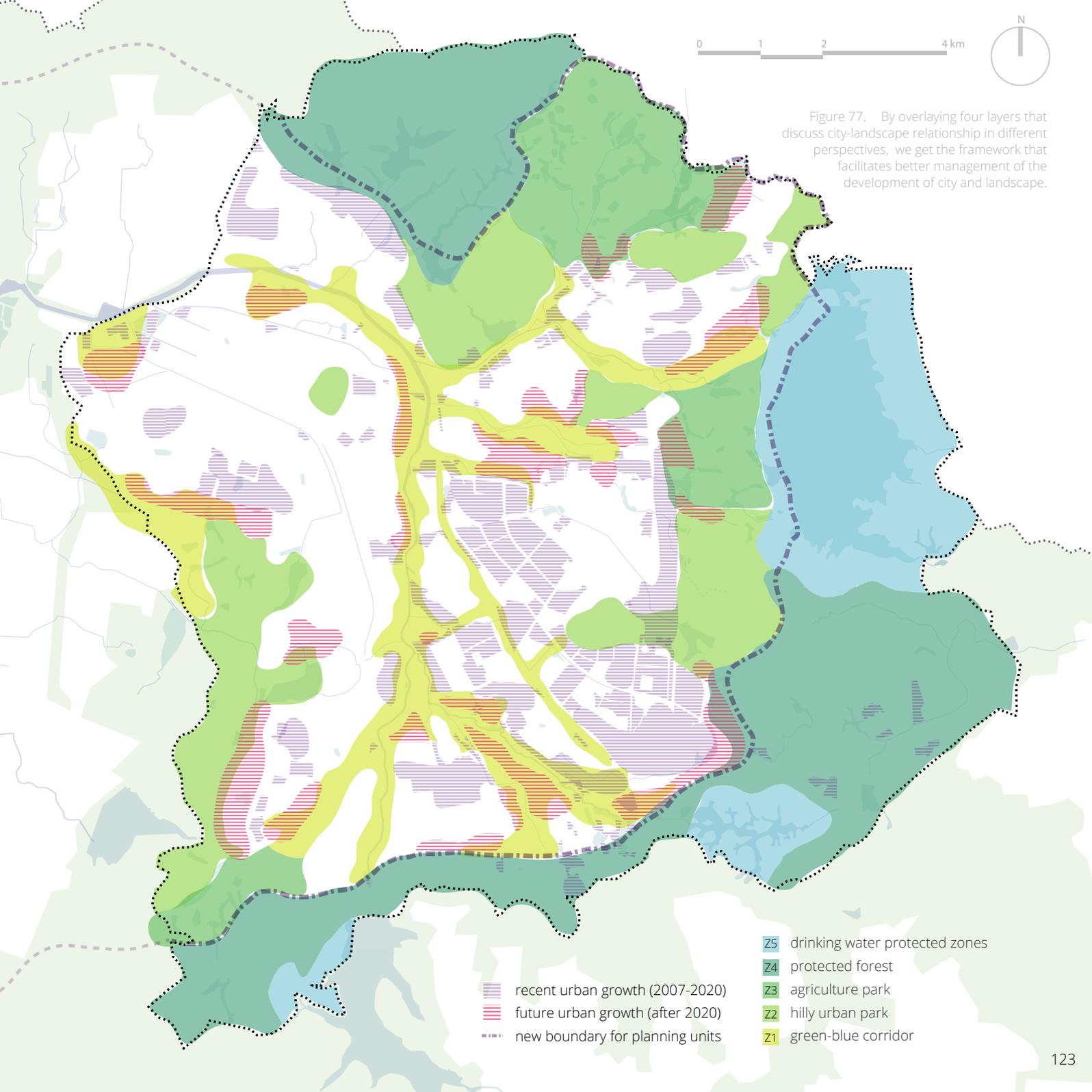
In total, the framework regulates main green network, urban growth, landscape identities, and planning units for Guangming, which reflects the complex and dynamic interactions between city, agriculture and nature.



0 1 2 4 km



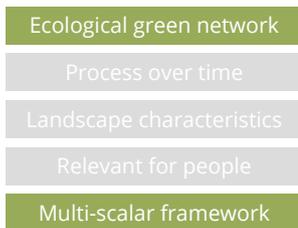
Figure 77. By overlaying four layers that discuss city-landscape relationship in different perspectives, we get the framework that facilitates better management of the development of city and landscape.



- recent urban growth (2007-2020)
- future urban growth (after 2020)
- new boundary for planning units

- Z5 drinking water protected zones
- Z4 protected forest
- Z3 agriculture park
- Z2 hilly urban park
- Z1 green-blue corridor

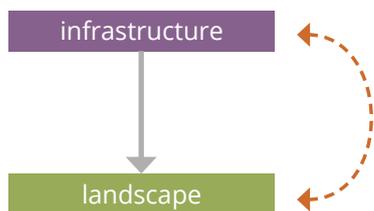
### 3.6 Urban structure and open space structure



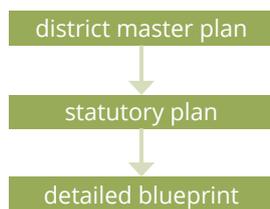
In current new town development, infrastructure plays a dominating role in shaping the city structure to facilitate regional mobility. However, the continuity and spatial quality of open space network is generally neglected in the city-scale master plan.

Using a landscape approach, *a different hierarchy between infrastructure and landscape* is introduced. An open space structure is regarded as the primary design element while infrastructure should be adapted to it. Figure 80 shows the adjusted urban structure of Guangming, in which infrastructure lines are modified according to the open space structure, yet the regional connectivity remains.

Another change from the original plan is *the reduction of details*. Secondary roads and neighbourhood streets are not shown in the master plan, so that more freedom is given for local scale to develop local networks according to local conditions.



Changing hierarchy between infrastructure and landscape



Hierarchy of Planning systems in Guangming: allowing more freedom for smaller scales

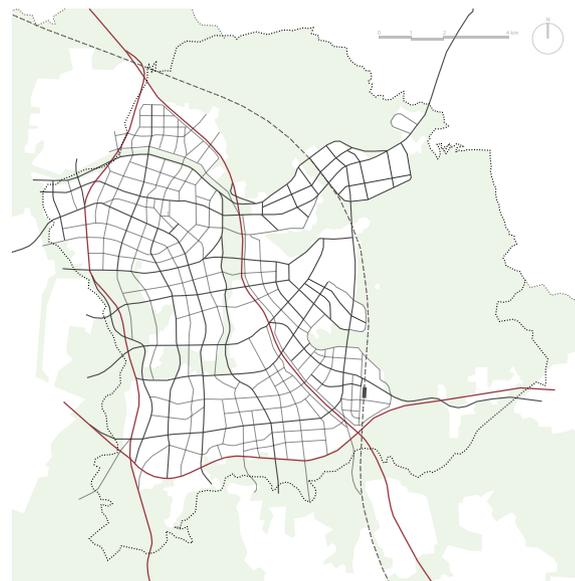


Figure 79. The road network in the Guangming master plan (2007-2020).

*"The ideal way of development would be that infrastructure follows planning or functional change of land use, growth or shrinkage. However, most of the time it is the other way round."*

A. van Timmeren, 2014

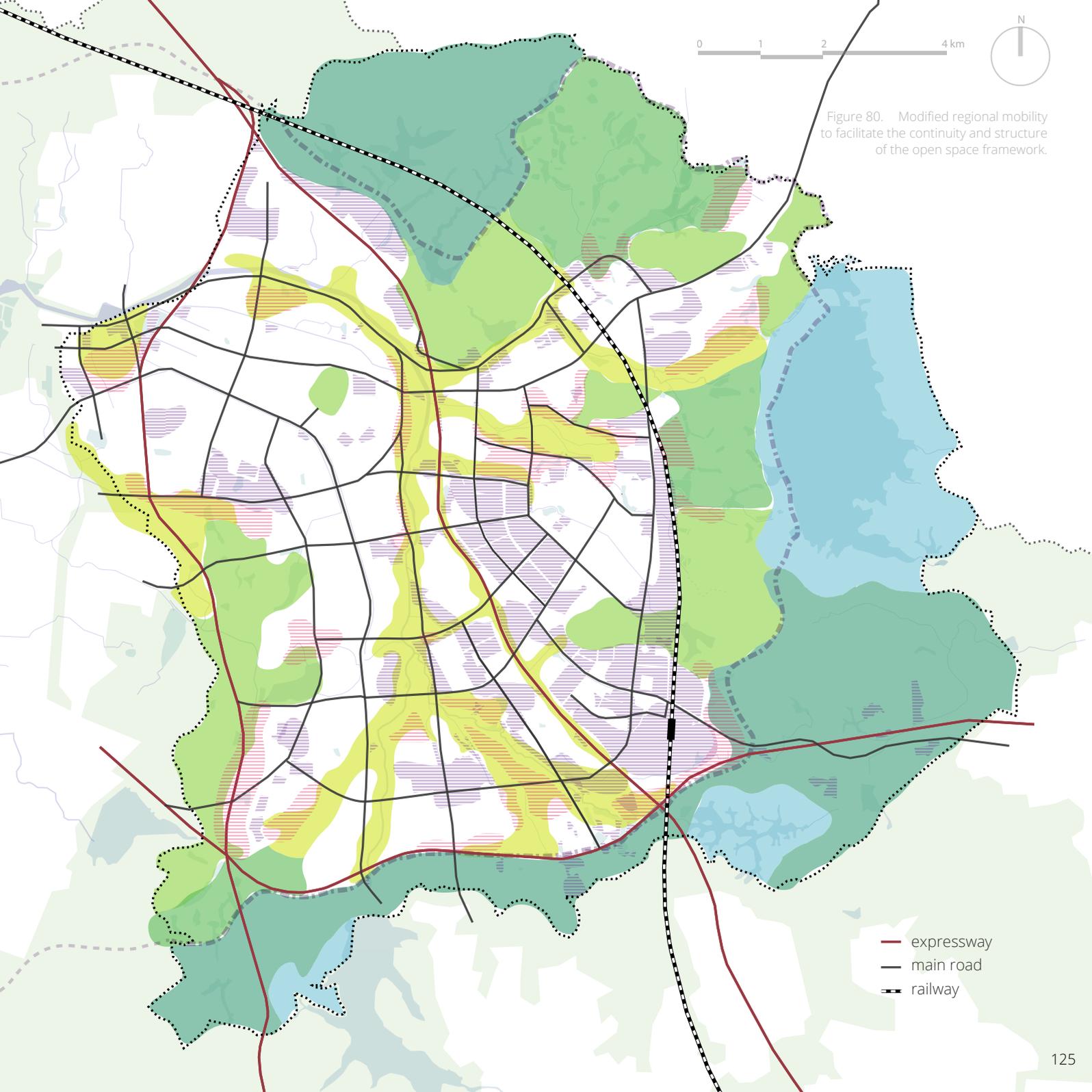


Figure 80. Modified regional mobility to facilitate the continuity and structure of the open space framework.

- expressway
- main road
- - - railway

## 4. Relationship Typology

Ecological green network

Process over time

Landscape characteristics

Relevant for people

Multi-scalar framework

As agriculture is used as a medium to integrate urban system and the natural landscape, agriculture should be situated in the urban or natural contexts to discuss its performance and operation. Typologies are developed in the study, aiming to provide tools and guidance for implementing city-agriculture-ecosystem relationships at neighborhood and street levels. They also demonstrate various potentials and the flexibility of agriculture being a design element to be incorporated into built environment. At the end of this section, two examples are provided to show the application of the typologies in specific locations.

### 4.1 Urban & landscape elements

To develop typologies of city-agriculture-ecosystem relationship, we need first to classify the urban and natural elements.

Table 6 shows the list of urban functions, modified from current land use system in Shenzhen, and landscape elements representing the major types of landscapes in Guangming. The urban elements can be categorized into two main types: buildings (land use) and infrastructure.

Diagram on the right selects typical form of these elements from Guangming. The spatial quality and characters are taken into account when I develop typologies for city-agriculture-ecosystem relationship.

	Infrastructure (S)	<ol style="list-style-type: none"> <li>1. highspeed railway</li> <li>2. expressway</li> <li>3. main road</li> <li>4. neighborhood street</li> <li>5. greenway</li> </ol>
Building	Residential (R)	<ol style="list-style-type: none"> <li>1. commercial housing</li> <li>2. social housing</li> <li>3. Danwei housing</li> <li>4. urban village</li> <li>5. rural village</li> </ol>
	Industry (M)	<ol style="list-style-type: none"> <li>1. manufactory / high-tech industry</li> <li>2. agribusiness</li> <li>3. industrial park</li> </ol>
	Public facility (A)	<ol style="list-style-type: none"> <li>1. health care / community service</li> <li>2. education</li> <li>3. cultural</li> <li>4. sport</li> </ol>
	Commercial facility (B)	<ol style="list-style-type: none"> <li>1. restaurant</li> <li>2. market</li> <li>3. recreational</li> <li>4. office</li> <li>5. shopping mall</li> </ol>
	Landscape element (E)	<ol style="list-style-type: none"> <li>1. hills</li> <li>2. river / stream</li> <li>3. reservoir / ponds</li> </ol>

Table 6. The classification of urban and natural elements that can have interactions with agricultural use.

infrastructure (S)



highspeed railway



expressway



main road



neighborhood street



greenway

residential (R)



commercial housing



social housing



urban village



Danwei Housing



rural villages



dormitory for worker

industry (M)



manufactory



high-tech industry



agribusiness



industrial park

public facility (A)



community service



education



cultural



sport

commercial (B)



restaurant



market



recreational



shopping mall

Landscape element (E)



hills



stream / river



reservoir



fish pond

## 4.2 Typologies

Of all elements, the typologies place special attention to agriculture. Thus, the typologies can be categorized to show the spatial relationship between agriculture and the rest three types of elements: buildings (land use), infrastructure and landscape elements.

Figure 81 shows the full list of typologies describing city-agriculture-ecosystem relationship. The typologies are used not only to illustrate the possible spatial combination between agricultural land and urban land use, but also to describe the possible interactions between agriculture and urban systems that can be facilitated by the spatial relationship. In other words, the typology system is a tool to link functional relationship and spatial design solutions. The functional relationship between urban systems and agricultural landscape also illustrates how urban agriculture can improve urban metabolism by making use of resources locally.

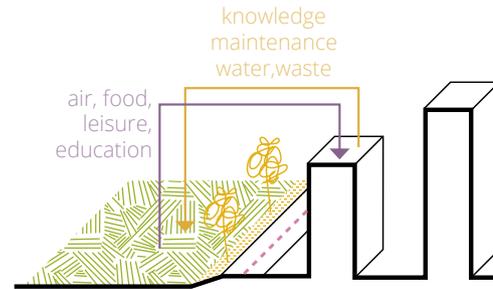
Detailed profiles for each typology are developed to better guide the application of typologies. A profile includes urban element and landscape element that are shown in

Options	urban element	landscape element	benefits of urban agriculture
Infrastructure (S) 1. highspeed railway 2. expressway 3. main road 4. neighborhood street 5. greenway Residential (R) 1. commercial housing 2. social housing 3. Danwei housing 4. urban village 5. rural village Industry (M) 1. manufactory / high-tech industry 2. agribusiness 3. industrial park Public facility (A) 1. health care / community service 2. education 3. cultural 4. sport Commercial facility (B) 1. restaurant 2. market 3. recreational 4. office 5. shopping mall		1. hills 2. river, stream 3. reservoir / ponds	Employment in agriculture Social integration of farmers Community development Aesthetically pleasing landscape Subsistence food production riparian buffer against flooding Water infiltration Moderation of urban heat Urban biodiversity Urban waste recycling Efficient management of open space Productive use of vacant land

Table 7. The classification of different dimensions that define conditions for application of typologies.

the typology, and also the benefits of urban agriculture can bring by using the typology, suggested locations for the typology, and advices on permission and restriction of agriculture types. By using the typologies, different regulations and plans I proposed can be combined, and be give physical forms. In other words, the typologies link them together and illustrate how these layers can work together to create a more integrative environment that is meaningful for local population.

The figure in the left is an example of a profile for one typology, which includes an illustration to show spatial and functional relationship, a brief discription, a detailed profile and an example to show possible spatial quality.



