Complex cities studio: P2 report

FARMING GUANGMING

Utilizing urban agriculture as a tool to achieve sustainable development in Guangming, Shenzhen

Jiayao Liu
4250281
Graduation Project
Msc 3 Urbanism
Faculty of Agriculture, TU Delft

Complex Cities
SpatialPlanning &Strategy
TU Delft
New New Towns
INTERNATIONAL NEW TOWN INSTITUTE

This is the high-speed railway station that stimulated the development of Guangming new town. In front of the station, there will be large-scale complexes for creative industry. 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.

CONTENT

THESIS PLAN

1 INTRODUCTION

1.1 Motivation

China is a country with very strong rural roots. Agriculture used to be the main livelihood for most of the population, and the society was organized in a way to facilitate agriculture activities. But within 30 years, a quarter of the population have left the soil and are registered as urban residents and a number of megacities arise. Through urbanization, cities seem to successfully disassociate themselves from agriculture. But when one look close into the life of urban residents, spontaneous farming is happening in small corners throughout cities. The small-scale agriculture activities add greenery to cities, making the city more liveable and human-scaled. Figure 1 shows the balcony of my parents' apartment, located in the old city centre of Zhongshan, a city in Pearl River delta.

It gives me inspiration to link agriculture with cities. As agriculture works directly on the natural conditions, links human with nature through productive activities, connects modern persons with tradition, and generates economic outputs, it has a lot of potentials to benefit urban environment. So is it possible to rebuild the relationship between agriculture and cities in China?

Figure 1. The balcony of my parients' apartment, located in the old city centre of Zhongshan, a city in Pearl River delta. ©The author

1.2 Introduction

The study site I chose is Guangming, a new town in Shenzhen outside of the Special Economic Zone (SEZ). The new town development began in 2007, and was driven by construction of a station of the regional high-speed railway which connects Guangzhou and Hong Kong. To utilize the opportunity, Guangming new town intends to attract high-end industries so that they can play a strategic role in industrial upgrading in Shenzhen. However, Guangming used to have a strong agriculture-based economy, many characteristics of which are overlooked in the master plan. I consider the agricultural root and the new town development in Guangming as an opportunity to experiment the idea of relinking agriculture and city during the urban expansion process in China.

However, linking agriculture and urban system is not a purpose of its own. It should be able to contribute to the sustainability of the new town development. By understanding the context, I realized the problems of new town development includes city-oriented development which results in fragmented countryside, missing consideration for ecosystem features and the demands of local communities, and blueprint approaches in lack of flexibility. My observation in the field study and related theories support the idea that agriculture has the potential to be used to enhance sustainability of the new town development by tackling the problems mentioned above.

Therefore, **the aim of the graduation project will be to formulate a flexible planning framework where agriculture can be integrated in the new town scheme so as to achieve more sustainable development of the new town and countryside in Guangming**. The final outputs will include the system of agriculture in Guangming, a planning framework with agriculture integrated, and a spatial proposal for Guangming as a testing ground. As reflections, the spatial plan will be evaluated to see whether it matches with the aim, and a generalized process will be discussed so as to formulate an integrative and multi-disciplinary approach to include agriculture in the urban system in Shenzhen.

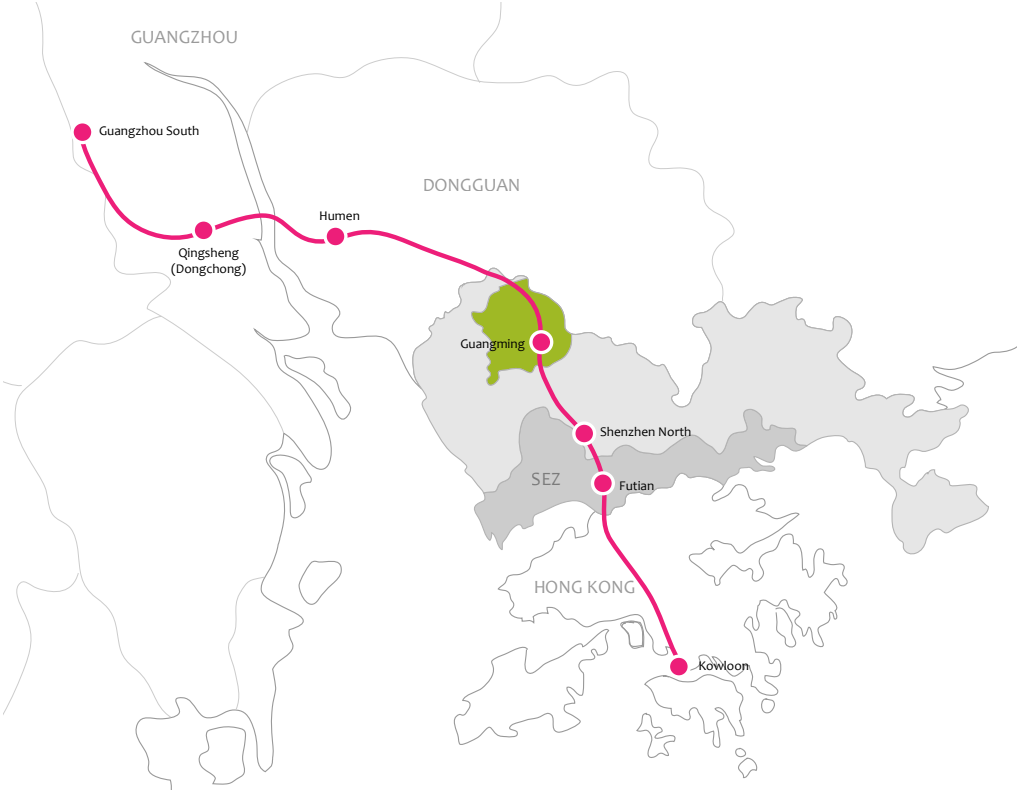


Figure 2. Regional high-speed railway and the location of Guangming new town. Elaborated by the author.

2 CONTEXT

2.1 Urban-rural relationship and the development of agriculture since R. P. China

Since the establishment of the People's Republic in 1949, the needs for feeding the vast population in China and facilitating industrialization and economic development are the two main issues in terms of urban-rural economic relationship (Wu, 2007)..

From 1949 to 1978, China applied the Soviet-type centrally planned model of development. The collectivization policy of agriculture forced peasants to work in collective farming, from where the output was shared by everyone equally (Long et al, 2007). The system diminished the working incentive of farmers, which together with the food price control policy (Long et al, 2011), resulted in low productivity of agriculture land (Putterman, 1997). For peasants looking for better living, to get employed in cities was also not possible, because heavy industry in cities could not generate enough employment for the rural migrants. In order to prevent high rate of unemployment in 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). In this way, the urban-rural dual system was established. During the period, food supply from the countryside to cities was well controlled by the government.

After the economic reforms of 1978, the urban-rural relationship has changed a lot. The urban-rural dual system was loosened, so low-priced labours, investments and land resource from the countryside are able to enter urban system, which greatly contributed to rapid development in China in recent decades. But on the other hand, the urban expansion usually takes place in the farmland near the city, resulting in a great amount of farmland loss in the urban fringe. The loss of farmland around cities and increasing population in cities are threatening the food security in most megacities. So food supply programmes ('shopping basket programmes' in Chinese) are developed by the government to guarantee sufficient food supply for the city. It reorganizes the whole food supply chain from production, processing to distribution. In addition to peri-urban area, remote rural areas are also included in the scheme and new technologies are introduced to enhance the productivity, which means modernization and standardization of agriculture.

In order to increase the productivity of farmland, modernized farming approaches are being promoted by the government. The agri-industrial type of farming is replacing of the traditional 'territorial integrative' approach.

2.2 New town development and top-down approaches

Urbanization in China

China is now experiencing rapid urbanization. Urban population is 52.6% of the overall population in 2012, doubling the number of 1990. Cities also explode in a rapid rate. For instance, in the last 30 years Shenzhen has grown from a few dispersed villages to a metropolis with more than 800 km2 built-up area. The remarkable urban growth is driven by industrialization and marketization with primary capital from abroad, the state or rural collectives. In the case of Shenzhen, investments from abroad (including Hong Kong) play a major role in accelerating economic growth as well as urbanization.

The rapid urban expansion is also advanced by strong motivation of the local government, as it is a way to generate profits for the local government. To explain why, some background should be introduced. There are two type of land ownership in China: nationalized and collective-owned. Collective-owned land usually belongs to villages, and government is the only one who can buy collective-owned land from villages (The policy is very likely to change according to Communique of the Third Plenum of 18th CPC Central Committee at the end of 2013). Using its administrative power, the local government can gain land for development at a very low price, and sell it to the developers at a high price (or also low price to industries as a way to attract investment). In 2013, land revenue accounts for half of the overall revenue of municipalities on average. But in the case of Shenzhen, only 9.31 % of the municipality's revenue in 2012 is from selling land (Zhang, 2014), which means land revenue is not a significant financial source for Shenzhen municipality. But urban expansion is still seen as an important way to boost economic growth, as it can attract industries and investment.

Land shortage in Shenzhen

One of the reasons why Shenzhen has much less land revenue than other metropolis in China is that Shenzhen do not have much land for sell. Being one of the first Special Economic Zones in China, Shenzhen is also the first city which faces the problem of land resource shortage for development. Of a territory of less than 2000km2, only 58 km2 in Shenzhen is available for development by 2020 (Hu, 2012). Shenzhen is facing the challenge of upgrading its industry to more knowledge-based economy, which needs land, as well as supporting facilities and appealing environment to attract high-educated groups.

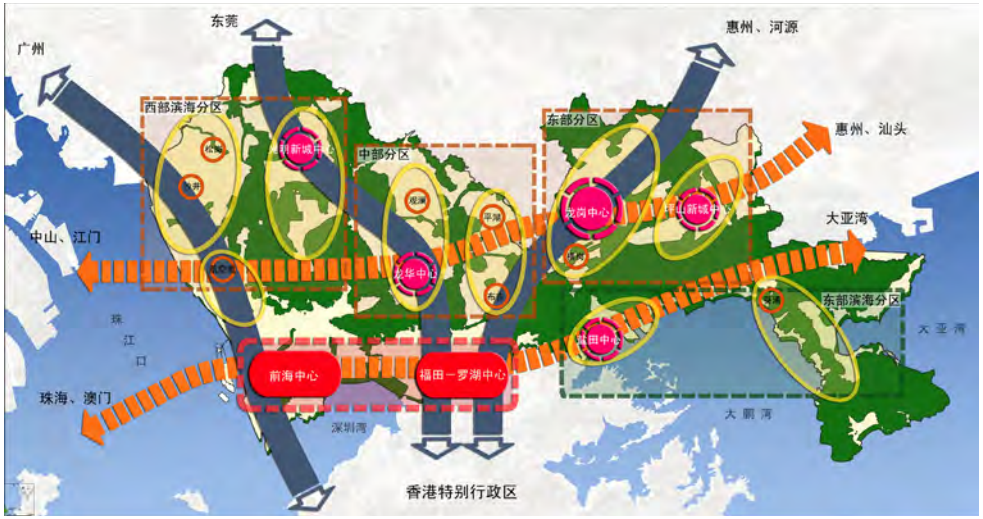


Figure 3. Restructuring Shenzhen: emerging new centers linked by infrastructure. The structure plan of Shenzhen (2010-2020).