*Building-agriculture: B-1*

Agricultural field located next to built-up area, separated by a neighborhood road, accessible and usable for urban users

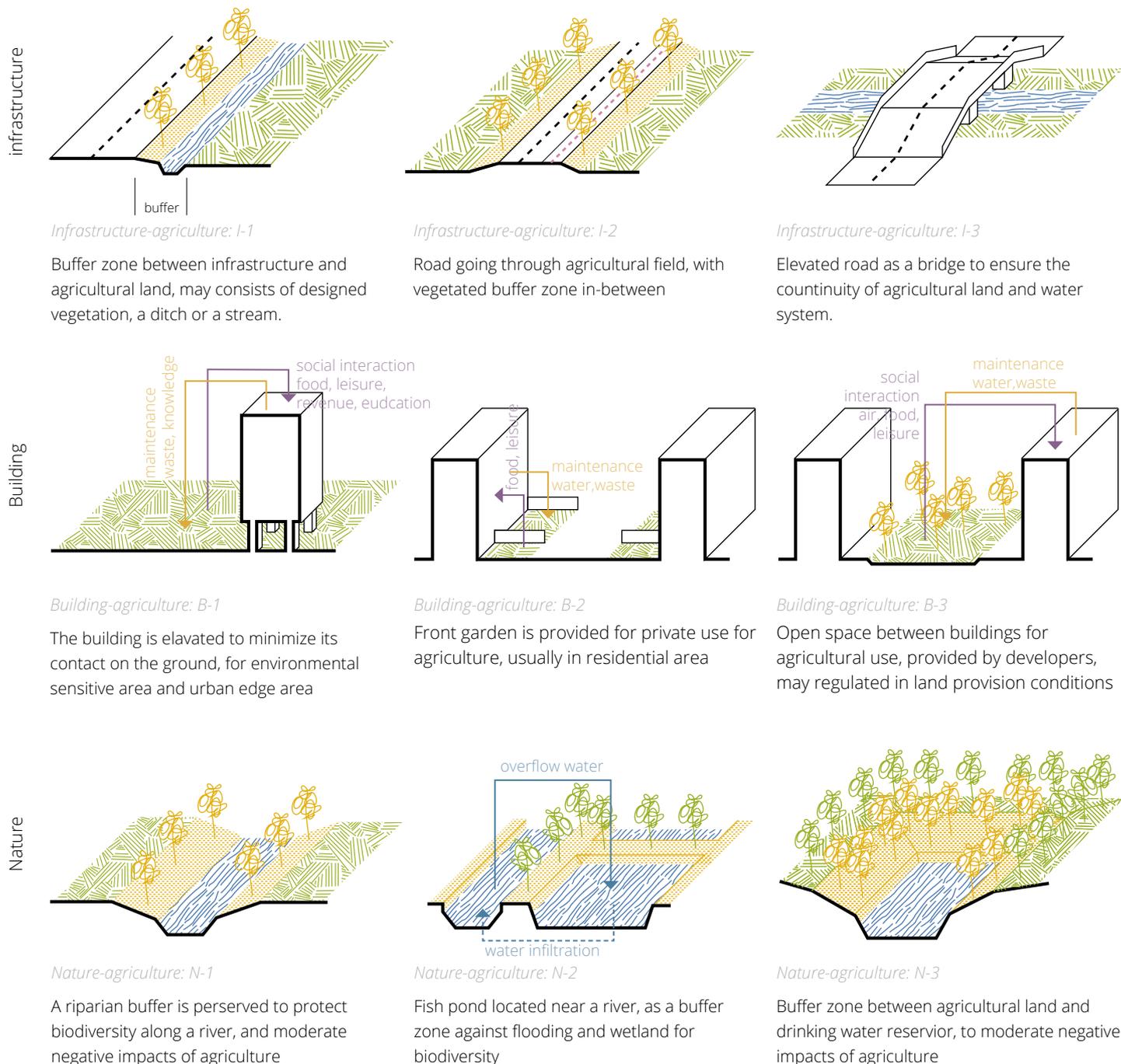
<b>Code</b>	B-1
<b>urban element</b>	R1, R2, R3, R4; M2; A1, A2, A3, A4; B1, B2, B3
<b>landscape element</b>	E1, E3
<b>possible purpose</b>	Community development Social integration of farmers Aesthetically pleasing landscape Subsistence food production Water infiltration Moderation of urban heat Urban biodiversity Urban waste recycling
<b>location</b>	Z0, Z1, Z2, Z3
<b>Permitted agri types</b>	Ag: 1,2,4,5 Mg: 1, 2, 5
<b>Restricted agri types</b>	Ag: 3

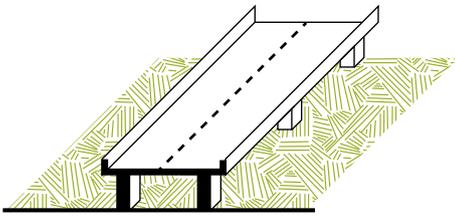
*Illustration:*



<ul style="list-style-type: none"> <li>Drinking water protection zone (Z5)</li> <li>Protected forest (Z4)</li> <li>Agriculture park (Z3)</li> <li>Hilly urban park (Z2)</li> <li>Green-blue corridor (Z1)</li> <li>Dense urban area (Z0)</li> </ul>	<p><b>location</b></p>
<p>Agriculture produce (P):</p> <ol style="list-style-type: none"> <li>1. Temporary crops</li> <li>2. Permanent crops</li> <li>3. Livestock</li> <li>4. Fishery</li> <li>5. Non-food crops</li> </ol> <p>Management layer (Mg):</p> <ol style="list-style-type: none"> <li>1. Subsistence farming gardens</li> <li>2. Small-scale family farms</li> <li>3. Medium-scale family farms</li> <li>4. Collective farms</li> <li>5. Large-scale agribusiness</li> <li>6. Recreation agri-park</li> </ol>	<p><b>Permitted / restricted agri types</b></p>

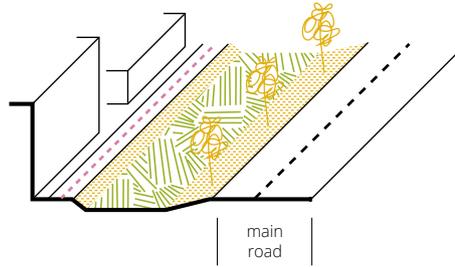
Figure 81. Spatial and functional relationship typologies between agriculture, city and other landscape elements





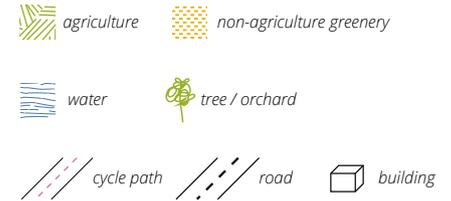
Infrastructure-agriculture: I-4

Elevated infrastructure over agricultural land, to ensure the continuity of agricultural landscape



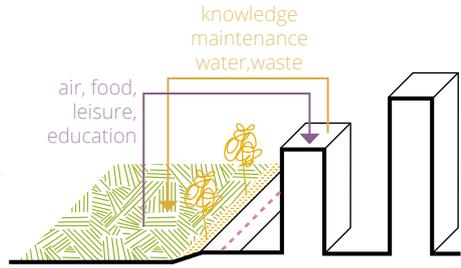
Infrastructure-agriculture: I-5

Agricultural land as a buffer zone between infrastructure and other urban functions



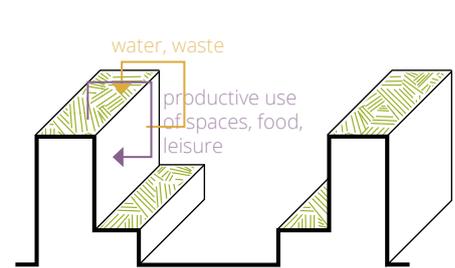
Building-agriculture: B-4

Low density settlements surrounded by agricultural land, to house farmers who work on the field



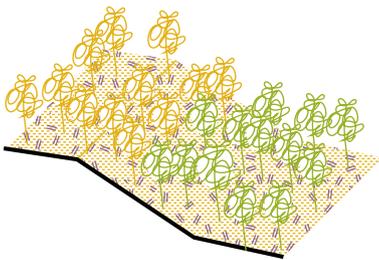
Building-agriculture: B-5

Agricultural field located next to built-up area, separated by a neighborhood road, accessible and usable for urban users



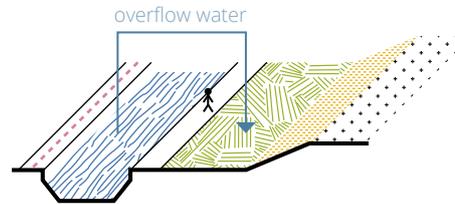
Building-agriculture: B-6

Agriculture attached to building,



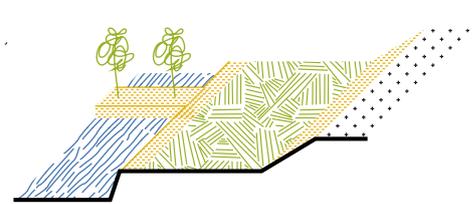
Nature-agriculture: N-4

Free-range livestock on hill area, hillside for orchard



Nature-agriculture: N-5

Agriculture as waterfront park, along a river, be flooded to enlarge the section of the river in extreme weather



Nature-agriculture: N-6

Increment of height from (fish) pond, agricultural land, to urban built-up area, to protect urban built-up area

Figure 82. Application of spatial typologies: section A-A, transition from city to nature

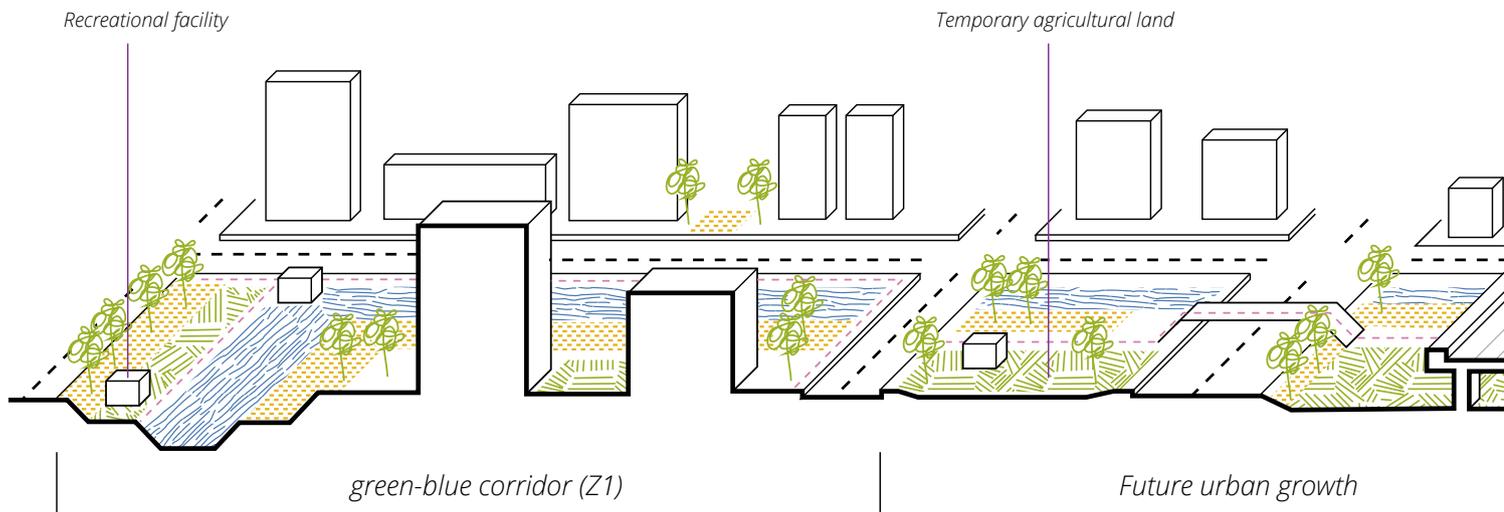
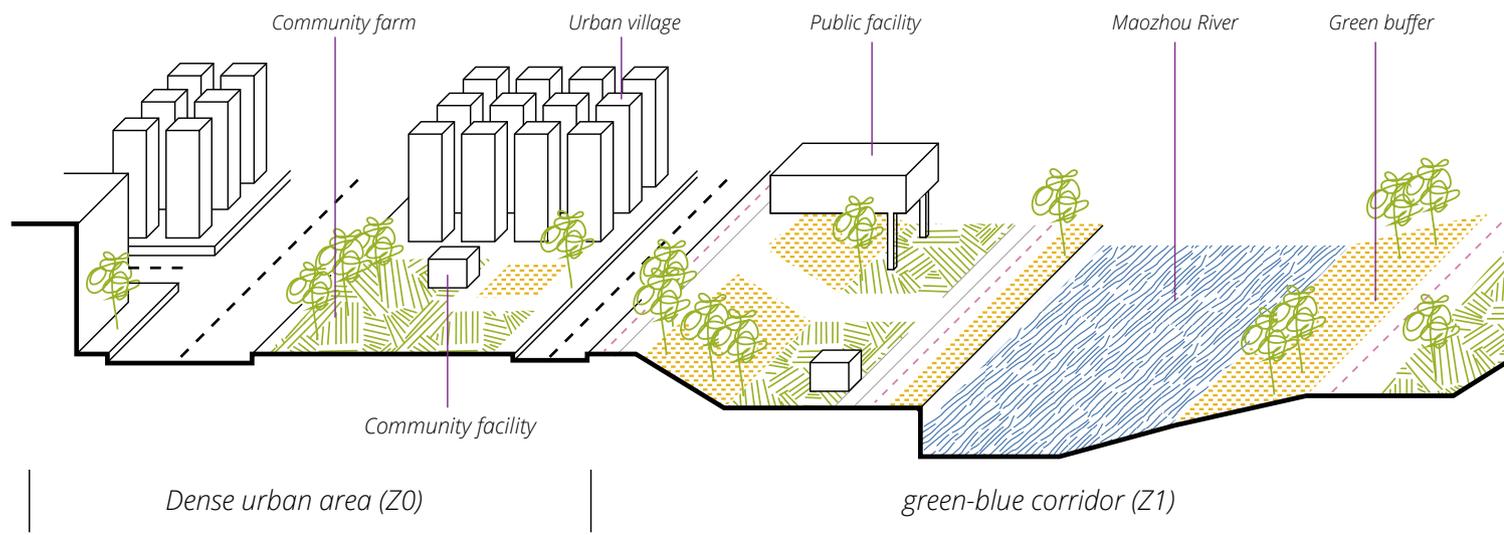
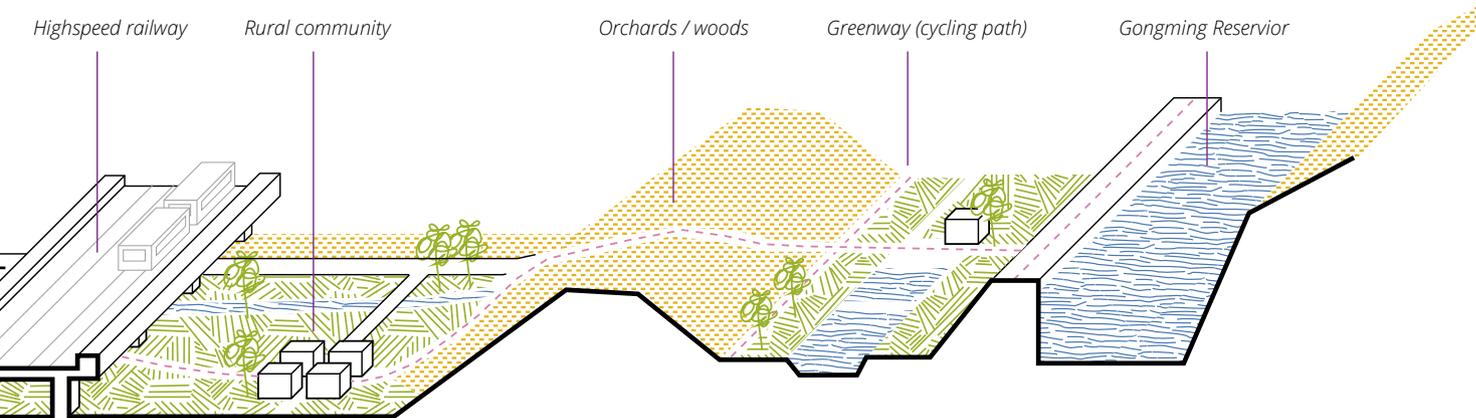


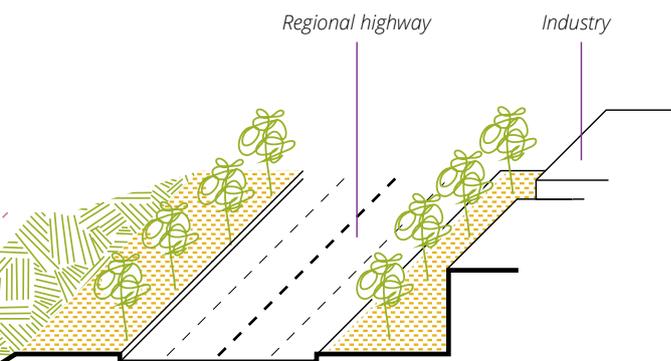
Figure 83. Application of spatial typologies: section B-B, green-blue corridor in city



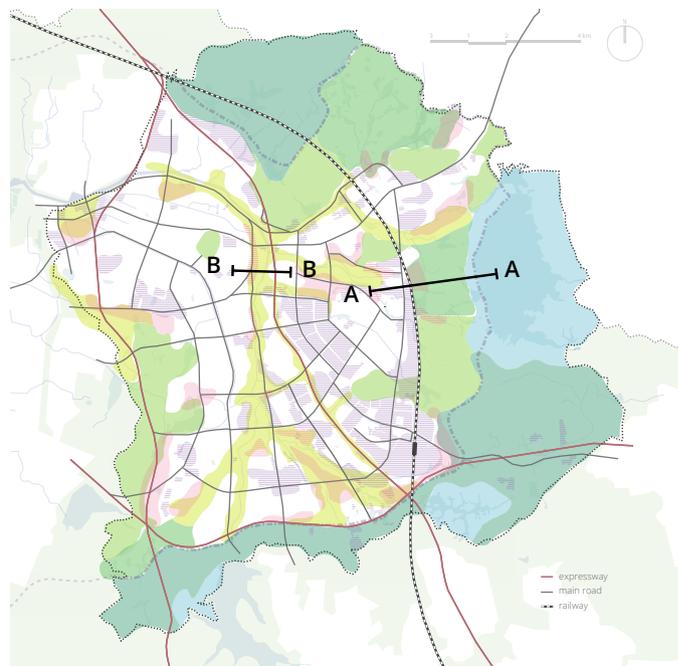


Agriculture Park (Z3)

Drinking water protection (Z5)



Dense urban area (Z0)



## 5. Evaluation

The development of the city-scale design follows the principles of agriculture landscape approach, with special concerns for the performance of agriculture. It shows how agriculture can be embedded in the city-scale plan and contributes to the integrated landscapes for the city region of Guangming.

### ***Roles and contribution of agriculture***

The main issue that the city-scale design addresses is the relationship between ecosystem and new town development. Through the lens of agricultural landscape, the city-scale design is able to include ecological conditions and performance into the urban form of Guangming. In the first stage of design, analyses on agricultural landscape contribute to the knowledge of the ecosystem and people's activities on open spaces in Guangming. Suitability analysis helps to identify suitable area for food production and multifunctional landscape, from which open space structure for Guangming is identified. The inclusion of agriculture also improves the characterization of open spaces, as agricultural operations are diverse and may damage or benefit ecosystem. Last but not the least, spatial typologies demonstrate the spatial quality and functional linkages that agriculture may achieve if it is included in the urban area.

**Figure 84.** Development process of the city-scale design



## How to facilitate inclusion of agriculture

The first step to include agriculture is to take it into account in the stage of analysis, so that suitable area can be identified and preserved for agriculture. Secondly, agriculture is included in the characterization of landscape, so that it can be allowed and regulated in zoning plans. The enlarged planning units that include more rural featured area also make it more likely for planners to consider the effects and practices of agriculture in planning process. The two-step urban growth scheme helps to preserve some agricultural land temporarily for urban farmers. Finally, the special relationship typologies provide guidance and inspirations for planners, designers and local communities to integrate agriculture in various urban environments.

## Effects of agricultural landscape approach (ALA)

As mentioned, ecological values are the main concern of the city-scale design. The connectivity of the green network and adaption of infrastructure in the ALA ensure the integrity of the ecosystem of Guangming. Thinking about development process is about understanding the transformation of urbanization, which if included in the plan can enhance flexibility and also moderate impacts of urbanization on the local. Landscape zoning utilizes characteristics as a way to regulate development and benefit communities rather than strict control. These lead to a planning framework that is massively different from the current one. Therefore, we may conclude that *shifting the focus from urban area to the unbuilt and landscape is the first step to achieve ecological sustainability in the city region, which will definitely challenge the existing planning framework and approaches.*

Ecological green network

Process over time

Landscape characteristics

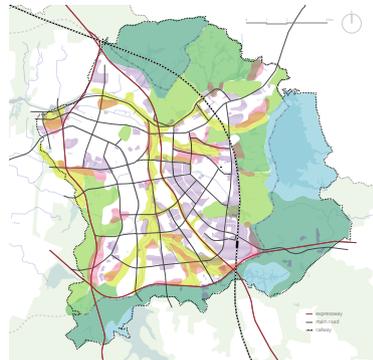
Relevant for people

Multi-scalar framework

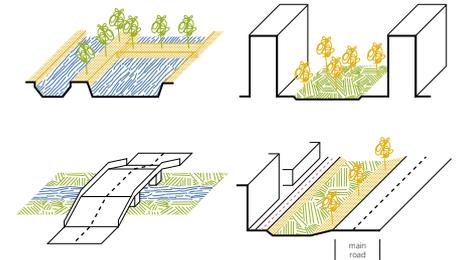
### Landscape characteristic zoning

Z0	Z1	Z2	Z3	Z4	Z5	P
Dense urban area	Green-blue corridor	Hilly urban park	AgPark	Protected forest	Drinking water protected area	Potential urban expansion area

### Urban structure



### Typologies of spatial relationship







# 分區

## DISTRICT-SCALE DESIGN

Content of district-scale design / Jiazitang: Agri-city  
transformation/ Xinqiang: the right to farm

# 1. Content of District-scale Design

The aim of having district-scale design is to examine the plans and regulations proposed in city level. It includes testing feasibility of the plan and showing opportunities and impacts the city-scale design may bring for neighbourhoods. These small-scale experiments should also demonstrate a process of translating the flexible city-scale framework into a more practical plan to guide constructions on sites.

Two locations are chosen for the elaboration in district level: Jiazitang and Xinqiang (figure 86). Surrounded and threaten by ongoing urban construction, Jiazitang is chosen to show how gradual urban growth can happen with respect to current agricultural and social conditions, and how infrastructure is modified to facilitate it. Located on the urban edge, the case of Xinqiang intend to illustrate how the transition from urban to rural help to tackle local conflicts, and particularly, sustain local communities, and how this transition can be regulated in a detailed statutory plan.

Despite different contexts and problems, the two locations follow the same process of design development, to show the elaboration of city-scale design on district scale:

- Analyse local conditions and current plans, and evaluate the impacts of current plans on local communities and landscape;
- Summarize the implication of the proposed city-scale plan on the location;
- Develop design using the condition offered by the city-scale plan to tackle local problems; elaborate the design and illustrate possible spatial quality and development process;
- Evaluate both the district-scale design and city-scale design.

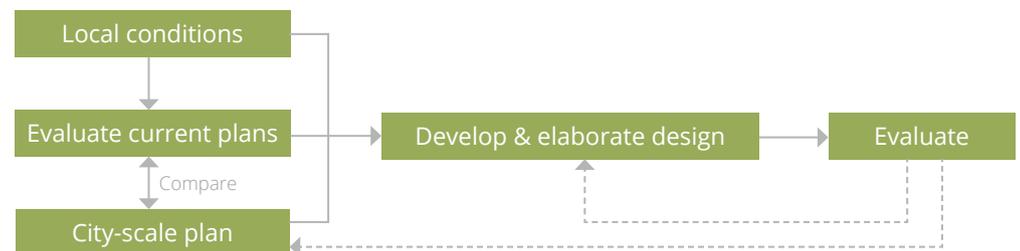


Figure 85. Development process of district-scale design.



Figure 86. Two locations for district-scale design: Xinqiang & Jiazi Tang

新羌  
XIN-QIANG

甲子塘  
JIA-ZI-TANG

- expressway
- main road
- railway

## 2. Jiazitang: Agri-city Transformation

### 2.1 Local conditions and current plans

Jiazitang is the name of an urban village in the area and also the northwest-southeast road going through a remaining agricultural land between two streams (figure 89). The agricultural land is one of the few open lands out of the ECL in Guangming that are not yet replaced by urban construction.

Currently, on the farmland grows mostly vegetable, which is the main source of income for the farming households. Farmers live next to their fields, in temporary houses that built by the households (figure 88). They lease the farmland, usually of 2-3 mu (1333-2000 m<sup>2</sup>) per household, from one company, which supports them with selling to markets and some farming facilities. The leasing contract between the company and farmers is for one year, which means when urbanization comes, the farmers can be easily removed from the field by the end of the contract.

Around the remaining vegetable field are three urban villages with high density, housing thousands of migrant workers. Near these villages, many small plots of farm can be found along neighbourhood streets or on vacant land. They are farmed by local residents as a complement to their daily food consumption.

Analysis of the local network built before the new town (page X) shows a strong relationship between road, water system, agricultural production and settlements (urban villages). However, the local network is likely to disappear if the new town plan



Figure 87. The river that define the boundary of the remaining Jiazitang agricultura land (10-15m width)



Figure 88. Local conditions in Jiazitang. From left to right: small-scale farmland, leased from a company; temporary house where farmers live in the field; urban villages around farmland; a spontaneous farmland along the street towards urban village, cultivated by residents living in urban villages.



Figure 89. Current land use and infrastructure network according to master plan and urban design of Guangming.

- |   |  |   |
|---|--|---|
| <span style="color: green;">■</span> urban park                         | <span style="color: orange;">■</span> urban village    | <span style="color: purple;">—</span> expressway                  |
| <span style="color: lightgreen;">■</span> arable land (vegetable field) | <span style="color: red;">■</span> public service      | <span style="color: black;">—</span> main road                    |
| <span style="color: green;">■</span> orchards                           | <span style="color: pink;">■</span> education          | <span style="color: black;">—</span> neighbourhood street         |
| <span style="color: lightgreen;">■</span> grassland / wetland           | <span style="color: brown;">■</span> industry          | <span style="color: black;">- - -</span> planned road             |
| <span style="color: blue;">■</span> fish pond                           | <span style="color: brown;">■</span> livestock factory | <span style="color: blue;">- - -</span> planned metro line        |
| <span style="color: grey;">■</span> under construction                  |  | <span style="color: yellow;">- - -</span> planned BRT / tram line |

### Importance of urban villages

*"..the informal development follows very clear principles and structures. These structures are historically grown from the natural landscape and the traditional rural patterns in the area. The informal development operates under very economic principles. Land and buildings are maximized for profit. Shops concentrate around the busiest hubs in the network. When growing, the networks remain in place because it would be uneconomic to relocate them."*

*"The informally organized urban villages are essentially incubators for the formation of social networks and economic life and the villages allow its inhabitants to enter a process of slow socio-economic upgrading."*

*M. van Oostrum, 2013*

is implemented, in which infrastructure and regional mobility are dominating and local network is hardly incorporated. The plan may also damage the existing urban villages, which requires a huge amount of funds to compensate land owners.

The loss of local network has great impact on local farmers. Because the infrastructure-led plan can only be implemented by removing local landscape and networks simultaneously, giving little time for local farmers to adapt to such changes. After the construction of infrastructure, the plots divided by the roads sometime will stay vacant for several years before investments are attracted. However, the vacant land is no longer available for those farmers. This temporal gap of productive use of land is a result from the dominating role of infrastructure, which mostly focus on regional connectivity.

The road structure and profiles are car-oriented. Main roads generally have eight lanes, with vegetation buffers on both sides (which are placeless open spaces). The main public transport lines (BRT or tram), instead of connecting dense urban area on more human-scale roads, make use of the main road network. The combination of wide main road and main public transport makes it difficult for pedestrian to access the public transport.



Figure 90. Local network built before new town development, showing a coherent relationship between structure agricultural land, water network, roads, and human settlements.

## 2.2 Proposed city-scale plan on Jiazitang

According to the city-scale plan, Jiazitang area should have the following characteristics:

- Green-blue corridor from northwest to southeast that is connected to the hilly area in the south;
- The green-blue corridor will be urbanized in the second phase of urbanization, which means the design should include the possibility of future urban growth on the agricultural land in the middle;
- The green-blue network (including rivers and the riparian zones) should be preserved permanently;
- Diverse agricultural production is possible;
- Functions of recreation and environmental protection should be well balanced;
- Possible farm types are subsistence farming gardens, small-scale family farms, medium-scale family farms and recreation agri-park
- On the edge of the corridor, areas for subsistence farming or community gardening can be provided for local population.

### Z1 Green-blue Corridor

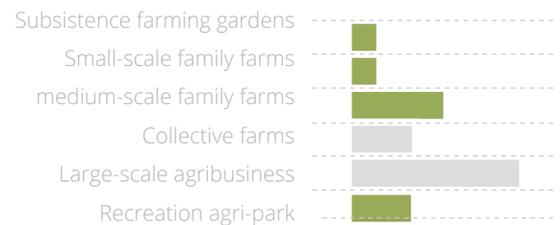
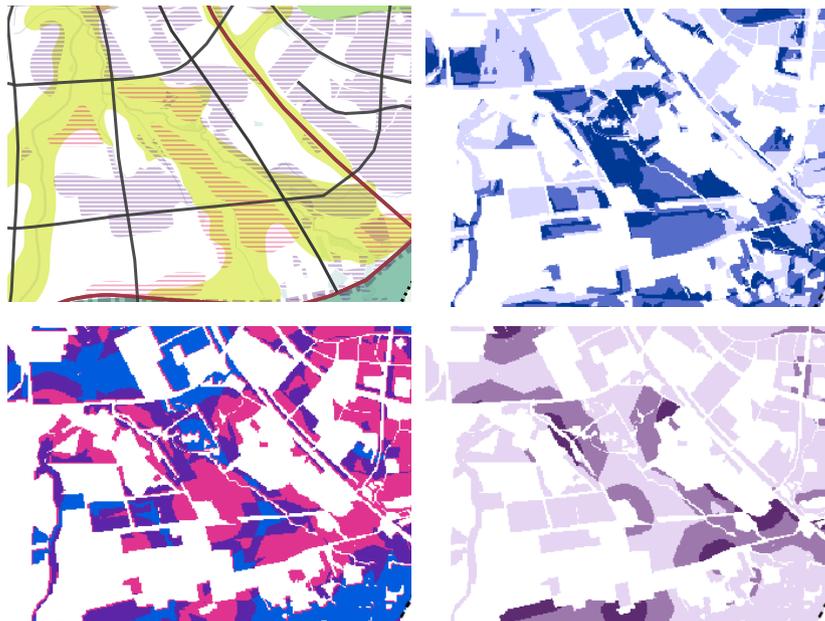
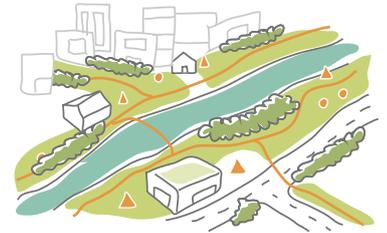


Figure 92. Proposed farm type scenario (possible farm types in Jiazitang: green)

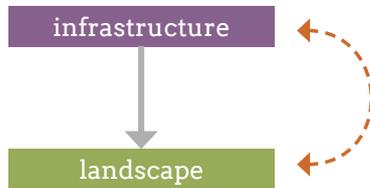
Figure 91. Zoom-in of city-scale plan. From top-left to bottom-right: city structure, suitability maps (diversity of potential agricultural production, eco-service or recreation dominated landscape, conflicts in right to use farmland).

## 2.3 Design development

### *Changing hierarchy*

As mentioned, the dominating role of infrastructure results in the disappearance of landscape characteristics, the loss of livelihood of local farmers and lack of opportunities for urban residents to grow their own food. In the city-scale scenario, the green-blue corridor going through the area provide an opportunity to preserve agricultural land temporarily for farmers and facilitate more modest and slow urban growth in the future.

The city-scale plan also indicates that the hierarchy between infrastructure and landscape should be changed in order to preserve the landscape structure and characteristics. In other words, the spatial continuity and gradual change of current landscape is of higher priority than the regional connectivity. As existing network for agricultural use is coherent with the landscape structure, it can be utilized and be integrated into the new urban structure.