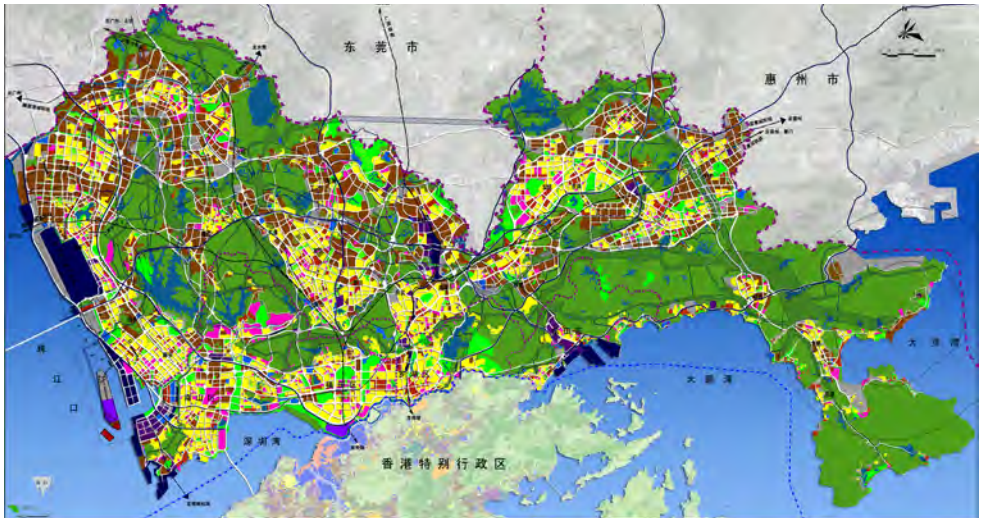


Figure 4. Green space and urban expansion. Master plan of Shenzhen (2010-2020).

2.2 New town development and top-down approaches

History of Guangming

Guangming new town consists of former Gongming town and Guangming Farm. Gongming and Guangming Farm both used to be agriculture-based society, like most places in China. Settlements were located near rivers as farming needed water and fertile land. At that time, settlement, soil and water were closely connected through agriculture activities (see figure 5).

In 1958 Guangming Farm was founded, and afterwards it focused on agricultural production and processing until the new town development. Gongming town was also an important agricultural production area for Shenzhen and Hong Kong, with products like pigs, fruits, vegetable, chicken, milk, fish and flower. In 1980s, Gongming also began to industrialize, with funds from abroad and collectives. Many manufactories appeared since then, mostly located along main roads and around existing settlements. It is the reason why most industries are located in the west of Guangming before the new town development.

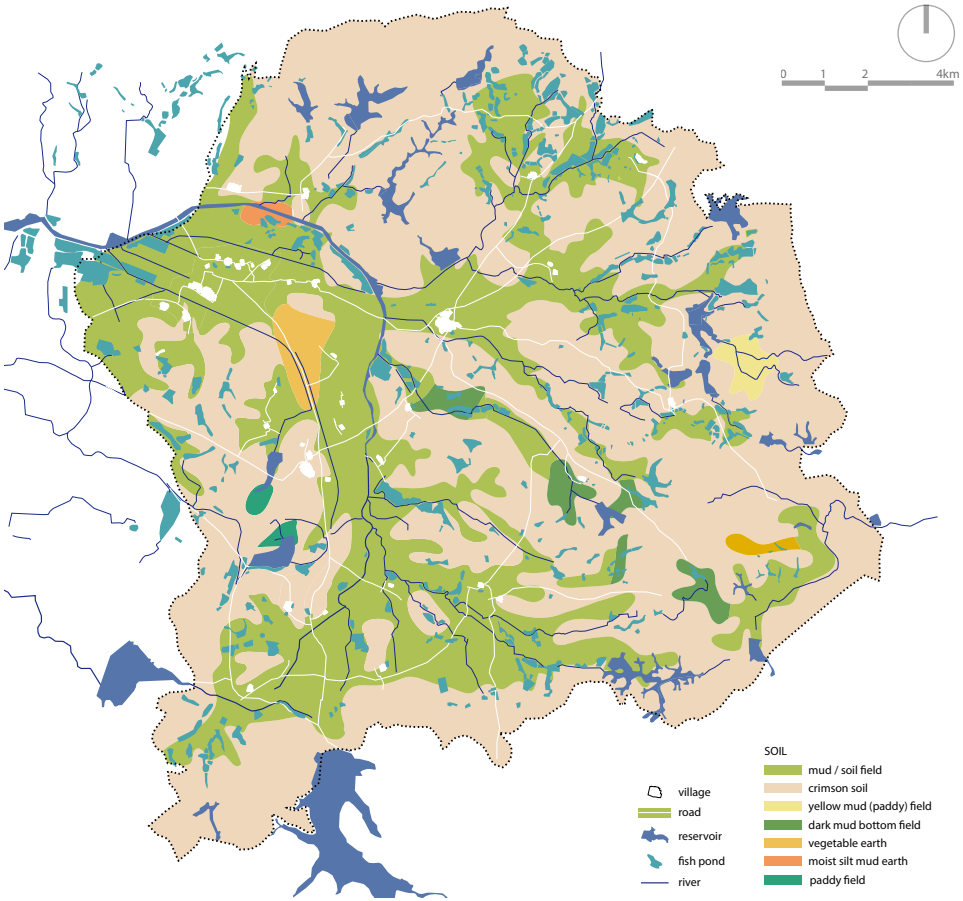


Figure 5. Relationship betwee soil, water and settlement before industrialization. The settlement layer is base on van Oostrum (2013), the soil layer is based on Atlas of Shenzhen City (2000), and the water layer is based on the Google satellite map of 2003. Elaborated by the author.

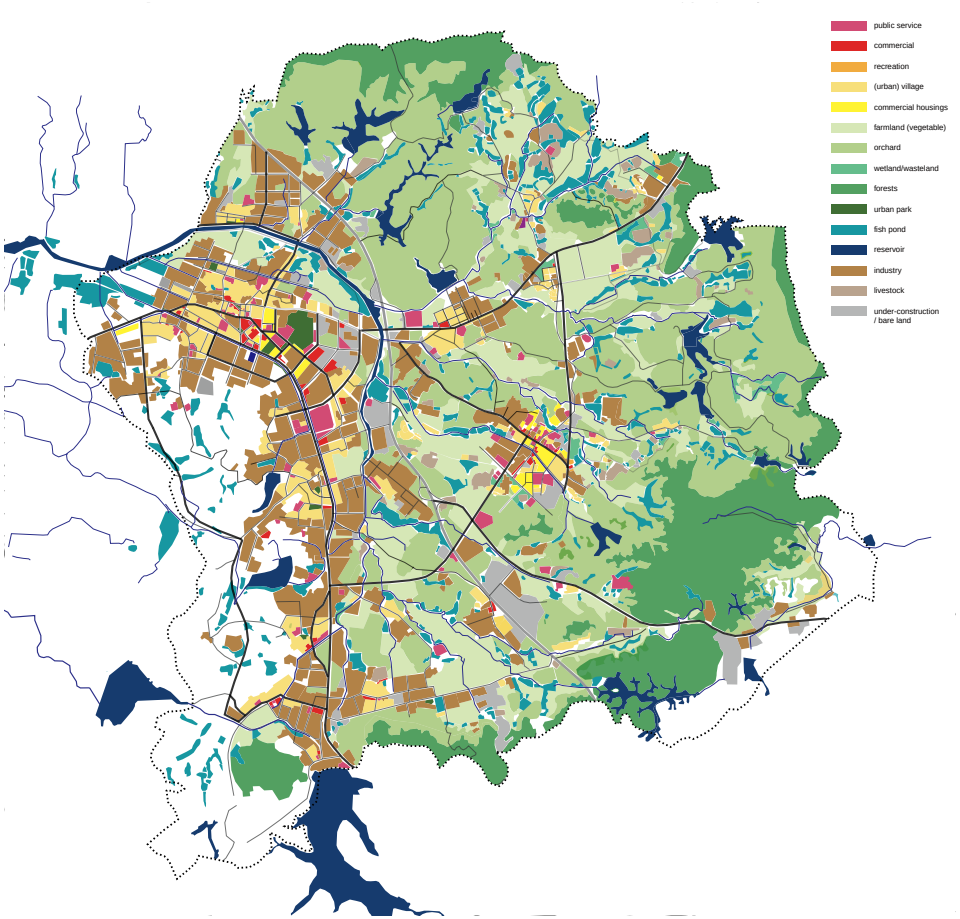


Figure 6. Land use map of Guangming, 2003. Before new town development. Based on Google satellite map of 2003, and land use map by the municipality (2004). Elaborated by the author.

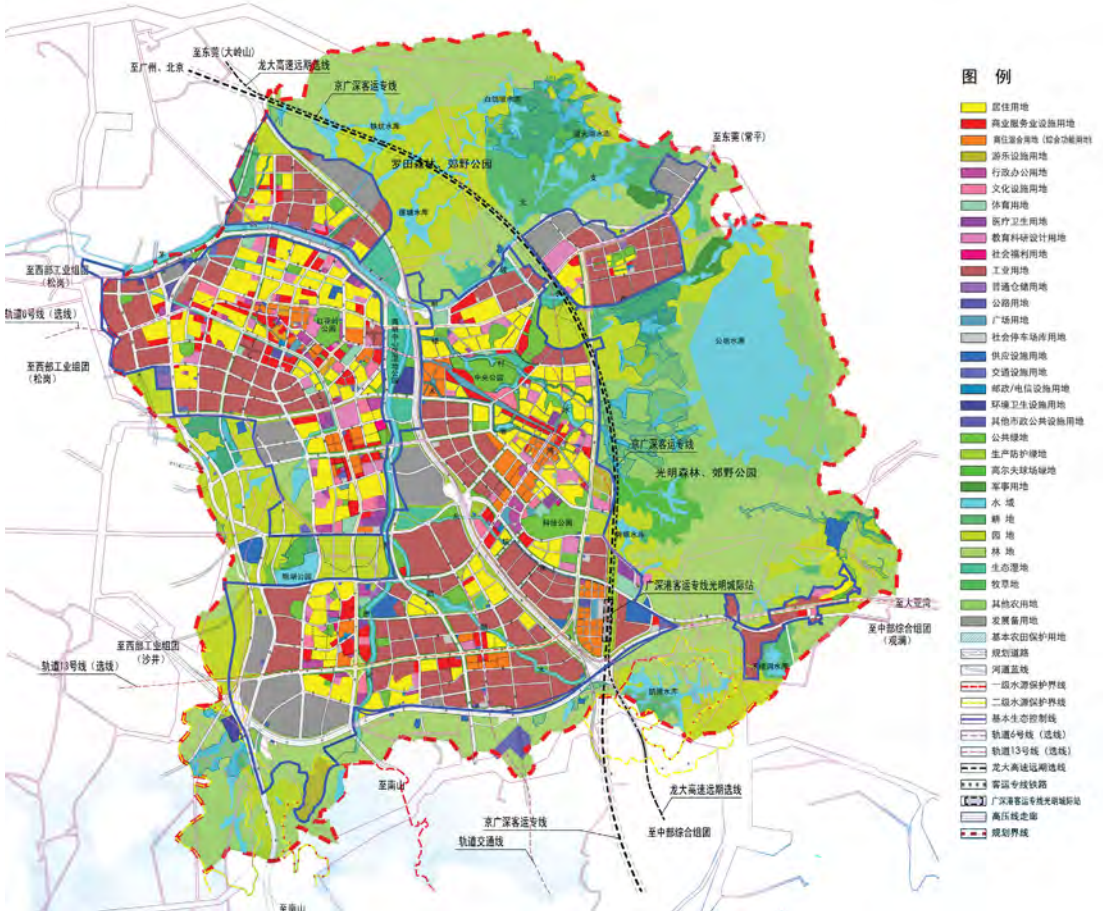


Figure 7. Master plan of Guangming (2007-2020).

2 CONTEXT

2.2 New town development and top-down approaches

Guangming blueprint

In the case of land shortage, available land in Guangming is precious for Shenzhen. About one third of Guangming used to belong to a state-owned farm, making it easy to access the land by the government. Combined with the opportunity brought by the high-speed railway station, Guangming is considered as a strategic area for industrial upgrading in Shenzhen. Therefore, the new town construction is pushed by the municipality as well as the government of Guangming, so speed is an important factor. In this way, the precious land for development is undergoing fast urban expansion, which seems to be a paradox.

To facilitate fast construction, urban grid structure was introduced (see figure 7): the road network is built first and used as a way for land parcelling. Preparation of land before sale includes access to seven kinds of utilities and site levelling. Site levelling usually needs to change the topography and remove all vegetation. It is different from development mode before the new town scheme: industries were situated along main roads and around urban villages, usually in an unorganized way (see figure 6). These industries will be relocated to certain industrial parks or transformed as business parks according to the master plan.

Guangming claims itself to be a green city, but in many aspects it still adopts popular (but usually unsustainable) methods for new town development in China. First, the road network is primarily designed for motor vehicles (see figure 9, 10). Secondly, new residential areas are developed as expensive commercial housing by real estates (see figure 13) or social housing by Shenzhen municipality (see figure 12), both with privatized open spaces. For migrants who cannot afford commercial housing and have no right to live in social housing, the only option to live is urban villages (see figure 11). In this way, different classes of population will be segregated in different neighbourhoods. Thirdly, public green spaces are mostly separated from urban built-up area by roads with at least four lanes. Along main roads usually are artificial green spaces that no one is able to use (see figure14). In a hill park under construction, original vegetation is replaced by homogenous new comers (see figure 15). Isolated artificial green spaces, car-oriented road network and residential segregation seem to constitute the future picture of the new town. But a 'green city' is a concept the meaning of which can be broadened and has a lot of potentials to be improved during implementation.

Figure 8. Residental for high-end industry workers.

Figure 9. Bicycle-unfriendly roads.

Figure 10. Car-oriented wide roads.

Figure 11. Urban villages for migrant workers.

Figure 12. Social housing for relocation of villagers.

Figure 13. Commercial housing.

Figure 14. Green space along the main road which no one use.

Figure 15. An artifical park on a hill.

Figure 16. Public space in lack of maintainance.

2.2 New town development and top-down approaches

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 Communique of the Third Plenum of 18th CPC Central Committee. Within the ECL, no construction is permitted except for important infrastructure, utilities, tourist facilities and parks. Even for existing buildings, modification and reconstruction need permission from government.

The ECL includes important natural resources in Shenzhen, but it cannot guarantee that natural system in the urban area is respected and integrated into planning. So in the urban area of Guangming, most rivers and streams are narrowed and are irrelevant to the urban structure.

However, without consultation with local communities in the decision making process, the ECL has strongly influenced the livelihood of local residents. Most communities in the ECL stagnate as no factories or enterprises are able to move in, and many residents are suffering from unemployment (Liu, 2010). Infrastructure construction also stops due to the ECL line. In 2013, the ECL was modified according to the local demands (see figure 17), but still a lot of communities remain in the ECL. A study on how to develop (or relocate) those communities is going on, led by the Urban Planning Land and Resource Commission of Shenzhen.

But it is not true that nothing happens in the ECL now. From my observation, one big 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 ECL in Guangming destroys the natural skyline. There is also one 'greenway', i.e. cycling path, in the ECL, which is part of the regional green way. It has very good spatial quality, yet badly connected with other networks.

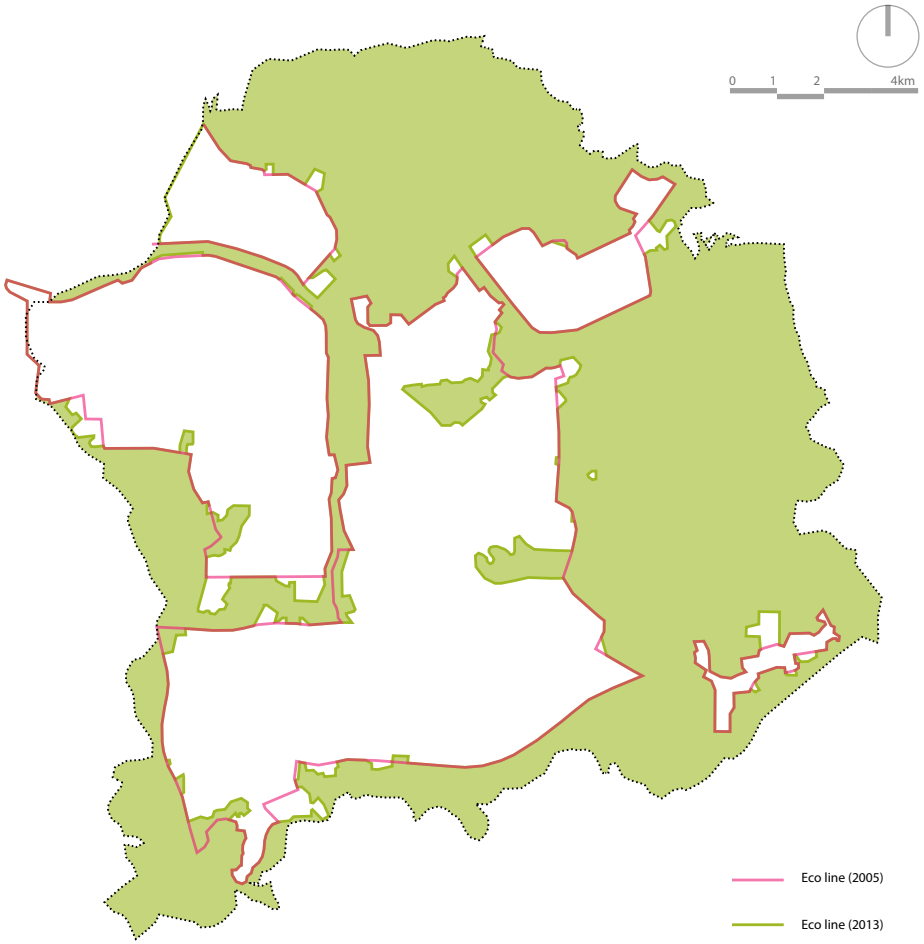


Figure 17. ECL in Guangming. Elaborated by author.

Figure 18. A highline that changes the natural skyline. ©Jiangnan Liu

Figure 19. Greenway (bicycle lane) in ECL.

Figure 20. Site leveling resulting in changed topography.

Figure 21. The dike for Gongming Reservoir. ©Jiangnan Liu

Figure 22. Theme restaurant in ECL.

Figure 23. Standardized and concentrated basic farmland.

Figure 24. The dike for Gongming Reservoir under construction.

Figure 25. Wasteyard.

Figure 26. Vacant basic farmland.

2.2 New town development and top-down approaches

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^2 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 (see figure 23, 26). Temporary buildings are removed, and people who live there beside 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 ECL, 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.

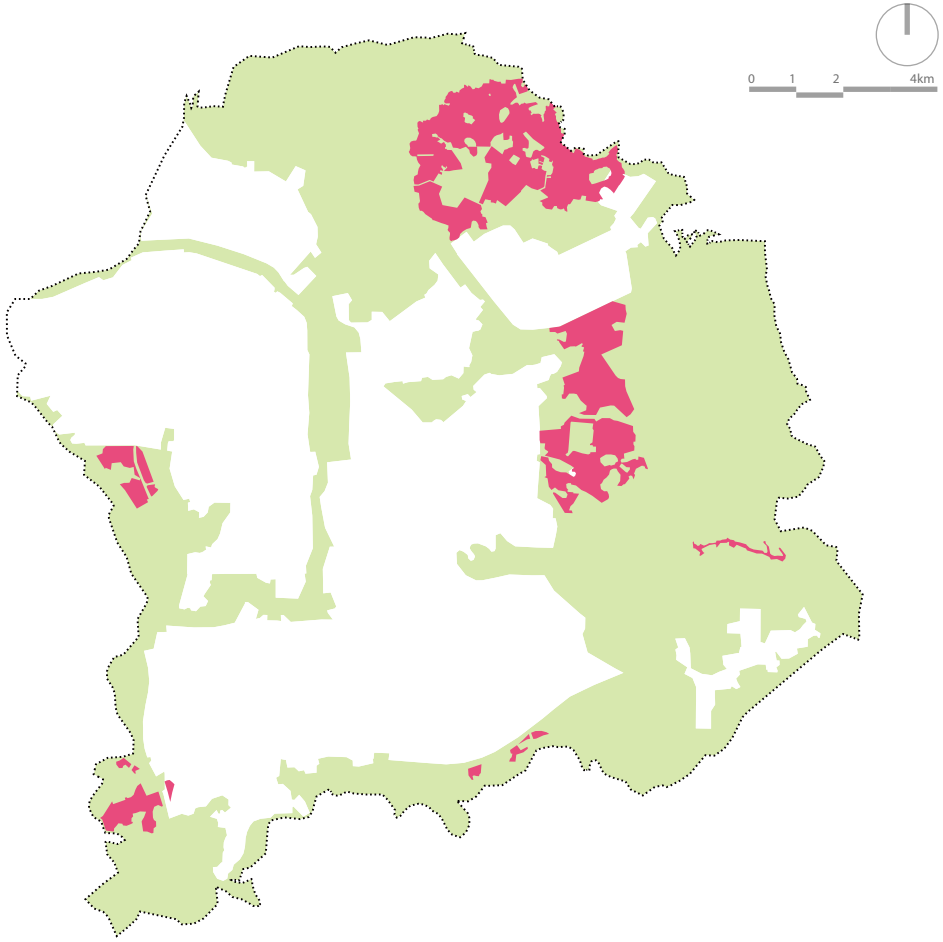


Figure 27. Basic farmland in Guangming. Elaborated by the author.