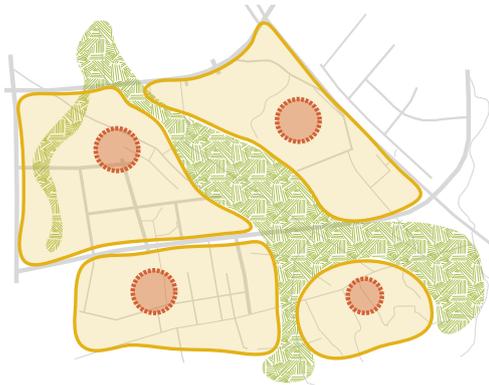
Changing hierarchy between infrastructure and landscape

### *Articulating two grids*

The challenge of restructuring the area is the different grids of regional connections and local networks. There is about 45 degree of angle between the planned urban grid and the direction of the two streams going through the area. Therefore, the challenge of preserving ecosystem and agricultural land is to integrate local networks and regional connections. Here is the design development process in order to deal with the challenge:

1. The green-blue corridor is introduced into the area, and by the corridor urban clusters (including built-up area and urban cores) are defined;
2. Main roads are defined for regional connection, some as the boundary of urban clusters, the others as the linkages between urban cores. The two types of roads should have different profiles;
3. The grids in the urban area follow the grid of the main roads, but also are adjusted to original road structure, which follows the same structure of the water system;
4. Identify permanent open spaces according to city-scale plan and local conditions;
5. Following the agricultural landscape structure, urban grid for future development is defined, to connect the urban clusters separated by the green-blue corridor;
6. Based on the new structure, cycling and public transport networks are designed on the green-blue corridor;

Figure 93. Process of design development



1 define blue-green corridor & urban core



2 define regional connection



3 urban grid follow regional network



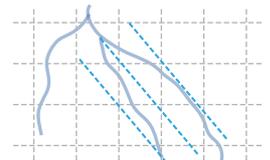
4 future scenario of open space structure



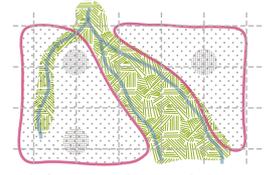
5 urban grid for future growth



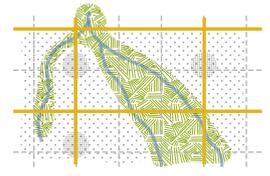
6 linking by public transport



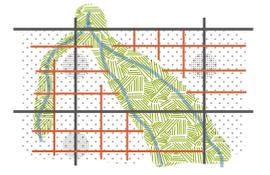
challenge: combining two grids



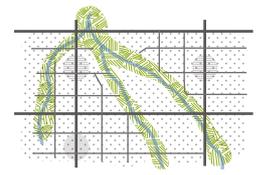
1. define corridor & urban core



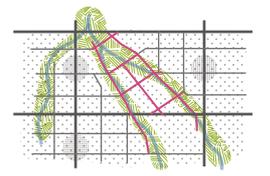
2. define regional connection



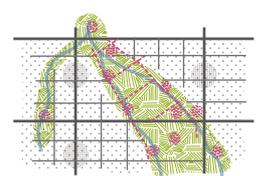
3. urban grid follow regional roads



4. future green network



5. landscape grid for future growth



6. linking by landscape grid

## 2.4 Phases of urban growth

By changing the hierarchy between infrastructure and landscape in design process, the urban structure is capable of facilitating more gradual changes from agricultural landscape to urban environment in the new town development process. It should be recognized that agricultural land can be transformed into open spaces or urban built environment. Distinguishing the two types of transformation is important, so as to preserve agricultural land for future urban open spaces during the development process. Figures in the right show how the two phases defined in the city-scale plan happen in Jiazitang, and the sections in the next spread illustrate how agricultural landscape is transformed to urban built environment.

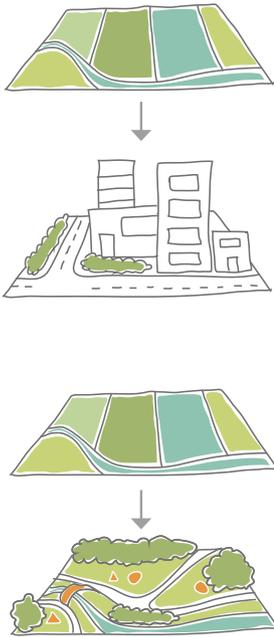


Figure 94. Transformation of agricultural in urbanizing area:  
agriculture to urban built environment;  
agriculture to urban open spaces

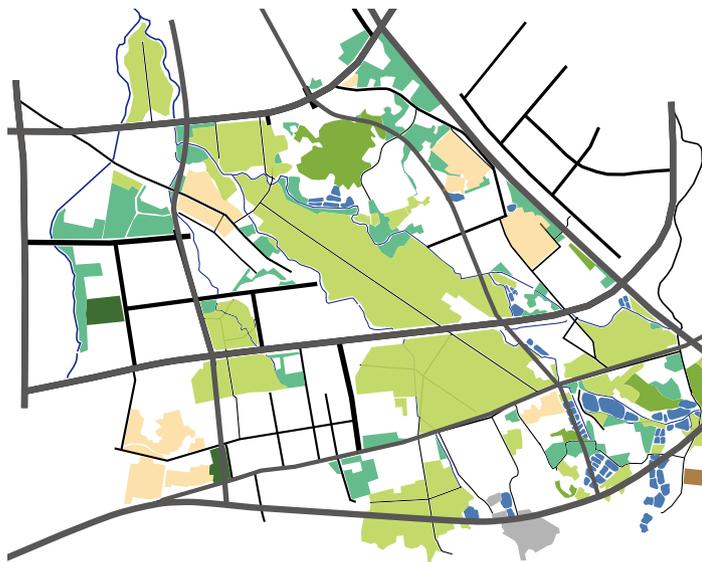
### *Phase 1: Rapid urban growth*

The first phase of new town development last for 10-15 years. In this phase, urbanization happens in a rapid rate, yet it should be confined in the area which is less environmental and agricultural sensitive. The road construction should respect and integrate local networks in addition to guaranteeing regional mobility.

The focus of development in this phase is on economic growth, yet spaces for community development and ecosystem services should be preserved for future betterment. Preserved open spaces include farmland near urban villages, riparian area and some existing agricultural land for future urban growth.

During this phase, agricultural land can continue to produce food for communities around. By introducing small programs and regulating farming activities on the agricultural land, quality of these open spaces may be improved for communities around. Possible programs include recreational facilities (cycling paths, sport facilities, allotment gardens, squares, local markets, local restaurants, etc.) and environmental services (waste recycling, sewage system, water purification, etc.), improving living conditions for farmers. The construction of these facilities may be led by local authorities or initiated by communities, with funds from the municipality. City-agriculture-ecosystem relationship typologies in the city-scale plan can help the local to develop their strategies and solutions. in the These small interventions do not require huge investment, but can greatly improve the quality of open spaces and the living environment for local communities and farmers during the first stage of new town development.

Figure 95. Phases of tranformation of Jiazitang



0 current situation of agricultural landscape, urban villages, road networks and water system



1 Phase 1: rapid urban growth on the edge of the green-blue corridor  
Small interventions happens in agricultural land: cycling paths, sport facilities, allotment gardens, squares, etc



2 Phase 2: urban growth on agricultural land yet preserving green corridors along the water network;  
Urban parks grow gradually by transforming agricultural land



Possible open space changes in the future

urban growth (phase 1) urban growth (phase 2) permanent open space

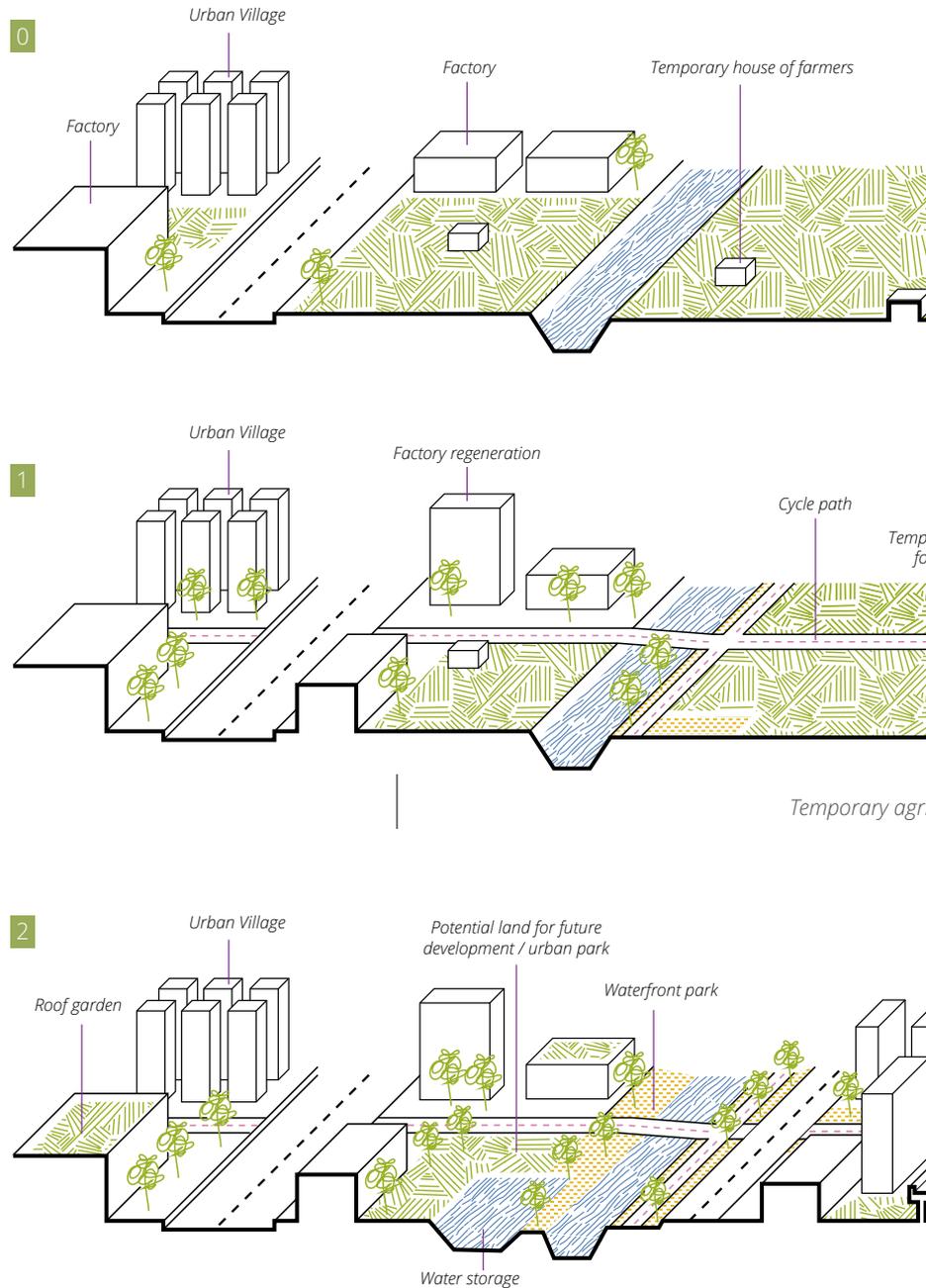
urban park agricultural land urban villages urban growth fish pond small program main road neighborhood street cycling path

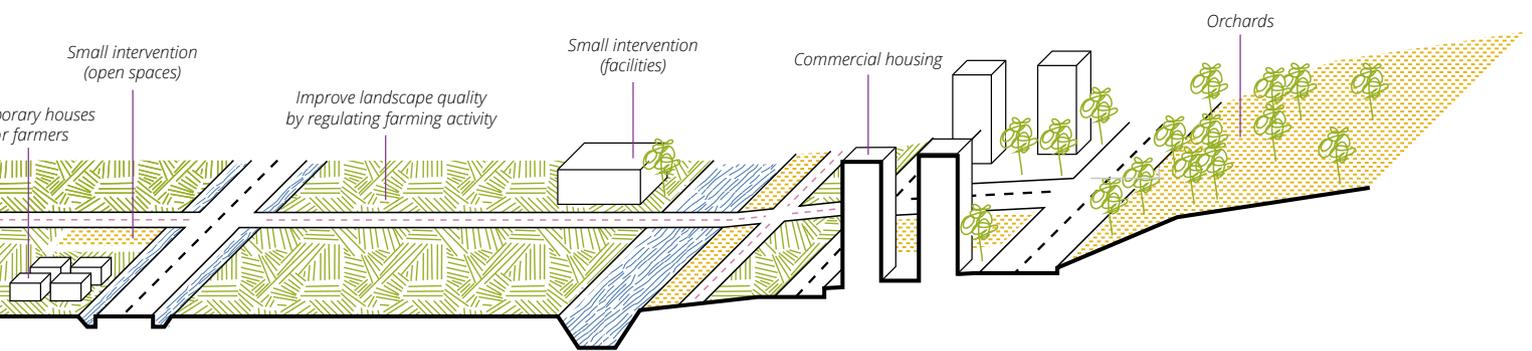
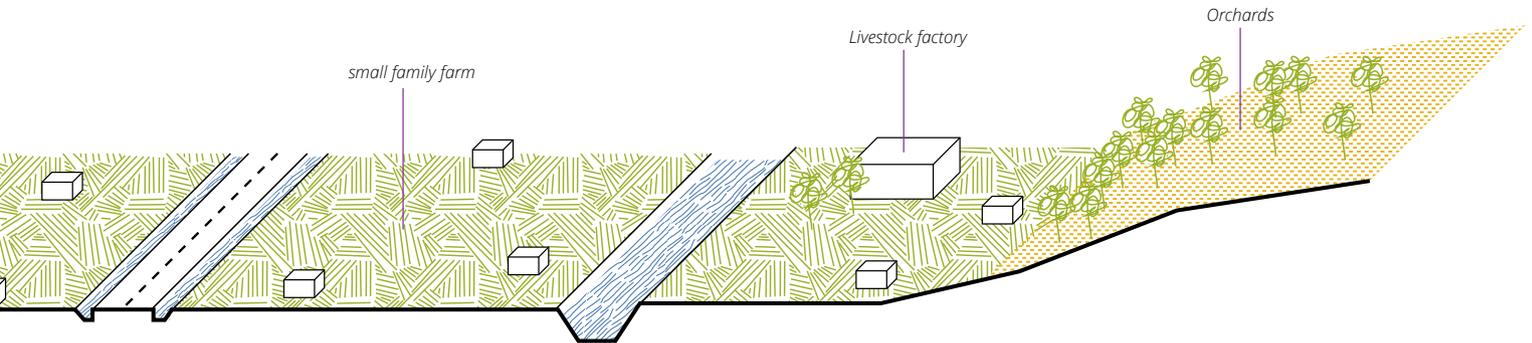
**Figure 96. Phases of transformation of Jiazitang (Section)**

**0** Current situation: agricultural land in the middle farmed by households, surrounded by urban villages and factories

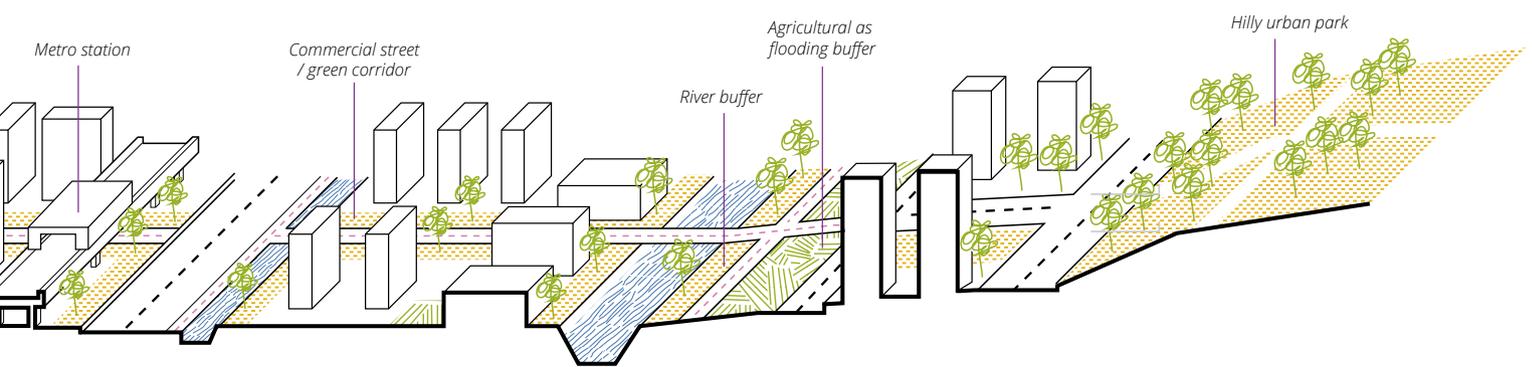
**1** Urban growth is guided on the both side of the green-blue corridor. Agricultural land in the middle can continue to produce food for communities around. By introducing small programs and regulating farming activities, quality of these open spaces may be improved for communities around, which do not require huge investment, but can provide temporary urban park for communities and enhance living conditions for farmers during the first stage of development.

**2** Urban growth on agricultural land begins but green corridors along the water network are preserved for ecological functions of the area. Public transport facilities are built to facilitate the growth of the area. More well-designed urban parks grow gradually by transforming agricultural land.





Agriculture park for communities around



-  agriculture
-  non-agriculture greenery
-  water
-  tree / orchard
-  cycle path
-  road
-  building

## Phase 2: Moderate growth

With thriving economy after the first phase, the second phase of the new town development should be more modest and include more public issues like environment and social cohesion in municipality's agenda. Public transport facilities and cycling paths built in the agricultural land in the first stage provide a good condition for development, while new public facilities are built to facilitate urban growth with higher quality.

As the second stage of urbanization happen in the green-blue corridor, the development of the area should treat the land and natural resources with more care, with more consideration for residents and ecosystem. The riparian zone should be preserved and be transformed gradually into pleasing urban parks with mix functions for communities around. Other open spaces are also upgraded gradually in this phase. As for the small interventions in open spaces that developed in the first phases, they may remain if they work well for communities or be transformed into urban parks. Agricultural landscape does not necessarily disappear from the territory. Rather, if agricultural land is well integrated into urban area and still welcomed by the residents, they are very likely to remain in the urban area through other forms.