Water system

A big reservoir is under construction in the ECL, called Gongming Reservoir. It will be the biggest reservoir with an area of 6 km^2 and a volume of 148 km^2, aiming to secure water supply in Shenzhen. Dikes of more than 4 km are being built, with a height of more than 20 m (see figure 21). Shenzhen, although located in the Pearl River delta, water supply is always a problem. 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.

In the master plan, water ways mostly are narrowed and the banks are solidified in the urban realm. What's more, more than half of the fish ponds have been covered for farmland or urban construction (see figure 28, 31). Most fish ponds are located along rivers, being the lowest area of the surrounding, so they can be used as buffers during heavy rains. With construction of the new reservoir and existing reservoirs, it seems that intensive rains will not be a problem for Guangming. Yet 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).

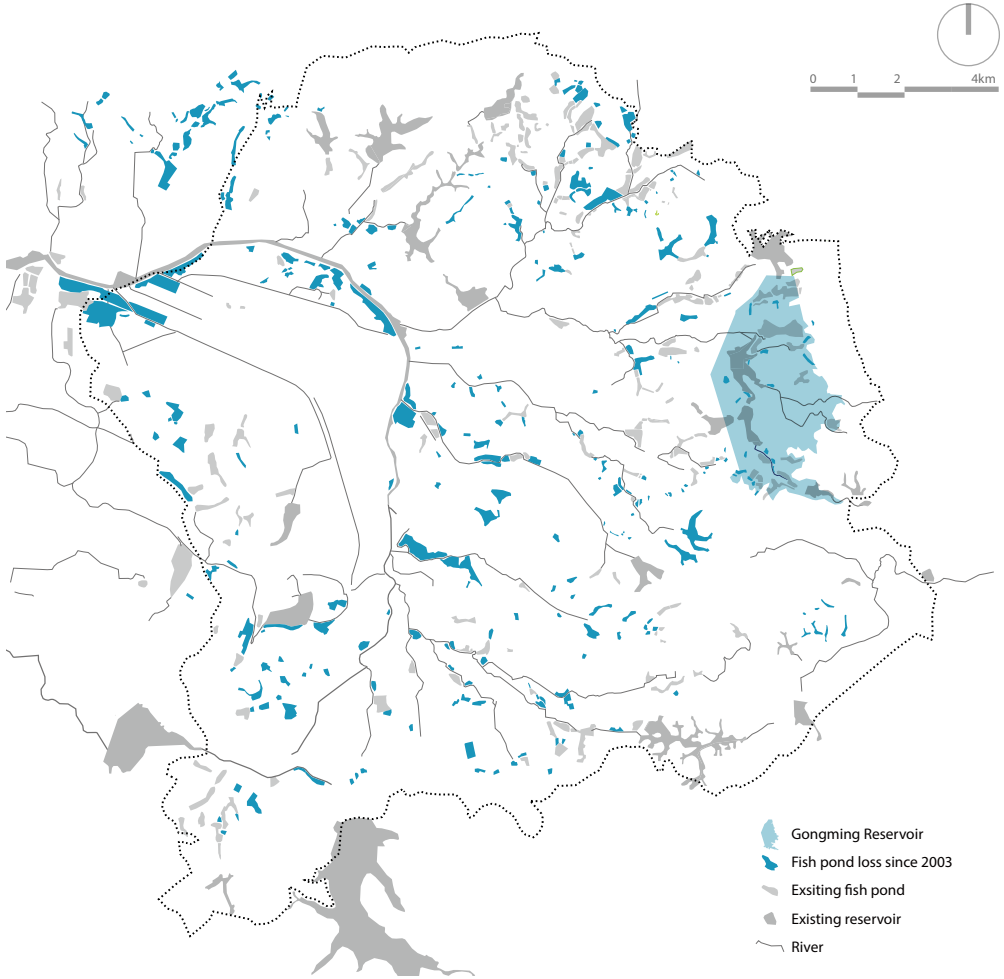


Figure 28. Changes of water system in the last decade.

Figure 29. Natural river banks.

Figure 30. River banks in new town.

Figure 31. A fisn pond that is gone. (On the board: the pond is deep. Swimming is forbidden.)

2.3 Observation: farming system

Spontaneous subsistence farming

Subsistence farming happens in various places, including vacant land in industrial area or after the construction of railway, some urban neighbourhoods, near or in the urban villages (see figure 32). It is usually farmed by residents around to grow vegetable for their own use. A farmland usually is divided into small plots (2-5m^2), which is taken care of by different households. So in one field, vegetable might be different from plot to plot, creating a quite pleasing landscape. This kind of farming indicates a demand of farming from local residents, as well as a potential to integrate agriculture into urban tissue.

Informal household farming

Informal household farming is usually cultivated by one household (often one couple) with an area of 1300 m^2 to 2000 m^2 (2 mu to 3 mu) (see figure 35, 39). The products usually are fish or vegetable, sometimes horticulture, and mostly are sold by themselves in Guangming (see figure 37). The revenue from farming highly depends on the weather and market price. It is not clear whether farming is the only source for households. 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 water and electricity supply (see figure 34). Some farmers have lost their farmland (or fish ponds) and were forced to leave or relocate themselves due to the urban development or consolidation of basic farmland, usually without compensation. Their farming is considered illegal by the government, making the farmers very vulnerable to urban development. As they are not under supervision, their farming activities may pollute water and soil.

Lessee household farming

The farming activities of lessee household farming are basically the same as informal household farming. The biggest difference is that farmers lease the land from companies. Farmers have contracts with companies, which usually last for one year. Companies provide facilities to protect vegetable from storms (see figure 38). Farmers also live in temporary houses, but the houses are supported by companies. Companies may also buy products from them, but farmers have freedom to sell their products to markets on their own. Small-scale household farming is a traditional type of farming in China. Despite its drawbacks, it accommodates rural migrants and provides affordable and localised food for cities.

Farming enterprises

In farming enterprises, farming activities are usually big-scale and standardized. 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 (see figure 40). Besides Guangming Group, more and more modernized farming enterprises move in after consolidation of basic farmland.

Guangming Group: With an area of 55km^2 and a history of more than 50 years, Guangming Group (former Guangming Farm) owns more than 7km^2 orchards (see figure 33), 20km^2 economic forests (see figure 36). 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, Guangming Group has been again under the administration of the Guangming government in order to facilitate new town development. For instance, some factories have been relocated for the new town development. Housings are built by the government as compensation for the former employees of Guangming Farm.

Figure 32. Spontaneous subsistence farming next to the high-speed railway.

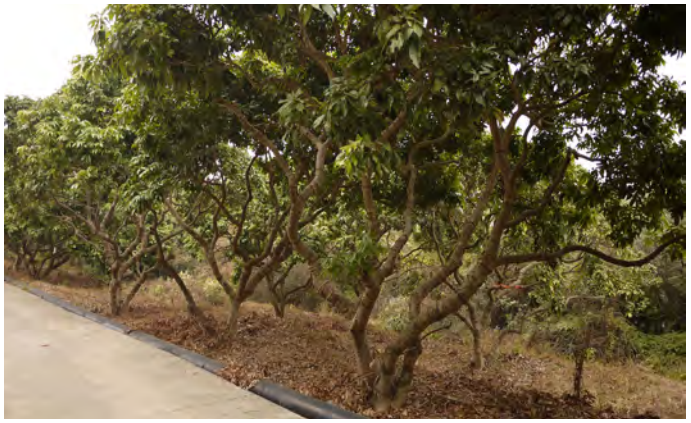


Figure 33. Lychee trees.

Figure 34. Temporary housing and an apartment building built by villagers.

Figure 35. Informal small-scale household farming.

Figure 36. Trees for urban greenery.

Figure 37. Informal open market.

Figure 38. Lessee household farming.

Figure 39. A fish pond that is recognized as illegal.

Figure 40. The building of Guangming Group.

3 PROBLEM STATEMENT

1. City-oriented development leads to fragmented countryside

An ECL established to protect the green spaces is a progress for planning, but in the ECL projects do not coordinate with each other, resulting in fragmented countryside. The stagnation of communities in the ECL is a joint effect of the ECL and basic farmland consolidation. The communities can no longer gain revenue from developing industries or spaces to develop their agriculture-based economy. Projects like the basic farmland consolidation, Gongming Reservoir and golf clubs locate in the ECL for their own reasons, mostly due to the demand of the urban system (see figure 41). They do not contribute to defining the picture of lifestyle in the countryside in Shenzhen. Instead, they are making landscape and vegetation in the ECL more monotonous, as well as the life of local residents. Besides, there is a huge imbalance between the development in the urban area and the countryside in terms of infrastructure, facilities and support from the government. To sum up, living in the countryside is not yet a desirable choice for people.

2. The local scale and ecosystems characteristics are missing in the new town development plan

The characteristics of the ecosystem does not reflect much in the master plan of Guangming or the shape of the ECL: the urban grid structure and site levelling change the topography; the waterways are narrowed; and the soil layer seems to be an irrelevant element for urban development; newly built parks and farmland do not consider the biodiversity, etc. Missing enough consideration of ecosystem might bring threats to the resilience of the city in long term.

Besides, the existing conditions and demands of local residents are generally not included in the development plan. The orientation of agriculture development is commercial, mega-scale and enterprise-oriented, which only benefits local people by offering a few jobs. On the other hand, the initiatives of local residents to farm are ignored. The rural background of most population in Guangming makes subsistence farming a common way for food production. However, in Guangming subsistence farming can only happen in an informal way.

The failure of including the local scale and ecosystem makes the new town development plan not a genuinely sustainable and 'green' plan.

3. The new town development plan is an end product rather than a process

The blueprint planning methods adopted by Guangming is not flexible enough to deal with the complexity and uncertainty of the new town development. It is a rigid plan, so if a certain kind of land use, for instance agriculture, is not included in the plan, then it is difficult to integrate them in the implementation (Mubvami et al., 2006). Besides, the current plan is based on given circumstances, but if the situations change, which always happens in China, the system can hardly adjust its structure to the new circumstances. In this case, a completely new comprehensive plan is needed, or otherwise it will lead to spatial fragmentation.

The time scale is a very important factor for the new town development, but also for sustainable development (Wiggering et al., 2003). The adaptation of natural and social conditions is usually not as fast as urban changes. But under the pressure of industrial upgrading and economic development, Guangming is being developed in a rate exceeding the paces of natural system and population. For instance, basic farmland consolidation in Guangming finished in three years. It took the land from farmers but left no time for farmers to have new livelihood or develop new skills.

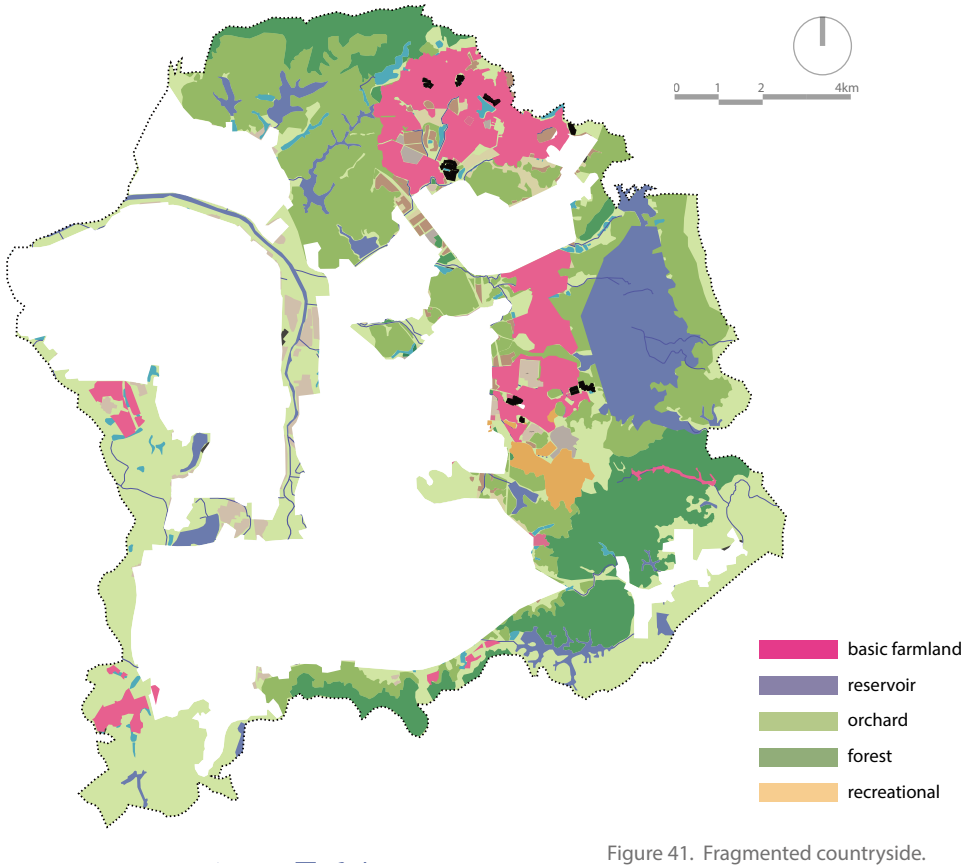


Figure 41. Fragmented countryside.

4 OPPORTUNITY

Guangming used to be an agriculture-based society. It used to have a harmonious relationship between the ecosystem and the society. But conflicts and problems come when urbanization and industrialization happened. Urbanization often excludes the development of agriculture from its scheme. But research has shown that multiple functions can also happen in the agricultural field, which indicates a great potential for agriculture to be part of the urban system. Table 1 shows the potential of urban and peri-urban agriculture (UPA) can perform to contribute to the economic, social and environmental sustainability of urban system.

Figure 42. Farmland as greenery for the street.

Dimensions		Potentials
Economic	Local economy	Employment in UA to reduce social inequity and poverty Supporting micro-enterprise providing services for agriculture
	opportunity	Productive use of vacant land Promoting a viable business model
Social	Food access, security	Affordable food for the urban poor Improving diet by provision of fresh and healthy food
	Interpersonal relationship	Social integration of disadvantaged groups and enhancing gender equity (UPA are mainly undertaken by women in some developing countries) Community development, social interaction, capacity building Provision of aesthetically pleasing landscape in and around cities
	Liveability & health	Involving city residents in growing and preparing food Open space for outdoor recreation and leisure Promoting awareness of food, health and the environment Encouraging physical activities by farming
Environmental	Resilience	Increase cities' adaptation to climate change providing natural buffer against natural disasters Water infiltration for flood control and groundwater replenishment Urban micro-climate moderation (greening, air and heat) Urban biodiversity
	Low-carbon	Urban waste recycling Production of local food to reduce food miles
	Management	More efficient management of open space

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

5 PROJECT AIM

With the recognition of the problems and potentials in Guangming, the aim of the project, therefore, is **to formulate a flexible planning framework where agriculture can be integrated in the new town scheme so as to achieve more sustainable development of the new town and countryside in Guangming**. Here, sustainability refers to in the long term resilience against changes and in the short term liveability for local communities.

6 RESEARCH QUESTION

How can agriculture be integrated and utilized in the planning system to balance the development of city and countryside and achieve more resilient and liveable urban environment in the urban expansion process of Guangming, Shenzhen?

Sub questions:

1. In which way can urban and peri-urban agriculture contribute to the urban development in Guangming? What kind of farming system is suitable and sustainable in Guangming?

2. What kind of planning principles can be utilized to make existing planning approaches in Shenzhen more flexible and inclusive?

3. What kind of design principles can contribute to the resilience of Guangming new town?

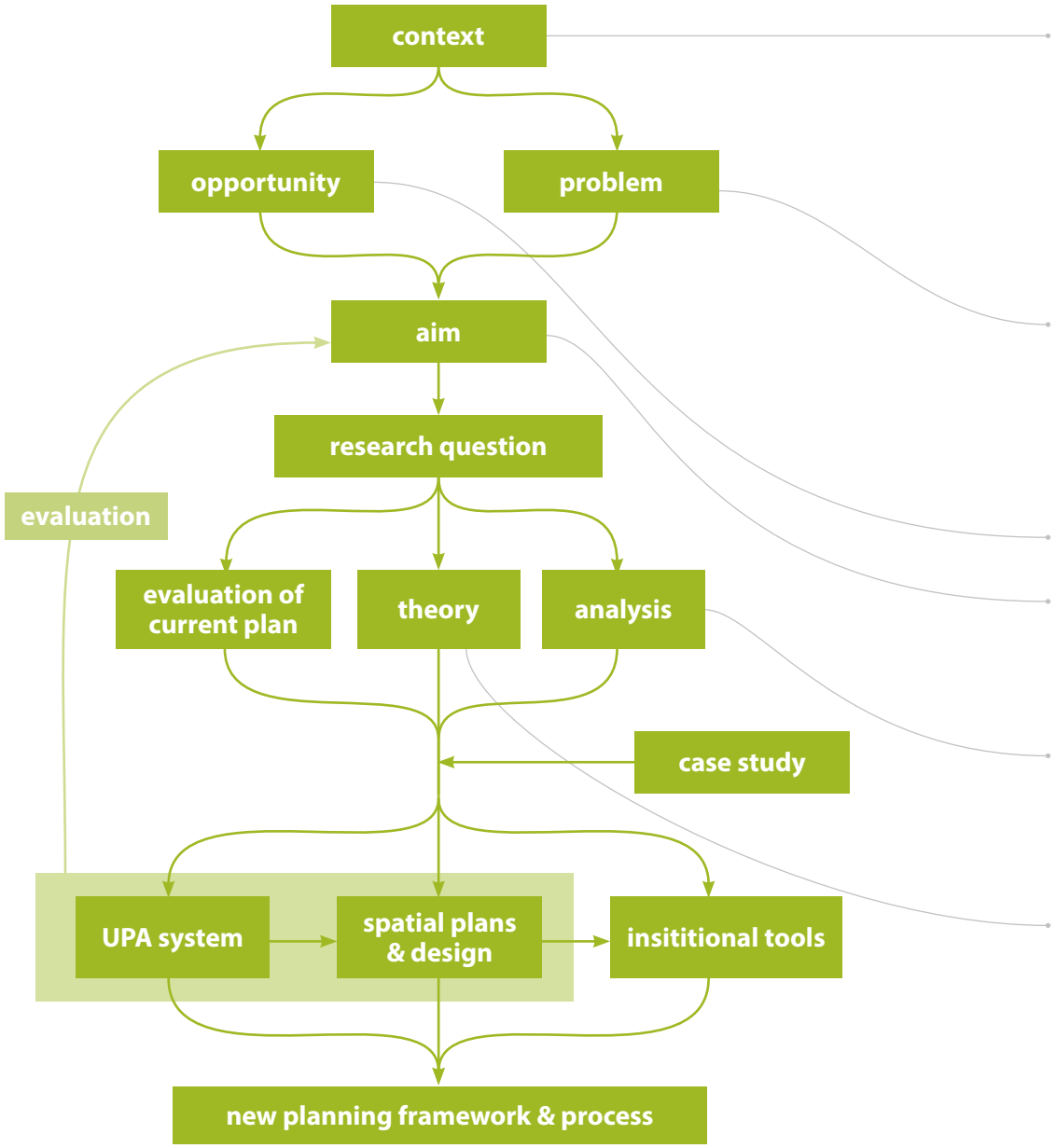
4. How to sustain the development of peri-urban communities in the ECL?

7 METHODOLOGY

problem statement

analysis

end products



Context
- urbanization in China
- land shortage in Shenzhen
- Guangming blueprint evaluation
- the Ecology Control Line
- basic farmland policy
- water system
- history of Guangming

problem definition
- City-oriented development leads to fragmented countryside
- The local scale and ecosystems characteristics are missing in the new town development plan
- The new town development plan is an end product rather than a process

opportunity
- Multifunctionality of urban and peri-urban agriculture

aim
- to formulate a flexible planning framework where agriculture can be integrated in the new town scheme so as to achieve more sustainable development of the new town and countryside in Guangming.

analysis
- urban structure (mapping, layer approach)
- ecosystem (mapping, layer approach)
- stakeholder (inteview, newspapers, reports, literatures)
- institutional structure (newspapers, reports, literatures)

theory
- urban and peri-urban agriculture
- sustainable urban development (Resilience, liveability)
- flexible planning framework for urban expansion

8 RELEVANCE

Societal relevance

The failure of considering the local scale and ecological layer, fragmented interventions in countryside and lack of flexibility are the main problems of the current plan of Guangming, which is not unique only to Guangming or Shenzhen. In the process of new town development in many countries, the local conditions are often overlooked, which also leads to conflicts and loss of locality. By including agriculture in the new town scheme, the approach of new town development can be more integrative. The project intends to integrate the demands of existing and potential local residents and the ecological characteristics in the long-range comprehensive plan of Guangming, which can be a case study on how a new planning framework can facilitate a more liveable and resilient new town.