## 2.5 Evaluation

### *Evaluating the district-scale design*

The focus of the district-scale design of Jiazitang is to guide the transformation from agricultural land to urban built environment. *Thinking process over time* helps to formulate a development process with more moderate impact on the local. The new urban network and phasing of development give spaces and time for local farmers to adapt themselves to changes. The remaining agriculture in the first stage can be transformed into a temporary urban park with low cost to benefits communities in the urbanizing process, which demonstrate how the flexibility of agriculture can be utilized.

To facilitate a more moderate and gradual urbanization in Jiazitang, *preserving local networks* that shaped by agricultural production is the main challenge. Because preserving local network is not only important for existing communities to be integrated into new urban structure, but also essential to preserve the ecological network in urban structure, as the local network based on agricultural production is a response of human to ecological conditions. The design has well demonstrated the feasibility of enhancing regional connectivity and preserving local network simultaneously. A side benefit of the approach is a more human-scale street network, because the original network is more organic and more relevant for the local life.

Ecological green network

Process over time

Landscape characteristics

Relevant for people

Multi-scalar framework

### Evaluating the city-scale design

The approach shows how the city-scale design can be successfully conveyed to the local scale. The approach of the city-scale design facilitates the integration of regional mobility and local network, the combination of agricultural and urban development, and the phasing of development process in Jiazitang, which helps to achieve territorial synergy of the area.

### Reflection

There are many technical issues and institutional barriers to achieve more modest urban growth in China, like administration periods, land ownership, community empowerment, utility supplies. However, the plan does not intend to provide a comprehensive solution for the area, but to demonstrate how infrastructure network can be modified for guide the process of urbanization on agricultural land with less impact on communities and ecosystem, and stimulate more reflections on the sustainability of current infrastructure-led development mode in China.

*"The plan does not intend to provide a comprehensive solution for the area, but to demonstrate how infrastructure network can be modified for guide the process of urbanization on agricultural land with less impact on communities and ecosystem..."*



## 3. Xinjiang: The right to farm

### Basic facts of Xinjiang

- 5 main villages
- 11km<sup>2</sup>
- Inhabitants: 25000
- Registered inhabitants: 2500
- Problems:  
*poverty, food desert, poor infrastructure, decreased biodiversity, complicated land ownership, no overall development plan or strategy*

### 3.1 Local conditions and current plans

Xinjiang is a typical area that is heavily influenced by the ECL. Xinjiang is the name of the administrative district with five main villages and thirteen settlements. Around 90% of the area is located within the ECL, where construction is restricted.

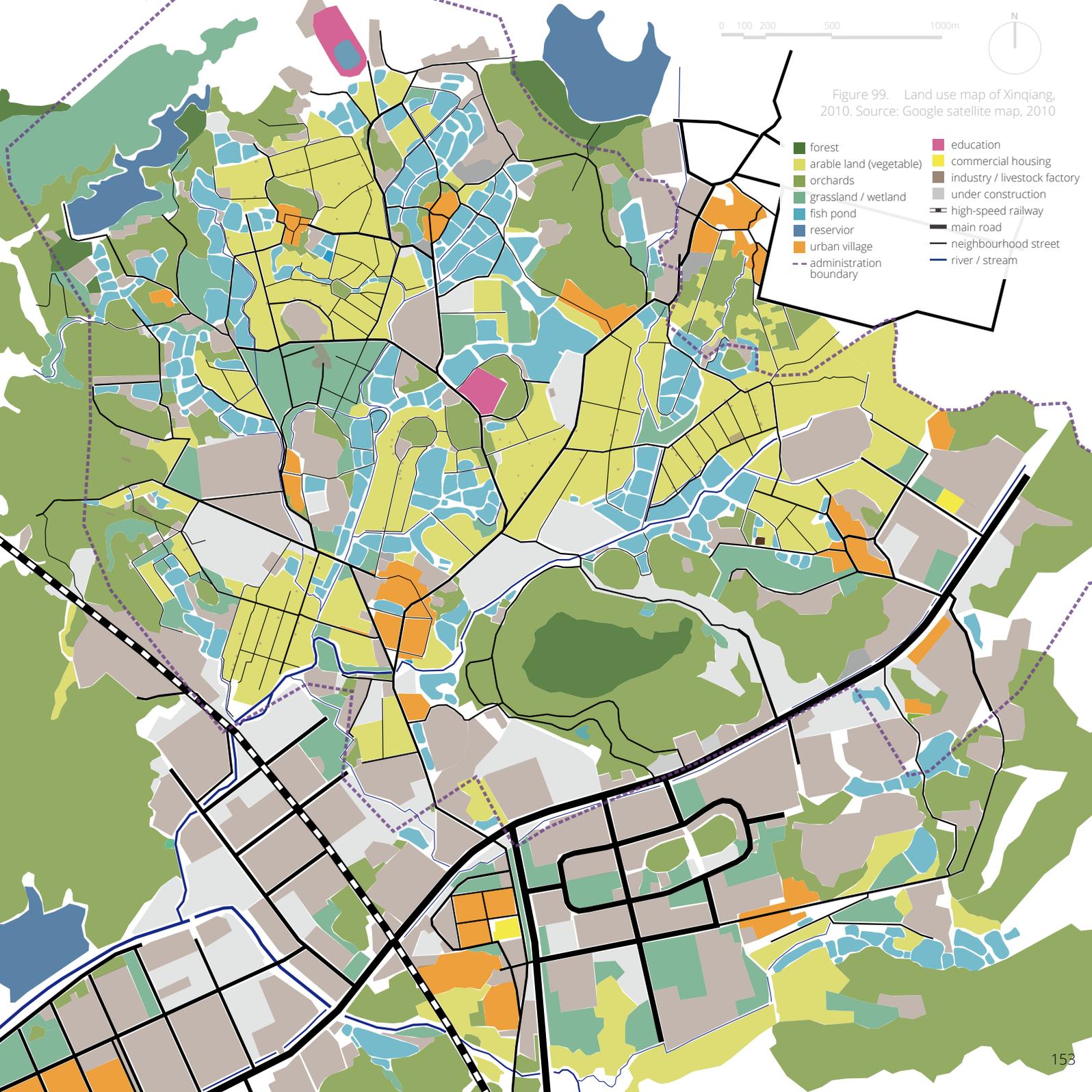
There are around 25000 residents living in the area, of which 2500 is registered inhabitants. In other words, 90% of the population in the area are migrant workers. Most of migrants live in two villages, Xinpotou and Qiangxia, which are located near the main road connecting Guangming to Dongguan. Therefore, although Xinpotou is located in the ECL, rents from houses and factories built before the establishment of the ECL can sustain the registered residents there.

On the other hand, villages in the more remote area away from the city are impacted negatively by the ECLs. The ECLs deprived their opportunity to develop their real estates for rent or develop their own industries. The competitiveness of local residents for finding a job in factories is generally lower than the migrant worker. One third of registered population depends on governments' subsidies; in one village called Honghu, less than 10 persons are employed out of 330, the overall population.

However, the situation has worsened because of the land consolidation for basic farmland from 2011 to 2013 (figure 104). Before it, unemployed local residents can still make a living from farming. After 2013, they even need to buy food from markets in the city, even though their settlements are surrounded by arable land.



Figure 98. Left: traditional houses and community still remain in Xinjiang; right: villages within the farmland. Pictures by M. van Oostrum, 2013



The infrastructure in the area is so poor that remote villages is badly connected to the rest of the city. As the only one connection to the city for the whole area, the four-lane road is always over-crowded during commuting hours (figure 102).

The biodiversity of the area has also decreased because of the land consolidation. Figure 100 shows the landscape transition from rivers to settlements, where landscape is interrelated and form inner material circles. After the land consolidation, the diverse landscape will be replaced by standardized and homogeneous agricultural production.

### Current plans

No overall plan or strategy is formalized to guide and coordinate the economic, social, environmental and spatial development in the area. Most of the development is based on policies and negotiations between local communities and the municipality on specific issues.

A study on how to sustain the communities in the ECL is going on, led by the Urban Planning Land and Resource Commission of Shenzhen. Some policies are put forward recently, hoping to solve the problems by providing those communities with land in the urban area (far away from the communities) for collective industry and real estates.

*(The information above is mostly based on the online reports by Shenzhen Centre for Design since 2012. <http://www.szdesigncenter.org/?cat=47> )*

### Recent policies for ECL communities (2014)

*To provide land to sustain communities in the ECL, collective companies are established for each communities. 52 ha of land is distributed among companies, where they can develop industries. These companies are funded by the municipality with 1.8 billion RMB.*

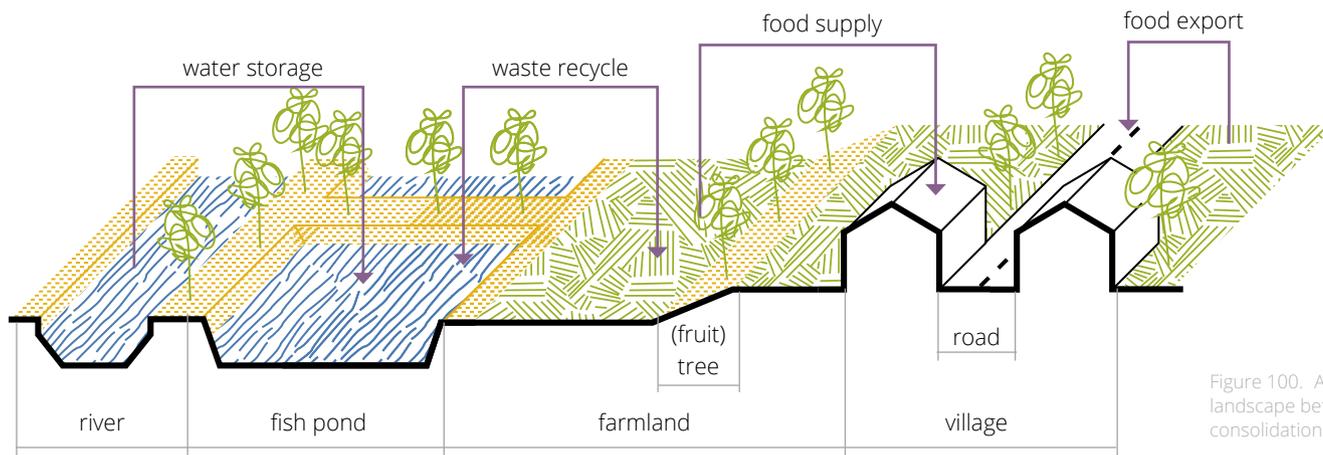


Figure 100. Agricultural landscape before land consolidation.



Figure 101. Population distribution.



Figure 102. Road network and traffic jam location (pink) in commuting hours.

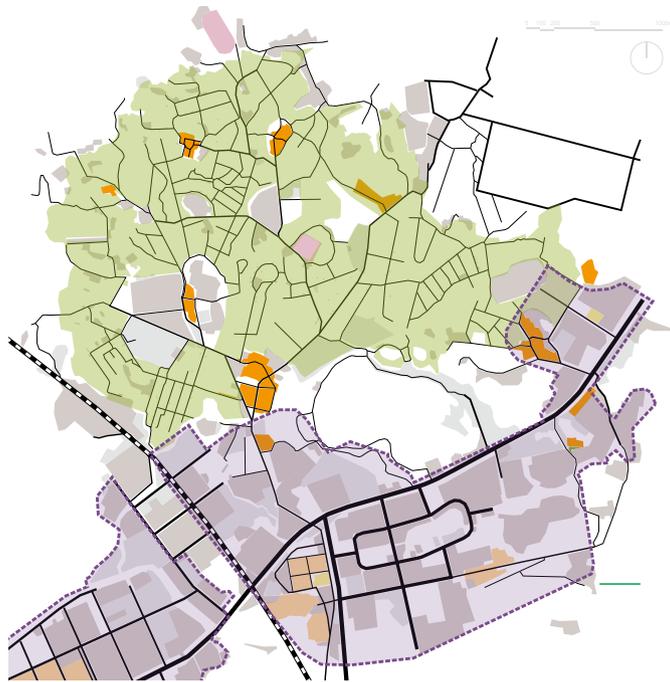


Figure 103. The ECL (purple) and land consolidation for basic farmland (green).

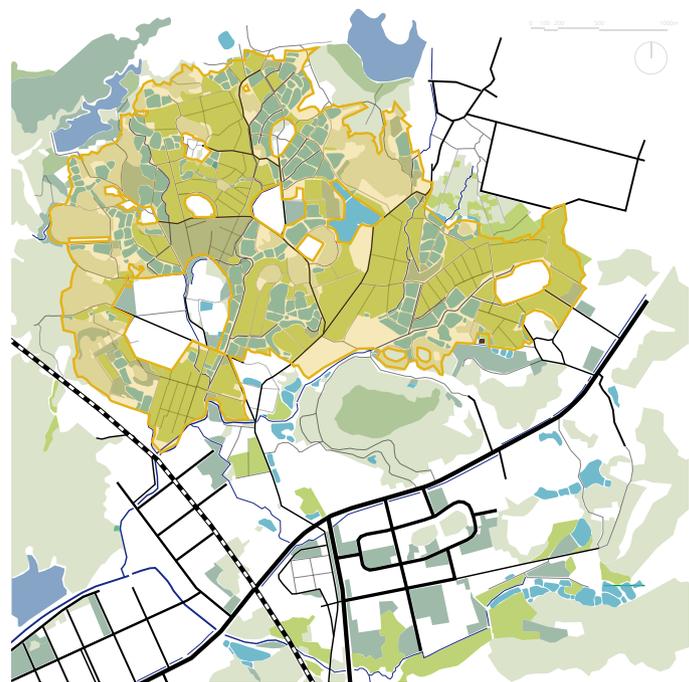
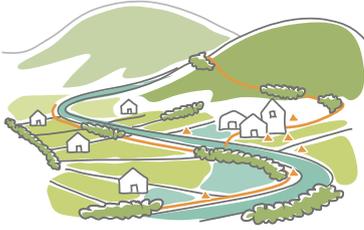


Figure 104. Disappearance of diverse landscape due to land consolidation.

## Z3 Agriculture Park



## 3.2 Proposed city-scale design on Xinqiang

According to the city-scale plan, a plan for Xinqiang district should have the following characteristics:

- The area has high agricultural value, as diverse agricultural products are possible;
- Located within the planning unit area, detailed statutory planning is necessary for the area;
- Future urban growth on the edge should be taken into account;
- The blue network, or the water system, should be preserved permanently;
- Recreation service provided for the city is the main non-agricultural function;
- Various farm types are possible, which implies dealing with conflicts in the right to use the farmland is one of the main challenges.

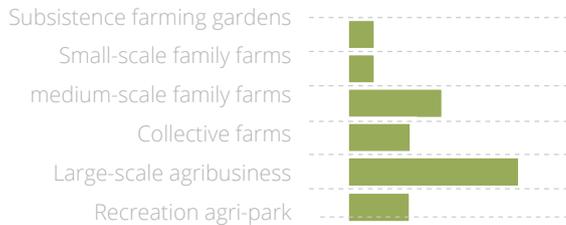


Figure 106. Agricultural farm types, All are possible for the area.

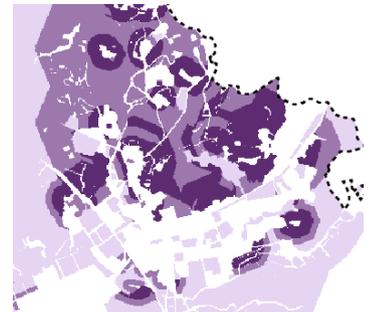
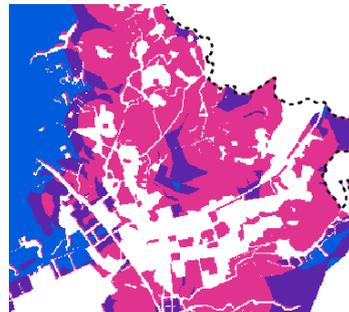


Figure 105. Zoom-in of city-scale plan. From top to bottom: city structure, suitability maps (diversity of potential agricultural production, eco-service or recreation dominated landscape, conflicts in right to use farmland).

### 3.3 Design development

The development of Xinjiang can be regarded as an issue of sustainable development of rural communities. The development of these communities often depends on its contexts and conditions. Despite different contexts, emphases and methods, one is common for these cases: putting people in the centre.

To understand people better, I analyse the power relationship and demands of different stakeholders in Xinjiang (Figure 108). The most important question is whether these demands can be met by one plan. Many examples have demonstrated that with proper planning, it is possible to strengthen economic capacity, social cohesion and environmental resilience of communities in countryside at the same time. Some of the examples are listed on the next page. The formulation and implementation of rural community development plans require collaborative relationship between the municipality and local communities. But for Xinjiang, the first step is to provide land for communities in the ECLs to develop their agriculture-related economy.

In this project, the concept of AgPark is used as an example to illustrate feasibility to meet various demands of stakeholders. But it should be recognized that, whatever kinds of strategies and tools are adopted, the future vision should be based on discussions and negotiations among stakeholders. The flexibility and enlarged statutory planning units defined in the city-scale design provide opportunities for stakeholders to gather around and envision a sustainable future of the area.