Scientific relevance

UPA is a permanent part of the urban system (van Veenhuizen and FAO, 2007), and has a lot of potential to benefit urban environment. However, at present urban and peri-urban agriculture (UPA) is not considered as an urban land use in China or many other developing countries, which leave little space for UPA to benefit the urban system. Therefore, more studies are needed to be done so as to understand the performance and importance of UPA, especially in the urban expansion process, to facilitate sustainble urban expansion. So in my project, possibilities of design, planning framework and process will be explored in the graduation project to testify whether and to which extend UPA can contribute to sustainable urban expansion.

9 INTENTED END PRODUCTS

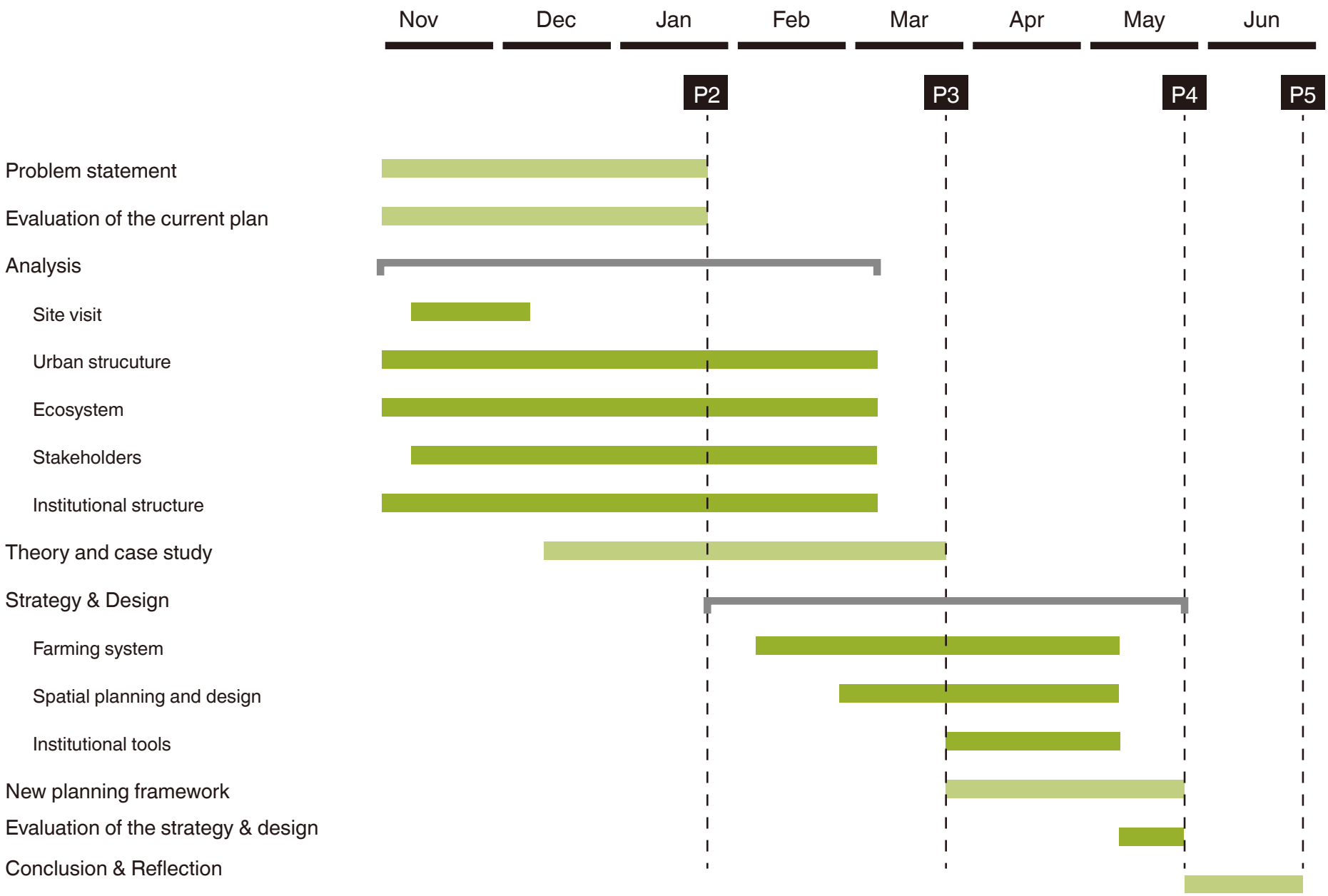
UPA Farming systems of Guangming by defining the types of activities and functions of agriculture land that are suitable and contribute to the sustainability of the new town, as well as their possible locations and supporting facilities.

Spatial design and planning which is a testing ground for spatial integration of agriculture

Institutional tools that facilitate the integration of agriculture, within the frameworks for urban-rural planning and land planning in China

A new planning framework and process which includes agriculture in the urban expansion.

10 TIME SCHEDULE



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THEORY PAPER

SUSTAINABLE CITY BY FARMING

A Review of Urban and Peri-Urban Agriculture as a tool to achieve Sustainable Development

Abstract In the last decade, there is a growing trend to consider urban and peri-urban agriculture (UPA) as part of the urban system, as well as a way to achieve a more sustainable future for cities. This paper reviews research on the role and potentials of UPA through the lens of sustainable development, focusing on how UPA can contribute to the sustainability of cities. Being part of the systems like food, city and countryside, UPA should strengthen the sustainability of these systems and also play a role in connecting and synergizing these systems. The characteristics and analysis approaches of UPA are described in the paper, which reveal great opportunities for UPA to support sustainability due to its diversity and multifunctionality. In the last part the paper, design and planning approaches for UPA are introduced to show how the potentials of UPA can be used and connected with urban development in practices. The review takes an international perspective, including academic discussion regarding both developing and developed countries.

Key words urban and peri-urban agriculture, sustainable development, food system, multifunctional agriculture

1 Introduction

Urban and peri-urban agriculture (UPA) is gaining increasing importance in both developed and developing countries. Diverse potentials of UPA are recognized to contribute to more sustainable cities. The paper intends to review the role of UPA in the framework of sustainable development, and its potentials to be used as a tool for sustainability.

The literature review provides a comprehensive overview of the existing academic discussion on using UPA as a tool to achieve sustainability. As UPA is part of urban, rural and food system, it should contribute to the sustainability of these systems, as well as synergize them. Therefore, sustainability in terms of city, countryside and food supply chain will be discussed to position UPA in the sustainable development. The second part of the paper will characterize and classify UPA to understand its value and potential outputs. Multiple design and planning approaches will also be explored to show how to integrate UPA in urban design and planning practices. The review tries to include perspectives from both developing and developed countries and at the same time recognize the differences of the contexts.

2 Sustainable development and UPA

2.1 Emerging trends: synergizing UPA and cities

With the growth of cities and technological progress in the last century, cities seem to successfully disassociate themselves from agriculture: countryside is committed to food production while cities are places where non-agricultural activities concentrate (Salle and Holland, 2010). However, there is a growing concern on integrating agriculture into urban development since the start of the 21st century.

Food production that is detached from cities, its major markets, is no longer considered sustainable. One reason is that it increases greenhouse gas emission by long-distance transport and ignorance of seasonality, which calls for localisation of food production (Steel, 2008). The decreasing quality of food and unhealthy diets in developed countries also raise the needs for fresh food and food-related experience in or around cities (Salle and Holland, 2010, Steel, 2008), while in developing countries, food security becomes an issue for many metropolises (Pearson et al., 2010). The issues above cause demands for changes of food production in peri-urban and urban area and better connection between UPA and cities.

On the other hand, the environmental and social values of UPA to improve urban environment are gaining importance. As cities grow into bigger, matters like resilience, flexibilities and negative effects of built environment arise, which brings high attention to ecology of cities. As part of the city ecosystem, UPA can contribute in many ways (Pearson et al., 2010). Additionally, the potential of UPA on recreation and leisure for local communities is also gaining importance due to the rise of the post-fordist society (Zasada, 2011).

To conclude, the needs for more sustainable food system in and around cities, together with the problems and demands from cities, create forces to evolve closer relationship between UPA and cities. It first requires knowledge and understanding on what sustainability means from the perspectives of urban system and food system.

2.2 UPA in the framework of sustainability

Strengthening links between UPA and cities is not a useful aim in itself, unless it is put within the framework of sustainable development to evaluate its outputs.

The concept of sustainable development is evolved by various global issues today, like 'social issues, economic concerns, resource allocation, environmental damage, population growth, access to potable water, health and energy usage' (Roosa, 2008), etc. The definition and implementation of sustainable development may be very complex, but the basic idea is indisputable: 'to orientate economic action and social balancing endeavours towards the conservation of functions of ecological systems' (Wiggering et al., 2003). It implicates three dimensions: environment, social and economic, which can be paraphrased as "Profit (or Prosperity), People, Planet". As agriculture highly depends on natural conditions and is able to generate economic and social value, it has great potentials to articulate the three sustainable dimensions.

Agriculture is traditionally considered to be part of the rural sector, specialized in food production. The emerging trend of synergizing agriculture and urban development implies a closer relationship between urban, rural and also food system. Sustainability in terms of the three systems will be explored below.

2.3 Sustainable urban development

Cities seem to play a decisive role in leading the world towards sustainability (Mega, 2010). They occupy only a small portion of the ground but exert their influence to a much bigger scale and highly concentrate resource, activities and people. From a natural resource perspective, sustainable cities could be defined as 'the cities which do not cause the consumption of renewable resources at a rate higher than their regenerative capacity and contribute to the replacement of non-renewable resources, particularly through savings, research and innovation' (Mega, 2010). But in order to achieving the environmental goal require improved performance of the other two dimensions: social and economic sustainability.

However, it is difficult to give a generalized picture of sustainable urban development, as the different contexts of different countries and regions localise the meaning of sustainability and diversify issues and challenges, which also For instance, in most European cities, urban stagnation is the main problem at present due to the crisis, enhancing economic competitiveness and restructuring existing city is the main challenge. In Africa, key issues are survival and lack of opportunities (Veenhuizen and FAO, 2007), while in Asia, managing rapid urban growth is one of the biggest challenges. As the development of UPA highly depends on its connections with urban social, economic, political, ecological and spatial system (Veenhuizen and FAO, 2007), the diverse urban conditions make the performance of UPA very different between countries and regions.