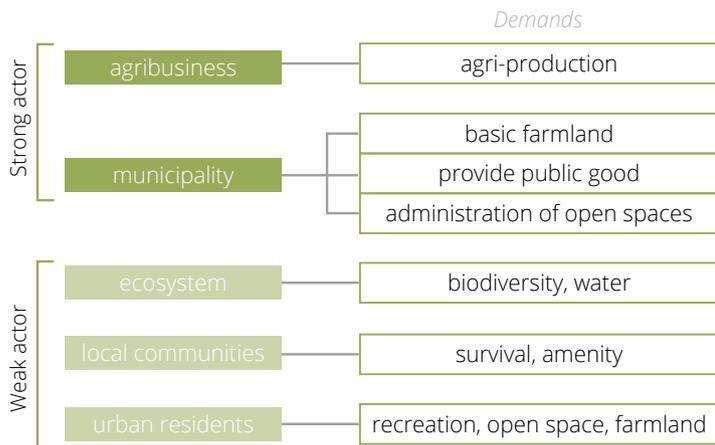


Figure 108. Cooperative / participatory planning process



Figure 107. Cooperative / participatory planning process

### Continuous productive urban landscape (CPUL)

*The concept of CPUL suggests that urban agriculture is more than dispersed spots in the neighbourhood, but also a landscape element that can be embedded in different types and scales of open urban spaces. Embraced in the urban green network, UA can also benefit from being part of the networked landscape. In CPULs, non-vehicular circulation routes are introduced to link open urban spaces, increasing the accessibility of wider regional landscape, in which way peri-urban agriculture can be more meaningful for urban residents, making more leisure activities possible. (Bohn and Viljoen, 2005)*

### Example: AgPark + CPUL

Currently, most of the farmland in Xinjiang is intended to develop large-scale agribusiness to increase the productivity of land. However, many researches show an inverse relationship between land size and productivity (FAO, 2014). Small-scale farms managed by a family may also achieve high level of productivity because the land is managed more carefully. Small-scale family farms are also more likely to have sustainable agricultural practices, because living in the area, farmers tend to pay more attention to the environment than agri-business. What's more, family farms can provide more job opportunities than agribusiness.

AgPark is a US experience which combines small- and medium-size farms with a municipal park. It allows small-scale farms in Xinjiang to work together to enhance their capacities and provide recreational facilities to urban residents. In Xinjiang, the AgPark is located around three remote villages, as shown in figure 109, so that small- and medium-scale farms can sustain these communities. In the AgPark, multiple agricultural products and recreational services can be provided by family farms or tourist services.

## A selection of rural community development tools & projects

### Rural Design (the US)

*Rural design is an important tool for rural communities to build upon existing assets and improve the way a community looks, its quality of life, and its economic viability. By using rural design can help community leaders and residents to find creative strategies that address:*

- How to build strong economies and grow jobs;
- Where to locate new growth or redevelop older areas;
- How to design efficient transportation systems;
- How to protect the community's historic and culturally significant resources.

<http://www.rural-design.org/>

### AgPark (the US)

*Agricultural park is a combination of working farms and a municipal park, which:*

- acts as buffer zones between urban and agricultural uses.
- has multiple uses that accommodate small farms, public areas and natural habitat.
- allows small farm operations access to secure land and local markets.
- provides fresh food, and an educational, environmental and aesthetic amenity for nearby communities.

<http://www.sacog.org>

### SEPLS & The Satoyama Initiative (Japan)

*Satoyama landscape is a traditional Japanese multi-functional land use system. The term "socio-ecological production landscapes and seascape" is used to describe this kind of landscape which is "dynamic mosaics of habitats and land uses where the harmonious interaction between people and nature maintains biodiversity while providing humans with the goods and services needed for their livelihoods, survival and well-being in a sustainable manner."*

*The Satoyama Initiative aims to help evaluate such landscapes and promote the revival and amelioration of the mechanisms for their sustainable management.*

<http://satoyama-initiative.org>

### Community Empowerment (Taiwan)

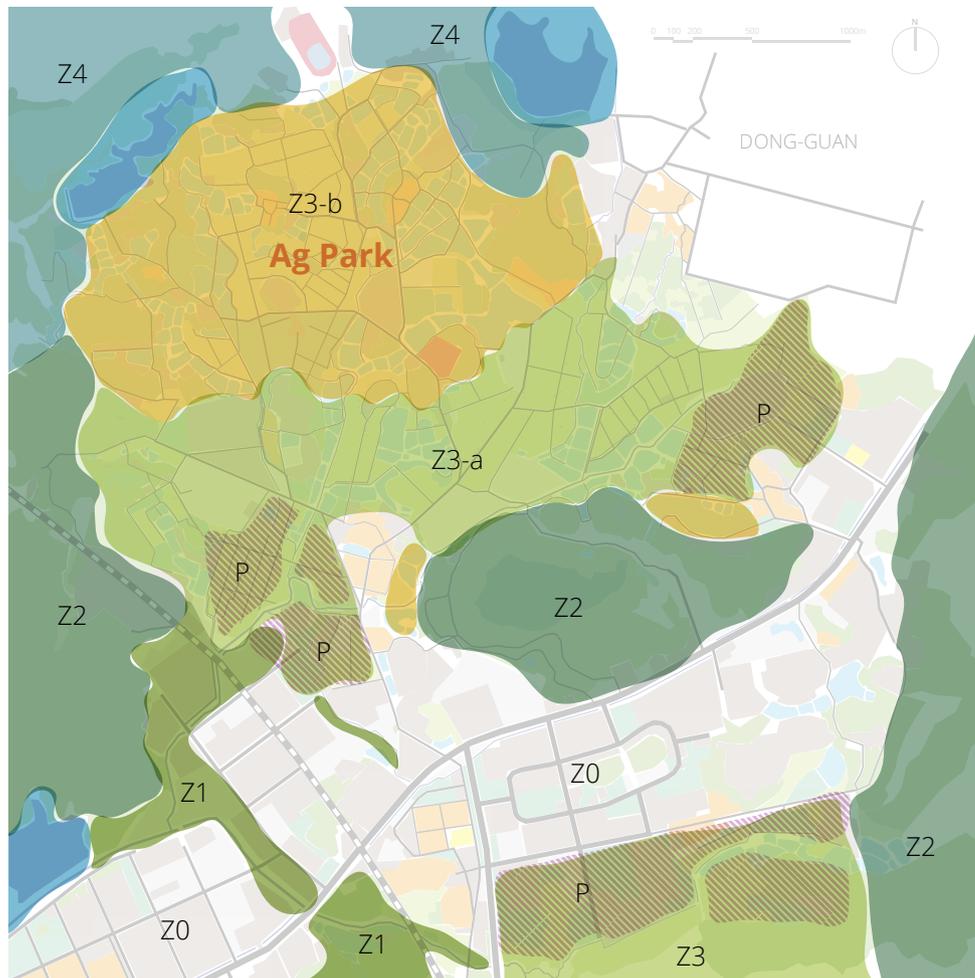
*The Taiwanese government has been working in collaboration with local communities since 1993. These community development projects have enabled communities to help each other grow and surpass themselves.*

*A key term in Taiwan's community development projects is the idea of a "new hometown". The New Hometown Community Building Project aimed to encourage the public to identify with the places where they lived and create quality lives for themselves. The idea is that if people are dedicated to improving their living environment, the whole country will eventually become a wonderful place to live.*

<http://sixstar.moc.gov.tw>

The AgPark should work together with the surrounding areas to provide more diverse experience for tourists. Figure 112 shows a great variety of functions that can happen in AgPark and the surrounding.

Beside defining programmes, the design of circulation system is also crucial, as it should meet the different circulation needs of local population, food production and transportation and urban visitors. If the area is embedded in the regional greenway network, it is more likely to attract visitors. Figure 110 shows the planned circulation system to meet these requirements using the concept of CPUL.



### Family farm

*Family farming is a means of organizing agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labour, including both women's and men's.*

### Estimated effect of the AgPark scheme

- Total basic farmland area in Xinjiang: 8300 mu
- AgPark area: 4000 mu
- Family farms:  $50 \text{ mu} \times 70 = 3500 \text{ mu}$ , provide employment:  $4 \times 70 = 280$
- Collective farm / park: 500 mu, provide employment: 30
- Employment in tourist services: 100
- Total employment provided: 410

Figure 109. Definition of landscape characteristic (sub-)zones of Xinjiang

Figure 110. Continuous cycling and road networks for Xinqiang

### Circulation network

- Tracks for agricultural equipments;
- Roads for cars and public transport for commuting;
- Cycling paths (greenways) with pleasing landscape along;

### Landscape transition (figure 111)

Following the greenway from point A to B, visitors will experience diverse sceneries, with a sequence from urban to rural, from artificial to natural. It is facilitated by the landscape zoning in city-scale design and the introduction of the AgPark in the district-scale design.

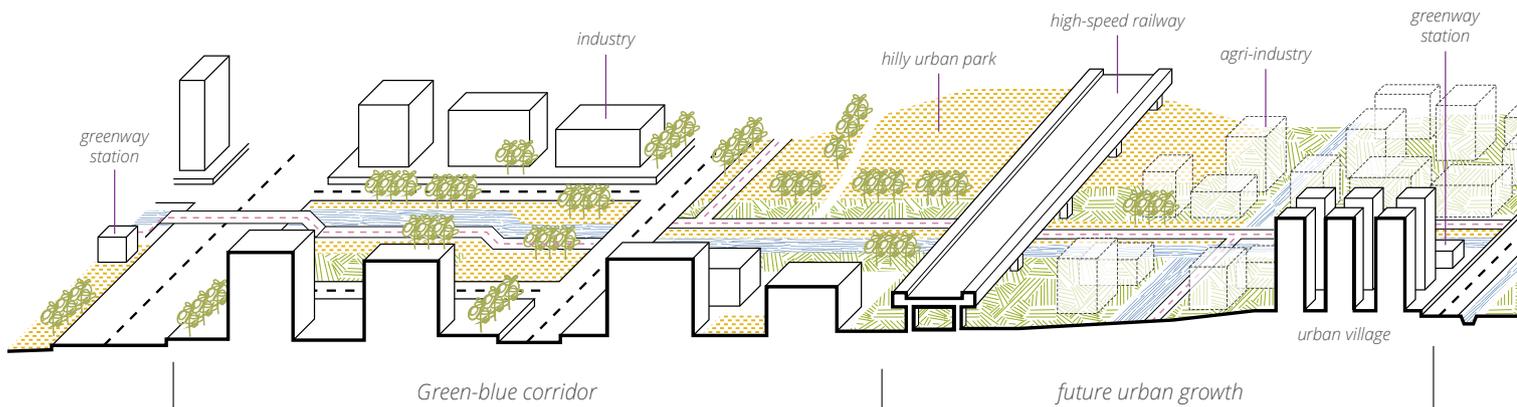
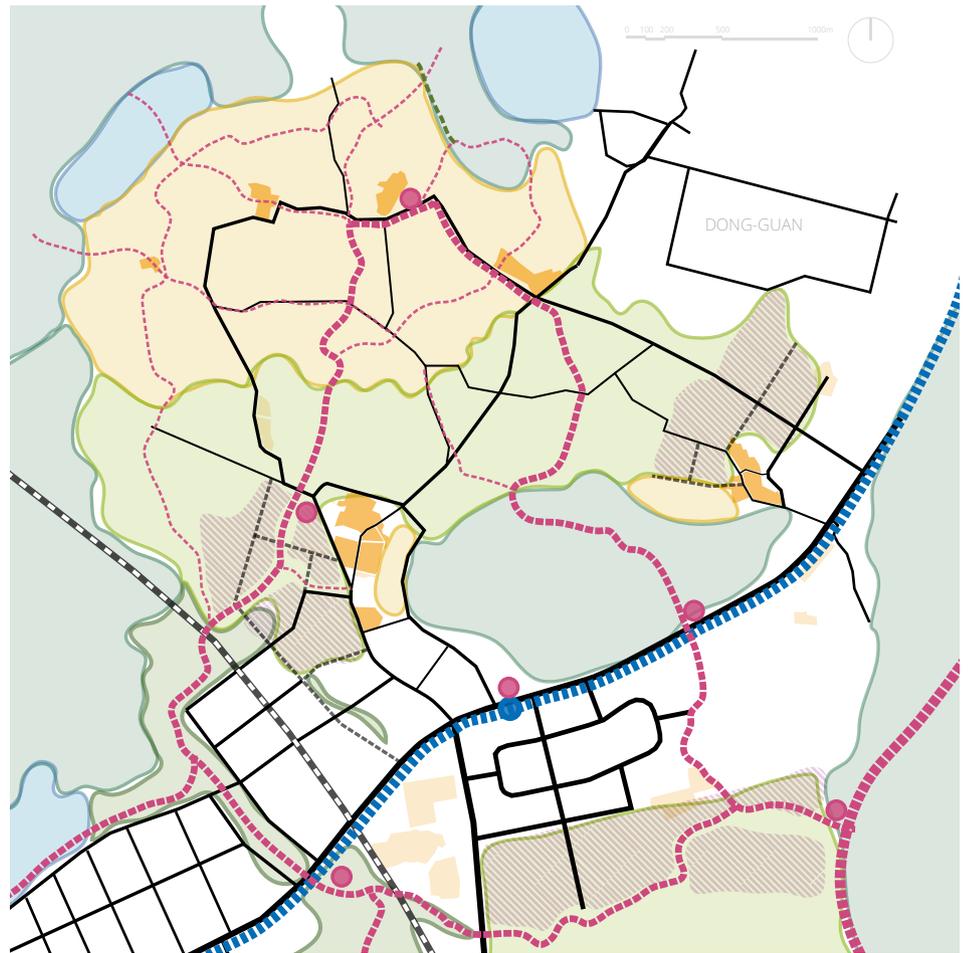
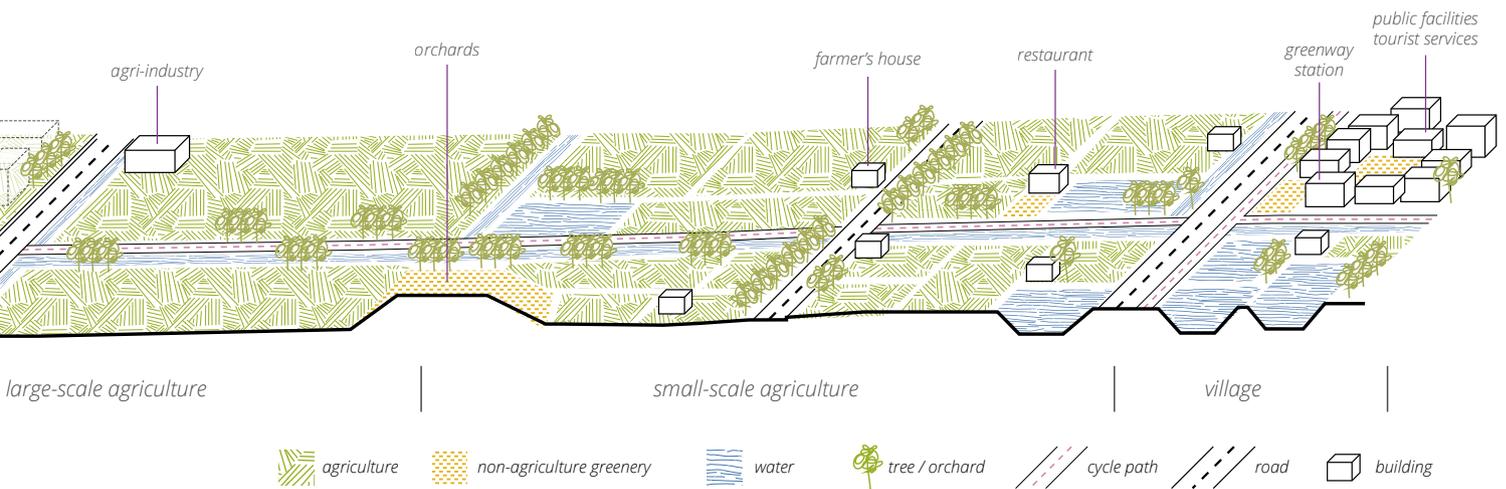


Figure 111. CPUL from urban to rural: tourist path from point A (urban area) to point B (remote village) (shown in figure 112)



Figure 112. Management mode, agricultural and non-agricultural produce of the AgPark and the surroundings

- |                            |                          |
|----------------------------|--------------------------|
| NON-AGRICULTURAL PRODUCE   |                          |
| <b>RECREATIONAL</b>        | <b>ECOSYSTEM SERVICE</b> |
| private event              | biodiversity             |
| festival                   | material circulation     |
| artistic creation          | water management         |
| public education           |                          |
| cycling                    | <b>MANAGEMENT</b>        |
| retreatment                | <b>RESPONSIBILITY</b>    |
| cooking lesson             | family                   |
| tea house                  | enterprise               |
| restaurant                 | municipality             |
| exercises                  | <b>FARMING METHODS</b>   |
| sightseeing                | equipment-based          |
| dog walking                | labor-based              |
|                            | <b>AGRI-SERVICE</b>      |
| <b>AGRICULTURE PRODUCE</b> | food supply logistic     |
| temporary crop (vegetable) | food market              |
| permanent crop (orchards)  | innovation               |
| fish                       | research                 |
| processed food             | education                |
| livestock                  |                          |
| floriculture               |                          |
| seed                       |                          |



### 3.4 Evaluation

Ecological green network

Process over time

Landscape characteristics

Relevant for people

Multi-scalar framework

#### *Evaluating the district-scale design*

The district-scale design is not elaborated in details, as the development of the area should be based on consensus developed by local communities and other stakeholders. Therefore, the purpose of the design is not to give a comprehensive solution to the area, but to provide one possible method and some inspirations for planning the countryside in the ECLs.