2.4 Sustainable food supply chain

The food supply chain includes aspects from production of the food, processing, transportation and storage, distribution, consumer purchase, consumer use, and waste recovery (Baldwin, 2009, Salle and Holland, 2010). The unsustainability of current food supply lies in worldwide imbalanced nutrition and 'overreliance on inputs for food production' (Baldwin, 2009) which contribute to greenhouse gas emissions and energy and water consumption. Sustainability of food supply chain should include considerations on energy, waste, water, air, climate, biodiversity, food quality, food quantity, food price, food safety, employment, and employee welfare (Veenhuizen and FAO, 2007).

The design of the food supply chain has great influence on performance of food production, since primarily through its products agriculture land is linked to cities. One example is the models of supply chain organisation summarized by Schans (2013). In the Fordism model, outputs need to be standardised for efficiency and so do inputs, which requires standardisation of farming activities as well. The Toyotism model, i.e. making diversified products out of standardised inputs, upgraded Fordism model to 'a more consumer-friendly version', but it does not influence the production end of the supply chain. Recently, driven by the awareness on sustainable food production, raw material is differentiated by the level of quality or sustainability, which may encourage improvement of local environment and communities.

The recent change of food supply chain indicates opportunities for more sustainable agricultural products. To assess sustainability of a product, the entire lifecycle should be taken into account for calculating consumption of non-renewable energy and greenhouse gas emission (Viljoen et al., 2005) Based on this understanding, environmental friendly agriculture products should be organic, seasonal and localised (Viljoen et al., 2005, Vermeulen, 2013).

Schans (2013) distinguishes two potential visions for future sustainable food production: the 'agri-industrial' and the 'integrated and territorial' approaches. The aim of the scenario is both to transform a linear production model to a circular system in which waste can be reused. The agri-industrial perspective, based on a closed system philosophy, tend to be more effective in terms of food production by using technology to limit negative natural influences. The territorial integrative perspective is based on an open system philosophy, in which more interaction between food production and wider environment is allowed or encouraged, thus it is more likely to deal with external changes and serve many functions simultaneously like recreation and environmental services. The two scenarios are not contradictory. The agri-industrial approach can also benefits surrounding environment and provide better urban experience by incorporating more interactions with nature and society. It suggests that multifunctionality is very likely to play a crucial role in achieving sustainability in food production, which will be addressed below.

2.5 Sustainable countryside

Securing food supply used to be and still is the dominate function of countryside. But being periphery of cities, rural area is losing its attractiveness, making the food system vulnerable. In many developing countries, rural immigrants flow into cities, resulting in problems like urban poverty.

Based on these concerns, many researches have shown their acknowledgement to broadening functions of agriculture beyond food production, and seen it as a strategic means towards a sustainable future of agriculture and rural development (Renting et al., 2009, Wiggering et al., 2003, Zasada, 2011, Torreggiani et al., 2012, Salle and Holland, 2010, Veenhuizen and FAO, 2007). Multifunctional agriculture should be seen as part of sustainable rural development, which should 'redefines nature by re-emphasizing food production and agro-ecology and it reasserts the socio-environmental role of agriculture as a major agent in sustaining rural economies and cultures'(Marsden and Sonnino, 2008). Reconnecting agriculture production to wider society and markets requires integrative approaches, of which UPA should play a key role due to its proximity to cities.

3 Characterization of sustainable UPA

3.1 UPA-city Relationships

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

Urban system is highly dynamic compared with rural system, which has a strong influence on the development of UPA (Veenhuizen and FAO, 2007). Urban development provides economic opportunities for the agriculture producers in peri-urban area, while farmland loss due to urban sprawl, increasing land price and relatively high income from urban sectors become challenges to sustain UPA in and around city. As a respond to urban dynamic, UPA can be used for sustainable urban development by broadening its output.

Mega (2010) listed synergies and conflicts between city and UPA in the dimensions of environment, society and economy, and suggested that the degree of synergy and conflict between UPA and city in the long term determines the sustainability of UPA. Supply-demand relationship between agriculture and city overviewed by Vermeulen (2013), points out the opportunities for synergy and integration.

However, current policies often treat UPA as a conflicting land use of urban development, instead of part of the urban system (Pearson et al., 2010). To better understand the UPA-city relationship, Pearson et al. (2010) proposed three elements: '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'. The distinction can give a framework for analysis and interventions and find out missing knowledge in enhancing UPA-city relationship.

The synergy between UPA with urban development is the most importance aspect for achieving sustainability of UPA.Veenhuizen and FAO (2007) summarized sustainability indicators in UPA studies, which include: productivity, land security, protection of environment and people, economic viability, social and political acceptability, and ability to form cooperatives, which means that UPA 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 gaining more social and political acceptability".

3.2 Potential of UPA

With its close relation with urban system, UPA has potentials to contribute to urban systems in many ways. Table 1 shows potentials categorized into economic, social and environmental dimensions, based on Graaf (2013), Zasada (2011), Pearson et al. (2010), Veenhuizen and FAO (2007), Mubvami et al. (2006).

It should be recognized that the actual roles that UPA can or should perform in a given area to a great extent depend on the context. For instance, UPA serves different purposes in developing and developed countries. In developing world, UPA 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).

3.3 Analysis and classification of UPA

There are a large variety of farming systems in urban and peri-urban area. Many studies tried to classify these farming systems, using single or multiple criteria, mostly based on their own study approaches. The main criteria include location, main products, degree of market-orientation, scale and intensity of production, people involved, etc. Table 2 shows the possible categories for some commonly-used criteria.

criteria	types
location	Intra-urban, peri-urban; In the homestead, away from the residence; Private land, semi-public land, public land.
main products	Types of crops or animals; Mixed, specialized.
degree of market-orientation	Subsidence, commercial.
scale of production	Macro, meso, micro.
intensity of production	Energy, knowledge, labour, capital-intensive (extensive);
Relation with surroundings	Controlled, self-organization; Forest gardening, soil-based cultivation, hydroponics, aquaponics; Soil bounded, building integrated
People involved	Income: low, mid, high Rural immigrants, rural farmers, urban residents

Table 2. Summary of single criteria for classifying farming system. Based on Pearson et al. (2010), Veenhuizen and FAO (2007), Graaf (2013), Veenhuizen (2006)

Dimensions		Potentials
Economic	Local economy	Employment in UA to reduce social inequity and poverty Supporting micro-enterprise providing services for agriculture
	opportunity	Productive use of vacant land Promoting a viable business model
Social	Food access, security	Affordable food for the urban poor Improving diet by provision of fresh and healthy food
	Interpersonal relationship	Social integration of disadvantaged groups and enhancing gender equity (UPA are mainly undertaken by women in some developing countries) Community development, social interaction, capacity building Provision of aesthetically pleasing landscape in and around cities
	Liveability & health	Involving city residents in growing and preparing food Open space for outdoor recreation and leisure Promoting awareness of food, health and the environment Encouraging physical activities by farming
Environmental	Resilience	Increase cities' adaptation to climate change providing natural buffer against natural disasters Water infiltration for flood control and groundwater replenishment Urban micro-climate moderation (greening, air and heat) Urban biodiversity
	Low-carbon	Urban waste recycling Production of local food to reduce food miles
	Management	More efficient management of open space

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

Some criteria are interrelated with others. For instance, according to the proximity to cities, UPA can be subdivided in intra-urban and peri-urban agriculture. Intra-urban agriculture takes place in the inner city and tends to be more small-scale and more subsistence-oriented. Agriculture in the peri-urban area is strongly influenced by the dynamic of urban fringe, including population change, increasing land price and new types of land use. On average, the peri-urban farms is larger in size and more market-oriented than the intra-urban ones (Veenhuizen and FAO, 2007).

Due to the interrelationship between criteria, different farming systems can be identified according to a combination of criteria. Based on different studies on topologies of UPA, Moustie and Danso (2006) summarized four main types of UPA: subsistence home intra-urban farmers; family-type (semi-) commercial farmers (intra- and peri-urban); intra and peri-urban agriculture entrepreneurs; multi-cropping peri-urban farmers. Another type of UPA distinguished by Smit and Bailkey (2006) is community-based UPA.

However, it is acknowledged by many authors that the whole picture of farming in urban and peri-urban area cannot be captured by analysis of farming system, which can be dated back to 1970s, as non-agricultural activities and linkage with wider urban system are not included (Veenhuizen and FAO, 2007). New approaches appeared in recent years to understand the dynamic of urban farms.

The sustainable livelihoods approach by Farrington and Carney (1999) focus on local people and local dynamic, by analysing major livelihood assets, strategies they apply, strength, opportunities and constraints of households, etc. The approach, as well as other actor-oriented approaches, is strong in understanding human decision-making process, and able to address synergies of agriculture and non-agriculture activities, which is quite helpful within the concept of multifunctional agriculture(Renting et al., 2009).

Food system analysis, as mentioned above, can also contribute to characterising the food production system. By assessing and discussing all processes related to food, food system analysis discusses and formulates the relationship between food and urban environmental, social and economic system, so that a certain types of UPA can be developed to enhance the sustainable food system (Veenhuizen and FAO, 2007).

From the perspectives of policy purposes, UPA can be classified as market-oriented, social-oriented and environment-oriented (Cabannes, 2004). The framework helps directly to policy makers and local authorities to develop strategies out of their concerns and orientate their interventions accordingly. For instance, Bohn and Viljoen (2013) suggested that the commercial-scale production should contribute more to food security, while personalised production is more relevant to social issues.

4 Designing sustainable UPA

UPA is a relatively new urban issue, and demands the development of multidisciplinary and integrated approaches to deal with both urban and rural sectors. This chapter discusses spatially related design and planning approaches that can be applied to UPA and contribute to its sustainability.

4.1 Multifunctionality

Multifunctionality is an important concept for sustainable UPA. Potentials mentioned above indicate the possibility of functions UPA can accommodates. Co-existence of multiple functions in one area implies that synergies and integration of conflicting situations is the crucial problem for multifunctional agriculture (Brandt and Vejre, 2004)

Multifunctional agriculture is proposed for different concerns in the notions of different organizations and regions, so there are also various approaches and application. Renting et al. (2009) classified four conceptual approaches to multifunctional agriculture: market regulation, land-use, actor-oriented and public regulation. The authors also pointed out that land-use approach, which is frequently used for urbanists and landscape designers, is strong in addressing spatial issues and territorial level in the analyses. But limitations of the land-use approach are missing multifunctionality at the farm level and insufficient concern for social and decision making processes. The authors suggested that no single discipline can fully deal with the complexity of multifunctional agriculture, and therefore integrated and interdisciplinary approaches are needed.