For rural community development, whatever the solution is, the basis is to sustain and retain local communities, rather than encouraging outflow of population. The nature of agriculture is to root people on the ground. It is totally different from urban sectors, which feature mobility. So to avoid loss of population in the countryside, developing local farms and enhancing the capabilities of the farms are the ways to go.

The AgPark is the example to show one possibility to develop small-scale family based farming on the basic farmland in Xinqiang. It is an alternative to current management mode of large-scale agribusiness, and supported by related research and experiences, the AgPark approach may deliver more social and environmental benefits than the current plan of the municipality.

#### *Evaluating the city-scale plan*

The scenario of sustainable agriculture discussed in the city-scale plan facilitates the inclusion of local farms. The landscape zoning, as a replacement of the ECL, enables controlled construction in the countryside, where local communities can develop agricultural-related services to multiply the value of their products.

Another thing to highlight is the importance of an overall vision for the area. To sustain local communities, merely restriction of construction with a compensation plan is not enough. By including local initiatives and demands, a vision enables individuals and the municipality to work together and build consensus. The enlargement of the planning unit area in the city-scale enables urban planners and designers to intervene and help communities to formulate their overall plans.

Many ECLs are being regulated in Guangdong and other cities in China (Government of Guangdong province, 2013). It is important for urban planners to understand the consequences of the ECLs and rethink the rural planning and design from the perspectives of agriculture and farmers, so as to achieve a more sustainable countryside after the ECL.

### *Rethinking current policy*

The problems happening now in the communities were not foreseen when the planners draw the citywide ECL line. It took almost 10 years to come up with a preliminary compensation plan for these communities. Currently the plan is to provide industrial land for communities who form collective companies to manage the real estates. But if we think in the long term, what can keep the people staying in the land if they earn their living outside of the area? If people afford to leave the area and move to the city, is it fair for other urban residents who cannot be supported by the same public resources? (The municipality plan to invest 1.8 billion RMB in those collective companies.) The local communities get the compensation because of their location, and because of the compensation, they are very likely to leave the area.

The final outcome of these series of policies may only be revealed in the future. However, because the potential consequences are not considered in a bigger picture, the solution of one problem may lead to other problems, like the case of the ECL 10 years ago.



### ***The Only fisherman Left***

Surrounded by weeds, far away from the settlements (in the ECL), with two dogs and several free-range chicken, the traditional-style house here looks like a “retreat away from the world” written in Chinese ancient literature. With this romantic feeling in my mind, I got closer and had a talk with the dweller.

He is a young fisherman. His livelihood relies on the two fish ponds in front of his house, but lately his business is not going very well. His house is of poor condition, with leaking roof and unstable electricity supply. He said the area covered by weeds now used to be agricultural land, for fishery or vegetable by several households. Two years ago, the municipality removed the farmers without any compensation. But the land remains vacant till now. “I don’t know what else I can do if I lose these fish ponds,” he said.

Astonished by the reality, I said: “I feel really sorry that I cannot help.” The fisherman said: “No worries. Finish your report, get a diploma, and then find a good job. The world is difficult to be changed.”

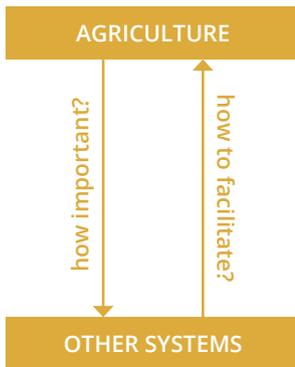
The background image shows a rural landscape. In the foreground, there is a field of tall, green and yellow grasses. In the middle ground, there are several haystacks and some traditional houses with tiled roofs. In the background, there are modern, multi-story buildings, possibly a school or university campus, under a bright sky.

# 結論

CONCLUSION

Conclusion / Recommendation / Reflection

# 1. Conclusion



## **Hypothesis & research approach**

*Integration* is the key word in dealing with the relationship between urban development and agriculture in this project. However, the integration of city and agriculture is not a purpose itself, but a tool for integration in broader contexts. In the project, agriculture is actually utilized as a lens to examine the complex relationship between urban and rural sectors, between human settlements and its surrounding landscape, between large-scale development and local communities, between short-term development pressure and long-term resilience. The core value behind these integrations is sustainable development, to be more specific, *wellbeing of people and environmental resilience of the city*, which however often compromise with economic growth and administrative convenience in the process of China's new town development. The notion "*city region as integrated landscapes for people, food and nature*" is proposed as a scenario to describe these interrelated connections and the special role of agriculture in achieving these integrations.

With these hypotheses, the research and design of the project are based on *the understanding of the conditions and dynamics of agriculture and its interactions with other systems*. By identifying the current roles and potential performance of agricultural landscape in the new town, the importance of integrating agriculture is examined while at the same time a new framework and approach is proposed to facilitate sustainable agricultural practices.

## **The importance of integrating agriculture and new town development**

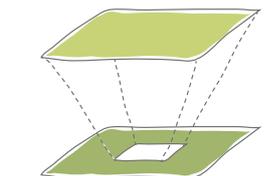
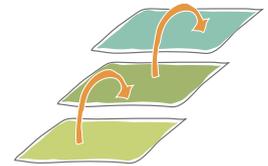
*Research question: What are the potentials of agricultural landscape to contribute to new town development in Guangming?*

The argument supporting the idea of integrating agriculture and new town development is built on understanding the consequences of lacking consideration of agriculture and identifying the potentials of agriculture in addressing problems in the development process of Guangming.

The on-site analysis shows that the performance of agriculture is tightly linked to the livelihood of local farmers, lifestyle and behaviors of current residents, and the ecological conditions of the area. The lack of consideration of the linkages makes local farmers and ecosystem vulnerable in the face of urban development. By re-introducing these perspectives of agriculture into the new town, the “Green City” vision of Guangming can be “greener” by making use of agriculture to achieve social cohesion and enhance environmental resilience.

Potentials of agriculture in achieving sustainability are reviewed by taking agriculture as a medium to achieve an integrated landscape in the city region and using the perspectives of urban agriculture and the landscape approach. By reviewing critiques on urban-rural relationship, I adopt a more persuasive explanation of cities and their territories, by taking ecology as ecosystem services and the city region as integrated landscape. Within this framework, agriculture with various benefits for the city can be considered as ecosystem services both in and around cities. Recent practices in urban agriculture have demonstrated that agriculture can be well integrated into urban environment and be utilized as an effective way to manage open spaces and benefit communities. The landscape approach, on the other hand, provide another perspective to consider the transformation process and regional connections of agriculture. Combination of the theories in landscape approach and urban agriculture enables a more complete understanding of agriculture, in both ecological and social dimensions, with both static and dynamic characteristics.

Within this theoretical framework, a new approach is formulated to demonstrate the potentials of agricultural land in new town development. First, based on analysis of current conditions, the approach recognizes agriculture as an existing entity that should be incorporated in urban development and transformed properly, rather than a new design concept introduced into the Green City Guangming. Therefore, the approach focus on guiding the transformation of agricultural landscape. Secondly, the approach utilizes agricultural landscape as a way to convey ecology into spatial forms, as existing agricultural practices to some extent reflect the performance of the ecosystem. Thirdly, the approach give special attention to agriculture in the city-nature relationship, and considers agricultural practices as an important attribute to categorize landscape



beside nature and city. The approach also recognizes urban and peri-urban agriculture as a medium to achieve greater public goods in open spaces besides economic benefits, and suggests that the city-agriculture integration helps Guangming to address the issues of community development, vulnerable farmers, open space management resilience, etc. Dealing with ecology and people simultaneously, the approach requires a multi-scalar framework that should guarantee connectivity of regional network and integration of these networks in smaller scales. This approach is referred as ***Agricultural Landscape Approach (ALA)*** in this project.

This approach focusing on agriculture makes urban structure more relevant to ecosystem and people, facilitates better quality of open spaces, strengthens characteristics of the countryside to balance the development of urban and rural, and moderates the impacts of new town development on local farmers. Therefore, it not only helps to solve problems in agriculture, but also addresses development issues in the new town. The approach integrates the organic urbanization mode that meet demands of resident before new town scheme and the top-down planning approach of current new town plan to ensure regional mobility, while at the same time include another layer: ecosystem.

The ***sustainable performance of agricultural landscape*** is also implied in the ALA approach, which is summarized as 1) providing knowledge on ecology for planning and design and moderate impact of new town development on farmers by retaining some temporarily available farmland in the transformation process from agricultural land to urban area; 2) deliver public goods being part of urban open spaces, including urban and rural community development, ecosystem services, and recreational and educational amenities. The productivity is still an important aspects of agriculture, yet this project argues that agriculture should be able to deliver other benefits in the process of urbanization.

### ***The role of planning and design in integrating agriculture and new town***

*Research question: How can planning and design help to facilitate the integration of agriculture and new town development and utilize agricultural landscape to improve the relationship between urban development, local people and ecosystem in Guangming, Shenzhen?*

To include agriculture in urban development, the first step is to understand agricultural conditions. Therefore, in this project, land suitability analysis is developed to understand

spatial conditions for agriculture and identify the possible locations for different types of agriculture.

Based on the understanding of ecosystem and land resources for agriculture, the open space structure of Guangming is redesigned. Following principles of ALA, *the spatial framework for development* defines the development process for rapid urban expansion and more careful urbanization afterwards, landscape characteristics for open spaces, and enlarge statutory planning units to facilitate more integrated urban-rural relationship. Compared with the Ecological Control Line (ECL), the development framework can better respond to the dynamics of urban development and landscape, and thus provide a more effective management method for the urban development process and the preservation of open spaces.

The interfaces between agricultural landscape, urban functions and natural landscape are guided by *a set of spatial typologies*. The typologies are complementary part of the city-scale spatial framework, as they show possible spatial quality achieved by agricultural landscape and spatial conditions required for sustainable agricultural practices in small scales.

*The two testing grounds*, Jiazitang and Xinqiang, show how the city-scale plan is applied in the smaller scale, and also demonstrate the benefits of integrating agriculture into the new town development both for the city and the countryside. In the case of Jiazitang, the structure of agricultural landscape is incorporated into the large-scale urban structure, to respect the natural system and also facilitate step-by-step urban growth. The design of Xinqiang tries to address the issue of preserving the right to farm for suburban communities, by allowing medium-scale family farms and collective farms in the ECL and strengthening their capacities by extending urban networks and functions into the area.

The application of ALA on city-scale design results in a different spatial framework from current plans, being a more flexible and process-orientated. It demonstrates how the introduction of landscape perspective and respects to agricultural landscape influence the urban development mode, and suggests that the idea of taking city region as integrated landscapes may provide some hints for the sustainable development of today's uncontrollable cities.

*"A landscape approach for city regions requires multi-level governance, new forms of collaboration, integration across disciplines and sectors, and adaptive innovation."*

*Forster and Escudero, 2014*

## 2. Recommendation

In this project, agriculture is more a perspective to understand the situation than a solution to urban problems. The project focuses more on raising questions, rather than answering them. Therefore, the recommendation section is mostly about pointing out problems and the insights to understand those problems through the lens of agriculture.

### *Rethinking open spaces in cities*

It has been well accepted that the open spaces in and around cities should be preserved for ecological values. But the contribution of these open spaces to cities and management methods of these open spaces is still quite vague for planners and governments. The results of the vagueness are arbitrary green networks lacking consideration for natural conditions, unsustainable operation of agricultural land, costly urban parks with artificial landscape and fragmented open spaces cut by infrastructure. Therefore, the preservation of open spaces is far from enough.

The performance of open spaces is highly related to its management methods, distribution and its urban contexts. Agriculture as an important method of maintaining open spaces is discussed in this project. In addition to its efficiency in open space management, the distribution of agricultural land and its adaptation to urban contexts are also studied, which enrich the knowledge of sustainable operation of open spaces.

One of the most important perspectives brought by agriculture is its concern for *people*. Urban agriculture shows that people's interests and initiatives can be utilized to maintain open spaces and make open spaces beneficial to communities. The perspective of urban farmers shows that open spaces not only carry leisure and ecological values, but also concerns the livelihood of people. Another new perspective is *the contribution of agricultural landscape to urban design*. By studying the structure and dynamics of existing agricultural landscape, which is sensitive to ecological conditions, urban design can include more landscape dynamics. By studying agricultural landscape and its relationship with people, nature and city, I hope to inspire *more studies on people's behaviours in open spaces and linkages between urban design and ecology*.

However, the performance of open spaces is also constrained by the infrastructure. The infrastructure-led development focuses on regional mobility, with less attention to local conditions. In Guangming, the open spaces are separated by infrastructure, and the urban structure is not designed to facilitate the continuity of open spaces. The dominating role of infrastructure hinders the open spaces to function as a system. ***It is crucial to reconsider the relationship between open spaces and infrastructure*** to create a holistic open space system for cities.

### ***Rethinking the ECLs and the urban-rural relationship***

The new open space framework in the project is actually challenging the current Ecology Control Line (ECL) system. Currently, the ECLs have four purposes: ***defining the main green structure for the city; defining locations for urban growth; protecting open spaces; defining the boundary of urban management***. It reflects the traditional way of considering the relationship between cities and the countryside: cities are for urban development while the countryside should remain unbuilt for agriculture, and a clear line can be drawn between the two.

However, in today's cities, the urban-rural boundary has been blurred. Urban systems, administration system and ecosystem concerning urban-rural relationship have different dynamics. Using one single line to guide the development of these systems at the same time actually oversimplifies the intense and complex interactions between city and its surrounding landscape. As a result, the rigidity of the ECLs restricts the development opportunities of the ECL communities; the lack of overall vision for the countryside defined by the ECLs leads to environmental and cultural degradation of the countryside; costly urban parks are planned, which is beyond the affordability of the municipality and the quality of the parks cannot be guaranteed; the ecosystem structure in the urban area is replaced by urban grids.

Recent researches have reformulated the relationship between cities and their hinterlands as the relationship between cities and ecosystem services. This interpretation addresses functional linkages rather than spatial division. It indicates that the management of open spaces is more than drawing a line to divide cities and

*By separating the four functions of the ECL, the new open space framework in the project can facilitate better management of open space system in Guangming, as it:*

- designs the open space structure according to the agriculture- and ecosystem-sensitivity, to improve the long-term environmental resilience of the city;*
- identifies two phases for green-field urban expansion, to guide rapid urbanization on less eco-sensitive area, enable more flexibility for the future and moderate the impacts of new town development on the agricultural-related society;*
- characterizes open spaces by its natural conditions and agricultural production mode, in which way open spaces are not only preserved, but also given identities with clear management responsibility;*
- enlarges the zone for detailed planning units, to facilitate better management and design for the interfaces of the city and the countryside.*

the countryside. New functional and spatial linkages should be established. It requires planning and design to challenge the current city-oriented development mode and treat urban and rural equally.

This approach focusing on ecosystem services has other benefits. Most buildings in new towns in China are developed by private sectors, spatial quality of which is difficult to monitor as urban design system is not well established in most Chinese cities. Focusing on improving the quality of open spaces, which are mostly managed by the municipality, is more feasible and practical to avoid fragmentation caused by private development and ensure environmental quality in future.

The new open space framework in the project suggests separating the four functions of the ECL in order to facilitate better management of open space system in Guangming. Whether the framework is administratively feasible is still unclear. But the main message it intends to deliver is that there should be *more studies on planning instruments to reflect the dynamic interactions between the city and the countryside, esp. in metropolitan areas*. Whatever policies are used to coordinate city-countryside relationship, the practical issues of local people and natural environment should be the main focuses, rather than some vague concepts or hypothetical theories.

### ***More attention to urban farmers and rural communities***

Currently hardly any attention is placed on the damage of new town development to urban farmers. Compared with migrant workers, another vulnerable group in cities, urban and peri-urban farmers are less in number, less concentrated in space, less organized, and thus more peripheral. Compared with villagers whose properties are protected by the law, farmers are more vulnerable as their farmland is not even secured, as all the territory of Shenzhen is owned by the state, which actually negates the right to farm the land of those urban farmers. Within this institutional structure, the loss of farmland is inevitable for small-scale farmers. The current large-scale infrastructure-led development accelerates the process by wiping away all the farmland at the same time. In my district-scale design of Jiazitang, the structure of agricultural landscape is utilized, the side effect of which is avoiding large-scale demolition of farmland so that farmers have more time to adapt to such changes.