UPA multifunctionality can be achieved by diversifying products and activities of farms, tourism development schemes, development of open space network, integrated rural development projects (Purple), etc. But different instruments might have conflicts and lead to confusion if they are not work within an integrated framework. Therefore, it is essential to distinguish different scales of multifunctionality (Viljoen et al., 2005) to deal with the complexity.

Viljoen et al. (2005) identified four scales that are interrelated and important to understand multifunctional agriculture: farm, rural community, regional and national levels. Due to different decision making process and actors involved, multifunctional agriculture has different emphasis in each scale. The direct expression of agricultural multifunctionality lies in the farm level. Having multiple functions in a farm can increase the economic income and deliver public good as well. Multifunctionality of rural-community level helps the area to attract external consumers and thus develop tourism economy, and the issue of landscape and environmental protection should also be addressed at this level. Social and economic issues like food supply chain, population flow, cultural and educational environment and economic opportunities are important at the regional level. Policies and ideas on national levels should be able to translate to local actions via community and regional levels.

4.2 CPUL: continuous productive urban landscape

The concept of continuous productive urban landscape (CPUL) is first mentioned by Viljoen et al. (2005), intending to reconnect cities to food system to prevent scarcity in European city development from a spatial design perspective. 'Productive' includes economic, social-cultural and environmental aspects, in the framework of which food production in the urban and peri-urban area is integrated in urban landscape network to benefit the urban realm.

A CPUL is city-wide open space network, connecting intra-city open spaces to the surrounding rural area. The key features of CPULs include 'outdoor spaces for food growing, shared leisure and commerce, natural habitats, non-vehicular circulation routes and ecological corridors' (Bohn and Viljoen, 2013).

The concept of CPUL suggests that urban agriculture is more than dispersed spots in the neighborhood, 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). For contemporary open urban spaces, bringing in urban agriculture can richen activities and experience, and enhance the influence of open spaces on shaping more sustainable local lifestyle.

On one hand, agriculture is embraced in the urban realm, while on the other hand, UPA 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.

4.3 Land use planning and policy

Urban farming requires urban space. Provision of land is a key issue for spatial planning and policy to facilitate agriculture in urban area and its surroundings. 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.

The implementation of land provision is highly constrained by development level and institutional structures like land policy and urban planning systems. In the developed society, UPA is used as part of the food system to improve existing urban realm, and many practices

happen in the intra-urban area in a bottom-up way at the community level. The bottom-up movement, in the Netherlands for example, often encounter planning restrictions. Vermeulen (2013) suggested a more supportive frameworks by the local government to encourage local initiatives. Hagan (2005) also argued that top-down approaches are needed to free up lands for agriculture.

On the other hand, in developing countries, cities grow rapidly, and long-range comprehensive planning based on blue-print approach is often used to guide the rapid urbanization. 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). Therefore, accepting agriculture as official urban land use is the key issue. Planning instruments like zoning, master plans, local plans, site plans should include UPA and recognize it as part of the development strategy, so that the urban form and functions can also respond to the needs of UPA. Policy and regulations are also required to enable access to the land and guaranteeing rights for farmer.

For policy makers and planners, in both developing and developed countries, food production should be put in a strategic position and be included in all relevant administrative sectors, in order to maximize its benefits. Besides, as the integration of agriculture in planning is relevant to different levels and types of authorities, multi-stakeholder approach is needed to integrate agriculture into planning systems, within which Urban planners should play a leading role in coordinating conflicting demands and facilitating conversation and cooperation (Mubvami et al., 2006).

5 Conclusions

The review of using UPA as a tool to achieve sustainable development demonstrates the importance of regarding UPA as part of the urban system, from where the contribution of UPA can be maximized for sustainability. Therefore, synergizing UPA and city development should be put in a priority in both academic study and policy making concerning UPA. Diversity and multifunctionality of UPA mentioned above shows potentials and dimensions of strengthening UPA-city relationship, which should be utilized innovatively and more relevant to urban development. Besides, in order to coordinate different systems, integrative and multi-stakeholder approaches are necessary for developing sustainable strategies on UPA.

One thing to point out is that the division of developing and developed society is quite rough and the conclusions might not be suitable for one particular location. The aim of clustering is to show the different potentials of UPA in different contexts and the importance of recognizing local conditions.

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GRADUATION PLAN

Personal information	
Name	Jiayao Liu
Student number	4250281
Address	Feldmannweg 98
Postal code	2628kw
Place of residence	Delft
Telephone number	06-49992817
E-mail address	ljyaooooo@gmail.com
Studio	
Theme	Complex Cities
Teachers	Vincent Nadin, Diego Sepulveda, Steffen Nijhuis
Argumentation of choice of the studio	The project is based on the studio's understanding on the complexity of interaction and conflicts between regional networks and local conditions, and tries to formulate a planning framework that can coordinate the demands of different scales spatially and functionally in one specific area.
Theme	
Teachers	
Title	
Title of the graduation project	Farming Guangming: Utilizing urban agriculture as a tool to achieve sustainable development in Guangming, Shenzhen

Product

Problem Statement

The problems of new town development includes city-oriented development which results in a fragmented countryside, missing consideration for ecosystem features and the local demands, and blueprint approaches in lack of flexibility.

Goal

The aim of the graduation project will be to formulate a flexible planning framework where agriculture can be integrated in the new town scheme so as to achieve more sustainable development of the new town and countryside in Guangming.

Process

Method description

1. Analysis on urban structure, ecosystem, stakeholders and institutional structure, using the layer approach, multi-scalar analysis

2. Case study on both developing and developed countries on urban and peri-urban agriculture

Literature and general practical preference

Literatures mainly include theory on urban and peri-urban agriculture, sustainable urban development (Resilience, liveability), and flexible development framework

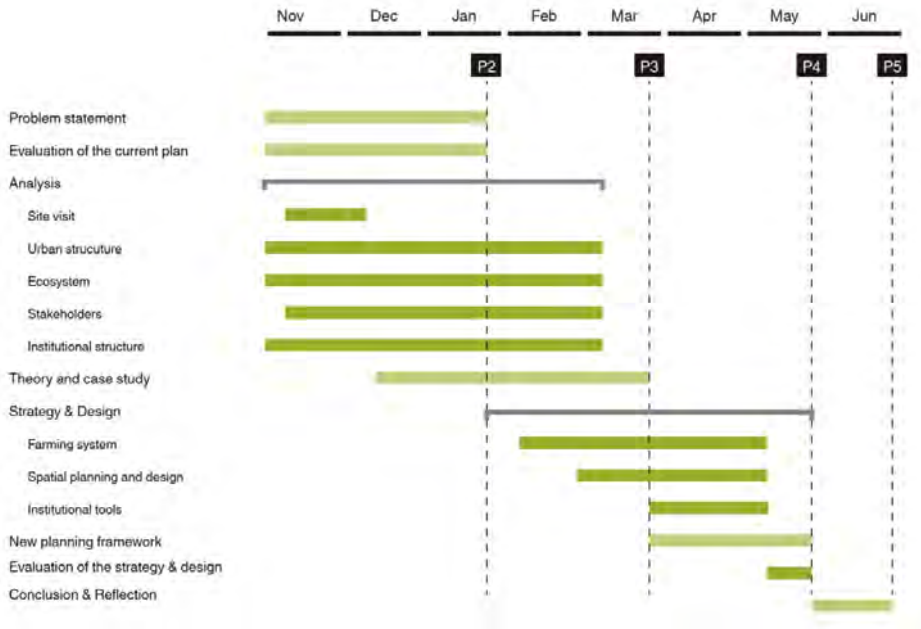
Reflection

Relevance

Societal relevance: The project intends to integrate the demands of existing and potential local residents and the ecological characteristics in the long-range comprehensive plan of Guangming, to facilitate a more liveable and resilient new town.

Scientific relevance: Urban and peri-urban agriculture has the potential to be used as a strategic approach to achieve sustainability during rapid urban expansion and rebuild the relationship between urban and rural sectors in China, which is not yet recognized in the urban planning system.

Time planning



Attention

With regard to the graduation we strongly advise you to select two mentors from Urbanism from different chairs at least one from a design section.

This should be taken into account when writing the Learning plan / personal graduation contract, in the time planning as well as in the relation to the content (e.g. statement, method and /or relevance).

PRELIMINARY DESIGN STRATEGY

UPA SYSTEM

Base on the need of urban residents, rural migrants, and food supply for Shenzhen city, three main types of farming system are identified:

Micro-scale farming

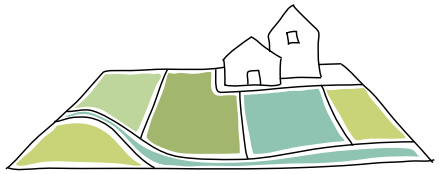
Location: near neighborhoods or public facilities like schools, hospitals

Products: vegetable, fruit, herb

Degree of market-orientation: subsisdence

Farmers: urban residents

Purpose: community building, subsistence farming, education, health



Meso-scale farming

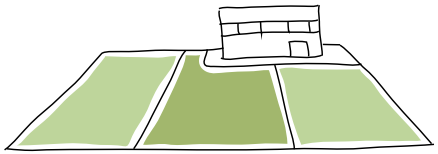
Location: public parks, around communities in the ECL

Products: animals (fish/chicken/pig/bee), vegetable, processed food, fruit, herb

Degree of market orientation: both subsisdence and commercial

Farmers: professional farmers, rural communities, rural migrants

Purpose: biodiversity, organic food, health, aesthetic landscape, livelihood for rural migrants / rural communities, tourism



Macro-scale farming

Location: in the ECL, away from rural communities

Products: (standardized/organic) vegetable

Degree of market orientation: commercial

Farmers: professional farmers

Purpose: supply fresh food for Guangming and Shenzhen, aesthetic landscape

SPATIAL DESIGN AND PLANNING

In the urban area:

In the urban area, the purpose of agriculture and open spaces is to enhance to urban environment and resilience of the city.

Open space corridors are proposed according to the existing water system and urban structure. Along waterways, the open spaces can perform as a buffer zone for flooding, and are suitable for agriculture production as well.

Small-scale farming can happen in neighborhood parks, around public facilities like schools and hostipal or on the edge of the ECL, so as to provide open space and food production area for local neighborhoods.

In the ECL:

Agriculture in ECL should be designed to enhance the livelihood of the rural communities and also restore the natural landscape and environment.

Currently around rural communities is the basic farmland where local communities cannot work. I propose the basic farmland around the rural communities should be freed in order to develop territorial integrative agriculture by local residents. The area can help local residents to develop their own agriculture-based economy, and also be integrated as part of the urban system as it is well connected with the urban tissue.