However, the loss of right to farm happens not only in the urban area, but also in the ECL, which is supposed to be free from urban development. The land consolidation is implemented by the government for the preservation of basic farmland and the

“upgrading” of farming (industrialization and standardization). Through the land consolidation, small-scale farms in the ECL are removed and sub-urban villages are suffering from poverty. The district-scale design of Xinqiang tries to address this issue, by allowing medium-scale family farms and collective farms in the ECL and strengthen the capacities of these farms by extending urban networks and functions into the area. My design is based on the assumptions that the countryside can offer an alternative lifestyle to urban life, and sustainable operation of agriculture can enhance the capacity of farmers and also achieve environmental value in the countryside.

My design shows how planning and design can help to address the issue of vulnerable urban farmers who lose their land due to urbanization or large-scale farms. But the future of the countryside or farms is a responsibility of not only planners and designers, but also local farmers, villagers and the society. No matter what kind of scheme is applied in the countryside, the livelihood of farmers and rural residents should be taken into account and they should have a voice in shaping these plans. There should also be more concerns and supports from the society, as it not only is a matter of social justice, but also concerns the sustainable development of the countryside in city regions.

### ***Urban agriculture and the countryside for cities***

The right to farm of urban farmers not only is a matter of social justice, but also concerns the sustainable development of the city and the countryside in city regions. Compared with the large-scale agriculture, the small-scale farming initiated by the individuals and communities is more flexible and adaptive to the complex urban situation, and can deliver more social benefits. Unfortunately, agriculture is now regarded as mainly an economic sector in the eye of the municipality of Shenzhen, and farming by urban residents and farming households is not reflected in the vision of agricultural development or the plans for urban area. Concerns for urban farmers provide some hints to reconsider the role of agriculture and the countryside in urban and peri-urban area.

In a rapidly urbanizing area, urban agriculture is also highly dynamic and constantly changing. It may be urbanized, or developed into other forms to responds to urban contexts. Therefore, the sustainability of urban agricultural practices cannot be discussed isolated from urban dynamics. It should be recognized that the responds agriculture to urban dynamics are more than enhancing productivity to supply food or generate revenue for the city. As precious open spaces in and around cities, urban agriculture should be treated more carefully.

As mentioned, agriculture associates people and nature. Through agriculture, not only planners and designer, but also local people who works on the land, can develop knowledge of the territory. The knowledge helps to achieve territorial integration of landscape, city and food production. This project suggests that urban agriculture in the context of urbanization can act in two ways: to guide urbanization process and to improve urban open spaces quality. The framework may provide some clues for further studies on sustainability of urban agriculture in urbanizing world.

### ***Planning the city region as integrated landscapes for people, food and nature***

The research and design have shown that the issues of food production, farmers, open space systems for the city, rural community development and environmental protection are interrelated. The reflection on current ECL policy also demonstrates that the division of urban and rural in open spaces is not able to respond to the holistic ecosystem and rapid urban growth. Therefore, it is crucial to rethink the relationship between urban and rural, city and countryside, people and urban development, open spaces and ecology, and try to ordinate these aspects in a holistic vision for the area. Agriculture in this project provides a perspective to understand these relationships. The term “landscape” indicates place-based approaches to urban development, natural resource and agricultural management, emphasis the spatial interactions in a territory. Therefore, taking city region as a integrated landscape indicates a shift from current city-oriented and economy-oriented development mode to ***a territorial integrated approach with more consideration for well-being of people, food production and natural environment.***

It is essential to consider the integration of different systems in a city region in the stage of planning, when different interests are gathered to envision the future of the area. As experts in space, planners and designers play a crucial role in the territorial integration of different systems. They should understand the spatial implication of different interests, show consequences of different decisions on people and ecosystem by visualization, stress the importance of the place-based approach for the integration and provide spatial solutions to ensure the spatial quality.







# 附錄

## APPENDIX

Site visit / Criteria of suitability  
evaluation / Bibliography

# 1. Site Visit



1. It is the only fish pond left after land consolidation of the area 2 years ago, run by a young fisherman and his friend. His livelihood relies on the two fish ponds in front of his house, but lately his business is not going very well. His house is of poor condition, with leaking roof and unstable electricity supply. He said the area covered by weeds now used to be agricultural land, for fishery or vegetable by several households. Two years ago, the municipality removed the farmers without any compensation. But the land remains vacant till now.



2. The only farmland was being cultivated in the area that is consolidated 2 years ago. It is a small-scale agricultural land farmed a couple with an area of 2 mu (1333 m<sup>2</sup>). They lease the land from the others. They just start farming a few month ago on the farmland. They sell their products in the nearest market.



3. Vegetable farm along the main road. The owner lease land from collectives, and has been working the farmland for more than 10 years. When the farmer is working on the field, neighbours come to have a chat with him and also work with him.



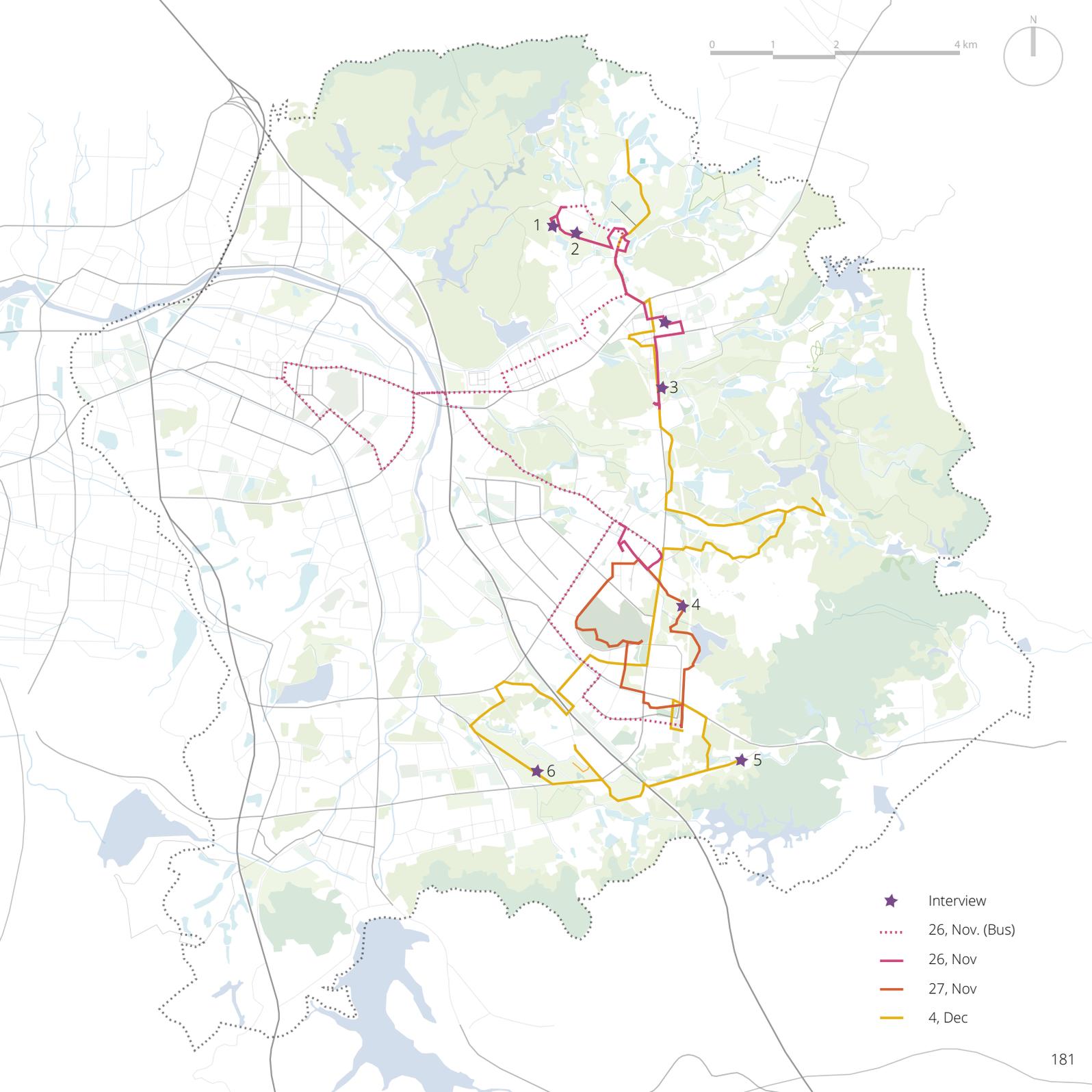
4. Subsistence farming next to the highspeed railway. A woman and her daughter were working in the field. They only use a small plot of the farmland, with an area of around 5m<sup>2</sup>. The rest of the farmland is shared by other neighbours. As the land is farmed by diverse households, the vegetation on the field is also diverse. They told me that they don't own the land. They live nearby and transformed the vacant land after construction of the railway into farm to grow food for their own use.



5. Small-scale family farm by a couple. They are relocated a few years ago to the current location due to urbanization of their previous land. They are migrants, but they have been farming in Guangming for more than 10 years. The woman told me she came to Shenzhen, because there is market here and agro-products can have better price. Other farmers who used to farm next to their previous location are almost gone, as they have to look for other jobs or other land to farm.



6. Small-scale farm by a couple. They lease land from a company, with whom the farmers have formal contracts, which usually last for one year. Companies provide facilities to protect vegetable from storms. Farmers also live in temporary houses of low quality, but the houses are supported by companies. Companies may buy products from them, but farmers have freedom to sell their products to markets on their own.



0 1 2 4 km



1

2

3

4

6

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- ★ Interview
- ..... 26. Nov. (Bus)
- 26, Nov
- 27, Nov
- 4, Dec

## 2. Criteria of Suitability Assessment

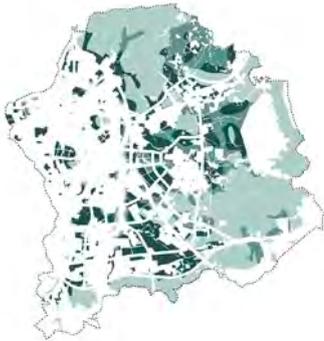
### **Agricultural produce**

#### ***Temporary Crops***

Definition: crops that mature within one or more rain seasons and are destroyed after harvesting, such as grains, vegetable, etc.

Criteria:

- Fertile soil, flat surface, sufficient water supply
- Away from water pollution;
- Away from main roads;
- In flood hazard area to increase infiltration and used as water storage during extreme weather
- Not on the polluted soil (brownfield land)

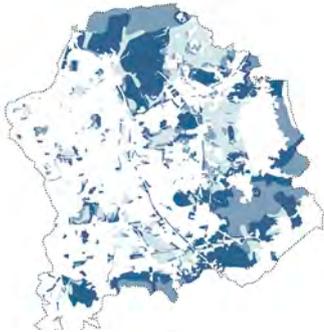


#### ***Permanent Crops***

Definition: crops which occupy the land for a long period of time and do not need to be replaced after each harvest, such as fruit trees, shrubs, nuts, etc.

Criteria:

- Hilly area;
- Away from water pollution;
- Not in temporarily available land;
- Along main road to reduce air pollution
- In urban dense area to moderate urban heat



#### ***Non-food Crops***

Definition: crops for uses other than human or animal consumption, whose functions includes bioenergy, landscape plants, construction, fiber, chemicals, etc.

Criteria:

- Along main roads to reduce air pollution
- For landscape plants and floriculture: flat surface, sufficient water supply



### ***Livestock***

Definition: domesticated animals raised in an agricultural field to produce commodities such as food, fiber and labor.

Criteria:

- Away from dense urban area to prevent diffusion of diseases;
- Away from polluted water.

### ***Fishery***

Definition: raising fish through fish farming or aquaculture

Criteria:

- Near current or lost fish ponds (which is suppose to be the lowest area of the surroundings);
- Away from polluted water;
- In flood hazard area to increase infiltration and used as water storage during extreme weather

### **Non-agricultural produce**

#### ***Recreation / Education***

Definition: leisure activities that involve people and are purposed for fun, health or education, such as gardening, sightseeing, hiking, eating, cycling, etc.

Criteria:

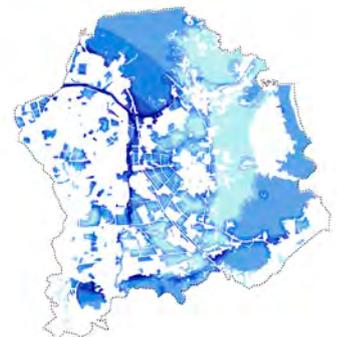
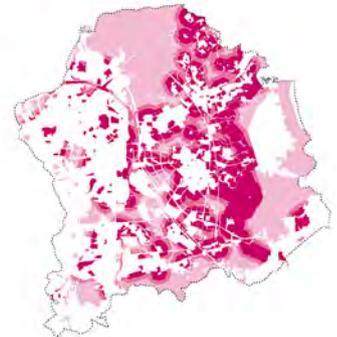
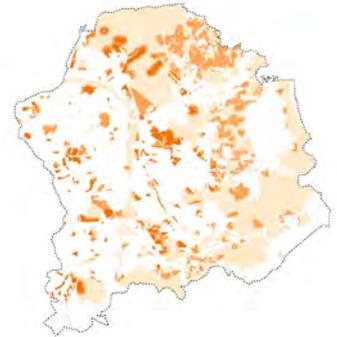
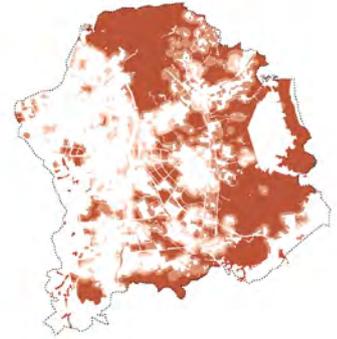
- Along greenways (cycling route);
- Near urban built environment, esp. public services, schools, residential area

#### ***Ecosystem service***

Definition: to increase the capacity of the region to respond to a perturbation or disturbance by resisting damage and recovering quickly, esp. flooding, urban heat, windstorms and deforestation by human.

Criteria:

- Flood hazard area;
- High urban density area;
- Along main roads;
- Water & soil pollution area;
- Existing natural forest.





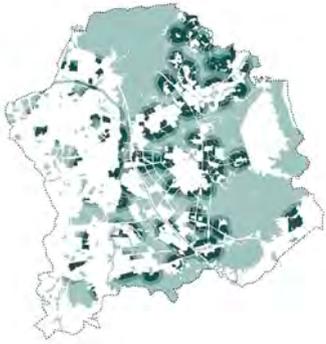
## Farm management

### ***Subsistence farming garden***

Definition: farms in which urban farmers focus on growing food to feed themselves and their families or shared by the communities

*Criteria:*

- Near public services like hospitals and schools as part of health care and educational environment
- Around urban / rural villages, where lower classes live
- On both temporarily and long-term available land



### ***Small-scale family farm***

Definition: small-scale farms (with an area less than 3000 m<sup>2</sup>) operated by one household to make a living

*Criteria:*

- Near public services like hospitals and schools as part of health care and educational environment
- Around urban / rural villages, where lower classes live
- On both temporarily and long-term available land



### ***Collective farm***

Definition: a farm operated by collective of communities in ECL.

*Criteria:*

- Size of land (>30ha.)
- Around existing settlements in the ECL
- Not on temporarily available land

### ***Large-scale agribusiness***

Definition: a large-scale, intensive, standardized farm (usually with an area more than 30 ha.) operated by an agriculture enterprise for production or research.

*Criteria:*

- Size of land (>30ha.)
- Near agriculture centers / industrial area
- Away from communities in the ECL to give communities access to land to develop their own economy
- Not on temporarily available land

### ***Recreational agri-park***

Definition: a farm operated by companies, collectives or the municipality aimed to provide recreation and tourism service for citizens

*Criteria:*

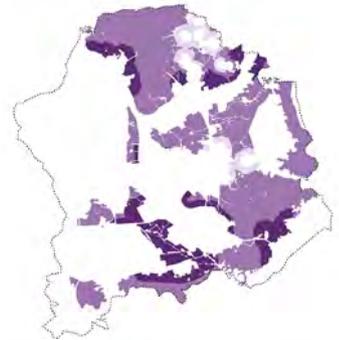
- Size of land (>30ha.)
- Near existing recreation facilities
- Away from communities in the ECL
- Not on temporarily available land

### ***Medium-scale family farm***

Definition: a farm by one household with an area of more than 6ha.

*Criteria:*

- Size of land (>6ha.)
- Around existing settlements in the ECL
- Not on temporarily available land



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良田萬頃 日食三餐  
廣廈千間 夜眠八尺

You eat only three meals a day,  
even if you have thousands of hectares of farmland;  
To sleep you need only eight feet of space,  
even if you have hundreds of mansions.

*Chinese Proverb*